STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT
No. GWB 18-06(P)

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840

TRANSCRIPT OF PROCEEDINGS

Volume 1

BE IT REMEMBERED that on the 24th day of September, 2018, this matter came on for hearing before FELICIA ORTH, Hearing Officer, at the Ralph Edwards Auditorium in Truth or Consequences, New Mexico, at the hour of 9:06 a.m.

A P P E A R A N C E S

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I N D E X

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I N D E X (Continued)

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E X H I B I T S

ADMITTED

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E X H I B I T S (Continued)

ADMITTED

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E X H I B I T S (Continued)

ADMITTED

E X H I B I T S (Continued)
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NEW MEXICO COPPER CORPORATION (Continued):

E X H I B I T S (Continued)
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NEW MEXICO COPPER CORPORATION (Continued):

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NEW MEXICO COPPER CORPORATION (Continued):

MS. ORTH: Good morning.
My name is Felicia Orth. I'm a Hearing Officer appointed by the New Mexico Environment Department to conduct a hearing in the matter of Discharge Permit 1840.
This is a Discharge Permit applied for by the New Mexico Copper Corporation for the proposed Copper Flat Mine. It was docketed by the hearing clerk as GWB 18-06(P).
UNIDENTIFIED SPEAKER: You'll need to turn that thing up a little bit.
MS. ORTH: Okay.
Does it help if I'm closer to it?
Okay.
THE INTERPRETER: And the interpreter is ready, as well.
MS. ORTH: The hearing is being recorded and transcribed by Cheryl Arreguin of Kathy Townsend Court Reporters.
There is also simultaneous interpretation between Spanish and English.
Ma'am.
(SANDRA O. CALDWELL, the interpreter, was duly sworn.)
THE INTERPRETER: Good morning.

Sandra Olivares Caldwell, certified court interpreter for the State of New Mexico.
I swear to interpret faithfully between English and Spanish languages to the best of my ability in accordance with the ethics and protocols of the interpreter profession.
Madam Hearing Officer, may I make the announcement?
MS. ORTH: Yes.
Use the --
THE INTERPRETER: Thank you.
Good morning, ladies and gentlemen.
I'm here to provide language access to anyone who is more comfortable in another language besides English. If you are more comfortable in another language, no matter what language that is, please let me know. If you are here assisting someone or accompanying someone who is more comfortable in another language, please let me know.
I'll be making an announcement in Spanish.
(In Spanish.)
Everyone present is comfortable in English?
Thank you very much.
Madam Hearing Officer, no requests at this point for interpreter services, but I will be available

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at any time during the hearing.
MS. ORTH: Thank you very much.
All right. So the hearing will be conducted in accordance with the New Mexico Water Quality Act, the New Mexico Ground and Surface Water Protection Regulations, the Supplemental Permitting Requirements for Copper Mine Facilities, commonly known as the Copper Mine Rule. And, of course, the procedures that apply here come from those sources and also 20.1.4 of the New Mexico Administrative Code.
All testimony will be taken under oath. All testimony will be subject to cross-examination.
A few housekeeping matters.
The restrooms are through that door at the back of the auditorium.
There is something of a coffee setup over here, although I have to explain it. All you'll find in the hot water pot is hot water. If you want leaded coffee, you cut open one of these Cafe Bustelo. If you want unleaded, you open the German decaffeinated coffee. And then there are tea bags, half and half and sugar cubes.
There are restaurants nearby, I know. We will take a lunch break somewhere 11:30, noon, whenever there's a good stopping place in a witness' testimony.

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Public comment will be invited throughout the hearing. We also have a special session set aside for public comment where we'll hear no technical witnesses. That will be starting tomorrow night, that's Tuesday night, at 5:00 p.m.
Otherwise, if you have public comment to offer, please let me know. We don't interrupt a technical witness' testimony, but at the end of a technical witness' testimony, especially if we're about to take a break, I will invite your public comment.
So really just let me know or let John Baca -- where is John?
MR. BACA: Right here.
MS. ORTH: There he is. That's John Baca. He is the hearing clerk. You see him there in the striped shirt.
If you have a question, you want to let us know about public comment, you've noticed the coffee pot's empty, whatever it is, talk to John, and we will figure it out together.
Let's see.
We will not go past about 7:00 p.m. each day. Again, it kind of depends on where the witnesses are in their testimony.
No decisions will be made this week. The

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essential process is we're making an evidentiary record. The transcript will be produced. The parties will have a chance to submit posthearing proposed findings and conclusions. I do a Hearing Officer report. All of that goes to the cabinet secretary. So it will be some months before a decision is made around anything we're doing here this week.
Also, I saw some E-mail traffic in the administrative record, and I wanted to be clear about another aspect of the -- of the public comment, which is your comment can come in verbally on this record here, with the court reporter, this week, and if we continue into the second week, that week, as well. However, when we adjourn, nothing further can come in, no public comment, no technical testimony, nothing.
Those are the procedures of the Environment Department, and this is the Environment Department hearing.
There is another hearing that will occur the week of October 22nd, also in T or C, but that's a hearing for another agency, the Mining and Minerals Division of the Energy, Minerals and Natural Resources Department. They have different rules.
In that proceeding, they actually invite written public comment after adjournment. So if you

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have something to say to EMNRD MMD, the Mining and Minerals Division, after the evidentiary record, the public comment record is closed, you can still do that. Just not for this hearing. So just get it in first.
Let's see.
Again, we will take a lunch break. We won't typically take a dinner break. When we break in the early evening, it will be for the night.
Are there any questions about what I would call administrative or housekeeping matters?
Mr. Butzier.
MR. BUTZIER: Madam Hearing Officer, just one point of clarification.
Is it the case that if somebody comes after work, between the 5 and 7 o'clock time frame, who wants to give public comment, that that person will have an opportunity during that window regardless of where we are in the -- in the technical testimony?
MS. ORTH: If you mean tomorrow night, the answer is yes.
MR. BUTZIER: But not otherwise?
MS. ORTH: If someone really wants to be heard and that's their chance, if you will, that's their window --
MR. BUTZIER: Okay.

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MS. ORTH: -- we can take them. I definitely want to make a space for anyone who wants to offer comment. I just want to do it with the least possible disruption.

MR. BUTZIER: And I know in the past that you've often invited public comment just before lunch.

Is that your intention in this proceeding?

MS. ORTH: So that's something we can do. Again, depending on where the technical witness is, breaks are often an excellent time to get some public comment in, either before or after lunch, or before we break for the day.

MR. BUTZIER: Thank you, Madam Hearing Officer.

MS. ORTH: Yes. Again, just let us know that you're ready to offer comment.

Any other questions about administrative matters?

Ma'am.

Tell me your name.

MS. BRITTAN: My name is Rhonda Brittan.

I was wondering if -- will public comment be restricted to a time limit?

MS. ORTH: I don't like to place time limits on folks. Most folks don't -- don't need them. I will

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ask you not to repeat yourself. I mean, there are other rules about public comment, no personal attacks, don't repeat yourself and don't stray into technical testimony, testimony that would require a scientific background. But other than that, we'd like to hear what you have to say.

Are there other questions?

No. All right.

So I have the pleadings in front of me. You -- anyone is welcome to look at them when we're on a break. We also have the administrative record here somewhere. It's usually maintained by the bureau.

Andrew, do you have that?

MR. KNIGHT: Madam Hearing Officer -- I'm not sure it's on.

MS. ORTH: It's on.

MR. KNIGHT: It's on.

The administrative record, we have -- we have large portions as -- as the applicant, I imagine, does, as well. But the administrative record was maintained electronically in this proceeding, and it is 18,000-some pages long. So the entire record -- as far as I know, the entire record is not in paper at this point, and I think it would be impractical to print out the entire thing.

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But certainly the application and most relevant parts of it I think we can -- we can have for inspection if someone would like to.

MS. ORTH: So that reminds me. If you would reach for your devices, please, and either turn them off or set them on stun. Those of us who are trying to make the record appreciate it. Thank you for that. And if you need to take a call, just step out of the -- step out of the room.

Sign-ins. So we have some sign-in sheets. Please sign in, give us as much information as you -- as you'd like, even if it's just your name. The sign-in sheets are used as evidence of public participation and for the correct spelling of your name in the transcript if you ask a question or speak up.

No salesmen will call. So please just sign in and indicate on the sheet whether you would like to give public comment. And we might approach you -- if we see that you are desirous of giving public comment, we might approach you and ask you if you have any time constraints.

Any other questions at all?

No? All right.

Oh, ma'am.

UNIDENTIFIED SPEAKER: Where's the sign-in

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sheet?

MR. BACA: Oh, right here.

MS. ORTH: John Baca is running around with the sign-in sheets. We had a number of people come into the room before -- before the sheets were at the sign-in table.

Okay. In that case, Mr. Knight, if you would begin the appearances.

MR. KNIGHT: Good morning, Madam Hearing Officer.

My name is Andrew Knight. I am representing the Mining and Environmental Compliance Section of the Ground Water Bureau of the New Mexico Environment Department.

And with me today I have three witnesses, Mr. Kurt Vollbrecht, Mr. Bradley Reid and Dr. Joseph Marcoline.

MS. ORTH: And --

MR. KNIGHT: And our division director, Mr. Bruce Yurdin, is with me at the table.

MS. ORTH: All right. Thank you.

Mr. de Saillan.

MR. DE SAILLAN: Thank you, Madam Hearing Officer.

My name is Charles de Saillan, and I'm

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representing Turner Ranch Properties and the Hillsboro Pitchfork Ranch.

With me today is Steve Dobrott, who is the former manager of the Ladder Ranch.

To his left is Jim Kuipers, who is one of our experts.

Directly behind me is Kendra Palmer, who is a paralegal with the New Mexico Environmental Law Center.

And to her left is Tom Myers, who is our hydrologist expert.

I think Bob Cunningham, who is the owner of the Hillsboro Pitchfork Ranch, should be close by.

MR. CUNNINGHAM: Right back here, Charlie.

MR. DE SAILLAN: Right there.

MS. ORTH: All right. Thank you.

MR. DE SAILLAN: Thank you.

MS. BARNCASTLE: Good morning, Madam Hearing Examiner.

Samantha Barncastle for the Elephant Butte Irrigation District.

With me today is the manager of the district, Mr. Gary Esslinger, one of my experts, Dr. Carroll, and three more of my experts, in order, Mr. Fuchs, Dr. King and Mr. Libbin.

MS. ORTH: Thank you.

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Mr. Butzier.

MR. BUTZIER: Madam Hearing Officer, Stuart Butzier of the Modrall Sperling law firm in the Santa Fe office.

With me today at the table here are New Mexico Copper representatives, including Mr. Jeff Smith and Ms. Katie Emmer.

Mr. Andrew Maloney is in the back over there with Tulla, who you'll hear about from Mr. Smith when he testifies.

And then I've got a number of experts here that I think I will wait to introduce as we go forward unless you want me to introduce them now.

MS. ORTH: No. That's all right.

MR. BUTZIER: Okay.

MS. ORTH: Thank you.

MR. BUTZIER: Thank you.

MS. ORTH: And while I have Mr. Butzier there, are you interested in making an opening statement, or are there preliminary matters we need to address before your opening statement?

MR. BUTZIER: I have not prepared an opening statement other than I can just say that we intend to offer five witnesses in support of New Mexico Copper's position in this proceeding.

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And we'll start with the chief operating officer, Mr. Jeff Smith, and I'd like to go ahead and call him, and he will sort of introduce some of the matters for the -- for the hearing today.

MS. ORTH: All right. Thank you.

Let me just ask if there's anyone else who would like to make an opening statement or reserve. It is your choice.

Hearing nothing -- oh.

MR. DE SAILLAN: We will reserve our opening statement until the commencement of our presentation.

MS. ORTH: Okay.

MR. DE SAILLAN: Thank you.

MS. BARNCASTLE: I will likewise reserve mine.

MS. ORTH: Okay.

MR. KNIGHT: Madam Hearing Officer, I have an opening statement I can make at this time.

MS. ORTH: Right now. All right. Thank you, Mr. Knight.

MR. KNIGHT: Good morning, parties, members of the public, Madam Hearing Officer.

We are here this week for a fairly narrow purpose, to determine whether this mine if constructed and operated in accordance with this permit will cause exceedances of groundwater quality standards at places

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of withdrawal.

There are many other peripheral issues, and some of those are important, and they will be discussed, but at its core the decision to issue this permit revolves around that single question.

You'll hear from the department's three witnesses this week that we have spent literally years scrutinizing the Mine Plan, the history of this site, the geology and groundwater flow characteristics of the area, and combined that with consultation with multiple other federal and state agencies and lessons learned from decades of our own permitting experience.

And through an iterative process, the bureau has created a permit that will allow mining to occur while protecting the quality of groundwater according to both the Copper Rule and the New Mexico Water Quality Act. This permit does not allocate water -- any water for use at the mine, and it's not by itself a permit to operate the mine. It is a permit to discharge water in such a way that surrounding groundwater is protected.

The Copper Rule was designed to be a permit by rule, a set of comprehensive, prescriptive requirements that an applicant must show they can meet, and if the department finds those requirements are met, the permit is issued. We do not have the discretion to consider

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other factors outside the scope of groundwater quality. This permit does not depend on any certain amount of water being available. It only sets maximum discharge limits.

In the first public draft of the proposed permit which was released back in February, the bureau imposed a number of additional conditions on the mine operators on top of those required by the Copper Rule. We find that those -- those conditions are both necessary and required in order for this permit to comply with the Water Quality Act.

The Water Quality Act also sets the criteria for denying a Discharge Permit. In Section 74-6-5 of the New Mexico Statutes, it states that, quote, a permit shall be denied if the discharge would cause or contribute to water contaminant levels in excess of any state or federal standard. Determination of the discharge's effect on groundwater shall be measured at any place of withdrawal of water for present or reasonably foreseeable future use.

A few words about the administrative record. The administrative record contains those materials relied on by the bureau in issuing the permit. It contains the application, records of our consultation with other agencies, all communications with interested

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parties relevant to the permit and thousands of pages of test results and scientific studies.

The administrative record does not contain materials that are not relevant to the issuance of this permit or materials that, while arguably relevant, were not relied upon by the bureau in issuing this permit.

There are many issues connected with the operation of this mine, but we are here this week to discuss only one important subset of those issues, potential impacts to groundwater quality and the measures to be taken to prevent those impacts that would lead to exceedances of standards at places of withdrawal.

We received a number of thoughtful, reasoned comments on the draft permit from the parties here today and from members of the public. We have made changes to the permit in response to those comments, and those changes impose additional burdens on the applicant. As the additional conditions imposed in the first draft of the permit, we believe those additional conditions are reasonable and necessary, and we have provided an explanation of them as required by the Copper Rule.

In closing, there are many -- many other valid topics for discussion related to this mine, and while they are all important, they are not all the subject of

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this particular hearing. This permit is but one component of a very long process, certainly an important one, but only one piece of the puzzle.

Thank you.

MS. ORTH: Thank you, Mr. Knight.

Mr. Butzier.

MR. BUTZIER: Thank you, Madam Hearing Officer.

We'd like to call Mr. Jeff Smith as our first witness.

JEFFREY SMITH

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Good morning, Mr. Smith.

Would you please identify yourself for the record.

A. My name is Jeff Smith. I'm the chief operating officer for New Mexico Copper.

Q. And, Mr. Smith, what will you be presenting in the hearing today?

MR. SMITH: Katie, can you go to the first slide.

This slide is an outline of my presentation

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that I'll give today.

I'll start off with a summary of my qualifications and followed by a summary and overview of New Mexico Copper Corporation.

After that, I will talk a bit about the Copper Flat project and give a brief summary of community benefits that will result from the project.

Then I will go into a summary of our application for a Discharge Permit and the methods that we are using to protect groundwater.

I will discuss the major mine units that are covered by the permit and a summary of our Reclamation and Closure Plan.

After that, I will talk about our financial assurance that we have -- our proposal that we have submitted, and then I will conclude with an introduction of our other experts.

Q. (BY MR. BUTZIER) And, Mr. Smith, would you please describe your expertise and qualifications to be talking about these topics.

A. As I stated in my introduction, I am the chief operating officer of New Mexico Copper Corporation.

I have a degree in mining engineering that I earned from the University of Arizona and a master's degree in business management from Stanford University

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Graduate School of Business.
I have 35 years of experience in mine management and mine engineering. My experience includes work in the United States, Mexico and South America.
Excuse me.
My experience includes time at the Quintana Minerals Copper Flat Mine from 1980 to 1983.
During my career, I served as -- on the Economic Development Authority for Pershing County, Nevada, and I have knowledge and understanding of the New Mexico Copper Rule requirements to prevent water pollution.
Thank you.
MR. BUTZIER: Madam Hearing Officer, at this time, New Mexico Copper would like to offer Mr. Smith as a mine management and mine engineering expert who also has expertise in connection with compliance with the New Mexico Copper Rule.
MS. ORTH: Objections?
All right. He's so recognized.
Q. (BY MR. BUTZIER) At this time, Mr. Smith, would you please proceed with the prepared presentation that you've made.
A. New Mexico Copper Corporation is the owner of the project assets. The company is the permittee, the

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developer and will be the operator of the Copper Flat Mine.
New Mexico Copper Corporation is organized as a New Mexico domestic profit corporation. The company was organized in 2010.
New Mexico Copper is a wholly-owned subsidiary of THEMAC Resources Group, which is listed on the Toronto Stock Exchange. The majority shareholder in THEMAC is Tulla Group, which is an Australian family investment group.
Tulla's other mining investments include Norseman Gold, which is Australia's longest continuously running gold mining operation that has produced over 5.5 million ounces of gold over 65 years in Western Australia.
Tulla is fully funding the Copper Flat project, and Tulla has invested more than $55 million to date in the project for engineering, property acquisition, permitting and all the consultants that are needed to accomplish that.
Our plans are designed to meet or exceed health, safety and environmental regulatory requirements.
We are committed to developing a long-term relationship with our neighbors in Sierra County, and

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we're dedicated to providing the local community with significant opportunities for employment and economic development.
We recognize the concerns and issues of neighboring property owners and the community at large, and we have included measures to address these concerns in our plans.
Copper Flat Mine property is accessed by State Highway 152, about 20 miles southwest of Truth or Consequences and four miles northeast of Hillsboro.
Mining at the property dates back to the late 1800s. There has been placer gold and copper mining at the property, and the history includes copper mining by Quintana Minerals from 1980 to 1983.
The land -- the property is -- the permit boundary at the property encompasses approximately 2,200 acres. This is a mix of private and public land, approximately 40 to 50 percent private ground. The public land is administered by the BLM, and our unpatented mining claims cover the entirety of the public land.
Reserves at Copper Flat include 675 million pounds of copper, 20 million pounds of molybdenum, 250,000 ounces of gold and 5 to 6 million ounces of silver.

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The production method at Copper Flat will be an open pit mine with a conventional flotation mill. The operation is very typical of the industry and very straightforward.
The duration of the project will begin with two years of construction, followed by 12 years of production, which then in turn will be followed by 10 to 20 years of reclamation and closure.
A feasibility study has been prepared on the project by M3 Engineering with assistance from a wide range of technical experts. That feasibility study resulted in a positive result and the decision to move forward with development of the mine.
Permitting is moving forward. Our federal EIS and state permits are progressing. We are using a common Mine Plan for all agencies, and that includes the Reclamation and Operation Plan.
This slide shows the location of the mine. This is the location within -- within a copper belt that extends from Arizona to New Mexico and down into Mexico. The Copper Flat Mine is located at the star just southwest of Truth or Consequences. And Hillsboro is -- will be in this location here. Highway 152 runs from I-25 to Silver City.
The region is served by rail. There's a rail

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line that extends over to Arizona and then down into Mexico.

As you can see from this, there is a significant number of copper mining and mineral deposits in this belt.

This slide shows our production profile that is outlined in our operating plans. It covers a 12-year operating period and shows average head grade and copper production into concentrate in the blue bars. We will be producing a concentrate at the operation and then shipping that away for smelting.

The first five years are planned to be higher grade. This will achieve a payback of the financing soon in the operation and then allow production to continue without the -- the financing overhead. First five years will produce approximately 35,000 tons of copper per year and then followed by approximately 25,000 tons of copper.

The ore at Copper Flat lends itself to a very typical and common crushing and grinding practice that is used throughout the industry today. We will be flotating -- employing flotation to produce a copper concentrate that contains the gold and silver, as well, and produce a separate molybdenum concentrate.

We are employing standard flotation reagents.

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There's no leaching on site or any other process. And after the concentrate is produced, it's shipped away for smelting.

The concentrate will have low impurities and is expected to yield a clean 28 percent copper grade. There's been metallurgical test work completed on the ore body that has -- has guided us in development of our concentrate quality. We produce it in a lab.

In addition, we have the records from the Quintana operation that also describes the characteristics of the concentrate.

There will be several community benefits that develop from this -- developing the Copper Flat Mine. These benefits are described and were -- were developed by the Arrowhead Center in a report that was produced in 2012.

In this report, the Arrowhead Center projects that there will be 1,156 jobs created during construction. This includes direct, indirect and induced jobs. And this number is through the State of New Mexico.

Construction of the project will add $55.6 million to the statewide labor income and will add nearly $80 million to the value of materials and goods that are produced within the state.

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Construction expenditures will include $45 million spent here in Sierra County and another $49 million spent in the rest of the state.

During the operation, there will be 270 full-time direct jobs at the mine. Individual wages will be very good, ranging from 35,000 to 60,000 annual, plus benefits. In addition to that, there will be a large number of indirect and induced jobs here in Sierra County, for a total of 360 to 400 jobs total.

Federal and state taxes paid will -- are estimated to be 175 million, in ad valorem, severance, income and gross receipts taxes.

After mining, there will be 10 to 20 years of reclamation and closure, and there will be ongoing jobs, wages and tax benefits occurring during that period.

Our application for Discharge Permit started in 2010. There was a Sampling and Analysis Plan and Baseline Data Report that was produced by INTERA and issued in 2012.

Our initial application for a Discharge Permit was submitted in 2011, which is prior to New Mexico adopting the Copper Rule. As the application was being developed, there were discussions happening in Santa Fe on the Copper Rule, and we were developing our plans to meet the requirements that we felt would be coming

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through the Copper Rule.

In 2017, we completed a revision to the application and reorganized the application to demonstrate compliance with the Copper Rule.

Our application is supported by numerous technical reports and supported by a Mining and Reclamation Plan that has been submitted to all of the agencies that are involved in permitting this mine.

The application includes extensive water management methodologies and controls for protecting -- for protecting groundwater.

The application was deemed by NMED to be administratively complete in 2012 and then followed by deemed to be technically approvable on February 1, 2018, and draft DP-1840 was issued by the agency on February 2, 2018.

On this slide, I've listed example methods that we've employed in our plans to prevent water pollution as required by the Copper Rule.

The plan includes water management planning, engineering and design of facilities and structures with sufficient capacity to contain anticipated storm events.

The site grading and -- we have included site grading and construction of diversion structures to direct unaffected stormwater away from the mine

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facilities and limit stormwater running onto the mine facilities.

Stormwater that falls directly onto the mine facilities will be captured for use at the mine.

The ore processing is by flotation only. We're not employing ore leaching or solvent extraction processes.

We have developed and will implement and follow a waste rock characterization and management program. As testimony continues today, there will be discussion of materials that have been identified as -- as potential acid-generating. That material is very small in nature. We have identified -- we have a plan to identify that in the field as we mine it and will segregate it and store it properly in our facilities.

We will be constructing fully lined and contained process facilities, including the flotation plan, the tailing storage facility, the process water piping systems and process and affected water impoundments.

We will have a solution management process at the tailing storage facility throughout the operation and through the reclamation and closure phases, including facility draindown after processing ends, followed by placement of an engineered cover and

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revegetation of the tailings facility.

Our plans include reclamation of legacy disturbances that will be completed during construction and operation. Early in our development phase as we're constructing the facility, we will address unreclaimed mine waste stockpiles that exist from previous operations at the property. We will reshape them, grade them, cover and revegetate.

We will complete reclamation and closure of the site according to our Reclamation Plan that has been submitted following the operation, and this also includes reshaping and revegetation of the disturbances that we create during the operation.

I'd like to introduce now the major mine units that we'll be talking about today. And to accompany this, we have a figure that we'll go to that outlined these major mine units.

First on the list is the open pit. The future open pit is located in this area.

Just for reference, this outline on this figure, this is the permit boundary that encompasses approximately 2,200 acres. At the west end of the permit area is the open pit. This is located primarily on private ground that is owned by New Mexico Copper.

The process facility is to the east of the

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open pit, in this area here. This facility -- this facility includes contained and lined facilities, will be utilizing existing foundations in locations in this area here, this disturbed area here.

The tailings storage facility is located in the southwest region of the permit area -- or -- sorry -- southeast area of the permit area. This will be a synthetically lined storage facility, located adjacent to the process area. The liner for this facility is a high density polyethylene, or HDPE, synthetic liner, 80-mil thick, high quality, standard liner that is used for environmental containment around the world today.

The TSF includes solution underdrain and collection and process water recycling systems. The water recovered from this facility will be reused for mineral recovery as part of a Water Conservation Plan. The TSF dam that's at the front of this impoundment will be designed, constructed and will comply with OSE Dam Safety requirements.

There are HDPE-lined impoundments and ponds located adjacent to the tailing storage facility, our waste rock stockpiles, the process area. These ponds and impoundments are designed to include capacity for stormwater events.

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The mine's waste rock stockpiles are located adjacent to the open pit and the open pit surface drainage area and northeast of the process area. These waste rock stockpiles are located on low permeability andesite bedrock.

Included in the facility are roads and administrative areas. The surfaces of these areas will be graded and maintained for stormwater management. This area -- or these areas include a wastewater package treatment facility that will discharge greywater to the tailings facility.

I'll describe now elements of our Reclamation and Closure Plan.

The engineering for the Reclamation and Closure Plan is complete, and plans have been submitted to the -- along with the Mining Operation and Reclamation Plan, which also serves as the Closure Plan for the Discharge Permit.

The New Mexico Copper's Discharge Permit application including the Closure Plan was deemed technically complete by NMED on February 1, 2018.

The plan includes salvage of growth media ahead of construction and storage of the growth media for reuse at reclamation.

The plan includes three large growth media

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stockpiles that will be located at strategic areas around the property, the mine property. These stockpiles will be graded and revegetated and access controlled to prevent erosion in the future and maintain those stockpiles for the future.

After mining is complete, the material will be removed from those stockpiles and used for covering the facilities and revegetation phase.

Shortly after mining ends, the open pit will be filled with freshwater to the equilibrium level of the hydraulic sink and partially revegetated to limit oxidation of the pit walls. The mine rock stockpiles at the tailings facility will be covered with growth media and revegetated.

Water from the tailings facility will be removed through evaporation, and following that the surface will be regraded, covered and revegetated.

Buildings, pipelines and other surface structures will be removed. The concrete foundations will be broken and removed or buried as appropriate.

All pond and trench liners will be removed, and the excavations will be backfilled and revegetated, except as needed for ongoing water management.

New Mexico Copper will post financial assurance for the reclamation and closure of Copper

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Flat, and the financial assurance will be held jointly by NMED, MMD and the BLM.

Our financial assurance proposal is based on the estimated cost of reclamation -- the cost of reclamation and closure as performed by third-party contractors under agency management as required by 19.10.12 NMAC, which is administered by MMD.

Our financial assurance proposal also includes a Closure Water Management Plan as required by 20.6.7.33H NMAC, which is administered by NMED.

The estimated cost of reclamation and closure has been prepared by SRK Consulting using the Copper Flat Reclamation and Closure Plan that was prepared by Golder Associates as part of our permit applications. The costing for the proposal was prepared using estimating standards and practices that have been accepted by a wide range of regulatory agencies and jurisdictions.

The estimate relies on average productivities from the Caterpillar Handbook and other similar references and costing references, not best case. In addition, the estimate -- the proposal includes and incorporates cost factors from agency guidelines, from the MMD agency guidelines.

The financial assurance estimate prepared by

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SRK and submitted for review totals $55.8 million. This total includes contractor performance of the work, mobilization and demobilization, agency management and contract administration, closure water management and monitoring.

The cost calculations require approval by three agencies. The Copper Flat estimate was submitted for agency review on August 9th, 2018.

Documentation of our cost estimate is provided as an exhibit to our notice of intent.

We have several experts here to provide testimony on our plans and designs, and I would like at this time to introduce them. The team here today was drawn from a larger group of experts which we have employed over a number of years since 2010 to develop the plans and designs for this project.

With us today is Steven Finch from John Shomaker & Associates. Mr. Finch will be presenting testimony on groundwater hydrology at the Copper Flat area.

Dr. Ruth Griffiths of SRK Consulting has joined us from Cardiff, UK. Dr. Griffiths will be discussing geochemistry at the Copper Flat Mine.

Following Dr. Griffith, we will have a discussion of the tailing storage facility design from

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Dave Kidd, our design engineer from Golder Associates.

Todd Stein, also at Golder Associates, was focused on developing our reclamation plans, and Mr. Stein will give an update on our reclamation plans and designs.

We have many other experts that have been employed on this project, and they are reflected in the record.

That concludes my presentation.

Q. I do have a couple of questions, Mr. Smith.

In your opinion, do the various plans and proposals included with New Mexico Copper Corporation's application materials that are in the administrative record fully meet or exceed the requirements of the Water Quality Act, the Copper Rule and associated groundwater program regulations administered by the New Mexico Environment Department?

A. Yes, they do.

Q. In your opinion, will the construction, operation, maintenance, reclamation and closure activities that occur at the Copper Flat Mine in accordance with the plans and procedures that are outlined in the materials -- will those operations, construction reclamation and closure meet or exceed the requirements of the Water Quality Act, the Copper Rule

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and the associated groundwater program regulations administered by the New Mexico Environment Department?
A. Yes, they will.
Q. And is it the case that Mr. Juan Velasquez will be joining you and be available to -- for questioning as part of the cross-examination relating to the scope of your direct testimony?
A. Yes. He will.
Q. And could you please just briefly introduce Mr. Velasquez and explain his role in this.
A. Mr. Velasquez is principal of Velasquez Environmental Services. Mr. Velasquez has been assisting us for a number of years in developing our permit applications and developed the application for the Discharge Permit for submittal to the Environmental Department.
Q. Thank you, Mr. Smith.
With that, Madam Hearing Officer, we'd like to make most -- make both Mr. Smith and Mr. Velasquez available for cross-examination, as discussed previously.
MS. ORTH: All right.
If Mr. Velasquez would join Mr. Smith at the table, we'll have him sworn in.
(JUAN VELASQUEZ was administered the oath.)

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MS. ORTH: Okay. Thank you.
JEFFREY SMITH and JUAN VELASQUEZ
having been first duly sworn or affirmed, were examined and testified as follows:
MS. ORTH: Mr. Knight, we'll start with you.
Do you have questions of Mr. Smith or Mr. Velasquez?
MR. KNIGHT: I do not.
MS. ORTH: Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
CROSS EXAMINATION
BY MR. DE SAILLAN:
MR. DE SAILLAN: Good morning.
My name is Charles de Saillan. I'm with the New Mexico Environmental Law Center.
I'd like to start out with some questions about the benefits to the community that you discussed earlier, and I want to direct my questions to Mr. Smith, if I could, please.
First of all, the -- you referred to the Arrowhead Center report, which is one of your exhibits?
MR. SMITH: Yes.
MR. DE SAILLAN: Okay.
And that's Exhibit 6, I think, of the copper

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company's exhibits?
Could you tell me what the Arrowhead Center is?
MR. SMITH: The Arrowhead Center is an agency within the New Mexico State University. The group is focused on economic studies and reporting on economic development.
MR. DE SAILLAN: Okay.
And did New Mexico Copper Company pay for the -- the report that the Arrowhead Center did?
MR. SMITH: We did.
MR. DE SAILLAN: Okay.
And were you involved in preparing the report?
MR. SMITH: I was not directly involved. I have read the report and -- and followed up with it.
MR. DE SAILLAN: Okay.
And what did you say the date was on the Arrowhead report -- Arrowhead Center report?
MR. SMITH: 2012.
MR. DE SAILLAN: Okay.
And do you have a copy of that handy?
MR. SMITH: I don't have one in front of me right now. I think I can get one.
MR. BUTZIER: Madam Hearing Officer, I do.
MS. ORTH: Great.

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MR. BUTZIER: It is -- Mr. de Saillan correctly pointed out that it's Exhibit 6 to the New Mexico Copper Corporation's exhibits offered as part of the statement of intent to present technical testimony, and I'm fine with sharing a copy with Mr. de Saillan, if that's acceptable.
MS. ORTH: I think he wants Mr. Smith to look at it.
MR. BUTZIER: You want Mr. Smith to look at it?
MR. DE SAILLAN: Yes, please.
MR. BUTZIER: Okay.
MR. DE SAILLAN: Thank you, Mr. Butzier.
MR. BUTZIER: Quite welcome.
MR. DE SAILLAN: Now, what does that say about what the unemployment rate was in Sierra County at the time that it was published?
MR. SMITH: I am looking for it. I don't have it at my fingertips.
MR. BUTZIER: Madam Hearing Officer, if there's a particular part of the report that Mr. de Saillan would like to refer him to, that might speed the process.
MS. ORTH: All right.
Mr. de Saillan, do you want to refer him?

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MR. DE SAILLAN: Yeah. I'm -- excuse me. I'm looking for the page here myself. I had it written down, but -- I think it's page 18.
MR. SMITH: I read Unemployed -- this is the Civilian Labor Force from Table 3.9.1, Employment Status of the Population 18 Year -- 16 Years and Older, Unemployed 1.6 percent.
MR. DE SAILLAN: Okay.
I would direct your attention to the paragraph that's just under 3.9, section 3.9, Labor Force and Employment, says Sierra County unemployment rate?
MR. SMITH: I see that. 4.3 percent.
MR. DE SAILLAN: Okay.
And that's pretty low, isn't it?
MR. SMITH: Compared to today, it is.
MR. DE SAILLAN: And compared to the national unemployment rate at the time?
MR. SMITH: Yes, compared to the nation's unemployment rate of 7.9 percent.
MR. DE SAILLAN: And compared to New Mexico's unemployment rate?
MR. SMITH: The state -- the state was 7.2 percent.
MR. DE SAILLAN: Okay.
And do you know what the national unemployment

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rate is now?
MR. SMITH: Today, I would estimate it is 4 to 5 percent.
MR. DE SAILLAN: Okay.
And in New Mexico?
MR. SMITH: Slightly higher than the -- the national average.
MR. DE SAILLAN: Okay. So the unemployment rate has gone down.
Do you know what the unemployment rate in Sierra County is at this -- currently?
MR. SMITH: I believe the unemployment rate in Sierra County is higher than the state average.
MR. DE SAILLAN: Okay.
But the numbers here are pretty old; is that correct?
MR. SMITH: These are from 2012, and these numbers are probably prior to that. The report is dated 2012. I'm guessing they -- these are statistics from 2006 to 2010, five-year average estimates.
MR. DE SAILLAN: Okay. Thank you.
Now, let's talk a little bit about financial assurance issues.
You mentioned that New Mexico Copper Corporation is a wholly-owned subsidiary of THEMAC.

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Now, how many mines in New Mexico does New Mexico Copper Corporation operate?
MR. SMITH: New Mexico Copper operates no mines in New Mexico at this time.
MR. DE SAILLAN: So does New Mexico Copper have any other businesses in New Mexico?
MR. SMITH: No. New Mexico Copper is focused on developing Copper Flat.
MR. DE SAILLAN: Okay.
Does it have any other assets in New Mexico?
MR. SMITH: Outside of Copper Flat, no, it does not.
MR. DE SAILLAN: Does it have any other assets in any other state?
MR. SMITH: It does not.
MR. DE SAILLAN: Okay.
So what happens to New Mexico Copper when the ore body at the Copper Flats Mine runs out?
MR. SMITH: Well, that's speculation into the future. The intent would be that New Mexico Copper develops additional mines and transfers operations to those additional mines.
MR. DE SAILLAN: Does it have any plans for additional mines?
MR. SMITH: We are certainly always thinking

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along those lines and looking ahead for additional opportunities, but we have no specific plans at this time.
MR. DE SAILLAN: Okay.
Where else are you looking?
MR. SMITH: Well, certainly right now we would consider opportunities in New Mexico.
MR. DE SAILLAN: Okay.
Now, the cost estimate that has been prepared for the -- the Copper Flat Mine assumes that 20 years after closure New Mexico Copper Corporation will be able to cease all mining -- excuse me -- all monitoring, maintenance and water management at the Copper Flat Mine; is that correct?
MR. SMITH: Twenty-five years is the correct number.
MR. DE SAILLAN: Okay.
And the closure estimate assumes that the -- that for that period of time the -- the water will continue to drain from the tailing storage facility only for 25 years; is that correct?
MR. SMITH: Yes. That's our assumption.
MR. DE SAILLAN: Okay.
MR. SMITH: That assumption is based on review and analysis of what we believe the draindown curve will

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be.
MR. DE SAILLAN: Okay.
And the closure cost estimate assumes that the period of time that groundwater monitoring will be necessary is 25 years after the cessation of mining; is that correct?
MR. SMITH: I'm sorry. Can you repeat that?
MR. DE SAILLAN: The closure cost estimate assumes that the period of time that groundwater monitoring will be necessary is 25 years after the cessation of mining; is that correct?
MR. SMITH: Yes. The estimate includes monitoring during that 25-year closure period as required by the Copper Rule.
MR. DE SAILLAN: Okay.
And the closure cost estimate assumes that the period of time for maintenance is seven years after the mining operations cease; is that correct?
MR. SMITH: Maintenance of --
MR. DE SAILLAN: Maintenance generally.
MR. SMITH: What specifically are you referring to?
MR. DE SAILLAN: Maintenance generally.
MR. SMITH: Maintenance generally. There is maintenance ongoing through that 25-year period as the

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draindown is occurring.
MR. DE SAILLAN: Do you agree that these assumptions are fairly optimistic?
MR. BUTZIER: Objection as to the form.
MS. ORTH: Mr. de Saillan?
MR. DE SAILLAN: I'd ask Mr. Butzier to state what he objects to about the form of the question.
MR. BUTZIER: It's ambiguous, and we haven't had a foundation to understand what Mr. de Saillan may mean about fairly, et cetera.
MS. ORTH: Right. So I think it's too broad.
MR. DE SAILLAN: Do you agree that these -- that these assumptions in terms of the length of time that is going to be necessary for the -- for the mine to implement these things that we just talked about is optimistic?
MR. SMITH: I -- I believe that we have done the best job we can at estimating the time frames, and that's what we have built into our plan.
MR. DE SAILLAN: All right. Let me ask you a little bit about the history of the Copper Flat Mine.
The mine has gone into bankruptcy twice under previous operators; is that correct?
MR. SMITH: I'm aware of one. I'm not aware of two.

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MR. DE SAILLAN: Okay. One of them went into bankruptcy, the other one ceased operating perhaps without going into bankruptcy.
MR. SMITH: Yes.
MR. DE SAILLAN: Is that correct?
MR. SMITH: That's correct.
MR. DE SAILLAN: Okay.
And do you know why that was?
MR. SMITH: Why what was?
MR. DE SAILLAN: Why it was that -- first of all, that the original company went to -- went into bankruptcy?
MR. BUTZIER: Madam Hearing Officer, I'll object. There's been no foundation that the original company went into bankruptcy, and it's not clear what company Mr. de Saillan is referring to.
MS. ORTH: All right.
So, Mr. Smith, with all of these questions, if you can answer the question as it's posed, please do that. If you need further clarification or you don't know the answer, just say so.
And, Mr. de Saillan, just make sure he is properly situated in the -- in the question.
MR. DE SAILLAN: Okay. Thank you.
So let me ask the question again.

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Was the original company -- or the original operation abandoned?
MR. SMITH: The original operation closed due to the economic -- the price of copper, and there was reclamation performed. I don't consider that to be abandoned.
MR. DE SAILLAN: But it didn't -- did not continue operating, did it?
MR. SMITH: It did not continue operating. You are correct.
MR. DE SAILLAN: Okay.
And then was there a subsequent operation that went into bankruptcy?
MR. SMITH: There was a -- I believe you're referring to Alta Gold in the late 1990s. It was not in operation. They were planning and were forced into bankruptcy by circumstances elsewhere.
MR. DE SAILLAN: Okay.
And do you agree that the ore grade at the Copper Flat Mine is relatively low grade?
MR. SMITH: The ore grade is -- at Copper Flat -- it depends on what you are comparing it to. It is lower than other mines that -- that are operating; however, it is similar or higher grade than other mines in other locations. The grade is -- has been studied,

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and the project has been studied, and the grade is sufficient to support the operation.
MR. DE SAILLAN: What percent copper is the ore body?
And I recognize there's a range there.
MR. SMITH: Yeah. There's a range. The average will be .35 to .4 percent.
MR. DE SAILLAN: And what was the volume that -- of ore that will be extracted?
MR. SMITH: Extracted by our company, by New Mexico Copper?
MR. DE SAILLAN: That's correct.
MR. SMITH: Yes. The plan is -- is between 25,000 and 30,000 tons per day.
MR. DE SAILLAN: Okay.
The New Mexico Copper Corporation is currently implementing abatement at the Copper Flat Mine; is that correct?
MR. SMITH: We are in discussions on abatement at the property with the agency. We have completed studies and are proposing additional studies towards abatement.
MR. DE SAILLAN: Okay.
You have submitted a Stage 1 Abatement Plan?
MR. SMITH: Stage 1 is a report on the studies

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that have been completed.
MR. DE SAILLAN: And that has been submitted to the Environment Department?
MR. SMITH: That has been, yes.
MR. DE SAILLAN: Okay.
And when was that?
MR. SMITH: That plan would have been submitted, oh, three years ago, approximately.
MR. DE SAILLAN: Okay.
And why is abatement necessary?
MR. SMITH: The abatement is directed at some cleanup of water issues, legacy water from the legacy dumps that we intend to reclaim when we start construction.
MR. DE SAILLAN: So there's water contamination at the mine now.
MR. SMITH: There are areas of water that are higher than the background. Yes.
MR. DE SAILLAN: And what are the sources of that contamination?
MR. SMITH: The source is the tailings facility, the existing tailing facility that is present there. That facility was constructed without a synthetic liner, and there has been leakage from those tailings into the groundwater.

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MR. DE SAILLAN: Okay.
And what are the contaminants that are being addressed?
MR. SMITH: The -- that area, the -- is characterized by sulfate and TDS, not metals or other constituents.
MR. DE SAILLAN: When you say TDS, you mean total dissolved solids?
MR. SMITH: Total dissolved solids.
MR. DE SAILLAN: Okay.
And you mentioned that this -- the original tailings facility was unlined and therefore it's leaking.
Do you mean to imply that a lined tailing facility won't also leak?
MR. SMITH: I mean to imply that, yes, the lined tailings facility, the potential for leakage is very much reduced.
MR. DE SAILLAN: Liners nevertheless leak, though; isn't that correct?
MR. SMITH: There are assumptions on that. Yes.
MR. DE SAILLAN: Okay.
How far along is the company in the abatement process?

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You indicated that a Stage 1 Abatement Plan had been submitted to the Environment Department several years ago.
What is the status of that process now?
MR. SMITH: The status of that process is waiting for our plans to develop the mine to move forward. Our plan is to address the issues and abate the issues through the construction of the Copper Flat Mine, at which time we will reclaim the legacy disturbances and -- and put a liner at the TSF, which will address those abatement issues.
MR. DE SAILLAN: Okay.
New Mexico Copper has not yet submitted a Stage 2 Abatement Plan; is that correct?
MR. SMITH: That is correct.
MR. DE SAILLAN: And what is the schedule for submitting that?
MR. SMITH: At this time, we -- we don't have a formal schedule for submitting that. That is -- again, we are rolling that into our applications for permits today.
MR. DE SAILLAN: Okay.
One thing I want to clear up here.
You mentioned that the tailings storage facility will be lined with an 80-mil liner. There's

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some references in the record to an 80-millimeter liner.
I don't know if you've seen that, but I want to clarify that those are incorrect based on your understanding?
MR. SMITH: Yes. The -- it's 80 mils --
MR. DE SAILLAN: Okay.
MR. SMITH: -- thousandths of an inch.
MR. DE SAILLAN: Okay. Thank you, Mr. Smith. That's all my questions.
MS. ORTH: Thank you, Mr. de Saillan. Ms. Barncastle?
MS. BARNCASTLE: Thank you.
CROSS EXAMINATION
BY MS. BARNCASTLE:
MS. BARNCASTLE: Mr. Smith, I'd like to direct my questions to you.
I'm starting on slide number 14 in your PowerPoint where you refer to vegetation, revegetating certain sites.
What type of vegetation do you plan to use?
MR. SMITH: There is a seed mix that is outlined in our EIS as well as in permit applications, but essentially it is native plants that exist at the site today and return it back to matching what is there today.

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MS. BARNCASTLE: What percent of cover are we looking at having when we revegetate out there?
MR. SMITH: It will vary from location to location, and -- and again the goal is to be similar to the cover that's there today. And if you look at the site today, it varies, the percent cover varies from where you are on the property.
MS. BARNCASTLE: Will those types of plants need to be watered separate from the natural rainfall that we receive?
MR. SMITH: No. The intent is that they will survive in the natural environment, and that's -- that's our goal.
MS. BARNCASTLE: I'm looking now at slide number 6.
How many mines are on that slide in the, quote, copper belt you referred to?
MR. SMITH: Well, I would -- I would need to count, but there's one to two dozen there, starting with Mineral Park and stretching over through Chino and Copper Flat.
MS. BARNCASTLE: Are you generally familiar with each of those mining locations?
MR. SMITH: I am.
MS. BARNCASTLE: How many of those mines are

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within 15 miles of a major water storage reservoir?
MR. SMITH: I can't answer that. I believe that mines -- there is reservoirs there outside of Phoenix, and I believe some of those may be near that, but I can't answer that specifically.
MS. BARNCASTLE: You don't know for sure.
You don't know for sure?
MR. SMITH: I don't know specifically.
MS. BARNCASTLE: We have so many copper mines in this copper belt.
Why do we need another one so close to Caballo Reservoir?
MR. SMITH: The -- the mine is -- is necessary to supply a strategic metal and mineral to -- to the world for use in developing -- in developing the technologies that are necessary. The mine is focused on a mineral resource that exists at the location that we're planning.
You don't go anywhere in the world to -- and create a mineral resource. You have to go to where the mineral resources are located. Copper Flat is the location of a mineral resource.
MS. BARNCASTLE: Now, you just testified that there is existing contamination at this site; is that correct?

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MR. SMITH: Yes.
MS. BARNCASTLE: What direction is that groundwater contamination migrating?
MR. SMITH: The -- the testimony coming in the future will talk about that in detail.
The plume that is under the tailings facility has been proven to actually be shrinking and not migrating.
MS. BARNCASTLE: Nothing further, Madam Hearing Officer.
MS. ORTH: All right. Thank you, Ms. Barncastle.
Is there anyone else who has a question of Mr. Smith based on his testimony?
No?
Mr. Butzier, do you have any follow-up?
MR. BUTZIER: Thank you, Madam Hearing Officer. I do, just a few questions.
REDIRECT EXAMINATION
BY MR. BUTZIER:
MR. BUTZIER: Mr. Smith, you outlined a two-year construction period and a twelve-year production period and then reclamation and closure after that.
Do you recall that testimony?

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MR. SMITH: I do.
MR. BUTZIER: What gives you optimism that -- that the copper market will be sufficient to allow that operation to proceed through conclusion?
MR. SMITH: There have been many, many studies done by market analysts around the world that show the demand for copper will increase over the next several decades. This demand is being driven by sustainability projects such as wind power, solar power, electric vehicles, the proliferation of telephones and appliances around the world.
The -- the electric vehicle market is expected to grow significantly over the next 10 years. There are announcements -- frequent announcements these days of car manufacturers that are shutting down their gasoline and diesel lines and going solely to electric.
The -- that's the demand side that is moving that way.
The supply side is tightening. The mines, including the mines in this copper belt and elsewhere around the globe -- their grades are dropping. Mine production is declining, which leads to, you know, a shift in the supply and demand curve and the equilibrium point, which causes the copper price to rise.
MR. BUTZIER: Thank you.

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And Mr. de Saillan asked questions about whether liners like the one that is going to be employed at the tailings facility at the Copper Flat site -- whether they leak.
And I think your testimony was that there's planning involved to account for the possibility of that occurring? Is that -- am I characterizing correctly your testimony?
MR. SMITH: Yes, you are.
MR. BUTZIER: Is it your understanding that New Mexico Copper Corporation's hydrology and geochemistry experts have taken into account the possibility of leaks from the HDPE liner in this very case?
MR. SMITH: Yes. Our experts have included that in their analysis and are reporting on that today.
MR. BUTZIER: Okay. Thank you.
Mr. de Saillan referred you to the Arrowhead Center's report, which he correctly pointed out was Exhibit 6 to the statement of intent to present technical testimony from New Mexico Copper; is that correct?
MR. SMITH: Yes.
MR. BUTZIER: And did you also supply a copy of your resume that is Exhibit 1 to the statement of

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intent from New Mexico Copper?
MR. SMITH: Yes.
MR. BUTZIER: And a PowerPoint presentation that is Exhibit 2?
MR. SMITH: Yes.
MR. BUTZIER: And a resume of Mr. Juan Velasquez that is Exhibit 3?
MR. SMITH: Yes.
MR. BUTZIER: And a resume of Ms. Katie Emmer that is Exhibit 4?
MR. SMITH: Yes.
MR. BUTZIER: And the M3 technical feasibility study that you referred to in your testimony that is Exhibit 5?
MR. SMITH: Yes.
MR. BUTZIER: And the New Mexico Copper's financial assurance proposal that is Exhibit 7?
MR. SMITH: Yes.
MR. BUTZIER: And did you also include as Exhibit 8 -- did New Mexico Copper also include as Exhibit 8 a Joint Powers Agreement Between the New Mexico Energy, Minerals and Natural Resources Department and the New Mexico Environment Department relating to financial assurance?
MR. SMITH: Yes. That was included.

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MR. BUTZIER: And did New Mexico Copper include as Exhibit 9 a Memorandum of Understanding Between The New Mexico Environment Department And The US Bureau of Land Management New Mexico State Office also related to financial assurance, that is Exhibit 9?
MR. SMITH: Yes.
MR. BUTZIER: Madam Hearing Officer, I'd like to move the admission of New Mexico Copper's Exhibits 1 through 9 submitted with its statement of intent to present technical testimony.
MS. ORTH: Are there objections?
MS. BARNCASTLE: No objections.
MR. DE SAILLAN: No objections.
MS. ORTH: All right. Thank you.
MR. BUTZIER: That's all I have, Madam Hearing Officer.
MS. ORTH: NMCC Exhibits 1 through 9 are admitted.
(Exhibits NMCC 1 through 9 admitted into evidence.)
MS. ORTH: Is there anything else with -- in connection with Mr. Smith, or can we excuse him?
Ma'am.
Tell me your name.
MS. BRITTAN: Rhonda Brittan.

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MS. ORTH: All right.
Do you have a question?
MS. BRITTAN: Yes, I do.
MS. ORTH: Yeah. So we -- I'm sorry. We need you to talk into a microphone.
MR. BUTZIER: If you want to come to this middle table, you can use this mic.
EXAMINATION
BY MS. BRITTAN:
MS. BRITTAN: I just wanted to know about -- you know, I know you're going to do a reclamation thing with vegetation. What about the critters that live there? There are prairie dogs and burrowing owls all over that place. And I was wondering what's going to happen to those little guys?
MR. SMITH: Well, our -- our plans return the property to its premining uses, which includes wildlife habitat. So our revegetation will result in vegetation that is similar to what's there today, and I anticipate that those critters will -- will come back and build new nests.
MS. BRITTAN: Okay. Thank you.
MS. ORTH: Okay. Thank you, Ms. Brittan.
Ma'am, if you would come up, please.
MS. NICOLL: I'm Debora Nicoll.

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EXAMINATION
BY MS. NICOLL:
MS. NICOLL: I just wanted to know -- you're planning to do the -- there is pollution there so you're planning to do abatement during construction.
MS. BRITTAN: Speak into that microphone, please --
MS. NICOLL: Sorry.
MS. BRITTAN: -- so we can hear you.
MS. NICOLL: All right. Sorry.
Is this better?
MS. BRITTAN: Yes.
MS. NICOLL: Okay. Sorry.
So there is pollution there, and you're planning to do abatement during construction.
In the event that this is not -- this permit is not granted, will you do the abatement now, or, you know, will there be abatement for the pollution that's there now?
MR. SMITH: We will meet the requirements of the Abatement Plan that is required by the agency, and we will complete that work as required by the plan.
MS. NICOLL: Even if you don't get the permit?
MR. SMITH: Yes.
MS. ORTH: Sir, come up, please, to the

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microphone.
MR. GARCIA: Hi.
Jason Garcia.
EXAMINATION
BY MR. GARCIA:
MR. GARCIA: Just a couple of questions.
We had discussed, and you had questions from this gentleman over here about population, income, whatnot.
Do you currently know what the population decline of Sierra County is based off of the facts that we don't have good-paying jobs? Also, do you know what the median income of the area is based off of the fact that we don't have an abundance of good-paying jobs? Do you have those numbers?
MR. SMITH: I don't have the numbers in front of me at my fingertips. I do know that the population is declining, has been doing so over a number of years. But I don't know the specific numbers of that decline or current employment.
MR. GARCIA: The current rate is 6 percent in this area.
MR. SMITH: Thank you.
MS. ORTH: Anything else before we excuse Mr. Smith and Mr. Velasquez?

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Oh, ma'am.
MS. NICOLL: Sorry.
Hi.
Deb Nicoll again.
FURTHER EXAMINATION
BY MS. NICOLL:
MS. NICOLL: The other question is the mine when it was operating before closed down after like three-and-a-half months because of low copper prices.
Do you plan to start and stop the mine as needed according to the copper prices on the market?
MR. SMITH: Our -- our plan and our forecast is that we will not do that. We intend to start and run --
MS. NICOLL: Continuous?
MR. SMITH: -- for the entire operation. And we believe that the copper prices will stay at a point that we will do that. Our operating costs are very competitive compared to the price -- the forecasted prices.
MS. NICOLL: Okay. This is a belief, that it will be high enough.
If it does go low, and it is pretty low right now, will you continue operations, even though it's going to hurt your bottom line?

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MR. SMITH: Even -- even at today's prices, we would be able to continue to operate. Yes.
MS. NICOLL: Okay.
MS. ORTH: Anything else at all?
Yes, ma'am. Come back up, Ms. Brittan.
FURTHER EXAMINATION
BY MS. BRITTAN:
MS. BRITTAN: If there is a need for repairs to the lining of the pit -- first of all, how will they be detected? Any leakage from that -- I don't know for whatever reason they may happen, but will groundwater -- will it be detected before there's groundwater contamination, or does groundwater contamination have to occur before a repair is detect -- needed? And how would a -- once the tailings are in there, how would repairs be effected?
MR. SMITH: The -- as the liner is placed, before any material is stacked up on it, there is a quality control/quality assurance program, and as the liner is placed down, it is inspected and vacuum tested to ensure that the fabrication and installment is done properly. So that's done right up front.
Then as the facility operates and material is stacked on it, there will be monitoring wells around the base of the facility that are installed to detect if

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there are any issues that develop during the operation.
MS. BRITTAN: So that would happen before groundwater -- oh. So that would happen before groundwater contamination occurred?
MR. SMITH: The monitoring wells would pick it up in the water, and that's where we would detect it. So that's immediately underneath the facility.
MS. BRITTAN: Okay.
And then how would repair -- any repairs be effected?
MR. SMITH: Well, it depends on -- it would have to be analyzed, and the location and extent of any issue would have to be determined, and then a plan would have to be made.
MS. BRITTAN: So you'd have to dig those tailings out or something and get down in there?
MR. SMITH: That's possible. Yes.
MS. BRITTAN: Okay. Thank you.
MS. ORTH: All right. Thank you, Ms. Brittan.
Anyone else? Any questions of Mr. Smith or -- sir, if you would come up.
MR. BOKICH: My name is John Bokich.

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EXAMINATION
BY MR. BOKICH:
MR. BOKICH: Mr. Smith, you mentioned and there's been discussion about copper prices and the effect on the operations. You mentioned earlier that there was other minerals involved, and I seem to recall from previous publications that the gold reserves have increased significantly, moly has increased significantly, the grade was improved, from the drilling that you did five, six years ago.
Can you -- isn't that included in your economic analysis?
MR. SMITH: You're correct. The gold, silver and molybdenum is included. The grades of those minerals have increased over the knowledge that was in place 35 years ago through improved technologies and additional drilling. So we have a much better handle on the amount of gold and silver that will be included in this production.
MR. BOKICH: Okay. Thank you.
In addition, there's been a fair amount of discussion about the contamination, the plume from the previous operations.
You mentioned in your testimony that was primarily sulfate and TDS, total dissolved solids,

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right?
MR. SMITH: Yes. That's correct.
MR. BOKICH: Aren't those levels of sulfate and TDS very low relative to things like discharge of our hot springs into the Rio Grande River or groundwater samples that are taken in the Mesilla Valley, where we've had effects from agriculture?
MR. SMITH: Yes. Relatively speaking, you're correct.
MR. BOKICH: Thank you.
MS. ORTH: Okay. Thank you, Mr. Bokich.
Anything else before we excuse Mr. Smith and Mr. Velasquez?
And we'll take a break.
No?
Thank you very much, gentlemen.
MR. SMITH: Thank you, Madam Hearing Officer.
MS. ORTH: And let me just say for those of you who might not have been to one of these hearings before, Mr. Velasquez joined Mr. Smith for questioning in the event a question was posed that he had information to offer.
It is meant to provide even better information to a questioner who may not have exactly the parameters of someone's expertise. It's not meant to prevent

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Mr. Smith from being fully questioned or from preventing anyone from directing questions to a particular witness. It really is a way of trying to get the best information out there.

So thank you, Mr. Velasquez. Although you didn't get questions, thank you very much.

MR. VELASQUEZ: I contributed mildly.

MS. ORTH: Yes, you did.

Let's take -- Oh. Let's take a 10-minute break.

(Proceedings in recess from 10:38 a.m. to 10:52 a.m.)

MS. ORTH: All right. We are coming back from the break, please. Please take your conversations out of the room if you'd like to continue talking.

Hello.

All right. We are moving on to another witness for NMCC.

Mr. Butzier.

MR. BUTZIER: Madam Hearing Officer, New Mexico Copper Corporation would like to call its second witness, Mr. Steven Finch.

MS. ORTH: All right. Thank you.

We'll swear him in.

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STEVEN FINCH

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Good morning, Mr. Finch.

Would you please identify yourself for the record.

A. My full name is Steven Taylor Finch, Junior. And I'm a principal hydrogeologist-geochemist with John Shomaker & Associates, water-resource and environmental consulting firm out of Albuquerque, New Mexico.

Q. And, Mr. Finch, what will you be presenting as part of your testimony today?

A. I have an outline on the slide number 2.

I will briefly go over my expertise, key references that I relied on as part of my analysis.

And then the hydrogeologic setting for the -- not only the permit area, but the region as required by the Copper Rule.

And then various other facilities and the hydrogeologic analysis that went along with it and those components that are required for the Copper Rule, including the Monitoring Plan.

Q. And, Mr. Finch, could you please pull your

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microphone a bit closer so that we can hear you.

Thank you.

What else will you be talking about today?

A. That summarizes --

Q. Sums it up?

A. Sums it up. It does.

Q. Okay. Thank you.

Mr. Finch, why don't you go ahead and summarize your expertise and qualifications to be addressing those topics.

A. As presented here on slide 3, I have a bachelor of science in geology and a master of science in geology. My master's has a -- was also -- had an emphasis in geochemistry.

I have a few certifications and registrations as a geologist where appropriate.

And my relevant experience, been with John Shomaker & Associates for 28 years as a hydrogeologist-geochemist. I was on the Copper Rule Technical Advisory Committee, participated in development of the Copper Rules. And on and off I've had the privilege of performing hydrogeologic analysis -- analyses at the Copper Flat property since 1992.

Q. Can you briefly describe the Copper Rule

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Technical Advisory Committee role that you played and that process?

A. Yes. That committee was a fairly large committee of technical experts from industry and state government and others that we had a monthly meeting and we discussed various portions of the Copper Rule as they were being developed.

The parts that I participated in most and I gave several presentations on open mine pits, monitoring requirements, how to assess the tailing impoundments and associated discharges with tailing impoundments and the like.

MR. BUTZIER: Madam Hearing Officer, I would offer Mr. Finch as an expert testimony in hydrology and geochemistry as well as having significant expertise in connection with the New Mexico's Copper Rule and compliance with the Copper Rule.

MS. ORTH: Okay.

Any objection?

MR. DE SAILLAN: No objections.

MR. KNIGHT: No objection.

MS. ORTH: All right. Thank you.

He's so recognized.

Q. (BY MR. BUTZIER) Mr. Finch, would you please go ahead and proceed with the presentation that you've

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prepared for today's hearing.
A. Certainly.
First I'd like to introduce some of the key references that I relied on that -- other than the Discharge Plan application packet. These were prepared before the application packet. They're quite extensive and submitted to various agencies and adopted by those agencies.
I'll start from on the left here. The Baseline Data Characterization Report, which was prepared in 2012 by INTERA. We were also part of that. Very extensive analysis of the data for the proposed mine site and the surrounding area. That was -- that report's been heavily relied on by other consultants as well as us to prepare this Discharge Plan application packet.
The second report cover is results from the stage 1 abatement. There was a Stage 1 Abatement Plan submitted to the Environment Department. That was with an amendment to the Abatement Plan, and that was approved by the Environment Department.
And that -- this report shown here details the first year -- results of the first year of the investigation of the stage 1 abatement, which provides a great level of detail on the aquifer conditions within

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the mine permit area, nature and extent of existing contamination and also recommended abatement options.
Going in sequence here, the third report cover from the left is called Model of Groundwater Flow in the Animas Uplift and Palomas Basin. That is a report of a numerical model, the numerical groundwater flow model. It's a mathematical representation of the groundwater flow system.
This report has been submitted to various agencies. It's been adopted by the New Mexico Office of State Engineer. And it goes in excruciating detail of how the model was constructed, the data used to develop the model, all the ins and outs of the framework of the model and how it was calibrated.
And then the final report cover here to the far right is called the Probable Hydrologic Consequences of the Copper Flat Mine Project. And that is a report that's required by the Mining and Minerals Division, and it was submitted, reviewed and then adopted by the Mining and Minerals Division.
That report contains -- basically it takes the model, and we use the model to determine what the effects of this mine would be on the groundwater system. It also goes in detail about surface water effects and other things.

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So those four reports, all of them quite extensive, are -- I'll be referring back to them as I go through this presentation as the production of them.
Okay. Moving on, the next group of slides will be related to the Hydrogeologic Setting and Conceptual Model of the permit area and the region. This is required as part of the Copper Rule.
And you'll see up on my slides here -- this is slide 5 -- I'll have a reference to the Copper Rule. That's what the numbers 20.6.7.11K&P New Mexico Administrative Code. So that comes right out of the Copper Rule. And this is what's required for a Copper Rule -- I mean a Discharge Permit application.
You have to submit information on the regional geology, hydrology and a conceptual model, which is how we visualize the system. It's not necessarily a numeric model. I'd like to define the -- or, you know, kind of explain the difference.
First we find a conceptual model, and then we take that conceptual model and we put it in mathematical terms to make a numeric model to calculate the effects.
What's shown here, slide 6, is a regional geologic map. I'd like to orient where we are on this map.
You see -- let's see if this pointer works.

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There we go.
This on the right-hand side is I-25, by this little symbol and line.
And then you have the Rio Grande and the Caballo Reservoir to the east of that.
You'll see Highway 152 coming through the center of this map. Hillsboro is located in the southeast -- southwest corner.
We have this box you see that's depicted by this line. That encompasses most of the area. That box is -- defines the area that the model included. The model included not only the mine permit area, shown by this -- this yellow outline, but the larger area around it.
To give you an idea of distance, from the mine permit area to the Rio Grande, over here on the right, is 12 miles. And that -- that should give you an orientation of where we are in the world.
So now I'll go through and explain some of the geologic detail that's showing here for the region.
This -- you see these vertical black lines, some are dashed, and some are solid. These are fault systems, and these fault systems are part of what we call the Rio Grande Rift. The Rio Grande Rift is what forms the valley that comes through New Mexico, and it's

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centered on the Rio Grande. This valley that formed has mountains on the west and mountains on the east.

You'll see here this green color and this brown color represent bedrock that's been uplifted as the first set of mountains on the west in the Rio Grande Rift. This uplift is called the Animas Uplift.

The significance of the two colors, the green and the brown. The green is a very competent rock called andesite, and it was formed by a volcano. This volcano is super old, formed in Cretaceous age in geologic time many, many millions of years ago. And then the rocks depicted by the brown color are older than the volcano. This -- so this whole brown and green sequence of rocks was uplifted and exposed at the land surface.

As you go east, you see a more orange color. That represents Santa Fe Group sediments. Those sediments filled in the rift, and they're thousands of feet deep and of various types of layers of sand, silt, clay. And that is what is also referred to as the Palomas Basin.

You'll also see here a bright yellow color. That is more recent. That's on -- more recently formed because it's within the creek drainages. The major creek drainages, we have Las Animas Creek, and we have

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Percha Creek.

And you'll see the recent alluvium. That alluvium is same thing. It's sand, gravel, silts and clays, but it's -- it's not very thick, and it's just along the stream drainages.

Next I want to show here as presented as slide 7 is what I would call a conceptual model of the regional geology. So we're not only looking at the way it looks like on the surface, but we're looking at the subsurface geology depicted by a 3D diagram here.

And so it's -- here north is kind of off -- it's slightly tilted so we have these north/south faults that are in the black lines. You see the land surface depicted by this -- this aerial imagery.

Here's I-25 on the -- on the right-hand side.

And then the Animas Uplift as it's labeled here is this -- this green part. This goes right through the mine permit area as shown identified here, Mine Permit Boundary. So most of the mine permit area is -- resides within the Animas Uplift.

This uplift is -- as I mentioned, is the andesite rock that also has in the middle -- what I call the middle of the volcano was intruded with a different type of rock that is called quartz monzonite. That contains the ore body. So it's localized in the center

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of that volcano.

The permeability of the andesite is -- my -- there we go.

The permeability of this andesite that surrounds the ore body has been significantly reduced because there were some fractures in this andesite rocks -- rock, and those fractures, or whatever openings that were in that rock, were filled in with fluids, and those fluids formed minerals, silicate and calcite minerals.

And that further reduced the permeability of what would otherwise have been, you know, something that could have transmitted water, but it doesn't transmit water very well at all, is the key point there.

The thickness of this andesite hasn't been fully explored, but there was a drill hole, part of the exploration program, that went down 3,000 feet. So we do know that that andesite rock is 3,000 feet thickness, which is quite sufficient.

So here I'm going to summarize the regional geology that's required as part of the Copper Rule for a Discharge Plan application permit.

I've described briefly the structure, the Rio Grande Rift and the north/south trending faults. We're going to talk -- I'm going to talk in much more detail

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about these faults and how they play a role in groundwater flow beneath the mine permit area.

The Animas Uplift, which contains that crystalline bedrock, in the mine permit area is the andesite. This andesite is very low permeability.

And then off to the east we have the Santa Fe Group sediments. And those sediments are not all sands and gravels. There's lots of clays and other silts and materials. So with that, depending where you are, the permeability changes -- or can vary. So we have a wide range of permeabilities for the Santa Fe Group sediments.

Moving on, I want to zoom in a little bit here and briefly discuss how the surface water or stormwater flows across the land. So what we have here is a map showing different colors, and these colors represent watersheds. So we have Grayback Watershed, Las Animas Watershed, Percha Watershed showing here.

The mine permit area, as shown by the outline, yellow outline, is all within the Grayback Watershed. The arroyo that -- for Grayback Watershed, Grayback Arroyo, close to the mine site, is ephemeral. It only transmits stormwater, basically. So it's a -- rarely has flow in it, only after intense, sudden rainstorms.

All right. Shown here on slide 10 is another

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map that comes right out of the Discharge Plan application packet, and what it is intended to show here is the mine permit area, as shown by the yellow outline, and then this red line you see around it is a half-mile distance from the permit area.

The purpose of this is to show all the wells that we have identified within a half mile -- or within a half mile of the permit barrier. Most all of these wells are part of the Copper Flat project and are monitoring wells.

So you'll see a group of wells that are in the left-hand side of the permit area are wells that were drilled around the pit as part of stage 1 abatement and before that. We have a high density of wells over there along the east side of the permit area, and those were related to evaluating the tailings that Quintana built.

There is one well that is shown outside of the permit boundary. It's labeled GWQ-4. That comes from our 1993 report. That's actually a stock well that is, I believe, operated by the Pitchfork Ranch.

So we have data on all these wells, and we understand their completion, what aquifer they're in and all their details.

The other thing on surface water, the only surface water within the permit area is what I described

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earlier as Grayback Arroyo, which flows through the site, and it conveys stormwater, ephemeral drainage.

Oh. Sorry. Springs. There are no perennial springs within this area that we've identified. And that comes from the Baseline Data Report, a very detailed assessment we did in 1993. So within this area, we do not know of any perennial springs.

There are -- you'll find in our 1993 report there are some what we call seasonal seeps that may come out of one of these drainages. You'll have a high intense rainstorm, and there will be locally concentrated precipitation and stormwater that slowly seeps out of the near surface feature. I wouldn't -- I do not call that a spring. Matter of fact, they were non -- they were nonexistent in the baseline data assessment.

Next, please.

Okay. As a geologist, I like to look at the big picture first, which I presented the regional geology, and you've noticed I've been getting closer and closer in on the site. And so now I'm going to talk about the site hydrogeologic characterization, all the data and analysis that we compiled and used to do this characterization in support of the DP application packet.

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It makes it easy when you have 40 years of data. I really enjoy -- the more data as a scientist, the more data you have, the higher level of confidence you have in what you're -- what you're evaluating.

So from that 40 years of data, we have results from several exploration drilling programs.

Many, many perturbations of geologic mapping.

Monitor wells. Data from wells is really the best way to assess a groundwater system.

Through aquifer testing.

Historic water level monitoring, data sets.

We have groundwater quality samples that go all the way back to the beginning of Quintana operation, which I believe was in the -- sometime in the late '70s.

And surface water samples from captured stormwater.

So put all together, that's our -- that's what we used to characterize the hydrogeologic setting within the mine perimeter area.

This very busy-looking spreadsheet off on the right-hand side is an example of one data set. This is a log from the New Mexico Copper geologists when they described the core that was drilled.

So every foot of core drilled, they did a super detailed analysis of the type of rock, the

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minerals in the rock, the type of fractures, what's in those fractures, if it's filled with minerals, what type of minerals are in there, all kinds of rock characteristics. It's an extremely detailed dataset.

That information was used to develop what we call the geologic model. So we can look at the geology in all three dimensions.

Shown here as part of slide 11 is a core taken from -- this is a picture of a core, and this core you'll see -- that's what the quartz monzonite looks like, this little speckled pattern. Then you have a hunk of andesite, this darker color, and you see this fracture. This fracture is completely filled with silicate minerals.

So that's a nice, solid core, shows you how competent that rock is.

Presented here, slide 12, I have an aerial photograph of the Copper Flat area.

And so to get you oriented, we have on the left-hand side Grayback Arroyo comes through here, it's diverted around the Copper Flat existing open pit, which is this area in here, in the center, and you see the existing open pit water body by this dark color. Animas peak is off on the right-hand side.

And what we have here, each one of these

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labels represents a drill hole in which a core was obtained and detailed analysis was performed. The yellow highlight there is the location of that core I showed in the previous slide.

So with this great level of detail and all different depths of drill holes, we've included that in our analysis.

So here is slide 13, which is -- comes -- also comes right out of the Discharge Plan application packet as noted by Figure 11K-2a. So everything is organized according to what's required by the Copper Rule.

We have a little more detail in the geology than what was shown on the regional. And that's -- the main details here are -- we'll have these dikes that radiate out in the andesite, and these dikes are filled with minerals.

We have the permit area as this yellow line again. And this shows you the area one mile outside of the permit area. That's required for determining the surficial geology.

This green andesite, you see it -- it's slightly covered here on the eastern edge of the permit area by the more orange, I guess, yellow-ish-orange color of the Santa Fe Group of sediments. And then barely see it, underneath this green line is a little

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bit of alluvium along Grayback Arroyo on the east side of the permit area, yellow color.

We have this fault system coming -- called the East Animas Fault system trending north/south, right on the eastern margin of the permit area. I'm going to go into detail about what that fault system -- how it behaves within the groundwater system and how we know its character.

So just more information. One very important parameter that we need and we use for assessing groundwater transport, impacts from dewatering, all kinds of stuff, is called hydraulic conductivity. The hydraulic conductivity basically just represents how water moves through the pore spaces or through fractures. And so it's -- you calculate it from testing wells, is the main way to calculate hydraulic conductivity.

So in this table here, which was also submitted as part of the Discharge Plan application, we have -- for each column here, we have water bearing zone, Range of Hydraulic Conductivity in these units, feet per day, and then I also put it in units of centimeters per second so you can see how the different -- some people use one set of units, some people use the other.

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I prefer feet per day. As an American we're stuck with those units.

The wells included in the test range. And then the value used in the model that -- the numerical model, the groundwater flow model, these are the values used. So we have a correlation between model input hydraulic conductivity and the range determined from -- from test, from specific wells.

Then the source of information.

I think the most important thing here is to show that the andesite, which is this nomenclature of Crystalline Bedrock Aquifer, comes from the Baseline Data Report. We've kind of carried it through. But I have a hard time calling the andesite an aquifer. It does have groundwater, but it's very immobilized.

Our range of hydraulic conductivity is 0 to .0027, which is extremely low. It's the lowest thing out there. And then many, many orders of magnitude more you see the Santa Fe Group range of hydraulic conductivity.

Now, this may be a little -- this just reflects the test data. As shown in the model, we have a larger range in hydraulic conductivity, because it covers a larger area and the variability that we have observed in the region, in the Santa Fe Group sediments.

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So those two things are slightly different.

Next.

All right. So now this slide 15 is a map we have. In the base of the map, you see these fine lines. Those are the -- that's the topography of the land surface. And, you know, it's an elevation. It's like a topographic map.

And then shown here in the blue lines, these are groundwater elevation contours. This map was required as part of the Copper Rule so you can determine groundwater elevation, but also direction of groundwater flow across the mine permit area.

These arrows show direction of groundwater flow. So basically groundwater flows from a higher elevation to a lower elevation.

So there are a few little differences. I mean, we have that regional groundwater flow that goes from west to east, and then we have -- locally we have some -- some things that are a little bit different.

So around the existing pit, you see these circles. That means groundwater is flowing into the existing pit, and as that groundwater flows in, where the pit is exposed and the surface water area is evaporated, that pumps it out. So that creates a hydraulic sink, and as defined by those contours.

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Another thing you -- that we look at when -- when we are analyzing these lines of groundwater elevation are the spacing between them. So a close spacing means very low hydraulic conductivity, generally, and a wider spacing means that there's a change in aquifer, hydraulic conductivity or transmissivity of thickness and the way it transmits water.

So here you see tight spacing in the contours, and then out here you see a wide spacing, where it comes out to the Santa Fe Group aquifer, and then you see this crazy bunch of lines all mixed with each other, trending north/south. What those represent are -- is the boundary, the hydraulic boundary that's observed by the East Animas Fault.

That fault we -- we have -- from well data, we have defined its location, but we've also -- have demonstrated that the water level on the west side of the fault is 130 feet higher than on the east side of the fault. So that difference tells you -- that's one line of evidence that there is some type of boundary there.

I'll go into the other lines of evidence on why it's a boundary of groundwater flow due to this presentation.

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Okay. I know you've seen a lot of geologic maps, but I'm going to have to use them some more. So slide 16 is a site geologic map, and the only difference here we have is you a -- you see a red line.

So what I want to do in the next set of slides, I want to show this map with the red line, and that red line represents a cross-section for that area. And so I'm going to work through the mine permit area, start with the pit, and I'll go along Grayback Arroyo and then the tailings impoundment area. And I'll show you what the underlying geology and aquifer system looked like just in the -- in cross-section format.

Okay. Starting with the pit area, we have this hydrogeologic cross-section. On the Y axis here, this is elevation in feet. So each one of these is 250 feet in elevation. And the distance is the same. So this -- this -- there's no vertical exaggeration on this cross-section.

You'll -- the andesite here is indicated by the green, and then the quartz monzonite and quartz monzonite breccia, which is the main part of the ore body, is the other two colors, the white and the pink.

This top line is the land surface as it is today. And you'll see here's -- we have existing wells shown in the dark black lines, and then these other

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lines that are black are from the drill holes, where we got the drill hole data to use to map this out.

Here we have the existing pit water body and the groundwater contours. On this scale it's hard to see, but groundwater is flowing towards the pit on either sides.

Next I'll show a cross-section along Grayback Arroyo. Here I've used a different color for the andesite, slide 19.

On this cross-section, the andesite is a gray color. Overlying that is the alluvium. That blue dashed line is the water table as defined by the well data. And then the tan is the Santa Fe Group sediments.

So along most of this transect, Grayback Arroyo is underlain by either alluvium or andesite, and then as you get out towards the east, you see it's alluvium and Santa Fe Group. This is where majority of recharge occurs in this system. We do not have recharge occurring in the andesite. It's more readily infiltrating out here to the east.

Okay. On the final one, it's a little off kilter here. This red line represents the area of the current and future tailings impoundment, which is this cross-section of that. It's from west to east. Slide 21 here.

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The andesite is also indicated by the gray color. And then you see a bunch of busyness in this -- what is now the Santa Fe Group, and this -- we have dashed lines representing beds of the Santa Fe Group, and this kind of a red color is a red clay within the Santa Fe Group.

These other dark lines here represent wells, and then the little stippled areas on the bottom of the screen here are wells for those wells.

You see a change going right in the middle. That change, which is depicted by this dashed black line, is the East Animas Fault. So here we define the location of this fault by wells on either side of it. We have this red clay that's been down-dropped on the east side of the fault. You see it's up here, and it's here. These beds are -- sediments are actually dipping down this way.

So this is -- comes right out of the stage 1 abatement and our conceptual model for the existing tailings impoundment. And what we determined is that the -- there's a little sulfate, TDS, total dissolved solids, plume that resides right here that infiltrated in this area, and it's -- it's stagnant. It can't go anywhere because of this fault system, or this fault that's defined as the East Animas Fault.

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Wells on each side of the fault, such as this one -- can't read the number, but that well does not have sulfate or TDS.

So we have the difference in geology, we have the groundwater data so you see the -- the blue hashed line and how it drops across the fault zone, and we have the water chemistry, all to provide us lines of evidence that this fault provide -- acts as a barrier, not as a conduit to flow.

Okay. There are many other estimates of where this fault resides, this fault being East Animas Fault, and it's in the published geologic literature, which has caused some confusion.

So these different dashed lines, you have pink, green and -- I guess that's purple or reddish. Those are different inferred locations of the East Animas Fault. But the real location is the blue line. And that's what we've identified through extensive study at the mine site.

All right. Moving on to another submittal requirement for the Discharge Plan permit application, Copper Rule requirement is to provide predischarge TDS data, predischarge to the -- which means anything prior to what the permit is -- the proposed mining operation discussed in the permit.

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So showing here is that same map of the permit area and the half-mile boundary with all the wells inside of it. So we use data from these wells to provide information on predischarge total dissolved solids. That's what TDS stands for. You've heard it several times, but it doesn't hurt to reiterate.

This table comes right out of the Discharge Plan permit application packet. And we have -- here again for each one of the columns in the table, we have the aquifer, the subaquifer, the predischarge concentration, the wells from which the data came from, the sample date and then their kind of location.

I think the important thing to point out here is that the only thing -- well, let me back up.

Most all the data at the mine site is less than 1,000 TDS except for the little area along Grayback Arroyo and then right within the ore body itself. Matter of fact, most of the water in the mine site is better than the City of Alamogordo La Luz well field, which you'll probably hear in Alamogordo you drink that in the summertime.

And just to recap the permit area hydrogeology, we discussed the geologic model, which is based on those cross-sections and the data, it's a conceptual model, not numeric. And we have a great

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understanding of the -- of the rock type, the map faults, structures and rock characteristics.

We have aquifer characteristics from well testing.

And we have water quality from over 40 years of data collected.

So it's a very robust data set that was -- gave us a good advantage for providing all the submittals needed for the Copper Rule for the Discharge Permit application packet.

Okay. Moving on, we're -- I'm going to go into how we analyzed on the hydrogeologic analysis that was performed on the open pit, Waste Rock Stockpile 2 and 3, which is by the -- over there by the header, WRSP, and tailing storage facility.

I'll start with the open pit. And here again -- oop. I'll talk about -- when I say closure and postclosure, I'm just talking about the -- we're talking about the hydrogeologic components that go into closure and postclosure, not necessarily the engineering aspect. And monitoring I'm referring to the Monitoring Plan. Just to clarify that.

First thing we do when -- which I believe this was discussed pretty extensively in the Technical Advisory Committee when we were developing the Copper

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Rule, is to define the open pit surface drainage area.

Shown here on slide 27 is the definition for the open pit surface drainage area. In general terms, it's just all surface -- it's the area in which the water of surface of the -- the surrounding area flows into the pit. So it's the -- it's the watershed area for the open pit, another way to explain it.

It's also defined as the underlying groundwater as contained by the pit. As I discussed earlier how you have groundwater flow into the pit, it's pumped out by evaporation. So that's contained.

Next.

Slide 28 is -- what we have here is a map of the pit area. And you see where Grayback Arroyo is diverted around -- as it is now, it is diverted around the current and future pit, which is the future pit is defined by this -- all these brown squiggly lines, which that's those -- those lines represent the benches and walls of the pit and also the haul roads. So it's a detailed topographic representation of the pit.

And then this blue area outline is the open pit surface drainage area. You'll see it on many other maps from here on out.

All right. So why -- you know, why is that really required? Well, part of the -- why is the open

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pit surface drainage area so important is -- it's important because it helps define what's required for the monitoring program, the groundwater monitoring program, and also it helps define what's required to protect water pollution as the main objective of the Copper Rule.

So here we have -- this is a map of the open pit area shown. And the base map is all those lines or the topography. You can see the pit centered here, the open pit surface drainage area. Within that open pit surface drainage area, there is Waste Rock Storage Pile 1, and -- so from there, we say, okay, let's develop a monitoring program.

Can you hit the next --

The monitoring wells were shown there earlier, but I'm using these green dots so those back there can see them a little easier. We have -- these green dots represent the monitoring program -- the groundwater monitoring program proposed in the Discharge Permit application packet, and they compose of existing wells and proposed wells.

So we have -- on the far left-hand side, we have wells upgradient. We have wells around the pit, and particularly the higher density wells on the -- what could be the downgradient side if it wasn't contained.

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And then I always consider the pit itself as a point, obviously. That helps define where the elevation of the water is.

There were -- I believe this plan was reviewed, accepted, but I believe the Environment Department proposed two other wells here, which I don't think are necessary. One is in this area up here, by the Waste Rock Storage Pile 1. I'm not -- I can't remember exactly where it was proposed. And the other is down in this corner, where we already have plenty of monitoring.

The way I envision this is like many other projects. You develop a Monitoring Plan, and for an extensive project like this, you use the groundwater flow model to also validate that over time as part of a -- a test to see how well it works.

So with those two tools, you have this network and a calibrated model in place, I feel very confident this what we have proposed here is very sufficient for defining conditions around the open pit.

Okay. So speaking of the groundwater model, the numeric model that's used to calculate effects on the aquifer, these blue lines are -- are elevation -- groundwater elevation contours simulated by the model, and they represent the elevation of groundwater at the

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end of mining.

And so from those lines, we can determine direction of groundwater flow. So direction of groundwater flow is towards the pit, and then with these flow arrows, we can determine what we call open pit hydrologic containment, another requirement of the Copper Rule.

So containment is all within the mine permit area, and that is demonstrated by the modeling effort. That is also referenced in -- and you can reference this information in great detail from the Probable Hydrologic Consequences report that I mentioned earlier.

Okay. So that's -- I gave you a snapshot of the monitoring system proposed during operations, what the groundwater system looks like at the end of mining. And then now we'll briefly go into the open pit reclamation.

What we're proposing -- or what New Mexico Copper Corporation is proposing for reclamation comprises of several components for the open pit.

There -- we have within the open pit surface drainage area -- you'll have a reclaimed watershed, as shown in the green there on slide 31. You have -- you'll have a -- this yellow represents a reclaimed haul road. So any water that comes from the watershed will

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be conveyed down the reclaimed haul road.

And then in the middle of the pit, it will be partially filled with water, what we call rapid fill reclamation. So it will be filled with clean water to -- to establish hydrologic equilibrium as a hydrologic sink. And I'll explain that in more detail.

So we use the reclaimed watershed, haul road and the pit shell and the surface area of the proposed rapid fill water body all to develop the water balance that goes into understanding what's required to reclaim the pit, but that water balance also is directly fed into the geochemistry analysis, that extensive analysis that SRK did, which they'll testify -- or present later on after me.

Next, please.

Okay. Just a recap on that. The rapid fill will be with low total dissolved solid alkaline groundwater. And that has many advantages. I won't go into all of them. One is to establish hydraulic equilibrium in the pit as a sink. Also to improve water quality.

The rapid fill to steady-state conditions maintains that hydraulic sink.

The steady-state open pit water level for maintaining the evaporative sink is 435 feet below the

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current pit. So if the current pit is a sink, water at extreme depth below the future pit will be a sink after reclamation, even during operations. That's going to be a hydrologic sink from here on out.

The evaporation, which is what maintains the pumping of groundwater and water that flows into the pit, the sink -- hydrologic sink conditions.

Okay. So now -- next, please.

I show this -- back to our cross-section we had of the open pit area, the only difference here you see from the previous one I submitted -- this is slide 33 -- this one's oriented west to east instead of north to south. I have the land surface at the existing pit water body. And then the hatched line is the future pit as proposed.

And we have these blue lines out in -- in the rock. There's two sets. There's a light blue, which is the model-simulated water level elevation for end of mining. So you see it's the bottom -- it's the very bottom of the pit there. That is dewatered. And then a hundred years after mining, which is in equilibrium with the levels to which rapid fill achieves to maintain that sink.

So with the elevation of the groundwater higher than what is in the pit, maintains groundwater

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flow to the pit and therefore prevents discharges to groundwater.

Next.

So just a water budget. This water budget comes from the groundwater fill model. And it's calculated from the numeric models.

And so we have -- just to show you the differences, we have -- the main thing here, in the bottom, we have the total water going in. These units are in acre-feet per year. Currently it's 25 acre-feet. And that same amount is evaporating out. And that's what maintains that sink that we have out there today.

In the future, we'll have 93 acre-feet coming in, 93 acre-feet evaporating out. And the reason why the evaporation is more, because the surface area is greater. The current water surface area is five acres, and the future one will be about twenty-two.

Another thing to point out here is that the groundwater flow is a smaller portion of what flows into the pit. You see here for both the current and future pit, the larger -- the larger component of any flow of water to the pit is run-off and precipitation, not groundwater. And that's because the andesite is very low permeability.

Next.

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Moving on to the Waste Rock Stockpiles 2 and 3. Since those are outside of the open pit surface drainage area, the Copper Rule requires an aquifer evaluation. So I'm going to briefly go over the aquifer evaluation, what we propose for monitoring and the calculations that went into demonstrating that what we're proposing is protective of groundwater, and surface water for that matter, being run-off.

Next.

Okay. Slide 36, I have a very busy geologic map of the Waste Rock Storage Pile 2 and 3 area. You've seen these lines that are shown in the footprint of that. And this geologic map is from the New Mexico Bureau of Geology. I have over here a definition of aquifer evaluation which is from the Copper Rule as cited.

On this map, I will -- won't go into too much detail on the geology, but all the green colors represent the andesite. You see under the footprint these yellow colored regions. Those are very thin veneer of what I call colluvium. You can just call it, you know, just stuff that's eroded off from Animas Peak.

We know that's very thin because down here in the bottom we have outcrops of andesite that poke through this cover. So this cover material will be

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scraped off, or the alluvial material will be scraped, and then -- down to the andesite, and then this -- the waste rock stockpile placed on top of the andesite.

Another thing to show here is you see these red lines are dikes, which all of them are mineralized and filled with minerals, having low permeability, similar to the andesite or less. But even if -- if they for some reason did represent a localized fracture system, none of them are mapped within the footprint of the waste rock storage pile. So we have very -- an area of very competent rock.

One of our key lines of evidence for the hydraulic properties of the andesite in this area comes from this big red dot, which I put here, and the label. This well is GWQ-5,R which we did extensive testing on this well as part of stage 1 abatement.

Slide 37, I have a graph here of data collected from that well I showed you on the map, called GWQ-5R. And on the Y axis, we have depth to water. And then on the X axis, days since well was drilled.

This red line represents the total depth of the well. And when we drilled this well, it was dry. So typically when you drill a hole and it's dry and you expect water, a lot of times someone will move on, say, well, let's don't make a well here. We decide to make a

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well, because I had some extreme curiosity and suspicions.

Over time, we had, as shown by this dark line and green dots -- we measured to see if there was water in the well, and the water slowly seeped in over time. Took 90 days for it to come up to where -- what we call the -- where the groundwater is actually represented in this -- at this location.

That -- that is an indicator of how low the permeability is in this andesite. Matter of fact, this well, we were barely able to produce enough water out of it every three months to sample for stage 1 abatement. It's not -- it wouldn't be adequate for a stock well or for any other type of well, for use, that is, just sampling.

All right. So if you were standing at that well and you wanted to look across to the north, say northwest, you would -- you would be seeing this photograph. This is a photograph, presented in slide 38, looking towards Animas Peak northwest. And on this photograph, I have identified several features.

Down here, lower part, you see kind of this line going through. That's the -- that's Grayback Arroyo. And then we have an surface water monitoring station. That's what SWQ-3 stands for.

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This little -- you see this kind of -- what do you call it -- pile-looking stuff, that's the andesite outcrop. And then this white line here is the approximate area of the Waste Rock Storage Piles 2 and 3.

So photos like this really provide a good indication for me as a hydrogeologist to say how am I -- if a facility is built here, how am I going to monitor this thing. Even though the andesite has low permeability, where do I expect -- if there was something to emanate out from the pile that could cause a discharge to groundwater, where would I put wells.

So what -- what you see here is -- you'll see these little drainage in the footprint of the waste rock stockpile. There's drainage here, there's -- you can barely see one there, and there's one here.

I'll show a map here of where the monitoring wells are, but they are at those locations at the toe of the pile where these drainages are. That's the most likely place to be monitoring for discharges for this type of a facility.

Next.

But before I get to the Monitoring Plan, I'm going to talk about a conceptual model that we developed as part of the aquifer evaluation.

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MS. ORTH: Okay. Mr. Finch --

MR. FINCH: Yes.

MS. ORTH: -- I'm sorry to interrupt you.

It's noon. I'm wondering if you would estimate the rest of your comments.

MR. BUTZIER: Madam Hearing Officer --

I think your direct's probably only 15 minutes more?

MR. FINCH: Yeah. I'm on slide 39. I believe I have 48.

MS. ORTH: Okay.

MR. BUTZIER: Maybe that's underestimating.

MS. ORTH: So my question -- my real question is would you like to break for lunch and come back or keep going?

MR. BUTZIER: My own personal preference is that we continue at least through the end of his direct testimony, but I'm flexible.

MS. ORTH: Anyone object to that?

Okay. Thank you.

Please go ahead.

MR. FINCH: Okay. Thank you.

So during operational conditions, this is a -- has a vertical exaggeration. So it's actually exaggerating. So potential discharges during

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operational would only occur -- if you had stormwater collected on the pile, it would -- it could infiltrate through a preferential pathway, would hit the andesite -- andesite is on a slope -- and go into the toe drain and be conveyed into a lined stormwater pond.

But that is not what we found through a modeling exercise. We used an engineered standard model to evaluate potential infiltration, percolation through the pile during operations and found that it's not likely. So to have a discharge of groundwater at this facility or operation, you have to have water go through the pile and then go through the andesite.

And so there's -- I guess what I would say there's several lines of defense here to prevent groundwater discharges.

Next.

The other thing I think is -- which I love about the Copper Rule is that there's a very strong requirement for stormwater management. And that's one of the best things about it. Stormwater that's going to be diverted away from the waste rock stockpile.

The low moisture content of the material in the pile prevents downward migration of surface infiltration from precipitation.

The toe drains allow for capture of impacted

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stormwater, of, you know, water that may impact stormwater.

And the andesite permeability is extremely low, as I've already demonstrated.

And then from our modeling runs and analysis, we're not expecting anything to infiltrate during the operational period. This is also consistent with what we've seen out there with existing stockpiles that are over 30 years old. And there's no evidence of seepage out from the base -- or the toe of those -- of those facilities.

Next.

Okay. That was during operations. This is just a summary of what's -- what we have after reclamation.

Here again stormwater is diverted away from the facility.

There is an installation of a store-and-release cover that prevents infiltration for the long term.

And then our modeling indicates that there -- if there is any discharge, you know, like many, many years out, that's going to be extremely small and not even measurable.

So there's the benefits of what's -- what we

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have here is that there's limited time between operations and reclamation, and that prevents infiltration. And a store-and-release cover system for the long haul after this system is recovered -- or reclaimed. And then the last line of defense is the low permeability of the andesite.

We believe this all meets the requirements for the Copper Rule to prevent discharges to groundwater.

All right. Finally, our -- this is a map of the facility, and I'll briefly go over the proposed monitoring system.

Can you click the next --

So we have -- this well up here, PGWQ-3, on slide 42, represents the background. You need a background well -- or upgradient -- I'm sorry -- an upgradient well for each facility.

And then we have -- as close as possible to the toe of the stockpile, we have wells lined -- or up against it. And each one of these locations are in areas where -- as I described previously, where we expect if there were to be any water coming out from the base of the facility, it would report there in those drainages, underneath it in the footprint.

And in addition, we have wells downgradient, along Grayback Arroyo.

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I believe the -- there is another location where the Environment Department proposed an extra well up in -- on the north side of the facility, and we don't believe that's necessary based on our understanding of groundwater flow in areas for potential discharges.

In addition to groundwater monitoring, in the proposed Monitoring Plan we have surface water monitoring. And that surface water monitoring relates to stormwater, or wherever water is in Grayback Arroyo. So as part of the stage 1 abatement, we put in autosamplers. They're these whole systems that collect stormwater.

And -- and you see on this map we have the permit boundary outline, and this blue line is Grayback Arroyo as it goes through the permit area. The yellow is the open pit surface drainage area. And then each one of these green diamonds represents a monitoring point with an autosampler.

We actually have those in place today. We have -- the upgradient one is SWQ-1, and we have SWQ-2, 3 and 4. And let me qualify. Those are in place today. We propose to add SWQ-5. This gives you very valuable data from monitoring stormwater through the mine site.

Okay. Last but least, we'll go over the tailings storage facility. And I'll briefly discuss

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aquifer evaluation and proposed Monitoring Plan.

You'll find this -- I'm not going to go into a great level of detail, but the aquifer evaluation included an analysis of potential liner leaks. That is because it's a lined facility. That's the only way you would have a discharge, is through leaks in the liner.

And this comes right -- this Table 3.6 on slide 45 comes right out of the Probable Hydrologic Consequences report. And there's a great level of detail in that report on this. This evaluation or calculation of potential leakage was then used by SRK and others to evaluate discharges to groundwater.

We also did some precontaminant solute transport modeling of what would happen. Basically it's the same thing. If you had a leakage, what you calculate here would be a very small rate of .5 gallons per minute, and it would stay in the area within the footprint of the tailings storage facility, just as what we've identified in the stage 1 abatement for the existing facility.

Next, please.

So to summarize that, it's -- we've used the industry standard for evaluating the potential leakage, and it's a fairly insignificant rate.

The hydraulic gradient -- so the driving force

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for any discharges in groundwater is the hydraulic gradient. When you put a lined facility over an area that was previously recharged, you reduce that recharge, and the hydraulic gradient flattens.

That hydraulic gradient will flatten and make it where groundwater movement is reduced significantly.

The potential leakage that percolates to groundwater will blend or remain beneath the tailing storage facility for hundreds of years. This is all based on our -- our numeric model analysis and analysis of liner leaks. We feel very confident about that.

Okay. Monitoring. So with -- even though it's a lined facility, I think we have a very robust monitoring program that --

Can you hit one and one more.

There we go. Perfect.

The green dots represent what we propose for monitoring the tailing storage facility. We have an upgradient well here as -- as required, and we have perimeter wells where we feel are the most important areas for monitoring.

There is the -- the Environment Department had proposed a well down here, in the southwest corner. We don't believe that's necessary given our understanding of the direction of groundwater flow and the fact that

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it's -- the andesite is there, you have andesite, you have a lined facility, just like -- but nevertheless, we feel we've got a good curtain of monitoring points around the other parts of the facility.

And more importantly, here is the East Animas Fault. We have wells -- it's hard to tell. We have wells on either side of the fault.

Another thing to point out here, the wells in yellow are current -- are wells that exist today, and those -- as the facility is built out, they will be plugged and abandoned. But I'm sure data will be collected as much as possible from those wells until they're plugged and abandoned.

All right. I'm going to summarize it so we can go to lunch.

We have a high confidence in the understanding of the hydrogeologic setting and groundwater protection measures due to the abundance of site data and detailed evaluations.

The Copper Rule requirements were considered for the aquifer evaluation and monitoring for each proposed facility. I feel like we've met every aspect of that.

The operational and postmining conditions are considered for groundwater protection measures.

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So not only that, there is a continuous responsibility to prevent discharges to water -- to groundwater and to prevent water pollution.

In my professional opinion, the New Mexico Copper DP-14 -- 1840 is compliant with the Copper Rule. We've gone over in excruciating detail and provided what I would call above and beyond analysis to meet those requirements.

MR. BUTZIER: Thank you, Mr. Finch.

Madam Hearing Officer, I may have a few questions to ask, but I suggest we take -- take a break now that he's gotten through his direct testimony --

MS. ORTH: All right.

MR. BUTZIER: -- and then pick up with that after lunch.

MS. ORTH: All right.

MR. BUTZIER: Thank you.

MS. ORTH: Thank you, Mr. Butzier.

Let me ask, just show of hands, if I were to invite public comment immediately following the lunch break, which will be in an hour, is there anyone who would want to make that public comment today?

I see one hand, two hands, three hands. All right. So I'd like to do that, then.

When we come back -- excuse me. Is an hour

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enough? Should we do an hour and 15? 1:30?

So let's do 1:30. And when we come back at 1:30, I will invite public comment, as many people want to give it, and then we'll return to Mr. Finch's testimony.

Thank you.

(Proceedings in recess from 12:18 p.m. to 1:31 p.m.)

MS. ORTH: We are back after a lunch break.

And pursuant to some earlier comments, there were definitely some folks who would like to offer public comment after the lunch break and before we return to Mr. Finch's testimony.

Just a few things about public comment.

One, you will be sworn in. You'll be asked to swear or affirm that your comments are true.

Two, I have to ask you not to stray into technical comment. Technical comment is essentially scientific comment that would require the education and expertise to back it up. So please don't stray into technical comment.

As I explained earlier, I do not set a time limit by minutes. I ask only that you not stray into science, that you not repeat yourself and that you don't engage in any personal attacks.

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I think those are the only three rules we have for public comment.

So we're going to start with this gentleman, then we'll move to Ms. Brittan, and I know of at least a few other folks to call on when they're completed. We'll take public comment until folks in the room are done raising their hand.

One more thing. Public comment can be offered either verbally or in writing or both. That is to say you can make verbal comment and then hand me the paper on which you're basing that verbal comment. That's fine.

However, I do have to ask you to offer public comment verbally only once. So please collect your thoughts before you go. Repeated appearances don't -- aren't beneficial. If you think of something you really want to add to what you said today, just write it out, and it will be added to the written public comment.

All right?

So this is not anyone's only chance. There will be lots of chances all week long.

We'll start with you, sir, if you would give us your name.

MR. CHATFIELD: My name is Harvey Chatfield.

And I live right down a little ways from the

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mine there on Animas Creek.

MS. ORTH: All right.

HARVEY CHATFIELD

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

THE REPORTER: Would you spell your last name for me.

MR. CHATFIELD: Chatfield, C-H-A-T-F-I-E-L-D.

THE REPORTER: Thank you.

MS. ORTH: Please go ahead.

MR. CHATFIELD: Okay.

Well, I just wanted to say, you know, Burt here, when we used to run that ranch there where the mine is, one time he told me, he said -- I worked up there from the get-go when it started until -- a matter of fact, I went to work for the company that tore the thing down, and which was a sad day. But anyway, old Bert, he says, "Harvey, I imagine this mine job kind of saved your ranch, didn't it?"

And I said, "You just bet it did," because it was right there close to home and I could ranch at night and work the mine in the daytime, you know.

But -- and I never saw anything out there that was shady or anything else that the mine tried to do to

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go around the rules or regulations and everything. We had monitor wells all below the tailings dam. We -- I worked with the engineering company and -- or department, and we had to monitor those wells and take elevations on top of the tailings dam and everything else to make sure that there weren't any problems.

And so I could say I think maybe there was a leak there maybe where the -- where the bedrock was pretty close to the surface, and I think that's the only problem that there was. But that will be -- that won't be in a new area.

So I just wanted to say that I think I can see no way that with all these liners and new things we have -- excuse me -- nowadays. And I've seen those in garbage dumps put down, you know. I've never seen them in a mine operation. But they look pretty darn efficient to me.

And I think with everything we've got going, I don't see how. And I don't see how anything could ever get to Animas Creek. There's people here that think it's going to get over to Animas Creek, but that's in a different drainage, and it -- it's just almost impossible.

So I just think we need the mine, and I think there's no way that they're going to contaminate

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anything.

MS. ORTH: Thank you, Mr. Chatfield.

Ms. Brittan, if you would tell us your name, spell the last name, and speak into the microphone.

MS. BRITTAN: My name is Rhonda Brittan, B-R-I-T-T-A-N.

RHONDA BRITTAN

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. BRITTAN: Well, I wrote my public comments prior to this hearing. I have found out since that the tailings storage pit will be 627 acres in size. And that's just the tailings pit.

There is a reason I will not go to Silver City. I become horrified and depressed at seeing and feeling the mine there. Now, I really do feel the mine. Maybe it's an absence of mass that I am sensing. They have plumb bobs that will swing toward a mountain because it's massive. So there's a definite physical attraction, and it -- it doesn't exist. And there's an emptiness. There's literally a hole in Silver City.

This is a monstrous project. Reopening the Copper Flat Mine is a terrible idea on several counts.

I spoke with Brad Reid at the water quality

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bureau in Albuquerque who told me this mine will require a water tailing storage facility encompassing several hundred acres. That would be 627 acres I heard today.

Any run-off will flow down the face of the dam, into some sort of collection pond. I don't know the size of that. What kind of vapors will that give off? Toxic elements that will drift into the air around the neighbors in the area?

The absolute destruction of several hundred acres of beautiful land and wildlife habitat should be enough to block this project, but to dump noxious tailing into a huge, plastic-lined pit endangers the groundwater, a much more precious resource than the copper they hope to extract.

If the water tailing storage pit develops a leak, how could it possibly be repaired or even detected before groundwater contamination occurs?

And from Mr. Smith's testimony this morning, he seemed to indicate that there would be some groundwater contamination in order to detect the -- you know, as a leak is being detected.

I hear there is a very loud smashing and grinding involved in processing the ore on site. Besides the noise, there is an airborne dust created, which I imagine is not pleasant to breathe either.

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So besides the air pollution, water pollution and noise pollution, this project plans to operate right next door to the Ladder Ranch, a well known environmental preservation project, which as of Friday, the 21st, had a total of 191 visitors this year, with a full schedule of tours for October lined up.

The mine is the exact opposite of this immediate neighbor's business and is absolutely the most ruinous of neighborhood projects imaginable.

The couple hundred local folks proposed to be employed by the mine does not compete with the money that hundreds of tourists every year consistently spend on local hotels and restaurants so they can observe and appreciate the amazing and beautiful natural landscape and wildlife that New Mexico is known for and that our children will inherit for generations to come.

The short-term thinking of the bottom line of this mine will dry up our local wells with an outrageous number of gallons of water usage. Where will we be then? Ecotourism will be gone forever if we protect this sustainable industry.

Thank you.

MS. ORTH: Thank you, Ms. Brittan.

Mr. Swingle.

Give your name, and we will swear you in.

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MR. SWINGLE: Thank you.

My name is Bruce Swingle. That's S-W-I-N-G-L-E.

BRUCE SWINGLE

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. SWINGLE: Thank you.

My name is Bruce Swingle. I am county manager for Sierra County, and I'm speaking on behalf of the Sierra County Board of County Commissioners.

The Sierra County County Commission has and continues to support Copper Flat Mine. In determining whether to support the mine, as a matter of public policy County leadership relied on much data and information presented by a number of credentialed professionals, professionals with extensive experience and expertise in mining.

After assessing New Mexico Copper Corporation's business model and environmental safeguards, the County Commission has approved two resolutions of support for the mine. The City of Elephant Butte and Village of Williamsburg have also passed resolutions of support. Suffice it to say the vast majority of Sierra County residents support the

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mine.

Today New Mexico Copper, Jeff Smith, gave a great presentation on Copper Flat Mine operations and mitigation plans, plans, you know, strategies to protect the environment and area resources.

Let us not forget New Mexico Copper Corporation is trying to reopen a mine that has been operating on and off for generations in an area where the mining of copper and other precious metals has occurred since the 1880s. It is absolutely a part of this community. Mining is a part of this community.

Mining particularly at the Copper Flat site is culturally and historically connected to Sierra County. Hillsboro was originally selected as the county seat only because of mining and the mining population that existed at the time.

Many misrepresentations have circulated -- and I'm sure you're going to hear many of those tomorrow night -- have circulated about how the mine is going to harm the Rio Grande Valley. These misrepresentations are intended to scare people and create a hysteria against the mine.

The fact is New Mexico Copper is committed to responsible mining, reasonable environmental protections and safeguarding our community and our state.

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One of the misrepresentations is due to the wetter -- a well -- a water contract the mine is required to hire members of the Jicarilla Apache Nation. Indian preference is language -- is common boilerplate language in many contracts with Native American entities.

As a former county manager in McKinley County, I entered into a number of Indian preference contracts with the Navajo Nation. Indian preference simply means that if you have two candidates with equal skills, equal experience and equally suitable for the company, you would hire the Native American. Ultimately you hire the candidates best qualified, best suited for the job, which, of course, could be a Jicarilla member.

Regardless of the contract with the Jicarillas, the mine will need to hire many skilled workers from outside of Sierra County. Sierra County does not have enough skilled workers in the mining industry to satisfy the need. Growing our community's population is an intended benefit we welcome in Sierra County.

Another misrepresentation is that New Mexico Copper Corporation will bus employees to the mine from various areas from the state and out of state, thus no or limited Sierra County residents will be employed.

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The truth of the matter is creating van pools to transport workers to a job site is positive for all concerned. Transporting workers from T or C to the mine decreases traffic and serves as a benefit to the employees. St. Cloud mine, many other mining operations and other operations around the state currently use a van pool system to transport employees to the job site.

The final misrepresentation I'll discuss is mining camps. This misrepresentation claims that no mine employees will live or shop in our community and that employees will be required to -- or forced to live on mine property and shop on mine property.

New Mexico Copper is not creating mining camps in Sierra County. Although mining camps, research camps, oil and gas field camps and the like serve a purpose in extremely remote areas, Copper Flat mine is not in an extremely remote area.

Sierra County and the State of New Mexico need Copper Flat Mine. New Mexico and Sierra County rank at the bottom of most socioeconomic measures. Copper Flat Mine can single-handedly change the economic landscape in Sierra County and vastly improve New Mexico's economy without compromising the environment.

Sierra County's per capita income is a meager $20,495, while the national rate is over twice that at

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over $58,000. Sierra County is truly one of the poorest counties in one of the poorest states in the country.

The county's median household income is $29,679, substantially lower than the state's which is over $46,000. The national median household income is over 49 -- over 59,000.

New Mexico has the second worst poverty rate in the United States at over 20.4 percent. The national poverty rate is 12.7 percent. Sierra County's poverty rate is over 22 percent.

The mean property value in Sierra County is $89,900, compared to the state's rate at $167,500. Properties are not selling, and there's virtually no construction -- or new construction in Sierra County.

As of March, 2018, Sierra County's unemployment rate was 8.8 percent compared to New Mexico's rate of 5.6 percent.

To compound the issue, Sierra County is losing its population. The county's population has declined 19 percent since 2000. Unfortunately, without the mine and similar economic development projects to create jobs, the county's population will continue to decline.

Currently our youth leave the community to seek meaningful employment while our skilled workers work for far less than what they can make in nearby

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communities. One can't blame the youth or a skilled workforce for leaving. They have to work, and they have to receive a reasonable wage.

From a public policy perspective, the only thing worse than the outmigration of residents is for the residents capable of working to stay here. They will stay unemployed or underemployed, and they'll end up collecting unemployment and other social assistance programs.

Sierra County needs this mine. Copper Flat Mine will provide a significant economic boost to Sierra County and New Mexico through job creation and tax revenues. The mine will create approximately 1,300 direct, indirect and induced jobs. Copper Flat Mine is expected to create approximately 275 direct jobs, making it the largest employer in Sierra County. The estimated taxes paid over construction and life of the mine is approximately $175 million.

Property taxes alone are projected to exceed $6.5 million. In a county that only collects $8 million a year in taxes, the mine will equate to improved services, a better quality of life for our residents and provide much needed revenue for our schools. Currently the mine pays about $5,700 a year for the property. The numbers are dramatic with the operating -- the mine

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opening.
The mine will stimulate population growth, improve employment rates, increase earnings per capita, positively affect our housing market, improve the quality of life of our area residents and certainly affect other key industries in the area, such as construction, retail, arts, entertainment, recreation, health care and tourism.
The entire state will benefit from Copper Flat Mine. As of February, 2018, New Mexico Copper Corporation has spent $38.8 million in New Mexico. Of that, 3.4 million in Sierra County, 12.6 million in Albuquerque and 22.8 million in other parts of the State of New Mexico.
With respect to the -- to the environment, we're all environmentists -- we're all environmentalists to some extent. We all want to protect our natural resources. These resources sustain our way of life, our culture. However, if somebody is against mining simply because of a belief that mineral extraction is an assault on the environment, they will never support the mine. They will never support any mine for that matter.
Reasonableness must prevail. Mining is accomplished all over the country without harming the environment. After hearing New Mexico Copper

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Corporation's presentation today, reasonable -- reasonable people will agree that New Mexico Copper Corporation is implementing reasonable safeguards to protect the environment, our community and our state.
The environmental debate reminds me of the Dakota Pipeline protests in 2016. Extremists -- and I don't use the term "extremists" carelessly or irresponsibly. Extremists from around the country reacted to the construction of an oil pipeline running from North Dakota to Southern Illinois.
In reality, it was a pipeline similar to the 2.4 million miles of energy pipeline running across this country. This specific pipeline created no greater threat, no greater harm to the environment than any other pipeline. But these individuals failed to reason and believed that this particular pipeline would cause irreparable harm to the environment.
You're dealing with an extreme element that will not reason or rationalize facts. They are against mining and this mine in particular regardless of what measures New Mexico Copper Corporation employs. They believe mining in any fashion will destroy the environment. They believe that creating good-paying jobs through mineral extraction is harmful to the environment. They fail to comprehend that the

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preservation of the environment and the creation of jobs are not mutually exclusive.
After decades of regulations, state and federal oversight and scientific and technological advancements, many extremists refuse to acknowledge that a win/win scenario can be achieved. Based on the plan articulated by the New Mexico Copper Corporation today, the Sierra County Commission believes New Mexico Copper Corporation mine meets every reasonable standard.
The commission implores you to make the reasonable decision, make the right decision for Sierra County and the State of New Mexico and approve Copper Flat Mine's groundwater protection Discharge Permit.
Thank you for giving Sierra County the time and opportunity to support the mine today.
And I do have written comments for you.
MS. ORTH: Thank you very much, Mr. Swingle.
I'll make a stack of written comments here on the table.
MR. SWINGLE: Thank you.
MS. ORTH: Thank you.
Let's see. The gentleman in the black hat.
MR. IRWIN: Good afternoon.
Can everyone hear me?
MS. ORTH: We need to swear you in.

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RAY IRWIN
having been first duly sworn or affirmed, gave public comment as follows:
PUBLIC COMMENT
MR. IRWIN: My name is Ray Irwin. I'm a registered professional geologist, currently serving as exploration manager for Stella Natural Resources, and I'm here today on behalf of the New Mexico Business Coalition.
As you may or may not be aware, the New Mexico Business Coalition is a grassroots, statewide, pro business association. We support job creation and reasonable regulation, which includes granting of the necessary Discharge Permit for the Copper Flat Mine.
As vice-president of exploration for THEMAC Resources from January, 2012 to December, 2013, excluding hydrological studies, I planned and supervised all geology-related activities at the Copper Flat Mine site. As a result, I have specific knowledge and a deep understanding of the project's geology and potential environmental impacts due to the planned mining.
During this and since my time working on the project, THEMAC Resources has expended a very significant amount of time and money to develop a Mine Plan that will safely explore the copper deposit at

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Copper Flat in an environmentally sound manner that complies with all state and federal regulations and minimizes long-term environmental impact.

You will probably be hearing opposition to this mine that is largely if not completely emotionally based. My comments will stick to what I know to be a fact. The Copper Flat Mine is going to be a closed loop facility which not only minimizes water consumption, but also prevents water from leaving the premises except via evaporation.

Additionally, a lined tailing storage facility equipped with an impermeable synthetic pond liner will be constructed to prevent water used in the milling process from seeping into groundwater while simultaneously mill tailings are secured by an engineered structure to prevent discharge into nearby drainages.

Since the planned operations at the Copper Flat Mine will be a zero discharge facility, it will not require a natural pollutant discharge elimination system permit from the EPA which governs surface water discharges. Likewise, under current mine plans and designs, Copper Flat will not need a 404 permit from the US Corps of Engineers.

With these plans in place and federal agencies

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satisfied, NMBC is confident that a groundwater Discharge Permit approved by the New Mexico Environmental Department would be a prudent step in moving the development of the Copper Flat Mine forward.

From an economic perspective and during the 18- to 24-month construction period, the Copper Flat Mine will generate approximately 1,150 direct, indirect and induced jobs in the region and the state.

Once in operation, the Copper Flat Mine will generate approximately 275 to 300 long-term, high-paying jobs in the Sierra County location and, similar to the construction phase, many more indirect project-related service and support jobs in the region and the state.

The estimated annual income -- or annual payroll is approximately $16 million before payroll taxes and benefits. These anticipated new high-paying jobs with good benefits is exactly what Sierra County and New Mexico needs.

The NMBC and I therefore ask that your decision on this important issue not be swayed by negative misinformation and encourage you to approve the groundwater Discharge Permit.

Thank you for your time.

MS. ORTH: Thank you, Mr. Irwin.

Did I see another hand over here?

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Sir.

Thank you.

MR. IRWIN: You bet.

MR. LYON: I'm Kenneth Lyon, chairman of the Sierra County Commission.

KENNETH LYON

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

THE REPORTER: Would you spell your last name, please.

MR. LYON: L-Y-O-N.

THE REPORTER: Thank you.

MR. LYON: And, of course, our county manager just gave a very articulated, well written talk which does certainly express the opinion of the County Commission. I just want to add a few quick things to that.

One would be that we appreciate you coming down for this hearing to hear input from the county. But probably what you're going to get if you're a proponent of increasing the tax base and a proponent of mining, a proponent of new industry, you're going to hear people say yes. If you hate mining to start with, you're going to hear people say no. If you're just

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totally opposed to mining, really the rationale doesn't have anything to do with it perhaps.

What does have to do with it, we're relying on the state to make the good judgment whether this mining operation is lawful, if it's legal and if it will truly protect the environment. And if you people find that to be true, certainly we're in support of it.

We don't have Silicon Valley moving to Sierra County. We don't have any big manufacturers or corporations coming in to set up business. We don't have the opportunity that Las Cruces does for new businesses. We don't have the opportunity that Albuquerque has for new businesses.

This is one of the very few shots we have. I feel we're very fortunate they're even considering opening it up. I'm glad they haven't got discouraged. They've spent millions of dollars already.

And I just want to state again the County Commission certainly supports you. Thanks for choosing Sierra County to open the mine.

MS. ORTH: Thank you, Mr. Lyon.

Did I see another hand on this side of the room?

No?

Let me focus over here. Other hands over here

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for public comment?
This is not your only opportunity.
Anyone?
No.
All right. We will return to the technical case, then.
Where did Mr. Finch go?
MR. FINCH: Right here.
MS. ORTH: There he is.
UNIDENTIFIED SPEAKER: Will we have an opportunity to ask Mr. Finch questions?
MS. ORTH: Yes.
UNIDENTIFIED SPEAKER: Thank you.
MS. ORTH: People in the room have the opportunity to ask questions of every witness. I turn first to the agency, then to the ranches, then to Elephant Butte, then to the audience. That's the order in which I take questions.
So, Mr. Finch, you remain under oath, and I believe Mr. Butzier had some wrapping-up questions for you.
MR. BUTZIER: Thank you, Madam Hearing Officer.

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STEVEN FINCH
having been previously duly sworn or affirmed, was examined and testified further as follows:
DIRECT EXAMINATION (Continued)
BY MR. BUTZIER:
Q. Mr. Finch, you referred in your testimony to the diversion of the Grayback Arroyo.
When did that happen, and what's going to happen at the end of mining to the arroyo?
A. The arroyo diversion was created when Quintana Minerals started their project, which routed Grayback around the open pit. And that will stay that way all the way through every sequence of this proposed project, as my understanding.
Q. Okay. Thank you.
I think at one point in your testimony you talked about a primary purpose of the -- of the Copper Rule was to protect water pollution.
I assume you meant protect against water pollution; is that correct?
A. Yes, that is correct.
MR. BUTZIER: Could we have slide 29 pulled up, please?
Q. Mr. Finch, while we're working to solve the technical -- well, here we go. Sorry.

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And could you bring up the green dots again. I think -- yeah.
Mr. Finch, you indicated when this slide was up that there's plenty of monitoring.
Do you recall that?
A. Yes, I do.
Q. What is -- what is your response to the notion that there are certain gaps between, for example, the upper right side of the pit facility? Why wouldn't it be necessary to put a monitoring well in between the two that are up there? Upper right.
A. Upper right. So looking at slide 29, that's in the neighborhood of Waste Rock Storage Pile 1.
I'm sorry. Can you re --
Q. I'm just asking, you know, there's a distance between those two monitoring wells, and why do you think it's unnecessary to put another monitoring well in between those two?
A. We have numerous other wells to the east, right on the other side of Animas Peak. You want to include the whole monitoring system as a whole. That's -- but I guess to sum it up, I -- with the existing wells we have, which are less than what's proposed here, we're able to define a system that's -- and the hydrologic sink aspect of the existing pit. I

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don't see why we would need, you know, so many more wells to do that.
And we're proposing additional wells here to the north and one to the southeast. To me, that's more than adequate.
MR. BUTZIER: Could we pull up slide 40, please.
Q. In connection with this slide, Mr. Finch, you indicated that on the second bullet point there that the low moisture content -- I think your testimony was that that suggested that it would be unlikely there would be water infiltration. That might seem counterintuitive.
What -- can you expand on what you meant in connection with that bullet point?
A. This is in -- slide 40 is in reference to Waste Rock Stockpile 2 and 3 during operations, and so material that's going to be made up of that pile as it's -- as it's dumped, it will have low moisture content, or zero for that matter, and it's also coarse grain. It's going to be -- there have been numerous studies that evaluate the grain size distributions of these types of facilities.
And with the low moisture and the big void spaces within the pile that will develop, these void spaces have air, and the air acts as a -- basically a

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barrier to vertical migration of infiltrated precipitation.
Q. Okay. Thank you.
And can we go to slide 47, please.
Here again, Mr. Finch, there's -- there's a ring of monitoring wells, and then there's a gap in the lower left, this time between two monitoring wells, and I think you indicated that it's unnecessary to put a monitoring well in between those.
Could you expand a little bit more on why that's your opinion?
A. Yes. As was provided in my direct testimony, the direction of groundwater flow is west to east. It's not south in the direction of your -- where you're indicating. Not only that, this corner, this southwestern corner of the tailings impoundment at slide 47, that's andesite. So we have a -- I just don't see a need to put another well in the andesite.
Q. Okay. Thank you.
Now, Mr. Finch, did you provide your resume to me that is now Exhibit 10 of New Mexico Copper Corporation's exhibits?
A. Yes.
Q. And the PowerPoint presentation that is slide 11?

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A. Yes.
Q. Okay.
And is Exhibit 12 from New Mexico Copper Corporation's submission an additional water balance detail for the Copper Flat mining scenario?
A. Yes.
Q. And then slides -- or -- excuse me -- Exhibits 13 through 20 of New Mexico Copper Corporation were additional materials that -- that we have included as exhibits that relate in some way to your testimony; is that correct?
A. That is correct. That relates to my analysis that was performed --
Q. Okay.
A. -- as presented here in my direct.
MR. BUTZIER: Madam Hearing Officer, New Mexico Copper Corporation moves the admission of Exhibits 10 through 20 that were part of the statement of intent to present technical testimony package.
MS. ORTH: All right.
Any objections?
MR. DE SAILLAN: Madam Hearing Officer, I have one issue with the slides, which I believe is Exhibit 11. Slide 11, at least my copy, shows the pop-up that Mr. Finch included in his presentation, and

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that pop-up eclipses the original slide. So I think if Mr. Butzier could provide us with a copy of the original slide, we wouldn't have any objections.
MS. ORTH: All right.
MR. BUTZIER: We can certainly do that. Thank you.
MS. ORTH: All right. Thank you, Mr. de Saillan.
Anything else?
No?
All right. In that case, NMCC Exhibits 10 through 20 are admitted.
(Exhibits NMED 10 through 20 admitted into evidence.)
MR. BUTZIER: Thank you, Madam Hearing Officer.
That's all I have.
MS. ORTH: All right. Thank you.
Mr. Knight, do you have questions of Mr. Finch?
MR. KNIGHT: I do not.
MS. ORTH: Thank you.
Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.

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CROSS EXAMINATION
BY MR. DE SAILLAN:
Q. Good afternoon, Mr. Finch.
A. Good afternoon.
Q. I understand you work for Daniel -- or -- excuse me -- John Shomaker & Associates.
A. That is correct.
Q. I'd like to please ask you to give Dr. John my regards.
I'm going to go through some questions here for you, and I'm going to focus for the most part on your slides, but at the end I'll have a number of questions that don't exactly relate to the slides.
But I'd like to start now with slide number 12.
And as I understand that, that shows a -- it looks like a large number of borings that were taken around the site; is that correct?
A. That's correct.
Q. Okay.
And were there -- were the -- were the observed water levels in each of those borings recorded?
A. In some of them, they were. A few of these borings were converted to monitoring wells.
Q. So some of them it was recorded, but some of

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them it was not?
A. That's correct.
Q. Do you know approximately how many or what percentage it was recorded?
A. No. I used the geologic data from this -- from these holes, did not use the -- any water level data.
Q. Okay.
Is any of that information in the administrative record?
A. Are you -- can you specify? You mean which information?
Q. The information as to the water -- the observed and recorded water level in the borings.
A. The borings that were converted to monitoring wells are -- that information is in the Stage 1 abatement report.
Q. So that applies just to the ones with -- that were converted into monitoring wells.
A. Correct.
Q. And as far as the other wells, that's not available, that information is not available?
A. Not to my knowledge.
Q. Okay. This slide also shows the Grayback diversion, which you talked about a little bit at the

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end of your testimony.
Is there a diversion structure associated with the -- with the rerouting of Grayback Arroyo?
A. Yes. The diversion structure is shown on slide 12 here, on the far left-hand side. You see a cut to the very lower right corner is a cut through the topographic high, and then to the north of that is an earthen berm.
Q. So is there anything more to it than -- I didn't quite catch it all.
You said an earthen berm, and what was the other part?
A. A cut in the bedrock high.
Q. Okay.
And that -- will that earthen berm need to be maintained?
A. It's been the same since I've seen it over the last 40 years -- 30 -- 30 years. I would refer that question to the geotechnical engineer.
Q. Okay.
Is the Grayback Arroyo a tributary to the Rio Grande?
A. Yes.
MR. DE SAILLAN: Let's move on to slide 22, please.

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Q. And you discussed some of the faults when you -- when you presented this slide.
Has there been any hydrologic characterization of the faults?
A. The work we perform I would consider is a hydrologic characterization. That work would be in the Stage 1 Abatement --
Q. Okay.
A. -- Report.
Q. I'm sorry. Go ahead.
A. In the Stage 1 abatement report.
Q. Okay.
Have you placed any monitoring wells in the faults?
A. Not in the fault zone, but very close. As you can see on slide 22, those -- there are several wells very, very close to the fault.
Q. How far away from -- excuse me.
How far away from the fault are they?
A. Fifty to a hundred feet.
Q. Okay.
And did you characterize the faults in terms of fracture zones?
A. Yes. I mean, we have the geologic data from these borings on either side of the fault and in the

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Santa Fe Group sediment. So there is no fracture zones in the red clay or the other sediments or various grain size.
Q. Okay.
Could the faults serve as a conduit for the migration of contaminants?
A. Not on the data I have. That red clay is very low permeability, and it's smeared along the fault zone, and that's why it acts as a barrier. It's like a clay pot.
Q. Do you have any other information to indicate that it is a barrier?
A. Yes. As I explained in my direct testimony, we have the geologic data from the holes drilled. There were some geophysics done -- I remember prior to the stage 1 abatement analysis. There was also the water level data we have for the site on either side of the fault zone. So we have that 130-foot drop in the depth to water.
We have water quality data from wells on either side of the fault zone. So that -- to me, that's three lines of evidence.
Q. How many wells do you have on the east side of the fault zone to -- to support that 130-foot drop?
A. We have two in this area.

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Q. Okay.
Let's move on to slide 30, please.
Now, your slide shows the final pit lake elevation of 4,894 feet above sea level; is that correct?
A. That is correct. That represents the pit water body surface after rapid fill.
Q. Right.
Now, how precise is that figure?
A. You mean the -- are you referring to the elevation?
Q. Yes, I am.
A. To the foot.
Q. Does that take into consideration seasonal variability?
A. Yes. We -- as part of the Probable Hydrologic Consequences and other document and correspondence with various agencies -- whatever it was, the EIS or NMED or Mining and Minerals, I -- I apologize. I can't remember which one. But we went into that analysis in great detail, looking at the potential variations in water level over time due to various climate regimes, based on the last hundred years of data that we have from Hillsboro weather station.
Q. Okay.

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So is that an average number?
A. No. We have average numbers, and we have seasonal variations that have been documented, which the seasonal variation is -- is very small. It's a foot or two.
Q. So how much is the seasonal variation?
A. A foot or two.
Q. Okay.
And what about longer-term fluctuations? Did you account for that at all as the -- for example, that you'll have a period of drought, a period of wetter years? Did you look at that type of fluctuation?
A. Right. We did based on the hundred years of data from the Hillsboro weather station.
Q. And how much variation did you get there?
A. The same.
Q. Okay. This slide also indicates that the open pit will change the gradient of water flow around the pit; is that correct?
A. Are you referring to the current open pit or the future?
Q. I'm -- this one is the future, correct?
A. Shown in slide 30, yes, that's the future.
Q. Okay. So I am referring to the future.
A. Okay. The current open pit will be similar to

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the future, just a little bit -- the depth is the only difference.
Q. Okay.
A. So both are hydrologic sinks.
Q. But this one is a wider hydrologic sink; is that not correct?
A. Yes. Because you have the -- once you get to the end of mining, you have the pit as shown here is much bigger than the pit we have out there today.
Q. Right. Okay.
So for example, in the southwest portion of that map, it shows the -- the contours have moved closer towards the pit, and the same thing in the northwest corner of the picture; is that correct?
MR. BUTZIER: Madam Hearing Officer, could I ask for a clarification on that question?
MS. ORTH: Yeah. I'm not sure I understood it either.
MR. BUTZIER: It's not clear compared to what and exactly what he's referring to.
MS. ORTH: If you would just rephrase.
MR. DE SAILLAN: Okay.
Q. So on the northwest and southwest corner of the picture, it appears that the contour levels have moved closer to the pit -- or will have moved closer to

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the pit compared to what they are today.
A. I do admit that's an awkward question, but I will try to answer to the best of my ability.
MS. ORTH: Do you agree with that statement?
MR. FINCH: No. For one, the contours are different between the current pit and the future pit. So if you -- what I need is a reference, like a certain elevation or something, and I'd have to go back and compare.
MR. DE SAILLAN: Okay.
MR. FINCH: I believe to answer your question. I'm just -- I'm still -- that's a little confusing to me, but --
MR. DE SAILLAN: Okay.
The -- let's go to slide 38, then.
Oh. Let's -- slide 36. Excuse me.
Q. On slide 36, there is a light green area that's labeled as Kap.
Could you tell us what that refers to?
I don't think it's labeled on there.
A. Right. It's not labeled on there. That -- all the -- but it is in some form or fashion. If you look in the box here in the lower left corner, this blue with the explanation, everything under Ka, so Kap, then you have Ka, that's -- that relates to the -- you have

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Kab -- that relates to the andesite.
Q. Okay.
And then what does the P stand for?
A. I would -- without having full -- this is a reference map from the New Mexico Bureau of Geology. I would have to go and dig that up to give you their specific description for each one of these. But Ka represents the andesite, and various other subcategories of andesite.
MS. ORTH: I have to take your comment later. I'm sorry, sir.
MR. DE SAILLAN: Okay. Thank you.
Let's move on to slide 38.
Q. Now, slide 38 is a photograph, and you have an area that's indicated as being an outcropping of andesite; is that correct?
A. That is correct.
Q. And does that outcropping appear to be weathered?
A. It is.
Q. Okay.
Let's move on to slide 40.
Now, you indicate that the low moisture content of some of the coarse waste rock will prevent downward migration of seepage during operations.

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I want to ask you about that.
Isn't it true that a lot of that waste rock is going to be removed from below the water table?
A. That's correct.
Q. So --
A. It will be dewatered. The pit's dewatered as you mine.
Q. Okay.
And that will remove the moisture content from the rock?
A. Not all of it.
Q. And what is the expected particle size distribution?
A. Could you provide me a reference for what material you're asking about?
Q. For the waste rock. I'm sorry.
A. From what I've seen in other similar facilities, that ranges from giant boulders to sand size particles.
Q. Now, you also state here that the infiltration for -- through the -- to the waste rock storage facility or waste rock storage pile is not expected through the operation period, consistent with observations from existing waste rock storage piles on site.
What observations are you referring to?

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A. Observations from the various field investigations that I've done on site that go back to our 1993 study that John Shomaker and I did to current time, 2010 to about -- well, current day time. I've stomped around and done visual inspections of the existing waste rock stockpiles.
Q. Are those observations documented?
A. In my notes, yes.
Q. Okay.
A. I have --
Q. Are those notes part of the administrative record?
A. That I would have to check. I'd need to -- I would have to review some reference materials.
Q. Okay.
Okay. Let's move on to slide 41, please.
You state that the stormwater will be diverted away from the waste rock; is that correct?
A. That's correct.
Q. What about stormwater that runs off of the waste rock? How will that be addressed?
A. Slide 41 shown here that they're referencing is after reclamation. So that -- that would be based on the cover and the cover design, which Mr. Stein is going to cover -- or is going to do his direct about. So

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that's a question for another expert.
Q. Okay. So you don't know the answer.
A. As far as run-off from the waste rock storage pile after reclamation, a better answer and more technical answer will come from Mr. Stein.
Q. So you don't know the answer.
A. The design should have stormwater conveyance features in it.
Q. Okay.
You mean in the cover.
A. Yes.
Q. Okay. This may be also a question for Mr. Stein, but I'm going to ask you anyway.
Did you model the cover system based on daily time steps to consider one-day storm events?
A. We did consider maximum precipitation events, which would be a daily event.
Q. Okay.
And where is that reflected?
A. In the Probable Hydrologic Consequences report.
Q. Okay.
Let's look at slide 42.
And this slide shows monitoring wells around the waste rock, correct?

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A. Correct.
Q. And did you do a hydrologic -- any kind of hydrologic analysis to determine where to locate those monitoring wells?
A. Yes. Thank you for asking. That was one part I may have breezed over in my direct.
We have the groundwater contours as we understand them today, and then we have various sequences of model-simulated groundwater contours as through the mining period, all the way a hundred years after reclamation. And so we use those contours as we understand today and those simulated by the model to get an understanding of direction of groundwater flow and where is the best location for monitoring based on that understanding of groundwater flow direction.
Q. Did you prepare any calculations on how contamination would disperse through the groundwater if it reaches groundwater?
A. A colleague in my office, Mike Jones, did numerous calculations to look at transport from the waste rock stockpile.
Q. And is that included in any of the reports?
A. I believe that is not in the Probable Hydrologic Consequences, it's in the EIS documents. I'd have to verify that.

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Q. Okay.
Okay. Let's move on to slide 45.
Now, you mentioned here that the potential for leakage to the liner in particular -- that there is a potential for leakage through the liner in the tailing storage facility, right?
A. This is an approach that we took to evaluate this particular facility.
Q. Okay.
And you estimate the leakage to be 0.5 gallons per minute?
A. That's correct.
Q. Okay.
And isn't this really a best case scenario in terms of the amount of leakage?
A. The best case scenario would be zero, if you really do a good job of liner installing.
Q. Is that practical?
A. I don't know. I would defer to a liner expert on that.
Q. Did you consider the possibility of a much larger leak?
A. We used the industry standard that's documented in great detail in the Probable Hydrologic Consequences report.

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Q. Okay.
Let's move to slide 46.
You state, I think, in the second bullet there -- yeah, that the hydrologic gradient beneath the tailings storage facility will be reduced due to the reduced recharge.
Did you calculate how much the gradient would change?
A. No, did not.
Q. Okay.
You state that the groundwater beneath the tailing storage facility will have a low travel velocity.
And what -- were there any calculations on which that was based?
A. Yes. We just used basic Darcy's law, the numerous velocity calculations using Darcy's law, and the existing hydraulic gradient that we see under the tailings facility, which is quite flat. I believe that's in the Stage 1 abatement report.
Q. Okay.
Those calculations are in the report?
A. Our results of those calculations.
Q. Are the actual calculations in the report?
A. There's a lot of material out there. I'd have

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to --
Q. I agree.
A. -- pull it out.
Q. Okay.
And what do you mean by low travel velocity?
A. Well, low is -- what I mean by that is that it's not going to move. I would say just like as we observed with the existing TDS and sulfate plume beneath the tailings impoundment -- the current tailings impoundment, it has not moved anywhere in 30 years. And so that, to me, is a low travel velocity, that it's -- maybe it's going to move a few feet in a decade or a hundred years. It's --
Q. Okay.
So when you say that the leakage if it reaches groundwater will blend or remain beneath the tailings storage facility for hundreds of years, what is the basis of that statement?
A. Well, based on our .5 gpm, the volume of water that's underneath the hydraulic gradient and the travel velocities that we have calculated either through Darcy's law or through modeling exercises within other colleagues in my office.
Q. Okay.
Let's move on to slide 49, please.

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And --
MS. EMMER: There is no slide 49.
MR. FINCH: Yeah.
MS. ORTH: The slides end at 48.
Q. (BY MR. DE SAILLAN) Okay. Let me just ask you.
Your -- I forget which slide it was, but you referenced a well on the southwest side of the tailings facility that the Environment Department had proposed? Do you recall that testimony?
A. Yes.
Q. And first of all, I think you responded that you didn't think it was necessary because it was upgradient of the tailing storage facility?
A. Correct. There's already an upgradient well of the tailings facility, as required by the Copper Rule.
Q. Okay.
But this was upgradient -- more directly upgradient or -- upgradient from the different location of the tailings facility?
A. It was to the south of the upgradient well we've already proposed.
MR. BUTZIER: Madam Hearing Officer, could we pull up slide 47?

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I believe that might be what Mr. De Saillan is talking about.
MS. ORTH: Thank you.
MR. DE SAILLAN: Thank you, Mr. Butzier.
MR. BUTZIER: You bet.
MR. FINCH: There you go. Okay.
Q. (BY MR. DE SAILLAN) So are you opposing installation of this additional well?
A. I don't oppose the installation. I don't see the necessity of it.
Q. Okay.
Okay. A few more questions here.
What is the current depth -- or the depth of the current pit lake?
A. Are you referring to the water depth?
Q. Yes.
A. Twenty-five to 30 feet, if my memory serves me.
Q. Has it varied over time?
A. It has.
Q. By how much?
A. It's been shrinking over time, and I believe my best guess without having reference materials in front of me would be it's decreased in depth of about 10 feet.

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Q. Okay.
Now, earlier you testified that the alluvium that sits on top of the andesite -- maybe you used the term "colluvium." I'm not sure.
But either way, you indicated that that was going to be scraped off? Do you recall that testimony?
A. I do, reference to the Waste Rock Stockpile 2 and 3.
Q. Right. Okay.
And have you measured the thickness of that alluvium or colluvium?
A. We've made some estimates when we were doing the field survey based on the slope of the andesite and the rock outcrops, but we -- there's been no drilling to confirm that.
Q. Okay.
And then you made reference to a clay deposit to the east of the Animas fault? Do you recall that testimony?
A. I do. I believe there's clay deposit on the west and east side of the fault.
Q. Okay.
And is that included in the groundwater model that you prepared?
A. The fault zone is simulated in the groundwater

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model.
Q. And does the fault zone include the clay layers?
A. It includes low permeability to simulate the clay layer.
Q. Okay.
And what is the -- what is the area -- the surface area of Waste Rock Piles 2 and 3?
A. I don't have that number off the top of my head.
Q. Okay.
And then you stated that you have 40 years of data on that -- on this site.
Do you recall that testimony?
A. Yes.
Q. And I want -- I want to ask you how consistently that data has been collected over the past 40 years. Are there time gaps in the sequence?
A. Yes. And they're based on certain events and data collection efforts. So there -- there have been -- we've compiled -- that was one really nice thing about this project, is that this was the first effort to really compile all the available data, because there was some data that the Environment Department had, there's some data that we actually had from way back, you know,

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from the beginning of time when they were opening the mine.

And then all the data that we collected, you know, up to current day has been -- has been put into one database. But there are a few gaps in that. Yes.

Q. Okay.

When were the gaps?

A. And generally speaking, the gaps would be -- there was a little bit of a gap -- and it depends on what data set you're talking about now. We have a full record of climate data from the Hillsboro weather station, which is an important piece of data. We have -- you know, for some wells, we might have more water level data than we do water quality. So that's -- it really depends on what data set you're referring to.

Q. Okay.

I guess I could ask you when you -- when you talk about there being 40 years of data, what data sets were you referring to. Okay? You mentioned the climate data already.

A. Okay. So we have the climate data. We have the water level data. We have surface water quality data from -- from the samplers along Grayback, stormwater samplers. We have groundwater chemistry data from sampling of wells.

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Q. Okay. Well, let's take them one at a time.

When did you have gaps in the water level data?

A. There is -- here again depending on which set of wells, but there is a gap between -- I would say about 2000 and 2008.

Q. Okay.

A. It's a gap that's pretty common in both the water levels and the water quality.

Q. Okay.

And --

A. Groundwater quality, that is.

Q. Okay.

Are there any other gaps in the groundwater quality?

A. That's the most significant gap that I can think of.

Q. How about the surface water quality?

A. There may be a little bit more of a gap. There was some stormwater samples that were collected before the mine was opened -- the Quintana mine was opened in the '70s. And then we collected surface water data in the '90s, the early '90s. There was some collected in the late '90s. And then we have from about 2010 on a very solid record of data collection.

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Q. Okay.

And what about the -- I think the other thing you mentioned was water chemistry data?

A. Right. I believe that's -- that would be -- that's about the same as the surface water.

Q. Okay.

Okay. Thank you, Mr. Finch.

That's all my questions.

MR. FINCH: Thank you.

MS. ORTH: Thank you, Mr. De Saillan.

Ms. Barncastle, do you have questions?

MS. BARNCASTLE: Yes.

MS. ORTH: Okay.

MS. BARNCASTLE: I do.

MS. ORTH: The microphone is coming your way.

MS. BARNCASTLE: Thank you.

CROSS EXAMINATION

BY MS. BARNCASTLE:

MS. BARNCASTLE: I would like to start with slide 12.

Q. All right. Would it be fair to say that each of those core samples was drilled not for the purpose of determining permeability, but for the purpose of determining where to mine or mapping out the ore body?

A. That was the primary objective. I would agree

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with that.

Q. And you referred to a detailed analysis that was performed on those core samples shown on slide 12.

What did that detailed analysis entail?

A. The -- pardon me. Can you specify? Do you mean -- are you referring to the cores?

Q. Yeah.

Your direct testimony, I believe you referred to detailed analysis performed on the core samples --

A. Right.

Q. -- shown on this slide? What was that detailed analysis?

A. The detailed analysis included a -- they had core samples that were collected, and then they had professional geologists on site describing every aspect of the geology of those core samples.

Q. Was there permeability testing done on those core samples?

A. There were permeability tests done on some of the core holes that we performed injection tests on.

Q. Was permeability testing done on all of those core holes?

A. Oh, no. No. But we can take the geologic description and infer permeability based on the other data sets we have. So we can -- we can cross-reference

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with the geologic description where we have permeability and the geologic descriptions where we don't have permeability, and there's people look at those similar rock characteristics and map that out.

Q. Did you find places where there was no permeability?

A. Yes. Well, I mean, or we got a -- basically a zero result, was at GWQ-5R, which is off this map.

Q. How did you measure the hydraulic conductivity in the andesite?

A. Various methods that we had. Pressure injection tests of open core holes. We did -- there were -- not only us, but consultants prior to us, there are numerous pumping tests from wells drilled in the rocks. And from stage 1 abatement, when we sampled -- collected a sample from a well, we would measure the specific capacity and convert specific capacity into hydraulic conductivity.

Q. Okay. I'd like to go to slide -- give me a second.

Slide 14, please.

In your Range of Hydraulic Conductivity column, how did you measure 0 hydraulic conductivity? You have 0 to 0.0027?

A. 0 is from a pressure injection test on GWQ-5R.

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And Dr. Shomaker did that analysis, and -- which is appended to the -- the groundwater model report. And what he observed in the data collected from that pressure injection test is that because the pressures got so high we were -- we were creating fractures in the rock from the pressure -- from the pressure test, that -- and that's the only water that was -- that went in.

So he -- he determined that that was basically -- that was so low it was 0.

Q. That was an assumption?

A. No. That was his calculation.

Q. Why are the model values for the Santa Fe Group outside the range of the measured values?

A. As I tried to explain in my direct, there are two different regions. So -- and on top of that, the model when you'll do hydraulic conductivity domains, you're doing a domain for an average for a large area, whereas the result here, shown in the -- under the Range of Hydraulic Conductivity is from specific points from those wells.

And so the lower end on the model actually is for areas outside of where these wells were tested.

Q. Wouldn't it be fair to say that the model assumptions in that category are in favor of New Mexico Copper?

A. No. The model inputs are in favor of calibrating the model to get the most accurate representation of the groundwater system.

Q. Now, you've said multiple times today that there is water flowing into the pit through the andesite that is 0 permeability.

How is that possible?

A. Well, it doesn't necessarily have 0 permeability. It has a range of 0 to .0027 on the test data. That's just a range.

MR. BUTZIER: Madam Hearing Officer, I think the question also mischaracterizes the testimony. I don't think that was his testimony at any point.

MS. ORTH: All right.

Mr. Finch, would you like to clarify whether that was your testimony earlier?

MR. FINCH: My testimony was on the range of hydraulic conductivity. I don't believe I ever said that the andesite had 0 hydraulic conductivity, as -- on an average or as a whole.

MS. BARNCASTLE: Thank you for that clarification.

Q. What geophysical data did you use outside of the permit boundary particularly to the east of Caballo

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Reservoir?

A. Could you clarify in -- or what part of the analysis?

Q. Well, would it be safe to say that there's not as much data -- I'm on slide 15 -- there's not as much data to the east of the fault outside of the permit boundaries as there is within the permit boundaries?

A. Oh, no. We have a wealth of -- a good amount of data. The -- there was a groundwater exploration program that was conducted in the '70s in relation to finding water supply for this mine, and there were numerous wells drilled and tested as part of that to the east of -- of this whole -- off this map to the east.

The well down there in the corner, MW-4, was one of those wells.

Q. Okay. So I'll ask you again, then.

Was there any other geophysical data aside from what you just referred to outside of the permit boundary to the east, towards Caballo --

A. We did not use geophysical data. We used well data and published geologic data, for the area east of the permit area.

Q. In an effort to avoid mischaracterizing your testimony, did I understand you correctly when I thought I understood you to say that -- in your direct that

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hydraulic gradient changes are equal to changes in hydraulic conductivity?
A. That is what I said. Correct.
Q. What data do you have to support that?
A. It's a fundamental understanding of hydrogeology that we get from textbooks, but we have all this data on the site that we've talked about that describes the hydraulic gradient and the properties. And where you have a steep hydraulic gradient, you have low hydraulic conductivity, and when you have a flat hydraulic gradient, you have a high hydraulic conductivity.
Q. All right.
You referenced the barrier boundary to flow.
Does that mean there's no flow across the fault?
A. A barrier doesn't imply no flow. It implies limited flow. It could be no flow, but it could be low flow to limited flow. And limited here is enough to create a 130-foot drop in the water table. And no -- none of the sulfate- and TDS-elevated groundwater on the west side of the fault has migrated across this to the other side.
So we have a very good understanding that this fault system limits or prevents groundwater flow across

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it.
Q. The only testing across the fault are those two wells, though, as far as water quality, correct?
A. That is correct.
Q. So your opinion is based on two wells not showing a water quality change.
A. No. It's based on the numerous wells we have on the west side and the two wells we have on the east side. So as a whole, we're looking at over a dozen wells.
Q. Did the hydraulic testing in stage -- in the stage 1 abatement include aquifer testing to determine hydraulic conductivity of the red clay in the fault zone?
A. I'd have to check that, but I believe a previous consultant that drilled a well into that completed it, did test it. But I'd have to verify that through examination of the -- of that report.
Q. The data that you're basing your opinion on is solely concentrated within the mine area only plus the half mile outside; is that correct?
MR. BUTZIER: Madam Hearing Officer, I'd request a clarification. There have been a number of opinions expressed, and it's not clear to which opinion she is referring.

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MS. ORTH: Right. The half mile thing was, I thought, one aspect of it.
Would you clarify that, Mr. Finch.
MR. FINCH: The half mile is just a Copper Rule requirement. We used -- another Copper Rule requirement is providing information on the region, which I have. So we have included regional data as well as localized data.
Q. (BY MS. BARNCASTLE) What information is available and in the record that you relied upon for any of your opinions to tell us what's happening downgradient?
A. Can you clarify downgradient? Of what?
Q. Well, if the water is flowing to the -- is it west? East?
A. Regionally groundwater flows from west to east.
Q. Okay. So further over, then, down from what we're looking at here, on slide 15.
A. I'm sorry. Can you rephrase that? What was the question again?
Q. So what data and information did you rely upon as far as the whole geographic area further to the east, toward Caballo Reservoir, to tell us what's happening in the groundwater in that area?

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A. As part of other studies that I've referenced, the key references in my direct, we had -- the Baseline Data Report didn't just include the mine permit area. The Baseline Data Report, per Mining and Minerals Division requirements and the Sampling and Analysis Plan that was approved by the MMD, include a much larger area all the way within that whole box I showed for the groundwater flow model.
So we have all the data collected as part of that. We developed a conceptual model report. Then we developed a numeric groundwater model. All industry standards and in the same sequence of things, to analyze the system.
Q. Okay. I'd like to move to slide 34.
In this slide in your comparison of the existing pit to the future pit, we see that the water surface area at the existing pit will multiply by a factor of more than 4, but we also see that the evaporation out doesn't multiply by as much.
Can you explain why?
A. Thank you. That's a good observation. And I do have an answer for that.
The existing pit doesn't have much shade or cover that's exposed to solar radiation, and so it has a higher evaporation rate. The future pit will be

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basically -- what do you want to call it -- say down in a hole, the future pit water body, which will be shaded.

So we have data from other mine sites, pits in New Mexico where we calculate that change in evaporation rate. So it has a smaller evaporation rate. For the existing pit, we used an evaporation rate of 65 inches per year, and for the future one we used 50 inches per year.

Q. Thank you.

I'd like to move to slide 36, please.

In the permit and in your testimony, the Waste Rock Stockpiles 2 and 3 are on andesite, but this figure shows it's on alluvium, correct?

At least part of 3 is.

A. As shown here, correct.

Q. Okay.

And you testified that the alluvium will be scraped off?

A. Based on the plan and what's in the Mine Plan is to remove that and to use it for cover for reclamation.

Q. Aren't there existing waste rock stockpiles here?

A. The daf label there is -- refers to -- af refers to artificial fill. So some of that -- there is

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a little piece of it up in the north part of that gray area that is some existing material from a previous operation, my understanding.

Q. Is the plan to include scraping off the alluvium from below the existing waste rock stockpiles?

A. I would defer that question to whoever is going to talk about the reclamation efforts next. That would be Mr. Stein.

Q. Okay.

Slide -- let me see here. Slide 37, please.

Now, during your discussion of this slide, you, I believe, said that it took 90 days for water to seep into this well?

A. As shown here on slide 37, this graph, yes. That's correct.

Q. Okay.

Is there additional data to justify this low permeability value?

A. The pressure injection tests that we did.

Q. Is that part of the record?

A. Yes.

Q. Do you know where in the record we might find that?

A. The -- it's in both the model -- the modeling report and also the Probable Hydrologic Consequences

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report and in the Stage 1 abatement report.

Q. Thank you.

Slide 39, please.

This I understand shows that you are going to -- when I say "you," I use the term colloquially to mean New Mexico Copper Corporation.

A. Understood.

Q. I apologize.

I believe this shows that water will be captured and collected off of the waste rock stockpiles.

And what is going to happen with that water then?

A. I believe Mr. Smith testified that water gets recycled and used, or it gets -- it gets used in the mining process.

MS. BARNCASTLE: Slide 41, please.

Q. Here you testified rather quickly about the store-and-release cover system, and I would like you to please describe the properties of the proposed store-and-release cover.

A. The properties of the store-and-release cover will be covered by Mr. Stein as part of the reclamation efforts.

Q. Okay.

Slide 42, please.

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Would it be fair to say that New Mexico Copper Corporation used existing infrastructure for monitoring purposes shown on this figure? In other words, they didn't develop anything additional for monitoring purposes?

A. I'm a little confused. I see lots of additional monitoring.

Q. What are -- what are new versus what are existing --

A. Oh.

Q. -- as of the time the copper mine closed the last time?

A. Thank you. Okay.

So --

And maybe the green dots.

There you go. Thanks.

The green dots were, I think, covering up some of the labels, and so now you just see -- you can see it, the orange triangles. Every well that starts with a P, so PGWQ, is a new -- is a new monitoring well to be installed. Now, if you see a well that is -- we have like over there, off on the right-hand side, there's a blue dot, it says GWQ-3, that's an existing well.

So all the triangles here are proposed monitoring wells. Those will all be new.

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MS. BARNCASTLE: Madam Hearing Officer, I'd like to at this point raise the same concern that Mr. de Saillan raised regarding slide 11 in that I couldn't read this initially in the format that it was given to me. So you might need to do the same thing with slide 42.

MS. ORTH: Slide 42.

Mr. Butzier?

MR. BUTZIER: Yes. We'll do that.

MS. ORTH: All right. Thank you.

Q. (BY MS. BARNCASTLE) What was done with the existing infrastructure to ensure its fitness for the purpose that is now being used? In other words, what was done with the old infrastructure to ensure that it's accurately monitored and accurately able to do what you're wanting it to do here?

A. Can you qualify infrastructure?

Q. The monitoring wells.

A. Oh. Monitoring wells.

So your question is what do we do with the existing monitoring wells?

Q. To ensure their integrity for the purpose of what you're using them for now.

A. Well, that was a rigorous analysis we went through in developing the Monitoring Plan that's

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submitted as part of the Discharge Plan application. In that plan, we took everything we knew from stage 1 abatement and said this well is a valid point, we'll keep it, or we said this well is going to be removed from the mining process, and we'll replace it, or we said we need additional wells.

I mean, the whole thing was -- was a very rigorous analysis. We even considered potential -- around the pit drawdown effects from pit dewatering. So the monitoring system would be able to monitor for the duration of time needed.

It's all in that document.

Q. What document specifically?

A. The Groundwater Monitoring Plan that's part of the Discharge Permit application packet.

Q. Okay.

I'd like to go to slide 45, please.

What data was relied upon to determine that the andesite is the exact same hydraulic conductivity as the liner?

A. We never considered the andesite to have the exact hydraulic conductivity of the liner.

MS. BARNCASTLE: Could you please go to slide 40, please.

Q. Does slide 40 say that the permeability is at

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or less -- I guess it says less.

A. Less, yeah.

Q. Okay. So the andesite is -- has a lower hydraulic conductivity than the liner.

A. That's the -- that was the previous slide, whatever that was. That doesn't represent the hydraulic conductivity of the synthetic liner. It's the material under it that I believe it's -- it's an input value for the bed material that we put in for the calculation.

Q. This is -- so why -- why did you use this number, then, that we're seeing here in the 1 times 10 to the minus-6 power? Where does that come from?

A. That's detailed in the Probable Hydrologic Consequences report. This is an appendix of expected values with this type of analysis.

Q. And that just so happens to be the same for the liner as what you come to for the andesite.

A. No. No. As we just discussed, the andesite is less than that.

Q. Okay.

Just a moment, Madam Hearing Officer.

MS. ORTH: All right.

MS. BARNCASTLE: I have nothing further. Thank you.

MS. ORTH: Thank you, Ms. Barncastle.

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Is there anyone else who has a question of Mr. Finch?

Raise your hand.

Ms. Brittan, would you come up, please.

EXAMINATION

BY MS. BRITTAN:

Q. I have a question about the holes that you drilled, the core -- the core analysis holes.

A. Yes.

Q. What happens to those? Do those get filled in with something or just leave them?

And I don't know if they collect stormwater or --

A. They get plugged back.

Q. What do you use?

A. Well, those were -- I couldn't say, but the State Engineer does have requirements for that.

Q. They do have requirement for --

A. They do have requirements for exploration holes that count the water.

MS. BRITTAN: Okay. Thank you.

MS. ORTH: Thank you, Ms. Brittan.

Mr. Irwin.

MR. IRWIN: I'm replying to Ms. Brittan's question here. Since I was in charge of the drilling in

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2012, let me respond to that. Mr. de Saillan also brought up the question.

When we permitted the drilling in 2011 and 2012, they were permitted as exploration core holes. They're small diameter, approximately three inches in diameter. The purpose of those holes is to understand rock qualities, rock characteristics from a stability point of view and, of course, obtain geological information and geochemical information to upgrade the existing resource.

As a result -- as a result, to get the maximum core recovery, all those holes were drilled on the -- a drilling mud. Typically that's a mixture of a bentonite compound, a clay. And at the end of the drilling by state of -- New Mexico State Engineer regulations, those holes are embedded.

In the case of why no hydrological studies were done on that, we were paying a driller to drill as many holes as quickly as we could, maximum core recovery. Upon drilling the holes, since we were drilling in a heavy mud fluid, we could not -- there's insufficient water coming into the deposit and certainly not under pressure. We could not sense when we hit the water table.

And again, since we -- by state requirements,

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we had to abandon the holes, there is no water information on those holes.

That gets back to your question.

On the slide that Mr. de Saillan was asking what Kap is, I'm not familiar with that geologic map. That's a very generalized map. Kap would represent cretaceous andesite porphyry.

On the project, there's three different types of andesite flows, andesite without phenocryst, porphyritic andesite with plagioclase phenocryst and hornblende andesite porphyry. But that -- that's just a general term, andesite porphyry.

MS. ORTH: Thank you, Mr. Irwin.

MR. IRWIN: Um-hum.

MS. ORTH: Are there other folks with questions of Mr. Finch?

Sir, come up, and I'll need your name first.

MR. MIJAL: Martin Mijal, M-A-R-T-I-N M-I-J-A-L.

EXAMINATION

BY MR. MIJAL:

Q. So all this technical stuff.

You have a pile, I guess, WRSP, that you have to move dirts -- or rocks before you can get to the ore. And part of it will be that andesite -- how do you say

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it?

A. Andesite?

Q. Andesite, which is impervious to water. But since this waste rock storage pile is going to be broken up, andesite seems like it will be porous to water. The natures of -- you know, present in andesite, water won't go through it. But once you break it up, it seems like it's going to be gravelly, which is a classic way to do drainage.

And then you said that it will be holding oxygen, which seems like water is heavier than oxygen, would displace oxygen. I didn't catch that right.

MS. ORTH: But what's your question, Mr. Mijal?

Q. (BY MR. MIJAL) The question is that does not seem like WRSP is impermeable because it's broken up andesite.

A. It's -- it's the -- it's not necessarily andesite. It's andesite, quartz monzonite, other parts of the rock mined out at the pit.

Q. Well, that just furthers my argument that it's not -- it is permeable. So to me, that's --

MS. ORTH: Mr. Mijal, he didn't say that the tailings or the rock pile would be impermeable. He was speaking to the characteristic of the rock, not the

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characteristic of the pile. And we will be hearing from Mr. Stein who will talk about the pile.

MR. MIJAL: Okay.

Q. I don't know if this is appropriate, but the tailings seem like eventually they are dust, the mine tails. In other words, to get the ore, they grind it into fine dust. Then they mix in the water and the reagents. So by the time you're getting the copper out, you have a bunch of dust.

And so 40 years of control, you're going to keep it wet?

MS. ORTH: So, Mr. Finch, would you address first if the tailings pile is dust.

MR. MIJAL: Thank you.

MR. FINCH: No. It's the way -- at least my limited understanding of how tailings is made in the process, it includes water. That's how you get it to deposit in the tailings pile. Then you decant that water.

I mean, we have numerous examples in New Mexico of -- well, not numerous. There are a couple of operating tailing impoundments in New Mexico, one big one in particular that I won't name. That's how it works.

MS. ORTH: All right.

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Q. (BY MR. MIJAL) So you do keep it wet through the whole hundreds of years.
A. It stays -- it has moisture. Yes.
Q. Good. I just thought it would be dry.
Well, thanks.
MS. ORTH: Thank you, Mr. Mijal.
Are there others with questions of Mr. Finch?
I see a hand back there.
Ma'am.
MS. UPHUS: My name is Lynn Uphus, U-P-H-U-S.
MS. ORTH: Thank you.
EXAMINATION
BY MS. UPHUS:
Q. Mr. Finch, you stated that the new tailings holding facility will be 22 acres surface.
A. No.
Q. No?
A. I think --
Q. Currently it's at five acres, and proposed in the future it would be 22 acres of surface exposure?
A. That's the -- that's the water body in the pit.
Q. So how many cubic feet of water will be tied up in this holding facility? Would it be the surface times the depth? Currently we're at twenty-five feet

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with a five-acre surface?
A. Right.
Q. How many cubic feet of water is being tied up right now that is unusable for any other human use?
A. I don't know cubic feet.
Q. Cubic feet?
A. I don't -- I'd have to calculate that. So I don't --
Q. Okay.
A. I'd have to do that, but --
Q. That's a figure that's important to me and maybe others.
A. Right. So --
Q. And I would like to know in the future, as well.
A. So currently if you take the existing pit at five acres --
Q. Um-hum.
A. -- as an area, and let's say an average of twenty feet depth, then it's five times twenty. So that's a hundred acre-feet.
Q. A hundred acre-feet.
A. That's what's sitting there right now.
Q. And in the future, we'll have 22 acre surface?
A. And a much larger volume of water in there.

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Q. Correct.
And what is the projected depth of that water?
A. I don't remember. But it's going to be about 2,200 acre-feet that will be sitting there.
Q. Um-hum.
And that reflects how many cubic feet of water that is not usable?
A. I can just speak to the acre-foot volume. I would need a calculator to give you cubic feet.
Q. Okay. Thank you for that.
I guess we can all do a little math when we get home.
A. Yeah.
Q. You referred to data from four reports when you first started your presentation, Baseline Data Characterization Report, which includes the Stage 1 Abatement Plan and an amendment, the Model of Groundwater Flow, numerical groundwater flow model, the Probable Hydrologic Consequences of the Copper Flat Project, and then the fourth one which would refer to the identification of perennial springs.
The dates you gave for the perennial springs report was 1993.
These other reports, when were they -- and models, when were they designed? And my question in

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regards to that is that's 25 years ago. Don't we have any more --
A. So --
Q. -- current models for use?
A. The '93 was a report that was -- that we did in -- for a different -- for the same area but for a different client related to the Copper Flat project. The reports that I listed up there were all current, from 2012 to 2014, up to 2017. They have -- embedded in those reports they have all the historical data, including the 1993 data from that report.
Q. Thank you.
So the statistics that you present today are the most current.
A. Yes, ma'am.
Q. Okay. Thank you.
A. Sure.
MS. ORTH: Thank you, Ms. Uphus.
Any other questions of Mr. Finch?
All right. Mr. Butzier, would you like to follow up?
MR. BUTZIER: Yes, please.

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REDIRECT EXAMINATION
BY MR. BUTZIER:
Q. Mr. Finch, one of the key documents that you've been referring to and that were referred to in one of your early slides was the Baseline Data Characterization Report; is that correct?
A. That's correct.
Q. And would that be what is referred to as part of the permit application including Baseline Data Characterization Report and appendices that appears in the administrative record from July 18, 2012, at Bates number 02498 to 05295, just for the record?
A. Yes.
Q. You also referred to groundwater -- a groundwater flow model; is that correct? As a key document?
A. That is correct.
Q. And there's an entry at the administrative record, entry 123, Model of Groundwater Flow in the Animas Uplift and Palomas Basin dated 8/22/2013, at Bates number 08042 to 08444.
Would that be the report you're referring to?
A. Yes.
Q. And you also referred to a stage 1 report. There's an entry in the administrative record index at

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152 that is described as Results from the First Year of Stage 1 Abatement Investigation of the Copper Flat Mine (Stage 1 Abatement) dated May 14 -- May of 2014, at Bates number 09579 to 09915.
Would that be what you're referring to?
A. Yes, it is.
Q. There's also an entry at 159 in the administrative record that's described as Model of Groundwater Flow in the Animas Uplift and Palomas Basin Copper Flat Project, Sierra County, New Mexico, prepared by John Shomaker & Associates dated 8/15/2014, at Bates number 09969 to 10385.
Would that be the same model that we talked about earlier?
A. That is the same model we've been talking about.
Q. And you also referred to a key document that you described as the Probable Hydrologic Consequences document. There's an entry at 321 -- oh, excuse me -- 323 that's described as Probable Hydrologic Consequences of the Copper Flat Project (prepared by Shomaker & Associates) dated 12/12/2013, at Bates number 17282 to 17358.
Would that be that document?
A. It is.

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MR. BUTZIER: I just wanted to reflect, Madam Hearing Officer, where those key documents that have been referred to pretty extensively appear in the administrative record.
MS. ORTH: All right. Thank you.
Q. (BY MR. BUTZIER) Now, Mr. Finch, Mr. de Saillan asked you whether a well had been -- a monitoring well had been placed right in the East Animas Fault.
Do you recall that?
A. I do.
Q. And I think your answer was that there was not a monitoring well right in the fault; is that correct?
A. That would be hard to do.
Q. That was going to be my question, one of my questions.
Why wouldn't you put it right in the East Animas Fault?
A. Because it would be -- you have water that's built up on one side, and when you drill a hole, it's not necessarily always straight. If you were to drill through the fault zone, then you create a conduit through it to the other side.
Q. Okay. Thank you.
And I think perhaps behind Mr. de Saillan's

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question was a concern that there might be a possibility of water from the east side of the Animas fault finding its way through the fault, the East Animas Fault, all the way to the Ladder Ranch.
In your professional opinion, is that something that anybody should be concerned about?
A. No.
Q. And why not?
A. We have -- well, for one, the -- a small amount of TDS and sulfate contamination that occurred from the existing tailings impoundment did not travel east. It mounded up right there underneath the pile, with no eastward movement at all. We have -- so that's one line of evidence.
We have a groundwater model that's been calibrated to all the data we have that shows that that's not the direction in which water would travel either. It basically mimics what we've already observed from the existing plume. It stays mounded up behind the -- underneath the facility behind the fault zone.
Q. So my question really related to northward, moving along the East Animas Fault to the Ladder Ranch.
A. Right.
Q. Is that, in your professional opinion, something that anybody should be concerned about?

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A. No. They shouldn't be concerned about water moving northward.
Q. And why not?
A. Because it's -- it's my opinion it's physically impossible based on the data we have, the observations we've made and the modeling calculations we have performed.
Q. Thank you.
Let me go back now to what I think you may have understood me to be asking.
Ms. Barncastle asked a number of questions relating to your understanding of the hydrology conditions to the -- to the east of the East Animas Fault, in relation to the sulfate plume that has existed since the Quintana days.
Do you recall that?
A. Yes.
Q. In your professional opinion, should anybody be concerned that the sulfate plume that exists from the Quintana days will find its way to the -- is it the Caballo Reservoir or the Elephant Butte Reservoir?
A. Caballo.
Q. Caballo Reservoir?
A. No. There should be no concern with that.
Q. And why not?

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A. It hasn't moved anywhere in 30 years, and Caballo is still 12 miles away. So I think --
Q. Okay.
A. -- that should ease all concerns.
Q. And now -- and that's -- we're talking now about the existing plume from the Quintana days, correct?
A. I understand that. Yes.
Q. Is there any -- in your professional opinion, should there be any concern that any contamination will travel from the future mining operation at Copper Flat to either the Caballo or the Elephant Butte Reservoir or the Rio Grande?
A. With the way the Copper Rules have been -- the requirements of the Copper Rules, I'm a firm believer in them, in protecting water sources from pollution, and I believe with all the stormwater controls, the design features, the monitoring network, and you combine all of that together, it's -- that is bulletproof as you can make it.
Q. Thank you, Mr. Finch.
One last just point of clarification.
I'd like to have slide 12 on the screen, please.
I think Ms. Barncastle asked you about this

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slide and may have come away with the impression that every one of those matters that are identified in the little white boxes are core drillings.
And I just -- I hadn't understood that to be the case, and I wondered if you can clarify whether that is the case.
A. Yeah. All those boxes are holes that were drilled to characterize the geology.
Q. So they are core drillings.
A. They are.
Q. Okay. That helps me. Thank you.
That's all I have, Madam Hearing Officer.
MS. ORTH: All right. Thank you very much.
Any reason not to excuse Mr. Finch and take a break?
No?
All right.
Oh, Mr. De Saillan.
MR. DE SAILLAN: I didn't quite hear you.
I do have a couple of recross questions if that's permitted.
MS. ORTH: All right.
MR. DE SAILLAN: Okay.

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RECROSS EXAMINATION
BY MR. DE SAILLAN:
Q. Mr. Finch, Mr. Butzier asked you about the potential for contaminants to flow to the north from the mine site.
Thank you.
And I was wondering, the -- whether the company had characterized the fault zone north of the tailings facility.
A. Did you say basalt zone?
MR. BUTZIER: Fault.
MR. FINCH: Oh, the fault zone.
MR. DE SAILLAN: Fault.
MR. FINCH: We have taking -- we have taken -- yes. So not to the degree that was performed at the tailing facility, but yes, we have characterized the full length of the fault zone.
Q. (BY MR. DE SAILLAN) How far north?
A. As far north as mapped by Dr. Seager, Dr. Hawley and others that have done extensive research on the geology of the area.
Q. Is that as far north as the Ladder Ranch?
A. I would have to look at the geologic map to see how far that fault zone goes, but it -- my understanding, it's -- that's what forms the Animas

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Uplift. So the Animas Uplift goes -- does go into the Ladder Ranch. Yes.

Q. Okay. So you believe that the fault has been characterized up to the -- onto the Ladder Ranch property.

A. We have a good understanding of the fault zone of -- throughout the model domain, which is the larger region.

Q. Okay. Thank you.

I have no further questions.

MS. ORTH: All right.

Anything else before we excuse Mr. Finch?

Sir.

MR. BOKICH: Real quick.

MS. ORTH: All right.

MR. BOKICH: Hi.

I'm John Bokich again.

EXAMINATION

BY MR. BOKICH:

Q. Mr. Finch, I remember in the cross-examination that you were asked if water levels were recorded in all the drill holes, and it's my understanding if you're drilling a core hole, you're using drilling fluids, muds. It's virtually impossible to determine a water level in a drill hole when you're using drilling fluids.

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A. They -- there have been -- you can use air or mud to drill a core hole, but I think Mr. Irwin's explanation clarified that.

Q. I know from my experience doing some construction on the site, building drill sites, we were drilling mud pits, most of the holes that we prepared for had -- were using drilling mud to drill the holes.

That's all.

MS. ORTH: Thank you, Mr. Bokich.

Anything else before we excuse Mr. Finch?

No?

All right. Let's take a 15-minute break.

(Proceedings in recess from 3:41 p.m. to 3:59 p.m.)

MS. ORTH: Okay. We are back off a break.

Let me repeat just a few housekeeping things from earlier.

We will not take a dinner break, a proper dinner break. When we break sometime between now and 7:00 p.m., we'll break for the night.

Tomorrow night we will end the technical case regardless of where we are before 5:00 p.m. and take public comment between 5:00 and presumably about 7:00 or until folks are done giving it.

Again, the pleadings file is available on

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breaks. The administrative record is available -- or large portions of it are available on breaks.

Please sign in if you haven't done so. Sign-in sheets are with Mr. Baca there at the refreshment table.

And I can't think of anything else right now.

So thank you all very much.

And we'll turn to Mr. Butzier for -- oh. I knew there was something else.

We do have an interpreter available here. In the event you are not entirely comfortable with the proceedings in English, we do have an interpreter here.

Ma'am, why don't you repeat your statement.

THE INTERPRETER: Yes, ma'am.

Good afternoon, ladies and gentlemen.

If you're more comfortable in another language besides English, please let me know. I'll be making an announcement in Spanish.

(In Spanish.)

THE INTERPRETER: Everybody's good in English still?

No requests.

MS. ORTH: Thank you.

All right. Mr. Butzier.

MR. BUTZIER: Thank you, Madam Hearing

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Officer.

Ms. Griffiths, would you please identify yourself for the record.

MS. GRIFFITHS: Yes. My name is Ruth Griffiths. I'm a senior geochemist with SRK Consulting.

THE REPORTER: Hold on.

MR. BUTZIER: Would you please speak as slowly as you can do that for the -- for the help of the court reporter.

MS. GRIFFITHS: I will do.

THE REPORTER: I have to swear her in.

MR. BUTZIER: Oh, I'm sorry. That's -- okay.

RUTH GRIFFITHS

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Ms. Griffiths, what will you be addressing today with your testimony?

MS. GRIFFITHS: So if we could move to the next slide, which is an outline of my presentation.

Firstly, I will introduce the three technical experts who worked on the geochemical characterization program.

I will then go on to explain the objectives of

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the geochemical characterization program that we conducted for the Copper Flat project. This will also include a brief introduction to the fundamentals of acid rock drainage and metal leaching and the requirements of the Copper Rule.

I'll then go on to explain the methodology and the results of our characterization program.

And finally, I'll go on to present the results of our water quality predictions for the main mine facilities. So that includes the tailings storage facility, the waste rock stockpiles and the pit lake.

MR. BUTZIER: Ms. Arreguin, is that speaking slowly enough for your purposes?

THE REPORTER: Yes. Thank you.

Q. (BY MR. BUTZIER) Okay. Would you please go ahead and introduce the technical experts.

A. Yes.

So firstly, myself, Dr. Ruth Griffiths. I'm a senior geochemist with SRK.

I have a bachelor's degree in environmental earth science, a master's degree in environmental monitoring and analysis and a PhD in environmental geochemistry from Aberystwyth University.

And I am a chartered geologist and a certified European geologist.

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And I have over eight years experience in the mining industry, specializing in the geochemical characterization of waste rock, water and soils, and also the application of geochemical modeling in mining environments.

I've worked on over 35 characterization programs across many continents, but mainly focused here in the Western US.

I also have a number of technical publications related to mining and geochemistry.

I would also --

MR. BUTZIER: Madam Hearing Officer, at this time, before she introduces the other participants in the geochemical analyses, I'd like to move for the admission of Ms. Griffiths as an expert in geochemistry, in particular in relation to mining projects.

MS. ORTH: Okay.

Objections?

MR. DE SAILLAN: No objection.

MS. ORTH: No?

Thank you.

She's so recognized.

Q. (BY MR. BUTZIER) Please proceed.

A. Thank you.

I would also like to introduce the other two

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technical experts who worked on the geochemistry aspects of this project.

And firstly, Dr. Rob Bowell, who is here with me today.

Dr. Bowell has a bachelor's degree in geology with chemistry from the University of Manchester, and he has a PhD in environmental geochemistry from the University of Southampton.

Dr. Bowell is a chartered geologist and a chartered chemist. He's also a certified European geologist, an accreditation auditor with the Cyanide Code and an adjunct professor with Queen's University in Kingston, Ontario.

Dr. Bowell has over 30 years experience in the mining industry and specializing in environmental geochemistry and engineering and also mineralogy and process chemistry.

He's worked on 177 geochemical characterization and modeling projects on almost every continent and has a significant number of published and peer-reviewed conference papers, including books on arsenic and uranium.

I'd also like to introduce Ms. Amy Prestia, who was a key technical person on the characterization program.

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And Ms. Prestia is a principal geochemist with SRK in Reno.

And she has a bachelor's degree in geology with a minor in chemistry, and she has a master's degree in geology from the University of Washington.

She's also a professional geologist in the State of Washington.

Ms. Prestia has over 17 years experience in the mining industry, specializing in geochemical characterization in mine permitting and closure projects. She also specializes in field and analytical-based geochemistry and the preparation of waste rock management plans.

Ms. Prestia has contributed to over 20 mine permitting projects in Nevada, Idaho, California and Oregon and has several peer-reviewed papers in the field of geochemistry and mining.

Q. And, Ms. Griffiths, would you please proceed then with your presentation for today.

A. I will.

So the primary objective of the geochemical characterization program was to develop the geochemistry required for permitting the Copper Flat project. And the reason that we need geochemical characterization is severalfold.

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Firstly, we need to understand the potential reactivity and -- or stability of mine waste that will be extracted by the projects. We also want to assess impacts to receptors. And finally, identify options for management and closure of the mine facilities.

I think it's important to note that the geochemistry program that we conducted and starting in 2010 builds on the previous geochemical characterization program that was conducted by SRK between 1996 and 1999.

So there were several key questions that we were trying to answer as part of our characterization program.

Firstly, what is the potential for the development of acid rock drainage and metal leaching from material that will be generated by the project?

Secondly, does the geochemistry change due to mining?

Thirdly, is there an increased risk to impact groundwater or surface water from the mine facility?

And fourthly, what sorts of management or closure actions can be implemented to mitigate any risk?

So I will firstly just briefly introduce you to the fundamentals of acid rock drainage and metal leaching.

So many mining deposits have sulfide minerals

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associated with them, so pyrite, pyrrhotite, marcasite, et cetera. Now, when these sulfide minerals are in the ground, they're relatively stable; however, when they're brought to surface and they're exposed to air and water, the surface area of that material is increased, which increases the potential for exposure to air and water and may result in acid rock drainage or metal leaching.

And because of this, we need to really understand the geochemistry of all the materials that will get extracted by the project. So that includes any waste rock that will be generated and deposited and any tailings that will be deposited in the TSF, any wall rock that will be exposed in the final walls of the pit and, finally, any low-grade ore material.

Q. Ms. Griffiths, TSF is a term that means what?

A. Sorry. TSF means tailings storage facility.

So this schematic just really explains how acid rock drainage may develop.

So here on the left, we have our metal sulfide mineral, in this case pyrite. If we react to the sulfide mineral and -- with oxygen and water and there are no neutralizing minerals present, then we may get the development of acid rock drainage.

However, if we do have neutralizing minerals present in the form of either calcite, dolomite or

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silicate minerals, we may get the development of either acid rock drainage or neutral mine drainage, depending on the relative balance of these two minerals.

So if there's sufficient neutralizing minerals present, we would get the development of neutral mine drainage; however, if there are insufficient neutralizing minerals present, then acid rock drainage may result.

And I think it's also important to note here that it's not only the presence or absence of sulfide and carbonate minerals that are important here. There's also other factors such as mineral textures or encapsulation of sulfides that have an important role in the potential for acid rock drainage development, and that's something that's very important in the case of the Copper Flat project, and we will discuss later.

So just to go on to talk through some of the requirements for characterization under the Copper Rule. And I hope you'll forgive me for the amount of text on this slide, and I will just read off some of the requirements.

So under Section 20.6.7.21 of the Copper Rule, there is requirement for waste rock stockpile characterization.

So all waste rock that is stored, deposited or

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disposed of at a copper mine facility shall be evaluated for its potential to generate acid and to release water contaminants at levels in excess of the standards.

A plan for determining the potential of the materials to release water contaminants and the method for such evaluations shall be submitted to the department for approval in a Material Characterization Plan, that should include a number of aspects.

Moving on, there's also the requirement for a static testing program using, at a minimum, acid base accounting to evaluate the acid generation and neutralizing potential of the material, and also meteoric water mobility procedure to determine water contaminant leaching potential.

And I'll just pause here to briefly explain what the term "static testing" means, and also in the next paragraph there the term "kinetic testing."

So static testing is really a short-term screening level test that we apply as a first stage in our characterization program. And it's really to evaluate the potential for acid rock drainage or metal leaching to develop. It doesn't look at longer-term rates of those -- of those processes.

And that is something that's evaluated through the kinetic testing program, which we'll go on to

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discuss in a bit more detail later.
So moving on to the next point, point d, if the results of the static testing indicate that a material may be acid generating or may generate a leachate containing water contaminants, a kinetic testing program shall be proposed to evaluate reaction rates, provide data to estimate drainage quality, the lag time to acidification of the material and primary weathering and secondary mineral precipitation or dissolution.
So really the key aspects here as they relate to the Copper Rule are a static testing program that needs to contain an acid base accounting, a meteoric water mobility procedure testing and, finally, a kinetic testing program.
So if we could move on to the next slide.
This schematic here shows the flow chart that we followed for our characterization program. So as you can see, we took a phased approach.
And the first phase included a desk study. So this included a review of all the geologic and mineralogic information available for the project from the drill core logs, et cetera.
We worked with a projectologist to identify the main material types for the projects, and we used

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this information to select representative samples for testing.
So based on this analysis, we collected 132 samples of waste rock and low-grade ore and 14 samples of tailings material.
We then submitted these samples for a series of static tests. So these are the short-term screening level tests. And they included acid base accounting and net acid generation testing and multi-element analysis on all 146 samples. We also conducted meteoric water mobility procedure testing on 49 samples to assess the potential constituent mobility. And we conducted mineralogy on 28 samples.
And these screening level test results were used to assess -- or used to provide a preliminary assessment for the potential for acid rock drainage and metal leaching. And we used those results to select representative samples for longer-term kinetic testing.
So this was conducted on twenty-three waste rock and low-grade ore samples and nine tailing samples. And these were run for a considerable period of time, which we'll discuss later.
The results of this kinetic test program were then used in water quality predictions. So they were coupled with information from the Mine Plan and from the

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hydrologic water balance and surface water and groundwater quality data and climatic data to develop water quality predictions for each of the main mine facilities.
As you can see, we started this process back in 2010. It's been a long process. It's been a very comprehensive program that's lasted for seven years, and we've collected a lot of good data.
So just to outline the key aspects that relate to the Copper Rule, you'll recall the requirement for static testing. This should include at a minimum acid base accounting and meteoric water mobility procedure testing and finally kinetic humidity cell testing. So our program included all of those components and far significantly more than that.
I think it's also important to note that the characterization program was consistent with an international best practice. So it was carried out in accordance with the Global Acid Rock Drainage Guide, or the GARD Guide.
And so this schematic here just shows the characterization requirements for each stage of mine planning.
So here we have exploration phase, moving through the feasibility and design, construction,

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operation, decommissioning and closure.
So this red box here represents where we are with the Copper Flat project. We're in the feasibility and design stage. And if you can recall from the previous slide, these were the components that were included on flow chart. So define the main material types, select samples, static testing, kinetic testing and assessment of drainage water quality.
So the characterization program is also in accordance with international best practice.
So if we walk through some of the specs in the program piece by piece, the first stage is the desk study. So we reviewed the exploration drill core logs available for the project, and we consulted with project geologists to make sure that we captured all of the main material types.
So for the purpose of our program, we defined material types based on rock type or lithology. So that included quartz monzonite, which will comprise the majority of waste material, 78 percent. It will include also coarse crystalline porphyry which is about 15 percent of waste and breccia which is 6 percent and andesite which is 1 percent of waste.
We also defined material type based on oxidation, so whether it was sulfide material containing

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sulfides with no evidence of oxidation products. So for Copper Flat, this comprised about 96 percent of material was classified as sulfide.

And there was also oxide material which was entirely oxidized with no evidence of sulfide minerals and transitional material, which is a mixture of sulfide material with some oxidation products. And together the oxide and transitional materials only comprise a very small portion, approximately 4 percent of the overall waste rock for the project.

We also defined material type based on copper grade, using a cutoff at .164 percent copper. And so any material that contained greater than this was classified as ore, anything less than this was classified as waste.

So we undertook two phases of sample collection as part of our program, and it was initiated in April, 2010. And then we took further sampling in December, 2011.

And the reason that we undertook this in two phases was because there was additional drilling that was undertaken in 2011 that captured the new material types, in particular the coarse crystalline porphyry material, and we wanted to make sure that we captured this in our characterization program. Hence why we

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undertook two phases.

So during these two sampling campaigns, we collected 146 samples representative of waste rock ore and tailings. So this included 112 core samples from the exploration drill core and 22 grab samples from the surfaces of the existing waste rock stockpiles and, finally, 12 samples from the metallurgical test work program.

And we considered the samples to be spatially and lithologically representative of the materials that will be generated by the project.

And just to highlight these pictures here, so this represents the sulfide material and transitional material and the oxide material.

So we used a 3D geological modeling software called Leapfrog to aid with our sample selection process and make sure that we could visualize all samples and ensure that they were spatially representative.

And so these cross-sections here that you see here were taken from Leapfrog. And the gray shape you can see here is the future pit shell for the copper project. I don't know if you can see these black lines here. They are the drill core traces. And the colored discs represent our geochemical samples.

And so as you can see, there's a good

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distribution -- good spatial distribution within the pit shell.

We did collect a number of samples that fall slightly below the base of the pit. These were samples that were collected during the first sampling campaign when the cutoff grade was slightly different. But it's -- you know, these material types are exactly the same as those that will be encountered in the pit.

I think I should also point out that the different colored blobs here represent the different lithologies.

We also collected a number of grab samples from the surfaces at the existing facilities. So these samples are representative of materials that have been exposed to weathering in the field for 30-plus years.

The locations of these samples are shown here by the yellow dots and show good spatial distribution across the site.

This matrix summarizes our sample collection.

And so here we have -- on the left, we have our main material types that were defined for the projects. And this column here shows the percentage of waste for each of those material types and the percentage of ore. And then here we have the number of samples that were collected for each of those material

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types.

So what we aimed to do was focus the program on material types that will comprise a greater proportion of waste. So for example, the quartz monzonite material comprises the greater proportion, 75 percent of -- of waste so we collected a higher number of samples of that material. And conversely, the andesite only makes up a smaller proportion of waste, and so we collected a lower number of samples.

And this table here summarizes the characterization methods that were used for the Copper Flat project.

So if you can recall the terms "static" and "kinetic" testing, that's split into these two categories.

So firstly, looking at the static test methods, which is the screening level assessment, we carried out two test methods to look at the acid-generating potential of the samples, so acid base accounting and the net acid generation test, to look at the balance of acid-generating sulfide minerals and acid-neutralizing carbonate minerals.

We also conducted a multi-element analysis to look at the bulk geochemical composition of the materials and identify constituents that may be present

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at the elevated levels and that may be released in contact waters.

We also conducted a mineralogical assessment, and this was really to support the rest of the program, to assess mineral textures and potential controls on both acid generation and metal release.

In order to look at the potential for metal leaching, we conducted a meteoric water mobility procedure test, which you'll recall is a requirement under the Copper Rule. So this is a 24-hour leach test with deionized water which essentially simulates rainfall events to see what would be leached during rainfall events.

On the tailings, we conducted a synthetic precipitation leaching procedure, or SPLP, test, which is a similar test method.

And finally, we conducted kinetic testing on a subset of samples and to assess long-term rates of acid generation and metal release, and involves weekly leaching over greater than 20 weeks.

So to run through some of the results of the static test program.

First of all, so you recall this is the -- the screening level assessment that doesn't look at longer-term rates.

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So what we found is that the acid generation potential of the Copper Flat materials is dependent on the sulfide content, and this is because there's limited neutralizing minerals in the form of carbonates, et cetera.

We saw that the majority of samples showed either a low or uncertain potential for acid generation and based on acid base accounting.

And any potentially acid-generating waste was limited to the transitional material and which is -- which only comprises 4 percent of future waste.

And what these results showed us is that because there's an uncertain potential for acid generation from some of the material, we needed a kinetic testing program to confirm the longer-term behavior.

In terms of the potential for metal leaching from the screening level tests, we did find that the waste rock materials were enriched in a number of elements, and so this included copper, molybdenum, sulfur, selenium and silver.

However, during the MWMP tests, so similar to -- simulating rainfall events, neutral leachates were produced with low-metal concentrations.

The only exception to this is the transitional

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material which showed a higher potential for metal release. And again, this only comprises a small proportion of waste.

So this plot here is a standard method of characterizing or classifying geochemical behavior from acid base accounting using criteria from the BLM.

So here on the X axis we have the sulfide content, and here on the Y axis we have the net neutralizing potential, which is the difference between the neutralizing potential and the acid-generating potential of the samples.

So anything that falls in this upper field is classified as nonacid-forming material based on acid base accounting. Anything that falls in this lower field is classed as potentially acid-forming material. And anything that falls all within this gray box in the middle here is classified as having an uncertain potential of acid generation.

And as you can see, the majority of samples either fall in this uncertain field or nonacid-forming field. And because there's a large number of samples in this zone of uncertainty, this dictated the requirement for a kinetic testing program, which we'll go on to discuss shortly.

There are a few samples of potentially

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acid-forming material. And these red squares here represent the transitional ore and waste, which only comprises a very small proportion, 4 percent of overall waste.

The ore -- the transitional ore will be mined out and processed. So it won't be deposited in the final waste rock stockpiles.

And similarly, the sulfide ore materials represented by the green crosses won't be deposited in the waste rock stockpiles and will be processed as part of mining activities with an aim of removing the sulfides.

This is a similar plot and presenting again the acid base accounting data.

So here we have the neutralization potential ratio, which is the ratio between the acid generation potential and neutralizing potential, plotted against the net neutralizing potential, which is the difference between those two components.

Again we have different fields, as are dictated by BLM criteria. So here in the upper right, we have materials that are nonacid-forming. And here in the bottom left, we have potentially acid-forming material. And again this gray zone that represents uncertain characteristics.

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And as you can see, again we have a large number of samples that fall into the zone of uncertainty, meaning there's a requirement for kinetic testing. The potentially acid-forming material again is limited to the transitional waste and ore material with a small amount of the sulfide ore, as well.

We also conducted a series of net acid generation tests which is a second method for determining the potential for acid generation.

So this uses a strong oxidizing agent called hydrogen peroxide, and it's essentially a very aggressive oxidizing test to provide a high-end estimate of the potential for acid generation if all sulfides in the material were to be oxidized.

So this plot here represents our net acid generation testing results. So the way that the results of the tests are reported, it gives you a NAG pH value. And so values close to 0 are more acidic, and pH 7 is around neutral and going to pH 12 which is -- which is alkaline.

Anything that has a NAG pH greater than 4 is considered to be nonacid-forming. And you probably can't see very clearly from this plot, but actually the majority of our samples sit right on the axis here. So they have a NAG pH of greater than 4 and a NAG value,

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which is this second measure here, of 0. So what this means is there's really a very limited potential for acid generation from those materials.

We do have a small number of samples that show a higher potential for acid generation. And again that's limited to the transitional material that will comprise a small proportion of waste.

We also conducted meteoric water mobility procedure testing to evaluate the potential for metal release and during simulated rainfall events.

And what we found is that the potential for metal leaching is generally low with the exception of the transitional waste and ore material.

So this plot here is called a Ficklin plot. It's the standard method for characterizing and evaluating mine waters. So it classifies water chemistry based on both pH and also a number of key metal -- base metal contents. So based on where water samples fit, you can either classify it as -- as high-metal or low-metal.

And as you can see for Copper Flat, the majority of all samples sit here in this near-neutral, low-metal field, supporting there's a low potential for acid generation and metal leaching. Again the exception is this transitional material which shows a higher

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potential for metal leaching.

If we move on to the tailings material. So we collected and analyzed 12 samples of tailings as part of our characterization program. This included samples representative of future tailings from the metallurgical test work program. And also we had a sampling of historic tailings that we submitted for characterization.

And we found that the tailings were -- either had a low potential for acid generation or an uncertain potential based on the screening level test.

So tailings produced during the early years of mine life, between years zero and five, are characterized by a slightly higher sulfide content, .53 percent. And based on the screening level static tests, these showed an uncertain potential for acid generation.

Tailings produced after year five of mine life are characterized by a lower sulfide content, so less than .2 percent, and are nonacid-generating. And I think it's important to note that these sulfide contents are actually lower than the historic tailings material.

So you look -- heard me say that there was uncertainty in some of these screening level tests and because of that we needed to conduct a kinetic humidity

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cell testing program.

So the reason that we did this was to address some of the uncertainties in the static test results and also to provide source term chemistry for the geochemical models, including the waste rock stockpile and the tailings storage facility and the pit lake.

So the humidity cell test is a standard accelerated weathering test that's designed to simulate long-term rates of acid generation and metal release.

And the testing was carried out according to the ASTM standard method.

And so this schematic here just shows how the humidity cells operated. So the massive sample is placed in a column, and dry air is circulated through the column for three days, and followed by wet air, and then on the seventh day the column is leached with water, and the leachate is collected and submitted for analysis for a range of metals and pH.

So we had the very comprehensive humidity cell testing program that was conducted for Copper Flat, and we had 32 tests that were started in 2010.

And we focused the testing on the more abundant material types as defined by the geologic model.

And we really aimed to characterize the range

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of material types and behavior of each of those materials.

The ASTM standard method calls for a minimum text work period of 20 weeks, but the Copper Flat cells were run in excess of 20 weeks. So the minimum period we conducted the test for was 28 weeks. But in many cases, the tests were run for considerably longer than the minimum period required and up to a maximum of 122 weeks. So we collected a lot of data from this program.

And the termination of the test was determined when steady-state conditions were achieved.

So what we found from the humidity cell testing program was that it wasn't only the sulfide content that was important in controlling the potential for acid generation in these materials. There was also -- it was dependent on the mineralogy of the samples. And we'll go on to discuss that in a bit more detail.

So you'll recall that a lot of the samples showed uncertain potential for acid generation based on these screening level tests. But actually when we submitted these tests for the -- the samples for longer-term tests, 20 out of 23 samples maintained neutral to alkaline conditions throughout the entire duration of the test.

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The only samples that showed acid generation were two samples of transitional material, which you'll recall is the greater reactivity we saw in the screening level tests, that will comprise about 4 percent of waste.

But only one sample of sulfide material showed very late-stage acid generation after around 80 weeks of testing.

And what this tells us is that the screening level tests, so the acid base accounting, et cetera, really overestimated the potential for acid generation for this project, and the kinetic testing procedure is a much more reliable indicator of the longer-term potential for acid generation.

And in terms of metal leaching results from the humidity cell test, the results were generally consistent with a static test. We saw a number of elements that were enriched in the samples, but typically the leachates that were produced by the tests were near-neutral and had low-metal concentrations, with the exception of the transitional material.

So this graph here just shows the alkaline pH and over the course of the humidity cell test work of all of our samples.

So here on the X axis, we have the number of

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weeks that the test was conducted for. And here on the Y axis, we have the pH or the acidity of the solution that was generated.

So we would consider anything above pH 5 to be nonacid-generating. This is consistent with the MEND guidance. Anything below pH of 5 is acid-generating.

And as you can see, most samples here have neutral to alkaline pH. The main exceptions are this sample here which produce acid relatively quickly. This is a sample of transitional material that's collected from one of the existing waste rock dumps on site and this sample here which is transitional ore material.

This sample is -- represents sulfide waste, and we saw very slow decline in pH and very late-stage acid generation.

Again this Ficklin plot here just classified the humidity cell leachates in terms of their pH and metal content. And you can see that the majority of samples fall in this near-neutral, low-metal field, and with the exception of those three samples that we saw in the previous graph.

So the blue samples represent the transitional material, and this green sample here represents the one sample of sulfide waste that's produced late-stage. So this is the early part of the test, and this is the

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later stage.

Moving on to the tailings samples, we conducted humidity cell testing on a number of tailing samples. So here we have the pH and over 50-plus weeks of testing.

As you can see, all samples are well within the nonacid-generating field and produce neutral to alkaline leachates. And all samples fell in this near-neutral, low-metal field.

What was very important for the Copper Flat characterization program was the mineralogy that was conducted. So this was conducted on 28 samples of waste rock and ore.

And one of the primary reasons we conducted such a comprehensive mineralogy assessment was because we wanted to understand why we didn't see acid generation in the humidity cell test and despite the -- in some cases the sulfide content and the prolonged testing.

And what we found is that the lack of acid generation can be attributed to a number of things.

So firstly, sulfide minerals were often found to be encapsulated in slow-reacting silicate minerals such as quartz and feldspar. So the silicates are essentially kind of shrouded in a nonreactive silicate

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mass which reduces -- greatly reduces their exposure to air and water.

We also found that the sulfides are generally medium to coarse grained and disseminated and very well crystalized, and this means that they're more stable and resistant to weathering reactions.

We also found that there was the presence of acid-neutralizing silicate minerals, such as chlorite, which were contributing to buffering or neutralizing potential in the samples.

And we undertook a comparison of the Copper Flat deposit with similar analog deposits and similar geologic terrains and in similar climatic conditions. And what we found is that the sulfide contents and the acid-generating potential of the Copper Flat material is towards the lower end of the observed range.

So this plot here shows the sulfide content for a number of projects in Nevada, Arizona, Chile, and here we'll have -- here we have the Berkeley Pit, which I'm sure some of you are familiar with, and Copper Flat.

And so as you can see, this kind of square in the middle here represents the median sulfide content. So the median sulfide content at the -- of the Copper Flat deposit is in most cases significantly below or certainly within the range or the low end of the range

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of similar analog deposits.

This is also shown on this figure here. The Copper Flat samples are represented by these orange dots. Here the red crosses are the Berkeley Pit which are well within the acid-generating field. And Copper Flat typically falls in the uncertain or nonacid-forming fields based on acid base accounting.

So just to summarize the results of the characterization program before I go on to discuss the water quality predictions.

We found that the majority of waste rock shows very low potential for acid generation of metal release. So 96 percent of the material has a low potential.

Weathering reactions are very slow, and this is because the sulfide minerals are coarsely crystalline and often encapsulated, which means they're more resistant to weathering reactions.

We found that the screening level tests for the acid base accounting and the net acid generation tests typically overpredicted or overestimated the potential for acid generation.

And when we conducted the longer-term tests which are more representative of longer-term weathering conditions, we found that the majority of cells maintain neutral conditions. So 20 out of 23 cells maintained

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neutral conditions after -- in excess of a hundred weeks of testing in some cases.

The only exception to this is the transitional material which shows a greater potential for acid generation and metal release. This material only comprises 4 percent of waste rock and won't be exposed in the final pit walls.

And this material will also be managed by encapsulation in the waste rock stockpile and presents a low risk to surface water and groundwater.

So I will go on to discuss the water quality predictions that we undertook for the mine facilities.

So we used the geochemical characterization test work results to develop water quality predictions for the waste rock stockpile, for the tailing storage facility and for the pit lake. And these facilities are shown on this figure here. That's the tailing storage facility, waste rock stockpile and on the pit.

We used a number of data sources as inputs to our model.

So we used -- initially used mass-balanced results from the humidity cell test work that were scaled to field conditions.

We used site-specific climate data and information from the hydrologic and hydrogeologic water

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balance developed by John Shomaker & Associates.

We also used representative groundwater chemistry data that had been collected as part of the baseline program.

We used published rainwater chemistry data from the National Atmospheric Deposition Program.

And finally, we used information from the mine plotting through the information on waste rock and tailings tonnages and facility design and footprints and the composition of the final pit walls.

And the water quality predictions were undertaken using the US Geological software called PHREEQC, which is the standard method -- standard industry method for water quality predictions and is widely available and applied.

So if we initially look at the waste rock stockpile, the objectives of this model were to assess the potential for groundwater quality impacts from the stockpile.

So we used a number of assumptions in our model.

So the final facility will contain 60 million tons of waste rock, which will mostly comprise quartz monzonite.

The final facility will have a surface area of

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180 acres.
And we undertook our model for a postclosure scenario. So after closure, a revegetated store-and-release 36-inch cover will be placed on the surface of the facility and to promote run-off and enhance evapotranspiration and reduce the amount of infiltration to the facility.
Because of this cover, long-term infiltration to the facility is assumed to be low, so 2 percent of mean annual precipitation.
We assume that of the total mass of material in the facility only 20 percent of this is available for geochemical weathering reactions. And this is a standard procedure and consistent with a number of published literature guidelines which range from 10 to 30 percent.
And this is essentially because the majority of the reactivity is associated with the fine-grain material, so larger boulders, et cetera, and the majority of that will be held within the center of the boulder and is not available for weathering reactions.
We assumed that the waste rock stockpile is sited on low permeability andesite. However, and based on the analysis of John Shomaker & Associates, we're not -- we're not assuming that there will be -- or we're

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not expecting that there will be any seepage to groundwater in the future and because of the low permeability of this material.
However, we did conduct an evaluation to see if there was seepage from the facility what the potential impacts to groundwater might be. So we assumed that of the 2 percent of annual precipitation that infiltrates the facility a small proportion of this, so 5 to 10 percent, may eventually reach groundwater.
This cartoon here is our conceptual model so just looking at the main inputs and outputs to the waste rock stockpile model.
And so here we have our facility that contains 60 million tons of waste rock. It will be covered at closure with a revegetated store-and-release cover, which will enhance evapotranspiration and prevent infiltration.
But we did assume that there will be a small amount of infiltration to the facility and that may eventually make its way to groundwater. And we assessed the groundwater chemistry under the facility here upon mixing in the aquifer.
Looking at the results of this model, we found that the porewater within the waste rock stockpile is

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predicted to be moderately alkaline.
Because we'll be covering the facility with a revegetated store-and-release cover at closure, this means that sulfide oxidation will be limited.
We're also predicting that no impacts to groundwater will occur should there be any seepage from the facility. And predicted groundwater chemistry is similar if not almost identical to current groundwater chemistry.
Furthermore, all parameters are below New Mexico groundwater standards, with the exception of fluoride, which is naturally elevated in the existing groundwater.
So this table here, I appreciate there's a lot of data. And so here we have -- and if you wish to refer this table in more detail, it's contained within the Geochemical Characterization Report.
And here we have the number of constituents compared to the New Mexico groundwater standard. Here we have the existing groundwater chemistry in the andesite and the predicted groundwater chemistry for two seepage scenarios.
And in all cases, groundwater chemistry is very similar to existing groundwater chemistry with no impacts predicted.

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Moving on to the model for the tailings storage facility, the primary objective of this model was to assess potential for groundwater impacts from this facility.
So again we had a number of assumptions.
The final facility will contain a hundred million tons of tailings.
And we have a surface area of 530 acres.
The tailings will be deposited in a lined facility, and it will be constructed on the site of the historic tailings.
And these historic tailings will be used as a liner or a -- sorry -- a subbedding to the lined material. And what this will do is essentially isolate them from oxidation reactions. So they'll be placed under the liner so that no oxygen and water can access them.
A closure -- and the facility will include a number of closure actions. So this includes grading of the embankment slopes, placement of a 36-inch store-and-release cover, similar to the waste rock stockpiles, and finally, the management of any underdrainage.
As with the waste rock stockpile model, we did assume that there would be a small amount of

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infiltration to this cover. So we assumed that 2 percent of mean annual precipitation would infiltrate the cover.

We assumed that 70 percent of the total mass of tailings would be available for reactions. You'll remember this is -- this number is slightly higher than that assumed for the waste rock stockpile model, and that's primarily because the tailings material is much finer grained so generally has a greater reactivity -- or greater surface area, I should say.

Just moving through some of the additional assumptions, because there will be a liner placed under the tailings, there is a low potential for seepage. However, to assess the potential for groundwater impacts, we did assume that there may be minor seepage through manufacturing defects within the liner.

So for the purpose of these calculations, we assumed that there would be one circular defect per acre in the liner. And this was calculated by John Shomaker & Associates and is consistent with Giroud and Bonaparte's guidance.

And this will result in minor seepage from the facility.

And this seepage will consist of a mixture of processed water that's entrained within the tailings and

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also precipitation that may have infiltrated the facility.

So this diagram here shows our Copper Flat's well model for the tailings storage facility.

Here we have our map of tailing placed on an HDPE liner, which will be placed over the top of the historic tailings. So this is our revegetated 36-inch store-and-release cover that will be placed on top.

There will be a small amount of infiltration, 2 percent of mean annual precipitation. This will seep through the tailings, mix with the process water, and there may be small seepage through manufacturing defects within the liner, and a small portion of this may eventually make its way to groundwater.

And this is where we took our predictions here, in the top zone of the aquifer.

So moving on to present some of the results of this analysis.

We found that the solution chemistry will be dominated by moderately alkaline process waters, pH 8.2.

And seepage through the liner will be so low that impacts to groundwater are absolute or negligible.

And predicted groundwater chemistry is almost identical to current groundwater chemistry as a result of these very low seepage estimates.

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And critically, no parameters are predicted to exceed New Mexico groundwater standards under the facility.

And I think it's also important to note that containment of the historic tailings below the liner will reduce exposure of this material to oxidizing conditions. So it will contain that material.

And actually what this means is that water quality is likely to improve over time. So that sulfate plume that exists on site at the moment under the historic tailings is likely to be improved because of the source of that sulfate will essentially be cut off.

And further, as you all have heard from Mr. Finch's presentation earlier, particle tracking indicates that any seepage from the facility will remain in the immediate area for several hundred years and is not expected to migrate away from the facility.

Again I appreciate there's a lot of information on this table. We have our results here for a number of -- or predicted chemistry for a number of constituents compared to the New Mexico groundwater standards, baseline groundwater chemistry.

And we predicted groundwater chemistry under the tailing storage facility for a number of draindown scenarios ranging from 25 percent to 95 percent.

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And I don't know how well you can see this, but basically we're predicting no groundwater impacts with predicted groundwater chemistry that's identical or almost identical to an existing groundwater chemistry, with no exceedance of groundwater standards.

Finally, I'll move on to the pit lake water quality predictions.

So the primary objectives of this were to assess the future pit lake chemistry for the Copper Flat project.

Also to compare predicted pit lake chemistry to the existing pit lake.

To assess the effects of the proposed reclamation actions on proposed -- on predicted pit lake chemistry.

And finally, to demonstrate compliance with the New Mexico Mining Act regulations.

So specifically that's the operations must be planned and conducted to minimize change in the hydrologic balance in the permit and potentially affected areas.

Secondly, reclamation must result in a hydrologic balance similar to existing conditions.

And thirdly, postmining water quality must be similar to baseline premining water quality. So this

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third point here was really the key aspect that we were considering as part of the geochemical characterization program and the modeling effort.

So we completed pit lake predictions for three scenarios.

So we developed a calibration model for the existing pit lake that's on site in order to refine our modeling approach.

And then we developed two models for the future pit. So we developed one model for the unreclaimed pits with natural fill and also one for the reclaimed pit with rapid fill.

Again the predictions were made using the US Geological modeling software, PHREEQC.

And predictions were made for a number of postclosure years, ranging from six months out through 100 years postclosure.

And we have a number of data inputs that we used to our pit lake water quality predictions.

So we had information on the pit wall geology and surface areas that came from the feasibility study geologic model and on -- on pit shell.

The water balances were provided -- were provided by John Shomaker & Associates for the three pit lake scenarios.

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Groundwater chemistry at the groundwater that will enter the pit came from baseline groundwater data from the monitoring program.

For the rapid fill model, we assumed that the pit would be rapidly filled with good quality water from the water supply wells. So we obtained data from wells PW-1 and PW-3.

The source term chemistry for the pit walls was obtained from the humidity cell program that was scaled to field conditions.

Precipitation chemistry data were obtained from published data from the Gila National Monument meteorological station, which was collected between 1985 and 2011.

And finally, thermodynamic data was supplied with PHREEQC.

Now, I appreciate this schematic contains a lot of information, but I will try and talk you through, because it explains how we approached our pit lake modeling predictions.

So here in the bottom in blue, we have our hydrology inputs and hydrogeology inputs to the model. So this included groundwater inflow to the pits, run-off from the pit walls, direct precipitation onto the surface of the pit lake, any storage within the pit lake

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itself and, finally, any evaporation from the pit lake surface.

Here in green at the top, we have our various chemistry inputs to the model. So this included chemistry from the humidity cell program, groundwater chemistry taken from the baseline monitoring program and precipitation chemistry data.

So we combined these two components, so the hydrology inputs and the chemistry inputs, and we determined the amount of rock that will be exposed in the pit wall, and we reacted our water with this amount of rock that will be exposed.

And this was scaled from -- from lab conditions to field conditions to reflect the water-to-rock ratio that we will see in the field. So this was conducted for both any run-off entering the pit and any groundwater entering the pit.

And this -- these solutions were mixed, and the pit lake was about -- allowed to evaporate. Any oversaturated phases were allowed to precipitate. And finally, that predicted water chemistry was fed into the next time step. So for each step of the model, so six months, one year, two years, et cetera, we conducted this process.

As you may be aware, there is an existing pit

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lake on the Copper Flat property. This was developed during the early 1980s.

And the chemistry of this pit lake has been variable, but has been broadly circum-neutral, around pH 6.5, throughout the 35-plus years of existence.

There are occasional acid wall seep events that we see in the existing pit lake. And these relate to the transitional material that's exposed in the pit walls associated with the Sternberg Lode. And this material will be removed as part of the proposed operation so it won't be present in the future pit. So we're not expecting these acid wall seep events for the future pits.

There's a real benefit that we have a good water quality data set for the existing pit, because it helps us to understand the processes that control water chemistry and can be used to verify model assumptions and approach.

I think it's important to say -- and Mr. Finch touched on this earlier in his testimony, but the water level in that pit has dropped slightly in its 35 years of existence, and there has been evapoconcentration of solutes within that pit. So that current pit lake is a hydraulic sink so the only water loss is through evaporation. So evapoconcentrated processes are

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controlling the chemistry.
And this has resulted in an increase in -- here we have sulfate and chloride concentrations over time. So this represents a sample collected in January, 1989 through to January, 2017.
So we undertook a calibration model of the existing pit and to verify our future pit lake predictions and calibrate our model.
So the water balance of the existing pit was developed by John Shomaker & Associates.
And the model results show good calibration for most parameters. With constituent concentration -- predicted constituent concentrations are within the range of measured concentrations in the existing pit, which essentially verifies our modeling approach.
So we then went on to develop water quality predictions for -- with two scenarios for the future pit.
The first of these was for the unreclaimed pit that was allowed to fill naturally with groundwater and run-off.
And the second phase was for the reclaimed pit with rapid fill, whereby the pit lake is initially filled during the first six months with 2,200 acre-feet of good quality water from the water supply wells.

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This model also incorporated reclamation from New Mexico Copper's Mine Reclamation Plan. So this included reclamation of the pit haul road, as we can see here, and reclamation of the expanded 4,900 catch bench, which is located here, and reclamation of the pit crest, and, finally, the rapid fill that we discussed earlier.
So this conceptual model is for the future unreclaimed pits.
So it assumes that postclosure there will be a pit lake that forms in the pits as a result of groundwater inflow to the pit void, run-off of precipitation from the pit walls, direct precipitation onto the pit lake surface and, finally, run-off from the open pit surface drainage area.
As Mr. Finch presented earlier, the resulting pit lake will be a hydraulic sink. So what this means is there will be no outflow to groundwater or surface water, and the only means by which water will be lost from the pit lake will be through evapoconcentration -- or -- sorry -- evaporation processes.
This graph here shows the pit lake stage for the future unreclaimed pit.
So we see the elevation of the pit gradually recovering over a number of years. And here we have the various inputs to the pit lake. So it's dominated by

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direct precipitation and pit run-off with a lesser amount of groundwater inflow.
Moving on to the reclaimed pit scenario with rapid fill.
So during the first six months postclosure, the pit will be filled with 2,200 acre-feet of water from the water supply wells.
And this will have a number of beneficial effects. It means that the pit walls will be rapidly submerged. So any sulfide minerals that are exposed will not be exposed to air and water because they're essentially isolated within the pit walls.
It limits exposure of these to oxidation processes.
It also reduces the effects of the evapoconcentration over time because we're starting with a better initial water quality.
Again this pit scenario we're -- the modeling show that this will be a hydraulic sink. So there will be no loss of water to groundwater, there will be no flow through, and the only means by which water will be lost from the pit is through evaporation processes.
Sorry. If you could go just one slide. Thank you.
So this -- if you compare this stage curve

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here to the reclaimed pit, you will see that the water level reaches the equilibrium level much quicker than the unreclaimed natural fill scenario.
We assumed that there would be a certain amount of leaching from the pit walls. So we scaled our humidity cell data from laboratory conditions to field conditions based on the water-to-rock ratio we're likely to see under future conditions.
So the volumes of water were provided by the water balance developed by John Shomaker & Associates, and also the massive material in the pit walls were defined by the geologic model and Mine Plan.
So we assumed that there would be a certain depth of fracturing within the pit walls. For the purpose of our model, we assumed the fracture thickness of one foot, with a fracture density of around 10 percent. And this is -- this is a reasonable estimate for Copper Flat because they'll be using smooth ore blasting techniques and presplit drilling, which essentially reduces fracturing in the future pit walls.
Just to run through the results of our pit lake water quality predictions.
So pit lakes -- the future pit lake is predicted to be moderately alkaline, between pH 7.9 and 8.2. So there will be buffering by the inflowing

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groundwater. There's also a very limited amount of acid-generating rock exposed in the final pit walls. So the combined effects of these two components means we're expecting neutral to alkaline pH conditions.

We do predict there will be an initial -- a slight initial flush in trace element concentrations during the first six months as the pit fills. And this relates to the solubilization of oxidation products from the surfaces of the pit walls and fractures.

Similar to the trends observed in the existing pit, we do predict that there will be an increase in total dissolved solids, or TDS, over time because of evapoconcentration effects.

So when we compare the predicted chemistry to the existing pit lake, we see that the predicted chemistry is in -- either within the same range or better water quality compared to the existing pits.

Critically, we're not predicting the acid wall seep events for the future pit. This is because the transitional material that's currently exposed within the pit walls in the form of the Sternberg Lode will be mined out as part of operations. So that won't exist in the future pit walls.

We found that rapidly refilling the pit results in better water quality. This is because the

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long-term effects of evapoconcentration are reduced and predicted constituent concentrations are lower.

So I'll just present some graphs showing some of the results for key constituents. Each graph follows a similar format so I'll just briefly explain what it shows.

Here on the X axis, we have the number of years postclosure out to 100 years. And then here we have constituent concentrations, or in this case pH.

So the red line represents the predicted chemistry for the future reclaimed pit. The green line represents the predicted chemistry for the unreclaimed pit. And these gray lines here represent the range of measured chemistry in the existing pit lake. So minimum, average and maximum.

What you see here is that we have moderately alkaline predicted chemistry, which is towards the upper range of pH observed in the existing pit. And the reason we're predicting higher pH is because of the removal of this transitional material from the Sternberg Lode which contributes to acid water events. This will no longer be present in the future at a pit lake.

If we look here at the predictions for sulfate, we can see that predicted sulfate concentrations are either within the range or less than

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the range in the existing pit lake. For reasons that we see lower predicted concentrations are severalfold.

So firstly, certainly in the case of rapid fill, we're reducing the effects of evapoconcentration. We're starting off with better initial water quality.

We're also removing that transitional material that contributes sulfate to the pit lake.

And the blasting practices that will be used for the future pit are different to what was used back in the 1980s. So blasting practices have improved, and the thickness of fracturing is assumed to be much less as a result of these improvements.

Here we have the predicted copper concentrations. In the future pit, again these fall -- these fall towards the lower end of the range observed in the existing pit.

Similarly here for fluoride, we have concentrations that are either towards the lower end or below the range of existing water quality. So better predicted water quality for the future pit.

And similarly here for arsenic, predicted concentrations are either within the range or, in the case of the unreclaimed pit here, it's less than the observed range, representing an overall improvement in water quality as part of the proposed mining operations.

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Similarly here we have selenium, and we see predicted concentrations well within the range or toward the lower end of the range for the existing pit lake.

This Ficklin plot -- you all have seen similar plots several times throughout this presentation, but I think it's a good illustration of how pit lake water quality is predicted to be -- to improve in the future. So -- sorry.

The green circles that you can see represent the chemistry -- the measured chemistry of the existing pit. And a lot of those fall in either the acid, high-metal or the near-neutral, high-metal field with some in the near-neutral, low-metal field. Plus it's quite variable.

The red squares that you can see represent the predicted chemistry for the future reclaimed pit.

And the gray diamonds represent the predicted chemistry for the unreclaimed pit.

And the majority of future pit lake predictions fall within this near-neutral, low-metal field, particularly for the rapid fill scenario, which is this -- these red dots here.

So just to summarize the results of the pit lake water quality predictions, future pit lake waters are predicted to be moderately alkaline, with

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constituent concentrations within the range of variation seen for the existing pit lake.

We do predict that there will be an increase in total dissolved solids over time as a result of evapoconcentration effects, which is similar to the trends observed in the existing pit lake.

We are not anticipating that there will be any acid wall seep events for the future pit, and pit lake water quality is predicted to be estimated -- sorry -- is predicted to be better than the existing pit lake.

Critically, the results demonstrate that the changes to the hydrologic balance of the future pit will be nil or minimal so there will potentially be similar to existing conditions. Future water quality will be similar or better quality than the existing pit lake. And finally, rapid refilling of the pit results in further improvement of the water quality.

So finally, just to summarize all of the results of the geochemistry program, the majority of waste rock, 96 percent of waste rock, that will be produced by the project shows a low potential for acid generation and metal release.

Weathering reactions are likely to be very slow due to the coarse crystalline nature of sulfide minerals and also encapsulation in slow-reacting

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silicate minerals.

We found that there -- the screening level tests, including acid base accounting, generally overestimate the potential for acid generation, and overestimated the reactivity of the samples. And in actual fact, these acidic conditions weren't realized when we undertook longer-term weathering tests in the form of humidity cell testing.

Furthermore, the tests that we conducted showed low potential release or generation of metal-rich solutions.

The only exception is the transitional material which does show a greater potential for acid generation and metal release. This material only comprises 4 percent of waste rock and will be managed by encapsulation in the waste rock stockpile, and as such, there will be a low risk to impact surface water and groundwater.

Our water quality predictions show that we're not expecting impacts from -- groundwater impacts from either the waste rock stockpile or the tailing storage facility.

And finally, pit lake waters in the future pit are predicted to be neutral to moderately alkaline with constituent concentrations that are similar to or less

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than the existing pit lake.

And that concludes my direct testimony.

Q. Thank you for your presentation, Ms. Griffiths.

Did you provide a copy of your resume as New Mexico Copper Corporation's Exhibit 21?

A. Yes, I did.

Q. Did you provide PowerPoint presentation as Exhibit 22?

A. Yes.

Q. Did you also provide resumes of Mr. Rob Bowell and Ms. Amy Prestia as Exhibits 23 and 24?

A. Yes, I did.

Q. And then in offered Exhibits 25 through 86, did you also provide a set of materials that provided some of the background analyses and information that goes into your presentation today?

A. Yes, I did.

MR. BUTZIER: With that, Ms. -- Madam Hearing Officer, I would like to offer into evidence Exhibits 21 through 86.

MS. ORTH: Objections?

MR. DE SAILLAN: No objections.

MR. KNIGHT: No objections.

MS. BARNCASTLE: I do have a concern. I --

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test. Hello.

I have a concern.

Slide 14 in Dr. Griffiths' presentation doesn't match the slide 14 I have from disclosures.

MR. BUTZIER: Could we go to slide 14, please.

Ms. Griffiths -- and, Madam Hearing Officer, with your permission -- would you describe whether this slide is changed and, if so, what was changed in the slide.

MS. GRIFFITHS: The fundamentals of the slide have not changed, just additional detail has been added.

So I believe that the slide that's -- is -- has been provided previously just shows that the materials are defined by the primary rock type, oxidation and the copper grade. It doesn't actually provide the percentages of material.

So those percentages have now been added to the slide for additional clarification to support the rest of the presentation.

MR. BUTZIER: Thank you.

We would renew our motion to accept all of these exhibits, including the PowerPoint presentation as changed and as it has been added to according to this testimony.

MS. ORTH: All right.

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Ms. Barncastle, do you have any questions about the addition?
MS. BARNCASTLE: I would just like to know if there were any other changes in what's being offered versus what was provided in the disclosures?
MS. GRIFFITHS: Not in terms of this presentation. I think there was two typos that were noted, and they've been corrected, but that's it.
MS. BARNCASTLE: No objection. Thank you.
MS. ORTH: All right. Thank you.
NMCC Exhibits 21 through 86 are admitted.
(Exhibits NMCC Exhibits 21 through 86 admitted into evidence.)
MS. ORTH: Anything further, Mr. Butzier?
MR. BUTZIER: Madam Hearing Officer, nothing further, other than I would like to have Mr. Rob Bowell come to the witness stand and made available when the time is appropriate. I don't know if you want to take a break or not.
MS. ORTH: I would like to take a break actually before we begin cross.
MR. BUTZIER: Before we take a break, could I move -- could I offer that Mr. Rob Bowell be also accepted as an expert in geochemistry as it relates to mine facilities?

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MS. ORTH: Are there objections?
MR. KNIGHT: No objection.
MR. DE SAILLAN: No objection.
MS. ORTH: Ms. Barncastle? No?
MS. BARNCASTLE: No objection.
MS. ORTH: All right. Fine. He'll be so recognized.
MR. BUTZIER: Thank you.
MS. ORTH: Let's take a break, 10 minutes.
(Proceedings in recess from 5:22 p.m. to 5:39 p.m.)
MS. ORTH: All right. We are going to begin the cross-examination of Dr. Griffiths and -- is it Dr. Bowell?
MR. BOWELL: That's right.
MS. ORTH: Okay. Great.
Mr. Knight, do you have questions of the panel?
MR. KNIGHT: Madam Hearing Officer, I have no questions for this witness.
MS. ORTH: Thank you.
Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
I do have several questions.

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THE REPORTER: Hold on a second.
We have to swear in Mr. Bowell.
MS. ORTH: Oh, sorry.
We have to swear in Dr. Bowell.
(ROB BOWELL was duly sworn.)
RUTH GRIFFITHS and ROB BOWELL
having been first duly sworn or affirmed, were examined and testified further as follows:
MS. ORTH: Okay. We're ready.
MR. DE SAILLAN: Okay. Thank you.
CROSS EXAMINATION
BY MR. DE SAILLAN:
MR. DE SAILLAN: Good evening, Ms. Griffiths.
I'd like to start out with slide 8, please.
And this slide indicates ARD and ML leachate treatment.
Do you know if any similar treatment is planned for Copper Flat?
MS. GRIFFITHS: This is just a general schematic that looks at the processes that may contribute to ARD, acid rock drainage, and metal leaching. As far as I'm aware, no treatment is proposed for the Copper Flat project.
MR. DE SAILLAN: Okay. Thank you.
Let's go to slide 18 -- well, yeah. Slide 18.

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Now, that shows us 16 samples for 4.5 percent of the ore for QFB sulfide, 22 samples for 75 percent of the ore for QM sulfide.
Could you explain why 16 samples for 4.5 percent versus 22 samples for 75 percent are equally representative?
MS. GRIFFITHS: So this -- this was due to a number of reasons.
Firstly, when we started our sample collection program, back in 2010, it was based on the PEA, the preliminary economic assessment, and we didn't at that point have the previous stability study and material tonnages.
So as you're probably aware, the cutoff grade on the pit shell has changed, and as a result of this, the relative proportions of each material has changed slightly. So we did collect a higher number of samples of this quartz feldspar breccia sulfide material.
Also, this, I believe, shows slightly more variability in terms of behavior so we collected more samples of this material.
But yes. Both the 16 samples and the 22 samples is considered a reasonable sample number for each characterization of each material type.
MR. DE SAILLAN: What do you mean by

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considered a reasonable sample number?
MS. GRIFFITHS: There is no -- or the official guidance on the number of samples is variable. So the GARD Guide does provide guidance on the number of samples, and it's -- it specifies that you must characterize the range of -- of variability in the ore material, and -- but it doesn't -- as far as I'm aware, it says you have to collect several hundred samples in total when you're at the feasibility study stage.
So we consider this -- this adequate based on -- we consider this sample distribution adequate based on the geology information that we have seen.
MR. DE SAILLAN: Did you do any kind of statistical analysis to determine if you had an adequate number of samples to characterize, to make a characterization?
MS. GRIFFITHS: We did not.
MR. DE SAILLAN: Okay.
Now, you referenced in slide 26 ASTM D5744-13e1.
MS. GRIFFITHS: Um-hum.
MR. DE SAILLAN: Are you aware of a recent revision to that standard?
MS. GRIFFITHS: I believe this is the revision, the 2013 revision.

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MR. DE SAILLAN: What year?
MS. GRIFFITHS: 2013.
MR. DE SAILLAN: Okay.
Were you involved in that revision?
MS. GRIFFITHS: I was not.
MR. BOWELL: Just clarification, I am involved in the ASTM committee -- I am currently involved in the ASTM committee which is looking at the revision of the standard.
MR. DE SAILLAN: Okay. Thank you.
Let me back up to slide 21.
You state that the majority of the samples are classified as either uncertain or nonacid-generating.
Looks like the majority of the samples are actually uncertain.
What -- how do you determine whether it's uncertain as opposed to acid-generating or nonacid-generating?
MS. GRIFFITHS: So the criteria we apply are BLM criteria, and so here they're based on the net neutralizing potential, on this slide, and I think the next slide shows the neutralizing potential ratio. So the BLM defines criteria for classification of acid-generating material and nonacid-generating material and uncertain material.

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So based on the BLM criteria, any material that has a net neutralizing potential between minus-20 and 20 has an uncertain potential for acid generation.
MR. DE SAILLAN: Okay.
So those were the BLM methodology?
MS. GRIFFITHS: Correct.
MR. DE SAILLAN: Okay.
Then slide 25, I didn't quite understand how you sampled the future tailings.
MS. GRIFFITHS: So those samples came from the metallurgical test work program that was conducted in a laboratory environment. So we took samples of material from that program, and they're considered representative of future tailings, and we submitted those for geochemical characterization.
MR. DE SAILLAN: So how did you -- how were you able to generate tailings that are representative of the future tailings that are going to come from this mine?
MS. GRIFFITHS: We weren't directly involved in the metallurgical test work program so I'm afraid I can't comment on that.
MR. DE SAILLAN: Okay.
MR. BOWELL: Just to clarify, in the mining industry, it's essential on a metal mining project that

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during previous building feasibility study you want to take test work in order to segregate the ore minerals so you can determine purity, grade and really the value of the ore.
Now, that metallurgical test work mimics the processes that will be applied in the field. So it generates a waste material. That waste material for all intents and purposes has the same material characteristics as a process plan would have in reality or in our production.
So tailings produced in test work would show the same chemical, mineralogical and physical characteristics to those that will be produced during operation. So that's considered a suitable analog.
MR. DE SAILLAN: Okay.
Okay. Slide 35.
Can you identify Nevada 1 and Nevada 2?
MR. BOWELL: Sorry. This is my slide again.
Nevada 1 is the Liberty Pit which is in the Robinson Mining District.
And Nevada 2 is taken from the Rio Tinto project which is in Pershing County in Nevada.
MR. DE SAILLAN: Okay.
MR. BOWELL: I think it was the Copper City version on -- the Copper City side of the Rio Tinto

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Mining District which was under evaluation in 2004 to 2006.
MR. DE SAILLAN: Okay.
And of the five sites that are shown, which of them are in porphyry copper deposits?
MR. BOWELL: They're all porphyry systems, they're all calc-alkaline porphyry systems. The Copper Flat, Chile, both the Nevada examples and the Arizona group of samples all come from very typical low-styled, disseminated sulfides in porphyry.
Berkeley Pit was put up here as a counterpoint to that. It is a well known porphyry system, but it actually is a sulfide-rich stockwork developed within the same kind of magmatic rock. So it actually has a slightly different geology to the others.
MR. DE SAILLAN: Okay.
I want to go back to slide 21.
No. I am not reading my writing. Which one -- I think it was 27, that showed the -- it's like a structural -- yes. That's the one.
So this is a like a structural integrity test that you performed? It looks like the sample on the inside there is a solid piece of rock, a monolithic piece of rock; is that correct?
MS. GRIFFITHS: So this shows the humidity

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cell test. So on the right, we have a picture of what the column looked like in the lab, and on the left, we have a schematic of how that column is set up.
So it contains a sample of crushed waste rock material, so crushed to less than 6.3 millimeters, and that is contained within the column, and that is then -- air is circulated through the column, and it's flushed on a weekly basis.
MR. DE SAILLAN: Okay. So that rock is crushed?
Because from here it doesn't look like it.
MR. BOWELL: It's a poor folks' graphic in that respect, but, yes, the rock inside there is crushed.
MR. DE SAILLAN: Okay.
MS. GRIFFITHS: And that crush size is according to the ASTM standard.
MR. DE SAILLAN: Okay.
Slide 37.
You indicated that the -- the waste rock that has a higher acid-generating potential would be encapsulated within the waste rock pile, and I was wondering how that's going to be accomplished.
MS. GRIFFITHS: I believe the details of that are included in the Waste Management Plan, which New

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Mexico Copper will be able to provide more details.
MR. DE SAILLAN: Okay.
Could you explain?
MS. GRIFFITHS: I am not familiar with how that material will be encapsulated, but I'm sure the New Mexico Copper would be able to provide additional detail on that.
MR. DE SAILLAN: So the word "encapsulation" is not your term.
MS. GRIFFITHS: No.
MR. DE SAILLAN: Okay.
All right. Slide 41.
What is the basis for your assumption that infiltration will be 2 percent of total precipitation?
MS. GRIFFITHS: This came from water balance estimates developed by John Shomaker & Associates. It's considered a relatively reasonable estimate, I believe, for infiltration through a covered waste rock stockpile.
MR. DE SAILLAN: Okay.
Considered by you?
MS. GRIFFITHS: This is not my area of expertise.
MR. DE SAILLAN: Okay.
DR. GRIFFITHS: Infiltration.
MR. DE SAILLAN: Okay. Thank you.

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I'm going to go ahead and ask the same question with respect to slide 46.
MS. GRIFFITHS: So the same cover will be applied to the tailings storage facility as will be applied to the waste rock stockpile, so that's a 36-inch store-and-release cover, and revegetated. So we've assumed the same amount of infiltration through that cover because the properties will be the same.
MR. DE SAILLAN: And again are you basing that on work that was done by John Shomaker & Associates?
MS. GRIFFITHS: Correct.
MR. DE SAILLAN: Okay.
Then slide 42.
I think with respect to that slide you said that fluoride is naturally elevated? Is it above the applicable water quality standards?
MS. GRIFFITHS: It is --
MR. BUTZIER: Madam Hearing Officer, I would like to say that that partially at least calls for a legal conclusion and understanding of the language of the 3103 regulations in NMED's groundwater standards.
MS. ORTH: All righty. I think he's -- he is not seeking speculation, that her statement is fluoride's already elevated, as I understood it, and that that was the one value -- I believe she said that

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that was the one value that was higher than the standard.

So --

MR. BUTZIER: My point, Madam Hearing Officer, if I could elaborate --

MS. ORTH: Yes.

MR. BUTZIER: -- is that Ms. Griffiths may not be the right person to ask about the fact that under the 3103 groundwater standards in the regulations of the WQCC administered by NMED the numeric standard applied unless existing contamination is higher than the numeric standard. And that's the situation here.

And so there was maybe a little misunderstanding about terminology used in that particular slide, and that's the nature of my objection.

MS. ORTH: Okay. Now -- I understand now.

So, Mr. de Saillan, with that clarification, would you please reask your question.

MR. DE SAILLAN: Yes. Thank you, Madam Hearing Officer.

So based on your understanding of the regulations, when you say that it's naturally elevated, does that mean it's above what you understand the standards to be?

MR. BUTZIER: Same objection.

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MS. ORTH: Okay. Dr. Griffiths, do you understand the question, whether it exceeds the numeric standard without thought as to whether that means compliance.

MS. GRIFFITHS: Yes. I understand the question.

MS. ORTH: Okay. Go ahead.

MS. GRIFFITHS: And yes, to answer your question. It does exceed the numeric standard.

MR. DE SAILLAN: Okay. Thank you.

Okay. Slide 44, please.

The historic tailings under the tailing storage facility has -- you refer to it as a method mitigating -- of mitigation to prevent further metals leaching into groundwater.

Can you tell us of any other locations at which this approach was taken that you're aware of?

MS. GRIFFITHS: I defer to Dr. Bowell on this question.

MR. BOWELL: I think you'll find that the Chino -- not Chino -- I mean the Cerro Chino project in the Bisbee area also --

THE REPORTER: Say that again, please.

MR. BOWELL: Sorry.

Cerro Chino project, which is in the Bisbee

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Mining District in Arizona, it also had the same approach as an old tailings impoundment, was reused, and new tailings were placed on top of that.

I can't remember if they had a synthetic liner or not, but they certainly reused the old tailings impoundment as a means of storage, and one of the aspects that was often quoted about it was that it was a way of mitigating the oxidation of the high-sulfide tailings, which were the older, late 19th century tailings.

MR. DE SAILLAN: And was that approach successful?

MR. BOWELL: That's a great question.

I don't know. I didn't work on that project. I just read a paper on it. It was certainly successful -- like it is successful at Wheal Jane in Cornwall, where an old tailings impoundment was being used for disposal of modern sludges, and a synthetic liner was placed over them, and the groundwater quality in that area has improved over time.

And that has been documented in a number of studies.

MR. DE SAILLAN: And what was the -- what were the sludges?

MR. BOWELL: The sludge came from mine water

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treatment, from underground pumping from an old, abandoned underground mine, and the sludge was present within the water which was treated, the sludge was separated from the water, and the sludge, which was a very fine-grain material, similar to tailings, was then placed on top of a liner which was on top of the old tailings impoundment.

And that's the Wheal Jane. Wheal is spelled W-H-E-A-L. It's Cornish for mine. So --

MR. DE SAILLAN: Slide 55, please.

Now, could you explain how the model was changed to reflect reclamation of the pit?

MS. GRIFFITHS: Yes. So for the reclaimed surfaces, so this included the haul roads, the catch bench and the crest of the pits, we assumed that the reactivity of that material would be effectively greatly reduced, and the chemistry of that material is just represented by essentially run-off chemistry with minimal reactivity, because that -- the pit walls with the fracturing will no longer be exposed to oxygenating conditions.

MR. DE SAILLAN: Okay.

Okay. Slide 61, please.

Now, your assumption here, I think, is based on the pit walls remaining intact?

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MS. GRIFFITHS: Sorry. Are you referring to your previous question about --
MR. DE SAILLAN: No. This is slide 61.
So your assumption here depends on the pit wall remaining intact?
MS. GRIFFITHS: No. That's not correct.
If you could go back to slide -- the previous slide. Was it 44?
Sorry. Just -- keep going.
MS. ORTH: 55.
MS. GRIFFITHS: That one, sorry, with the yellow.
MS. ORTH: Try 55.
MS. GRIFFITHS: There we go.
So if I can point to on this diagram, if you can see, sorry, the yellow areas represent the reclaimed areas. It's assumed there will still be fracturing, et cetera, within these exposed areas of the pit here, the nonyellow.
MR. DE SAILLAN: Okay. So there would be fracturing.
MS. GRIFFITHS: That's correct.
MR. DE SAILLAN: And what would that be the result of? Would that be the result of blasting of the pit?

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MS. GRIFFITHS: That's correct. Those fractures relate to the blasting.
MR. DE SAILLAN: Okay.
Over time, are you aware of benches on pits sloughing and crumbling?
MS. GRIFFITHS: Yes. I'm aware of it. It's not within my area of expertise. I would consider that a geotechnical stability issue.
MR. DE SAILLAN: Okay. So that was not built into your assumptions.
MS. GRIFFITHS: Please, could you clarify what you mean by not built into your assumptions.
MR. DE SAILLAN: Back to slide 61, you were making assumptions about the -- the weathering of the pit walls and contribution of the pit walls to contamination.
Were you taking into consideration the possibility over the long-term of sloughing or crumbling of the pit walls?
MS. GRIFFITHS: That is not taken into consideration.
MR. DE SAILLAN: Okay. Thank you.
Okay. Slide 62 through 66.
And I -- you talk about concentrations of contaminants, and I was a little confused here. You

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talked about it's within a range, and I wasn't quite sure what that range was that you were referring to, that had -- if it was pegged to groundwater quality standards or surface water quality standards.
MS. GRIFFITHS: My apologies. I will explain that in a bit more detail.
So the range I'm referring to is the range of chemistry that we've seen measured in the existing pit lake. So that's based on measurements made between 1989 and 2017.
So these -- these values here represent the minimum measured chemistry during that period, the average measured chemistry and the maximum measured chemistry during this period.
MR. DE SAILLAN: So -- okay. So it had nothing do with standards.
MS. GRIFFITHS: That's correct.
MR. DE SAILLAN: Okay.
Now, how many mine sites have you made major geochemical predictions for?
MS. GRIFFITHS: I couldn't give you an exact number, but I would say probably on the order of 10 to 15.
MR. DE SAILLAN: Okay.
And have any of those mine sites been in

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operation for more than 10 years?
MS. GRIFFITHS: No.
MR. DE SAILLAN: Okay.
Have you had a chance to revisit your predictions at any of those mine sites?
MS. GRIFFITHS: I have not. But as I presented in my direct testimony, with the Copper Flat project we have an existing pit lake on site that we were able to use to calibrate our model and give us confidence in our modeling approach.
We don't often get that opportunity, where we have an analog lake or, you know, water quality data for the site. So that -- the fact that we were able to replicate that chemistry gave us confidence in the predictions.
MR. DE SAILLAN: Okay.
That is all my questions.
Thank you very much.
MS. ORTH: Thank you, Mr. De Saillan.
Ms. Barncastle.
CROSS EXAMINATION
BY MS. BARNCASTLE:
MS. BARNCASTLE: In the record, Bates page number 5529 is the beginning of an existing report where testing was done in 1997 regarding potential for acid

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generation, and you didn't discuss that in your direct testimony.
Why is that?
MS. GRIFFITHS: That's correct. We didn't provide information on that report. If required, Dr. Bowell worked on that original characterization program so he can provide more detail.
But from my understanding, the sampling for that program was focused on the existing waste rock dumps and was focused on the finer-grained, more reactive material from those existing waste rock dumps. So it's not considered representative of future mined materials for the Copper Flat project.
MS. BARNCASTLE: But it is true that it did show more potential for acid generation than the test results you direct -- your direct testimony focused on.
MS. GRIFFITHS: That's correct to some extent, because those -- as I said, those samples were focused on the finer-grained, reactive material from the existing waste rock dumps. So those existing waste rock dumps primarily received the transitional material, which we heard was the more reactive material, and there will be a very small proportion of that material that will be mined as part of future mining operations.
So we're expecting, because the future pit

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will go much deeper into the sulfide zone, the reactivity of the future mine materials will be less.
MR. BUTZIER: Madam Hearing Officer.
MS. ORTH: Mr. Butzier.
MR. BUTZIER: Although Ms. Griffiths clearly understood the question and knows exactly what she's talking about in relation to the document, I wonder if Ms. Barncastle could repeat the Bates number, because I'm a little slower and not catching up with her.
MS. ORTH: All right.
Ms. Barncastle.
MS. BARNCASTLE: 5529.
MS. ORTH: Thank you.
MR. BUTZIER: Does that have a number in the index to the administrative record, just an item number?
MS. BARNCASTLE: I can tell you that it's EBID's Exhibit 19. I don't know -- I don't have the administrative record up in front of me.
MR. BUTZIER: Thank you. That will do it.
MR. KNIGHT: If I may, that's item 108 in the administrative record.
MS. ORTH: Thank you, Mr. Knight.
MR. BUTZIER: Thank you.
MS. BARNCASTLE: Let's see where I was at.
Can you -- can you give me a little bit more

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of an explanation as to why the samples from the 1997 study are not representative of what you expect to see from this mine in the future?
MS. GRIFFITHS: So the samples that were collected in 1997 were collected from the existing waste rock pile. So that's material that's already been extracted from the pit. So those waste rock piles will be reclaimed as part of the mining operations.
The future mine materials were represented by the exploration drill core. So samples were collected from -- from drilling within the proposed footprint of the future pit. So that is considered more representative than surface material that was mined previously.
MS. BARNCASTLE: On slide 35 --
MR. BOWELL: Can I just elaborate on that? Sorry. Can I just elaborate on that, because I did some of the work on --
MS. BARNCASTLE: Sure.
MR. BOWELL: So the test methodologies that we carried out in the field were with a series of what we call paste pH, which is a field assessment, which 20 years ago was a very common way of trying to identify high-risk materials. So it's a much smaller sample. As Ruth said, it was done on materials which were

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preexisting in the field.
With the program that we had for Alta Gold, we only had six cores that were made available for our use for looking at future wall rock.
So I would probably contend that the characterization part that was done 20 years on is a lot more relevant to looking at future mining of the pit as opposed to the material we had available 20 years ago.
So we ended up looking at material -- because the Copper Flat deposit is in a porphyry system, these systems are often quite zoned. So part of the issue with early mining of porphyries is that there's more oxides in the transitional material than there is later in the mine life. There's higher copper grades there typically.
So the material more on the current waste rock pile represent generally more weathered material that was geologically higher in sulfide and higher in metals than the material deeper down in the porphyry system. That's a fairly standard anatomy to a porphyry system. Hence there's some discrepancy between the two characterizations.
MS. BARNCASTLE: Thank you for that.
Slide 35, please.
I believe your testimony was that Copper Flat

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is in the range of these other mines; is that correct?
MS. GRIFFITHS: I believe I said it was towards the low end of the range.
MS. BARNCASTLE: Those other mines are contamination sites; is that correct?
MS. GRIFFITHS: I'm not sure what you refer to when you say contamination sites.
These are essentially other characterization programs that we have worked on. So they -- this is the characterization data for those sites.
MS. BARNCASTLE: The Berkeley Pit is a Superfund site?
MS. GRIFFITHS: That's correct.
MS. BARNCASTLE: Slide 37, please.
Let's see, where is it.
I might be on the wrong slide. Oh, no, no. Okay.
Third bullet point down, acid base accounting and net acid generation methods generally overpredict acid generation.
The question is overpredict in comparison to what?
MS. GRIFFITHS: So as you'll have heard during the direct testimony, there's the two testing types. There's the shorter-term screening level test that we

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call static test. So that includes acid base accounting and net acid generation tests. So those tests are screen level tests. They don't take into account longer-term weathering reactions, which we see in the kinetic humidity cell test.
So what we found from those screening level tests is that there is an uncertain potential for acid generation for many material types, but actually when we subjected those samples to longer-term weathering in the humidity cell tests, we didn't see any acid generation.
So the uncertain was -- was an over -- the uncertain classification was an overestimate of the potential for acid generation. And in fact, those conditions weren't seen at all in the longer-term humidity cell test which we would consider more representative of weathering characteristics.
MS. BARNCASTLE: So the screening tests aren't very helpful, then.
MS. GRIFFITHS: They are helpful, and they're also a requirement of the Copper Rule, to carry out these screening level tests. But we find the kinetic humidity cell tests more representative because they take into account mineral reaction rates. So they're carried out on the -- on the crushed material, whereas the static screen level tests are undertaken on the

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pulverized material.
So those screening level tests don't take into account mineral textures or anything like that, but are taken into account in the humidity cell tests. And that's -- as we've heard, the mineral textures at Copper Flat are very important in controlling the chemistry.
MS. BARNCASTLE: And when you say humidity cell test, you're referring to the kinetic test.
MS. GRIFFITHS: That's correct.
MS. BARNCASTLE: What geochemical data was used for the input from the waste rock and tailings models?
MS. GRIFFITHS: For the waste rock model, we used data from the humidity cell testing program. So from the Mine Plan and the geologic model, we knew what materials were going to be deposited in that -- that waste rock stockpile, and then we used humidity cell data for most materials within our prediction.
MS. BARNCASTLE: Is that data included in the record?
MS. GRIFFITHS: Yes, it is.
MS. BARNCASTLE: Can you refer me to where we might find those in your reports?
MS. GRIFFITHS: It's contained in the Geochemical Characterization Report for the Copper Flat

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Project.
MS. BARNCASTLE: Do you have a Bates page number?
MS. GRIFFITHS: Page number? Oh.
MR. BUTZIER: Madam Hearing Officer, if she wants to move on while I look, I'd be happy to see if I can answer that question.
MS. ORTH: All right.
Can you continue without that number now?
MS. BARNCASTLE: Yes, I can. Thank you.
MS. ORTH: Okay.
MS. BARNCASTLE: On multiple of your slides, you refer to seepage assumptions being based on the John Shomaker & Associates determinations; is that correct?
MS. GRIFFITHS: That's correct.
MS. BARNCASTLE: If JSAI were wrong, does that also mean your predictions are wrong?
MS. GRIFFITHS: How do you define wrong?
MS. BARNCASTLE: Well, if they were incorrect, then your reliance on their incorrect determinations would affect your predictions; is that correct?
MS. GRIFFITHS: Yes. But I think it's important to note that we're not just using the Shomaker & Associates data. There are, obviously, a lot of other data that feeds into those models. So that's

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just one small component.
MS. BARNCASTLE: Sure, understood.
Slide 47, please.
In bold, in the fourth bullet point down, no parameters are predicted to exceed New Mexico Water Quality Control Commission groundwater standards.
How close, though, do the predictions come to exceeding groundwater impacts?
MS. GRIFFITHS: I'm not able to answer that question without looking at the results directly. I know that the predicted watered chemistry is almost identical to existing water chemistry. So we're not predicting any impacts as a result to groundwater.
MS. BARNCASTLE: Where in the record could we find that actual prediction data?
MS. GRIFFITHS: That's also contained in the Geochemical Characterization Report.
MS. BARNCASTLE: I think that's all for my questions.
MS. ORTH: All right. Thank you.
Mr. Butzier, have you found it?
MR. KNIGHT: Madam Hearing Officer, I just want to say I misspoke earlier. The item at Bates 5529 that Ms. Barncastle was referring to is actually item number 110 in the record.

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MS. ORTH: Okay. Thank you. So we'll correct that.
MR. BUTZIER: I was hoping you were going to say what -- where the geochemical study was.
But I'm still looking, Madam Hearing Officer.
MS. ORTH: All right. Thank you.
Is there anyone else who has a question of Dr. Griffiths or Dr. Bowell based on their testimony? Anyone at all?
Okay. I see no hands.
Mr. Butzier, do you have any follow-up?
MR. BUTZIER: No, I do not, Madam Hearing Officer.
MS. ORTH: You do not. All right. Thank you very much.
If there's no reason not to excuse the panel, we'll excuse them.
Thank you very much.
MR. KNIGHT: And, Madam Hearing Officer?
MS. ORTH: Sir.
MR. KNIGHT: The item that Mr. Butzier is looking for in the record, could you give me the title of that document? I might -- I might have it here.
MR. BOWELL: It's May, 2013, the Geochemical Characterization Report, Copper Flat Project, New

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Mexico.
MR. KNIGHT: Right. Well -- okay. We'll still need to look for that.
MR. BUTZIER: Actually that may be the very same document --
MR. VOLLBRECHT: It is.
MR. BUTZIER: -- number 110.
It's item number 110 with a range of -- Bates range of 5529 to 7439.
MS. BARNCASTLE: I wondered if it was the same. I wasn't sure, and I didn't want to say that, but I wondered if it was the same one I was using. So --
MR. BUTZIER: I'm just glad we --
MS. BARNCASTLE: -- that helps clarify.
MR. BUTZIER: -- solved it. Okay.
MS. ORTH: Great. That took a village. All right.
Thank you very much, Dr. Bowell and Dr. Griffiths.
So, Mr. Butzier, it's about quarter after 6:00. I can ask if anyone is moved to offer public comment at this time, or you can leap into your next witness.
What would you like to do?
MR. BUTZIER: My preference would -- Madam

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Hearing Officer, would be to go with whatever public comment is available and then call it a night, and we can start fresh in the morning with our last two witnesses.
MS. ORTH: All righty.
Let me ask if there's anyone who has not yet offered public comment who would like to offer public comment at this time. There will be other opportunities, including tomorrow night. But if you -- you would have a clear path tonight.
No?
All right. Let's reconvene, then, at 9:00 a.m. in this room.
Thank you.
(Proceedings adjourned at 6:19 p.m.)

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, CHERYL ARREGUIN, the officer before whom the foregoing proceeding was taken, do hereby certify that the witnesses whose testimony appears in the foregoing transcript were duly sworn or affirmed; that I personally recorded the testimony by machine shorthand; that said transcript is a true record of the testimony given by said witnesses; that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this proceeding is taken, and that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in the action.

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STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT
No. GWB 18-06(P)

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840

TRANSCRIPT OF PROCEEDINGS

Volume 2

BE IT REMEMBERED that on the 25th day of September, 2018, this matter came on for hearing before FELICIA ORTH, Hearing Officer, at the Ralph Edwards Auditorium in Truth or Consequences, New Mexico, at the hour of 9:06 a.m.

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I N D E X

PAGE

I N D E X (Continued)

I N D E X (Continued)

I N D E X (Continued)

E X H I B I T S

E X H I B I T S (Continued)
ADMITTED

E X H I B I T S (Continued)
ADMITTED

E X H I B I T S (Continued)
ADMITTED

MS. ORTH: Good morning.
My name is Felicia Orth.
We're on day 2 of the hearing in the matter of the application of New Mexico Copper Corporation for a groundwater Discharge Permit for the Copper Flat Mine. The Discharge Permit is DP-1840. The matter was docketed by the hearing clerk as GWB 18-06(P).
We do have an interpreter for anyone who is more comfortable participating in this hearing in a language other than English.
Ma'am.
THE INTERPRETER: Good morning, ladies and gentlemen.
If you feel more comfortable in another language besides English, that's okay. Just let me know you do not speak English very well. I'll be making an announcement in Spanish.
(In Spanish.)
Everybody's good in English?
Madam Hearing Officer, no requests for interpreter at this time. I will be available throughout the hearing.
MS. ORTH: Thank you very much.
We went through the housekeeping matters. I assume you've all figured out that the restrooms are

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back that way. There's hot water to make coffee or tea on the table back there.

If you have a question and we're not on a break, please approach John Baca.

John, wave your hand, please.

He's the hearing clerk for the department. And we'll figure -- we'll figure it out.

When we broke yesterday, we were in the middle of the presentation by New Mexico Copper Corporation. So we'll continue with that this morning.

And just a reminder that at 5 o'clock we will stop with the technical case and open public comment and take that until there's no more to be given tonight.

There will be other opportunities for public comment, as well, and there will not be a dinner break. When we break after public comment, that will be our break for the evening.

Are there any questions or preliminary matters before we return to the technical witnesses?

No?

All right. Thank you.

Mr. Butzier.

MR. BUTZIER: Thank you, Madam Hearing Officer.

New Mexico Copper would like to call Mr. David

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Kidd as its third witness -- fourth witness.

DAVID KIDD

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Would you please identify yourself for the record.

A. My name is David Kidd.

Q. And who are you with?

A. I am with Golder Associates in our Tucson, Arizona office.

Q. And what will you be talking about today?

A. What I'd like to go over --

Can we move the slide forward there.

There we go.

So I'd like to talk about my -- my background and experience as it's related to this project and other projects.

I want to give an overview of the -- kind of the basics of tailing storage facilities.

I'd like to talk about the Copper Rule and how it -- how it interacts with the tailing storage design.

I also want to present an overview of the feasibility design, tailing storage facility design that

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we've done that's included in the DP.

I also want to tie this to the work that we're doing with the State Engineer's Office Dam Safety Bureau.

Also, there was some common threads in some of the comments that we reviewed. I'm going to provide some responses to that.

And provide summary conclusions.

Q. Thank you.

And would you go ahead and describe your expertise and background.

A. Yes. So my role on this project has been as a project director, lead engineer of record on the design.

I've got -- my educational background, I've got a bachelor's degree and a master's degree in civil engineering, master's degree with an emphasis in geotechnical engineering from the University of Arizona.

My relevant experience, in the early '80s, I was in the engineering department at Amax Coal Company in Illinois. I went through an MSHA training program to inspect tailing storage facilities, and we would perform weekly inspections of the tailing storage facility we had at that particular mine.

After that, I went to grad school and -- and got a -- and have been doing tailing storage facility

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design, mine waste design, similar types of things continuously for the last 30 years.

Over those 30 years, I've worked on approximately 30 tailing storage facility designs.

I'm a registered engineer in New Mexico.

I'm also the engineer of record at the Questa Mine for the tailing storage facility. I've been doing that continuously since 2003.

I've also worked on tailing mine waste dumps, things like that at Chino and Tyrone. I'm familiar with -- got a lot of experience working in New Mexico.

Q. And does your expertise include tailings design construction as well as operation?

A. It does.

Q. And how about cover design?

A. I have done some of that. Yes.

Q. Okay.

But you consider yourself an expert on the dam safety requirements of the Office of the State Engineer?

A. I do.

MR. BUTZIER: Okay. Madam Hearing Officer, at this time, I'd like to offer him as an expert in tailings design, construction and operation as well as cover design and also for his expertise in dam safety issues.

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MS. ORTH: All right.
Objections?
MR. DE SAILLAN: No objections.
MS. ORTH: No?
All right. Thank you.
He is so recognized, and that's not the first time I'm saying that about Mr. Kidd.
Q. (BY MR. BUTZIER) Mr. Kidd, you mentioned in some of your preliminary remarks the feasibility design document that was included as part of the Discharge Permit application; is that correct?
A. That's correct.
Q. And I'm going to hand you a document and ask you to please identify it.
A. This is the design report that we produced as part of the Feasibility Level Design for the tailing storage facility.
Q. And is that part of what appears on the index to the administrative record under item number 321, which is generally described as Discharge Permit Application (DPA) for the Copper Flat Mine DP-1 (Revised August 2017) with attached application forms?
A. It is.
Q. And is that appendix essentially Appendix A to that discharge plan -- permit application?

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A. It is.
Q. And could you briefly just -- just for the benefit of the audience describe what's -- what that consists of.
A. So -- so Jeff had spoken about -- Mr. Smith had spoken about the feasibility study that was done in 2013, and as part of that feasibility study, we produced -- well, the tailing storage facility is an important part of that so we produced this work which covers the -- the concepts -- the vet -- I would say the vetted concepts, the engineered concepts of our plan to store tailings for the New Mexico Copper Corp. project.
Q. And is a significant part of that document an intention to comply with the -- with the Copper Rules?
A. It is. The Copper Rule wasn't in effect officially at that time, but we knew it would be so we were designing with the environmental controls that we had anticipated at the time, and it -- and it does comply with the Copper Rule, where also the intent was to be in compliance with the State Engineer's program, too.
Q. And just to be clear about that, there are certain requirements within the Copper Rule that specifically relate to tailings impoundments, correct?
A. That is correct.

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Q. There's also as a separate process administered by the Dam Safety Bureau of the Office of the State Engineer -- a separate permitting process to get dam safety requirements approved, correct?
A. That is correct. Yes.
Q. Okay.
And would you -- with that as background, would you please proceed with your presentation, including giving us a little bit of a background just in general on tailings facilities, and then proceed from there.
A. Okay. I will.
So kind of apologize in advance for the low level here on this. This is starting at the basics.
So tailing by definition --
And, Joe, sorry, it's got an S on it.
It's finely crushed and ground rock residue and associated fluids discharged from the -- from the milling and concentration process associated with mining.
So the tailing storage facility is the engineered structure and -- and associated facility structures that -- that provide permanent storage for those tailing materials.
One of the important parts -- or one of the

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important considerations for tailing storage design is that there's not a one-size-fits-all, you know, approach to this stuff. Every design is site-specific, it's material-specific, it's regulatory-specific. So we've taken those factors and incorporated it into this -- into this design.
A few more basics. There's basically some common types of tailing storage facilities, configurations.
One of the -- I would say one of the more common ones is a -- and it's really defined by the topography at the site, the geologic conditions underneath the site, these sorts of things. But a cross valley configuration is commonly a very efficient tailing storage design where you've got a small embankment volume that can contain a large volume of tailings.
Our site doesn't have this type of canyon type topography. So we are looking at a side hill design where we're on basically a topography that's -- it's basically a nice mesa type configuration, using the term loosely, but it's pretty well protected by ridges and drainages, and this side hill facility sits on top of that.
The other configuration is a ring dyke, and

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that's typically used in very flat terrain.
Next.
Again the basics you'll typically -- we'll work with various consistencies of tailings.
Slurry is the most common, where you've got 30 to 50 weight percent solids in -- in the water stream that is -- that is going out to the -- to the tailing impoundment.
Thickened tailing is where they'll use thickeners or mechanical devices to reduce the amount of water in the tailing stream, increase the amount of weight percent solids. You can even get the thickened tailing to the -- to the extent that it -- toothpaste is probably an extreme analogy, but something like a wetter paste that exhibits resistance to flow or has yield strength, sheer strength.
Filtered tailing is where they use filter presses, vacuum equipment, that sort of stuff to produce a filtered cake that's typically 80 or plus weight percent solids. And that behaves really just basically like a moist sand that you might buy at a materials yard.
So another important part is the -- the tailing embankments, unlike water dams, which are typically the dam is built and then the water level

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behind the dam fluctuates. So tailing impoundments are typically built with a starter facility, and then everything is raised throughout the life -- throughout the operational life of the facility, both the embankment and the impounding material behind it.
And there's some choices to make as to how you configure those embankments, downstream, centerline or upstream.
Here's kind of a schematic of that.
Downstream, and you've got your storage facility, you keep building the embankment and -- and down away from the tailing material that's stored.
Centerline is where you've got your storage facility built, you start building filling tailing, and then you raise basically in a vertical and a bit of a downstream type configuration. And that is what's proposed here at New Mexico Copper Corp. That's what we've got in the feasibility design.
And then upstream type construction, where you're actually using competent tailing material to build your embankment on as you go up.
All of these are viable, upstream probably less so. It's not good in seismic conditions. It's not good if you've got high rates of rise, that sort of stuff. So we're not doing that here.

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So this slide talks about the next -- this and the next slide really talk about tailing storage and how the copper -- how the Copper Rule applies to tailing storage.
So in the rules, they -- they state the -- you know, the practice of engineering. All plans, designs, drawings, reports, specifications require that it -- the work be done under the guidance of a licensed professional engineer in the State of New Mexico.
Design plans, specifications and quality control/quality assurance must be submitted, all signed and sealed by the professional engineer.
They also state that -- that the -- that the Dam Safety Bureau -- the New Mexico Office of the State Engineer Dam Safety Bureau must submit all the documentation of compliance with that program back to the Environmental Department for -- for approval with the Copper Rule.
Q. And, Mr. Kidd, just to be clear, the requirement is for the applicant to submit that documentation of compliance with Dam Safety Bureau requirements; is that correct?
A. That is correct.
Q. Thank you.
A. So in general terms, I would say that the

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Copper Rule really applies to the -- the environmental controls that you're -- you're providing with your tailing storage dam design, the release to groundwater, potential release to groundwater, or surface waters. And the Dam Safety Bureau is really the structural component of dam safety, the -- the structural components of the dam.
So, you know, I've worked with the Dam Safety Bureau for a number of years, you know, and I must say they run a very good, rigorous program. They're -- it's one of the better ones here in the state that I've been associated with, as I work in other jurisdictions.
The Copper Rule, you know, has an area where they talk about, you know, new tailing storage units.
New tailing impoundment units are -- and it's stated that the stormwater run-on must be diverted, and our design does that.
As I mentioned earlier, this facility is located in a higher area, and it's protected -- naturally protected by some arroyos and drainages, but, you know, we've assessed those for run-on controls.
They also mandate that seepage from the sides of the TSF shall be captured and contained by headwalls.
Groundwater impacted by the TSF in excess of applicable standards shall be captured and contained.

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The applicant shall submit design plans signed and sealed by the New Mexico PE along with the design report.

It also says the department may require additional controls.

Okay.

So in our feasibility design, we've incorporated a geomembrane liner into this, underneath the entire facility, that -- that I feel complies with the additional controls requirement.

Q. And, Mr. Kidd, I'm going to hand you a copy of something we've marked as New Mexico Copper Corporation's Exhibit 105.

And can you describe what that is, please?

A. Yeah. This is 80-mil thick HDPE geomembrane. This happens to be textured geomembrane, which we're not planning on using under the entirety of the footprint. We may include it some places. But it just adds a little bit of additional friction. And if you need it, you know, we can -- we can incorporate that in the design.

The more common would be smooth HDPE geomembrane.

Q. Thank you.

Please proceed.

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A. And it's used everywhere throughout the mining industry.

Q. Go ahead and please proceed with your presentation.

A. So, you know, we feel our Feasibility Level Design is -- is well in compliance with the -- with the Copper Rule. Okay?

Yeah. So the basis of our Feasibility Level Design is we provided storage for 112 million tons of tailing.

The nominal input, daily input to the TSF is 30,000 tons a day.

Stormwater potential run-on is diverted around the facility.

We have characterized the site with 82 -- the geotechnical characterization, 82 test pits and 75 boreholes between what Golder's done and what Sergent Hauskins & Beckwith did for the earlier design. And that's in addition to the -- also all the well information that -- that Shomaker has already talked about. All of that is applicable to the site characterization of this -- this TSF.

The liner system that we've got proposed as an interceptor system is a prepared subgrade, 12-inch thick layer of liner bedding material, and then this 80-mil

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thick HDPE geomembrane and then a granular drainage network over the top of that, supplemented with perforated pipes to reduce the hydraulic head on the -- on the liner system.

On the geomembrane liner, we -- and drainage system, we'll build an earthen starter dam to elevation 5,250. That's prior to tailing deposition. That starter dam is -- will have a 2-and-a-half-to-1 inboard slope, 2-to-1 outboard slope.

So once tailing filling begins, we're going to use cyclones to -- to segregate the sand fraction from the finer fraction. So you got -- you got sand underflow that is deposited on the centerline of the dam and on the outslope to bring that up. It will also be compacted as it's coming up. And then the cyclone overflow goes into the impoundment. And the upward slope of the sand embankment will be 3-to-1.

Again, whole tailing can -- if there's a time we don't need to run the cyclone stations, the whole tailing can go inboard and be deposited inside the embankment, inside the impoundment, as well.

Our feasibility design, this gets into the Dam Safety Bureau characterization classification. We've gone forward with the significant hazard potential classification. It was -- it was what the previous

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design was, and, you know, we've done some field checking on that.

We've also -- our design incorporates freeboard for wave run-up for the water that's on top of the facility to supernate the water pool, and we've also provided containment for the 72-hour probable maximum precipitation event, which is 26 inches of rain in 72 hours. That's a lot.

We've also incorporated water reclamation from the facility so the supernatant pool that's on top of the tailing storage facility will be pumped off there and returned to the mill for reuse.

And then the underdrain system will drain into -- drain via gravity into a double geomembrane pond located down at the toe of the embankment, and that will be pumped back to the mill for reuse, as well.

Q. And -- okay. Go ahead. Sorry.

A. Okay.

So in our Feasibility Level Design, we've -- we've performed slope stability calculations, and those meet or exceed the specified factor of safety values that are prescribed by the State Engineer's Office.

We've performed residual sheer strength analyses in our stability models to -- to predict that even post liquefaction, if that were to happen, you

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know, or we've got saturation conditions, that we've still got a stable embankment.

We've also performed sensitivity values on the -- under seismic loading conditions on the liner interface, which can -- is typically one of the weaker interface systems that you've got in this whole design system. And so we performed sensitivity values as to what it would take to maintain a stable embankment, and we were well within acceptable or common values for that.

Q. Okay, Mr. Kidd. Now I'd like you to -- even though you've testified that the OSE process is a separate process from the Discharge Permit process administered by NMED, just for the benefit of the audience and the Hearing Officer, I would like you to go ahead and briefly walk through what the process is over at the State Engineer for dam safety.

A. Okay. As I've said earlier, New Mexico Office of State Engineer Dam Safety Bureau runs a very rigorous program. They -- so in the State of New Mexico, any dam that is 25 feet or higher measured from the downstream toe and impounds 15 acre-feet of fluid, water, tailing, is considered a jurisdictional dam.

Also, if it's six feet or higher, again measured from the downstream toe, and impounds fifty

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acre-feet of water, mobile fluid, tailing, whatever, those are dams regulated by the Dam Safety Bureau group in the Office of the State Engineer.

They have a dam size classification. This is -- is common throughout, you know, most every jurisdiction. And they say that a small dam -- they state that a small dam is 25 to 40 foot high, also impounds 50 to 5,000 -- or 1,000 acre-feet of fluid; a medium size dam 40 to 100 foot embankment height, impounds between 1,000 and 50,000 acre-feet; a large dam 100 foot embankment height and greater than 50,000 feet of storage.

So at New Mexico Copper Corp., when we build a starter dam, we're going to be in the medium classification, but we're going to quickly advance to the -- to the large classification, and -- but all of our design basis for this is based on the large category.

It -- this is important because it kind of governs other design factors as you go through, mostly structural, not environmental.

Also an important consideration is a hazard potential classification.

So -- so a low hazard potential is failure or misoperation results in no probable loss of life or --

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and low economic or environmental losses. Principally, you know, the theoretical failure, theoretical dam breach would be contained within the owner's property.

A significant hazard potential classification, so failure or misoperation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities or can impact other concerns. So these are often located in rural or agricultural areas, but not in really populated areas with significant infrastructure. And this is what our Feasibility Level Design is based on.

High hazard potential classification is that failure or misoperation will probably cause loss of human life.

And again, these things are important classifications because then further design components are based on -- on this.

Dam safety also has minimum factor of safety values. I touched on this earlier. So they define 1.5 for steady-state long-term stability. Our feasibility design conforms to that.

They also say 1.5 factor of safety for operational drawdown conditions. That's basically for when water is impounded at the dam. It applies more to

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a water dam than a tailing storage dam. So during normal operations as water is added or withdrawn, you have to maintain a 1.5 factor of safety.

And then in unusual conditions where you might have rapid draindown of water conditions, you have to maintain a 1.3 factor of safety. Again that's more for a water storage dam than a tailing storage facility.

1.3 for end of construction, while maybe some small corporation still exists in your construction zones.

If you have a high or significant hazard potential -- hazard potential classification, you've got to consider seismic design, and you have to perform seismological investigation to determine the appropriate seismic parameters to use in your design.

We've done that at a -- at a feasibility level for this, and we will advance that going -- going forward. We've been able to work with USGS database to get seismic response characteristics for this particular site.

So again the Dam Safety Bureau mandates the seismic design of the embankment for an operating basis earthquake. I don't want to get in the details too much of this. It'll put you all to sleep.

But, you know, our design is -- is meant to

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operate for 12 years. That's the operating period, but the State Engineer says you have to design for a 100-year period for that.

And they also state a 50 percent probability of exceedance during that service life. But because we're operating -- or because we've got a significant hazard design classification, we're in -- we're designing to the 2,500-year return period for that seismic event. High hazard dams in the State of New Mexico have to be designed to the 5,000-year return period.

Again, these are things related to the structural integrity of the facility, not really the environmental considerations of the facility.

The State Engineer also prescribes dam geometry.

They define minimum crest widths, or at least a kind of rule of thumb for crest width. We're in excess of that in our design because we've got to have pipelines and things like that and truck traffic on top of our dam. So our crest width is -- it complies with this. It's in excess of that.

They also state that the longitudinal profile of the embankment must include camber to accommodate future settlement of the facility, and the most

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settlement typically occurs where the section is the thickest.

And again this is more applicable to a water dam where the dam is built once and basically just the water goes up and down behind it, but a tailing dam you're continuously building, and so that settlement is compensated, you know, during construction as you're -- as you're continuing to add material to the embankment.

They also prescribe freeboard.

You know, they state that wave run-up from a 100-mile-an-hour wind with a reservoir -- with the water reservoir at the spillway will not overtop the dam. They've -- you know, they've got other criteria along these lines, too.

We don't have a spillway in our operating tailing dam. So we provide all the -- basically the flood storage within the freeboard or within the operating design pool -- or the contingency design pool on top of the facility. In a tailing impoundment, it's not common to incorporate a spillway, again because it's always going up.

So we approached that by providing storage for that -- for that storm event. And again we do have -- we do have storage for -- for that in our -- in our design.

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State Engineer also mandates that the design must include an Instrumentation Plan, an Operation and Maintenance Manual and Emergency Action Plan. The instrumentation is typically piezometers in the embankment, survey monuments. You can have inclinometers. There's a number of things that are -- that are incorporated in an Instrumentation Plan.

The Operation and Maintenance Manual defines how often those are measured, what -- what happens. So there's alert levels associated with piesometric conditions in the dam. You're looking for normal operating conditions, but if -- if something -- if you get an elevated piesometric condition, water pressure condition, it's a sign that something wrong may be going on.

So it's continuously monitored for this type of facility -- or, you know, this type of potential failure.

And then if these things -- so if some of these alert levels are triggered, you've also got an Emergency Action Plan in place that defines the notification process to basically the regulatory officials, the public.

And, you know, for example, up at Questa, there's 10 parties that have this control document, the

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Emergency Action Plan, and we run desktop, you know, simulations once every couple of years where, you know, you simulate an emergency and you run through the protocol on this.

So again, you know, I will say the Dam Safety Bureau does a really good job here in New Mexico on this -- on this type of stuff.

So this -- you know, I talked about it in these slides, but again, they've also got a checklist of all the stuff that has to be provided with the design submittal. You know, we've got our feasibility design, but we're also going to be going for the construction permit -- or the permitting construction level design process with these guys. We are in it now.

They require a dam application form, detailed cost estimate, filing and plan review fees, water rights for the -- or what falls on the -- basically the catchment.

Again we'll have an engineering design report similar to this, but that will contain more detail for the hazard potential classification and the engineering analysis that support that.

All the hydraulic analysis from, you know, the precipitation that runs on the upgrading catchments, the diversion facilities.

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Spillway design for -- for closure of this impoundment, a spillway will be incorporated to get the water that falls on the top surface off the -- off the top and down the side slope.

Outlet works design, we've got an outlet works on this facility for startup.

The engineering design report is going to include a detailed geological assessment, geotechnical investigation, seepage analysis, stability analysis, seismic analysis, you know, details of the dam geometry, erosion protection, structural design, utility.

We've also got to produce construction drawings. They're prescriptive about what that -- what those contained and/or will contain.

You know, we have to have a title sheet, have to have an area map. We've got to have -- the topography has got to be in a prescribed datum. We've got to produce dam plans and profile sheets, cross-sections of basically everything.

And we also have to describe the -- and show a detail for the permanent benchmarks that are around the facility and which tie to the survey measurements on the dam itself.

We have to prepare a technical specifications.

We have to have a plat of survey that's

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stamped by a professional land surveyor in State of New Mexico.

We have to have a Dam Site Security Plan so basically the public can't get to this particular dam. This area will all be fenced and contained within these guys' property.

I talked earlier about the Instrumentation Plan. It's -- it's a comprehensive document of all the monitoring equipment that's installed in and on the dam.

You know, we talk about the -- we have to have logs of the installations.

So with the instruments typically come with calibration type certificates, we have to keep -- maintain a record of those.

And then we also describe the -- the reading -- instrument reading schedule and the data interpretation on that.

The Operation and Maintenance Manual is basically again -- describes the instrumentation, the monitoring, and also talks about the operating instructions. So -- and it -- what it really does, it ties the design engineer to the operators of the facility. It's a very important step.

And I would say years ago that didn't happen very much. A lot of times they just get a design and

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off they go. But now through the program that the State Engineer here mandates -- and it's fairly common -- there has to be continuity between the design engineers and the operators.

And that's really where this Operation and Maintenance Manual kind of at least describes all that stuff. You know, if we were to just give that to an operator, he'd just glaze over. But this is detailed on what to do if the water pool level gets high, how to operate the cyclone stations, all this sort of stuff.

Maintenance requirements, State Engineer mandates vegetation control and these sorts of things. So this is where all this information is contained.

An Emergency Action Plan has to be developed.

So we will be doing a theoretical dam breach analysis, and from that dam breach we'll have, you know, flood routing downstream of how far it goes, what the -- what the wave will look like, how far it extends. And again, the emergency protocol is followed that if this needs to get implemented, what happens.

So that's --

Q. So, Mr. Kidd, thank you for that presentation.

In your professional opinion, does the feasibility design document that I put in front of you today, that is included as part of the Discharge Permit

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application, comply with the requirements of the Copper Rule and associated groundwater discharge regulations?

A. Yes.

Q. And are you aware that a proposed provision of DP-1840 as submitted by the New Mexico Environment Department with its statement of intent to present technical testimony includes as a condition that New Mexico Copper will provide documentation of compliance with the dam safety requirements that you've just outlined?

A. Yes.

Q. And that is the -- that is the requirement -- a requirement of the Copper Rule, is it not?

A. It is.

Q. Okay.

A. So we have to go through that process described to feed back to this.

Q. Pursuant to a condition that's been proposed for DP-1840.

A. Yes.

MR. BUTZIER: Thank you.

That's all we have, Madam Hearing Officer.

MS. ORTH: Thank you, Mr. Butzier.

Mr. Knight, do you have questions of Mr. Kidd?

MR. KNIGHT: Madam Hearing Officer, I have no

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questions for this witness.
MS. ORTH: Thank you.
Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
I just have a few questions.
CROSS EXAMINATION
BY MR. DE SAILLAN:
Q. Early on you stated that the mine is quickly going to go from a medium classification to a large classification.
Do you remember that testimony?
A. Yes.
Q. When you say quickly, how quickly is that going to occur?
A. We've got filling curves in the report. I would say a couple of years. So --
Q. Okay.
And then you also stated that the -- the plan provided that any spills would be contained within the owner's property.
Do you recall that testimony?
A. That any spills. I don't think I said exactly that.
Q. Okay. I may have gotten it a little bit

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wrong.
Do you recognize --
MS. ORTH: I'm sorry, Mr. de Saillan, to interrupt.
We need you to speak into a microphone so the people in the back can hear you.
It's right behind your laptop.
MR. DE SAILLAN: Sure. Sorry.
MS. ORTH: Also, I might be able to refresh Mr. Kidd's memory.
It was when you were talking about hazard classification, and you mentioned it was one hazard classification if it would all be contained.
MR. KIDD: Right. And that's the low hazard classification.
MR. DE SAILLAN: Right. Okay.
Q. Okay. So the -- your testimony is that doesn't apply here.
A. We are using -- right. Yeah.
Q. Okay.
A. We are not following --
Q. Okay. I missed --
(Simultaneous discussion.)
Q. I'm sorry. I misunderstood.
You also referred to an Emergency Action Plan.

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How does that -- how does that integrate with the Contingency Plan that's in the proposed Discharge Permit, if at all?
A. I have not looked at that Contingency Plan that's in that particular -- that document.
Q. Okay.
The Emergency Action Plan, does it address the possibility of contamination of surface water or groundwater?
A. It doesn't respond to -- it doesn't go through like a cleanup process. It's more about interacting with the public and public safety.
Q. Okay.
Are there any aspects of it that deal with preventing groundwater or surface water contamination? And I realize it's an emergency plan, but preventing groundwater or surface water contamination in the short-term?
A. Not in the Emergency Action Plan.
Q. Okay.
Okay. You used the tailing storage facility report, the Golder report as a basis for your testimony; is that correct?
A. Yes.
Q. And what is the -- what level of design

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completion does this report represent?
A. It's -- so feasibility design, you do enough work to be able to develop an accurate cost estimate to, say, 15, 20 percent. So I would say we're probably in the 40, 50 percent design complete phase.
Q. Okay.
And will you be revising the significant hazard potential classification, including an inundation analysis?
A. We will be doing a theoretical dam breach analysis and flood routing from that using accepted practices. So yes. That then is -- determines the hazard rating.
Q. Okay.
And what do you expect the result might be given more residents downstream of the tailing storage facility?
MR. BUTZIER: Madam Hearing Officer, I'd like to interpose an objection. That assumes facts not in evidence.
Q. (BY MR. DE SAILLAN) Well, let's assume that there are higher -- a higher level of residences in the -- in the area downstream of the tailing storage facility.
What would you expect the result might be?

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A. Well, if -- if the analysis shows that there are public at risk, then it would be a high hazard potential. If potential loss of life could occur, then it would be high hazard. If not, it stays significant.
Q. All right.
Now, is sensitivity -- sensitivity analysis a standard part of engineering design processes?
A. It -- yes.
Q. Okay.
And why wouldn't you recommend designing for the maximum credible earthquake for this dam?
A. I'm following protocol in the State of New Mexico. I feel that it's -- you know, we've -- I feel it's adequate.
Q. Okay.
And what is that protocol?
A. What I stated earlier.
Q. So the --
A. So if it's significant hazard, the 25 -- approximately a 2,500-year return period. If it's high hazard, then 5,000-year return period.
Q. Okay.
Now, seepage analysis is required by the Office of the State Engineer in New Mexico; is that correct?

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A. Um-hum.
Q. And why didn't you include that in your tailings storage facility report to the Environment Department?
A. Well, again, we did a Feasibility Level Design, and we had a geomembrane liner in there, and at that -- so again the intent of that is for -- you know, to get enough information in there for -- to develop cost estimates. You're doing the work in line with the requirements, but you don't do all of it in the beginning.
So we didn't do a seepage analysis because it really wasn't going to affect cost. We've got a liner in there so we know what that costs. We don't have to -- we didn't have to include well fields or whatever, you know, where seepage -- higher seepage might impact costs.
So that's just -- that was the reasoning.
Q. Okay.
Now, the emergency -- back to the Emergency Action Plan, will you use breach analysis to revise hazard ranking?
A. If it needs to be revised, yes, we will do one.
MR. DE SAILLAN: Okay. Thank you, Mr. Kidd.

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I have no further questions.
MS. ORTH: Thank you, Mr. De Saillan.
Ms. Barncastle.
MS. BARNCASTLE: Thank you.
CROSS EXAMINATION
BY MS. BARNCASTLE:
Q. Good morning.
So you have testified that there has been no analysis of the impacted area if the dam was breached?
MR. BUTZIER: Objection, that misstates the testimony.
MS. ORTH: All right. Ask him to --
Q. (BY MS. BARNCASTLE) What was your testimony regarding dam breach analysis?
A. We have not performed a theoretical dam breach. We have -- we've relied on other site reconnaissance by others to -- I'm not going to say confirm, but to agree that significant hazard was appropriate for our -- for this design.
Q. So what would happen in the event of a dam breach?
A. Well, that's really hard to say. It would depend on the magnitude of the breach.
Q. What did your -- what did you rely on -- you were kind of pointing off in this direction, saying you

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relied on other --
A. Well, we didn't do a dam breach analysis. They walked the downgradient drainage areas and kind of the flood routing areas and -- and rendered an opinion that there would be no potential loss of life at this point.
Q. What was the opinion as far as where the water would run in the event of a dam breach?
A. Just downgradient. I don't have the specific arroyo, if you will. I haven't done the flood routing.
Q. So will it reach the Grayback Arroyo?
A. I haven't done it.
Q. Okay.
Has the Dam Safety Bureau approved this particular design that you're talking about that you've preliminarily designed?
A. No.
Q. Do you consider it to be a final design that you'll submit?
A. No.
Q. Will it change through the Dam Safety Bureau's process?
A. It --
MR. BUTZIER: Objection, calls for speculation.

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MS. ORTH: Yeah.
Can you rephrase that, please?
Q. (BY MS. BARNCASTLE) Could the design change through Dam Safety Bureau's process?
MR. BUTZIER: Same objection.
MS. ORTH: No. I think that's okay.
Can you answer that question, Mr. Kidd?
MR. KIDD: Well, I don't -- I don't really -- it could. I don't know if it will. I mean, we've really done all this work with the intent of the design criteria for the Dam Safety Bureau. We have to -- as I described, there's a lot of refinement that has to be done.
Q. (BY MS. BARNCASTLE) And I think Mr. de Saillan covered this, but I'm going to ask just -- just in case.
Your classification of the dam is based on the previous classification from the '80s; is that correct?
MR. BUTZIER: Objection. That misstates the testimony, as well.
MS. ORTH: Yeah. I think it does.
Would you refresh our -- remind us of what you said about the study from the '80s.
MR. KIDD: Well, that's where it was, but we've also done some field verification.

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MS. BARNCASTLE: Okay.
Q. So your classification was starting basis from the '80s, but you've done additional work.
Is that a fair statement?
A. Additional work has been done, but not a dam breach.
Q. Sure.
Has Dam Safety Bureau approved the classification of the dam as significant instead of high?
MR. BUTZIER: I'm sorry. Could we repeat that? I didn't quite hear it.
Q. (BY MS. BARNCASTLE) I believe your testimony was that the hazard potential classification is significant, as far as you're concerned, right?
A. As far as what we've got in the feasibility study.
Q. Got it.
Has Dam Safety Bureau agreed with that classification yet?
A. Not yet.
Q. Okay.
What provisions do you have in place to ensure that run-on does not exceed the capacity of the dam as you've designed currently?

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A. Well, there's been surface hydrology work done, and -- so we're able to -- the facility has to be designed to prevent run-on. So we contain -- so we'll divert flood run-offs, potential run-on, and we contain what falls on it.
Q. Is the diversion design the same PMP as the dam?
A. We will run through that analysis and -- and see.
Q. You have not done that yet, though?
A. Not completely, no. That's again a refinement.
Q. Okay.
Slide 22 contains a statement that to comply with design requirements a water rights letter from OSE WRD is due to you.
What is the OSE Water Rights District Office letter that you're expecting?
A. From -- from -- that's really not my area of expertise. This is excerpted from their checklist. But as I understand it, water that falls on the facility, I mean, needs to -- you know, we need to have water rights for that.
Q. And those would be surface water rights; is that correct?

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A. That's what I understand.
Q. And you do not have those water rights yet?
A. I'm not sure.
Q. It's okay if you don't know. That's okay.
Do you know who of your group might know that answer?
A. The owner.
Q. Someone not you?
A. Yes.
Q. Okay.
All right. Let me look at my checklist.
Is all of your design information related to what you've just testified about the Dam Safety Bureau design -- is that in the NMED record somewhere?
A. Our design report is -- as stated earlier, is, yeah, part of the record.
Q. And that's just a preliminary design. There's not additional --
A. Well, the feasibility design report is in the record.
Q. Okay.
And there's not additional information outside of that at this particular time?
A. No.
Q. Just a moment.

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After the NMED permit is issued, could you change your Dam Safety Bureau design?
So let me preface that.
You have to provide documentation of compliance with Dam Safety Bureau as a condition of the NMED permit, but could you change your design later from what you've provided to NMED?
MR. BUTZIER: I'll object to that, Madam Hearing Officer, as at least in part calling for legal analysis and conclusion.
MS. ORTH: All right.
Mr. Kidd, are you able -- as an engineer who prepares and submits these plans, are you able to address Ms. Barncastle's question without a legal conclusion?
MR. KIDD: I -- I talked earlier about refinements that, you know, may happen during the -- you know, the advanced engineering phases. Change is kind of a pretty loose term. Materially change? I don't think you can. Again those are words I don't -- that have certain meaning to certain people.
MS. BARNCASTLE: I have no further questions.
Thank you.
MS. ORTH: All right. Thank you.
I think he gave you the best answer he could.

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MS. BARNCASTLE: Yeah.
MS. ORTH: All right.
Is there anyone else in the room who has a question of Mr. Kidd based on his testimony?
Sir, if you would come up to a microphone and give us your name first.
MR. MIJAL: Martin Mijal, M-A-R-T-I-N M-I-J-A-L.

EXAMINATION

BY MR. MIJAL:

Q. You have testified on this, but there's also talk about the rainwater will flow and be recycled and the water coming off the tailings will come off.
Could you give a description of -- you know, it's coming off, it's draining and being pumped somewhere.
Where is that somewhere?
A. So --
Q. How much does it contain? How much of that water is contained?
MR. BUTZIER: I believe that's beyond the scope of his direct testimony and it's been covered by other witnesses.
MS. ORTH: Okay.
And I'm not sure I understood the question.

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How -- in what respect would it relate to the testimony he gave this morning?
MR. MIJAL: If there's like that immense downpour of rain, it's going to drain somewhere. So apparently that's enough information. Wherever it drains now, it's going to affect someone else.
MS. ORTH: Okay. So he did talk about an extreme rainfall event as it pertains to dam safety.
MR. MIJAL: Well, sort of it's overflowing and on the contaminants from the tailings going into nature rather than going into their -- you know, apparently they want to reuse the water. They like welcome a monsoon, because we need water.
MS. ORTH: But then so what is your question as it relates to his expertise which was dam safety rather than --
MR. MIJAL: What happens to the water once it leaves the dam.
MS. ORTH: Okay.
MR. MIJAL: Yeah. That --
MR. KIDD: Well, it's -- so we're designed not to release water from the facility.
MR. MIJAL: Yeah, from the facility. So --
MR. KIDD: Rainfall is contained in the facility, recycled back to the mill for reuse.

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Q. (BY MR. MIJAL) Including the tailing extra water gets recycled?
A. Um-hum.
Q. And so your testimony doesn't talk about the pipes and storage place of where all that water goes?
A. Not all the -- yeah. Not all the mechanical piping systems, no.
Q. No. Okay. That's not your area. Good.
Well, thanks.
MS. ORTH: Thank you, Mr. Mijal.
Are there other questions?
Ma'am, come up and give us your name first, please.
MS. BROWNE: I need to -- do I need to give you my name?
MS. ORTH: If you would, please.
MS. BROWNE: Candace Browne.
MS. ORTH: Thank you.

EXAMINATION

BY MS. BROWNE:

Q. I understand that the final analysis hasn't been made for a possible breach, but it -- I think you did say that you and others have walked where you think that might happen and you walked --
A. I didn't personally walk it, but other people

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on our team did.
Q. Some of you did.
A. Yes.
Q. Okay.
I just wonder if any of those people are here and if they might be able to say as they walked down from the dam if they also crossed the highway.
MR. BUTZIER: I'm not sure that's a question, Madam Hearing Officer.
MS. ORTH: All right. It seems to me the question is for you, Mr. Butzier.
Will you be putting on a witness who walked the site?
MR. BUTZIER: We have no intention to do that. We can talk about it, but the witness that walked the site has already been on and off in this proceeding, and we may very well decide to put him on, but that's for the team to decide.
MS. ORTH: All right. You'll discuss it.
MS. BROWNE: Okay. Then I'll -- I'd like to state that a little differently, then.
Q. If -- if being a high hazard dam involves any possibility that people might be hurt, I'm wondering if the dam breach happens and if it involves going across the highway, they might be considering the fact that

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there might be cars on the highway, people might get hurt.
And the other thing is it just -- is that --
MS. ORTH: I'm sorry.
So, Ms. Browne, unfortunately, this is not the time for public comment. I'm happy to take your comment later.
MS. BROWNE: Okay.
MS. ORTH: So this is the time to pose a question to Mr. Kidd based on his testimony. And his testimony wasn't that the dam there would be high hazard. It was that the dam would be significant hazard, which is in between low and high.
MS. BROWNE: Okay.
UNIDENTIFIED SPEAKER: Isn't there public comment later on today?
MS. ORTH: There is. I will take public comment later.
So do you have a question of Mr. Kidd based on his testimony?
MS. BROWNE: Maybe I'm not saying it very well.
MS. ORTH: You can try again.
MS. BROWNE: I don't know how to -- I don't know how to make this statement, that it seems like --

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so they -- it was mentioned that there were no houses downgradient, and that that meant that it wouldn't be -- the people wouldn't be hurt.
And so I'm just trying to make this statement, I'm trying to ask the question that even though there aren't houses downgradient, I think the highway is, and so I'm -- that's the statement I'm trying to -- that's the question I'm trying to ask, if that is a fact, and couldn't it involve, then, cars and people in cars.
Is that --
MS. ORTH: So I think I understand.
So, Mr. Kidd, if you understand the question, do you know whether the highway is downgradient?
That would be a fact.
MR. KIDD: I -- I do.
MS. ORTH: And then do you know whether in the consideration of the hazard ranking the possibility that there would be cars on the highway after a breach was considered?
MR. KIDD: It will be in the theoretical dam breach analysis and the associated flood routing that we will do. It will.
MS. ORTH: Okay. So you have an answer. It will be considered.
MS. BROWNE: Okay. Thank you.

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MS. ORTH: All right. Thank you.
Are there other questions?
Sir, come up and give us your name first.
MR. NEWMAN: Hi.
My name is Lee Newman, and I have a tree farm below the new facility in Animas Creek.
EXAMINATION
BY MR. NEWMAN:
Q. I've got a couple of questions about the liner.
An 80-mil liner, it's going to come in -- does it come in rolls or sheets?
A. Um-hum.
Q. In rolls.
How many square feet is in a sheet? Must be --
A. Well, it depends on the thickness, because they typically are --
Q. Sure.
A. -- constrained by weight.
Q. Right.
A. So the thinner the liner, the more area you receive.
Q. Well, the 80-mil, what you're talking about here.

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A. Okay. It's -- we have a choice of roll width, and you typically like to work with the wider rolls, which are in general terms around 10 meters wide, 30 feet, and then the length is 250 feet long, something like that. Every manufacturer does it a little bit differently.
Q. You must have quite a few seams in a big project like this.
A. At every -- at every connection, yes.
Q. How do you seal the seams?
A. They -- so for a material like this, they use two methods.
The primary method is what they call a double wedge weld. So they overlap about four inches, and then they run this machine that creates two heat seams with an air channel in between it, and then you can pressure test that air channel to test the integrity of those two -- two seams.
Q. It sounds -- sounds complicated.
Will you be testing all of the seams?
A. Yes.
Q. All the seams will be tested?
A. Yes. It's part of the QA/QC procedure.
Q. I install liners, and I've installed quite a few liners in ponds and water projects in the Southwest.

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Our problem has always been seams leaking. Now, the method we described here sounds really, really good, but I can tell you that it's not waterproof to the standards of, say, leaking for a waterproof container or something that would be approved by the Coast Guard.
MS. ORTH: So is there a question, though, at the end of this?
MR. NEWMAN: Yes.
Q. The question is are you planning for leakage on the seams?
A. If a leak is -- you know, is observed during the QA/QC procedures, those leaks are repaired.
Q. Won't the -- won't the liner be covered up and during the life of the -- the use of the liner?
A. Yes.
Q. Inspection, visual -- will visible inspection be possible, or will the liner be covered?
A. Not of the covered liner.
Q. What method are you using to make sure there is no leakage from the liner?
MR. BUTZIER: Madam Hearing Officer, I think this gets beyond the scope of his direct, and Mr. Newman may not have had the advantage of hearing the testimony that occurred yesterday that went over essentially these topics.

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MS. ORTH: So, Mr. Newman, we did have testimony yesterday about potential groundwater contamination from a hydrogeologist yesterday. Mr. Kidd's testimony really is about the dam and the embankment and how the tailings go in there.
Q. (BY MR. NEWMAN) Certainly the liner is one of the major components of what you're talking about. Yesterday -- well, how many square feet is this liner going to be?
A. Well, ultimately the facility is 640-ish acres. So that.
Q. So 640 times 43,560.
A. (Nods head.)
Q. That's a lot of liner.
Will this liner perform better than a liner that is used in landfills today and per EPA requirements?
A. It's very similar.
Q. Don't most of the liners used in landfills today leak? Isn't that a major problem that we're having with landfills?
MR. BUTZIER: I'll object. This is outside the scope.
MS. ORTH: Right.
Mr. Kidd, do you have the experience or

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knowledge to answer that question?
MR. KIDD: I'm not a landfill practitioner.
MS. ORTH: I'm sorry. The questions have to relate to his testimony --
MR. NEWMAN: Sure.
MS. ORTH: -- and expertise.
MR. NEWMAN: Sure.
Q. Well, we have a lot of data on liners and landfills and leakage, and do you know of a -- of a large commercial landfill that doesn't leak?
MS. ORTH: Again that's outside the area of his expertise.
MR. NEWMAN: I understand. It's very important that whether the liner leaks. To me, it's a weak point, the liner.
MS. ORTH: And I would be happy to take your comment later.
MR. NEWMAN: Thank you.
MS. ORTH: Okay. Thank you.
Are there other questions of Mr. Kidd based on his testimony?
Ms. Brittan.
MS. BRITTAN: Hi.
My name is Rhonda Brittan.

EXAMINATION
BY MS. BRITTAN:
Q. I'm not sure if you can answer this question, but -- hello. Oh.
MS. ORTH: I can hear you.
MR. KIDD: We hear you.
Q. (BY MS. BRITTAN) After the whole project is done and there's a reclamation thing, what happens to the liner? Do you know? Is -- would you --
MR. BUTZIER: Madam Hearing Officer --
I'm sorry to interrupt --
MS. BRITTAN: That's all right.
MR. BUTZIER: -- you.
But that's also outside the scope and will be covered by our next witness.
MS. BRITTAN: Okay. Thank you very much.
MS. ORTH: All right. Thank you for asking, Ms. Brittan.
Other questions of Mr. Kidd based on his testimony? His testimony.
Ms. Browne.
MS. BROWNE: I just -- okay. I was here for part of the day yesterday, but I don't hear very well, and I just want to try to understand where we're at.
Did they cover -- I mean, I was here for a

part of the way that they monitor the liner and the tailings storage facility, but did they talk about the liner yesterday? Did I miss that?
MS. ORTH: Mr. Butzier.
MR. BUTZIER: I think we should just, Madam Hearing Officer, let the record speak for itself. I think in short the answer is yes, we did talk about the liner yesterday and also monitoring of various aspects of the facility.
MS. BROWNE: Okay. Okay.
And could I just ask one more question?
Is there -- never mind.
MS. ORTH: All right. Thank you, Ms. Browne.
Are there other questions based on Mr. Kidd's testimony?
MS. BARNCASTLE: I do have one follow-up question.
MS. ORTH: Oh, Ms. Barncastle.
MS. BARNCASTLE: And it's related -- we may not have gotten there yet, but the Exhibit 105, I think I understood the testimony to be that that was not representative of what would be going in as a liner?
MR. KIDD: The only -- so it's made out of the same material, it's the same thickness. This -- we may or may not use textured sheet.

Do you see the rough surface?
MS. BARNCASTLE: Yes.
MR. KIDD: So this is called a textured geomembrane. We may be using smooth.
MS. BARNCASTLE: Okay.
MR. KIDD: So that's the only difference.
MS. BARNCASTLE: Okay.
MR. BUTZIER: Ms. Barncastle, if it would help, there's no need for us to actually move its admission. It was mostly just a demonstrative.
MS. BARNCASTLE: Oh, got you. Okay.
MS. ORTH: All right.
Any other questions of Mr. Kidd based on his testimony?
And I'm getting to you.
Mr. Butzier, do you have any follow-up?
MR. BUTZIER: I do. Thank you, Madam Hearing Officer.
REDIRECT EXAMINATION
BY MR. BUTZIER:
Q. Mr. Kidd, both Mr. de Saillan and Ms. Barncastle asked you some hypothetical questions relating to the OSE Dam Safety process, and in particular what might happen or what might be the consequence of OSE after reviewing the dam breach

analysis, deciding that this particular facility should be classified as a high hazard facility rather than a significant hazard.
Do you recall that testimony?
A. Yes.
Q. My question to you is bringing it back to what we're here to talk about today, is the Discharge Permit aspect of this.
My question is, again hypothetically -- since you're an expert, you can speak hypothetically -- my question to you is if that were to happen, if OSE ultimately concluded that it was a high hazard, would that fundamentally change anything relating to the -- the feasibility design work here in so far as it relates to the compliance with the Discharge Permit requirements under the ground -- under the Copper Rule and the groundwater program?
A. Not in my opinion. I think, you know, the liner is really one of the important considerations for the Discharge Permit, and that, I mean, will maintain it. I mean, yeah, those things don't change as part of the OSE process.
Q. It would still be a large dam.
A. Yes.
Q. Correct?

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A. Yes.
Q. It would still cover essentially the same footprint --
A. Yes.
Q. -- the tailings facility.
It would still have the same features in terms of -- I forget the terminology, but the sides of the facility and what might happen with the sides of the facility?
A. Yes.
Q. There would still be the monitoring that has been proposed for the project, correct?
A. Correct.
Q. What would change -- am I -- I'll ask you this as a question. Would what changes be the level of structural design rigger for the dam itself that is something that is separate from issues relating to the Discharge Permit and groundwater protection?
A. That is correct. It's primarily a seismic design and -- and storm design.
MR. BUTZIER: Thank you, Madam Hearing Officer.
That's all I have.
MS. ORTH: All right.
Is there any reason not to excuse Mr. Kidd?

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No?
Thank you very much, Mr. Kidd.
Shall we take a break? Until 10:30?
(Proceedings in recess from 10:22 a.m. to 10:38 a.m.)
MS. ORTH: All right. We are back after the break.
Mr. Butzier.
MR. BUTZIER: Thank you, Madam Hearing Officer.
One housecleaning matter. I neglected to move the admission of Mr. Kidd's resume, his PowerPoint slides and one additional exhibit. I'd like to do that at this time. If you feel that we need to bring him back up, I can do that, whatever your preference.
MS. ORTH: Are there going to be objections?
Let's see. I don't see Ms. Barncastle.
Mr. de Saillan or Mr. Knight, will there be objections?
MR. DE SAILLAN: What were the exhibits?
MR. BUTZIER: His resume, his PowerPoint presentation and the rules and regulations governing dam design.
MR. DE SAILLAN: No objections here.
MS. ORTH: All right.

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MR. KNIGHT: No objection.
MS. ORTH: No objections. All right.
So they are admitted.
I will ask Ms. Barncastle at some point, but they're admitted.
MR. BUTZIER: Thank you.
(Exhibits NMCC 87 through 89 admitted into evidence.)
MR. BUTZIER: New Mexico Copper would like to next call Mr. Todd Stein.
MS. ORTH: Okay.
You know what, would you tell me the numbers.
MR. BUTZIER: The numbers are 87, 88 and 89.
MS. ORTH: Okay. Thank you.
87 through 89 are admitted.
Mr. Stein, so we need to swear you in.

TODD STEIN

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:
Q. Mr. Stein, would you please identify yourself for the record.
A. My name is Todd Stein. I'm a hydrogeologist with Golder Associates. I've been with the firm since

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2004. I'm a professional geologist, and I'm here to present testimony on the Copper Flat Reclamation and Closure Plan.
Q. Thank you.
Go to the next slide, please.
I may repeat some of what you just said -- or have you repeat some of what you just said, but can you in a little bit more detail let us know what it is you will be addressing in your testimony today?
A. So today I'll be addressing the Reclamation and Closure Plan for Copper Flat, as I just mentioned.
The layout of my testimony is I want to first present my background and experience.
And then I want to describe the reclamation and closure components for the main facilities of the mine, to just kind of lay out what the plan is for the entire facility.
And then go through the proposed reclamation schedule at the tail end of my presentation.
And then go through a summary of my testimony at the end.
Q. And in a bit more detail, could you please describe your expertise and background experience that's relevant to this?
A. So my educational background is I have a

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bachelor's degree in geology from New Mexico Tech, and I have a master's in hydrology from New Mexico Tech.

I've worked in the environmental consulting field for over 28 years, and I've worked with both private industry, state and federal agencies on various different projects.

As I mentioned before, I've been employed with Golder Associates since 2004, and I've worked and been involved in the development of closure/closeout plans in New Mexico since 2007, and I've been actively involved in developing closure/closeout plans in accordance with the Copper Rules since the Copper Rules were implemented.

Q. And does --

A. Yes.

Q. Does your expertise include detailed familiarity with the Copper Rules insofar as they relate to reclamation and closure issues?

A. Yes, it does.

MR. BUTZIER: Madam Hearing Officer, I'd like to move that he be accepted as an expert in reclamation design and testing and performance as well as Closure Plan design, testing and performance as well as expertise with the Copper Rule insofar as it relates to reclamation and closure issues.

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MS. ORTH: Objection?

MR. DE SAILLAN: No objection.

MR. KNIGHT: No objection.

MS. ORTH: All right. Thank you.

He's so recognized.

I'll offer Ms. Barncastle an opportunity to register an objection later if she wants.

MR. BUTZIER: Thank you, Madam Hearing Officer.

Q. Mr. Stein, would you please go ahead and proceed with your presentation today.

A. Yeah. Just finally on my background and experience is I've been involved in the evaluation and development of reclamation cover designs and performance testing since 1997.

So just to lay out what I'm going to be presenting on the Reclamation and Closure Plan, these are the major facilities and -- that are involved in the Reclamation and Closure Plan.

We've got the existing waste rock stockpiles. These are the legacy stockpiles. There's four of them, Existing Waste Rock Stockpiles 1, 2, 3 and 4.

We've got reclamation of portions of the Grayback Arroyo, or sections of legacy stockpile material that's adjacent to the Grayback Arroyo.

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We've got -- as you've seen in previous testimonies, there's the new waste rock stockpiles. There's three of those, Waste Rock Stockpiles 1, 2 and 3.

There's a tailings storage facility, which Dave Kidd just presented the Feasibility Level Design on.

And then there's the open pit, which was presented -- has been presented.

And the plant area.

We've got a series of surface impoundments. These are lined surface impoundments within the facility, HDPE lined.

And then we've got -- this is kind of a group of facilities that really -- it's hard to put them into one category. These are pipelines, pipeline corridors, electric utility lines and poles, other various features located throughout the mine that we take care of in the Reclamation and Closure Plan.

And then, lastly, as part of the development of the mine, initially sought soils growth -- growth media material will be salvaged from the footprints of the tailing storage facility as well as the Waste Rock Stockpiles 2 and 3, prior to their construction.

So just general layout. I know you've seen

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this before, but these are the major facilities.

We've got the existing waste rock stockpiles. Here's 1. And 2 is really two separate smaller areas, and I'll mention -- when I describe this -- these two, 2A, 2B, they really get combined into one as part of the reclamation program. And then here's 4 here, down on the southern portion of -- the southeastern portion of the pit. And then Existing Waste Rock Stockpile 3, which is located within the -- the plant area.

We've got the pit area here, the three new waste rock stockpiles. We've got 1, 2 and 3. And then we've got the tailing storage facility and the plant area.

And I'll show in later slides the locations of some of the other facilities, the growth media stockpiles and other facilities.

But these are the major surface area features within the mine.

Next slide.

So initially the way I have this laid out is for these major facilities I describe what the Reclamation Plan is first, and then I'll show you graphically what the design is for these facilities.

So again, as I mentioned previously, there's four legacy stockpiles that we're -- we reclaimed.

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They're going to be reclaimed in accordance with requirements of the Copper Rule. And the two main requirements are 20.6.7.33, which is closure requirements for the mine facilities, and 20.6.7.34, which is implementation of closure.

So for East Waste Rock Stockpile -- and I'm -- oh, and one thing I want to mention on this is East Waste Rock Stockpile 1, 2 and portions of 4 are located within the old pit surface drainage area. And according to the Copper Rule, they're not required to be covered -- the outslopes aren't required to be covered for these facilities, but the copper -- the current Reclamation Plan is that they -- the entire facility will be reclaimed and covered and revegetated.

So this plan goes above and beyond the Copper Rule requirements.

So for East Waste Rock Stockpile 1 and the majority of East Waste Rock Stockpile 2 and portions of East Waste Rock Stockpile 4, they're going to be reclaimed during the preproduction phases of mine operations, which this is concurrent reclamation.

East Waste Rock Stockpile 3 is located within the plant area, and that stockpile is going to remain in place until closure of the plant area itself.

East Waste Rock Stockpile 4 -- well, let me

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mention East Waste Rock Stockpile 2. When I say portions of that, majority of -- there's -- like I showed before, there's two lobes to East Waste Rock Stockpile 2, there's 2A and 2B.

The portion of East Waste Rock Stockpile 2A, I believe it is -- let me just look here -- yeah. East Waste Rock Stockpile 2A, the majority of that stockpile is going to be removed and placed onto 2B as part of the Reclamation Plan. The portion -- the only portion that's going to remain, which is a smaller portion, is the portion that will be covered over by the new Waste Rock Stockpile 1.

So -- the -- for Waste Rock Stockpile 4, the exterior slope, which is the southern slope that runs along Grayback Arroyo -- that slope will be regraded and covered and revegetated during the preproduction phase. So again current reclamation. The top surface is going to be graded to drain toward the pit during operations, and it's going to be used as an equipment laydown yard during operations.

Next slide.

So the primary closure components for the reclamation of the existing waste rock stockpiles.

We're going to regrade to interbench slopes of 3-to-1 in accordance with the Copper Rule. And

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that's -- I don't know if I need to -- well, 20.6.7.33C.(3).

And then the maximum uninterrupted slope lengths of 200 feet, of maximum slope length, so 200 feet, in accordance with 20.6.7.33C.(4) NMAC.

Top surface will be graded to drain with slopes between 1 and 5 percent in accordance with the Copper Rule.

And there's going to be about a three-foot store-and-release earthen cover placed on the facilities after they've been graded, in accordance with the Copper Rule, and that's 20.6.7.33F.

Once the cover is placed on the stockpiles, it will be ripped, and any disturbed areas outside of the stockpiles due to reclamation construction will be also ripped, and then the -- and then also provide positive drainage away from the facilities. And then if there's not adequate growth material in the disturbed areas, an additional six inches of growth media will be placed in those areas, and those areas will be revegetated.

Stormwater conveyance channels have been designed for each of the facilities, and they're designed in accordance with the Copper Rule, to convey 100-year return storm and hold events, and that's in accordance with 20.6.7.33A.

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And the revegetation has been designed to create a stable, self-sustaining plant community that conforms to the planned grazing and wildlife habitat postmining land use in accordance with 19.10.5.507.

Additionally tied into the Reclamation Plan is the installation of -- and operation and maintenance of groundwater monitoring wells, which Mr. Finch presented earlier in his testimony.

And one of the conditions in the draft Discharge Permit is that we will construct a reclamation test plot on one of the existing waste rock stockpiles following the reclamation.

And the test plot program is designed to further evaluate the growth media as a reclamation cover material and also to look at vegetation sustainability, erosion characteristics of the cover material as well as the -- the capability of the cover material to reduce infiltration into the cover systems.

So that -- New Mexico Copper is committed to that test plot program, and that --

So we can go to the next one.

So this generally just shows the locations. I showed them in the map, but here's the locations.

Here's Existing Waste Rock Stockpile 1, 2A and 2B, and the next slide will show the portion of 2A that

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is -- remains in place.
Here's 4. And again I mentioned the -- the outslope along Grayback Arroyo. This outslope will be regraded and reclaimed during the preproduction phase of mining.
Here's Existing Waste Rock Stockpile 3 which is located in the plant area.
Next slide.
These are just -- it's a little busy, but -- so these -- this is the reclamation designs for the existing waste rock stockpiles.
Existing Waste Rock Stockpile 3 I'll talk about later when I go talk about the plant area.
So for Existing Waste Rock Stockpile 1, the blue lines here are either newly constructed conveyance channels or diversion channels, divert surface water run-on onto the reclaimed facilities. So these here are diversion structures to divert stormwater off and out this toe channel that will run along here.
And these are conveyance channels. So this slope here along Grayback Arroyo is going to be pulled back away from the Grayback Arroyo diversion. There will be no disturbance of the current diversion channel as part of this construction. We're pulling back this slope, and we're putting in a new toe channel to prevent

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any erosion of the existing diversion structure from run-off from the reclaimed facility.
Additionally as part of Existing Waste Rock Stockpile 1, this area right here currently receives run-off from the unreclaimed facility. So right now there's ponding in this area. It's a low area. We're backfilling this area and with growth -- growth media material and sloping it back so that we get clean stormwater run-off, report back to Grayback Arroyo.
So for 2B, as I mentioned before, the portion of 2A gets combined into 2B during the preproduction phase, and the slopes again get regraded to 3-to-1 slopes.
We've got the conveyance channels. And the conveyance channel here gets directed to the perimeter of the pit. There's a pit perimeter channel that's constructed around the pit. And this shows the whole -- the entire area that's going to be reclaimed here.
So again covering with three feet of growth media, revegetation, sloping and the channel surface conveyance channels. This is the run-on -- a run-on diversion structure.
4, again the top surface during operation is going to be used as a laydown yard. The outslope here again is going to be reclaimed during the preproduction

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phase. We've got the conveyance channels here, this channel here, but we're on to the -- again to the pit -- the old pit channel, which I'll discuss later on.
And then we've got a toe channel here that will direct from this face here clean stormwater run-off to -- back to Grayback Arroyo.
Okay.
I want to briefly just talk about the components of the Grayback Arroyo Reclamation Plan.
So there's legacy disturbances within Grayback Arroyo.
And those disturbances are primarily related to the outslopes of the -- there's a plant area, there's an outslope area there that's going to be reclaimed. And then, like I mentioned before, there's the Existing Waste Rock Stockpile 4 slope.
And then additionally, there's the -- right here, the -- there's two land bridges that currently cross Grayback Arroyo, and those -- as part of the Closure Plan, those will be removed. And the slopes associated with the exterior -- the southern end of the -- between the two land bridges, that area gets reclaimed also.
That slope -- that's a pullback in that area because we don't want to disturb the Grayback Arroyo

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channel. So again all this slope reclamation meets the Copper Rule requirement. It's 3-to-1, less than 200-foot slope lengths, covered with 36 inches of growth media and revegetated.
The existing Grayback Arroyo diversion structure is maintained, and there's no additional disturbance of that diversion structure itself.
The revegetation also again, as I mentioned, is designed to create a stable, self-sustaining plant community.
So now I'll go on to the new facilities, and I'll start with the exist -- the new waste rock stockpiles.
Again there's three new waste rock stockpiles. There's the Waste Rock Stockpile 1, 2 and 3. The closure for those stockpiles meet the Copper Rules -- meet or exceed the Copper Rule requirements for closure, and that's 20.6.7.33, and as well as implementation of closure, that's 20.6.7.34.
The primary components of the closure of the facilities is we're going to regrade to interbench slopes between 2.75 -- and that's the Waste Rock Stockpile 1 which is located within the old pit surface drainage area -- to 3-to-1, which are all the -- the Waste Rock Stockpile 2 and 3, those are graded to

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interbench slopes of 3-to-1, with maximum uninterrupted slope lengths of 200 feet in accordance with the Copper Rule.

The top surface will be graded to drain on -- graded between 1 and 5 percent in accordance with the Copper Rule.

And where we have -- we -- I mentioned before there's -- there are 200-foot interbench slope lengths. So in between the 200-foot slope lengths there's benches built in. Those benches are 25-foot-wide. And there's conveyance channels built on each of the benches that will convey clean surface water run-off off the facilities once they're recovered, revegetated and reclaimed.

The stormwater channels are all designed in accordance with the Copper Rule. They're designed to convey a 100-year storm return interval. And that's in accordance with 20.6.7.33A.

And then, as I mentioned before, there's three-foot growth media placed on stockpiles following the regrading. And it will be revegetated in accordance with the Copper Rule.

The one thing I want to mention on this -- there's two things I want to mention.

I want to go back to previous testimony, a

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question that was -- on that, but I also want to mention that again it -- where we're -- Copper Flat, New Mexico Copper is going above and beyond the Copper Rule is that Waste Rock Stockpile 1 is located within the open pit surface drainage area, and in accordance with Copper Rule, the outslopes aren't required to be regraded or covered within the open pit surface drainage area.

Copper Flat, New Mexico Copper is committed to regrade, cover, revegetate and install surface conveyance structures within our channels within the open pit surface drainage area.

So that's -- I just wanted to mention that's one area where they've gone above and beyond.

And then secondly, a question came up yesterday, I believe, and I think it was on the encapsulation of the new waste rock stockpiles.

As part of the Material Handling Plan, and it's included in the Discharge Permit application as well as a condition in the draft DP, is that -- and as Ruth Griffiths mentioned yesterday, there's the potentially acid-generating material and then the non -- nonpotentially acid-generating material.

As part of the Material Handling Plan, the design of the new waste rock stockpiles, there will be a 10-foot zone above -- or below any PAG material that's

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placed on the stockpiles as well as on the sides and on top. So it's encapsulated within a nonpotentially acid-generating material. So there's a minimum of 10 foot of nonpotentially acid-generating material that will be placed over, underneath and on the sides of potentially acid-generating material.

And again I just reiterate these points on the installation, operation and maintenance of groundwater monitor wells that require closure/postclosure monitoring, and that's in accordance with the Copper Rule. And that's what Mr. Finch had testified about yesterday.

So again overview of the new waste rock stockpile facilities.

Here's 1. And I wanted to show you here's the portion of 2A that will be left in place. It gets covered over by the Future Waste Rock Stockpile 1.

Here's the footprint for Waste Rock Stockpiles 2 and 3. 2 basically sits above 3, which will -- I'll show you a little bit later.

Just for reference, here's Grayback Arroyo and the plant area here. And the open pit is in this area.

Okay.

So this is Waste Rock Stockpile 1. Here's the open pit. And again the blue, blue-ish lines are either

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surface water conveyance structures or they are run-on control structures.

So we've got 1 is here, and again we've got the 3-to-1 slopes -- or -- I'm sorry -- 2.75-to-1 slopes on Waste Rock Stockpile 1. And then we've got the surface conveyance channels. This will be covered, revegetated, surface conveyance channels will be built in.

And they -- everything gets -- the clean surface water gets diverted to the open pit perimeter surface conveyance channel here and then ultimately gets conveyed to the open pit -- open pit drainage channel, which I'll show later on when I talk about the Open Pit Reclamation Plan.

Top surface is graded 1 to 5 percent, and that's graded to drain away and out from the top of the surface.

Okay.

This is the -- as I mentioned before, Waste Rock Stockpiles 2 and 3 are really combined into what I consider just kind of one facility, but they're separated out.

So this is 2, and this is Waste Rock Stockpile 3 here. And again we've got top surface is graded between 1 to 5 percent, outslopes 3-to-1 on all the

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facilities here. And we've got three feet of cover and revegetation. And we've got construction of run-on controls here and any surface run-off conveyance channels and down-chutes that will direct clean surface water back to Grayback Arroyo.

One thing I want to mention here is these -- these are the operational surface conveyance or toe drain -- drainage conveyance channels that during operations these are designed to convey any seepage from the facilities to a -- this lined surface impoundment. Those -- during operations, they're going to be built into -- directly into competent andesite bedrock.

So this figure -- the tan areas here show those sections that -- that are still present following the regrading and reclamation of the Stockpile 3. These get reclaimed, also. The reclamation on those would be covering with growth media material, three feet of growth media material, and revegetation and grading to drain away from the conveyance structures.

Okay.

Okay. So for the tailing storage facility reclamation, again reclaimed in accordance with the Copper Rule. Copper -- the closure requirements are 20.6.7.33. And implementation of closure, you know, with all of those guidelines -- or those requirements,

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also, 20.6.7.34.

All structures -- the first thing that's going to happen is all structures, storage facilities, buildings, pipelines and other equipment either on the tailing storage facility or within the cyclone plant -- they get removed, and they're disposed of in an approved manner in accordance with federal and state laws.

For the disturbed areas outside the tailing storage facility, those get graded to drain, and then -- they get covered. If there's not adequate growth media material present at the time of the grading and drain -- grading for drainage, additional six inches of growth media material gets placed on those.

Now, on the tailing storage facility itself, those slopes get graded to between 3-to-1 and 3-and-a-half-to-1 in accordance with the Copper Rule.

Maximum uninterrupted slope lengths of between 200 feet -- and that 200 feet is for the 3-to-1 slopes -- and 250 feet for the 3-and-a-half-to-1 slope sections.

The top surface gets graded between 1 and 5 percent in accordance with the Copper Rule.

Again to design to the uninterrupted slope lengths between 200 and 250 feet, there's benches built into the design. These are 25-foot-wide benches. And

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conveyance channels get built into those for -- following the cover placement to convey clean surface water off of the facility and back to the local drainages.

Following regrading, the three-foot store-and-release earthen cover system is placed on in accordance with the Copper Rule.

Stormwater channels get built into the tailing storage facility, convey a 100-year return interval storm event in accordance with the Copper Rules.

And they're revegetated. They'll be revegetated to design -- to create self -- a stable, self-sustaining plant community.

And again reiterating that the -- just tying in installation, operation, monitoring of the groundwater monitoring wells that Mr. Finch described yesterday, and that's in accordance with the Copper Rule.

Okay.

So this just shows the existing footprint, this lighter line of the existing tailing storage facility, or the boundary of it. And then this purple shading here shows what the ultimate footprint of the facility will look like.

Okay.

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Okay. So for the tailing storage facility, there's -- this one I'll just describe in a couple steps, but for the surface reclamation component, this shows the regrading the slopes between 3-to-1 and 3.5-to-1 interbench slopes. It shows the bench channels -- the benches and the bench channels built in here for conveyance of clean stormwater following the cover placement.

Top surface is graded to drain back to the north, and there's an existing pipeline cut for the delivery of the tailing from the cyclone plant right through here. This -- excuse me.

This pipeline section here gets backfilled to a certain point with clean growth media, and then a conveyance channel gets built in here that will direct surface water off of the top surface. So the top surface is graded to 1 to 5 percent to drain, this area here back to Grayback Arroyo.

The one thing I wanted to mention on the tailing storage facility both during operations and prior to regrading, there's a line -- HDPE-lined toe berm along the outslope of the tailing storage facility. And that's designed during operations to contain any surface run-off from the tailing storage facility prior to it being covered.

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Once the facility is regraded, the tailing material stays within that lined toe berm. The cover itself gets extended, which is the cover of growth media gets extended beyond the -- the toe berm in order -- it allows us to direct clean surface water off of the slope of the reclaimed tailing facility off -- beyond the lined toe berm and then off to convey the clean surface water to Grayback Arroyo.

One other component of the -- which I'll discuss here, a couple slides, is we have the existing underdrain collection pond, which lies right in here, but we also have the construction of a new tailing evaporation pond, and that's part of the closure water management of the tailing draindown waters.

And but this -- what this shows is this is the final Reclamation Plan so it shows the tailing pond to be reclaimed, this evaporation pond. So it shows a configuration with the reflecting for reclamation which is the 3-to-1 side slopes, the covering and grading the surface to drain off and revegetation.

Okay.

So as I mentioned, there's as part of the -- you know, the management of the process waters from the tailing facility and the tailing draindown water during closure is we have a water management program, and

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there's two components to that water management plan.

There's a shorter term, active evaporation program, which includes mechanical spray units that will be installed on top of the tailing facility. And that's to get rid of the larger volumes of process water that will be present at closure.

And additionally, during initial stages of tailing draindown, that's where you get the majority of your draindown water. So these mechanical spray units are designed to enhance evaporation of those process solutions.

So the active evaporation program includes forced evaporation, and it also includes passive evaporation from the undrained collection pond.

And what that includes -- and I'll show a figure of this later, but it includes -- on top of the tailing facility, there's a 15-acre area that's dedicated for these mechanical spray units that will evaporate the larger volumes of water that are anticipated to be handled during the initial stages of closure.

It's a four-unit mechanical spray evaporation unit with capacity to handle 1,520 gallons a minute, with an average evaporation -- estimated evaporation of approximately 789 gallons a minute.

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Our estimates based on our current plan is to operate the active evaporation program to where it gets reduced to a point to where we estimate that it can be handled through passive evaporation, which is this second program. In that period of time, the estimate is approximately five years.

So for the passive evaporation program, I mentioned before there's that additional evaporation pond that's going to be constructed at the southeast toe of the tailing storage facility. And that's going to be a 22-acre, HDPE-lined evaporation pond to manage the long-term draindown water that we expect from the tailing storage facility at the end of the active evaporation phase.

Excess evaporation, which equals the free water evaporation minus the amount of precipitation that falls on the -- the evaporation pond itself, is estimated to be with this passive evaporation program approximately 113 acre-feet per year, average approximately 70 gallons a minute, using this -- utilizing this 22-acre, HDPE-lined evaporation pond.

One thing I want to mention about this HDPE evaporation pond, it's an extension of the existing underdrain collection pond which is a double-lined HDPE facility, and we are just extending that to -- expanded

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to 22 acres to provide this passive evaporation program.

So the maximum estimated draindown during the passive evaporation program -- so we're not going to start this program until draindown comes to around 70 gallons a minute, and it -- but our estimate is 67 gallons a minute at the end of five years, and it reduces to rates below five gallons per minute after 16 years, which again that is our estimate based on our evaluation.

And in the passive evaluation -- evaporation program assumes 20 years of operation following the five years of active evaporation or when the volume of draindown water from the tailing storage facility is reduced to a point to where the evaporation pond is no longer required. This point in time, which we include in our plan, will be determined in collaboration with the agencies.

Okay.

Again this is the -- just to show schematically the active evaporation program, that first five years that we have in the plan.

We have the four mechanical spray units here. These are evaporation -- mechanical spray evaporation units. We have a dedicated 15-acre spray area. And the -- this is where the pipeline is that -- what the

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level of the water to evaporation spray unit.
And then we've got our existing underdrain collection pond which collects the underdrain -- the draindown waters from the tailing storage facility. We've got our return pipeline here which directs it back to the gallons -- spray units.
Okay.
This is our passive evaporation pond here, 22 acres, that will collect water from the tailing draindown.
Surface water at this point gets directed off the facility. It's clean surface water. The facility is fully covered, revegetated, regraded, and conveyance channels are built to direct clean surface water off the facility. So it's designed to not allow any ponding on the surface, convey surface waters, and the incident precipitation significant enough to produce surface water would be directed offsite.
And there's your 22-acre surface evaporation pond.
I guess one thing else I want to mention is that the slopes will get reclaimed during the tail end -- they'll start to get reclaimed during the tail end of the active evaporation program. Because by the time we get to the passive evaporation program, we'll --

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the entire slope area is fully reclaimed, because we want to allow that clean surface water to drain off at that point.
As well as the top surface when -- prior to the start of the passive evaporation program.
Okay.
Okay. Now I want to go to the Open Pit Reclamation and Closure Plan.
So we -- first phase of the reclamation would be to remove any infrastructure -- that can be pumps, piping, electrical systems -- that aren't required for the rapid fill reclamation component, so anything that's not required per the Implementation and Closure Plan.
There's rapid filling in the pit, as was mentioned yesterday. That's approximately 22 acre-feet of water over a period of six months.
There's construction of an earthen safety berm and barbed wire fencing around the perimeter of the pit.
The berm serves a couple purposes. One is that it's a run-on control structure for the -- to prevent run-on into the pit itself from surface water, but we've also got a surface water conveyance channel that collects the surface water from the surrounding reclaimed facilities and directs it into clean surface water into the open pit.

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So we've got -- those surface water conveyance channels are designed in accordance with the Copper Rule for the 100-year/24-hour storm return interval.
We've got grading of any disturbed areas associated around the pit perimeter. That's grading, and we would also cover and revegetate those areas.
Installation of a security gate at the haul road entrance to the pit.
So overall, reclamation of the pit, which would include both the pit lake and the areas that are going to be covered with growth media and conveyance channels built and revegetated, includes a total of 55 acres, which of that 52 acre -- 55 acres approximately 20 acres is the pit lake, and the other 35 acres is reclamation of accessible areas within the pit as well as the -- the haul road that goes down into the pit, what we reclaim, and then there's a conveyance channel built on that, also.
And then there's the pit shell around the area that -- where we have the conveyance -- the pit perimeter conveyance channel, and then reclamation of the disturbed areas around there. Overall, this represents approximately 43 percent of the pit shell area reclamation.
We have revegetation of the disturbed areas,

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35 acres, as well as the accessible areas, and that will be in accordance with 19.10.5.507.
Then we have again installation, operation and maintenance of groundwater monitoring wells required for closure/postclosure monitoring, and that's in accordance with the Copper Rule, and that's what Mr. Finch presented yesterday.
Okay.
So I have two slides on the Open Pit Reclamation Plan. So we've got -- again we've got -- I want to -- this is the pit perimeter conveyance channel. It collects water from these reclaimed facilities here. And they convey it to the open pit -- the haul road, open pit conveyance channel. This is the main conveyance channel that brings clean surface water to the open pit -- to the open pit lake here.
And then we've got -- again this is 4 at the -- once the top surface is reclaimed, that conveyance channel is built in there, is directed there, also. Then we've got the berm that goes around -- as well as barbed wire fencing around the perimeter of the -- the pit itself.
Okay.
This second slide just shows the areas that -- in yellow here, these are the areas that would get --

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would get covered and revegetated. And these are the accessible pit areas. And then the pit shell area here, the perimeter area. That represents approximately 35 acres. There's the pit lake following rapid fill.

Okay.

Next we have the plant area, and that includes -- well, I've shown it, I'll show it again, but there's various fuel tanks, storage facilities, buildings, equipment. Those will be removed from the site initially and disposed of in an approved manner in accordance with federal and state laws.

Concrete foundations that are present, the walls will either be toppled, backfilled and covered with 36-inch growth media or they'll be removed and disposed of at a nearby approved construction and debris landfill.

There's two impoundments located within the plant area. There's a process water reservoir, impacted stormwater impoundment. These are HDPE-lined impoundments. And I'll discuss those later when I talk about the closure of the surface impoundments.

Again we have -- I mentioned before we have -- there's an existing waste rock stockpile located within the plant area. And that gets closed in accordance with the Copper Rule where the slopes will be 3-to-1 with

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less than 200-foot interbench slope lengths, covered with 36 inches of growth media and revegetated.

Pipelines located within the plant area, residual materials will be removed from all the pipelines, aboveground pipelines will be removed and disposed of at a nearby construction and debris landfill or at the tailing storage facility. Buried pipelines will be flushed, like I said, residual materials will be removed, and they will be capped.

There's an electric substation, associated transmission lines within the plant area, and those will be removed once they're no longer needed.

The top surface of the plant area we graded to be -- to a slope of 1 percent or greater and ripped, and it will be covered with a minimum of six inches of growth media.

There's stormwater conveyance channels again built into the design of the plant area following regrading and covering with growth media. And those will be constructed and designed -- they're designed in accordance with the Copper Rule.

And following the regrading, cover placement, conveyance channel construction, there's the revegetation in accordance -- well, to create a stable, self-sustaining plant community, conforms with wildlife

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and grazing habitat of PMLU.

Again installation, operation and maintenance of groundwater monitoring wells in accordance with the Copper Rule.

Okay. This shows the plant area.

So we've got the -- here's the two impoundments that we were talking about here. And this is Existing Waste Rock Stockpile 3, and you can see the slopes 3-to-1, top surface 1 to 5 percent, got conveyance channels built in following the cover placement. And we've got conveyance channels built into the surface of the plant area here that will direct clean surface water off of the plant area.

Also, I want to mention there's the -- this shows there's -- the land bridges in this design drawing here have been removed. So the land bridges -- there's two of them, I believe. The other one is maybe over here. And it may -- access bridge here. The -- both those you can see there's some grading here.

This slope here, this is the slope that I was talking about, the southern slope, as well as the slope here along the plant side -- those get regraded, covered and revegetated, also.

Okay.

Okay. So the surface impoundments -- there's

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a series of surface impoundment -- lined surface impoundments at the facility.

And the Closure Plan for those, there's -- I believe there's five. So there's the -- there's impacted surface impoundments A through C, and that's stormwater, those are stormwater impoundments that are put in place during the operations. There's a process water reservoir. There's a surge pond at the cyclone plant. The underdrain collection pond. And then the evaporation pond, that's the 22-acre pond. So these really get combined into one pond at closure.

So for the closure of the surface impoundments, we have the removal of all aboveground electrical systems, pumps and infrastructure associated with each of the impoundments. That's the first step that occurs during the reclamation.

Any residual fluids that are left in the impoundments will get pumped out of the impoundments and on top of the tailing storage facility. And that gets incorporated into the active evaporation program.

Flushing of all process water pipelines to remove any residual solutions, and the solutions get disposed of on top of the tailing storage facility. And then the fluids get evaporated in the active evaporation system.

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With the pipelines similar to the plant area, the removal and disposal of aboveground pipelines either in the TSF or nearby approved construction and debris landfill. Capping all buried processed water, tailing delivery, water delivery pipelines. These are buried pipelines.

So the surface of the HDPE liners will get ripped, and they'll get folded over, and then the entire impoundment area gets backfilled with growth media.

The area gets graded to drain away from the footprint of the tailing -- I mean the surface impoundments, and then it gets revegetated.

And this covering with -- the impoundments with six inches of suitable cover material, basically the backfill on the -- the impoundments themselves is going to be reclamation and cover material. So this really doesn't apply.

The -- so again once the surfaces -- the impoundments have been backfilled and graded to drain away from the impoundments, the area gets revegetated to create a stable, self-sustaining community that conforms with the planned grazing and wildlife habitat PMLU.

And then there's also the monitoring well -- groundwater monitoring wells installed for the closure -- postclosure monitoring in accordance with the

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Copper Rule in the general vicinity.

Okay. So this shows the locations of the surface impoundments that we closed.

Again here's the tailing storage -- or the tailing evaporation pond, 22-acre pond. Here's the surge pond and the cyclone plant. These are the three HDPE-lined stormwater -- impacted stormwater collection ponds that are installed during operations. There's -- this is C, this is A, and this is B here. And then this is the process water reservoir in the plant area, HDPE-lined.

So it just shows the general location of these facilities.

Okay.

As I mentioned before in the beginning of my presentation, there's -- there's what we kind of put into a group as the ancillary facilities, facilities that we know that will -- that will have identified that we know we're going to have to take care of. They're pipeline corridors, they're other general disturbed areas in the mine that will be taken care of at closure.

And so we've got haul roads and access roads that are not needed for closure or postclosure access to the reclaimed facilities. Those will be ripped to 12 to 18 inches and covered with six inches of growth media

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where suitable growth media does not exist.

Any culverts that are associated with these haul roads or access roads that aren't needed for stormwater management will also be removed as part of that reclamation of that -- that component of the haul roads and access roads.

Existing roads utilized for closure/postclosure access that are wider than a single vehicle, the section outside the additional area -- some of them are like larger haul roads, and we only need a smaller width. The area outside of that width that we need for access will also be reclaimed, similar to the roads that aren't going to be required for access.

Any pump stations, electric substations no longer needed for water management will be removed. And overhead -- overhead lines, power lines will be disconnected from the 115 kV line owned by Tri-State Generation and Transmission.

Again that's pipelines similar to the way they're handled with the surface impoundments in the plant area, residual sediments will be removed. They'll be flushed. The pipelines on the surface will be removed, anything that's buried will be flushed, capped.

And the fluids -- pipelines may be disposed of to the tailing storage facility prior to reclamation or

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in the nearby construction and debris landfill.

There's some pipeline corridors now for -- associated with the pipeline delivery to the cyclone plant that are HDPE-lined pipeline corridors. There's pipeline, and there's an HDPE liner underneath the pipeline.

So once the pipelines are removed, the liner is going to be ripped, and then the corridor, the trench that -- where the pipeline sits in will be covered with growth media. And then the surface will be graded away from the corridor itself and then revegetated to create a stable, self-sustaining plant community.

Any disturbed areas associated with these ancillary facilities will be ripped to a depth of 12 to 18 inches. If there's not adequate growth media within those disturbed areas, additional six inches of growth media will be placed within those disturbed areas and revegetated.

Okay.

As I mentioned before, there's three growth media stockpiles that are going to be built during the initial phases of construction. And those are designed to contain the suitable reclamation cover material within the footprints. So we're going to salvage the material within the footprints of the tailing storage

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facility as well as portions of the Waste Rock Stockpiles 2 and 3.

And so the majority of the material within the growth media stockpiles are going to be removed and used as reclamation covers.

We are planning -- in our plan, we -- we plan to leave a minimum of six inches of growth media within the footprint of the growth media stockpiles for revegetation and reclamation of those disturbed areas that will be associated with the stockpiling and the removing of that growth media from those stockpile areas.

So it's basically just to reclaim the disturbed areas associated with the growth media stockpiles.

So again we're going to leave a minimum six inches of growth media in place. We're going to rip the disturbed areas. So we're going to grade, make sure that the facilities are graded to drain from the disturbed areas, and then we're going to revegetate the footprint areas to create a stable, self-sustaining plant community.

The growth media stockpiles, current plan is for them to contain approximately 4.5 million cubic yards of media for reclamation cover.

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One thing that's not on this slide that I want to mention is that there's going to be a -- these stockpiles during operations, they're going to be -- there's going to be an interim -- they're going to be revegetated. There's an interim seed mix and revegetation program to just minimize wind erosion from -- from the stockpiles themselves.

So they'll be -- just it's more of a grass type to create erosion and to stabilize those for wind and water erosion during operations.

Okay. Again just to show you general location of the stockpiles.

So here's the tailing storage facility. Here's Growth Media Stockpile 1. And here's 2 here. And then 3 is here on Waste Rock Stockpiles 2 and 3 here in this area. And again -- so those are the general locations of the three growth media stockpiles.

Okay.

So this is the proposed reclamation schedule. And one thing I want to mention on this is that there's a footnote here that you probably can't read, several of you probably won't be able to read. Active mining operations are projected to be completed approximately 12 years and three months.

So where you see anything before the 12 years,

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you know -- or before 12 years, that's what we're considering concurrent reclamation.

So as I mentioned before, we've got Waste Rock Stockpiles 1, 2A and 2B, those are -- the plan is to reclaim those during the preproduction, and that's between years one and two.

Stockpile 4, the outslope -- again the southern outslope adjacent to Grayback arroyo is years one and two.

And one thing I don't really have on here is the Grayback Arroyo, the disturbed areas in Grayback Arroyo and the outslope for the plant area. Those will be reclaimed also years one and two. So they'll be covered, revegetated during that -- that period of time.

Waste Rock Stockpiles 1 and 3, again mine operations projected to continue to 12 years and three months. So you see here approximately two years after the cessation of mine operations, the reclamation -- or actually reclamation on Waste Rocks -- Waste Rock Stockpile 3 reclamation begins before cessation of mine operations. So it begins in year 10.

Mine operations are projected to be completed in year -- the year 12 and three months. So Waste Rock Stockpile 3 reclamation begins earlier on.

And then these -- the three stockpiles

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reclamation will be completed in year 15, which is approximately three years following closure.

Tailing storage facility, the active draindown begins right -- pretty much right -- pretty close to cessation of operations. There's the period of time here where the mechanical spray units need to be -- to be placed -- ordered, placed and -- and put into operation.

So there's a -- you know, we have 12 years and three months. We have active evaporation starting year 13. So there's a six- to nine-month period where we get piping -- projected piping in the active spray units be put in place.

And again there's the five-year operation period.

And as I mentioned before, portions of the tailing facility on the outslope of the tailing storage facility, we begin to reclaim those during the active evaporation program. That's the outslope portion.

We have construction of evaporation pond begins prior to the completion of the active evaporation program, and that's projected per year.

And we have the passive evaporation of draindown waters beginning in year 18 and continuing for 20 years.

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And then at the -- the completion of that 20-year passive evaporation program, we have the closure of the tailing evaporation pond.

Plant area reclamation begins in year 15 so approximately a little -- two-and-a-half to three years following cessation of operations.

Rapid fill of the pit, again I don't break this out into months, it would be a little busy, but that begins right after closure of the mine. And again it's really a six-month period, but --

And then the pit perimeter, that begins shortly after closure. That's years 14 and 15. And that's -- that includes construction of the pit perimeter conveyance channels, fencing, berming, cover placement, and then the construction of the haul road conveyance channel.

Then the ancillary facilities years 16 through 20.

Okay.

In summary, the Copper Flat -- it's my opinion that the Copper Flat Closure and Reclamation Plan meets or exceeds the requirements of the Copper Rule, is designed to create a -- to re-establish a self-sustaining ecosystem that conforms with the planned grazing and wildlife habitat PMLU.

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New Mexico Copper Corp. has committed to construct -- to concurrent reclamation of legacy stockpiles as discussed in this presentation as well as, you know, portions of the proposed Waste Rock Stockpile 2 during operations.

And portions of Grayback Arroyo that I mentioned previously.

And New Mexico Copper Corp. has committed to conduct the reclamation cover material test plots, and that -- again that's conditioned within the draft Discharge Permit. And that will further demonstrate suitability of the reclamation cover for the Copper Flat Mine.

Q. Thank you, Mr. Stein.

Did you provide a copy of your resume that's marked as New Mexico Copper Exhibit 90?

A. Yes, I did.

Q. And is your PowerPoint presentation Exhibit 91?

A. Yes, it is.

Q. And did you provide other reference materials that are Exhibits 92 through 104?

A. Yes, I did.

MR. BUTZIER: Madam Hearing Officer, I'd move the admission of Exhibits -- New Mexico Copper Exhibits

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90 through 104.

MS. ORTH: Objections?

MR. DE SAILLAN: No objection.

MR. KNIGHT: No objection.

MS. BARNCASTLE: No objection.

MS. ORTH: All right. Thank you very much.

Exhibits 90 through 104 are admitted.

(Exhibits NMCC 90 through 104 admitted into evidence.)

MR. BUTZIER: And, Madam Hearing Officer, that concludes the direct testimony of Mr. Stein.

MS. ORTH: All right. Thank you.

Mr. Knight, do you have questions of Mr. Stein?

MR. KNIGHT: Madam Hearing Officer, I do not.

MR. DE SAILLAN: Madam Hearing Officer, we have quite a few questions for this witness, and I was wondering if we could break for lunch and proceed with the questioning afterwards.

MS. ORTH: That's fine.

Let me just ask while it is still in my mind.

Ms. Barncastle, you joined us just a few minutes after Mr. Stein began.

Do you have any objections to register about his expertise or experience on closure and reclamation

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in order to give the testimony he gave?

MS. BARNCASTLE: No, ma'am, I do not.

MS. ORTH: All right. Thank you.

Let's break for lunch and return at 1:00.

Mr. Butzier.

MR. BUTZIER: Madam Hearing Officer, just a reminder, do we also want to ask Ms. Barncastle whether she objects to the three exhibits associated with David Kidd?

MS. ORTH: All right.

Exhibits 87 through 89, that was resume, PowerPoint and a report, I believe.

MS. BARNCASTLE: No objection.

MS. ORTH: All right. Thank you very much.

We're on break until 1:00.

(Proceedings in recess from 11:51 a.m. to 1:07 p.m.)

MS. ORTH: All right. We are back after the lunch break.

When we broke, we were about to begin Mr. de Saillan's cross-examination of Mr. Stein.

While I have your attention, please reach for your devices. I heard a lot of ringy-dingies this morning. Just turn it down. I understand you need to know when your phone rings, but the rest of us don't

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need to know that.
So Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
CROSS EXAMINATION
BY MR. DE SAILLAN:
Q. Good afternoon, Mr. Stein.
A. Good afternoon.
Q. First of all, I'd like to ask you a little bit about your background.
So how many major metal mine sites have you been involved in reclamation of?
A. I would say 15, I would put the number at.
Q. Okay.
And have those been in the Western United States?
A. Majority are in the Western United States. Yes.
Q. Okay.
Any in Nevada?
A. Yes. There has been some in Nevada.
Q. Which ones?
A. Well, peripherally been involved in the Bullfrog Mine. I was not necessarily on the reclamation end of things, but on the planning end of things at the

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Long Canyon Mine in Nevada.
Q. Okay.
A. Those are the two primary ones. Yeah.
Q. Okay.
And how about are there any in Montana?
A. None in Montana.
Q. Any others in New Mexico?
A. Yes. I've been involved in reclamation planning, closure planning at Questa, McKinley, Chino, Tyrone, Cobre and Hidalgo.
Q. Okay.
McKinley is a uranium mine?
A. It's a coal mine.
Q. Okay.
Of the -- I think you said 35?
A. No. I said 15.
Q. Fifteen. I'm sorry.
Of the 15 that you've been involved in, how many of them have been hardrock mines?
A. The majority of those have been hardrock mines.
Q. Okay.
And what has been your involvement in the Chino, Tyrone, Cobre, Hidalgo and Questa mines?
A. I've been involved in the cover design,

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closure planning, reclamation design, very -- it depends on the site, but in general, the closure planning, reclamation planning, cover design, permitting support.
Q. Okay.
And have you -- have you continued monitoring any of those mines after closure?
A. Yes.
Q. Which ones?
A. I haven't monitored, but I've evaluated the data from sites, and that would include Chino and Tyrone following reclamation, and I've looked at monitoring data for the Bingham Canyon Mine, Utah. That would be following closure. I've also looked at the Questa tailings. And that would be the primary ones.
Q. And have all of those mines that you just mentioned -- have they all involved long-term maintenance and monitoring? And when I say long-term, I mean on the order of more than 25 years, upwards of 100 years or more?
A. Not all of them.
Q. Which ones have not?
A. Bingham Canyon Mine.
Q. And how long was monitoring and maintenance necessary there?
A. Now, this is a portion of the mine facility

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that's been reclaimed.
Q. Okay.
A. They're not under an active monitoring and maintenance program right now. The sites that have been reclaimed are stabilized. It's -- these reclaimed areas are within an active mining area of the -- they're within an active mining area of the mine itself.
I think the monitoring, maintenance period was -- for those facilities were approximately five years.
Q. And what type of facilities were they?
A. Bingham Canyon Mine is a copper, gold, hardrock, silver, molybdenum mine.
Q. Okay.
But the facilities that --
A. Waste rock piles.
Q. Waste rock piles?
A. Oh, and -- I'm sorry -- and tailing facilities.
Q. Okay.
Let's move to slide 8, please.
Now, here you mention the -- slide 8?
Okay. On slide 8, you reference stormwater channels. And you mention a 100-year return interval event.

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You're basically talking about a 100-year storm event, right?
A. Yes.
Q. And isn't -- isn't that changing as a result of climate change? Isn't what -- isn't what would be considered a 100-year storm event or what has previously been considered a 100-year storm event changing as a result of climate change?
MR. BUTZIER: Madam Hearing Officer, I will object that that's -- that's an ambiguous question. It's not clear what -- what specifically he's talking about is changing. Is it a 100-year storm event to some other years storm event or -- and is it scientists? Is it -- you know, it's basically there's no context provided for the question.
MS. ORTH: All right.
And, Mr. de Saillan, you may be thinking of a reference by which the size of those events is established. If you would just clarify.
MR. DE SAILLAN: Sure.
Q. Isn't the severity of storm event that is considered -- that is normally considered to be a 100-year storm event changing as a result of climate change?
MR. BUTZIER: Same objection.

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MS. ORTH: Can we back up just a little bit? That is to say how he would understand the severity of a 100-year storm event to begin with?
MR. DE SAILLAN: Sure.
Q. I mean, who sets the standard for a 100-year storm event?
A. Well, there's procedures, there's standard scientific procedures in evaluating 100-years/24-hour storm event, and we use a 100-year period to evaluate what that storm event is. And I believe for ours it was NOAA Atlas, where we use the precipitation event associated with that.
Now, keep in mind that's over a 100-year period what that record is so you're looking at a long period of time to evaluate what that storm event is.
Q. All right.
So aren't those standards changing as a result of climate change?
MR. BUTZIER: Same objection.
MR. STEIN: So -- yeah.
MR. BUTZIER: Madam Hearing Officer --
MR. STEIN: I'm not sure where you're coming from on that.
MS. ORTH: So you referred to the NOAA Atlas for the standards, right? For --

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MR. STEIN: For the storm event.
MS. ORTH: For the storm event.
MR. STEIN: Yeah.
MS. ORTH: So is that changing?
I mean, I felt like he put it in context that time.
MR. STEIN: I haven't seen an update.
MR. DE SAILLAN: Okay. Thank you.
Q. Did you consider the possibility that in the future as this -- this closure -- the closure of this mine progresses, that you may have to change your estimation of what a 100-year storm event is?
A. We didn't look at climate change, but what I will say is that we have an additional one foot of freeboard designed into the channels which would handle additional input into the channels beyond the 100-year/24-hour storm event.
Q. Would you agree with me that over the next 100 years it's likely that we will receive more than one 100-year storm event?
A. I would say there's a probability. Yes.
Q. Okay. Thank you.
Now let's move on to slide 11.
You mentioned the -- the Grayback Arroyo diversion structure.

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Could you describe that structure for me, please?
MR. STEIN: Let me see the slide that present --
MS. EMMER: Which one?
MR. STEIN: That's what I'm looking for, the Grayback one that shows the Grayback.
I'll just describe it. I don't really have a slide that shows --
MR. DE SAILLAN: That's fine.
MR. STEIN: -- a depiction.
But anyway, the Grayback diversion is a diversion that was built into Grayback. Grayback used to flow through to the mine site. And so it gets diverted on the west side of the mine permit area, and it runs along the southern perimeter of the mine permit area.
I believe that -- I'm not 100 percent sure on this, but Grayback Arroyo used to run on the southern -- so from west to east. From the west side, it would run through the permit area toward -- in the vicinity of the current open pit. So there's a diversion that runs to -- more to the south. So it's a constructed diversion that's in place now.
MR. DE SAILLAN: Okay.

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Q. And how was that diversion structure built?
A. I think it was -- it's -- it was built with local fill materials. So there's a -- there's a berm in place in the -- to divert the flow. So there's an earthen bermed area along the west side of the Existing Waste Rock Stockpile 1. And then it runs along the south side. I think it ties back into its natural channel.
Q. Okay.
So the berm and whatever aspects to the diversion structure there are, is that a permanent diversion?
A. It's -- in our Reclamation Plan, it is included as a permanent diversion. Yes.
Q. Okay.
Now, you -- I believe you testified or one of your slides says that you plan to maintain the Grayback Arroyo diversion for the closure period.
What do you mean by the closure period?
A. Well, the Reclamation Plan, what I think -- what I was getting at there is we do not plan to disturb the existing Grayback Arroyo diversion structure as part of the Reclamation Plan. It's going to be maintained.
And there's no -- as part of any -- what I was trying to tie that into is the reclamation of the

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components along Grayback Arroyo, that's the Existing Waste Rock Stockpiles 1 and 4, the outslopes that face Grayback Arroyo, they're not going to encroach upon the Grayback Arroyo channel.
Q. So when you say it's going to be maintained, do you mean it's just going to be left alone in place as opposed to you're going to take care of it?
A. It's left alone in place. There are sections of Grayback Arroyo along the plant area that I mentioned. There's two land bridges where there's -- that those two land bridges will be removed so that you have open channel flow --
Q. Right.
A. -- through those areas.
Q. Right. I'm focusing specifically on the diversion.
A. The diversion is -- as far as maintained, it's left in place as is --
Q. Okay.
A. -- under the current plan.
Q. Okay.
Well, suppose the structure were to fail.
MR. BUTZIER: Madam Hearing Officer, I'm not sure that was a question. So far he's asked for a supposition, and I don't think there was a question

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attached to that.
MS. ORTH: Right.
MR. DE SAILLAN: Fair enough.
MS. ORTH: Would you rephrase that?
MR. DE SAILLAN: Okay.
Q. What would the Closure Plan provide for -- or does the Closure Plan provide for the failure of that structure?
A. Well, I'll tie it into the draft Discharge Permit. There's a Contingency Plan section in the draft DP document that specifically covers excessive erosion associated with any types of conveyance structures.
Q. Okay.
What happens -- does the -- does the Closure Plan address failure of the diversion structure after the mine has stopped operating and the Contingency Plan is no longer in effect?
MR. BUTZIER: Madam Hearing Officer, as I understand the question, he's asking for speculation.
MS. ORTH: I didn't hear it that way. He asked if the Closure Plan provided for potential failure.
MR. BUTZIER: Okay. Great. Okay.
MR. STEIN: I guess my response would be I -- the Contingency Plan should be in place at closure. So

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if there's a failure -- and if -- hypothetically if there was a failure, that that -- or excessive erosion on that diversion structure, the Contingency Plan would be in place at that point in time, and that would kick in.
MR. DE SAILLAN: Okay.
Q. But suppose that the mine is no longer operating, it's closed, it's gone out of business, the copper has all been mined out, and we're talking, you know, more than 25 years down the road, and the diversion structure fails, the Contingency Plan is no longer in operation.
Does your Closure Plan address that failure?
A. I'll answer that, but then I'll comment on what my opinion is on the failure of that dam.
Q. That's fine.
A. I mean of the diversion structure.
We do not specifically address failure of that diversion structure.
But what I will say is that there has been a diversion analysis done by M3 Engineering, and as part of that analysis, they looked at flows within Grayback Arroyo under a 500-year storm, and it showed that that structure is sound at 500 years. So -- under the 500-year storm event.

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So we are anticipating that, and it is not currently included in the -- in the Reclamation Plan.

Q. Okay. Well, let me just ask you one more question on this issue.

Suppose that the diversion structure were to fail.

Would the water from Grayback Arroyo then flow into the -- into the pit?

A. Well, again I don't anticipate that. And I don't believe it would -- well, again that's kind of an open-ended question. It depends on what kind of failure, where the failure is. So I -- I mean, unless you -- I mean, there's different types of failures that can occur on that.

Q. Okay. Let's say that the berm is breached.

A. Again it depends on where the berm's breached.

Q. Wouldn't it -- wouldn't it most likely flow back into its original channel?

A. Not necessarily.

Q. Okay.

Let's move on to slide number 12.

Now, I think you testified that as part of the closure here the nonacid-generating material would be encapsulated in the acid-generating material?

A. Around -- around the acid-generating material.

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So there's a 10-foot -- as part of the Mine Handling Plan, there's a 10-foot-thick zone underneath. So prior to the placement of potentially acid-generating material, there's a 10-foot minimum thickness of nonpotentially acid-generating material placed at the base, then the potentially acid-generating material would be placed on top of that, and then another minimum 10-foot layer would be placed over and on the sides of that.

Think of it as a -- a lens of potentially acid-generating material that's surrounded by a minimum 10-foot layer of nonpotentially acid-generating material.

Q. Okay.

But just to clarify, this would still be porous material, right?

A. Yes.

Q. So the encapsulation would not prevent water from seeping into the acid-generating material or draining out of the acid-generating material.

A. It's not going to prevent it, but it could have some benefits to being there with additional buffering capacity and whatnot. But that's not my area of expertise. That's a geochemistry.

Q. Okay.

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Let's move on to slide 16.

In that slide, I think you give a range for -- range for some slopes.

Do you see what I'm referring to?

A. Um-hum.

Q. And I'm wondering has that -- has that been determined yet, which -- where in the range the slopes are going to be graded?

A. It depends on the location. It's all tied into the Operational Plan of the tailing impoundment. So it's -- it's not if or -- if or that -- this or that type of analysis. There's -- there are going to be -- it's already in the design. There's sections of the tailing facility that will have 3-to-1 slopes, and then there's sections -- due to the operational design, there's slopes that will be 3-and-a-half-to-1.

Q. Okay.

And has that been determined yet?

A. Yeah. It's in our reclamation designs as part of the MORP document.

Q. Okay.

Slide 19.

And I think you estimate there that the drawdown time will be -- after 16 years that the drainage will be 16 gallons per -- excuse me -- five

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gallons per minute after 16 years; is that correct?

A. No. Well, yes. That is. After 16 years, we'll reach a fairly steady draindown rate of what we're estimating is approximately five gallons a minute. Yes.

Q. Okay.

And what is the basis for that conclusion?

A. We looked at a few things. We have -- in the Water Management Plan portion of the MORP, we looked at measured draindown rates in some lined facilities that we -- that our company works on. I evaluated those. And then we also looked at kind of a conceptual tailing draindown curve developed by the Nevada Department of Wildlife Protection.

Q. So you didn't do any independent calculation?

A. Well, we did a calculation based on -- we did an estimate based on observed tailing during downdrains at these reclaimed tailing impoundments, lined tailing impoundments. And then we looked at the conceptual draindown curve.

Q. Okay.

Did you -- did you consider how that number, that five gallons per day, might be affected by fluctuations in precipitation?

A. It's for -- well, the way I would answer that is that these -- the measured ones -- draindown curves

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incorporate fluctuations in precipitation. So that's built into the existing measured tailing draindown curves that are in the analysis.

And then I will also say that with our reclamation design the cover system and the conveyance channels are designed to limit drainage through the cover.

So fluctuations and precipitation are -- are -- are dampened by the reclamation cover system, the revegetation and the construction of the conveyance channels that directs surface water off from precipitation events.

Q. Okay.

So would that cover, say, long-term wet periods?

A. The cover is designed in accordance with the Copper Rule, which is -- you know, we have the three foot of earthen cover, and then it will be -- it will meet the water-loading capacity requirements of the -- of the Copper Rule, which is designed to store percent -- a certain percentage of winter precip as well as a certain percentage of summer precip.

Q. Okay.

A. With the assumption -- and the way those are established is that there's -- so a portion of water

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that enters the cover -- a good portion of it is going to evaporate and transpire from the vegetation. There may be a residual amount that's left in place that is not extracted from those two mechanisms.

So the cover systems are designed to store that additional precipitation during periods where either we have limited evaporation or the evapotranspiration are smaller as well as periods where we have maybe higher transpiration and evaporation but also higher precipitation, which would be the summer monsoon months.

Q. Okay.

Now, I was -- my last question I was referring to longer-term trends such as drought periods -- well, the opposite of drought periods, a relatively wet period where you have a lot of precipitation.

A. Can you repeat the question, then?

Q. Yeah, sure.

Was your -- was your analysis -- did it take into consideration long-term wet periods, multi-year wet periods?

A. What I would say is going back to the -- the measured draindown curves, that I present in the Water Management Plan, are -- cover a prolonged period of time, where there's variability in the precipitation

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during that period of time. There may be periods -- dry periods, there may be extreme precipitation periods.

I -- so I think the variability is handled in that, like from a -- but yeah. So anyway, that's -- yeah.

Q. Okay.

On your last bullet there, you talk about the -- well, you talk about the tailing storage facilities reaching a point where the evaporation pond is no longer required, and then you say this point in time will be determined in collaboration with the agencies?

So that -- that time has not yet been determined?

A. Our -- my professional opinion is that it's at that 20-year period. If observed flows -- if there are still observed flows at that point in time, then it would be negotiated with the agencies at that point as far as what the additional operational requirements would be.

Q. So your plan would need to be revised at some point in the future?

A. It would -- again that's -- that's speculative, I believe, but the -- my professional opinion is it's 20 years, but we don't want to say it's

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just going to be shut off no matter what.

So there's -- in the Copper Rule, there's postclosure, there's postclosure requirements. So if there's -- if we do observe flows, certainly it's -- we're not just going to -- it just wouldn't be -- the tailing evaporation pond wouldn't just be closed at that point in time. We would work with the agencies and determine the best path forward.

Q. All right.

Does the -- does the plan include tasks to address hazardous materials that might result from -- from leaks or spills of process solutions or chemicals or tailings or fuels?

A. From the reclamation?

Q. From the mine facility, any location at the mine facility?

MR. BUTZIER: That sort of turns into a compound question when you talk about tailings, fuels and various other things at any point in the mine site.

MS. ORTH: You might have to break it down.

MR. DE SAILLAN: Okay. That's fine.

Q. So let me ask you if the plan includes tasks to address hazardous materials that might result from leaks or spills of process solutions at the mine?

A. Now, on the -- you're talking about under --

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because I'm specifically speaking on the Reclamation and Closure Plan.
Are you talking on the operational end of things or --
Q. No, no, no. I'm sorry.
A. -- on the reclamation and closure?
Q. I'm sorry. I failed to clarify that. I am talking about --
A. Okay.
Q. -- for purposes of closure.
A. Okay.
So we address as part of, say, the plant closure, when we talk about disturbed areas, if there's impacted soils from a spill or, you know, long-term operation in that area, that gets taken care of as part of the Reclamation Plan.
Disturbed areas are -- you -- for disturbed areas, impacted soils would be covered and revegetated, or the material would be removed as -- like in pipelines there's -- we have the residual solutions are going to be removed and then placed on top of the tailing prior to reclamation.
Q. Okay.
When you say disturbed areas, does that mean --

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A. A disturbed area is an area that is either the surface is disturbed or there may be an impact to low-pH soils in a certain isolated area that would be reclaimed.
Q. Okay.
So suppose you have the residues of a previous spill.
Is that something that's incorporated in what you're referring to as disturbed areas?
A. Yeah. Yeah. Those would be covered and revegetated, those areas, or that material would be removed --
Q. Okay.
A. -- and disposed of accordingly.
Q. And that's covered in the Closure Plan?
A. Yes. We have -- we have acreage reserved for disturbed areas in the Closure Plan. Yes.
Q. So it's not specifically covered, it's more generally covered --
A. Yeah, because --
Q. -- in reclamation of disturbed areas?
A. -- you can't say where those would occur or if they would occur, but we have built in that those would be taken care of if they did occur.
Q. Okay. Thank you.

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Cheryl, we were talking at the same time there.
Did you get all of that?
THE REPORTER: I might have.
MR. STEIN: You're pretty good, then.
MR. DE SAILLAN: Okay.
Q. Does the Closure Plan include maintenance of access roads to and from the site and within the site for the period of closure?
A. It might -- I -- we have reclamation of components of the access roads that are required. So they're built -- so they'll be revegetated -- covered and revegetated. Sections of -- if the roads are wide or if they're not going to be used for access. But the access roads, I am not sure how they're handled in the -- I can't speak to that.
Q. Okay.
Now, the Closure Plan does not provide for water treatment, does it?
A. Well, evaporation is a -- is one component of water treatment, in my mind.
Q. Might be a component, but I don't think it's -- well --
A. You could consider evaporation water treatment. Yes.

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Q. How does your -- how does the plan address long-term monitoring and maintenance for things like erosion and revegetation, stormwater control maintenance?
A. Again that's handled -- the -- so for revegetation, there's generally a 12-year period where that's evaluated until you get final. And this is -- we're getting kind of out of the purview with NMED, but more the MMD requirements at least for the revegetation. So on the vegetation component, there's basically a 12-year period there.
The erosion and -- and cover maintenance will be handled during the closure period as part of the reclamation itself and the reseeding and then the monitoring period per -- there's generally an erosion and vegetation monitoring period in the -- following reclamation of the units.
And that's generally something that's included in the -- in my experience, it's included in the MMD permit requirements for that.
Q. Well, okay.
The -- and that period ends after 25 years?
A. I can't speak to that. I -- I wasn't involved -- I haven't really -- I'm not involved in the -- or I guess I haven't been intimately involved in

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the Monitoring Plan portion of the -- our program here was more on the Reclamation and Closure Plan.
Q. Okay.
So who is in charge of long-term maintenance and monitoring?
A. I'm not aware of who is.
Q. Okay.
So you made a distinction just now about the jurisdiction of the Mining and Minerals Division of the Energy, Minerals and Natural Resources Department and the Environment Department.
And is it your understanding that there's one plan, a Closure Plan/Closeout Plan that covers the requirements for both Energy, Minerals and Natural Resources and Environment Departments?
A. That's correct.
Q. Okay. Thank you.
Does the plan address the potential for pit wall failures, sloughing of the pit walls?
A. We don't consider that.
Q. Okay.
Have you performed failure modes effects analysis with respect to the Reclamation and Closure Plan and its ability to protect water resources?
MR. BUTZIER: Could I have the question

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repeated, please? I didn't quite hear it.
MR. DE SAILLAN: Okay.
Q. Are you familiar -- let me rephrase it a little bit, then.
Are you familiar with failure modes effects analysis?
A. No.
Q. Do you believe that a walkaway reclamation at a major metals mine site is feasible?
A. Yes.
Q. Suppose we assume long-term geomorphic changes will occur due to nature potentially compromising the proposed mitigation measures, such as the thickness and function of the cover or the stormwater diversion features.
Is your response the same?
A. I guess you'd have to be specific on what you're --
Q. Well, generally.
A. In what way?
Q. I'm not specifying what way. Any way.
MR. BUTZIER: Madam Hearing Officer, I think the witness has indicated he has difficulty understanding the question, and I believe it is ambiguous as generally posed by Mr. de Saillan.

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MS. ORTH: All right.
So, Mr. de Saillan, I understand the thrust of your question. You're asking him to assume some failure there.
Can you -- but I heard at least two potential types of failure.
Could you break down the question a little?
MR. DE SAILLAN: All right.
Q. Suppose we assume long-term geomorphic changes will occur, potentially compromising proposed mitigation measures, such as the thickness and function of the cover.
Would your answer still be the same?
A. My answer would be I would not anticipate that we would have any types of geomorphic events that would compromise the reclamation cover or the conveyance structures.
Q. Okay. Thank you.
I have no further questions.
MR. STEIN: Thanks.
MS. ORTH: Thank you, Mr. de Saillan.
Ms. Barncastle.
MS. BARNCASTLE: Thank you.

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CROSS EXAMINATION
BY MS. BARNCASTLE:
Q. I'm going to start where I left off yesterday with -- I think it was witness Finch, Steve Finch.
I asked of him is there going to be scraping of the alluvium below the existing waste rock stockpiles. That was in relation to his slide number 36 that shows there's alluvium below Waste Rock Stockpile Number 3.
A. Yes. So we did a supplemental soils investigation, and that's included in the record. So we did a series of, I believe, five test pits in the -- within the footprint of Waste Rock Stockpiles 2 and 3 to evaluate the potential for colluvial materials to be within the footprint that could be beneficial for reclamation cover material.
And as part of that -- so we did the five test pits, and, yes, we are -- we are going to remove a portion of that colluvial material that we believe is suitable for cover material.
Q. So you're going to remove the waste rock, dig down underneath it --
A. No.
You're talking about new Waste -- Existing Waste Rock Pile --

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Q. Yes.
A. -- Stockpile 3?
No. There's no -- we're not removing any material underneath.
Q. Okay. So there's not going to be scraping of that alluvial material.
A. No. We -- I'm sorry. I thought you were talking about the new planned Waste Rock Stockpile 3. So the Existing Waste Rock Stockpile 3, no, there's -- the material underneath there is not going to be removed.
Q. All right.
I also asked of Mr. Finch whether he could provide me with the exact properties of the store-and-release cover, and he said that you would do that for me.
A. As part of the investigation, we looked at soil textures, we looked at -- we did some chemical analyses on those two. And based on our evaluation of that material, we're looking at -- I guess under the USDA, we're looking at loams, sandy loams, sandy clay loams material, and we looked at the particle size distribution of that material.
And from that evaluation, we looked at relationships with soil moisture retention based on soil

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textures to evaluate the water holding capacity of that material, the estimated water holding capacity.
And we determined as part of that soil investigation that that material that we deemed suitable, that would -- that we're including in as reclamation cover material, would be suitable, in our opinion, at this point in time as reclamation cover material.
Now, I want to expand on that. As part of the condition in DP -- in the draft Discharge Permit, there's a requirement to further test the reclamation cover material to ensure that it meets requirements of the Copper Rule.
But at this point in time, the information that we have, we believe the materials in the -- in the volumes of materials that we say are readily available for reclamation cover material, that that particular volume will be suitable for reclamation cover material at the mine.
Q. So you will not have to go somewhere else and find additional cover material.
A. Correct.
Q. For the areas with reclaimed store-and-release cover, how much does the evapotranspiration need to be increased as compared with the current situation to

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ensure that only 2 percent deep percolation through the 36-inch cover is achieved?
MR. BUTZIER: I'll object to the question. I'm not sure what is referred to in the current situation.
Is that the natural ground or --
MS. ORTH: Would you clarify.
MS. BARNCASTLE: What is currently out there.
MR. BUTZIER: Yeah. Okay. Thank you.
MR. STEIN: I will say there are areas where the colluvial or alluvial cover over the bedrock is thinner than the three feet that we're proposing. So we -- the three-foot cover is greater than what's observed in certain areas of the mine.
Under the Copper Rule required under our calculations, looking at the winter and summer precip and the requirements under the Copper Rule, we're looking at a requirement to store a minimum of 20.9 inches within that three-foot cover.
So an additional component of the cover systems is the revegetation of the cover systems where you get additional transpiration and evaporation -- or transpiration from the vegetation, evaporation from the stored moisture within the cover system.
So I don't -- I mean, in a specific -- I mean,

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I'd have to calculate that out. I can't give you a specific number right now on what you're, I think, specifically asking for.
Q. (BY MS. BARNCASTLE) Have you done those calculations?
I'm sorry. I didn't let you finish.
Go ahead.
A. We have not done specific calculations. That was done by Shomaker & Associates under -- as far as their modeling evaluation.
But we have looked at the -- like I said, we looked at the texture, particle size distribution data, evaluate the water holding capacity, and then we're going to further evaluate the material characteristics where we'll actually be evaluating the further -- the suitability of that reclamation cover material as part of the test plot program.
Q. So did I understand you correctly to say that Shomaker & Associates has done the calculations that I'm asking for?
A. Shomaker & Associates did the modeling, the drainage modeling for the stockpiles. But I have looked at their estimates for a reclaimed cover, a reclaimed facility, and 2 percent -- based on my experience at other mine sites and closure sites, 2 percent of mean

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annual precipitation is a reasonable number, in my opinion.
Q. And do you agree that you can achieve that 2 percent maximum deep percolation?
A. Yes.
Q. And that's with the planned cover that will be out there, not with the potentially revised cover?
A. That's with the planned cover, yes. Correct.
Q. Bear with me on this one.
Throughout your presentation, you referred to ripping.
Please explain to me what that is.
A. So the ripping is basically loosening up the soil before you seed. So you're going to be regrading -- because over time this -- the -- over -- after placement and equipment running over even freshly placed cover, the -- it's common that as part of their revegetation process is -- is that we would rip to loosen the soil before we seed.
Q. So that's just a heavy machine that would go through and --
A. It's like --
Q. -- dig up --
A. -- yeah, a plow, a disc-type operation. Yeah.
Q. Got you.

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Existing Waste Rock Stockpile Number 4 has drainage that's collected at the toe downslope.
Will that water be pumped into the pit?
A. Well, Existing Waste Rock Stockpile 4 does not have a toe collection system. It has a conveyance channel at the base for stormwater -- clean stormwater run-off. There's no -- there's no toe collection at Existing Waste Rock Stockpile 4.
Q. Okay. Maybe it's the planned one, then, I need to refer to, then.
A. The -- under our operational period for planned -- are you -- I'm not sure what you're exactly referring to. Are you talk -- I guess I'm not --
Q. Maybe I didn't follow you either.
A. Yeah. I'm sorry. I probably wasn't clear.
Q. One of them --
MS. ORTH: Wait. One at a time.
Q. (BY MS. BARNCASTLE) One of them has the ability to collect water downslope, and we're wondering where that water will be taken, where it will go.
A. Okay. So I think you're referring to Waste Rock Stockpile 3. There's a drainage or a toe collection channel that's built into the Operational Plan for that facility. And that's beyond the constructed stockpile just beyond the toe, and it goes

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along the perimeter of the stockpile and runs into a lined stormwater impoundment, HDPE-lined impoundment. That gets put back into the process water circuit.
MS. BARNCASTLE: Can we go to slide 10, please.
Q. So this is the one I'm talking about, that it's the third one, and I believe that's Existing 4, and there is a blue line -- that one right there.
A. That's a surface water conveyance channel. Surface water conveyance channel. So after this slope is reclaimed, so it's covered and revegetated and regraded, and then also the top -- so this -- so this is designed so once the top is reclaimed, flow -- in this region here, surface water flow off the reclaimed surface, so this is clean surface water, gets conveyed back into Grayback Arroyo.
It's not a seepage collection structure.
Q. Okay.
And that's both during operation and after closure that that water will go back into Grayback.
A. This would be -- this -- this would be once this slope is reclaimed, because we don't want -- this is just specifically to handle clean surface water run-off, this channel.
I can't recall the sequence on when this

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structure is built, if it's -- if it's handling any flows, which it shouldn't be handling any flow. So it would be constructed following the reclamation of the slope here. So it's handling just the clean run-off from the slope, and then this disturbed area right in here gets reclaimed, also.
And the channel -- after the cover is placed and revegetated, the channel gets built in to convey surface water -- clean surface water run-off from the slope and this disturbed area here, and it would flow back in Grayback.
No seepage would -- there's no seepage -- this isn't designed -- or there's really -- there's no seepage in this area anyway. So the -- under the reclamation, it's specifically handled -- designed to handle clean surface water run-off. It's not a toe collection system.
Q. Okay.
And so I'd like the record to reflect that we're on slide 10, and it's the Existing Waste Rock Storage Number 4.
And can you describe which -- I don't know that I can describe which facility you're talking about that's going to lead back into Grayback, but it's the middle blue line, I guess, on the slide?

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A. Yeah. I can give you a channel number on that, if I can read it.
I think it's TC4. But it's in the MORP design --
Q. TC4?
A. TC4 I believe is the channel. Yeah.
Q. Okay.
And so that is not going to be collecting contaminated water, that will be constructed only after reclamation.
A. After that slope's reclaimed. Yes.
Q. Okay.
And then that water gets returned back to Grayback Arroyo.
A. Correct.
Q. And it's not anticipated that any contaminated water, any mine-impacted water could in any way find its way to that discharge.
A. Correct.
Q. Mr. de Saillan was asking you scenarios about Grayback Arroyo breaching and whether water might reach the pit, and I don't know if we ever got to an answer, but I'll try again.
Is there any possible scenario under which Grayback Arroyo could breach and water would flow

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directly into the pit?
A. There's no reasonable scenario. Like I mentioned before, M3 did a diversion analysis, and they did various storm inter -- storm intensities and intervals. They looked at the 100-year, 20 -- 200-year and as well as 500-year storm event, flows from a 500-year storm event, and there was no indication even under the 500-year storm event that there would be any breaching of the existing Grayback channel.
So I -- I'm -- I do not expect that. No.
Q. So your answer was there's no reasonable timeline that would happen, but what would an unreasonable event look like?
MR. BUTZIER: Objection to the form of the question.
MR. STEIN: I guess my answer would be I do not -- I do not anticipate or expect that, in my professional opinion.
MS. BARNCASTLE: Okay.
Q. So you changed your answer to it couldn't happen.
MR. BUTZIER: Objection.
MS. ORTH: I think he gave you his answer. I wouldn't characterize it further.
Q. (BY MS. BARNCASTLE) When you talked about

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encapsulating the acid-generating material with nonacid-generating material, you didn't really cover for us how we -- how you would determine what needs to be encapsulated versus what will not be encapsulated.
Can you discuss that for us, please.
A. I can discuss in general terms, but, I mean, that's probably more of a Jeff Smith, Mine Operations Plan.
But in any mine operation, there's ore control measures that are in place, material handling, because they want to -- as part of the ore control, you want to make sure you're -- you're mining the material that you want to mine and extract the metals and the -- the minerals that you want to get from that material.
And then so you're always characterizing the material you're removing from the pit. And part of that -- you could be looking at different parameters, but as part of the ore control measures, whatever is mined from that, it's designated in whatever testing is done by -- there's ore control managers. There's geologists that are looking at the material that's mined from the pit to make sure that the materials segregate appropriately as part of the mine operations.
So they -- there's testing done to determine whether the material is potentially acid-generating, the

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transitional materials, or whether that they're the nonpotentially acid-generating material, or the ore that they -- you know, that they want to process.
So that's done continuously throughout the mine operations.
Q. Okay.
So as far as you understand, there will be continuous sampling to help determine what --
A. There's continuous monitoring of the material that's mined from the pit, yes, and determine where that material goes as far as which waste rock stockpile it goes to and where it goes to.
MR. BUTZIER: Be sure you let her finish her question before you answer.
MR. STEIN: Oh, okay. Yeah.
MS. BARNCASTLE: And I'll try to make sure --
MR. STEIN: Sorry.
MS. BARNCASTLE: -- I let you finish your answer before I start talking. I apologize.
Let me see here.
MR. BUTZIER: Cheryl would appreciate that.
Q. (BY MS. BARNCASTLE) So you referred several times to clean surface water or stormwater collection ponds installed during operations that would be returning clean water to the environment.

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Am I confused? How would there be clean surface water in that area during operation?
A. I don't recall saying that.
Q. So I'm confused.
A. Or I misspoke, but I don't recall saying that.
Q. Okay.
And each of those collection ponds will be removed during closure.
A. Correct. They'll be reclaimed.
Q. So what will happen to the water that would otherwise make it to them when those ponds are removed?
A. Well, so the ponds will be backfilled with -- with reclamation cover material, and they get regraded. So -- and revegetated -- well, regraded to drain away from the footprint of the former ponds.
Stormwater, once the -- so if there's an adjacent facility -- right now it -- they're designed to collect any run-off from an uncovered facility at the mine, waste rock facility, or a portion of the mine.
So once reclamation occurs, the -- whatever the facility is is going to get covered, and it's going to get revegetated. And then we construct the surface water conveyance channels. So they're no longer needed, because the clean surface water at that point, after covers are in place and revegetated, gets diverted or

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conveyed off the facilities and back into Grayback Arroyo or into the open pit.
So it's only at that point in time, once the waste rock facilities, plant area are covered, are those -- those -- those stormwater impoundments aren't required anymore at that point in time.
Q. Are the clean surface water channels going to be lined to keep that water from mixing with mine-impacted water?
A. They're -- the conveyance channels are basically constructed -- there's cover -- reclamation cover material under the channels themselves. So you've got the cover, reclamation cover, soil cover, underneath those, and then you've got the conveyance channels built into the reclamation cover itself.
But as far as HDPE-lined channels, no. They're not lined.
Q. Is there potential for mixing the clean surface water with mine-impacted water then?
A. Well, the channel is designed to convey water out. So there's no ponding -- where you would have a potential for -- or a concern with mixing would be if you allowed ponding within a conveyance channel. They're designed to remove surface water -- expeditiously remove surface water from the facilities.

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So, I mean, there could be limited soil moisture beneath the channels. Yes.
Q. So there is some level of mixing that would have to occur to convey that water out, because some water is going to percolate down before the channel will act as a channel, right?
A. No, not necessarily.
Q. So it's your testimony that there will not be any mixing of mine-impacted water and the clean water.
A. There -- there's a potential for limited drainage or infiltration beneath the conveyance channels.
Q. I'd like to go to slide 24, please.
Now, I think I understand the answer to this, but why are we only revegetating the yellow portions and not the whole area?
A. Well, the way that the pit's constructed is that there's -- there's high walls and then a low bench and then high walls. So the areas that we show here are accessible portions of the pit that we can safely access for reclamation purposes, or for cover and revegetation. And those are around the pit perimeter and along the haul road, down to the base of the pit, and then there's a bench.
So these are -- it's more of a safety issue

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to -- as far as working within high wall areas. And that's the primary reason why you're just seeing what you're seeing there. They're accessible areas.
Q. Okay. Like I said, I thought I understood the answer, I just wanted to make sure.
Slide 27, please.
In this slide, you refer to ripping surface impoundment HDPE liners and folding over prior to backfilling.
I'm not sure I understand what you mean.
So what do you mean by folding over prior to backfilling?
A. So our plan is to -- so we're going to remove the sediment from the ponds, any sediment that's built up in there. And then the liners -- typically what we do is we -- there's an HDPE liner. We go in, and we rip that liner, because right now it's just collected. It contains water. So it will allow for -- it won't allow for any accumulation of water within the -- you just don't want the liner -- stay in place.
So we -- once it's ripped sufficiently, we fold it over, and then you still have your depression associated with the surface impoundment, and then that whole area gets backfilled and graded to drain positively. So it's covered over the liner after it's

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ripped --
Q. So the --
A. -- and folded into the middle of where the pond is.
Q. So the liner stays there.
A. Yes.
Q. And it previously held mine-impacted water.
A. Yes. But like I said, the sediment material would -- prior to ripping, it's removed from the liner materials. But yes. It -- depending on the location of -- it could have. Yes.
Q. What is done with that sediment that's removed that is potentially contaminated?
A. It gets -- under our plan, it gets put on top of the tailing facility prior to reclamation of the top surface of the tailing facility.
Q. Will there continue to be storage of mine-impacted water after closure?
A. In the surface impoundments?
Q. Um-hum. Yes.
A. No. Not -- no.
Q. Anywhere in the -- on the site?
A. There's storage of -- you're talking about impacted water?
Q. Yes.

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A. Well, there's going to be the drain -- tailing draindown water, which that's a -- whether it's impacted or not, I can't tell you, but it is a tailing draindown water, gets -- it's within the tailing Water Management Plan. So it gets -- it recirculates through the -- and into the tailing evaporation pond, which is a double-lined evaporation pond.
Q. And then there would be some water associated with the waste rock, also, right?
Some contaminated water would still exist because of the waste rock areas.
A. I'm not sure where you're coming from on that.
Q. If all the mine-impacted water facilities will be closed and removed, how do we ensure that no offsite discharges of the mine-impacted water after closure occur?
A. Well, I think the -- the monitoring system that Mr. Finch described will be monitoring the water quality and water levels within the groundwater as well as the surface water following closure of a particular facility. So he -- he'd be better to describe that Monitoring Plan. I think he described it yesterday, but --
Q. You also referenced flushing of various infrastructure.

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Where will that water go?
A. So any -- I think that pertains to the pipelines. So that flushed water again gets put back on the tailing and gets incorporated into that active evaporation program on the tailing impoundments, part of the Water Management Plan.
Q. During Mr. de Saillan's cross-examination, you referred to draindown curves.
Where are those?
A. Those are an attachment to the -- to the MORP itself. Those are included in the MORP document as an attachment to the MORP. There's a water -- it's part of the Water Management Plan.
Q. Is that draindown of the tailings or water flowing through the cover?
A. It's -- it's -- well, it would -- it's draindown water. Yes. There's a small -- well, we still have the 2 percent mean annual precip that's estimated. So that's also part of that -- would be incorporated in the draindown water.
MS. BARNCASTLE: If I can have just a moment to check my notes.
MS. ORTH: Yes.
Q. (BY MS. BARNCASTLE) So you referred quite a bit to reclamation going above and beyond what's

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required of -- in the Copper Rule.
What is the benefit to New Mexico Copper of going above and beyond what's required?
A. The benefit -- well, there -- the benefit is I -- for the Reclamation Plan, it -- the going above and beyond is making sure that we're taking care of these legacy sites first. So we want to do that as a good corporate citizen.
And the other benefit is that reclamation within the open pit surface drainage area is a component of the Open Pit Reclamation Plan where we're bringing in clean surface water into the open pit as part of the Reclamation Plan for the rapid fill and maintaining that level within the pit.
Q. So yesterday we heard a little bit about reclamation of the existing groundwater contamination, but we didn't hear anything in this plan today.
Does your plan consider reclamation of the groundwater contamination at all?
A. That's not a component of our plan.
MS. BARNCASTLE: I don't believe I have anything further.
Thank you.
MS. ORTH: All right. Thank you, Ms. Barncastle.

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Is there anyone else who has a question of Mr. Stein about his testimony?
Ms. Brittan.
EXAMINATION
BY MS. BRITTAN:
Q. Hi.
A. Hi.
Q. I just have a couple little questions.
So the terracing or benches, as you call them, so those will actually remain a feature of the landscape, won't they? They'll just be covered with vegetation?
A. Correct, yes.
Q. Okay.
Oh. The tailing storage facility, what kind of vapors will be given off from that evaporation process, open tailings?
A. The way those evaporation systems are designed -- the way we have them designed is that they're primarily contained within the -- that general area, the 15-acre site for the evaporation program.
But as far as the -- we've not really done an analysis of what the components of the evaporated water would be as far as the -- I mean, we know what the expected water chemistry is, but we haven't -- we're not

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anticipating they're going to -- we haven't evaluated that.
Q. Okay.
So fumes or anything like that, you haven't checked into that?
A. Well, I don't anticipate you're going to -- you would be able to detect anything outside of the mine permit area, as far as vapors or fumes or anything.
Q. Okay. Thank --
A. But I'm not an air quality expert. I --
Q. Okay. Thank you.
A. Yes.
MS. ORTH: Thank you, Ms. Brittan.
Are there any other questions of Mr. Stein based on his testimony?
Please come up.
We need your name first.
MS. BLAIR: I'm Dr. Kathleen Blair.
EXAMINATION
BY MS. BLAIR:
Q. When you speak about vegetating component restoration, the vegetative community, are you talking about using only immediately local species? Native species.
A. They -- yes. They're native species. We have

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the -- the seed mix in the MORP. So the plan seed mix. And that -- we've used that seed mix or a similar seed mix at other reclamation study -- or by reclamation sites, particularly in Chino and Tyrone, and they've been very successful there. They include both warm and cool seeds and grasses, forbs and shrubs, the seed mix does.
But they are primarily native species. Yes.
Q. You say primarily native.
A. Well, I --
Q. Have you done a botanical for the immediate area to know which species are or are not --
A. Yes. Part of --
MS. ORTH: Hold on. Hold on. You have to speak one at a time.
Please finish your question, Dr. Blair.
Q. (BY MS. BLAIR) Have you done a botanical flora of the immediate area so you know exactly which species should and should not be there that are native?
A. I would have to consult with the vegetation specialist in our office on that.
Q. It's become something of an issue on many reclamation sites that although they may use a species that has been documented in an area they're becoming aware that, in fact, there are issues with local genetic

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adapted subspecies or even races or populations that has impacted survivorship in the future.
That requires you actually select seeds and harvest seeds from the immediate area before the reclamation takes place, before the process takes place.
Has any of that been considered?
A. Again I'd have to consult with our vegetation specialist in our office on that.
Q. Have you considered the projected changes in weather and climate systems over the next 25 years that may preclude certain species being suitable at the time you actually apply them?
A. Again I'd have to defer to a reclamation -- or the vegetation specialist in our office on that.
Q. Have you -- do you use primarily the New Mexico plant labs in order to determine a number of these facets, or are they simply commercial recommendations?
A. No. I think the plant list we've developed over time based on reclamation of other facilities in the area, and it's been worked out in consultation with the Mining and Minerals Division as part of their review of the success of the reclamation over time and the revegetation at these mine sites.
And -- but any further specifics on that I'd

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have to refer to our vegetation specialist in our office.
Q. And are they then in communications with various university-based botanical experts that can --
A. Yes, they are.
Q. Okay. Thank you.
A. Yeah.
MS. ORTH: Thank you, Dr. Blair.
Are there other questions?
Ma'am.
Give us your name first.
MS. YARMAL: Hi.
My name is Cindy Yarmal. And I have Animas Creek Honey and Herb Farm. It's downstream from the proposed mine.
EXAMINATION
BY MS. YARMAL:
Q. And I'm just wondering.
Did you use the evaporation treatment that you talked about with the preexisting tailing pond that was on the property?
A. I can't speak to that, but I do not believe an evaporation system was in the previous -- was used during the previous operations.
Q. So I'm going to -- I'm also curious.

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The pond that was there or is there, what is being done with that?
Because you talk about all the things that you're going to do after, you know, reclamation of the property afterwards.
But what about right now? What is being done with the problems that are already preexisting on the property?
A. I have to defer that to probably Jeff Smith here on that. Our plan is for reclamation and closure. My component of my testimony is specifically on what happens after mining operations and reclamation and closure.
Q. I guess my concern is because we're talking about reclamation, you're saying what's going to happen after the, quote, new mine goes in.
What about what's already there? What about what has already been there?
MS. ORTH: So, Ms. Yarmal, we've heard from several other witnesses, including witnesses who described the reclamation that will occur either before or concurrent with new operations, and those witnesses have already testified mostly yesterday.
MS. YARMAL: Okay. Thank you.
It's just a major concern. I'm downstream.

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We have an organic farm.
MS. ORTH: All right. Thank you.
Are there other questions of Mr. Stein based on his testimony?
Ms. Browne.
MS. BROWNE: Thank you.
Candace Browne.
EXAMINATION
BY MS. BROWNE:
Q. The reclamation will happen after mining stops, right?
A. There's components that will happen immediately -- or soon after the mine starts operation, also.
Q. Okay.
A. The other components that are reclaimed afterwards, they're part of the mine operation. So it's difficult or really not feasible to reclaim them, because they're being used as part of the mine operations.
Q. Okay.
If the mine stops on a temporary basis, for example, if the copper price drops, will any portion of this reclamation process be implemented? And if so, what portion?

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A. Well, there's a -- as part of the permitting process, not necessarily in this, there's -- there's a bonding -- process for bonding which includes bonding for closure, whatever the estimate is for reclamation.
So those monies are set aside for -- if there's an unplanned closure at a certain point in time, those are set aside to handle the reclamation in accordance with the plan. So that would kick in the Reclamation Plan as I described it. Whatever components of the mine operations have been constructed at that point would be reclaimed.
Q. Even if that's just for a temporary period?
A. No. That doesn't -- no. Yeah. So --
MR. BUTZIER: Wait until she finishes.
MR. STEIN: Oh, sorry.
MR. BUTZIER: Were you finished with your question, ma'am?
MS. ORTH: Yes. She was.
Q. (BY MS. BROWNE) I'm not totally clear about your answer. Let me ask the original question again.
If the mine stops -- if mining stops on a temporary basis because of for some reason -- and I'm going to use the example if the copper price drops too low and they decide to close the mine, or stop mining for some period of time, they don't know how long it

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will be, will they -- will some of the reclamation processes be implemented? And if so, which ones and for what reason?

A. Well, again that -- any of the legacy sites there -- well, several legacy sites are taken care of up front.

Now, on the temporary -- there's specific regulations that handle if there's a temporary slowdown or shutdown of the mine, and I guess I'm not prepared to present that at this point, but -- so but there's specific regulations written to handle that type situation that you're talking about.

Q. And what I think I heard you say is that right now you don't have a clear answer for that, or you weren't able to speak about that?

A. I'm not able to speak about that, but I would refer you to the regulations that --

Q. There's something set up?

A. -- that detail that. Yes.

Q. There's something set up?

A. Yes.

Q. Okay. Thank you.

MS. ORTH: Thank you, Ms. Browne.

Are there other questions of Mr. Stein based on his testimony?

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Sir.

Give us your name first.

MR. KENT: Dallas Kent. I'm co-owner of the Animas Creek Honey and Herb Farm.

EXAMINATION

BY MR. KENT:

Q. In 2013, we had a 500-year event. 2014 was very close to the same. Some part due to the upper end of the watersheds being burned off. Houston had 2,000-year events in two years.

The reason is because warmer atmosphere, whether you -- no matter what you think it's caused by, will hold literally trillions of acre-feet of water, more than it did before.

So why are you basing your flows and your gallon-per-minute acre-feet of pond capacity on 500-year event?

A. Well, the -- when I refer to the 500-year event, that was an analysis of the flows within Grayback Arroyo associated with that event.

Q. During 2013.

A. Well, that's just a theoretical 500-year storm based on -- yeah, that analysis. So the other conveyance structures are designed in accordance with the Copper Rule, the reclamation design components.

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Q. And the Copper Rule takes into effect global warming or climate change or the severe effects of those?

A. Well, it incorporates a long period of record -- climate record, which is a 100-year period, and that's -- which includes prolonged periods of drought as well as prolonged periods -- wet periods. So it handles variability as part of that 100-year record.

Q. The severity of the storms we've seen over the last 10 years doesn't equate with any of the 350-year record that you can find in this area of the country, such as the Spanish have been here for 500 years.

So we're talking in the next 10 years, when the severity of the storms are expected to double, triple, quadruple, nobody even knows. And so, I guess, being downstream I'm a little more worried about the capacities of your treatment plants, your evaporation systems.

MS. ORTH: All right.

Is there a question, then, Mr. Kent?

MR. KENT: Question. A suggestion, I guess, that a 500-year event is probably not a good baseline going forward.

MS. ORTH: All right. Thank you.

Are there other questions of Mr. Stein based

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on his testimony? Other questions?

No?

Any -- do you have follow-up, Mr. Butzier?

MR. BUTZIER: Just a couple items, Madam Hearing Officer.

REDIRECT EXAMINATION

BY MR. BUTZIER:

Q. Several times, Mr. Stein, you referred to the MORP.

And can you say what that is?

A. Well, the MORP is the -- it's the Mine Operation and Reclamation Plan, and as part of that MORP -- a component of that MORP is the Reclamation and Closure Plan which I presented today.

Q. And you also mentioned that it includes draindown curves as an attachment, and you also talked about seed mix being present in that?

A. Correct. It's part of the Reclamation Plan.

Q. And is that what is described as the Mining Operation and Reclamation Plan, or MORP, which is the revised version July, 2017, identified as document 298 in the administrative record at Bates number 15458 to 15690?

A. Yes, it is.

Q. I'd like to pull up a slide from your

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presentation.
Is that the -- the Waste Rock Stockpile 2 and 3, future Waste Rock Stockpile 2 and 3 -- is that the stockpile that Ms. Barncastle was referring to that includes an area that will be scraped and another area of existing disturbance that will not be scraped?
A. I believe Ms. Barncastle was -- this is Existing Waste Rock Stockpile 3 here. That's what she was referring to. So we -- and as far as the removal of the alluvial or colluvial materials underneath this stockpile, it will not -- we don't have any plan there.
Our focus is to -- prior to development of this new stockpile here is to remove suitable reclamation cover material prior to the construction of the new waste rock stockpile.
Q. So I had understood her to be asking about the area of overlap, where the blue shading covers previously disturbed materials.
Did I misunderstand that?
I did misunderstand that?
MS. BARNCASTLE: Yeah. I was referring to slide 36 from JSAI's presentation yesterday where there's Waste Rock Stockpile 2 and 3 that are existing, where there would be scraping of alluvial -- well, I guess there's an alluvial fan, and then some of it's

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outside of Waste Rock Stockpile 3, some of it is under Waste Rock Stockpile 3, and the testimony was that that alluvium would be scraped, and my question was would you be removing the waste rock stockpile to scrape under or just scraping what's accessible outside of it.
MR. BUTZIER: Okay. Rather than further confuse the record, I think I will just leave that alone, Madam Hearing Officer.
Q. Mr. Stein, there was some questioning from Ms. Barncastle relating to reclamation of some of the stored -- the impoundments onsite.
Do you recall that?
A. Yes.
Q. And there was some questioning about what happens after that -- after those are reclaimed.
My question is at what point in time in the reclamation and closure process do those get reclaimed? What has occurred up to that point?
A. The impoundments, if they are to precede stormwater flow from an uncovered facility -- those get -- those are left in place to collect the impacted -- potential impacted stormwater, up to the point to where we start the regrading, covering and reclamation of whatever the adjacent or the contributing facility is during operations to that impoundment.

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So the intent is that they will continue to collect any potential impacted water from an uncovered facility up until the point until we start the regrading and covering and reclamation of that particular facility that could potentially contribute surface water to the impoundment. It's within the drainage area of that impoundment itself.
Q. So is it an oversimplification to say that essentially those ponds will not be reclaimed until they're -- it's unnecessary to continue to use them to capture mine-impacted water?
A. No. That's not an oversimplification.
Q. So it's accurate.
A. It is accurate.
MR. BUTZIER: Madam Hearing Officer, I have no further questions.
MS. ORTH: All right. Thank you.
And you've already moved your exhibits, I believe, right? It was like 90 to 104 or something?
MR. BUTZIER: I'm not sure that I did.
MS. ORTH: Okay.
MR. STEIN: I think you might have done it up front.
MS. ORTH: I think so.
MR. BUTZIER: Okay.

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Have -- if they've been admitted, then I -- I apologize.
I did do that?
MS. ORTH: Yes. 90 to 104. Thank you.
MR. BUTZIER: Okay. Thank you.
It's getting late.
MS. ORTH: We will excuse Mr. Stein, and let's take a break until 2:50.
(Proceedings in recess from 2:43 p.m. to 2:57 p.m.)
MS. ORTH: All right. We move now from the presentation by New Mexico Copper Corporation to a presentation by the Ground Water Quality Bureau of the New Mexico Environment Department.
Mr. Knight, I remember you made an opening statement at the beginning of the hearing. So I trust you'll just be leaping into the presentation of your witnesses.
MR. KNIGHT: Thank you, Madam Hearing Officer.
I would like to present my witnesses -- I'd like to have them give their direct testimony individually, and then, as was discussed previously, I'd like to have them stand for cross-examination as a panel.
And I guess I wanted to ask the other

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attorneys if there was any objection to having each one of them give their direct testimony and then save all the cross-examination questions until all three of them have given their direct testimony, if that's all right with you --

MS. ORTH: Okay.

MR. KNIGHT: -- or if that's all right with the other attorneys, I guess more to the point.

MS. ORTH: I think we discussed that.

Mr. de Saillan, do you have any objection?

MR. DE SAILLAN: Madam Hearing Officer, I have no objection to that approach, with the caveat that I also raised at the scheduling conference, that is I will be directing my questions to individual witnesses.

MS. ORTH: That's fine.

Let's see. I don't see Ms. Barncastle.

MR. BUTZIER: No objections.

MS. ORTH: All right. Thank you very much.

Please proceed, Mr. Knight.

MR. KNIGHT: Thank you.

First I would like to call Mr. Vollbrecht as my first witness.

MS. ORTH: Let's swear them all in.

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KURT VOLLBRECHT, BRADLEY REID and JOSEPH MARCOLINE having been first duly sworn or affirmed, were examined and testified as follows:

DIRECT EXAMINATION OF KURT VOLLBRECHT

BY MR. KNIGHT:

Q. Good afternoon, Mr. Vollbrecht.

Could you begin by just stating your full name for the record.

A. Kurt Vollbrecht.

Q. Mr. Vollbrecht, where are you employed?

A. The Mining Environmental Compliance Section of the New Mexico Environment Department.

Q. And how long have you worked for NMED?

A. Twenty years.

Q. And what is your current job title there?

A. I'm the manager of the Mining Environmental Compliance Section.

Q. What are your job duties in that position?

A. I manage the program that is responsible for all permitting, spill response, abatement and public participation activities associated with mining facilities in New Mexico in accordance with the New Mexico Water Quality Act and the ground and surface water protection regulations.

I also directly and indirectly supervise 12

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staff.

Q. Please describe your educational and professionals qualifications.

A. I hold a bachelor of science degree in geology from California University -- California State University Hayward and a master's in geology from New Mexico Institute of Mining and Technology.

During my 20 years with NMED, I have provided regulatory oversight ensuring compliance with the commission's regulations at a variety of facilities, including those for domestic and industrial wastewater discharges and abatement activities, and for the last 13 years, exclusively -- exclusively for those associated with mine sites.

Q. A copy of your resume has been provided as Exhibit 5; is that correct?

A. Yes.

Q. Have you submitted written direct testimony in this proceeding?

A. Yes, I have.

Q. And your full written direct testimony appears as Exhibit 2; is that right?

A. That is correct.

Q. Do you have any changes that you would like to make to that written testimony now?

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A. I do not.

Q. Do you adopt that written testimony as your testimony today?

A. Yes, I do.

Q. Could you please discuss the regulatory framework for draft Discharge Permit 1840?

A. Yes. Pursuant to the New Mexico Water Quality Act, the Copper Flat Mine is subject to Part 3 of 20.6.2 NMAC, which are the general groundwater permitting requirements, and 20.6.7 NMAC, which is the Copper Mine Rule which includes prescriptive requirements for protection of water quality of copper mines. DP-1840 was drafted pursuant to these regulations.

Q. Could you give a brief history of the discharge permitting process for this facility?

A. Yes. New Mexico Copper Corporation submitted an initial Discharge Permit application in 2011.

At that time, there was also done a cooperative agency process, which included New Mexico Copper Corporation was involved in that, the New Mexico Environment Department, the Bureau of Land Management, the Mining and Minerals Division, the Office of the State Engineer, as well, and this was a mechanism to ensure that the various regulatory requirements that the mine would be subject to would be met in a cohesive and

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comprehensive manner.
Over the past seven-and-a-half years, this resulted in an iterative process that has resulted in changes to the mine plan over time.
In 2015, New Mexico Copper Corporation submitted another Discharge Permit application which was intended to reflect the requirements of the Copper Mine Rule which came into being in 2013 as well as the changes to the mine plan that had occurred over that time.
Review of the 2015 application proceeded based on the requirements of the Copper Mine Rule and was subject to the Copper Rule timelines for review.
As a result of several requests for additional information, a revised permit application was submitted in 2017.
I should also state that at various times during this period there were a Stage 1 Abatement Plan submitted that included various proposals and associated summaries of monitoring that had happened during that time frame.
Q. Could you summarize the status of the administrative record in this matter?
A. Yes. On July 10th, 2018, NMED filed the index to the administrative record with the Hearing Officer.

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And then the following day, July 11th, 2018, NMED posted the DP-1840 record on the department web site. Subsequent updates to the administrative record were conducted on September 13th, 2018, and also submitted on the day before this hearing started.
Q. Mr. Vollbrecht, please describe the public process associated with DP-1840.
A. In 2011 with the initial application, what's called a PN-1, Public Notice 1, was issued by the department as well as New Mexico Copper. The PN-1 is really a notification from the department and the applicant that an application has been submitted.
Then in 2016, January of 2016, a PN-1 was issued for the revised permit application.
The PN-2, the Public Notice 2, which is the notification that a draft permit has been prepared, was issued on February 2nd, 2018, for a 30-day time frame, which is what is required by regulation under 30 days.
Received -- we received several requests to extend that time frame, and so it was extended to a total of 90 days, and the public comment period closed on May 5th, 2018.
The department received substantial public comment on the proposed draft permit, including a number of requests for hearings, and that determination was

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made that a hearing was warranted.
Department issued notice of the hearing in August of 2015 -- that is incorrect -- in August of 2018 in both the Albuquerque Journal and the local newspaper here, The Herald.
In addition, NMED E-mailed the hearing notice to everyone who had provided E-mail comments on two separate occasions. We sent the public notice to the facility's specific mailing list the department maintains. We posted notice on the department web site and posted the notice in about a half a dozen locations in the affected communities, in both English and Spanish.
This process exceeded or meets -- meets or exceeds all of the regulatory requirements of 20.6.2.3108 NMAC.
Q. What does draft DP-1840 state with respect to the surface water of the state determination for the Copper Flat pit water body following closure?
A. Condition C115G of draft DP-1840 states that surface water quality standards do not apply to the open pit water mine at closure. The basis for this condition is the Surface Water Quality Bureau decision that the open pit water body that will exist following closure of the Copper Flat Mine does not meet the definition of a

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surface water of the state.
Q. Can you discuss the steps taken that led to this decision by NMED?
A. The water quality of the open pit will be very good following rapid refill -- and we saw a fair amount of testimony on that -- and will meet all standards for groundwater, livestock watering and wildlife habitat.
Geochemical modeling conducted by New Mexico Copper Corporation predicted that over time the water quality will degrade due to evapoconcentration and inputs of groundwater from the surrounding mineralized rock into the hydrologic sink, and in 25 years after rapid fill, lake water quality may exceed surface water wildlife standards for one constituent.
Before the New Mexico Mining and Minerals Division can issue a permit for a mine under the Mining Act, NMED must provide an environmental determination that indicates that all applicable environmental standards will be met. This includes surface water standards.
Because of the requirements to provide this determination and the predicted water quality at 25 years after closure, New Mexico Copper Corporation and the Surface Water Quality Bureau met on several occasions to discuss the applicability of surface water

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quality standards to the open pit water body.
The definition of surface water of the state has three exclusions. These include that, one, the water body in question is a manmade body of water not originally created in a surface water of the state; two, a surface water body is a private water that does not combine with other surface and subsurface waters; or, three, the surface water body is a water treatment system or a component of a water treatment system.
In August of 2016, New Mexico Copper Corporation sent a letter to the Surface Water Quality Bureau summarizing the previous meetings and unique circumstances with respect to the setting and location of the current and future open pit water body.
The letter requested concurrence from NMED that if New Mexico Copper Corporation could demonstrate that it met the private water criteria in the definition of surface water of the state, that the open pit water body would not be subject to surface water quality standards.
In a letter dated October 16th, 2016, New Mexico Environment Department Surface Water Quality Bureau relied -- replied to New Mexico Copper Corporation, stating that because the open pit water body was an evaporative sink and no other surface waters

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flowed into the open pit, it therefore did not combine with other surface or subsurface waters.
The letter further acknowledged that New Mexico Copper Corporation had received jurisdictional determination from the United States Army Corps of Engineers that the open pit water body was not a water of the US.
The October of 2016 Surface Water Quality Bureau letter stated that if New Mexico Copper Corporation could demonstrate the future pit lake would be wholly on private land, surface water quality standards would not apply.
The phrase "does not combine with other surface and subsurface waters" within the definition of surface water of the state is viewed from a narrow lens in this instance. Because Grayback Arroyo has been diverted around the pit and no other surface water flows into or out of the open pit and evaporation from the pit lake water body results in a hydrologic sink, there is no potential that the open pit water body could contaminate any other groundwater or surface water.
This is in alignment with the Copper Rule which effectively grants a variance by rule from groundwater standards within the area of open pit hydrologic containment.

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The Copper Rule acknowledges that impacts to groundwater are likely to occur from open pit copper mining. New Mexico Supreme Court acknowledged that the most appropriate mechanism to mitigate these potential impacts is through containment resulting from evaporation of the open pit water body.
In summary, Surface Water Quality Bureau has determined that surface water quality standards at 20.6.4 do not apply to the pit lake. Pursuant to the Mining Act, New Mexico Copper Corporation is required to achieve preexisting conditions following closure. Modeling indicates the future pit lake will have better water quality than the existing pit lake, which testimony has been provided previously with respect to that.
Q. Thank you, Mr. Vollbrecht.
Could you briefly describe the status of the financial assurance cost estimate for this facility?
A. Yes. Ultimately three agencies, the Bureau of Land Management, the New Mexico Environment Department and the Mining and Minerals Division, must hold financial assurance for closure of the Copper Flat Mine through a Joint Powers Agreement between NMED and MMD and a Memorandum of Understanding that NMED holds with BLM, a mechanism exists for joint financial assurance to

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be held by all three agencies.
The New Mexico Mining Act includes financial assurance regulations. Therefore the Mining and Minerals Division takes the lead role as agency for jointly held financial assurance. And this is typical at other sites where all three agencies are involved.
NMED review and approval of the proposed cost estimate is necessary to ensure that the requirements of the Water Quality Act are met.
In addition to ensuring there is financial assurance to cover costs associated for the prescriptive surface reclamation requirements of the Copper Rule, there must be financial assurance provided for long-term monitoring and maintenance of the site postclosure and any short-term and long-term water management that may be necessary. This includes consideration of tailing draindown water management, both active and passive, groundwater quality monitoring and monitoring to ensure open pit capture is maintained.
There also needs to be adequate financial assurance in place to cover costs associated with the Abatement Plan in the event the facility never does operate. This would include source control through reclamation of the existing surface disturbance and long-term groundwater monitoring.

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The New Mexico Environment Department intends to require financial assurance for a period of 100 years to ensure adequate financial assurance is in place for long-term monitoring and maintenance. This is consistent with the financial assurance requirements for the Chino and Tyrone mines where long-term water treatment is required.

The financial assurance cost estimate will be subject to review every five years at permit renewal. No disturbance associated with mining will be allowed until the cost estimate is approved by all three agencies and financial assurance is in place.

Q. Thank you.

Is process -- is a process for review and approval of the financial assurance underway?

A. Yes, it is. The New Mexico -- or a request for comment on the cost estimate was sent to New Mexico Environment Department from the Mining and Minerals Division pursuant to the Mining Act requirements in August of this year. There have been several meetings between MMD, NMED, BLM and New Mexico Copper Corporation to discuss the cost estimate.

The first round of comments is due to the Mining and Minerals Division on October 15th. MMD can't issue the Mining Act permit until the financial

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assurance issues are resolved and all three agencies approve the cost estimate. We fully expect a hearing on the Mining Act permit that will include the approved cost estimate and financial assurance, and NMED will participate in that hearing.

Q. Thank you.

And finally, in your opinion, has the applicant met the requirements of the Water Quality Control Commission regulations both at 20.6.2 NMAC and the Copper Rule at 20.6.7?

A. Yes. The applicant has met the applicable requirements, including the general permitting requirements and those prescriptive Copper Rule requirements that are necessary to ensure protection of water quality.

Q. Thank you, Mr. Vollbrecht.

I have no further questions for this witness.

And I know -- Ms. Barncastle, I had discussed before you returned that we're going to have direct examination of all three witnesses and then have cross as a panel.

So I'm going to proceed with -- I'm going to call my next witness, Mr. Reid.

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DIRECT EXAMINATION OF BRADLEY REID

BY MR. KNIGHT:

Q. Good afternoon, Mr. Reid.

A. Good afternoon.

Q. Could you please state your full name and your job title.

A. My name is Bradley Reid, and my job title as designated by the State of New Mexico is geoscientist-advanced.

Q. And could you tell us where you are employed?

A. I work for the Mining Environmental Compliance Section, which is typically referred to as MECS, of the New Mexico Environment Department.

Q. And what are your main responsibilities with MECS?

A. I'm a permit lead with primary focus on copper mine facilities, including the Copper Flat Mine and the Chino Mine near Silver City.

My duties in MECS include drafting groundwater discharge permits, conducting inspection at mine facilities, public participation and ensuring that compliance, spill response and groundwater abatement at mining facilities in New Mexico is conducted in accordance with the Water Quality Control Commission regulations and the Water Quality Act.

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Q. How long have you worked for the department and MECS specifically?

A. I've worked for NMED for over 15-and-a-half years, and I have worked for MECS since December of 2012.

Q. Please briefly describe your educational background.

A. I hold a bachelor of science degree in geology with special honors from the University of Texas at Austin and a master of science degree in geology also from the University of Texas at Austin. My primary and secondary education took place in Albuquerque, where I was raised.

Q. Did you provide a resume along with your prefiled written testimony?

A. Yes. My resume is marked as NMED Exhibit 6.

Q. And you did file written testimony in this matter?

A. Yes. It is NMED Exhibit 3.

Q. And do you adopt that written testimony here today?

A. Yes.

Q. Please let's start, if you could, just provide an overview of your testimony.

A. My testimony provides a general overview of

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the Copper Flat Mine, describes the draft Discharge Permit, DP-1840, discusses changes to the draft DP in response to comments, and finally, it describes how the draft DP-1840 and its authorized mine units meet the requirements of the Copper Mine Rule.

Q. Okay. Please describe what the draft Discharge Permit and application for DP-1840 are based on.

A. The draft Discharge Permit is based on the discharge plan. The discharge plan for DP-1840 includes application materials submitted by the applicant, New Mexico Copper Corporation, to NMED dated December 11th, 2015, and Revision 1 of the Discharge Permit application dated August, 2017 -- this is known as the revised application -- and the materials contained in the DP-1840 administrative record prior to issuance of the draft Discharge Permit.

Before deeming the draft -- the Discharge Permit application technically complete, NMED issued three letters requesting additional information from the applicant in addition to four other comment letters required -- related to the technical review of the application and documents that are part of the discharge plan.

The three letters requesting additional

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information contained a total of 73 items requiring response from the applicant and approval from NMED in order for the application to meet the technical completeness requirements of the Copper Mine Rule.

Q. Please discuss how draft -- how the draft Discharge Permit is structured.

A. DP-1840 was drafted using a standardized permitting template developed through permitting other copper mine facilities in the state. The permit is divided into four parts, Parts A through D.

Part A is titled General Information and provides a statement of purpose, a brief outline of the discharge authorizations and defines others applicable regulations, permit duration and terms of issuance. The last part of Part A, A103D, lists additional requirements added to the Discharge Permit by NMED that are not included in the Copper Mine Rule.

As required by subsection I of 20.6.7.10 NMAC, NMED provided written explanation of the reasons for the additional permit requirements in the cover letter accompanying the draft Discharge Permit dated February 2nd, 2018.

Part B is titled Facility Specific Information. The first three sections of Part B, B100 through B102, provide the history of the site, a

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facility description and overview of site operations, a summary of the permitting history, information related to the location and groundwater and process water characteristics.

The next two sections, B103 and B104, define the mine units authorized by the discharge and management of water contaminants and authorize discharges and discharge volume limits pursuant to system design and operational requirements set forth in DP-1840 and the Discharge Plan.

Part C is titled Facility Specific Requirements and contains facility-specific design, construction, location, site-wide water management, monitoring, contingency, postclosure, abatement and financial assurance requirements for Copper Flat Mine.

Part D contains general requirements pursuant to Part 20.6.2 NMAC and Part 20.6.7 NMAC. These requirements are not specific to Copper Flat Mine and are general permit requirements.

Q. Thank you.

During the public comment period, the department received comments on the initial draft of DP-1840.

Please describe changes the department has included in the draft -- in the most recent draft in

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response to these comments.

A. As a result of careful consideration of comments received, NMED is proposing changes to be incorporated into the final version of DP-1840. The edits and basis for the changes are shown in revised draft DP-1840, marked as NMED Exhibit 1.

Overall the proposed edits strengthen and clarify DP-1840 and impose additional requirements on the applicant. The edits also represent a commitment by NMED for continuous improvement in the permitting process. NMED refines each Copper Mine Rule Discharge Permit developed to ensure each permit is clear, concise and in alignment with the rule.

Q. Please provide a summary highlighting some of the specific changes to the draft DP-1840 that resulted from comments on the initial draft.

A. Sure. In response to a concern raised by a member of the public, NMED has added requirement C104C to clarify the requirement that the application -- applicant submit a Construction Quality Assurance/Construction Quality Control Plan, known as a CQA/CQC Plan, a minimum of 90 days prior to construction of any impoundment that requires a liner system at Copper Flat Mine.

A CQA/CQC Plan as set forth by subsection C of

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20.6.7.16 NMAC ensures that construction of liner systems meet all design criteria plans and specifications. The existing requirements C100 and D102A address this requirement, but the addition of C104C adds clarity to the permit.

NMED added requirement C105C.2 to require that the applicant submit documentation to NMED of compliance with the Office of State Engineer Dam Safety Bureau permitting requirements prior to initiation of construction of any portion of the tailing storage facility.

NMED has been in communication with the Dam Safety Bureau and understands that New Mexico Copper is currently in compliance with Office of State Engineer regulations for the existing tailing storage facility.

NMED added requirement C108A and related permit requirements to require that the applicant combine three separate water management plans required by the Copper Mine Rule into one comprehensive site-wide Water Management Plan that includes the Stormwater Management Plan, the Mine Operation Water Management Plan and the Interim Emergency Water Management Plan.

It has been determined through other copper mine permitting efforts that a unified site-wide Water Management Plan with annual updates provides more

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clarity and reduces potential redundancy which may occur with three separate plans.

Upon further examination of the monitoring well network proposed by the applicant and in consideration of comments received on draft DP-1840, NMED has added requirement C113A to require that the amendment install two more monitoring wells at Copper Flat Mine in addition to those already required to be installed under draft DP-1840.

These two wells will provide additional groundwater information for the tailing storage facility and Waste Rock Stockpiles 2 and 3 and strengthen the DP-1840 Groundwater Monitoring Plan.

NMED received comments from the applicant requesting elimination of two additional monitoring wells NMED is requiring to be located around the open pit as specified in requirement C116C. These wells are necessary to fulfill the requirements of subparagraph (4) of 20.6.7.28B NMAC, which states a permittee shall install a sufficient number of monitoring wells around the perimeter of an open pit to monitor groundwater quality and the hydrologic gradient around the pit.

In addition, both these wells will provide critical groundwater information for abatement purposes.

Q. Thank you.

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Have there been any additional changes to the draft permit since the department provided DP-1840 in red-line/strike-out to the other parties on August 10th of this year?

A. NMED has made a few minor edits and typographical corrections since the August 10, 2018, draft. The edits are as follows.

In section C109, the word "existing" has been removed from C109A, and the order of C109A and C109B have been reversed. Please note that on the version submitted with the NOI on August 23rd, I failed to delete the word "existing" and switch the order of A and B. The final version of the draft permit added to the administrative record, found at Bates numbers 18734 through 18775, does reflect this change.

In requirement C113H, a quotation mark was added in front of the word "shall."

And although we would have been pleased to see an 80-millimeter-thick synthetic liner installed at the tailing storage facility, we have dutifully made a correction in the requirement B103D.2 for a typographical error listing the tailing storage facility liner thickness as 80-millimeter. It was corrected to read 80-mil.

In requirement B103F.4, Stormwater

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Impoundments A through C were all defined in parentheses as SWA, SWB and SWC.

And in requirement B104A, a typographical error of the discharge volume was corrected to change the discharge volume from 25,246,000 to 25,264,000 gallons per day.

Q. All right.

And those were the changes made between the -- basically between the filing of our notice of intent and when the final version of the draft permit was added to the record on the day before this hearing, but are there any additional edits that you would like to add to the Discharge Permit at this time?

A. Yes. Condition C113M in the monitoring and reporting section of the Discharge Permit is intended to require that the applicant report volumes and locations of acid-generating waste rock placed within a waste rock stockpile.

We recently noticed that this condition as it exists requires volumes in locations of not potentially acid-generating material placed, which we reference as NPAG, and that is a typo. NMED needs to change this condition for the final Discharge Permit to require reporting of volumes and locations of potentially acid-generating material, or PAG, material placed

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instead of NPAG.
Q. Thank you, Mr. Reid.
And, Madam Hearing Officer, we will submit a final final version of the draft Discharge Permit at the conclusion of this hearing which will reflect this one additional change.
MS. ORTH: All right. Thank you.
Q. (BY MR. KNIGHT) Mr. Reid, what is the guiding doctrine -- what do you understand to be the guiding doctrine of the Copper Rule?
A. Subsection K of 74-6-4 of the Water Quality Act states that the commission shall specify in regulations the measures to be taken to prevent water pollution and to monitor water quality.
Q. And how does subsection K relate to the Copper Rule and a permit drafted under that rule?
A. A copper mine permit drafted pursuant to the Copper Mine Rule specifies the measures to be taken to prevent water pollution at a copper mine facility. DP-1840 references applicable Copper Mine Rule regulations that specify design criteria, location, purpose and operation of mine units at the facility, which if executed as required under the rule will fulfill the requirements of the Water Quality Act and prevent water pollution.

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Q. Mr. Reid, does the draft Discharge Permit, DP-1840, meet the requirements of the Copper Mine Rule, and does it adequately specify the measures to be taken to prevent water pollution at the mine site?
A. Yes. The mine units proposed for construction and operation in DP-1840 meet Copper Mine Rule requirements.
Q. Thank you.
Now let's discuss how the draft Discharge Permit meets Copper Mine Rule requirements for some of the specific mine units at the Copper Flat Mine.
Let's start with impoundments.
A. Impoundment design is dictated by location of the impoundment and the designated purpose the impoundment will serve. Impoundments that store process water or leach solutions for long-term storage require additional engineering controls compared to impoundments intended to store solutions for less than 30 days.
C104 of DP-1840 specifies requirements for the design criteria, location, purpose and operation of the impoundments proposed for use at Copper Flat Mine. For example, all three stormwater impoundments are intended to store impacted stormwater for less than 30 days.
As such, the Copper Flat rule requires that they be designed with an engineered, single-lined,

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60-mil high density polyethylene, or HDPE, or equivalent material to prevent water pollution for this particular mine unit.
Impoundments intended for long-term storage of process water, such as the process water reservoir and the underdrain collection pond, are required by the Copper Mine Rule to be designed with an engineered, double-lined, 60-mil HDPE or equivalent material liner system with an integrated leak collection system to prevent water pollution for this particular mine unit.
I would also like to point out that the applicant has designed the process water reservoir, which is one of the most critical impoundments for operations, with an overflow weir that conveys solutions directly into the HDPE-lined tailings trench/pipeline corridor which discharges to the tailing storage facility. This design element offers additional water protection measures in the event of an extreme upset condition.
Q. Thank you.
Now please discuss how the draft Discharge Permit meets Copper Mine Rule requirements for the tailing storage facility.
A. The Copper Mine Rule allows for a tailing storage facility to be an unlined mine unit coupled with

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an aquifer evaluation required to determine the potential for impacts and subsequent requirements for a groundwater intersystem -- groundwater interceptor system as necessary.
In the case of Copper Flat, the applicant has proposed instead to line the tailing storage facility with an 80-mil HDPE liner system. NMED finds that this approach is satisfactory to prevent water pollution and exceeds Copper Mine Rule requirements for this particular mine unit.
The aquifer evaluation the applicant conducted for the tailing storage facility focused on potential water quality effects resulting from leaks in the tailing storage facility liner system. NMED has reviewed the aquifer evaluation and agrees that the tailing storage facility liner system will prevent an exceedance of the groundwater standards set forth in Section 20.6.2.3103 NMAC.
Lastly, I'd like to clarify that an important design -- engineering design feature of the applicant's proposed tailing storage facility is that all impacted stormwater generated from the tailing storage facility dam face will be captured and contained on HDPE-lined and bermed channels which are integrated into the tailing storage facility liner system.

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Q. Thank you.
Please discuss how the draft Discharge Permit meets Copper Mine Rule requirements for the waste rock stockpiles.
A. Engineering design requirements for waste rock systems vary depending on whether the stockpiles are constructed inside or outside the open pit surface drainage area. The applicant is proposing to construct three new waste rock stockpiles, one inside the open pit surface drainage area and two outside the open pit surface drainage area.
The Copper Mine Rule requires that an applicant conduct an aquifer evaluation for stockpiles located outside the open pit surface drainage area to determine the need for an interceptor system.
The aquifer evaluations for Waste Rock Stockpile 2 and 3 concluded that discharges from these waste rock stockpiles are not expected to result in an exceedance of groundwater standards. An interceptor system is not required at this time.
Considering the placement of the stockpiles on low permeability andesite bedrock, the demonstrated geochemistry of the waste rock, the integrated solution capture systems and the strong Monitoring Plan, NMED does not anticipate that contaminants generated from

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Waste Rock Stockpiles 2 and 3 will impact groundwater above the standard set forth in Section 20.6.2.3103 NMAC.
Dr. Marcoline will discuss this further in his testimony.
In addition, New Mexico Copper Corporation has also proposed a robust Material Handling Plan that places the potentially acid-generating waste rock material between layers of waste rock that is not acid-generating. And that has been discussed in previous testimony.
In the event that groundwater monitoring indicates that groundwater standards could be exceeded, there are provisions in DP-1840 which could result in NMED requiring installation of an interceptor system for implementation of other source control measures.
Waste Rock Stockpile 1 will be constructed inside the projected open pit surface drainage area on low permeability andesite and quartz monzonite. Waste rock with a higher potential to develop acid rock drainage will be placed within the authorized footprint of this waste rock stockpile. Any potential impacts to groundwater from stockpiles located inside the open pit surface drainage area will be contained by the area of open pit hydrologic containment.

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Q. Thank you.
Next, if you would, please discuss how the draft Discharge Permit meets Copper Mine Rule requirements for stormwater management and seepage collection for the Waste Rock Stockpiles 2 and 3.
A. In accordance with Section 20.6.7.21 NMAC, DP-1840 specifies that berms and open channel conveyance structures be constructed around waste rock stockpiles to prevent surface water run-on and to control run-off and/or flowing seeps from the proposed stockpiles. Channels must be constructed in a manner to maximize positive flow while minimizing the potential for ponding and erosion.
Collected solutions will be conveyed to the impacted stormwater impoundments. Any alluvial materials encountered along stockpile toes will be removed, and conveyance channels will be constructed into the low permeability bedrock to maximize collection of seepage and impacted stormwater generated from the stockpiles.
In addition, all alluvial or colluvial materials will be removed from the footprint of Waste Rock Stockpiles 2 and 3 prior to placement of waste rock.
Q. And now please discuss how the draft Discharge

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Permit meets Copper Mine Rule requirements for secondary containment for pipelines located outside of the open pit surface drainage area.
A. Section C106 of DP-1840 references Section 20.6.7.23 NMAC of the Copper Mine Rule, which specifies that all new pipelines located outside the open pit surface drainage area shall incorporate a mechanism of secondary containment to control leaks and spills.
To this end, tailing storage facility supernatant process water will be returned to the process water reservoir for reuse through a pipeline situated within the HDPE-lined tailings trench corridor. The return process water pipeline from the tailings storage facility underdrain collection pond will be placed within the tailing storage facility toe berm and on top of a synthetic liner during all build-out phases of the tailing storage facility.
The tailing pipeline will also be located within the lined tailing trench corridor until discharge at the tailing storage facility.
Q. Next let's discuss the water quality Monitoring Plan in the permit.
Does the Monitoring Plan proposed for implementation in DP-1840 meet the requirements of the

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Copper Rule?
A. Yes.
Q. Please provide details on how the Monitoring Plan was reviewed and approved by the department.
A. The applicant prepared a water quality Monitoring Plan that identified certain existing monitoring wells at the site to be used in combination with proposed new monitoring wells. In addition, the plan includes surface water and process water sampling to monitor water quality at Copper Flat Mine.
As a result of the technical review process, NMED required eight additional monitoring well locations be added to the monitoring well network and relocation of some of the monitoring wells to account for site-specific conditions, including preexisting topography.
As an example, NMED requested that the applicant move one of the proposed monitoring wells at the toe of Waste Rock Stockpile 3 to the base of an existing drainage channel that will be buried by waste rock during operations.
DP-1840 has contingency requirements in place that would be triggered in the event that impacts to groundwater are detected or anticipated. Implementation of contingency requirements could require a corrective

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action plan, additional monitoring wells and interceptor systems.
Q. Thank you.
Now please discuss how the draft Discharge Permit meets Copper Mine Rule requirements for closure.
A. Section C115 specifies -- specifies requirements for closure at Copper Flat Mine. The applicant prepared a closure/closeout plan referenced in DP-1840 to address closure requirements of the Copper Mine Rule. The Closure Plan as submitted and conditioned through DP-1840 meet applicable requirements of Sections 20.6.7.33 and 34 NMAC.
The proposed waste rock stockpile design meets the planning for closure requirements of subsection A of 20.6.7.18 NMAC. Paragraph (3) of Section 20.6.7.33C NMAC requires reclaimed stockpiles at a 3-to-1 slope at closure.
To facilitate this and minimize the amount of pushdown necessary to achieve the 3-to-1 slope at closure, each lift within the stockpile will have a maximum height of 75 feet and be placed with a 120-foot setback between lifts.
The Closure Plan as conditioned through DP-1840 specifies that all waste rock stockpiles, the tailing storage facility and other mine units that have

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a potential to generate contaminants be reclaimed at the end of mine life with 36 inches of approved reclamation cover material.
The applicant has committed to reclaiming Existing Waste Rock Stockpile 1, Existing Waste Rock Stockpile 2B and the outslopes of Existing Waste Rock Stockpile 4 facing Grayback Arroyo during the preproduction period of the mining operation. Condition C115H requires reclamation of Existing Waste Rock Stockpile 1 and Existing Waste Rock Stockpile 2B occur no later than three years from the effective date of DP-1840.
It is important to make the point that issuance of this permit requires reclamation of existing onsite disturbances regardless of whether the Copper Flat Mine ever operates. This will result in enhanced environmental protection by providing abatement-related source control.
Q. Thank you, Mr. Reid.
Last question, please discuss how the draft Discharge Permit addresses the ongoing abatement at this mine site.
A. Section C116 of DP-1840 addresses the Abatement Plan for Copper Flat Mine. Abatement activities to be implemented upon issuance of DP-1840

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include installation of additional monitoring wells, the submittal of a work plan to address any ongoing impacts to Grayback Arroyo and the collection of additional ground and surface water quality data.
I believe it is important to state again the issuance of that Discharge Permit will require implementation of abatement activities and ensures abatement occurs in a timely fashion regardless of any timeline for operation of Copper Flat Mine.
Thank you.
Q. Thank you, Mr. Reid, for your testimony.
And I would like now to call my third and final witness, Mr. Marcoline.
DIRECT EXAMINATION OF JOSEPH MARCOLINE
BY MR. KNIGHT:
Q. Good afternoon, Dr. Marcoline. Excuse me.
A. Good afternoon.
Q. Could you state your full name for the record.
A. My name is Joseph Marcoline.
Q. Dr. Marcoline, where are you employed, and for how long have you been there?
A. I'm employed with the Mining Environmental Compliance Section of the New Mexico Environment Department. I've been there for just under 16 years.
Q. And what is your job title?

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A. My job title is the oversight manager for the Chevron Questa Mine Superfund site.
Q. And what are your job duties in that position?
A. In that position, I oversee the design and implementation of the -- pretty much all aspects of the Chevron Questa Mine Superfund site, and that's in accordance with both New Mexico Water Quality Act and CERCLA.
I also provide technical assistance to NMED staff on issues pertaining specifically to unsaturated flow hydrology, to cover systems, waste characterization and performance criteria, performance monitoring.
Q. Thank you.
Please describe your educational and professional qualifications.
A. I earned a bachelor's degree in geology and math from Hamilton College, in Upstate New York, master of science degree in geology and geochemistry from New Mexico Tech, New Mexico Institute of Mining and Technology, and a PhD in hydrogeology from The University of British Columbia.
I've also, as I mentioned before, worked with Environment for approximately 16 years. The first six of those years was with -- predominantly working on mining -- or permitting and reclamation of hardrock mine

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sites in New Mexico. For the last 10 years with the department, I've worked on, again, development of the Remedial Investigation, the Feasibility Study, the Record of Decision, two Administrative Orders on Consent and worked on the Partial Consent Degree for the Chevron Questa Mine.
And now we're working on the implementation of the remedy at Chevron Questa Mine site.
Q. And a copy of your resume has been provided as Exhibit 7; is that right?
A. Yes.
Q. Have you submitted written direct testimony in this proceeding?
A. Yes, I have. It's Exhibit 4.
Q. And do you have any changes to your written testimony you'd like to make at this time?
A. There were a few -- there were misspelling and a few typos that I have corrected.
Q. Okay.
And do you adopt that written testimony here today?
A. Yes, with those corrections.
Q. What was your involvement with the development of the Copper Rule?
A. I participated on the Technical Advisory

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Committee that assembled the draft of the technical portion of the Copper Rule, the copper mine requirements. My largest contributions were in development of the waste characterization section -- I wrote the portion we saw on the slides in one of the talks yesterday -- the cover system and the performance monitoring sections of the Copper Rule.
That being said, I am not -- I'm definitely not as familiar with the Copper Rule in its entirety as Mr. Reid and Mr. Vollbrecht are.
Q. Does your written testimony discuss your involvement and development of the Copper Flat Mine draft Discharge Permit to date?
A. Yes, it does. My written testimony provides a summary of my technical review of several reports submitted by New Mexico Copper for this hearing. Specifically I was asked to review the Hydrologic Consequences Model -- or the Hydrologic Consequences report, the Geochemical Characterization Report, the Stage 1 Abatement report, both -- I reviewed both the 2012 and the 2014 groundwater modeling reports.
Q. Can you summarize your involvement with the department's preparation for this hearing?
A. Yes. In addition to the technical reports I just listed, I also reviewed the notice of intents and

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the other submittals, technical memorandums submitted by the other parties for the hearing.
My reviews on those submittals focused specifically and were pretty much limited to issues pertaining to water balance and on the geohydrology and characterization of the contaminant transport through different mine units and into groundwater.
Q. Dr. Marcoline, can you summarize how the New Mexico Copper Corporation has attempted to demonstrate compliance with the aquifer evaluation requirements of the Copper Rule, specifically with regard to the tailing storage facility?
A. Yes, I can. To summarize it, it's basically a three-step process.
The New Mexico Copper Corporation first predicted concentrations of the dissolved constituents in the process porewater and the tailing water. This was based on both static and kinetic testing program of historic tailing from older operations in combination with laboratory samples of tailing porewater collected during this historic operation.
This was used essentially as a chemistry of the water that would be leaking through or potentially leaking through the liner system.
The second, New Mexico Copper Corporation

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estimated the volume of water that would be likely -- or potentially likely to leak through the tailing facility if minor defects occur. New Mexico Copper Corporation extended the equations of Giroud, et al., 1997 -- we've heard -- I've seen several of the parties have referenced some of that same literature -- to quantify leakage rates through the synthetic liner system which is underlain by tailings subgrade. Each of them have a different hydraulic conductivity.

The calculations assume that approximately 1.5 feet of tailing material or tail water is ponded on top of that liner system from day one of the discharge to the facility.

The third portion of that was -- first we look at the chemistry of the water, then we look at the amount of water going through the system. The third part uses both volume and chemistry to put those inputs into a geochemical mixing model to evaluate the resultant groundwater quality beneath the facility.

The water quality of the tailing discharge was predicted to meet water quality standards for all constituents except for TDS and sulfate prior to mixing with groundwater. Pat Longmire, PhD, a geochemist with the department, evaluated the mixing models and concurred that water quality standards should not be

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exceeded.

Q. Thank you.

Can you summarize how the New Mexico Copper Corporation has attempted to demonstrate compliance with the aquifer evaluation requirements of the Copper Rule with regard to the waste rock facilities?

A. Yes. As with the tailing facility and similar, New Mexico Copper Corporation first predicted concentrations of dissolved constituents in the porewater within the waste rock. This was based on static and kinetic testing program of the waste rock again from the historic operation as well as from some of the boreholes. This was used as the chemistry of the water percolating through the waste rock pile.

The second step, New Mexico Copper used a dual porosity, unsaturated flow model to predict quantity of -- or the net percolation of meteoric water through the waste rock based on site-specific climate data.

The third step, the volume of water predicted to move through the waste rock during operations in conjunction with predicted chemistry were used to evaluate the potential impact on the groundwater quality beneath the waste rock and that water quality standards would be -- and the determination was that water quality standards would not be exceeded.

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Q. Can you summarize your review methods and conclusions with respect to the aquifer evaluation and potential for impacts to groundwater quality from the tailing storage facility and waste rock stockpiles?

A. Yes, I can. For the tailing facility, I evaluated modeling performed and equations used by New Mexico Copper to estimate leakage of tailing porewater through the synthetic liner at the base of the lining facility.

The method applied to estimate leachate from the facility was based on peer-reviewed literature studies and published data. The method, in my opinion, was -- is mathematically rigorous and I believe yielded reasonable results. Considering that the estimated volume of water that would be discharged beneath -- to groundwater beneath the tailing facility is fairly small and the quality of that water is fairly good, New Mexico's aquifer evaluation, in my opinion, was appropriate -- or is appropriate.

In addition, the permit requires a pretty comprehensive QA/QC Plan to ensure that the liner system is properly constructed. A monitoring network will be in place to monitor for impacts resulting from leakage, and then as well as contingency plans are required under the Copper Rule.

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The process for the waste rock piles is a little bit different, at least for the waste rock piles outside of the open pit surface drainage area. The waste rock piles -- I performed a pretty detailed evaluation of New Mexico Copper Corporation water balance modeling which estimated the quantity of percolation through the waste rock piles.

My evaluation included a detailed review of all the input parameters and conducted numerous runs of the New Mexico Copper Corporation numeric model.

In the process, I developed a series of batched model runs using New Mexico Copper Corporation's model as a base, and then I conducted comprehensive sensitivity analysis of the New Mexico Copper Corporation modeling results to the physical properties of the waste material.

In addition to the physical properties in the waste material, I also conducted sensitivity analysis to -- to the -- sorry -- to the van Genuchten parameters and also to precipitation and evaporation inputs.

Following the sensitivity analysis, I compared the predicted results to observations made at other hardrock mine sites in similar climates.

And again based on the fair quality of the predicted seepage, the predicted flux of water through

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the waste rock and the flux of these waters through 50 to 100 feet of unsaturated material beneath the waste rock, New Mexico Copper Corporation's aquifer evaluation, in my opinion, is appropriate.

Q. Thank you.

Does the New Mexico Copper Corporation aquifer evaluation as it relates to the waste rock pile require that the andesite beneath the waste rock -- does it require the andesite beneath the waste rock to be impermeable in order to be protective of groundwater?

A. No, it doesn't. In fact, the andesite is not impermeable, and it actually hosts a water table at depth. However, the low permeability of the andesite does help in several ways, however the main aquifer evaluation, in my opinion, is based on the limited flux and the -- and the chemistry of the water beneath the waste rock pile.

Q. Did you review the predictions related to development of an area of open pit hydrologic containment at the Copper Flat Mine following closure?

A. Yes, I did. Based on the review of groundwater conditions, precipitation data, final surface area and the depth to water in the pit, I am in agreement and believe it's a very defensible conclusion that it will be an open -- that the postmining open pit

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will result in an evaporatively driven hydrologic sink end of mining.

Q. Dr. Marcoline, did you review the adequacy of the monitoring well network with respect to monitoring the area of open pit hydrologic containment?

A. Yes I did. With the inclusion of additional wells required by the permit that Brad spoke about, the monitoring wells around the open pit are appropriately spaced and we believe provide verification of the water table gradient surrounding the pit.

Q. Would a fracture system near the pit result in pore quality water potentially leaving the open pit area?

A. No. It's the gradient of the water table that controls the direction of groundwater flow. A high conductivity or fracture zones adjacent to the pit could potentially change the size and shape of the open pit capture zone but would not result in groundwater flowing away from the pit.

I will note, too, that if following installation of the proposed wells, you know, there is any kind of question or lack of confidence in the characterization of the potentiometric surface, we would require additional wells for verification. And it is my understanding that these additional wells will be

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installed prior to any discharge, at least those two additional wells.

Q. In your written testimony, you stated that the monitor well network around the tailing storage facility and waste rock stockpiles provide an appropriate initial basis for monitoring of the proposed facilities.

What was the basis of your review?

A. My review of the monitoring network around both the proposed waste rock facility and the tailing facility was based on two things. It was based on the underlying geology. I looked at the geomorphology of the surface -- or -- excuse me -- the surface topography and my understanding of both -- understanding of both current and the postmining potentiometric surface, or the hydrology.

As an example, the geology at the copper mine is moderately complex. It does have several different sedimentary units. It's got multiple volcanic units with both brecciation and fracturing and faults. We looked at well locations in relation to, say, buried drainages, to geologic contacts and as well as the locations downgradient of projected groundwater flow directions.

While I believe that monitoring wells that are required by the permit provide an appropriate basis for

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additional monitoring of these proposed facilities, as the mine develops, NMED may require additional monitoring wells as appropriate. And that's why the permit has conditions for this.

Q. We heard some testimony earlier from the applicant that one of their witnesses believes that the additional monitoring wells north of Waste Rock Stockpile Number 3 and southwest of the tailing storage facility were, in his opinion, unnecessary.

In your opinion, what is the justification for these additional monitoring wells that the department is requiring?

A. The two wells in question essentially were -- are filling gaps in the monitoring well network and are located in potential that there is a change in the potentiometric surface, in the direction of groundwater flow.

Q. Thank you, Dr. Marcoline.

And that's all my questions for these witnesses, and we are now available for cross-examination or questions from anyone else.

MS. ORTH: And were you going to expressly move some exhibits?

MR. KNIGHT: I was going to expressly move some exhibits. In fact, I had that written right here

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at the end of Dr. Marcoline's testimony so that I wouldn't forget to do that.

I would like to move admission of Department Exhibits 1 through 7.

MS. ORTH: Any objections?

MR. BUTZIER: No objection.

MS. BARNCASTLE: No objection.

MS. ORTH: All right.

MR. DE SAILLAN: No objection.

MS. ORTH: Thank you very much.

Exhibits 1 through 7 are admitted.

(Exhibit NMED 1 through 7 admitted into evidence.)

MS. ORTH: Mr. Butzier, do you have questions of the NMED panel?

MR. BUTZIER: I do not.

MS. ORTH: Mr. de Saillan.

MR. DE SAILLAN: Thank you, Madam Hearing Officer.

I will go ahead and cross-examine the witnesses in the order of their direct testimony, starting with Mr. Vollbrecht. And I will again direct my questions specifically -- unless otherwise specified, specifically to the witnesses.

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CROSS EXAMINATION

BY MR. DE SAILLAN:

MR. DE SAILLAN: So good afternoon, Mr. Vollbrecht.

MR. VOLLBRECHT: Good afternoon.

MR. DE SAILLAN: I'm going to ask you a few questions to begin with about financial assurance.

I suppose I should have a microphone.

MS. ORTH: Yes.

MR. DE SAILLAN: I project pretty well.

MR. KNIGHT: You can have mine unless I object.

MR. DE SAILLAN: Thank you.

So I'm going to begin by asking you a few questions about financial assurance.

Now, I thought I heard you mention in your direct testimony that the Environment Department would be requiring financial assurance for 100 years; is that correct?

MR. VOLLBRECHT: Yes, that is correct.

MR. DE SAILLAN: Could you explain that in a little bit more detail?

MR. VOLLBRECHT: There's -- associated with financial assurance you typically determine the amount of time for that financial assurance, and a net present

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value calculation is done where costs are escalated out into the future, and then there's a discount rate that brings that back based on the value of that money.

What we do for sites that require long-term water treatment, such as the Chino Mine and Tyrone Mine, is require that financial assurance cost estimate to be for a period of 100 years. That is a sufficiently long enough time period that it ensures there is adequate money for long-term -- long-term care of the facility.

And so in the case of Copper Flat, we won't have long-term water treatment, but we would require long-term monitoring, long-term maintenance and any care that needs to be taken.

MR. DE SAILLAN: Okay. So the financial assurance would reflect monitoring and maintenance of the facility for 100 years?

MR. VOLLBRECHT: That is correct.

MR. DE SAILLAN: Okay.

And has New Mexico Copper Corporation agreed to that?

MR. VOLLBRECHT: I've informed them of that during the last meeting we had amongst the agencies at New Mexico Copper. So they are aware of that. Yes.

MR. DE SAILLAN: Okay. They're aware of it. Have they agreed to it?

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MR. VOLLBRECHT: I haven't heard back from them, but it is our intent to require that.

MR. DE SAILLAN: Okay.

It's -- that is not currently reflected in the financial assurance proposal that's been submitted to the state, is it?

MR. VOLLBRECHT: That is correct.

MR. DE SAILLAN: Okay.

And Mr. Knight refers to a revised permit that would be subsequent to the August 10th, 2018, permit.

Would the 100-year requirement be reflected in that permit?

MR. VOLLBRECHT: Mr. de Saillan, we had not intended to do that. We could consider that. We're -- we're still early in the financial assurance review process at this -- at this time. We will be providing written comments on October 15th back to the Mining and Minerals Division which would include this requirement from the state -- or from the Environment Department.

It's certainly something we could consider.

MR. DE SAILLAN: Okay.

How often is financial assurance renewed?

MR. VOLLBRECHT: The financial assurance is subject to renewal every five years upon permit renewal, which is required pursuant to the Water Quality Control

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Commission regulations.
MR. DE SAILLAN: Okay.
And has it been the practice of the Environment Department at other mine sites where long-term financial assurance is required to continue to require 100 years of financial assurance when the permit is renewed each five years?
MR. VOLLBRECHT: Yes.
MR. DE SAILLAN: And you expect that will be the practice with New Mexico Copper Corporation?
MR. VOLLBRECHT: I do.
MR. DE SAILLAN: I nevertheless want to go through some of the -- some of the financial assurance proposal just to -- just to establish the Environment Department's position on certain issues.
So first of all, what is the total estimated cost for closure on which the financial assurance proposal is based?
MR. VOLLBRECHT: I can't state exactly what the number was. I believe it was 55 million, approximately, I saw on a slide yesterday.
MR. DE SAILLAN: I think that's right, and I think that's close enough for our purposes.
Do you think that this overall amount is an underestimate?

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MR. VOLLBRECHT: That's a difficult thing for me to answer, Mr. de Saillan. I can say I do have -- we have a staff person assigned to the review and comment on that who is very familiar with cost estimates and will be providing comments on that. It would be more appropriate for me to probably make that -- respond to that after October 15th depending on the comments.
I -- there is not agreement on that number. I can tell you that.
MR. DE SAILLAN: Okay.
Is that staff person here today?
MR. VOLLBRECHT: No.
MR. DE SAILLAN: Okay.
Okay. There is an estimated Engineering, Design and Construction Plan cost which is $1,771,000.
Do you agree that that estimate is too low?
MR. VOLLBRECHT: I cannot comment directly on that.
MR. DE SAILLAN: Okay.
The plan also includes a $2,657,000 estimate for contingency costs.
Do you agree that those are too low?
MR. VOLLBRECHT: Likewise I can't comment directly on that number.
I can say that the New Mexico Environment

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Department and the Mining and Minerals Division have created a guidance document on contingencies with perhaps a component of the indirect costs, and we will be reviewing that, certainly.
MR. DE SAILLAN: Okay.
And I'll ask you again. The cost estimate includes 2,657,000 for -- excuse me. Next one.
Strike that last one.
Okay. Mr. Vollbrecht, if the cost estimate is too low, who would bear the cost of closure of the Copper Flat Mine once the mine is shut down and stopped operating?
MR. VOLLBRECHT: Is it safe to assume you're talking about the final approved cost estimate as opposed to that that's been submitted as proposed?
MR. DE SAILLAN: Absolutely. That is what I meant. Thank you for that clarification.
MR. VOLLBRECHT: Certainly.
If it did turn out that the cost estimate was too low, the State of New Mexico would be the one, assuming the company that was responsible was no longer financially viable.
MR. DE SAILLAN: Okay.
And that means ultimately the taxpayers; is that correct?

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MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: Now, is it your understanding that a discount rate will be applied to the cost estimate for closure?
MR. VOLLBRECHT: Yes. That is my understanding.
MR. DE SAILLAN: And that will have the effect of reducing the -- the amount of financial assurance that is required to be -- to be posted at this point; is that correct?
MR. VOLLBRECHT: That is correct. It does work in conjunction with an escalation rate, as well.
MR. DE SAILLAN: Okay.
And do you know at this point what the discount rate will be?
MR. VOLLBRECHT: I do not know what the specific number is.
MR. DE SAILLAN: Do you know what the escalation rate will be?
MR. VOLLBRECHT: I do not know that number. That will need to be determined prior to approval, and, once again, all three agencies will need to be in agreement prior to approval of that.
MR. DE SAILLAN: Okay.
Will the public have an opportunity to comment

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on the final financial assurance in the context of the groundwater Discharge Permit?
MR. VOLLBRECHT: I can say not directly, but indirectly, as I stated, by when the financial assurance cost estimate is -- is finally agreed to and an instrument is put in place, that will be done, finalized pursuant to the Mining Act permit, and there will be opportunity for a hearing on the Mining Act permit, and we would participate in that hearing.
MR. DE SAILLAN: Okay.
Now, looking at the -- the financial assurance proposal that has been submitted, is it your understanding that the cost estimate assumes that 25 years after closure New Mexico Copper will be able to cease all monitoring and maintenance and water management at the mine site?
MR. VOLLBRECHT: That is my understanding, yes, that that was what was proposed.
MR. DE SAILLAN: Okay.
And do you think that's a realistic assumption?
MR. VOLLBRECHT: As I stated, we intend to require 100 years of postclosure monitoring.
MR. DE SAILLAN: Okay.
And similarly is it your understanding that

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for the purposes of the closure cost estimate New Mexico Copper Corporation estimates that the period of time that will -- that water will continue to drain from the tailing storage facility is 25 years after cessation of mining operations?
MR. VOLLBRECHT: It's my understanding that's what was provided. Yes.
MR. DE SAILLAN: Okay.
And again do you think that period is unrealistic?
MR. VOLLBRECHT: I can't speak to that directly other than to say we are currently reviewing that.
MR. DE SAILLAN: Okay.
And is it your understanding that for -- that for purposes of the current submitted closure cost estimate New Mexico Copper Corporation has estimated that the period of time that groundwater monitoring will be necessary is 25 years after cessation of mining operations?
MR. VOLLBRECHT: It is my understanding that is what's provided in the estimate.
MR. DE SAILLAN: Okay.
And do you -- do you agree that that is an unrealistically short period of time?

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MR. VOLLBRECHT: Yes. I stated we would -- New Mexico Environment Department intends to require 100 years of postclosure monitoring.
MR. DE SAILLAN: Okay.
Is it your understanding that for purposes of the closure cost estimate that New Mexico Copper has submitted it estimates that the period of time for maintenance is seven years after mining operations cease?
MR. VOLLBRECHT: I'm not directly familiar with that, but I would assume you are correct.
MR. DE SAILLAN: Okay.
Do you agree that the closure cost estimate does not include costs for removal of large equipment, piping and other infrastructure?
MR. VOLLBRECHT: Once again I'm not that familiar with the details as I'm not the one doing the review of that, but --
MR. DE SAILLAN: Do you agree that the closure cost estimate as currently submitted does not include costs for mitigation of water contaminated during road reclamation?
MR. VOLLBRECHT: I'm not once again that familiar with the details of that.
MR. DE SAILLAN: And do you agree that the

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closure cost estimate does not include comprehensive costs for waste disposal?
MR. VOLLBRECHT: Same answer.
MR. DE SAILLAN: Okay.
MR. VOLLBRECHT: I suppose I would add that it's important to include all those things.
MR. DE SAILLAN: Okay. Thank you.
Do you agree that active water treatment will likely be necessary at the Copper Flat Mine after closure?
MR. VOLLBRECHT: Based on our analysis, we do not expect -- well, with the caveat -- we do not expect there to be a need for active water treatment, I guess, with the caveat of managing the water that's draining out of the tailing impoundment, and there's an active and passive treatment phase for that which is evaporation.
MR. DE SAILLAN: Do you agree that many of the closure parameters that the cost estimate is based on are highly uncertain?
MR. VOLLBRECHT: I -- I can't -- I'm not an expert on financial assurance so I can't answer that directly.
MR. DE SAILLAN: Well, this is not so much a question that goes directly to financial assurance.

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So things like, for example, the pit lake level, pit lake water quality, the volume of leakage from the tailing impoundments, things like that, would you agree that those are highly uncertain?

MR. VOLLBRECHT: I would not say highly uncertain. I think we understand the science behind those -- those estimates fairly well, and I would expect that we're in -- pretty close in the ballpark on where those things will end up.

MR. DE SAILLAN: Do you know what the form of financial assurance will be for the Copper Flat Mine?

MR. VOLLBRECHT: There has not been a financial assurance instrument posed yet. There are different requirements under the Mining Act as well as under the federal regulations that BLM is required to implement. I could say that the BLM requirements do not allow for a corporate guarantee.

MR. DE SAILLAN: Okay. So is it your understanding that the form of the financial assurance will not be a corporate guarantee?

MR. VOLLBRECHT: It's my understanding that the Bureau of Land Management would not allow a corporate guarantee as a form of financial assurance.

MR. DE SAILLAN: Okay.

Now, Mr. Reid mentioned the possibility of the

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Environment Department requiring additional -- and I think he was referring to stormwater collection. There was testimony, I think, in Mr. -- or Dr. Marcoline's presentation that the Environment Department might at some point require additional groundwater monitoring wells if you found it was necessary.

Are these types of things covered in or will they be covered in the financial assurance?

MR. VOLLBRECHT: If they apply for -- after closure. So stormwater management highly certain. With respect to groundwater monitoring, we would evaluate what a postclosure scenario looks like with respect to groundwater monitoring.

As you have pointed out, we agree that the permit does come up for renewal every five years and so those things would be reviewed at that time.

MR. DE SAILLAN: Okay. The -- the ranches and the Environmental Law Center have proposed that New Mexico Copper Corporation be required to do further characterization of the andesite bedrock which underlies the location of the proposed waste rock storage facilities.

Are you familiar with that?

MR. VOLLBRECHT: I have seen that proposal. Yes.

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MR. DE SAILLAN: Okay.

Do you agree that it would be desirable to have further characterization of the andesite bedrock?

MR. VOLLBRECHT: I -- it's beyond my expertise to weigh in on the technical merits of that. I think Dr. Marcoline could probably provide a better analysis of that. I think the department's position and the reason we've drafted the permit as we have is that we think that the evaluation that was done is adequate.

Doing more work will certainly provide more data and make it more defensible, and so I can't say I would object to that necessarily, but we don't necessarily think it's necessary.

MR. DE SAILLAN: Okay.

Do you think it would be desirable?

MR. VOLLBRECHT: That's a tough question in light of what I had just said. It may give other folks more confidence in the interpretation of the results. And certainly we are servants of the public, and if it will help the public feel more confident, I think that could be a positive outcome.

MR. DE SAILLAN: Okay.

The ranches have also proposed that additional -- that the Environment Department require additional monitoring wells. And when I say additional

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monitoring wells, I mean beyond the two that the Environment Department included in the August 10th proposed Discharge Permit. So the ranches have proposed additional monitoring wells.

Do you agree that the additional monitoring wells would be desirable?

MR. VOLLBRECHT: I would suggest my answer would be the same to that question as it was to the previous.

MR. DE SAILLAN: Okay, Mr. Vollbrecht. I'd like to talk to you a little bit about the -- the pit lake.

Now, in your testimony, you discussed the pit lake under the heading of Surface Waters of the State Determination at pages 6 and 7 of your testimony. And there you conclude that the pit lake will not be a surface water of the state.

Is that the Environment Department's conclusion?

MR. VOLLBRECHT: Yes, it is.

MR. DE SAILLAN: And you referenced the surface water quality regulations at 20.4.1 NMAC, which have been adopted by the Water Quality Control Commission; is that right?

MR. VOLLBRECHT: I believe it's 20.6.4.

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MS. ORTH: That's what he said.
MR. DE SAILLAN: Mr. Vollbrecht, I'd like to -- I'd like to show you an exhibit that's been marked -- or a document that's been marked as Ranches Exhibit 42.
And I'm going to ask Kendra to provide that for you and to counsel and the Hearing Officer.
Now, for the record, these -- this is a copy of one page of the surface water quality regulations at 20.6.4 NMAC.
Do you recognize those regulations?
MR. VOLLBRECHT: Yes, I do.
MR. DE SAILLAN: Okay.
And are you familiar with those regulations?
MR. VOLLBRECHT: More than I ever thought I'd be.
MR. DE SAILLAN: Okay.
And does this include the definition of surface water(s) of the state?
MR. VOLLBRECHT: Yes, it does.
MR. DE SAILLAN: Okay.
And that's at 20.6.4.7S.(5) NMAC?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: Okay.
Let's take a look at the definition.

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The first sentence of the definition lists what the definition includes, and that's pretty broad; is that correct?
MR. VOLLBRECHT: That is correct, yes.
MR. DE SAILLAN: And the second sentence then lists some more things included in the definition. It includes tributaries and manmade wetlands.
And then let's look at the next item, which is manmade bodies of -- manmade bodies of water that were originally created in surface waters of the state or which resulted in impoundment of surface waters of the state.
Do you see that?
MR. VOLLBRECHT: I do.
MR. DE SAILLAN: Now, do you agree that Grayback Arroyo is a surface water of the state?
MR. VOLLBRECHT: I believe it is. Yes.
MR. DE SAILLAN: Okay.
And the pit lake will be created in the original channel of Grayback Arroyo; is that correct?
MR. VOLLBRECHT: That is correct, although -- well, Grayback Arroyo has been diverted around the existing pit lake, and the Surface Water Quality Bureau determined that because of that prior diversion that occurred, that this would not be considered to be

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created in a surface water of the state.
MR. DE SAILLAN: Do you agree with that interpretation?
MR. VOLLBRECHT: Mr. de Saillan, with all due respect, I am not really in a position to agree or disagree with the Surface Water Quality Bureau. They've made a determination.
MR. DE SAILLAN: How much thought did the Environment Department give to this interpretation?
MR. VOLLBRECHT: All I can really speak to is the record. There were -- I had looked back through meeting notes from 2015 and 2016. There were a number of meetings between New Mexico Copper and the Surface Water Quality Bureau to discuss this issue. I was not in those meetings or privy to those discussions.
MR. DE SAILLAN: Do you know if any other interested parties or organizations were involved in those discussions?
MR. VOLLBRECHT: The other various agencies, BLM, the Mining and Minerals Division and New Mexico Copper, were in those meetings.
MR. DE SAILLAN: Okay.
MR. VOLLBRECHT: As I understand.
MR. DE SAILLAN: Okay.
Well, let's continue with the definition.

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The next sentence tells us that the definition does not include private waters that do not combine with other surface or subsurface water; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: Okay.
Now, so first of all, let's -- let's talk about how the pit lake is going to work.
It's -- particularly with a pit that is a hydrologic sink, doesn't the pit lake have the tendency to rise and fall in elevation over time due to seasonal variations and longer-term trends?
MR. VOLLBRECHT: It does. Yes.
MR. DE SAILLAN: Now, I heard Mr. Finch testify on behalf of New Mexico Copper Corporation that the elevation of the pit lake will be 4,894 feet above sea level.
Were you present for that testimony?
MR. VOLLBRECHT: Yes, I was.
MR. DE SAILLAN: Do you view that as a precise number?
MR. VOLLBRECHT: I think Mr. Finch also provided testimony that that could fluctuate one to two feet over time. So precise within -- within those bounds.
MR. DE SAILLAN: Do you agree that that's the

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appropriate bounds?
MR. VOLLBRECHT: I -- we're trending out of my area of expertise. I suppose if you got a significantly wet year or dry years, it could exceed those. The -- Mr. Finch also testified that the lake level had dropped approximately 10 feet over the last -- I don't know how many years, but some number of years.
MR. DE SAILLAN: He was -- he was referring, I believe, to the existing pit lake.
MR. VOLLBRECHT: That is correct. Yes.
MR. DE SAILLAN: So given the shape of the open pit, if the pit lake level rises, the surface area of the pit lake would expand; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: And so that expansion could result in the pit lake moving from being entirely on private property to encroaching onto public property; is that correct?
MR. VOLLBRECHT: As I understand, there is some BLM property close to the edge of that.
MR. DE SAILLAN: Now, Section C115G of the Discharge Permit, and I'm talking about the August 10th version, provides that surface water quality standards will not apply to the pit lake water body that will exist at closure so long as the pit remains a hydrologic

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evaporative sink and the pit lake water remains wholly on private land.
Now, I think that provision was added in the August 10th revised draft permit; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: Okay.
And as a side, I would mention that we appreciate the Environment Department adding that provision to the -- to the proposed Discharge Permit.
But I'm wondering how this provision is going to work in practice.
So let's say that the pit lake is entirely on private property for half of the year and encroaches on public property for half of the year.
How would the Environment Department deal with that situation?
MR. VOLLBRECHT: That's an interesting question. I think that the department would have to review that as a transient feature and speak with the BLM about that and determine the appropriate path forward.
MR. DE SAILLAN: Okay.
Is there -- do you have a sense of -- I mean, I can pose a whole lot of different hypotheticals here, of course.

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MR. VOLLBRECHT: Sure.
MR. DE SAILLAN: Do you have a sense as to at what point the Environment Department would say this is no longer on purely private property, but it encroaches on public property frequently enough and for a long enough duration as to make it no longer subject to the exemption?
MR. VOLLBRECHT: Yeah. I cannot provide a direct --
MR. DE SAILLAN: Okay.
MR. VOLLBRECHT: -- answer to using those criteria.
MR. DE SAILLAN: Okay.
Now, is it your understanding that the pit lake at the Copper Flat Mine, the proposed pit lake, will exceed surface water quality standards?
MR. VOLLBRECHT: The modeling shows an exceedance of a wildlife surface water quality standard for selenium at year 25, I believe it is.
MR. DE SAILLAN: Okay.
And isn't it likely that the pit lake water will deteriorate or have a tendency to deteriorate in quality as a consequence of evapoconcentration?
MR. VOLLBRECHT: That is likely, and that is what the modeling shows.

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MR. DE SAILLAN: Okay.
And just for the record, could you explain what we mean by evapoconcentration?
MR. VOLLBRECHT: Sure. The water, H2O, evaporates out of the open pit water body, the solvents, the various elements and minerals stay, the suspended solids, dissolved solids, they stay there, and they become more concentrated over time.
MR. DE SAILLAN: Okay. Thank you.
Okay. Let's go back to the definition.
The definition also refers to private waters that do not combine with other surface or subsurface water; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: Okay.
Now, let's look at the pit lake. And again I'm talking about the future pit lake as opposed to the existing pit lake.
Is it your understanding that clean groundwater will flow into the pit after -- after closure of the mine?
MR. VOLLBRECHT: It's my understanding that groundwater will flow into the pit after closure of the mine.
MR. DE SAILLAN: Okay. That's what I meant to

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ask, if I didn't.
And some of that water -- some of that groundwater will come from off of the -- the mine site; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: And in fact, the pit will actually behave as a huge well; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: So it will draw water into it.
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: And the clean groundwater that is drawn into the pit will combine with pit lake water; is that correct?
MR. VOLLBRECHT: That is correct. I mean, the pit lake will essentially be that water.
MR. DE SAILLAN: Okay.
And when that clean groundwater enters the pit, it has the potential to become contaminated with water from the mine -- contaminated water from the mine; is that correct?
MR. VOLLBRECHT: That's a -- the pit lake, as you describe it, pit acting as a -- as a pump, it pumps water from 360 degrees, from all directions around it, and so that will be a mix of water that's coming from

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upgradient, offgradient and, like I say, downgradient, although the gradient is towards the pit but from all directions.
MR. DE SAILLAN: Right.
MR. VOLLBRECHT: And so it will come from areas that are outside of the mine as well as areas inside of the mine.
MR. DE SAILLAN: Right.
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: And to the extent that clean water from off the mine site enters the pit, it will have the potential to become contaminated with mine-influenced water.
MR. VOLLBRECHT: It will mix with that water. Yes.
MR. DE SAILLAN: Okay.
Now, as I understand it, the Environment Department's position on this combining with waters is it's essentially a one-way street, that the exemption does -- the exemption does not apply if water flows out of the pit and combines with groundwater outside the pit.
However, the exemption continues to apply if clean water moves into the pit and combines with water in the pit; is that correct?

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And if you didn't understand my question, I can rephrase it.
MR. VOLLBRECHT: I think I understand it, but I had a hard time following it.
MR. DE SAILLAN: Okay.
MR. VOLLBRECHT: Yeah.
MR. DE SAILLAN: Well, why don't I do it this way. We're talking about this part of the definition, and maybe you could explain what the Environment Department's position is on why that exemption applies.
MR. VOLLBRECHT: I guess I'd go back to the -- the 2016 -- the October, 2016 letter from the Surface Water Quality Bureau where they stated that because it was an evaporative sink they determined that it does not combine with other surface or subsurface waters.
And so I think as you described in your question, that it is a one-way street, that is the direction the Surface Water Quality looked at when making that determination.
MR. DE SAILLAN: Okay.
Do you know if the Environment Department has always interpreted this exemption in that manner?
MR. VOLLBRECHT: That's a difficult thing to say. The department's been in existence for a long time. I can say that it is consistent with the Copper

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Mine Rule, which came to existence in 2013. That essentially has a variance by rule for the area of open pit hydrologic containment, and so all that water will report to the pit.
MR. DE SAILLAN: Okay.
Let me ask you, then, do you know Marcy Leavitt?
MR. VOLLBRECHT: I do.
MR. DE SAILLAN: And Marcy Leavitt was formerly employed at the Environment Department; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: And do you know approximately when?
MR. VOLLBRECHT: Marcy Leavitt was bureau chief when I started 20 years ago.
MR. DE SAILLAN: Bureau chief of what bureau?
MR. VOLLBRECHT: The Ground Water Quality Bureau.
MR. DE SAILLAN: Okay.
So do you know what other positions she held at the Environment Department?
MR. VOLLBRECHT: She was chief of the Surface Water Quality Bureau, she was division director. Prior to that, I assume she had technical positions, but I

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don't know.
MR. DE SAILLAN: Okay.
And she was the director of which division?
MR. VOLLBRECHT: The division names have changed over time. I could say we're currently called the Water Protection Division, which includes Groundwater and Surface Water Quality Bureaus. That was the division she was director of.
MR. DE SAILLAN: Okay.
So the name has been changed, but at the time that she was director, it sat over both the Ground Water Quality Bureau and the Surface Water Quality Bureau; is that correct?
MR. VOLLBRECHT: That is correct.
MR. DE SAILLAN: Okay.
So I want to show you another document that's been marked as the Ranches Exhibit 41.
And for the record, this is a transcript of the proceedings In the Matter of the Appeal of the Supplemental Discharge Permit for Closure for DP-1341, and this is Volume 3, pages 865 through 867 of that transcript, and it's dated October 29th, 2003.
Now, Mr. Vollbrecht, first of all, would you give Ms. Leavitt's interpretation of the New Mexico water quality regulations a high degree of respect?

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MR. VOLLBRECHT: Yes, I would.
MR. DE SAILLAN: Okay.
Could you just take a minute to review the document that I -- I've just handed you?
MR. VOLLBRECHT: Okay.
MR. DE SAILLAN: Now, would you agree with me that Ms. Leavitt is saying here that the -- the exemption is actually a two-way street, that the mixture with other waters works both ways? You could have clean water moving in to areas of dirty groundwater and -- and vice versa, and in either case the exemption does not apply?
MR. VOLLBRECHT: That is a -- that is correct. That is what she stated. She is speaking to the Water Quality Act and the definition of water, which is a bit -- somewhat different from the definition of surface water of the state, although that same phrase is contained.
My understanding of this hearing and this testimony, it was relative to groundwater contamination, and one thing that certainly has changed since that time is the Copper Rule and the interpretation of how that applies to the area of open pit hydrologic containment.
MR. DE SAILLAN: Okay. Thank you.
Could you just give me a second here. I may

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be almost finished.
MS. ORTH: All right.
MR. DE SAILLAN: Thank you, Mr. Vollbrecht.
I have no further questions.
I think now I'll move on to Mr. Reid.
MS. ORTH: Mr. de Saillan, just one minute.
I would like to start a break sometime in the next five minutes. So we can either start now, or you can go five minutes and then we can start, but we need a break before public comment begins at 5:00.
MR. DE SAILLAN: Okay. Well, why don't we -- my cross-examination Mr. Reid may go more than five minutes. So why don't we go ahead and take a break now.
MS. ORTH: All right.
We're going to be on break until 5:00 p.m., and when we return, we're going to have to take a break in the cross-examination of the department panel. We will be taking public comment starting at 5:00.
If you have not yet signed in on the sign-in sheet, please do so, because that's how I'm going to call on people.
Thank you very much.
MS. BARNCASTLE: Madam Hearing Examiner.
MS. ORTH: Yes.
MS. BARNCASTLE: Before we leave, do we

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anticipate that we will start cross-examination after public comment tonight, or will we resume tomorrow morning?
MS. ORTH: So typically the public comment goes for a while. There are typically a lot of people who come on a night when we've designated that. So my short answer would be I would expect that we will pick up the department's cross-examination tomorrow morning.
Are there any comments or observations about that?
I mean, I'm willing to stay as long as anyone is.
MS. BARNCASTLE: That would certainly be my preference, that we started tomorrow morning so I can go home and feed my little one.
MS. ORTH: All righty.
Anyone else object?
MR. KNIGHT: No objection from the department.
MS. ORTH: All right.
In that case, thank you, department panel. We'll excuse you until the morning.
And again we're on break until 5:00.
(Proceedings in recess from 4:46 p.m. to 5:07 p.m.)
MS. ORTH: Okay. Thank you.

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We are turning now in this hearing, which is a hearing on the proposed Copper Flat Mine.
Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
Real quick, just one thing I'd like to request of the Environment Department.
When you submit the latest version of the permit, if you could put a date on it so that we can distinguish it from the two previous versions of the permit, which both have sort of a blank date on, I would appreciate it.
Thank you.
MR. KNIGHT: We will do that.
MS. ORTH: All right. Thank you.
That was a request pertaining to the technical part of this case.
We're turning from the technical part now to nontechnical public comment. We will start in just a moment and go until everyone who is present has had an opportunity to make the comment they would like to make.
First, I'm going to speak with our interpreter, because if you are more comfortable in a language other than English, this pertains to you.
So if you would, please, state your name and

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certification for the record.
THE INTERPRETER: Madam Hearing Officer, Sandra Olivares Caldwell, certified court interpreter for the State of New Mexico.
MS. ORTH: Do you swear to interpret to the best of your ability and knowledge of the English and Spanish languages in accordance with the standards and ethics of the interpreter profession?
THE INTERPRETER: I do.
MS. ORTH: Thank you very much.
Now, if you would make your statement.
THE INTERPRETER: Thank you.
Good evening, ladies and gentlemen.
If you are here helping someone who is more comfortable in another language besides English, please let me know. If you yourself feel more comfortable in another language besides English, no matter what language that is, that's okay. Just let me know you do not speak English very well.
I'll be making an announcement in Spanish.
(In Spanish.)
Everybody is good in English?
No requests for interpreter, Madam Hearing Officer, but I will be available if someone wants it.
MS. ORTH: All right. Thank you very much.

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I would like to point out one other person in the room who if you have a question you should approach if we're not on break. If we're on a break, you can certainly approach me. If we're not on a break, please speak with John Baca.
Mr. Baca is there in the green-gray shirt.
Thank you.
So I have the sign-in sheets. I will be calling the names of those who signed in and indicated that they wish to make public comment.
If you have not yet signed in, please do so. The sign-in sheets are with Mr. Baca.
You will not be spammed as a result of signing in. We use the sign-in sheets only as evidence of public participation and for the correct spelling of your name in the transcript. We don't use them otherwise. They're maintained at the Environment Department.
Just a few rules.
I will ask you to collect your thoughts and merely give verbal comment once. If you think of something you want to say after you've already spoken, please put it into writing.
We do accept both verbal and written comment all the way up until the time we adjourn, which might be

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later this week, might be the week of October 9th. We're just going to go until we finish. No comment can be accepted after we adjourn, however, but we expect that to be a couple of days away at least.
We will ask you to be sworn in, and we will ask you not to make personal attacks on anyone, not the company, not the state, not the citizens groups or anyone else. No personal attacks.
And let's see. I think that was it really for the rules.
And I don't put a time limit on you. So I'll ask you not to repeat yourself, but I -- you do not need to watch the clock while you're speaking.
Are there any questions about any of that? About any of that?
No?
All right.
And, counsel, I know that the rules say that you may cross-examine anyone who speaks. Those of you who have been in my hearings before know that I discourage cross-examination of public commenters. So I'm not going to ask you if you have questions of them. You're going to have to get my attention if you really are going to insist on doing that.
MR. DE SAILLAN: Madam Hearing Officer, we

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have no intention of cross-examining any of the public speakers.
MS. ORTH: All right.
So I'm going to start here now.
Mike Bowen.
MR. BUTZIER: Madam Hearing Officer.
MS. ORTH: Sir.
MR. BUTZIER: Will you be keeping track of whether public comments stray from public comment into technical testimony and reminding people of that --
MS. ORTH: Thank you.
MR. BUTZIER: -- or is that something you're expecting us to point out?
MS. ORTH: No, no. Thank you very much. I knew I was forgetting one rule, and that was it. So thank you, Mr. Butzier, for reminding me.
This is nontechnical public comment. So I will ask you not to offer technical testimony. Technical testimony is typically scientific testimony that one would require the education or expertise necessary to offer it. Now, you may have that education and expertise, but if you didn't file a notice of intent to present technical testimony timely, sometime ago, then you're not a technical witness in this hearing.
MR. KNIGHT: Madam Hearing Officer, excuse me.

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I just -- while we have a lot of people here, I would like to mention that if the hearing does go into the second week of October, if we do need to resume the hearing on October 9th, that will be at a different location, and I think folks should be aware of that.
MS. ORTH: Thank you for that, Mr. Knight.
So just to clarify, we will be going through Friday of this week as necessary, and if we resume, that is to say if we're not done Friday by about 7 o'clock at night, we will pick up on October 9th, and you will want to look at the Groundwater Bureau web page or contact Mr. Baca to ask where we would be resuming that hearing on October 9th. And we'll do our best to get the word out.
So if you would please swear Mr. Bowen.

MIKE BOWEN

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. BOWEN: Madam Hearing Officer, thank you for the opportunity to comment on such a serious matter.
My name is Mike Bowen. I am the executive director of the New Mexico Mining Association. We're located in Santa Fe.
The New Mexico Mining Association currently

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has 18 operator members who explore, mine, produce and refine sand and gravel and other aggregates, coal, copper, humate, industrial minerals, molybdenum, potash, precious metals and uranium in New Mexico.
In addition, the association has over 70 associate members who provide consulting construction, engineering, drilling, laboratory, legal, reclamation and other services and equipment, fuel, power, chemicals and other supplies to the New Mexico mining industry.
The association serves as a spokesman for the industry and is active in representing its members and keeping them informed concerning legislation and regulatory developments.
It also serves its members on a wide variety of subjects such as taxation, environmental quality, public lands, health and safety and education, primarily through the expertise of its members and member companies.
According to the latest annual report published by the Energy, Minerals and Natural Resources Department, in 2016 the mining industry in New Mexico reported production values of more than $1.7 million.
New Mexico ranks first in the United States in potash production, second in copper production and 11th in coal production. New Mexico was once a leader in the

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production of uranium and still has large uranium resources that may be mined in the future, market conditions permitting.
Total direct and contract employment by the mining industry in 2016 was just under 5,000, with total payrolls of over 330 million.
Mining jobs are typically some of the highest-paying and sought-after jobs, particularly in the rural areas of New Mexico. Mining creates many additional jobs in the community as illustrated by the goods and services provided by our associate members and other local goods and services provided to our mine employees.
Since most mining operations are located in rural areas, these jobs are critical to the local economies where the mines operate.
Minerals are vital to everyday life. All of our electrical energy is supported by mineral production, including electric power generated from coal, uranium and oil and gas, as well as renewable power generation that requires steel, copper and other metals for wind towers and motors, steel, copper, silver and other metals for photovoltaic cells and solar installations and copper, steel and other metals for transmission lines.

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Potash and other fertilizers are essential to produce our food, and our roads and buildings for homes and businesses cannot be constructed without aggregates. If these essential minerals are not being produced in New Mexico, they must be produced somewhere else. New Mexico might as well enjoy the economic benefits of mineral production as well as the everyday benefits that consume the minerals.

As the legislature said in the Mining Act, the exploration, mining and extraction of minerals is vital to the welfare of New Mexico.

I believe this is the first public hearing held on a proposed Discharge Permit under the Copper Rule. The Copper Rule was adopted by the Water Quality Control Commission in December of 2013 pursuant to the New Mexico Water Quality Act.

Since then, the Copper Rule has been scrutinized and upheld on appeals to the New Mexico Court of Appeals and the Supreme Court, in each case by unanimous decision. The Copper Rule implements legislation passed in 2009. So the Copper Rule has been backed -- excuse me -- by all three branches of New Mexico's government.

The Copper Rule specifies detailed requirements for the design, construction, operation,

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monitoring and closure of copper mines to protect groundwater quality. These requirements are based upon experience gained under the Discharge Permits issued over nearly 40 years.

I am impressed by New Mexico Copper Company's plans for the Copper Flat project. New Mexico Copper has worked tirelessly to satisfy the requirements of multiple federal and state agencies, including BLM, the US Fish and Wildlife Service, the Environment Department and the Mining and Minerals Division.

While this area is limited to considerations of the requirements for a groundwater Discharge Permit, the mine plans reflect the need to comply with the myriad of environmental protection laws. These plans take years to come to fruition at a tremendous cost, representing New Mexico Copper's investment in the development of New Mexico's mineral resources.

I am happy to see that the Environment Department has issued a draft permit based upon the department staff's conclusion that New Mexico Copper's mine plans appear to meet or exceed all of the requirements of the Copper Rule and the commission's regulations. With the permit conditions proposed by the department, the Copper Flat project will be operated in a manner that protects groundwater quality.

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As I previously discussed, development of New Mexico's mineral resources provides many local and statewide economic benefits and employs many local residents. Issuance of the Discharge Permit for the project will be a great step forward to realizing the important benefits this project will provide in terms of employment, revenue for local and New Mexico businesses and substantial contributions to state and local tax revenues to support our schools, roads and other government services.

Many years have been spent and countless dollars spent for experienced engineers, scientists and other experts to develop the plans for the Copper Flat project. These plans must comply with a myriad of federal and state laws and regulations imposed on mining projects to ensure protection of public health and safety and the environment.

I would urge that the Hearing Officer and the department would focus on the requirements set out by the Water Quality Control Commission. Other matters such as dam safety requirements and water supply issues should be left to consideration by the agencies assigned by the legislature to consider those issues.

Approving DP-1840 will be good for the state and local communities and will send the right message to

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mining companies that are willing to invest significant resources and promising projects such as the Copper Flat Mine. For these reasons, on behalf of the New Mexico Mining Association, I urge you to approve Discharge Permit DP-1840 after considering all relevant testimony and comments.

Thank you for your time.

MS. ORTH: Thank you very much, Mr. Bowen.

Would you be willing to put your written statement next to the flowers there.

MR. BOWEN: Yes.

MS. ORTH: All right. Thank you.

The next person signing in -- and I apologize in advance for mispronouncing anyone's name. I do my best.

Ted Caluwe? Ted Caluwe?

No?

All right.

I also forgot to mention that there will be other opportunities to offer public comment. We don't have other scheduled times, but if you come during the day and let me or the hearing clerk know that you would like to offer public comment, we will find a time when we have a break in the technical case to accept it.

So if Mr. Caluwe comes back, we'd be happy to

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take his comment.
Taylor Streit -- Streit did not indicate whether he wanted to offer comment or not. So let me ask.
Would you like to?
MR. STREIT: Yeah, please.
MS. ORTH: All right. Come on up.
MR. STREIT: Sit here?
MS. ORTH: Yes, please, the table with the flowers.
I will ask for your name first and then that you be sworn in.
MR. STREIT: Taylor Streit.
MS. ORTH: And that was S-T-R-E-I-T?
MR. STREIT: That's correct.

TAYLOR STREIT

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. STREIT: I was kind of asked to be here because I had a similar -- a parallel experience with the Moly Mine in Questa.
I was in the outdoor business, in the fishing business in the area, still am, for a long time. Now I've moved down south -- or 10 miles south. And -- and

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I also write, and I have a book that has some photos in it that I'm going to submit.
And I wrote a little thing here.
And it is I like living on the frontier. But it has its drawbacks, and when there aren't many people around, bad things can happen to the environment. Such was the case with the Moly Mine on the Red River in Northern New Mexico a couple decades ago.
There was a little opposite -- there was little opposition, but myself and a handful of people -- we were the Concerned Citizens of Questa -- went to a lot of meetings like this. But molybdenum prices stayed high so our work didn't amount to much.
But that was a different time, and if a mine was proposed near present day Taos, which is by Questa, there wouldn't even be a meeting. Who cares what happens between Array, Hillsboro and Caballo? These tiny towns are somewhat near the extremely remote Aldo Leopold Wilderness.
In the north, in Questa, I saw a relatively small mine turn into a huge beast that broke all the rules. I watched it devastate the lonely Red River -- the lower Red River where I made much of my living, still do really, and that runs into the Rio Grande.
Not that the government didn't lay down the

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law. The Moly Mine was fined what amounted to pocket change. It was fined seemingly daily, or very often, but the fines were, I think, insignificant with the amount of ore that was coming out of the ground.
When the operation pulled out, it left a mess -- mess. And instead of doing the right thing and cleaning up the vast rubble, contaminated dirt and water, the mining companies fought the Superfund process vehemently.
And when our Superfund committee was given a tour of the reclaimed land, we burst out laughing at a reclaimed slope that we were taken to. There were two bushes growing out of a pile of small boulders. And we thought this was a joke, but the gal who was showing us around had such a look on her face, we realized she was getting well paid to visualize a green garden.
The Town of Questa's people had many health problems from exposure to heavy metals, also. These were ongoing problems, because when the mine pulled out, it left the town's water system bedded in tailings, the air full of nasty white dust in the spring winds.
And the people who were formerly miners all of a sudden were the unemployed. Many were forced to move on from what was their historical homes. And there were lots of social and criminal problems over the years. In

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fact, over a period of 20 years, there were 12 unsolved murders in a row.
I have moved to this lonely place, Southern New Mexico, and don't want to see the same things happen here. At my tender age, I am more interested in catfishing than, quote, hiking and trout fishing. But if I get in shape, it's possible, because we have the southernmost Rio Grande cutthroat trout fishery in the world. And that's our state fish.
Which is the Animas. It's not much of a stream, and it usually dries by the time it gets near the proposed mine wells, but it has a population of Rio Grande cutthroats above the Ladder on public land. And when the mammoth -- period. But when that mammoth well starts pumping, we can be sure that it will suck the Animas aquifer so powerful -- powerfully that it will dry it up even up into the wilderness.
I forget the technical term for that. I'm sure somebody will do it.
And then there is the downstream element, too. There is me and my prized well and two peach trees. In a parallel drainage, besides myself there are other life-forms, rare Arizona sycamore, catfish, green chile, pecans, waterfowl, cows, quail, deer, bighorns, farmers, and many touristy Texans.

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I care what happens to all this life. Don't you? But this -- but this "you" I speak of is just a few of us, and we rely on the New Mexico EID to do the right thing and not permit this mine.

This is my comment, and I'll -- leave it here?

MS. ORTH: Yes, please.

MR. STREIT: Yeah.

And I've also included a couple photos. I probably could have done a better job with this. They're out of my book, Man vs Fish. And they show the Red River premining. It's a very rare photo from when it was clear and -- you know, like water, clear. And now Red River is almost always a blue-gray color. And that blue-gray color is the standard.

I mean, I've seen it go from what was just normally water -- this is pre-19 -- about 1980, and the well went -- the mine went underground and did huge production about '81, and -- and then at present time, it still has this blue-green color.

At any rate, I've got the photos here. If anybody wants to see them, I don't know if I could --

MS. ORTH: All right. If you'd put them in front by the -- next to the flowers.

MR. STREIT: Yeah.

But that's about all I have, but the photo

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is -- tells more.

So thank you.

MS. ORTH: Thank you very much, Mr. Streit.

MR. STREIT: Thank you.

MS. ORTH: Kathleen Blair.

KATHLEEN BLAIR

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. BLAIR: Good evening.

I'm Kathleen Blair. I am a resident of Hillsboro and have owned property there for approximately 10 years.

I have a PhD in zoology with a concentration in ecology. Particularly I have specialized in the impacts of natural and human-caused changes in natural processes to ecosystems. I have taught a wide variety of university courses as an assistant professor in ecology, environmental biology, botany, wildlife biology, wildlife management at Central Missouri State and West Texas State -- A&M universities and was adjunct at Texas A&M University.

For the last 20 years, I've been an ecologist for the US Fish and Wildlife Service, working on the Bill Williams River National Wildlife Refuge, which is

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right down the stream from the Bagdad copper mine. So I've got 20 years of experience with some of these changes that are potentially being discussed.

I have professional expertise and personal interest in the results of this Discharge Permit.

Copper and other minerals are found in association with it as well as many byproducts of the processing process have been found highly toxic in multiple studies. As a result, I have four major concerns I do not believe that have been adequately addressed relative to the Discharge Permit.

A, federally protected migratory waterfowl and New Mexico wildlife species of concern will be attracted to extremely large and increasingly toxic water feature, as they have been through many such water features in multiplying across the west. Water is just too rare a thing on this landscape not to attract wildlife, in particular migratory waterfowl.

This has resulted in large deaths. It has resulted in selenium contamination of waterfowl and of wildlife and very high cost in fines and remediations to the mines. I see no provision for preventing this from occurring, by finding ways of discouraging migratory birds and other waterfowl from -- other wildlife from these areas.

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B, due to the toxicity of copper, which they are now starting to regulate at public water supplies as badly as it's lead -- they're starting to realize how bad it could be -- as well as the ancillary contaminants, any discharge from any catchment basin, whether it's the pit lake or the evaporation ponds, any of the catchment ponds, anything that is holding water that has a potential to be contaminated by the mine -- whether this is accidental human error or whether it is a natural event in excess of your current projected parameters, it could be severely damaging for people, wildlife and plants in the watershed, including both surface flows or groundwater downstream of the mine.

Such impacts could include the rural residents, watershed, the businesses, the Town of Caballo, Caballo Reservoir, Percha Dam State Park and potentially the Lower Rio Grande mainstem if these discharges are sufficient.

This could easily last for decades and possibly even in perpetuity, into the -- as it has happened elsewhere. In particular, for example, the Bill Williams River, Alamo Lake that has been contaminated by mercury from the Bagdad Mine. They never originally thought it was going to be there. It's naturally occurring.

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However, it is their tailings piles and their exposure of the mercury that has resulted in it becoming into the watershed. Alamo Lake, which is one of the premier bass fisheries in Arizona, now frequently has to forbid people from eating the fish because of the mercury concentration.

There's been for various reasons very little research done on what the potential for that mercury contamination on other wildlife may be.

So sometimes it's the things you're not really looking for in the planning that actually hit hardest.

Copper is necessary in small quantities for healthy plant populations and plant development, but it can be highly toxic at higher concentrations, particularly if it's engaged in water.

It is the primary algaecide, fungicide and herbicide for all aquatic applications. It kills plants in water.

Wind-driven dust from massive tailing piles and other exposure areas of the mine and the dry sediments from the evaporation ponds and other -- the copper tailings pile, the evaporation areas, concentrating sediments that can become windborne, disbursed over the landscape, and when it does rain and comes in contact, it will enter soil and potentially

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surface waters.

Once this rain carries the contaminated dust into the ground, it is -- particularly can be toxic to plants and the mycorrhizal fungi ecology which we are now beginning to discover was really critical to an awful lot of plant and soil development.

It's not an accident if you drive through the lands and hillsides around Santa Clara, around Bagdad, around Globe, around Bisbee look like they've been sterilized. They look like the moon. They have been sterilized. Largely not because of direct water contamination, but because of dust, years of dust sediments settling down in these regions and then being carried by rainfall in the soils.

And if you don't think -- if you have any illusions on the part of the county on using these tailing piles for infrastructure or roadbeds, I suggest you contact Ottawa County, Oklahoma and find out just how much trouble you can get in and just how fast, when those winds lift tailing sediments and -- into a dust and find out how fast your town can become a ghost town like Picher, Oklahoma.

I have concerns with those plant situations, as I mentioned previously, with precisely which plants will be -- will be utilized, which species will be used

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to generate those communities. And as we're learning more and more, there are very specific genetic populations in certain areas that turn out to be quite critical for restorations to be successful.

You can't just sit there and grow buckwheat and Bermuda grass all over the hills anymore and make it work.

All right. Climate change I also do not believe has been adequately addressed, at least to my satisfaction, for the next 25 years to 100 years. Again it was brought up whether this is a -- how long this mine will actually be in production, if it will be concentric or if it will be episodal. Depending entirely on what the price of copper is, it could wind up being stretched out for a time being.

But projections of increasing temperatures in New Mexico for the foreseeable future will result in higher evaporation rates out of many of these exposed areas. This will increase concentration of the contaminants at a rapid rate that -- probably more rapidly than it is being projected at the moment, particularly in those areas when they are combining recycling and reuse, increasing concentrations even more and evaporation. So you could end up with a real nasty situation in a real big hurry.

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Higher evaporation rates will also speed the exposure of toxic sediments through their evaporation of -- around the edges of the ponds or the ponds when they dry out. We do get long periods of droughts. Once again resulting in airborne contaminants that can be an issue for the downstream airshed as well as the watershed.

Second on climate change, flash flooding potential is projected to be increasing over the time this mine is projected to function. The episodic results, it is the -- we are -- it is projected to have longer periods of drought but more explosive and intensive rainfall when it does occur, which increases the probability of being a flash flood, since the soils will not be as good at holding the water back when it does occur.

Furthermore, these sorts of episodic issues with drought will reduce vegetation in the watershed upstream of the area. It will increase the probability of grass and forest fires, all things which will tend to denude a watershed and be much slower in recovery than is -- has been for the last hundred years. And without this vegetation protecting those slopes, again you're contributing to more flash flood severity and frequency.

All right. Such patterns have already been

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documented well over New Mexico, Arizona, much of the desert Southwest as well as other areas that these climate shifts are indeed happening. Such ecosystem processes require decades to regain any sort of stability or the kind of database to make accurate projections.

Hurricanes in the Gulf of Mexico, curiously enough, you might think that they're an issue. Tell that to Ruidoso after Hurricane Dolly came off the Gulf and lost a town just about over the entire thing. So the increased intensity of hurricanes that is projected, not frequency necessarily, but increased intensity to the point they're considering upping the scale to five might not be as high as they go anymore.

One of those comes off the Gulf of Mexico or the Gulf of California, because certainly you do get rainfall results from hurricanes coming in from either the Pacific or the Gulf of Mexico, again increasing the probability of flash flooding that could overwhelm these contained areas over newly contained areas.

Should these contaminated holding areas, whether they're evaporation ponds, whether they're the pit lake itself -- if any of these happen to be overtopped, once again, if they erode, if they fail, even if potentially human error is involved, although

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that may be less probable than environmental issues -- any downstream flow of these contaminated waters will damage property and water resources potentially as far down as the Rio Grande.

There are certain examples of both mine retention ponds being overtopped fail due to flooding, failing due to accidental release due to humor error. Ask the San Juan up in Northern Arizona just exactly what happens when somebody misses by a few inches with a bulldozer.

I see no provision for double emergency retaining structures on any of these. Most of them have a single retaining structure. I don't see an emergency backup on most of these features to protect the downstream watershed from any of these events during the life of these mine evaporation areas and the life of these big puddles.

Thank you.

MS. ORTH: Thank you, Dr. Blair.

Would you be willing to leave your comments --

MS. BLAIR: I need to edit. I've been scribbling all over it all day.

MS. ORTH: All right.

MS. BLAIR: I'll bring it tomorrow.

MS. ORTH: Okay. Thank you.

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Lee Newman?

Is Lee Newman here?

No?

Oh.

LEE NEWMAN

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. NEWMAN: Well, I came tonight to really talk about water chemistry of the tailings pond, my experience with tailing ponds, some technical issues. So I came tonight to talk about water chemistry, soil chemistry, water flows through Animas Creek canyon, with some real numbers.

Now I just left my papers on my seat. I'm not going to go into any numbers at all. I'm just going to talk from my experience and my life of working with mining companies.

Some of the finest jobs I've ever had have been with mining companies, Atlas Minerals, Moab, Utah, Hecla Mining Company, Hitsler Mining Company (phonetic).

At Atlas Minerals, I worked on the tailings ponds on -- I was young -- on keeping them from breaking. We didn't have spillways. And of course, without a spillway, when you have a break the soft

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material that the dam is made of just is gone. Now, our dam at lookout was -- at Atlas Minerals was right along the river, the Colorado River.

When uranium played out in the '70s, boy, it turn from a boomtown to a ghost town. My parents, my friends -- the houses were just let go. Nothing, the town turned to nothing.

The town got together with the Department of Interior, with Bureau of Mines and addressed the big tailings pond that we developed over the years, which is about the size of the one we're talking about for the Copper Flat, 600 acres. You realize 600 acres is huge.

To answer the lady's question back there from this afternoon -- she asked what would happen if the tailings pond broke at the Copper Flats Mine. Okay. 640 acres, one-foot depth -- let's say it dropped one foot. That's not too much. Okay. One foot down Grayback Arroyo off of 640 acres is going to be a 2,065,000,000 gallons. Okay. 2,065,000,000 -- do you realize a billion is a thousand millions?

The number -- the amount of water in tailings that would pour down Grayback Arroyo -- now, if somebody were recreating or hobby gold mining down there, would it take them out? Yes, it would take them out. Now, do I think that's a big issue? No. That's not what the

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big issues are.
The big issues are -- it's our duty to protect the water. Now, I have lived and been in the mining towns all my life, Cobalt, Idaho; Moab, Utah; Durango. I'm just naming the towns that had big tailings piles along the rivers. Every single town in the West that had big tailings pile along the rivers had to deal with them.
Now, in Moab, they had to take the tailings pile inland, mix it with aggregate, with concrete, and stabilize it. That's what should happen to the Copper Flat tailings pile, too. Right away it should be dealt with. It's not maybe. It's a for sure that that tailings pile is going to cause trouble in the future. There's no maybe about it. It has for every single mine in the communities I named, every time.
We've all seen orange creeks. I don't want Animas Creek to turn into an orange creek. Animas Creek is world famous. I mean, it's the beloved creek that Aldo Leopold and his brother fished in in the early 1900s and wrote the book -- and wrote the books about starting the Forest Service and the first hunting licenses. Animas Creek was the beloved Animas Creek. It still is to trout fishermen and -- and naturalists.
So we don't want -- I hope we -- I hope that

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the commission -- I hope that your agencies will protect the farms below the dam, below the mine.
I -- we have a farm, a tree farm. Now, we ship 60,000 drought-resistant trees a year off of our site in New Mexico. Nobody else in the state does it. Nobody else has the expertise to do it. 60,000 trees a year.
The drawdown from the Environmental Impact Statement, which I have over on my seat -- the drawdown from my farm -- and the Environmental Impact Statement says so -- all of my wells will go dry. All of my artesian wells will go dry.
Now, we spent 20 years putting together a system of solar collectors, harnessing the artesian water to water the fields. We've had awards. We were Green Business of the Year, the Governor's Cup award. We've been awarded by the Department of Interior. We were named Finest Tree Growers of New Mexico in The Best of New Mexico.
We have -- this is going to shut us down. This is -- this -- if you draw down the water the way you say you're going to do -- now, which brings up one of my main issues with tonight that I wanted to address, is sodium content of -- of the -- of Animas Creek and the aquifers below Animas Creek.

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It's been my observation from measuring sodium content in 20 years it is going up. Every time we have a drought and the water level goes down in Animas Creek, the sodium level goes up. The water is now so that if my neighbor, Adam Chavez, waters his hay field my wells start pumping air. So we're going to put pressure on that.
So, now, if you say, okay, look, there's probably aquifers below that you guys can all drill in, and that's what the environmental -- everybody know what the Environmental Impact Statement is?
MS. ORTH: Sir --
MR. NEWMAN: It's the document that governs this mine. It's the document that is paid for by Copper Flats Mines. It's the document that describes what is going to go into the water. In the -- in the Copper Flat Mine Environmental Impact Statement, it says the effects from the copper mining will be measurable in Animas Creek for a hundred years after mining stops.
We've got tables and -- that I've copied to distribute tonight, but since we're not into technical, I won't. But the tables show the drawdown are so dramatic on -- on the wells.
Do I sound a little up -- and, well, yeah. Twenty -- it's going to be 25 years of putting this

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together, and then just seeing a mining company come and -- first they want to take the water, and then they're going to put in a giant tailings dam right above us.
Now, what does history tell us? The tailings dam -- every one of them has failed. Name a success. Name one tailings dam that's stable and the community's happy with.
MS. ORTH: Mr. Newman --
MR. NEWMAN: Name one in the west, anybody. There isn't.
So I urge you to do us right for our community and not let this mine have the Discharge Permit, and we hope the State Engineer doesn't give them our precious water and further our problem. You should see the drawdown on -- that they're predicting for Caballo Reservoir and the river.
The drawdown in their own environmental -- nobody talks about that. Nobody talks about the Environmental Impact Statement, because once they wrote it, it didn't look good. So why do they never talk about it? Why is it never brought up? Because it doesn't look good. Because if you read it, a reasonable person is going to go, oh, wow. Wow. This just isn't right.

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So that's what I got to say.
MS. ORTH: Thank you very much, Mr. Newman.
Next we have -- please don't applaud.
Tom Shelley. Tom Shelley.

TOM SHELLEY

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. SHELLEY: Good evening.
My name is Tom Shelley. I worked in the copper mining industry and as a consultant for over 27 years. I also own and operate a cattle ranch in Grant County.
I appreciate mining and the tremendous economic activity and prosperity that it -- that they generate. It's this kind of activity that enables our great way of life. I know by experience that ranches and farms can co-exist with mines just fine.
I support the issuance of DP-1840. It will be a great milestone to see that a mine can be permitted and operated under the extremely stringent environmental requirements here in my home state.
Thank you.
MS. ORTH: Thank you, Mr. Shelley.
The next person indicating a desire to offer

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public comment is George Lee. I believe that's Lee.

GEORGE LEE

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. LEE: Good evening.
My name is George Lee, and I am a resident of Sierra County.
My wife and I have been property owners in Sierra County for the past 13 years. We invested our life savings into our home and property here, and we love our home here. Although we did not intend to do more than quietly retire to Sierra County to enjoy the scenic wonder and rural experience, life took us in a different direction, and we are both now very involved in serving our community. We are stakeholders.
I am not a scientist, but I can read, and I can listen. I believe the studies are in and the science is clear. The Copper Flats Mine is not affecting the environment, nor a threat to the quality of life for the citizens of our county.
What is a threat to Sierra County is poverty, poverty fueled by lack of jobs, lack of opportunities for our youth and declining population. The Copper Flats Mine will help to reverse the economic collapse of

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Sierra County and create opportunity for economic growth.
Sierra County sits at the bottom of almost every negative list of social and economic woes in the entire country. Let's not allow this to continue. Do not let the county and municipalities continue to die a slow death. Permit Copper Flats Mine to help our county revive its economic health.
Thank you.
MS. ORTH: Thank you, Mr. Lee.
Virginia Lee.
Nope. Please don't applaud.

VIRGINIA LEE

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. LEE: Madam Hearing Officer, about the year 2000, my husband and I tried to look for a place where we thought we would retire. We looked on the West Coast. We looked on the East Coast. We looked in Canada. We settled on here.
This place has got a lot to offer. It's got a lake. It's got a lot of things, a hospital. It's got a bowling alley. It's got a theater. It's got a senior center. This is -- this is where we decided we are

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going to spend the rest of our lives. Therefore, I am concerned about anything that happens in this community because this is now my community.
So when I hear about the Copper Flats Mine coming in, as a citizen I want to know the pros and the cons. So I thought about the cons.
All right. It's definitely going to be environment impact somehow. And I'm very concerned when I hear the farmers and the ranchers below saying that they're concerned how it's going to impact them. They are my neighbors.
I'm worried about the air. I'm worried about the ground. I'm worried about the water. I'm worried about after they close what is left, what do we have to deal with, what are we leaving for the generations behind us.
So those are the cons I'm thinking of.
Then the pros, I think about the pros.
There are a lot of jobs coming in. It will be the biggest employer in the county. That will bring GRT in. Do you know what our county can do with more GRT? How many more programs can we start? What is it out there that we can look at that we're not doing now? Maybe we could start a crisis intervention center or maybe some place for -- I don't know, homeless. There's

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just so many things that we can do that we can't now because we don't have the funding to.

And also the pros, when this copper mine opens, it will bring a lot of jobs. That will bring in their families. That will bring in a lot of people. We'll need new homes. They'll -- we'll need more teachers. We'll need a better hospital system. Their families will need jobs, and maybe their families will need qualified teachers and work in the hospitals.

And I can see the population growing, the county expanding, and then new businesses might start. More shopping, things that we need that we don't have now. Maybe we can have an Uber company start or two or three. When I look at what the county can do with the money, to me the pros are -- are really great.

And then I think, well, have they taken care of the cons? Every few months we hear an update about the mine, they're working on this, they're working on that. There are just an awful lot of regulations that they have to go through. And they have planned for this. Every obstacle, I believe, they've overcome. They have -- they have met everything that's been required to protect the environment and to clean it up after they're done and try and restore it as much as they can.

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And then I also think it's not completely fair to judge the past mining operations that have left barren lands on what's happening now, because regulations have changed, and they are now complying with what is -- what is required today. And they are not going to leave it like they've left it in the past. I just don't think that that's allowable.

And so they jump through all of their hoops, and I think they've done everything that they need to do to get this permit. And so as a citizen of Sierra County, I urge you to allow this permitting and allow our county to grow.

Thank you.

MS. ORTH: Thank you, Ms. Lee.

Earl Bridges.

EARL BRIDGES

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. BRIDGES: I just wanted to come up here and -- I'm Earl Bridges. I'm a supervisor at New Mexico Gas Company.

And I'm only a resident here as of three years. I've grown up around Elephant Butte, and I just kind of love this area in general, which is what drew me here, for my occupation.

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But what I wanted to come up here and do is just say thank you. I wanted to say thank you to the investors at the mine and those working for it. Thank you for the opportunity. Thank you for the believing that this could be a mutual beneficial endeavor for my community and for you. Thank you for getting out there and having the tenacity to do something.

And, you know, this community is dying. And if we don't do something, it's going to literally die off. And this is that huge opportunity for us to say that, you know, we're going to take the bull by the horns and try to do something different. And so thank you, you guys coming and stepping in, giving us that opportunity.

I work here in Truth or Consequences. I live at Caballo so I'm not far from the mine. And I realize there's going to be change, but I realize the change is also going to be extremely positive.

I mean, yeah, we got to move some earth, we got to do something to make a mine. But if we're going to employ a huge amount of the locals here, if we're going to employ people that can come in from the state, we're going to be bringing in money, we're going to be changing this atmosphere.

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This community is, like I said, dying off. The atmosphere is one of regression. And I for one would love to see this atmosphere change to a can do attitude and ambition, and I think that this mine could really change this town in general. And I just wanted to thank you guys for bringing that effort.

Thank you.

MS. ORTH: Thank you, Mr. Bridges.

Nolan Winkler.

NOLAN WINKLER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. WINKLER: You'll be happy to know I was told three minutes.

I'm Nolan Winkler. I'm an artist living in Hillsboro for 25 years and presently the vice-president of the Hillsboro Mutual Domestic Water Consumers Association. That should scare everybody.

I've heard a lot since I've been here about the New Mexico copper law, et cetera, but first, I would like to read part of New Mexico's Constitution that I feel is important to granting this Discharge Permit.

Article 20 -- it's very short. Article 22, Section 21 of the Constitution of the State of New

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Mexico says "The protection of the state's beautiful and healthful environment is hereby declared to be of fundamental importance to the public interest, health, safety, and general welfare. The legislature shall provide for control of pollution and control of despoilment of the air, water and other natural resources of this state, consistent with the use and development of these resources for the maximum benefit of the people."

I would ask if leaving at the mine site a 700 vertical feet of steep pit walls after mining protects the state's beauty or health or safety.

And I just heard tonight from a friend in Hillsboro that years ago when her -- her and other friends' children were teenagers they used to go swimming in the blue lake. Nobody knew where they went. They found out later it was the mine site. That -- so that goes to the safety of what the state has done on that site.

Second, I'm confused about letting this Discharge Permit go through at this time as the company that owns the mine has not yet secured enough water to allow it to function more than one-and-a-half to two years annually. If they cannot secure more, that means their 11 years of working time could extend way into the

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future.

My concern on that is trying to learn from history of like mining, would they even be in business so many years down the road. I would ask that this Discharge Permit not even be considered until the mine has secured enough water to function.

Third, I'm told that the reclamation bond of $54 million the mine suggests has not been legally set, and I again ask that the Discharge Permit not be considered until a reclamation bond is in place.

I'm wondering if this entire hearing is not putting the cart before the horse and to whose advantage is that.

Thank you.

MS. ORTH: Thank you, Ms. Winkler.

MS. WINKLER: Should I leave --

MS. ORTH: If you would leave that there, that would be great. Thank you.

Is this Arlene Lynch?

ARLENE LYNCH

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. LYNCH: My name is Arlene Lynch. I'm a 21-year resident of Hillsboro.

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I'm opposed to the mine. My concern is probably not as well thought out as a lot of people who have spoken here today. I didn't even think I was going to talk. But something's on my mind.

As they fill this pit lake, it occurs to me that probably the salinity of the water that goes down Animas Creek is going to increase.

What's going to happen to the guy with the corn field? What's going to happen to Lee with his nursery? To Cindy with her herb and egg farm? To the guy with the peacock?

They're going to -- you can't raise crops with highly salinated water. So that's my real concern. What's the plan for that? Does the mine have plans to compensate these people as their crops fail or the other people that are watering horses?

Again all of this is probably going to end up in the Rio Grande ultimately, and that's another concern, is the Mesilla Valley.

So basically that's what I have to say, and I want the mine to think about what's going to happen to these people. What is going to happen? Because it's inevitable as they draw down the toe of that pit lake that the salinity of the water in Animas Creek is going to go up.

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Thank you.

MS. ORTH: Thank you, Ms. Lynch.

Ryan Gott.

RYAN GOTT

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. GOTT: Good evening.

My name is Ryan Gott. I'm a resident in Animas Creek.

I recently moved from Durango, Colorado. I -- in 2015, I experienced the Gold King Mine disaster, where they had an accident and let out 3 billion gallons of water into the Animas -- contaminated water with arsenic and copper into the Animas River, turned it -- turned the river orange for about a week.

The City of Farmington, which is downstream, had to close their water -- their city water for a week, and it dried out the river for about a couple days once the river started to clear up again.

I have an acre-and-a-half soil farm that I'm raising vegetables and selling at the farmers market, and I'm concerned that my groundwater will -- in the future will no longer be available because they're going to pump all the water out, and I'm -- I'm very opposed

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to the mine, and I hope they don't -- they don't proceed and -- with the mine.

And that's all I have to say tonight, and -- thank you.

MS. ORTH: Thank you, Mr. Gott.

Charles Hacke.

MR. HACKE: It's not Irish. Hacke.

MS. ORTH: Hacke.

MR. HACKE: Deutsch.

MS. ORTH: Ah.

CHARLES M. HACKE

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. HACKE: My name is Charles Michael Hacke.

I'm retired from the Navy. Used to ride bastille by force up north. But during that unpopular war, I got spit on when I came back, but I forgive. That's in the past. That's their problem, not mine. I retired our Navy intel. I know how to use this real good. I have done it. I'm educated.

I've got breaches in Denver. And I worked with Father Downey. I helped him -- assisted him with the seismograph that was under the steps of the admin building. When we go to school, they have to complete

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the predicted earthquake to 64. Our equipment was so degraded. That's what the key was. Everybody else had the fancy, sensitive stuff. As soon as that first P-wave came in, all the galvanometers stuck.

Well, that's neither here nor there, but the point is Father Downey was instrumental in showing how when they do pumping to have -- to get rid of waste products, that's what was lubricating the fault zones. Okay? All right.

Now, after I graduated and went to the Navy and stuff like -- et cetera, et cetera, retired. But I'm also retired from the US Geological Survey Water Sources Division. That doesn't make me an expert. My definition of that expert is ex is a has-been, a pert is I'm good under pressure. Okay.

The only comment I have to make tonight, right now I am not convinced it's in our best interest yet. I think you've got some hoops to jump through. But I think there's some opportunities there. I believe that one man's trash is another man's treasure.

What is in those tailings, guys? I did some uranium geology on the Murray project. And I don't know what cross -- you're going to use an amine reagent.

I tell you what. If you ever see an infrared photograph of North Georgia, you'll see this big dead

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zone that's called Copperhill, Tennessee. There is not one tree that grows on that. And that's from the sulfur dioxide that was emitted from their -- I think that's a roasting process. I don't think it's active anymore.

So it's something to consider. And that's back when they had plenty of water, folks.

Water is life out here, and it's precious. And believe me, you mess up my coffee water, I'm going to be real grumpy and upset.

But there's an opportunity here. Why can't those tailings be recovered and whatever waste products are there -- because I'm sure there's valuable material in that.

You know, I know in the Middle East they do evaporation processes to get freshwater, and they have residue left over. Why can't that be done here? I mean, it's something to consider in the future, put a dome over it, let it evaporate, then you have a pan to come in and scoop that up.

Is that not useful? I don't know. I'm asking. That's -- I think that's an opportunity. You know, maybe a university or somebody can look at that.

I'm not real keen on using a process -- I don't know. How is the water involved in this? Does it involve a reagent of some sort? From what I understand,

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it's a froth -- froth process, where they take all that material off.

Well, let me draw your attention to Cartersville, Georgia, barite district there. They use an amine reagent to take the barite off, and then whatever is left over is put in a tailings pond. Do you know those tailings ponds have never dried? You try to step out on one of those, you're going to disappear.

So why not recover this stuff? Is that possible? I don't know. But right now I'm not real convinced on the basis it's going to be covered. But I think there's an opportunity there.

And based upon -- I've got to do some reading. I don't know anything yet, to be honest. I want to give you guys a fair shake. I'm 73 years old. I'd like to live a little bit longer. But my -- I have prostate cancer from being exposed, I'm sure, to radiation and several other things at my job in the USGS.

And in the Navy, God knows what we were exposed to there. And those radars we had could put an I beam on fire a hundred yards. That's how powerful that was. And some -- just the firemen, no telling what we experienced.

But it's in remission thanks to the good doctors at St. Louis University. And I'd like to be

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able to live further on. But don't mess up my coffee water, because I'll be looking you guys up. I don't really -- I'm not going to hurt you. I will be grumpy.

I just want to be reassured before this thing goes forward. Right now I don't think all my questions have been answered. And I'm saying no. Okay. Unless you think -- and I'm going to be fair about this. You convince me that you've covered all the bases on this stuff.

I don't like the idea of an open pit where wildlife can be attracted. Matter of fact, there was one of these tar sand pits when excess water was put out, and they don't reuse that water. There was a bunch of Canadian geese around that, and guess what, they're a bunch of dead geese.

It's like they -- they -- what's the term I'm looking for? Swimming pools. They are a nuisance in a sense, especially if they're uncovered.

And all I ask is I want to be assured -- well, and I do know that wind can take mine tailings away. History is a teacher. History is prologue to the future. Okay? So when someone says, well, I don't know future, you know, no. I want to be sure that all the Ts have been dotted and the Is crossed. That's all.

And I don't think that's asking too much. How

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about you -- any you of guys live downstream? I live in Las Cruces. I know I talked to one of your permit people, said, "Well, I live in Albuquerque." Well, you're not living downstream.

And I -- I can truly understand the concern of the people whose livelihood -- I would go crazy without a Hatch chile. I mean, it's an important concern. I don't know. Using the groundwater for this, it boggles the mind. I mean, how -- why is that so important? You use that amine reagent, right? Or some kind of reagent to draw it off.

So I got to understand your process a little more closely, be assured that this ain't going to be a fiasco, you know, where somehow you go belly up and you walk away, and guess what, us taxpayers got to clean up the mess. That's all. I think that's a fair question.

Would you like to live in the valley, in Mesilla, downstream, you and your family, and if God forbid something happened to that holding pond. That's a big pond.

I think there's still a lot of things that need to be addressed. Okay? Don't mess up my coffee water. Okay?

MS. ORTH: Thank you, Mr. Hacke.

All right. Please don't applaud.

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Jan Haley.

JAN HALEY

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. HALEY: My name is Jan Haley, and I'm a longtime resident of Hillsboro.

And my main concern is water. I -- I very much appreciate the economic circumstances of this county. I've lived here long enough to see firsthand what that looks like. And I very much agree that we need jobs and we need something that will stimulate our economy.

I believe that -- I guess I believe -- I know I believe -- I believe that water is life and that water is the most important thing that we can have. We cannot live without water. And in my mind, this mining operation is going to affect our water. There is no way it cannot affect our water.

According to the proposed plan by NMCC, when the water -- when the mining operation has been completed, the pit lake, which will be a 2,800-foot-wide hole, will be reclaimed by filling the bottom with water to the equilibrium level. The resulting pit lake will be 21 acres in area and 250 feet deep. It will require

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between 2,200 and 2,900 acre-feet to accomplish this. This would require six months of pumping water nine miles uphill and will take about three years to fill the pit lake.

This is my understanding. I hope this information is correct.

This will be an enormous waste of our already threatened water table, and it seems that this fact alone should halt any discussion of an operation that will both profit a few and threaten the future of our communities and the future of our extensive wildlife population.

So my question is why would this project, which, in my mind, threatens our lifestyle and could mean that this area could become uninhabitable for people and animals, be approved for the profit of a few.

And I wonder if we have learned any lessons from the past. Without water, good water, there will be -- there is the possibility there will be no human life in the future in that area downstream from this mining operation.

And in conclusion, I would like to quote Benjamin Franklin who said when the well is dry, we will know the value of water. That seems true to me.

So thank you.

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MS. ORTH: Thank you, Ms. Haley.
Dan Lorimier.

DAN LORIMIER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. LORIMIER: Hello.

My name is Dan Lorimier, and I'm a 40-year resident of Sierra County, where I live rurally. I've installed and maintain a water well to supply my home and my property.

First, I want to thank the department for holding this public comment session. And thanks also to the Hearing Officer for formalizing it.

I was involved in the development of the Dairy Rule and its stipulated agreement with this agency and New Mexico dairy industry in 2013, '14 and '15. And from that work, I developed a sense of the importance of synthetic liners with leak detection and recovery. I also became familiar with the problems associated with monitor wells and their after-the-fact pollution detection nature.

I oppose this groundwater Discharge Permit as drafted, and here's one reason.

Originally the New Mexico Copper Corporation

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planned a double liner system with leak recovery between the two synthetic liners. So they would have installed a gravel bed, a bottom plastic liner, an underdrain leak collection system plus leak detection censors, a top plastic liner and then the tailings.

The current plan, which is allowed by our new Copper Rule, calls only for a bed of gravel to hold a single synthetic liner and the tailings. It would also have a very mysterious component called an underdrain collection system installed above the liner.

The department should ask how the planned system could capture and recycle leaks above the synthetic liner when its purpose is to recapture leaks between the two synthetic liners.

What this plan calls for is actually an above-drain water capture system that pumps water that's inside the tailings pond to be used for production purposes. Nothing is there to prevent pollution that has made its way past or through the liner from entering the vadose zone and then the groundwater.

Rather than prevent groundwater contamination, this plan proposes to use existing monitor wells. And if pollution is detected, the company will install interceptor wells to pump up and treat the polluted water. Is their financial assurance sufficient to cover

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these formidable potential expenses?

With wide agreement that the unlined tailings pond used in the past is currently causing groundwater pollution, shouldn't the department require this company to install interceptor wells to treat the existing contamination at the outset of their production phase in addition to more monitoring wells?

Shouldn't this company install these wells in anticipation of groundwater pollution from their single lined dump tailings pond that has no leak detection or under-lagoon pollution recycling capacity?

Again, I oppose this plan and this draft permit as written. The department might still fold together their mission to protect and improve our New Mexican groundwater quality while regulating a New Mexico industry as sanctified and ultra-legal as copper mining.

Thank you.

MS. ORTH: Thank you, Mr. Lorimier.

Would you be willing to leave your written remarks there?

Thank you.

Veronique De Jaegher.

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VERONIQUE DE JAEGHER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. DE JAEGHER: My name is Veronique De Jaegher. I live locally in Kingston.

And I am opposed to the granting of the Discharge Permit for many reasons.

First and foremost, I'm concerned about the interceptor system that Dan Lorimier mentioned. It will be placed around the dam of the tailing ponds, a ring of wells that pumps groundwater back into the ground if contamination is detected in the monitoring wells. So it goes back in them.

Are there enough monitoring wells to detect all the contamination? If the water is flowing fast, can't a stream of pollution go between the monitoring wells undetected at the wells?

The same questions can be asked about the interceptor wells. How do they know if all the contamination will be captured? How close do they have to be to each other? How deep do the wells have to be? Have they tested or even designed the system?

If not, who will design and build a system if NMCC is gone, i.e., during reclamation? Does the money

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NMCC leave with the state for reclamation include funds for an interceptor system that might be needed if after closure the monitoring detects contamination?

Another point is NMCC says that it will create -- I heard 270 jobs over 11 years. I know that this issue is not germane to the granting of the Discharge Permit, but the issue is repeatedly brought up by the mine supporters.

First, in the contract that binds NMCC with the Jicarilla Apaches for the water, it is specifically stated that the NMCC will give preference in employment to the members of the nation and to maximize utilization of tribal members in all available employment opportunities. So those jobs won't be local employment after all.

Second, that employment would be temporary because of the stop-and-go mining due to the fluctuation of the copper price and not enough water.

What happens to all those jobs when the mine temporarily closes?

Thank you for your attention.

MS. ORTH: Thank you, Ms. De Jaegher.

If you would leave your written comments --

MS. DE JAEGHER: Yes.

MS. ORTH: -- the court reporter can refer to

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them.

Thank you.

Nichole Trushell?

NICHOLE TRUSHELL

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. TRUSHELL: And like Nolan Winkler, I also thought I only had three minutes so you can be sure this is three.

Good evening.

And I am Nichole Trushell. I live in Kingston. I'm a biologist, and I've lived in the Southwest all of my life.

As a resident of Kingston, you might wonder why I am concerned. This project is not located in my backyard. I care because if the Discharge Permit is granted, wheels will be in motion for stunning quantities of unreclaimable water to be used, for toxic chemicals to be released from the soils and for life-supporting waterways to be threatened.

Groundwater would likely be impacted, as would Animas Creek, a unique ribbon of life running through our dry landscape. The lives and farms of local people, many of whom have lived in along the Animas for decades,

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could be irreparably damaged.

Another thing that has not been mentioned is the beautiful population of Arizona sycamore finds its easternmost population in the Animas Creek. And of course, the Animas does flow into the Rio Grande.

Deciding in favor of this permit is wrong. My key reasons.

One, the toxicity of the massive amount of waste material and its permanence in our system.

Serious questions for me. How can long-term management of the liner be assured? Who truly understands the effects of the underlying geology on the system? Who will monitor this area and the potential for devastating contamination for generations to come? Who monitors it now? Where are those reports? Who will respond when the system failures occur? Who will pay for the long-term care of this project?

Second, the monumental use and toxification of precious water. The amounts of water proposed for operational needs are preposterous in a dry environment. I noted that a figure of 2.3 billion gallons of water was requested by NMCC for yearly operations.

Unlike municipal water, this water can never directly recharge our groundwater. It cannot. Let's quickly calculate. If an average personal water use is,

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say, 125 gallons of water a day, this amount of water alone would supply a city of 50,000 people for a year.

From what I read, third and last point, the economic benefit is very short-term, intermittent and questionable at best. And I note that a foreign company is the greatest beneficiary of this product, not New Mexicans.

In closing, allowing this project is a decision with effects long into the future, very negative effects. If any of the decision-making people have precious family or care about water, you must not grant this permit. This excessive waste and toxic legacy will be yours. The true cost to our water and to our environment is too great. No permit is my vote.

Thank you.

MS. ORTH: Thank you, Ms. Trushell.

William Lindenau.

WILLIAM LINDENAU

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. LINDENAU: My name is William Lindenau. I live in Kingston, in Sierra County, in the Percha Watershed, which is one of the watersheds that could be affected by this mine.

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Get my glasses out because I'm going to need it to read.

I'm opposed to the granting of this Discharge Permit as has been proposed. It is the duty of the Environmental Department to protect the health and safety of the people and the environment from the contamination by toxic materials in the groundwater. Because there is current contamination that has been known for 35 years around this mine, greater precaution should be taken.

The 600-acre, 200-foot-deep tailing storage facility is inadequately protected and monitoring as planned.

The proposed underdrain system does not satisfy the Copper Rule which specifies a tailing seepage collection system because it is above the liner and does not catch contaminants going past the liner and into the groundwater. To do that, NMCC should be required to construct an interceptor system to function from the beginning of operations with verification that NMCC owns enough water rights to operate a sufficient system.

Contaminants from the mine threaten both the Percha and Animas watersheds which drain directly into Caballo Lake and the Rio Grande River. It is your duty

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to protect the lives and livelihood of those citizens who depend on the quality of these waters.

Finally, no permit should be granted until an adequate surety bond is negotiated and secured. This site has had many owners who have departed under bankruptcy. All promises of reclamation at the end of operations are merely that, promises, without an adequate surety bond in place.

Thank you.

MS. ORTH: Thank you, Mr. Lindenau. Thank you for leaving your comments.

Steve Morgan.

STEVE MORGAN

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. MORGAN: My name is Steve Morgan. I'm a resident in Kingston.

I'm also a landscape architect for the past 35 years, and my -- my main work is in restoration and creating habitat.

As my career is coming to a close, I've taken on a new persona. I do living history performances. Many folks don't know who Aldo Leopold is. Fortunately, around here we do. He's considered by many as the most

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important conservationist of the 20th century because his ideas are so relevant to the environmental issues of our time.

He's also referred to as the Father of the National Wilderness System, wrote the first book on wildlife management, established the science of ecological restoration and authored The Sand County Almanac in 1949, which still inspires many to see the natural world as a community to which we belong.

I have spent the last 10 years researching Aldo Leopold writings, and they dovetail very closely with what I practice in my own career.

The one thing that has impressed me so much about Aldo Leopold is that he came to the West here in 1909, and his education and the training that he had he soon found to be quite inadequate to what he actually experienced as reality out in the field. And he changed a lot his thinking.

The one thing that he had a hard time with, which I also understand, is he was reluctant to revisit a lot of the wild areas that he's seen in his younger days, because he knew that they had changed.

He was a good part of writing a lot of the policy that particularly the US Forest Service, but also the BLM, National Park Service, Fish and Wildlife --

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these policies that they follow. I'd like to say a few of his words here which I feel are very pertinent.

"We must quit this thinking about decent land use as solely an economic problem. Instead we should look at each problem in terms of what is ethically and aesthetically right, as well as economically expedient. For a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community."

And "It is wrong when it tends otherwise."

"Ethical behavior is doing the right thing when no one else is watching even when doing the wrong thing is legal."

And one last thing of his words, and I use this line a lot in my talks. "Consider that what you do in the outdoors reflects your own set of ethics. It's your sense of responsibility to this world you exist in."

Now, I strongly believe that if Aldo was aware of this current situation he would have said these words, and quite a few more, but also remind those involved in making this decision that the total cost of this kind of economic destruction is never fully calculated. The amount of New Mexico water involved and the possibility of catastrophic flooding and the

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resulting environmental and economic destruction downstream should heavily outweigh the economic benefit to a foreign company.

I am opposed to granting this Discharge Permit.

Aldo saw many things over his whole career, where things were presented in a certain way, but very often without adequate information.

One of the things he was so adamant about establishing the wilderness system was because he felt that the -- we needed a land laboratory which the wilderness would provide because we needed to study. We needed to understand how the natural processes work. And he felt that if we didn't do that, we were designing policy by guesswork, which is folly.

And I feel that a lot of what we've been hearing with this mine, there's a lot of history that is being ignored.

So I really stress for everybody on these panels to truly look beyond this tiny, really, little bit of economic boom, and look at the long-term effects that this may cause. Our Southwest is a fragile environment. It takes very little to destroy it. And once it is disturbed as a wilderness, it is pretty much gone. You can attempt to restore it, but with our low

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water use, of what we receive in our climate, it is very hard to do restoration.

So I implore you all to look within yourself and really think about the long-term effects of what your decision in possibly granting this Discharge Permit.

Thank you.

MS. ORTH: Thank you, Mr. Morgan.

Please don't applaud.

Steve Buckley.

STEVE BUCKLEY

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. BUCKLEY: My name is Steve Buckley.

Like the Navy person here, I'm retired. I spent 30 years in the Army. I've lived all over the globe, and I've seen a lot of different poverty issues. And working here in the community the last 10 years, on a daily basis. I first came in in the houses and seen the poverty of the community.

And I used to be an instructor at the college here, teaching business and writing business plans and trying to get the young people to develop plans on what they could do with their life. And what we saw mostly

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was the children would come here, graduate from high school and move away. And it has to do with the economics of the community.

And speaking from my heart, I will tell you this community really needs this mine. I drive cancer patients. I'm in houses of people and going into places where -- meeting seniors who -- in their 70s and 80s who are dying or need treatment, and there's no way for them to make additional income, or even a lot of times their relatives have moved away. So we see that all the time.

And I've set through all day yesterday listening to what everybody had to say. The mine has came to our Rotary Club probably -- I don't know. Since 2012, I don't know how many times. And I've set through several briefings.

And sometimes -- I guess I'm not as smart as the rest of the people in this room, but, you know, our federal government and our state government create laws, rules and regulations to protect us. And that's what the whole purpose of this process is. But they protect us by creating these things, and then everybody wants to question are they valid, are they good, are they a high enough standard.

Well, we elect people to create rules and laws, and I believe that they've met the standards that

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were required.

As the treasurer of the Rotary Club in T or C, which represents over 40 members in this community, which are community leaders, civic-minded people, volunteers and businessmen, we are for this mine.

And I will tell you that I understand and I have strong feelings about what I hear from the opposition, and I respect that, and it makes me really proud to be American and be able to hear everybody come in this room and say exactly what they feel. But you have to make the decision, and that's -- you know, that's why we go through this process.

But are the rules that are set forth by the mining organization, the mining laws for the state -- are they valid? Are they used -- are they -- are they used standard being one?

If they are and that's what we're using, and that's what they're meaning to get permitted, then we ought to give them the permit, because they're meeting the rules. Rules are rules, you know, to me. I guess I was in the Army too long for 30 years. Everything is kind of black and white. Right?

But I will tell you from my heart this community is suffering. It is suffering. And they don't wear suits. And they make about $800 a month. If

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it wasn't for the boxes delivered to their house they probably wouldn't be eating.

And I'm shaking. And I'm a command sergeant, major F1 Army, and when we shake, it's because I'm that upset about it.

And I don't know what you all can do to make things better for the community. But this is the right step in the right direction.

I ran the Downtown Management District, watched businesses open and close for two years, tried to get more business in the community. It's a struggle. It's a struggle.

And I thank you for your time.

MS. ORTH: Thank you, Mr. Buckley.

Paul Tooley. Paul Tooley.

No?

Cathy Berger.

CATHY BERGER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. BERGER: My name is Cathy Berger. I live in Animas Creek.

Thank you, Madam Hearing Officer, for the opportunity to express my displeasure at the possibility

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of the issuance of a Discharge Permit for New Mexico Copper Corporation.

I've lived on Animas Creek for 20 years. And I don't know if anyone here who is interested in this process has driven through Animas Creek. It's quite an amazing place. There are magnificent ancient sycamore trees, 350 to 450 years old. So obviously, they predate any, in my opinion, water right or right to life as any other being on this planet. I do consider them to be alive as we are alive.

I wish you would go see what these trees are, how long they've been there and how they could actually be at risk from the proposed Discharge Permit. These are like the redwood trees of the Southwest. If you make a decision -- any decision without seeing them with your own eyes, then you're a derelict in your duties to the people of New Mexico and to the seven generations that follow ours.

The pit lake and tailings pond that are at issue here are 10 to 15 miles up-creek from my home. The water production wells are even closer. I don't think we need an expert hydrologist to tell us that water flows downhill. I am assuming groundwater also flows in a similar manner.

The last operator of this mine left in 1982.

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They left behind a tailings pond without a liner which has been leaking contamination into the groundwater for 35 years. Perhaps we have the cart before the horse here, but I would think that an Environment Department of the State of New Mexico should perhaps be concerned that there is presently contamination leaking into the groundwater from the existing tailings ponds before considering another permit by the same mine to do the same thing all over again.

And what about monitoring wells to monitor the plume of contamination that has already been contaminated with groundwater for 35 years?

By the New Mexico Environment Department's own regulations, there should be interceptor wells in place to pump the contamination of the groundwater back into the tailings pond. In order to do this, there would have to be sufficient water available in the interceptor wells along with the water rights necessary to pump this water. There are no interceptor wells at present.

This mine has had nine owners in 40 years and has only been in operation a total of three months in 40 years. During these 40 years, numerous letters of violation have been sent by the New Mexico Environmental Department, from my understanding, none of which have been responded to. There has been no bonds set to

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ensure that reclamation is adequate.

As a private property owner, who will I seek redress from if the groundwater becomes polluted? Do you think I will be able to find anyone to answer the phone?

This is all just one big scam. It's a water grab, if you ask me. The promise of jobs and money flowing into Sierra County is minimal compared to the impact not just on Sierra County, but potentially the whole Lower Rio Grande Valley. Far more money is generated in the State of New Mexico from tourism than from mining.

Let's change our priorities. Our land is more valuable than your money.

Thank you.

MS. ORTH: Thank you, Ms. Berger.

Please don't applaud.

Martin Mijal.

MARTIN MIJAL

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. MIJAL: So I am against the mine. The mine -- the mine has hired experts to say don't worry, no tailings, no pollution can escape this manmade

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construction and remediation. Copper code in New Mexico laws to protect us. The mine is in compliance with this.

New Mexico Department of Environment wants the mine to put up a bond for 100 years to maintain and monitor any problems that might occur when the mine is closed.

The mine will be in operation -- well, mine will be in operation, leaking massive pollution for maybe 15 years.

I'm reading the wrong one. I'm not ready -- I'm not organized.

What I want to say is the copper code is only -- wants the mine to pay 25 years after it closes for monitoring and maintaining the remediation that they did. So this way the multimillionaires are happy. Our impoverished citizens get wonderful jobs for 15 years of mine operation. And our industry has gold, silver, molybdenum and copper.

So this mine will operate for maybe 15 years, making massive piles of pollution. Maybe the mine will pay for all that 100 years of monitoring and maintenance, but this pollution will not go away. This is a Superfund state -- site, that hopefully it will be contained.

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This site won't be cleaned up, won't be carried away, but the pollution will be covered up and considered good enough.

So imagine the year 4018. If all wells last 2,000 years, all of this is intact. What do we know now that was built 2,000 years ago that's still functioning as designed? Unfortunately, the covered up pollution is probably now uncovered, the pollution is ruining our air, earth and watershed.

So thank you.

This is illegible.

MS. ORTH: That's all right.

Thank you, Mr. Mijal.

Mike Armijo?

MR. ARMIJO: No comment.

MS. ORTH: Okay.

Carl Teston?

Jared Bartoo?

J. Robbin Broddy.

Ron Fenn.

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RON FENN

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. FENN: Okay. Thank you.

I'm a 20-year resident of Truth or Consequences. I retired to this community.

What I have seen over that 20 years has been a great deal of dismay, mostly brought by outsiders, in suits, who have come here and promised great economic wealth and improvement to our community. What the people who don't live here don't understand is this is a retirement community. It's not even a tourist community. It's a retirement community. A third of our population are more our retirement-aged individuals.

Therefore, they do not make an employment pool for a mine. All of the people who will be employed if this permit and this process goes through will be from outside. And from my understanding, this is not going to be a long-term solution to our -- our community's problem.

We currently ignore our greatest resource, our greatest asset, and that is the minds of our people, our retirees. The community constantly wants to ignore the fact that all old people have nothing to offer and do

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nothing for the community itself. Oh, the retirees. There are no programs within this community that are designed to improve the lives of our seniors.

We prefer to have somebody coming in from outside and dropping a pile of money. And guess what. All the GRT in this community is less than a third of our budget. More than a third of our budget comes from stealing money from our electric utilities and our other utilities to make up a $2-million-a-year budget deficit.

The employment of outsiders in a mine operation is not going to improve this situation. Instead of concentrating on what our reason for being is, which is a beautiful place for people to end their lives, in a comfortable, clean environment, is being ignored for the sake of potential wealth.

I sat here 10 years ago when a group of suited individuals from Florida came with great promises of economic benefit for this community. And though the community that filled those benches up there, those seats said to a man "Do not do this," a small group of five individuals said "Okay, we'll do it."

And 10 years since that time, 8,000 acres has gone without a single porta potty being built upon it, and so much for the economic value or the promises.

This is a kind of community that if you don't

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want to live here, you don't want to enjoy the purity of our air, the limited amount of water that we have and the beautiful atmosphere and the -- and the weather, then you're coming here for the wrong reasons.

And unless this country is running out of copper and this is a vital mine for the safety and economy of our United States, as opposed to just another addition to the pot, we are wasting things that we should not, that we will never recover.

There was just a very important publication on the Internet today about our dwindling water supply and the fact that perhaps next year we are not going to have water enough for our farmers. Our farmers sustain us with food. Copper does not. Please remember that and think about it.

And I will leave this with you.

MS. ORTH: Thank you, Mr. Fenn.

J. Khalsa.

J. KHALSA

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. KHALSA: I will keep my comments brief because I feel that everything that I would have liked to say tonight has already been said.

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And really it comes down in my mind to why does a foreign corporation get to come in and tell people who have been living in a place and don't want a mine there that they're going to come in and make money for themselves, take it, and they don't live there. The people who are going to make money on this mine don't live there.

Yes, there may be less than 300 people who will get jobs there in seven years. That's -- that's nothing. And they're probably not even great-paying jobs. They're probably not jobs that require a lot of training or anything. So they're not going to be huge-paying jobs.

And as someone else mentioned, the mine has already promised that the Jicarilla Apache Reservation both get -- get preference on those jobs anyway in order for them to have enough water.

The other thing is the jobs will be very temporary jobs, if the mine can't operate all year long. It's really not going to give this -- this county the kind of economic boom that some people think that it will. And in fact, once it's -- once they leave, it -- all the adverse repercussions will be left with the people who live here. And the money that they -- that the corporation has made will be gone.

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So it just -- everything else has been said. Our land, our water is way more important than short-term profits for a company that won't even offer much to this -- to this area. Yes, we do have needs, but there are many other ways that we can meet those needs without destroying the earth and our environment. And without clean air and clean water, clean land, what else matters?

MS. ORTH: Thank you, Ms. Khalsa.

Denise Barrera.

DENISE BARRERA

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. BARRERA: Good evening.

My name is Denise Barrera.

December 1st of last year, 2017, I was employed as the general manager of Sierra Electric. We're headquartered in Elephant Butte, New Mexico. Sierra Electric is a member-owned, rural electric co-op, serving over 3,150 members with 4,192 meters.

Excuse me.

We serve Sierra County excluding the City of Truth or Consequences, Catron, Socorro and Luna Counties. 99 percent of our meters are in Sierra

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County. We have about 900 miles of line with a density of 4.65. That is 4.65 meters per one mile.

Rural cooperatives have seven cooperative principles that they go by, one being concern for community, which is one of the highest concerns of Sierra Electric, including the economic needs of the members and residents of Sierra County.

NMCC mine will enhance and provide a unique opportunity for growth and sustainability to the Sierra County residents, surrounding counties and the State of New Mexico. It will offset the existing weak economic conditions our county is currently facing. It will allow local companies to provide additional employment opportunities and local governments the resources to improve and develop sustainable critical services for its citizens.

In 1982, when Quintana Mine came online for a short period of time, our purchases went from 18.2 million kilowatt hours in 1981 to 47.5 million. That was an increase of 29 million kilowatt hours, and that was just for the few months that they were in operation.

The NMCC copper mine load is a 40-megawatt load, and at a 90 percent load factor would increase our purchases from 65.4 million kilowatt hours that we sold

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in -- last year in 2017 to 263 million kilowatt hours. We're looking at approximately 197 million kilowatt hours increase.

What does that mean?

This would benefit the economic and financial conditions of our members of Sierra Electric by reducing the burdens of our current ratepayers, which 81 percent are residential consumers. It would allow us to maintain and operate our system and infrastructure without having to increase rates or borrow funds, and it will also open up opportunities for additional economic development projects.

The Sierra Electric Board of Trustees adopted a Board Resolution in February, 2016 supporting NMCC and its investments and efforts in the development of the Copper Flat mining project in Sierra County. And I won't bore everybody with the whereas.

Over two -- over two years later, they continue to strongly support this unique opportunity for growth and sustainability to Sierra County and state economics.

On a more personal note, I have lived here practically my whole life. I graduated from Hot Springs High School. I started my career at Sierra Electric. I left in 1987 for a better job. The last 22 years of my

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36 years in the electric cooperative business, I drove every day back and forth from Deming to T or C for work. While working in Deming, I never moved out of Sierra County.

I have served on numerous boards and committees, one of which I served 12 years on the local school board. As a member of the school board, I handed out hundreds of diplomas to graduating students, knowing that the majority of these kids were going to leave Sierra County for better career opportunities.

And those who remained in Sierra County are faced with higher costs of living and lower wages. My son and his classmates graduated in 2004. My son is in Yuma, Arizona. He has fellow classmates in Las Cruces, Albuquerque, Santa Fe, Dallas, Nashville, and this is just a few of the classmates.

I could go on for hours about what I feel this mine could do for our community. But in closing, NMCC has demonstrated their commitment to Sierra County. They have already invested millions of dollars in this project, and I ask that you please approve the groundwater protection Discharge Permit.

And I thank you for giving us all the opportunity.

MS. ORTH: Thank you, Ms. Barrera.

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If you would leave your written statement, that would be great.

MS. BARRERA: You want the resolution, too?

MS. ORTH: Yes.

Rebecca Dow. Rebecca Dow?

No?

UNIDENTIFIED SPEAKER: She had to leave. She'll be back.

MS. ORTH: Okay.

Anyone who was had to leave before I called their name, again, they are welcome to come back tomorrow. I believe we'll be in hearing at least another couple of days.

MS. BROWNE: You're not done?

MS. ORTH: Sorry.

MS. BROWNE: Are you done?

MS. ORTH: I can't hear you, Ms. Browne.

UNIDENTIFIED SPEAKER: Are you done?

MS. ORTH: No. There are three more yeses.

UNIDENTIFIED SPEAKER: Thanks.

MS. ORTH: Steve and Angela Detloff?

UNIDENTIFIED SPEAKER: They've left.

MS. ORTH: Okay.

James Berger.

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JAMES BERGER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. BERGER: So my name is James Berger. I live up in Animas Creek. So you probably get an idea of where my affections are.

I don't have any earth-shattering revelations, just some practical conclusions about things that are impacting our everyday life.

I've lived in New Mexico most of my life. My parents lived here. My grandparents homesteaded here and were here before New Mexico became a state. And I've lived all over New Mexico, kind of settled in the Sierra County area because I was looking for solitude, a peaceful place to grow food and raise a family. And this looked like a reasonable place to do that. Although it is a harsh climate here, but that's one of the reasons that there's not a lot of people here.

Animas Creek is one of the few areas in New Mexico -- in Southern New Mexico we have year-round running water. It's a natural riparian area. It's beautiful and delicate, and most dependent on the groundwater. And that is where my real concern is.

My sense about discharge of -- water discharge

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of -- from a mining operation certainly concerns me since there are millions of gallons involved, and also a lot of material displacement that certainly can impact, which I'm sure has been gone over many times here today.

One of the things that is of primary concern to me is the fact that there are so many unknowns. With so many things that are unknown, it seems to be a potential for error and -- in the state. We don't have a good or thorough understanding of aquifers, artesian water and in even rainfall-dependent surface water.

There are a good many known facts and statistics, but they all pale in comparison to the unknowns. We can only surmise and postulate about the true nature of what goes on 50 to a thousand feet below the surface.

What tailings of any kind, crushed rock, fine sands, slurry, and a host of other types of debris, we can only postulate what they might do when piled in huge amounts and disbursed on our landscape.

And then when unconditions -- unexpected conditions arise, we have to wonder what is our backup, what solutions are at hand and on what timetable. These are all serious questions that demand serious answers.

Of course, I don't want to see Animas Creek or any other downstream or upstream area potentially

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impacted by toxic discharges. I don't want to see those -- any of those areas destroyed. And so I have to be in opposition to the mining operation at Copper Flat.

And have I -- as I said before, there are just too many unknowns, too much at risk and too few benefits.

Thank you.

MS. ORTH: Thank you, Mr. Berger.

I have two more names. This one is hard to read. It looks like Hans -- Hans Townsend.

Please correct me when you come up.

And then the last name I have is Mary Cavett, Mary Cavett.

Hold on a sec.

Please tell me your name.

MR. TOWNSEND: H-A-N-S, Hans, Townsend.

MS. ORTH: I was right?

MR. TOWNSEND: That was right.

MS. ORTH: Okay.

HANS TOWNSEND

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. TOWNSEND: I live here in Truth or Consequences. I moved here 11 years ago because I saw

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the opportunities that are here. Plus I saw what a beautiful place it was and because has lots of expansion possibilities. It has a great deal of possibilities.

I'm president of the Chamber of Commerce. I own the Desert View hotel, and I work hard and long. I'm a retiree, but I still work 14, 15 hours a day. I'm 71 years old. And I do that for a reason. That reason is moving forward, me and everybody else.

I want to say a few things that are -- I think are very important and that a lot of these things people seem to just ignore.

I get the impression that a lot of people here think there's never been a mine in New Mexico before. The way they talk, something unusual is going to happen, something's going to happen that they've never seen before.

We have -- I think it's over 20 operational mines in Sierra County right now. And there have been hundreds of mines here. Before there was Sierra County, there was New Mexico. Mining was the main trading source of the area by the Spanish and Native Americans inhabitants long before then. In other words, we're talking about over a thousand years.

Has that mining destroyed us? No, it hasn't destroyed us. It's the only thing that's brought any

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prosperity to a lot of people that lived here in those times. Sierra County grew a mine because it was blessed with an abundance of underground resources, resources that many others would be overjoyed to have. We're still here, and the area is still beautiful.

I don't understand when people come up here and make comments that are neither factual nor are they sticking to the things that we know. They want to balloon things. Anyway, it's time that our business community at least realizes the enormous value, the positive economic impact of the Copper Flat Mine will have on the community.

It's time the advantages and true facts are seriously considered and appreciated by the community, not the baseless fearmongering and exaggerated hogwash continually promulgated by those who don't want things to change, most especially the ones who consider themselves to be leaders. These are the people who should be making sure we move forward, not stagnating, and not letting opportunities to our economy slip away.

It's time to come down to earth and realize that all things change. They change for the better, or they change for the worse, but nothing stays the same.

The mining industry has also changed. The way things are mined nowadays is nothing like they were a

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hundred years ago. They don't use the same poisons. It's not done the same way. We've moved forward. Technology advances. Everybody knows that. So I don't know why we're ignoring it here.

The technical advances made over recent years affect just about every aspect of the industry, especially the ability to operate a successful mine that is also ecologically responsible in its operations.

The mine will need several hundred employees, and although local labor will have a chance to be trained for some of the jobs needed at the mine, most of the labor will have to move here because we have had little to offer so most of our young people moved away.

This is not a retirement community. If you want to say what it really is, it's become a retirement community because kids have to go somewhere else. It's not because they don't come here. It's because they can't live here. They need to go. And I'm sure a lot of them don't want to go. But there's nothing here. And there's nothing here because so many people resist anything that means a little change in their lives.

The mine -- let's say 200 people, workers come from somewhere else. There's nowhere for them to live but here. That's a low figure, but if it's 200 workers, that means 600 new residents as an average figure.

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Includes spouses, children. That's a 10 percent population increase in T or C and about 6 percent for the county.

And these are not retirees. These are mostly people of working age, something we need desperately. That will be 400 who do not work at the mine, and some will have skills that we really need in the community. From these 400 family members you can be sure that a percentage of these will look for work part-time or otherwise.

This will also help bring other businesses to our area. We've had lots of businesses look at the area, but because there's no labor here, they don't come.

Having a larger labor pool will draw more business to our area and also improve the growth opportunities for the businesses already here. Does nobody think about that? There's only the people that think about their backyard?

You retire here because you like it, because it's beautiful, because you like the community. If you didn't like the community, why did you come? The community includes kids, includes schools, includes families. They don't survive. So if you've got your retirement check, you think that's all that matters,

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you're in the wrong place.

The new residents will shop, buy gas and use services here in Sierra County. They'll use doctors, they'll use hospitals and our clinics. They'll go to the cinema, the brewery. And they'll need houses and apartments.

There are many here who have the common sense to realize this is an enormous opportunity for the community. Sorry. I'm really concerned about this. I can't believe what I hear. It's time to hear from more of those people about positive support for this one-time, one-of-a-kind opportunity for Sierra County instead of nebulous negatives from repetitive naysayers.

Sometimes they take a fact and they look to bend it out of shape and all reality just to fit their agenda. I've read every piece of paper I could get from those people who are writing the negatives. They don't match up. They don't match up with reality. They don't even match up with reality 50 years ago.

Does anybody read what the mine has put out or what anybody else puts out? Don't you take a balance? Don't you read and compare, go online and look and say what is the truth? Where do I find the truth? Is mining still the same as before with using mercury and -- it's not the same. It's advanced. And we need

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it.

These people are not thinking about the survival of the community. They say these things mostly for personal reasons, selfish personal reasons, to be an antihero, and because they think that's a lot of what the community want to hear. Go read the facts. Read what the mine will do. Read all the things that they've put in, the official papers, the papers that have been checked and tested. Look at reality.

We hear continuous complaining about the state of the roads, our water and sewer systems, electric. And my belief is that if we don't do something, we won't have electric in this town soon.

We have outages over and over again, and the reason we have outages is because most of the money is taken out of the electric and put in the city general fund to keep us alive. But that means they don't spend money on repairs, they don't spend money on upgrades.

Go to some of those transformers out there. I'm surprised they're not all blowing up. That has to come to an end. And one day it will come to an end. And if we don't do something to move forward, that's where we will really go backwards.

This is partly because Sierra County is very poor, one of the poorest in the US, not just New Mexico.

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That's not going to change unless we help it change. And this is about the best jobs you're going to get.

MS. ORTH: Thank you, Mr. Townsend.

If you'll leave your written statement so the court reporter can refer to them.

MR. TOWNSEND: Thank you.

MS. ORTH: Mary Cavett.

MARY CAVETT

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. CAVETT: Well, for a moment, I had a lovely picture from Hans' testimony of all these Chiricahua Indians coming into our community to work. I love native people.

Native peoples, though, are the truth keepers of the land, and they are the ones all over the world that talk about how we used to have clean water, how all the countries of the world had clean water, and they don't, because of -- because of mining and fossil fuel extraction.

And I would just like to see this community kept as pristine as it is. We already have seepage from the last mine at the same spot.

I visited our sister city, Silver City, and I

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talked to the people in Hurley, and they have just been issued a notice from the water company not only don't drink the water, but don't even brush your teeth with the water.

That could happen here. I don't want to see it happen. I really want us to keep our water safe and our air pure.

Thank you.

MS. ORTH: Thank you, Ms. Cavett.

Ma'am.

MS. DOW: I was out when you called my name.

MS. ORTH: Oh, all right.

Come up to the table.

Do you need a break?

No?

THE REPORTER: We're almost done, right?

MS. ORTH: We are.

Thank you.

Tell us your name and be sworn in.

MS. DOW: Thank you so much, madam.

My name is Rebecca Dow.

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REBECCA DOW

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. DOW: Thank you, Madam Chair, and thank you for being here.

And my name is Rebecca Dow.

And I've listened to the testimony and thoroughly enjoyed pulling into the parking lot full of vehicles that are as a result of extractive industry and natural -- our use of natural resources.

And I've heard the saying before if you can't grow it, you must extract it, and that is what has afforded us the privileges that we enjoy, the quality of life we enjoy in America and around every developed world.

And I -- I noticed several people when they were coming up to testify their beautiful native jewelry, the turquoise, the silver. That was extracted from the land. And we all appreciate the beauty of that jewelry.

I also have noticed folks commenting on the research that they conducted in their home on the Internet using their computers. All result of extractive industry.

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And we've come to this point where we are trying to balance between being responsible for the environment and dealing with the adverse poverty that has plagued this community for far too long.

I have the privilege of working -- being a state representative for District 38, which is known as New Mexico's mining district, and to be able to look at the statistics and look at the data around this district, and one of the first things that surprised me was to see that District 38 had an average household income of over 40,000 a year, which caught my attention because here in Truth or Consequences the average household -- household income is around 29,000.

And one of the reasons I ran for office was to find economic opportunities, because I have spent the last 19 years of my life providing services for children in adverse poverty, children with the most adverse childhood experiences, victims of poverty, victims of abuse, victims of neglect. And to see the correlation between poverty and the life experiences of children drove me to run for office.

And I've been able to knock on doors and visit this district and learn that our average household income is a result of the mining district and the mines that are open in Grant County, which includes my

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district.
And to knock on those doors and see the beautiful historical buildings that have historical significance, and many of the people in this room that are testifying against mining industry that are living in those homes, some of the most beautiful homes in our district, built on the incomes of people who made their living in extractive industry.
So it seems -- it's conflicting to me as a state representative to be asked to stop extractive industry, but to increase natural -- to increase alternative energy, being asked to tap the permanent land grant fund for universal access to preschool, to fund single-support, single-parent insurance, which costs the state millions -- we don't even have a price tag, when all of these things that we do have -- many of the things that we do have come from the permanent land grant fund, which is a majority of extractive industry.
We are a mineral-rich state. And to have an organization that has come and put in millions of dollars to try to be the first mine to open in over 25 years, and to go through this process and to get to the point where they -- from listening to the testimony and the E-mails that I've been reading, that they've given the best effort that's happened so far to meet the

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requirements to receive their Discharge Permit, that if it does meet the state's requirement it should be permitted.
I mean, there's other hurdles to cross, but at this point, this is the conversation that we're asking for. We're asking the state if you agree that they've met those regulations and they've met the standards, that they should be permitted.
The cost of copper is only going to go up as we demand and require alternative energy. This is a resource we have in our district that can address not only what many people in my district demand, alternative energy, but to address the poverty that plagues this community.
And I've heard people talk about the hole in the mountain or the areas being mined and what it looks like afterwards. And I've heard people testify today about poverty.
The correlation of poverty and the fact that more women in this district are on antidepressants than not, the fact that more children are born to teen mothers than not, the fact that the result of that is multigenerational poverty and children experiencing domestic violence, falling asleep on park benches at the age of four, the experiences that children have

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described to me, coming to school on Monday in the same clothes they left on on Friday, is very ugly.
And it comes at a high price to our children, to their innocence. They're not safe, they're not protected. They have no food security. They need help. And here's an opportunity, a real opportunity. And every person in here who testified against mining is using extractive industry in their day-to-day lives.
So I just ask for you if they've met the standard to issue the permit.
MS. ORTH: Okay. Thank you, Ms. Dow.
We've come to the end of the names on the sign-in sheets.
Ms. Browne, are you going to be with us tomorrow?
MS. BROWNE: On day one on page 4, I signed up. I'd rather not wait until tomorrow.
MS. ORTH: You would. Okay.
Please go to the table.
MS. BROWNE: You have it?
MS. ORTH: I don't have day one. I have day two.
MS. BROWNE: This is day two.
MS. ORTH: Yes.
So we're going to hear from Ms. Browne.

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CANDACE BROWNE
having been first duly sworn or affirmed, gave public comment as follows:
PUBLIC COMMENT
MS. BROWNE: So my name is Candace Browne, and I've lived in Sierra County for the last 21 years.
And I want to thank the State of New Mexico for allowing us to have this public hearing, because they didn't have to do it. And I really appreciate it.
I -- I have just been overwhelmed by listening to people talk about -- about how they feel about this. I have felt my heart open, and I have felt my heart close, and I know what it's like to make a decision based on your heart being open and a decision based on using your mind.
When I first came to Sierra County, practically the first day I was here, they happened to have the first meeting about the concern about the mine, and it was people on Animas Creek. And when I heard about the mine -- and I've been here. I've seen Animas Creek, and I've seen the sycamore trees.
And I said -- I came from back east. I knew nothing about mining. I knew nothing about concerns about water. And my heart said they can't do it. If they do, they'll kill the trees. And the trees are

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really important to us for many reasons.
So that was my heart opening up 21 years ago, and I've been involved in concerns about this mine ever since then. So I've been doing things to try to stop the mine for 21 years.
And I didn't have a computer until this mine came on board, and so I really didn't know a whole lot about mining, water rights, how they look things up, how to look up other issues. But since then, I have spent countless hours, and I have tons of data.
And I wanted to ask people, but most of them are gone, and say, you know, how many of you have read and -- you know, let me see the hands of the people who have read. But that's my mind, and that's not really what I want to do.
So I'm just going to start reading some of the things that I wrote down before I heard all these wonderful things being said by people.
I am indeed seriously and very sincerely concerned about the overwhelming possibility of environmental pollution if this copper mine is allowed to open.
I am opposed to you granting this permit for the discharge of the wastewater unless -- and I think you're the one who gets to make the decision?

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You're not. Okay. I don't know who does make the decision anymore. I thought it was the New Mexico Environmental Department, then I found out it wasn't. Anyway.
But whoever it is, I want them to be 120 percent sure that this mining company, THEMAC, who is financed out of Australia, who calls themselves the New Mexico Copper Company, that was set up in Canada, that they have proven with detailed documentation in all areas and beyond a doubt that they intend to protect our Sierra County environment from any waste water contamination or including anything else that might contaminate our environment, and I want this -- this detailed documentation to include anything following closure.
And I want them to prove beyond a possible doubt that they will take every possible precaution to protect our fragile desert environment, which is already stressed to the max right now with serious drought conditions.
I've brought to this public hearing some of my research, which I began in 2011, and I've been doing it continuously until last night. Some of my research is included inside a notebook that I will hand in following my comments, and I ask that this written comment be

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added to the public record of the hearing.
My -- my comments in my notebook are basically focused on that heavy duty plastic liner called the HDPE geomembrane liner which will be laid out on the ground of the -- we don't know exactly how many anymore, but I've heard a lot of figures, but at least 547-acre tailing storage facility, which is commonly called the tailings pond. And it's designated to hold 100 million tons of rock and generate acid mine drainage.
Well, I really want us to be proud of our New Mexico Environmental Department, and I also wanted to make it really easy for whoever needs to look at my notebook that they wouldn't have any trouble finding it.
And also, as many people have spoken up with their hearts open, that whoever it is that makes this decision really is protecting and guarding our New Mexico air, our New Mexico earth, our New Mexico wildlife and our New Mexico plants. So I wanted to bring some really simple symbols to help whoever looks at the notebook to -- to remember that.
And since when I wrote these, it was the New Mexico Environmental Department that I thought I was going to be speaking to, then I thought I was going to be speaking to you, and then I -- now I don't know who I'm speaking to, but all of you get to be -- I am

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designating all of you our guardian bears. The bear is a great guardian.
So anyway, I have the book. So here you go. So you won't have to wonder what it is you're protecting. There you go. White bear. Whoever you are, you're the white bear. Okay? And these are my comments.
So I want -- I want to thank you for hearing these comments, and I want to ask for your -- to think about in a sincere and knowledgeable way and to put all your attention on the details of this permit, and please make it carefully with -- and feel that you're fully informed.
I also wanted to make a couple of other comments. If -- they talk about -- people have talked about the mine bringing in jobs, and they've already said a lot of things about that.
But the thing is that if the water is used, we have very little water left. The reservoir is down. The last I heard it was at 4 percent. When I moved here 20 years ago, it was full. And it's the farmers not only south of us, you know, on the Rio Grande, but it goes -- has to go all the way down to Mexico. And there are people everywhere who need this water.
If we don't have it, if it's poisoned, or if

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we poison billions and billions and billions of gallons of water with this mine, those people won't have it. Those are jobs that will be lost. Those are people that won't have a way to make a living. So what's the trade-off? And that water won't come back for a hundred years? All of you who know what that answer is?

So when we think about jobs, we have to think about that.

Also, people have talked -- people have talked about other mines in this state. And because I got interested in mining, I learned about the uranium mines up in the Navajo area, and I'm reading a book right now called Yellow Dirt, Yellow Cake. I don't even remember the name of it.

But the Navajos have a disease now called Navajo neuropathy because of the uranium mining, and they -- and people tried to stop that mine. They tried to stop it from happening. But they couldn't because people turned their backs. People were told they'd be fired. That is genetic for the Navajo people.

So there may be -- there may be something good about mining somewhere, but there are places where it's not okay, and there are times when it needs to be stopped and not allowed.

Thank you very much.

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MS. ORTH: Thank you, Ms. Browne.

So that's the end of our public comment for this evening --

THE REPORTER: Ms. Browne, will you leave your papers.

MS. ORTH: Oh.

Ms. Browne.

MS. BROWNE: Oh, I'm sorry.

MS. ORTH: Would you leave your written comments.

MS. BROWNE: What about it?

MS. ORTH: If those are not what's reproduced in that green folder, if you'd leave them, the court reporter can refer to them, your written comments.

MS. BROWNE: Oh, this little bit?

MS. ORTH: Yes.

MS. BROWNE: Okay. Good luck trying to figure these out.

MS. ORTH: So I will invite public comment on every subsequent day of the hearing. So if you know someone who wants to comment, please encourage them to come back.

We are adjourned for the night, and we'll reconvene tomorrow morning at 9 o'clock.

And the decision-maker in this matter is Butch Tongate, cabinet secretary of the Environment Department.

(Proceedings adjourned at 7:50 p.m.)

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STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, CHERYL ARREGUIN, the officer before whom the foregoing proceeding was taken, do hereby certify that the witnesses whose testimony appears in the foregoing transcript were duly sworn or affirmed; that I personally recorded the testimony by machine shorthand; that said transcript is a true record of the testimony given by said witnesses; that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this proceeding is taken, and that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in the action.

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STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT
No. GWB 18-06(P)

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840

TRANSCRIPT OF PROCEEDINGS

Volume 3

BE IT REMEMBERED that on the 26th day of September, 2018, this matter came on for hearing before FELICIA ORTH, Hearing Officer, at the Ralph Edwards Auditorium in Truth or Consequences, New Mexico, at the hour of 9:05 a.m.

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I N D E X (Continued)

E X H I B I T S

E X H I B I T S (Continued)

MS. ORTH: Good morning.

My name is Felicia Orth, Hearing Officer appointed to conduct a hearing in the application of New Mexico Copper Corporation for a groundwater discharge permit for the Copper Flat Mine, which is DP-1840, docketed by the hearing clerk as GWB-18-06(P). This is day 3 of that hearing.

We broke into the technical case last night to undertake -- to take public comment last night. As I said, folks who were not there last night may still give public comment.

I don't see anyone in the room not -- is there anyone here not affiliated with a party who would like to -- well, Mr. Mijal, hi -- who would like to offer -- make an indication that they want to offer public comment at some point?

John, the hearing clerk, will indicate to folks signing in from here on out that -- if they indicate that they want to make public comment, he will tell them that we will make sure to take them on the next break, in connection with the next break.

So are there any preliminary matters, anything we have to address before we resume the cross-examination of the Department panel by Mr. de Saillan?

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No?
All right. Thank you.
Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
KURT VOLLBRECHT, BRADLEY REID and JOSEPH MARCOLINE
having been previously duly sworn or affirmed,
were examined and testified further as follows:
CROSS EXAMINATION (Continued)
BY MR. DE SAILLAN:
MR. DE SAILLAN: I think the next witness I'll be talking to is Mr. Reid.
Good morning, Mr. Reid.
MR. REID: Good morning.
MR. DE SAILLAN: I actually don't have very many questions for you. I had some plans at one point of giving you some more detailed comments on the draft Discharge Permit through some friendly cross-examination questions, but we didn't quite have the time to do that. So I'm going to ask you about a few other things related to -- mostly to the Discharge Permit.
MR. REID: Okay.
MR. DE SAILLAN: The first thing I want to ask you about is the -- the cover that is to be placed on top of the waste rock piles.

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My understanding is that that would be a three-foot cover?
MR. REID: That is correct.
MR. DE SAILLAN: And do you know what material New Mexico Copper will be using for that cover?
MR. REID: Yes. They did a soil survey early on in the Discharge Permit process, and they identified reclamation cover material down near the tailing storage facility, the storage -- tailing storage facility. They will also be salvaging alluvial and colluvial material from beneath Waste Rock Stockpile 3.
Those are the primary sources that I'm aware of.
MR. DE SAILLAN: Okay.
And will that be combined or used separately?
MR. REID: The two sources?
MR. DE SAILLAN: Right.
MR. REID: Well, they have -- there will be three growth media stockpiles, and I would imagine that they would place the material that they collect closest to some of the growth media stockpiles that are identified at that Discharge Permit application.
MR. DE SAILLAN: Okay.
And will there be amendment made to the -- to that material?

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MR. REID: Not that I'm aware of.
MR. DE SAILLAN: Okay.
And how much material is going to be needed?
MR. REID: I don't know the answer to that off the top of my head.
MR. DE SAILLAN: Do you know an approximate number?
MR. REID: You know, 36 inches over the -- you know, the mine units that have potential to discharge water contaminants. So --
MR. DE SAILLAN: Right.
So we're talking the waste rock piles?
MR. REID: The tailing storage facility, anywhere at the process facility area where there's impacted materials that have the potential to generate water contaminants, the historic waste rock stockpiles and the -- you know, where the impoundments that will be closed out will need cover, as well.
MR. DE SAILLAN: Okay.
So that's quite a bit of material.
Is there enough available at the sources that you referenced a minute ago?
MR. REID: I believe they have identified that there is enough cover material available.
MR. DE SAILLAN: Okay.

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Now, you testified earlier, and I'm going to paraphrase a little bit, that the Copper Mine Rule sets certain standards for copper mine facilities that the Environment Department is essentially bound to follow.
Do you recall that testimony?
MR. REID: Yes.
MR. DE SAILLAN: Okay.
Now, the Copper Mine Rule also allows the Environment Department to place additional requirements in the permit that go beyond the requirements of the Copper Mine Rule; isn't that true?
MR. REID: That is correct.
MR. DE SAILLAN: And all the Environment has to -- Environment Department has to do really is to give an explanation of the reasons for those additional requirements; is that correct?
MR. REID: That is correct.
MR. DE SAILLAN: Okay.
And that -- just for the record, that's in 20.6.7.10.1 NMAC.
Is that your understanding? Is that what you're referring to?
MR. REID: Yes, subsection I of 20.6.7.1 NMAC.
MR. DE SAILLAN: Yes. Thank you. I misread my -- my writing here.

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Okay. And I want to ask you a few questions about abatement.

There is a provision in the permit that essentially incorporates the ongoing abatement process into the permit; is that correct?

MR. REID: That is correct.

MR. DE SAILLAN: Okay.

And as I understand it, and the testimony from -- from yesterday or the day before was that New Mexico Copper has submitted a Stage 1 Abatement Plan to the Environment Department.

Do you agree with that?

MR. REID: I would agree. Yes.

MR. DE SAILLAN: And when was that submitted?

MR. REID: The Stage 1 Abatement Plan was submitted originally, I believe, in 2011, and then there was an amendment submitted to the Stage 1 Abatement Plan submitted later that year, maybe October, 2011. There was a status report submitted in 2013, and then there was a results from the first year of Stage 1 investigation submitted in 2014.

MR. DE SAILLAN: Okay.

So has there -- which -- of those different documents, which one is the final Stage 1 Abatement Plan?

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MR. REID: We -- we haven't approved, you know, the Stage 1 Abatement Plan at this point. They -- well, no. We did -- we have approved the Stage 1 Abatement Plan. I guess it would be the amendment to the Stage 1 Abatement Plan that was submitted in October of 2011. That would be the one that was approved.

MR. VOLLBRECHT: Mr. de Saillan, if it's okay, could I --

MR. DE SAILLAN: Yes. If you want to elaborate, Mr. Vollbrecht, that would be fine. Thank you.

MR. VOLLBRECHT: I'd love to, yes. Thank you.

That -- I mean, the Abatement Plan that was originally submitted, that's a proposal to do a site investigation, and as is typical of other facilities, once you start to gather information, that plan can change, it can be added onto.

And I would suggest that everything that they've submitted is a component of the Stage 1. The Stage 1, the intent of that is to determine the nature and the extent of the -- of the impact. And so as you learn things, you may put in new wells, and the plan would evolve over time.

MR. DE SAILLAN: Okay.

So that -- what would have been -- or what do

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you see now as the -- the final Stage 1 Abatement Plan? Is it all of the above?

MR. VOLLBRECHT: I would suggest it is all of the above as well as we're requiring some additional wells as a component of this permit.

One thing to bear in mind that's probably not clear from the record is that we kind of ran into some -- I guess I could say conflicting requirements when we were embarked on the NEPA process with BLM and whether or not BLM would allow additional wells prior to them finishing the NEPA process.

And so we've been working with that federal agency with respect to timelines. The NEPA process is pretty close to being complete. They couldn't allow things to happen out there that could be construed as components of the Mine Plan because it would have to go through its own separate NEPA process or be included in the NEPA process for mining.

And so it -- it wasn't quite as straightforward as we would have liked it to have been.

MR. DE SAILLAN: Okay.

MR. VOLLBRECHT: So I would say Stage 1 is still ongoing.

MR. DE SAILLAN: Okay.

So has New Mexico Copper submitted a final

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site investigation report to the Environment Department?

MR. REID: They've submitted results from the first year of sampling and, as Kurt mentioned, that in the permit, you know, we are actually requiring more sampling, another year of sampling from the Stage 1 abatement wells. So at this point, there is no final Stage 1 Abatement report that we have -- that has been submitted or approved by NMED.

MR. DE SAILLAN: Okay.

When you say a final Stage 1 Abatement report, are you referring to what the regulations refer to as the final site investigation report?

MR. REID: Yes.

MR. DE SAILLAN: Okay.

So this has been a fairly lengthy abatement process.

MR. REID: It has.

MR. DE SAILLAN: So at this point, do you know what the company plans to do for final abatement?

MR. REID: I believe in the results from the first year of investigation they did -- there are recommendations in there, you know, some of which involve source control.

I can think of an example at the tailing storage facility, the plume that exists beneath the

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historic tailing storage facility, if it were to be covered with a synthetic liner, that would provide source control for the plume.

MR. DE SAILLAN: Okay.

But that has not been approved yet.

MR. REID: It has not.

MR. DE SAILLAN: Okay.

Okay. I have no further questions for Mr. Reid.

Thank you, Mr. Reid.

I will next proceed with Dr. Marcoline.

Give me just a second here.

Good morning, Dr. Marcoline.

MR. MARCOLINE: Good morning.

MR. DE SAILLAN: Now, first -- get the mic here.

First, I want to ask you about the water balance calculations that you referenced in your written testimony.

MR. MARCOLINE: Okay.

MR. DE SAILLAN: Now, there was no citation in your written testimony.

So could you tell us what -- what you were referring to there?

MR. MARCOLINE: In the direct testimony, the

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water balance calculations that I was referring to primarily dealt with the water moving through the waste rock stockpiles as well as the open pit capture.

MR. DE SAILLAN: Okay.

And where can that be found?

MR. MARCOLINE: The -- I believe that information is from the -- some of it's in the Stage 1 Abatement document, some of it's in the Hydrologic Consequences report and the 2014 and 2012 modeling reports.

MR. DE SAILLAN: Okay.

Anything else?

MR. MARCOLINE: Those are -- I think those are the dominant ones that I looked at, predominant ones.

MR. DE SAILLAN: Okay.

But it sounds like you're suggesting that there were some other things that you looked at?

MR. MARCOLINE: I looked into them in more depth, if that's what you're asking. Yes.

MR. DE SAILLAN: Okay.

And I guess what I'm trying to get at is what are the other things that you looked at?

MR. MARCOLINE: Specifically what I looked at in more depth was the -- was the modeling and the water balance calculations, potential for water to move

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through the waste rock. That's where I spent most of my time.

MR. DE SAILLAN: Okay.

So is there -- you talked about the predominant things.

Are there some secondary things that you looked at that are relevant?

MR. MARCOLINE: I also did look into the literature a little bit more. I looked into the -- some of the leakage from the liner numbers.

MR. DE SAILLAN: What was that last point?

MR. MARCOLINE: The literature and the calculations for leakage of water -- or potential leakage of water through the liner -- synthetic liner system.

MR. DE SAILLAN: And where was that, that last item?

MR. MARCOLINE: The New Mexico Copper presented that in Appendix B of -- I believe of the Hydrologic Consequences report.

MR. DE SAILLAN: Okay.

Now, you also -- in your written testimony, you reference a New Mexico Copper Corporation evaluation of liner leakage, and it -- you assume a 0.5-gallon-per-minute leakage rate; is that correct?

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MR. MARCOLINE: No. I think that was a calculated number, not an assumption.

MR. DE SAILLAN: Okay.

And do you agree that the leakage rates could easily be substantially more than .5 gallons per minute?

MR. MARCOLINE: You know, I think that's completely speculative. I think there's a lot of interesting information. Those numbers were based on averages from peer-reviewed literature studies. I think there's case study for larger leaks and there's case study for smaller leaks.

MR. DE SAILLAN: Okay.

Now, you -- have you reviewed any of the references that say that leakage rates can be significantly reduced through quality control and testing?

MR. MARCOLINE: Yes, sir.

MR. DE SAILLAN: And can you name any of those sources?

MR. MARCOLINE: Yeah, I can. I guess we could -- we could start with, you know, some -- there's some dominant references that keep coming up, and actually they came up in New Mexico Copper's work, they came up, I believe, in some of your expert's direct testimony that was submitted.

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So the predominant references that have been least referenced in this hearing are found basically from either Giroud or -- and Bonaparte, back -- old -- 25-year-old studies, '87, '89. These folks -- at least Giroud is still around, too.

So there's also some additional references that were looked at, like Abigail Beck. She -- she's not a -- questionably, I think she's considered an academic now, but she's been probably one of the leaders in liner tech and testing and especially with new technologies and models.

So if you look at some of these older, '89 studies which allow these base -- these things have been based on -- they're pretty old. They're fairly old. There's been some EPA studies that I've looked at, physical case studies around the entire country on liner leakage.

But if you look at -- even in -- in recent as editorials and publications like, say, Geosynthethica, from this year, there was comments from Giroud himself who basically said with new types of liner testing, potentially like arc testing or something like that, same references that are referenced about liner holes are saying that liner defects could almost be eliminated with proper testing.

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MR. DE SAILLAN: Okay.

How much practical experience does the Ground Water Quality Bureau have with liners at mine sites?

MR. MARCOLINE: Not a whole lot, I'm sure. The -- you know, a lot of the PLS systems and things like -- and those type of collection systems at the larger mines are lined systems. The bureau themselves have -- the bureau itself has numerous lined facilities throughout the state.

But again, you know, the technology has been changing with liner industries. Some of the earlier PVC liners, we've seen major failures in places like Santa Rosa where you maybe have a pinhole leak, but your geology is very different. You have Karstic environment where your fluids start dissolving the underlying material, and then you have big blowouts.

But those are not the type of failures we've been seeing at these large mine sites.

MR. DE SAILLAN: Do you think it would be a good idea to use for the tailings facility instead of an 80-mil liner a 100-mil liner or a 120-mil liner?

MR. MARCOLINE: Or an 80-millimeter liner?

You know, I don't really have an answer to that. It's -- I don't know. I don't know. Again, I did review the literature and the calculations on this

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site, but I'm not the liner expert. I will say that.

MR. DE SAILLAN: Okay.

Next you discuss the groundwater monitoring system.

And I was wondering if New Mexico Copper Corporation provided any description of the hydrogeology near the monitoring wells to justify their location.

MR. MARCOLINE: That I'm aware of, I did not see the justification -- no. I would say not that I'm aware of. No.

MR. DE SAILLAN: Okay.

Now, you say that the proposed monitoring well system provides an appropriate initial basis for monitoring, and you seem to suggest the possibility of additional wells; is that correct?

MR. MARCOLINE: I can see how you -- how you interpret that way. The -- I would think I have to step back a little bit.

You know, until we actually understand the system better, I think, you know, we go off of the best information that we have.

And that's where I mentioned in my written -- or my spoken testimony yesterday that we look at the geomorphology, we look at what we think the projected head and the flow directions are going to be, contacts,

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geologic contacts, and that's basically what -- you know, we have the core rods -- core rods, and that's essentially how -- what we've used as identified if initial basis is appropriate.

Really until those wells are in and everything's being monitored, we may not know if we need more or not.

MR. DE SAILLAN: Okay.

Would you agree that additional wells would be desirable?

MR. MARCOLINE: I'm always someone who likes to see more data. So is it necessary is a different question. Desirable? Yeah. I'd love to have it be a Cape Cod aquifer, over 200-some wells, but it's not practical, practicable.

MR. DE SAILLAN: Okay.

I don't think we're talking about that many wells, but would you like to see a few more wells out there?

MR. MARCOLINE: I think at this -- at this stage the number of wells out there with the additional ones that Brad has put in the permit is appropriate.

MR. DE SAILLAN: Okay.

Okay. Next I have a few questions about the andesite bedrock that you referenced.

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First of all, where on the mine site is the andesite bedrock located?

MR. MARCOLINE: The andesite bedrock is a pretty large volcanic unit basically. The andesite bedrock that I was focused on predominantly was in and around the Animas, the east side of -- west -- east side of Animas Creek where the waste rock stockpiles -- the new ones will go.

The quartz monzonite and the brecciated zones are actually within -- kind of encompassed within the andesite, as well. So the andesite is bigger. So some of the -- some of the borehole testing of andesite was actually up on the -- on the west/northwest side of the pit, I believe, as well.

So it's a pretty big, intrusive unit.

MR. DE SAILLAN: Okay.

What is the area that underlies the Number 2 and Number 3 waste rock piles?

MR. MARCOLINE: I don't have that number off the top of my head.

MR. DE SAILLAN: Do you have an approximation?

MR. MARCOLINE: I don't. I've walked it, but I don't know the area.

MR. DE SAILLAN: Perhaps Mr. Reid could help us with that.

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MR. REID: Yeah. Let's see.

Yeah. Waste Rock Stockpile 2 will be approximately 49 acres, and Waste Rock Stockpile 3 will be 122 acres upon full build-out.

MR. DE SAILLAN: Okay.

So if I have your numbers in my head correctly, it's about 170 acres?

MR. REID: That's correct.

MR. DE SAILLAN: Okay.

Now, Mr. Marc -- or, Dr. Marcoline, you testified about a number of pressure tests that New Mexico Copper Corporation conducted on some of the andesite; is that correct?

MR. MARCOLINE: Yes, I did.

MR. DE SAILLAN: Okay.

And could you explain your understanding of how these pressure tests were performed?

MR. MARCOLINE: I think there were several different types of tests that were performed. Some of those were older, and they were deep borehole tests. I believe that was a 90 -- actually, I don't know the well numbers, but they were older tests, deep borehole tests on the andesite.

MR. DE SAILLAN: Okay. I'm talking specifically about the pressure tests.

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MR. MARCOLINE: Okay.

MR. DE SAILLAN: And I think those were done on andesite and some quartz monzonite at one time period? And I'm trying to get at your understanding of how those pressure tests were done.

MR. MARCOLINE: Some of the -- some of the testing was fairly simple, like a slug -- a slug test basically, slug test rebound. You're basically measuring -- you're either displacing water or pulling water and measuring rebound. There are also some pump tests that were done.

Those two -- or those wells -- exact wells I don't know. The lower one was a pump test. The other two were -- I believe were simple slug tests. I could be wrong.

MR. DE SAILLAN: So I'm sorry. You said that two of the wells were pump tests and one of them was a slug test?

MR. MARCOLINE: I believe so, yes.

MR. DE SAILLAN: Okay.

And the one that was a slug test, that was done in conjunction with a number of other tests that were performed on monzonite?

MR. MARCOLINE: I'm not sure.

MR. DE SAILLAN: Okay.

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I think in your testimony you took issue with the testimony of -- or the comments of one of our experts who indicated that the hydraulic conductivity of several of the tests was lower than what has been -- the andesite has been characterized as.

MR. MARCOLINE: Um-hum.

MR. DE SAILLAN: And you pointed out that those tests were performed in quartz monzonite? Do you --

MR. MARCOLINE: I do recall it was my -- my recollection was it was Table 5-2, something, where the -- the samples that were -- that had a lower hydraulic conductivity -- or a lower hydraulic conductivity than that 10 to the minus-6 were in the quartz monzonite, were not in the andesite sample.

MR. DE SAILLAN: Okay.

And was that slug -- were those slug tests?

MR. MARCOLINE: I'm not sure. I'd have to go back to the -- that information was in the Stage 1 Abatement. I'm not sure.

MR. DE SAILLAN: Right. Okay.

Okay. In reaching that conclusion, you relied on the Stage 1 Abatement Plan report?

MR. MARCOLINE: I believe for the -- the numbers in the -- on the Table 5-2, the Stage 1

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Abatement report had a description of the testing for each of those wells.
MR. DE SAILLAN: Okay.
Well, let's take a look at that report.
And I have a document that Kendra is going to pass around that's been marked as the Ranches Exhibit Number 39.
That should be a three-page document.
Okay. Now, the first page there is a title page from the Stage 1 Abatement report from May, 2014, and that's Bates number 09579.
The second page is Table 2 from that report, and that's Bates number 09592.
And the third page is a well completion diagram from Appendix A of the same report, and that's Bates number 09655.
And this is the report that you're referring to; is that right?
MR. MARCOLINE: Yes. That is correct.
MR. DE SAILLAN: Okay.
Now, two of the wells -- let's take a look at Table 2 there, which is on the second page.
The two wells that you reference -- or two of the wells that you reference are on lines 1 through 4 of Table 2; is that right?

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MR. MARCOLINE: I believe it's the second -- yeah. And then -- but also I believe there's the GWQ-5R.
Is that correct?
MR. DE SAILLAN: Right. Let's focus on those first two ones for now. Okay?
MR. MARCOLINE: Okay. Yep.
MR. DE SAILLAN: Okay.
So those are labeled GWQ96-22A and 22B and GWQ96-23A and 23B; is that correct?
MR. MARCOLINE: That is correct.
MR. DE SAILLAN: Okay.
And just for the record, could you explain what the designations A and B refer to in these monitoring well numbers?
MR. MARCOLINE: I'm not sure. They typically -- typically the A and B is an alluvial and a bedrock, but I'm -- in Copper Flat, I'm not exactly sure.
MR. DE SAILLAN: Okay.
But do they indicate the multiple screens within the well?
MR. MARCOLINE: The -- there is a -- it does show the screened interval for A is the shallower -- or it says the total depth is shallower than the B. So it

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does show the screened intervals, as well. Yes.
MR. DE SAILLAN: Okay.
Now let's look over on Table 2, the column marked geologic unit.
It looks as though 22A and B is indeed completed in andesite, but it also looks like 23A and B is completed in the quartz monzonite, doesn't it?
MR. MARCOLINE: That's correct.
MR. DE SAILLAN: And now let's look at the last page, which is the well completion diagram for Well 23A and B.
And according to this diagram, most of the well is completed in quartz monzonite; is that correct?
MR. MARCOLINE: I don't have that last page.
I have one -- GWB96-23. Okay.
Is that the correct one?
But not 22.
(Discussion off the record.)
MR. MARCOLINE: Okay. You're looking at GWB -- or GWQ96-23.
MR. DE SAILLAN: Yes.
MR. MARCOLINE: Okay.
MR. DE SAILLAN: And so does it appear that that well is completed in quartz monzonite?
MR. MARCOLINE: It sure does, yes.

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MR. DE SAILLAN: And in particular, the well screens are in the quartz monzonite units?
MR. MARCOLINE: Yes, it does. It looks that way.
MR. DE SAILLAN: Okay.
Now let's look back at Table 2.
And I would ask you that the well screens in -- actually you could look in either place, I guess.
The well screens appear to be pretty deep in the monzonite, don't they?
MR. MARCOLINE: Yes.
Is this -- is this A, or is this B?
I don't see --
MR. DE SAILLAN: Well, both of them really.
MR. MARCOLINE: Okay. I see them.
Repeat your question. I apologize.
MR. DE SAILLAN: So that the well screens, both of them appear to be pretty deep, right?
MR. MARCOLINE: They're both in the andesite. Yes. The second one in the -- the nested well B is a deeper one.
MR. DE SAILLAN: Right.
MR. MARCOLINE: The well screen in the nested well B appears to be deeper, somewhere around 150-, 250-, 100-foot screen, it looks like. Big screen.

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MR. DE SAILLAN: Okay.
MR. MARCOLINE: And it looks fairly deep.
The other one is a -- relatively shallow. The alluvial well is fairly shallow. Looks like it's between 50 and 100.
MR. DE SAILLAN: Between 50 and 100?
MR. MARCOLINE: That's what it looks like to me.
(Discussion off the record.)
MR. DE SAILLAN: All right. Let's look at the table.
What does the table say about the depth of the well screens?
MR. MARCOLINE: The table is -- the table looks correct. It looks like what I just read. It says -- the table says that the alluvial aquifer is screened between 50 and 100 and it's in a quartz monzonite. That appears to be correct.
MR. DE SAILLAN: Okay.
MR. MARCOLINE: The basal well, or the bedrock well, whatever B stands for, is screened between 150 and 250, which I believe is approximately what I said, in the quartz monzonite, as well, if you look in the geologic unit.
MR. DE SAILLAN: Okay.

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And what is the depth to the water table?
MR. MARCOLINE: In this picture -- or in this diagram, it looks like it's around 41.37 feet whenever this was conducted, 1996.
MR. DE SAILLAN: Okay.
Now, let's take a look at another report.
So I'm going to ask Kendra to pass around a document that's marked as Ranches Exhibit 40.
Now, this is from a document that's entitled Amendment to the Stage 1 Abatement Plan -- excuse me -- Abatement Plan Proposal for the Copper Flat Mine. It's dated October 14th, 2011.
The first page is the title page, which is Bates number 02192.
The second page is Table 2 from that report, which is Bates number 02201.
The print on that table is pretty microscopic. I apologize for that.
But I want to take a look at a few of the wells on that table.
So the first one is well GWQ-4, which is four lines down.
Do you see that?
MR. MARCOLINE: Yes, sir.
MR. DE SAILLAN: And first of all, what type

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of well is that?
MR. MARCOLINE: It says it's a supply well.
MR. DE SAILLAN: Okay.
And what geologic unit is it completed in?
MR. MARCOLINE: It's in -- it says it's in andesite.
MR. DE SAILLAN: Okay.
Next let's look at Well GWQ-6(N), which is about six lines down in the table.
Do you see that?
MR. MARCOLINE: Yes.
MR. DE SAILLAN: And what type of well is that?
MR. MARCOLINE: That is also a supply well, completed in the andesite.
MR. DE SAILLAN: Okay.
And then let's look down near the bottom of the table, there's a well that's labeled as the Pague well, or the Pague well, or the Pague well. I'm not sure how to pronounce that. P-A-G-U-E?
MR. MARCOLINE: Correct.
MR. DE SAILLAN: And what type of well is that?
MR. MARCOLINE: It's a supply well -- or -- it's a supply well.

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MR. DE SAILLAN: And what geologic unit is it completed in?
MR. MARCOLINE: It says it's in andesite.
MR. DE SAILLAN: Okay.
And the next well I want you to look at is the Dolores well, which I think is right below the previous one.
And what type of well is that?
MR. MARCOLINE: It's also a supply well within the andesite.
MR. DE SAILLAN: Okay.
And the next well is the Paxton Well.
What type of well is that?
MR. MARCOLINE: It is a supply well in the andesite.
MR. DE SAILLAN: And the next well is labeled LRG-4156 well.
What type of well is that?
MR. MARCOLINE: A supply well.
MR. DE SAILLAN: And what geologic unit is it completed in?
MR. MARCOLINE: This table says andesite.
MR. DE SAILLAN: And at the bottom of the table is LRG-4159 well.
And what type of well is that?

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MR. MARCOLINE: It is also a supply well, completed in the andesite.
MR. DE SAILLAN: Okay.
Now, in your testimony, you say that it is reasonable to assume that the bulk hydraulic conductivity of the andesite is between 10 to the minus-7 and 10 to the minus-11 centimeters per second.
If that were the case, would you expect to have all these supply wells completed in the andesite?
MR. MARCOLINE: If that's true, then no, I would not. I -- but I haven't looked at these wells. I don't know -- some of these are very old, the '40s, '30s, and I don't -- haven't looked at the geologic logs. I haven't looked at any testing data on them.
So I -- but based on the assumption that they were logged correctly, then yes. I would agree.
MR. DE SAILLAN: Okay.
Dr. Marcoline, given our conversation the last few minutes on the andesite and the hydraulic conductivity of the andesite, do you stand by your conclusion expressed in your testimony that it is reasonable to assume that the hydraulic conductivity of the andesite is on the order of 10 to the minus-7 to 10 to the minus-11 centimeters per second?
MR. MARCOLINE: Based on the wells that I

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looked at, I would -- I would still stand by that. 96-23, I would say yes, I would -- warrants a second look.
Do you have the log for 22?
MR. REID: Yeah.
MR. MARCOLINE: Hold on.
The other well that I have referenced is clearly in the andesite, as well. It warrants looking at.
MR. DE SAILLAN: Okay.
So would you agree that it would be a good thing for New Mexico Copper Corporation to do further characterization of the andesite?
MR. MARCOLINE: Like I mentioned earlier, I'm not opposed ever to actually having real good data. So I wouldn't be opposed to it. I'm not positive that it's necessary at this point, as I stated in my direct -- in my written testimony yesterday.
MR. DE SAILLAN: Okay.
But do you at least have a question as to whether it might be necessary based on our conversation today?
MR. MARCOLINE: I guess I could repeat what I just said. Based on our conversation today and on what I said yesterday, the -- I stated that the -- my

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decision of -- or my -- not my decision, but my evaluation of water moving to the groundwater beneath the waste rock pile was not conceptually based on the conductivity of the andesite.
While I think it would be good to know that or -- it would be good to know that and more details on anything, at some point it becomes -- it becomes academic, and I think -- I think at this point we have enough information on that.
This information -- this does raise question of this Monitor Well 23B, which actually -- which actually was tested. The other wells we brought up, again, I don't know anything about them. They're older. They're supply wells.
I work -- I've worked on hundreds of drill rigs, drilling operations, and, you know, typically -- let's just say I've seen a very large variety of -- in terms of quantity -- quality of well logging, and especially depending on the drill method and if they're using mud and if it's chipped or how it comes up, it's -- you know, I've seen a large variety and quality of logs, especially older logs. So --
MR. DE SAILLAN: Okay.
What about fractures in the andesite? There are fractures in the andesite, correct?

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MR. MARCOLINE: Correct.
MR. DE SAILLAN: Now, essentially, as I understand it, you're basing your testimony on two data points, the well that's Number 22, that we agree is in the andesite, and the other -- the other well where the slug test was performed.
Now, if neither of those borings crossed a fracture in the andesite, would you have a complete picture of the hydraulic conductivity of that andesite unit?
MR. MARCOLINE: No. But I would -- I would correct your statement a little bit, that my -- you know, the only portion of my testimony which I would agree to that is that one statement about the feeling confident about the hydraulic conductivity of the andesite based on those wells.
So the other portions of my testimony I -- was explicitly saying that the hydraulic conductivity of the andesite, in my opinion, was not the dominant factor.
Does that make sense?
MR. DE SAILLAN: I don't think I quite understood your answer --
MR. MARCOLINE: I was essentially making a clarification to your question, but --
MR. DE SAILLAN: My question referred to the

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possibility of fractures in the bedrock, and -- let me start over.

You are using at this point essentially two data points for your conclusion that the -- that it's reasonable to assume that the hydraulic conductivity of the andesite is 10 to the minus-7 to 10 to the minus-11 centimeters per second.

Given that, if neither of those data points went through a fault, would you have a complete picture of the hydraulic conductivity of the andesite?

MR. MARCOLINE: I understand your question now. I think that was phrased better.

I agree. I agree, you know, but -- I agree with that statement for sure. We're also looking at a scale -- you know, we look at a scale system. We have two -- at this point, that's what we had, is two points, and based on those two points, I think it is a reasonable conclusion.

The chance that a 100-foot screen interval or close to a 100-foot screen interval does not intersect fractures, it's anybody's guess. It's probably very likely that the difference in the two values from the two tests other than method could very well be because one of them intersected shallower fractures than the other. But it is possible.

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MR. DE SAILLAN: Okay.

Did you do any kind of statistical analysis on whether those two data points, or even three data points as you initially believed, would give you a reasonable level of confidence that you had representative samples of -- I believe earlier the testimony was 170 acres of andesite that underlines the proposed waste rock piles?

MR. MARCOLINE: Considering that the andesite was not -- the hydraulic conductivity of the andesite was not a driving factor in my analysis, I was comfortable with that.

MR. DE SAILLAN: Okay.

Dr. Marcoline, thank you.

I have no further questions at this point.

And, Madam Hearing Officer, I would like to move for the admission of the Ranches Exhibits 39, 40, 41 and 42, which are the four exhibits that I used in the cross-examination of the Environment Department witnesses.

MS. ORTH: All right.

Are there objections?

MS. BARNCASTLE: No objection.

MR. BUTZIER: Was Exhibit 42 the one that was the Marcy Leavitt excerpt?

MR. DE SAILLAN: Yes, it was.

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MR. BUTZIER: I do object to that, because that is a -- like a two or three pages from a very lengthy document, and I just don't think we should admit it into the record without seeing more context for that document.

MR. DE SAILLAN: I can provide you with the rest of the document if you don't have it, Mr. Butzier.

MR. BUTZIER: I would appreciate that, and I would still have an objection to admitting those two or three pages into this record.

MR. DE SAILLAN: And what would be the grounds for the objection?

MR. BUTZIER: Because I haven't yet seen what you have just offered to show me. I'm happy to look at it, and maybe I would withdraw my objection later, but right now I still have an objection.

MR. DE SAILLAN: Okay.

MS. ORTH: All right.

Mr. Knight?

MR. KNIGHT: No objections.

MS. ORTH: All right.

So the other exhibits are admitted, 39, 40, 41 and -- sorry -- 42 -- I'm out of order now.

39, 40 and 42.

41 is the Marcy Leavitt testimony, and we'll

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wait pending Mr. de Saillan's production of the rest of that, and I'll invite your objection when you've seen that.

(Exhibits Ranches Exhibits 39, 40 and 42 admitted into evidence.)

MR. BUTZIER: So, Madam Hearing Officer, that was 41 that I objected to?

MS. ORTH: Yes.

MR. BUTZIER: Thank you.

MR. DE SAILLAN: I think that might have been my mistake. My apologies, Mr. Butzier.

MR. BUTZIER: No problem.

MS. ORTH: Okay.

And you're finished, Mr. De Saillan?

MR. DE SAILLAN: I'm finished with the Environment Department witnesses. Yes, Madam Hearing Officer.

MS. ORTH: All right. Thank you.

Ms. Barncastle, do you have questions of the department witnesses?

MS. BARNCASTLE: Yes, I do. Thank you.

CROSS EXAMINATION

BY MS. BARNCASTLE:

MS. BARNCASTLE: I will start this morning with Mr. Reid.

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Good morning.
There's been testimony about the removal of alluvial material from the Waste Rock Stockpile Number 3 and 2. It was slide 36 from the Finch presentation.
Do you recall that?
MR. REID: Yes.
MS. BARNCASTLE: Do you have that slide in front of you?
MR. REID: Not directly, but I -- it was from Mr. Finch's that showed a geologic map of the waste rock stockpile superimposed?
MS. BARNCASTLE: Yes.
Madam Hearing Officer, may I approach the witness?
MS. ORTH: Yes.
MS. BARNCASTLE: So I'm going to show the witness slide 36 from the Finch presentation.
Do you have that?
MR. REID: Yes. I'm familiar with it. Yes.
MS. BARNCASTLE: Okay. There's been some confusion about whether or not the alluvial material will be removed.
Do you have any information that may enlighten us?
MR. REID: Yeah.

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Which alluvial material are you talking about? Can you be more descriptive, please?
MS. BARNCASTLE: Well, there's the alluvial material on that slide.
Do you need it in front of you again?
MR. REID: Yes.
MS. BARNCASTLE: It's designated in yellow. Uh-oh.
MR. REID: The yellow flowers?
MS. BARNCASTLE: The yellow flowers, yeah.
See right under Waste Rock Stockpile Number 3, there's alluvial material designated in yellow? Do you see that?
MR. REID: I do, yes.
MS. BARNCASTLE: There has been some testimony that the alluvial material will be removed.
But my understanding is some of that alluvial material is under an existing waste rock stockpile; is that correct?
MR. REID: Yeah. I believe Waste Rock Stockpile -- Existing Waste Rock Stockpile 3 is over on the western portion of proposed Waste Rock Stockpile 3, and they will be -- I think it's actually this part that's represented by daf.
So the part -- so to answer your question, no.

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The alluvial material will not be removed beneath the Existing Waste Rock Stockpile 3. New Mexico Copper has proposed to remove alluvial material beneath the proposed Waste Rock Stockpile 3, and any stormwater conveyance channels will be excavated down into the bedrock.
So any alluvial materials that are encountered beneath the toe of the proposed waste rock stockpile will be removed, and stormwater channels will be excavated in the bedrock.
MS. BARNCASTLE: Thank you. That's significantly more helpful.
Mr. Reid, you also testified that should groundwater contamination occur, installation of an interceptor system would be required; is that correct?
MR. REID: I believe I didn't say that explicitly. I think I stated that if groundwater contamination were to occur, that NMED could require a corrective action which could include an interceptor system. Yes.
MS. BARNCASTLE: What other types of corrective actions might NMED require?
MR. REID: Installation of additional monitoring wells. We could require a geochemistry study to try to better define the nature and extent of the

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groundwater conditions in question.
MS. BARNCASTLE: Is it possible that NMED would not require any remediation?
MR. REID: If groundwater were in the monitoring wells, groundwater results show they're above standards, the New Mexico Copper would be required to do -- implement source control measures which could include an interceptor system or abatement measures.
MS. BARNCASTLE: And what would an interceptor system look like?
MR. REID: Well, typically interceptor systems are emplaced in wells, and they are pumping systems. There's other types of interceptor systems that could be installed, depending on kind of site-specific conditions, including cutoff wells or seepage collection trenches.
MS. BARNCASTLE: So it's possible that there could be a pump-and-treat system? Is that what you referred to initially with the --
MR. REID: Yeah. A pumping system that would intercept the contaminated groundwater, and that would likely be -- return to the process water reuse circuit. So I would say it would not be -- it would be part of the process water circuit.
MS. BARNCASTLE: I'd like to direct you to

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Section C105C.2 of the draft permit as amended in August and presented yesterday in your testimony. That would be as amended in August of 2018.

MR. REID: Is this about the tailing storage facility?

MS. BARNCASTLE: Yes.

Do you have that handy?

MR. REID: I do.

MS. BARNCASTLE: What does it mean to -- that the permittee shall, quote, submit to NMED documentation of compliance with the Dam Safety Bureau of the Office of the State Engineer?

MR. REID: Well, as was testified -- as we heard in previous testimony the past -- yesterday, New Mexico Copper will be required to get a dam safety permit for the tailing storage facility. So the New Mexico Copper will be required to submit compliance with Dam Safety Bureau regulations and including an approved dam permit.

MS. BARNCASTLE: So the actual permit is required.

MR. REID: Yeah. They will need to have a dam permit before any activities occur at the tailing storage facility.

MS. BARNCASTLE: And NMED is requiring that

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permit be provided to NMED before construction can occur, the final permit issued by OSE Dam Safety Bureau.

Sure, Mr. Vollbrecht.

MR. VOLLBRECHT: I -- Ms. Barncastle, I think demonstration that they have that permit could take probably a number of different forms. An approval letter from the State Engineer would suffice, and anything that -- that was provided by New Mexico Copper we would also confer with the Office of the State Engineer.

We talk with them on a regular basis at sites that we have a joint interest in, and so we would certainly -- not only would be required to receive that documentation, but we would also follow up with the State Engineer to make sure that all the requirements had been met.

MS. BARNCASTLE: In fairness, my concern is that I wouldn't want to see documentation of compliance in the form of "We're going through the process and that's sufficient." I would like to see a final permit issued. And that's what I'm trying to make sure that the department will require.

MR. VOLLBRECHT: Understood. That is what we will require.

MS. BARNCASTLE: Thank you.

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I'll move on to Mr. Vollbrecht.

You just stated that you work with OSE -- and I'm so sorry about the colloquial use of the term "you" again -- that the department works with OSE regularly. You mentioned in your direct testimony that the agency took a cooperative agency approach to this application, and you included Mining and Minerals Division, BLM and other agencies.

What were those other agencies?

MR. VOLLBRECHT: The Mining and Minerals Division, the Office of the State Engineer, the Bureau of Land Management. I believe Game and Fish attended some of those meetings. It would be difficult for me to go through at various times. It's been a seven-plus-year process, and there have been a variety of different participants in those -- in those meetings.

MS. BARNCASTLE: At what point were those other agencies involved?

MR. VOLLBRECHT: I could say from the get-go the New Mexico Environment Department entered into a cooperative agencies agreement with BLM and M -- the Bureau of Land Management also had those agreements with a number of other agencies. I can't fully comment on the extent of those and who were all involved.

MS. BARNCASTLE: From the get-go being defined

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as from the time the application was submitted or from sometime before that?

MR. VOLLBRECHT: The original application to the department for the Discharge Permit was submitted in 2011, and the cooperating agency process started around that same time, in 2011.

MS. BARNCASTLE: What was OSE, the Office of the State Engineer's, contribution to the cooperative agency approach?

MR. VOLLBRECHT: They typically had someone attend meetings. We had monthly meetings for some number of years. It wasn't always monthly. I think at times when things were slowing down they would become less frequent.

But, you know, my recollection from in the early days I did attend those meetings, there were 20 people in the room, a variety of regulators, different agency representatives, New Mexico Copper representatives, as well as the contractors on location doing the NEPA work.

MS. BARNCASTLE: Who from OSE attended those meetings? Do you recall?

MR. VOLLBRECHT: Yeah. Kevin Myers was the -- from my recollection, the primary person attending those.

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MS. BARNCASTLE: Was he an attorney? Hydrologist? Something else?
MR. VOLLBRECHT: Mr. Myers is a hydrologist. He used to work for the department. He worked for the State Engineer for a number of years. He's actually now with the Mining and Minerals Division.
MS. BARNCASTLE: Okay.
Did the Office of the State Engineer provide written comments regarding the permit, the draft permit?
MR. VOLLBRECHT: I do not believe so. They did receive a copy, but we did not receive written comments from them.
We have had conversations with staff from the Dam Safety Bureau. I've spoken with Chuck Thompson, who is the chief of that bureau. We've also had conversations with the technical staff person who has done the review of various documents.
MS. BARNCASTLE: Was the Office of the State Engineer involved in the meetings regarding surface water determination?
MR. VOLLBRECHT: I cannot say to that. I'd have to look back through the record and look at who attended those meetings. They wouldn't necessarily have an interest in that.
MS. BARNCASTLE: Why is that?

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MR. VOLLBRECHT: The pit lake is not a dam, and the determination on that would not be something that would be associated with water rights.
MS. BARNCASTLE: It's not considered a new appropriation of water?
MR. VOLLBRECHT: That would be, but that's not relevant to the discussion of whether or not it is a surface water of the state.
MS. BARNCASTLE: Did the Office of the State Engineer at any point in time provide comments to the department, written or otherwise, that helped the department shape this permit?
MR. VOLLBRECHT: I do not believe so.
MS. BARNCASTLE: Let's talk a little bit about the public's participation now.
Your testimony yesterday was that PN-1 was issued in 2011; is that correct?
MR. VOLLBRECHT: That is correct, with the -- with the first application that was provided.
MS. BARNCASTLE: And then another PN-1 issued in January of 2016?
MR. VOLLBRECHT: I believe that is correct. Yes.
MS. BARNCASTLE: And then PN-2 was finally issued on February 2nd of 2018.

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MR. VOLLBRECHT: That is correct.
MS. BARNCASTLE: You also testified that you received several -- you being agency, and I apologize again -- the agency received several requests for extensions of the public comment period?
MR. VOLLBRECHT: That is correct.
MS. BARNCASTLE: How many requests for extensions were received?
MR. VOLLBRECHT: I can't recall the exact number. There were a few, several.
MS. BARNCASTLE: And was the comment period extended?
MR. VOLLBRECHT: Yes, it was.
MS. BARNCASTLE: What was the extension? How many days was it extended by?
MR. VOLLBRECHT: It was -- the original was -- public comment period was 30 days, and the extension was for an additional 60 days, for 90 days total.
MS. BARNCASTLE: Were there any additional requests for extension toward the end of the 60-day period?
MR. VOLLBRECHT: I believe there were.
MS. BARNCASTLE: And why were those not granted?
MR. VOLLBRECHT: That was an upper-level

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management decision, I could say.
But in general, the requests for extension were directed at, I believe, concerns about folks saying we need more time to review the record to decide whether or not we would have a hearing, and the department had determined right away that -- that we were going to have a hearing on this matter. There was significant public interest going back years even. There was never a question as to whether or not we would have a hearing.
And so --
MS. BARNCASTLE: And you're aware -- are you personally aware that the Elephant Butte Irrigation District sent an Inspection of Public Records Act request to the department?
MR. VOLLBRECHT: I am familiar with that. Yes.
MS. BARNCASTLE: Are you aware of when that Inspection of Public Records Act request was responded to?
MR. VOLLBRECHT: I do not have those dates at my fingertips.
MS. BARNCASTLE: Would you agree that it was sometime after the public comment period closed, that the documents were finally provided to the EBID?
MR. VOLLBRECHT: I could say maybe two things.

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Number one is whether or not the department filed a response to IPRAs appropriately, in a timely manner is certainly not the subject of this -- this particular matter. But we did meet all the particular -- all the requirements of the Inspection of Public Records Act.

MS. BARNCASTLE: Would you agree that failing to respond to a Inspection of Public Records Act request prior to the public comment period would impact a party's ability to fully and completely comment?

MR. VOLLBRECHT: I would once again say we responded to all Inspection of Public Record Acts in a timely manner and in accordance with the law. The record in this case became rather voluminous, perhaps more so than was necessary, but we included everything in the record as appropriate.

MS. BARNCASTLE: Is the public participation the same for all discharge permits no matter what their size is?

MR. VOLLBRECHT: The rules require a minimum of a 30-day public comment period.

MS. BARNCASTLE: So for an application that's 100 pages long, it is treated the same as an application and record that is 18,000 pages?

MR. VOLLBRECHT: The department typically

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issues public notice for 30 days, as required by the rules, and when we do get requests for extensions, we consider those on a case-by-case basis. And in this case, we did extend the public comment period to 90 days.

MS. BARNCASTLE: In your opinion, was 90 days sufficient for the public to adequately contribute given that the department had over seven years?

MR. VOLLBRECHT: That public comment period is really to -- for the department to determine whether or not a public meeting or a public hearing should be held. A full review of the record is something that would be more in alignment with a proceeding such as today.

And so in the department, as I stated previously, it was quite clear we were going to have a hearing on this matter, and that based on, you know, the time frame for the hearing, which is now -- where are we? September? Back to February, it's been seven months. And you're right. The record is very extensive.

MS. BARNCASTLE: So it's been seven months since the PN-2 was issued, but it hasn't been seven months since the record was made available to the public; is that correct?

MR. VOLLBRECHT: The record has been made

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available to any parties who requested to review the record.

MS. BARNCASTLE: And the Elephant Butte Irrigation District requested review of the record on February 14th; is that correct?

MR. VOLLBRECHT: I'll take your word for it. I don't have that in front of me.

MS. BARNCASTLE: The public -- I actually just lost a mic.

So I'll end right there.

MS. ORTH: We have another one we can bring you.

MS. BARNCASTLE: It's most likely a sign from above. I'll take it.

MS. ORTH: All right.

MS. BARNCASTLE: I'll go ahead and just end right there.

MS. ORTH: All righty.

Let's see. I've already asked you.

Mr. Butzier, I'm sorry. Did you have something further?

MR. BUTZIER: Madam Hearing Officer, I have some follow-up questions relating to the questioning of these witnesses by others.

MS. ORTH: Okay. Just give me one moment.

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First, let me ask if there's anyone else in the room who has questions of the panel from the Groundwater Bureau.

Mr. Mijal.

MR. MIJAL: I should go now?

MS. BARNCASTLE: Madam Hearing Officer, this microphone has a low battery and is not going to continue to participate today.

MS. ORTH: All righty.

So I'll ask Mr. Baca to figure that out, either with the assistance of Peter.

MR. MIJAL: Thanks for the opportunity.

MS. ORTH: Please go ahead.

EXAMINATION

BY MR. MIJAL:

MR. MIJAL: Thanks for serving the people of New Mexico.

I have three questions, I have two pages, and -- first, I have two paragraphs and then the question.

Mr. Vollbrecht, I'm glad you are changing the copper code from 25 years past the mine's closure to where a bond is set up for 100 years. This way the funds are there to monitor and maintain the pollution on the closed mine site. Starting the year 2118, taxpayers

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of New Mexico will have to pay for the monitoring and maintenance of the mine's pollution.

So paragraph two, I appreciate how hard it is to come up with the amount of money needed for this 100 years of future work. We can think of 100 years ago and the rate of inflation, but also the changes in technology from 1918.

Here's the question. I wonder if you could get the bond funded in the mine's gold ounces. The THEMAC web site says they will get 430,000 ounces of gold. Why not have the bond from the mine be given as 10 percent of this? New Mexico will have 43 ounces -- 43,000 ounces of gold which will fluctuate in price because of inflation over the 100 years. This might be the best long-term way to fund the bond. Question.

MR. VOLLBRECHT: That's an interesting question. Thank you.

The -- I guess I'd say a couple of things of clarification.

The 100-year period actually doesn't start today or doesn't start the day the permit's issued. That will start at the end of mine reclamation. So that may be anywhere from 20 to 30 years from now. And then 100 years out into the future is what the financial assurance will be required for.

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And I think as was pointed out in questions to -- yesterday, we would not -- that 100-year period keeps rolling. I guess that five-year permit rolls into the future until we reach a point where we feel it is no longer necessary, if we reach that point.

As with respect to the type of financial assurance instrument, typically those come in the form of cash bonds or trusts, those types of things, kind of insurance instruments through a bank or some other financial institute. It would be difficult for the state to manage a pile of gold over the long term.

I'd say it's certainly an interesting idea, though.

MR. MIJAL: Yeah. The reason I suggest it is that besides our environment being fragile, our economic system is, and traditionally gold has been more stable.

So question number two is really three paragraphs.

So paragraph one. The mine hired engineers to comply with the copper code's need for data. These experts assure us that the 1983 mine's pollution is inert and increasing the scale of the mine by a massive amount will pose no problem. The experts say that the mine will create a huge amount of pollution, and all the pollution that operating the mine will cause will be

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contained on site so there will be no run-off pollution.

Therefore they comply with this part of the code. There will be no run-off pollution. They acknowledge that they will cover the pollution up and there will be no problem after 100 years, which as you just told me will be beyond 2118. There will be no danger to the New Mexico air, earth or watershed.

Paragraph two. My understanding of their data is that at the end of the 15 years of mine operation this will be the equivalent of a toxic Superfund site. The difference is that the mine will pay for mitigation. As you know, toxic waste is not cleaned up to some magical garbage dump but covered up.

So this toxic pollution is still there. It's just under three feet of dirt with monsoon diversions and evaporation to get rid of the toxic water. So most of the solids will dry to a toxic powder, and we are assured they won't blow away all over our beautiful state.

Paragraph three. The mine plans on using 1930s technology, which is strip-mining open pit to get the metals. Then they'll contaminate massive amounts of potable water with the bubble process to separate the valued metals. Their site is in an arid, environmentally fragile area with low water for the

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existing uses.

Currently the water is used for agriculture/ranching, which provides lots of jobs and food. Plus the water is partly owned by the ranchers and farmers in Texas and Mexico which also provides jobs and food.

Here's the question. So finally my question. I would like the copper code to have another change besides the bonding for 100 years post mine closure. This new change would be that if the mine's management can only use 1930s primitive technology in this sensitive site the mine be put on hold until they can use better technology.

One example is to use the tunnel boring machine to access the ore body. The engineers would calculate an efficient pathway to the ore body, and only a minimum of overburden would be produced for the waste rock stockpile, thus less volume of pollution.

Once the ore body is reached, use a nonwater way to separate the ore. Paradoxically this nonwater process can be more efficient at getting more desired metals out of the ore. This could include having the tailings cleaned of poisons which to certain uses are needed in their manufacturing processes. Thus the tailings are not soaked with precious potable water, and

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the mine has more benefits for the people who need metals and chemicals.

Also, the tailings are less toxic and without the bubble water take up less volume. There is less for the Superfund toxic waste to cover up for 100 years.

The open pit is a vector of pollution, as well, and this proposal could mean that the existing pit could be filled in with the waste rock stockpile from the toe.

So here is the question. Restate the question. Could the copper code also be changed so that modern, 2018 mining technology be used so that metals would be extracted without using scarce water, and also this would be generating substantially less toxic waste? And if this mine is not available, maybe just put the mine on hold until it is available. You know, technology is just massively increasing.

So my question.

MR. VOLLBRECHT: I can re -- try and restate that. The question is are they using the most appropriate methods for mining and processing the ore?

Okay.

MR. MIJAL: The question is based -- I don't know if those are even available right now. Therefore they should be put on hold until there are methods which

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don't use potable water and don't use as much pollution, use minimal overburden, minimal tailings. And at this point, the technology may not exist, but as you know, it's almost like a straight line of technology. In five years, they may actually get more money by doing it with technology that may not exist.

MR. VOLLBRECHT: Yeah. Mr. Mijal, I -- you've kind of strayed from my area of expertise with respect to the mining engineering and how materials are processed.

They are using kind of tried and true methods, certainly, and there have been improvements over time in that. They did do a feasibility study to evaluate different processing techniques, especially with respect to the tailing impoundment, and it was determined that some of those other methods were not feasible. And it is in the economic feasibility study they couldn't operate the mine at a loss.

But once again, we're not -- my job is to ensure that they do -- if they do mine, that they mine in accordance with the regulations as they exist today, which are required to ensure protection of water quality. There are a lot of other moving parts as well as other permits that they need to acquire before they can mine.

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I'll probably leave it at that.

MR. MIJAL: Well, you do have a lot of power. So it's a possibility. I -- they have to meet a criteria that maybe the technology is not going to be here for five years.

So third question is the THEMAC web site says 30,000 pounds a day of mine powdered metals, gold, silver, molybdenum, copper, will be trucked to the railroad station Rincon -- Rincon, New Mexico. These metals will go then by rail to the Mexican port of Guaymas. The web site doesn't say where the metals will then sail to.

Maybe to the mine owners in Australia. Maybe have the metals further processed in China where the labor is cheaper and the environmental protection pollution laws are not -- laws are not as strict. Then these gold ounces can be shipped to the New Mexico Treasury as the bond as is proposed above.

My question is why not amend the copper code to be more than protecting the physical environment? We could amend the copper code to have these jobs in New Mexico, not in Australia or China. This is also in accord with the NMCC's ideal of providing jobs to the Jicarilla Nation and the impoverished, unemployed people here in Sierra County.

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So that -- yeah. To amend the codes so that we have jobs. We can process the metal, not just ship it to Guaymas.

MR. VOLLBRECHT: As I understand it, in Guaymas there is a -- there is a smelter, which is where that concentrate gets processed. There is no smelter in New Mexico. There used to be a smelter in Hurley that serviced the copper mines there. There was another smelter in Hidalgo. Those have been closed.

I would expect that the process to permit a smelter in New Mexico would be at least as controversial an idea as this process, if not more. We would need a similar round of permits.

They're taking advantage of an existing facility in another place.

MR. MIJAL: Well, a summary is, number one, change the copper code so the time the mine pays for is 100 years of monitoring and maintenance, which you are doing.

Two, since the mine's bond has to fund 100 years of the future which has many unknown variables, the bond could be done in 43 ounces of gold which goes to New Mexico Treasury.

Three, the copper code is changed to state that when a New Mexico mine is in a fragile, arid

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environment, then 1930s primitive, polluting techniques are not allowed. If the technology is not yet available, the mine must wait until the inventors develop it.

Four, New Mexico Copper Corporation is admirable in giving jobs to the Jicarilla Nation and local impoverished people in Sierra County. Their web site implies that there are more jobs from New Mexico's wealth that could be done by these above people. You just told me that you don't want to put a smelter in New Mexico, which I guess is your power.

MR. VOLLBRECHT: That's not my choice. If someone came to me and proposed to build a smelter, I would show them the rules and require them to follow that process with respect to protection of water quality for construction and operation of the smelter.

MS. ORTH: Mr. Mijal, do you have other questions?

MR. MIJAL: Well, just a closing statement.

The New Mexico Department of Environment is charged with protecting New Mexico's beautiful lands. The above changes to the copper code help protect our state in a more comprehensive way of protecting our lands by lessening pollution from 1930s technology.

Thank you.

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MS. ORTH: All right. Thank you.

When I ask folks if they have questions, I'm hoping that they can focus on questions and not sort of additional public comments.

Are there other questions of the panel from the Groundwater Bureau?

Ms. Blair. Dr. Blair.

EXAMINATION

BY MS. BLAIR:

MS. BLAIR: I'm just trying to kind of get this clear in my head.

At the closing of the mine, the open pit will -- which has been pumped to keep it dry because it is in contact with the groundwater, it will -- the pump will be removed, it will be allowed to fill, other waters from the site will be diverted into it as well in order to bring its level up? Or is it simply going to be a passive fill?

MR. VOLLBRECHT: The rapid fill that's been discussed --

MS. BLAIR: Yes.

MR. VOLLBRECHT: -- it's my understanding that the supply wells, which are some number of miles to the east of the facility, will be used to do the rapid fill of the pit lake, which with respect to waters that will

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go into the pit, there's the feature that was described over the last couple of days as the open pit surface drainage area.

That includes the area where surface water run-off would flow into the pit, and that will all come from reclaimed areas. And so that would be technically for the most part clean stormwater that would flow into that pit.

MS. BLAIR: And the water that is being utilized during the mine, the processing water, the contaminated water, will it go to the pit? If not, where does it go?

MR. VOLLBRECHT: Once the mine is up and running, water -- it becomes somewhat of a closed loop, and any water that gets lost would be lost through evaporation and then would be replenished from either pumping of the pit or pumping of the supply wells.

At closure, the water that's in the process, it would all go into probably the final resting spot, that's going to be the tailing impoundment, where it would evaporate off. And as part of their Closure Plan, they have active evaporation for some period of time until it's reduced to a low enough volume that it can be passively evaporated.

MS. BLAIR: Right.

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And the evaporation process, of course, removes water and some volatiles but leaves all sediment and all contaminants behind. So that will be dealt with on that tailings pile.

MR. VOLLBRECHT: That is correct.

MS. BLAIR: All the -- presumably at some point, the pit will achieve some sort of hydrostatic stability with whatever is coming in as opposed to what's evaporating out, since the evaporation will -- just like with a straw in a Coke, the evaporation will create a drawing in in order to maintain whatever that hydrostatic stability is.

So the pit will continue to draw off of groundwater in order to maintain whatever is in it. And whatever comes into the groundwater or what is already in the pit in the way of contaminants again as the water leaves.

So over time, we would look at that pit water degenerating in quality?

MR. VOLLBRECHT: That is correct. And I testified to that yesterday.

MS. BLAIR: Right. I was just wanting to make sure that that was happening.

And that's in perpetuity.

MR. VOLLBRECHT: That's correct.

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MS. BLAIR: And it's an enormous, 200-acre lake that's not covered or in any way protected from waterfowl or anything else coming in to utilize it and then engage with that gradually worsening, more contaminated water in perpetuity.

MR. VOLLBRECHT: The geochemical modeling done with respect to the pit lake showed that, as you indicated, the water quality does degrade over time. It's not -- it's not how -- how can I say it -- it's not extremely poor quality water. It's not -- because of the nature of this ore body, it's not a situation that we see at some of the other pit lakes where you have very low pH water that's really heavily laden with metals.

At some point in the future, the modeling indicates that there could be some exceedances of standards of one metal standard that was shown to be exceeded in the geochemical modeling.

MS. BLAIR: That's selenium.

MR. VOLLBRECHT: My -- sorry.

MS. BLAIR: Sorry.

MR. VOLLBRECHT: My suggestion -- that is correct, it's selenium -- would be that in the event that were to happen, that we would address that at that time.

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MS. BLAIR: And the selenium is a very major significance to waterfowl in particular.

MR. VOLLBRECHT: Understood. Yes.

MS. BLAIR: So that could become an issue.

MR. VOLLBRECHT: I -- I think there could be --

MS. BLAIR: So at a certain level, it's a sort of perpetual pollution machine that will just gradually skid downhill.

MR. VOLLBRECHT: The modeling indicates that the water quality will degrade over time.

MS. BLAIR: Okay. Thank you.

MS. ORTH: All right.

Ms. Browne.

And let me just remind folks speak one at a time, if you would.

MS. BROWNE: Candace Browne.

EXAMINATION

BY MS. BROWNE:

MS. BROWNE: In your testimony yesterday, you said that you were going to be requiring a Construction Quality Assurance Plan, correct?

MR. VOLLBRECHT: That is correct. Yes.

MS. BROWNE: Could you explain why that's important? And what is it for?

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MR. VOLLBRECHT: Yes. That plan is intended to ensure that the liner system is installed correctly and that it is free of defects, and then it is properly tested to ensure that it is free of defects so that once it goes into production we do not have leaks and discharges to groundwater, minimized to the best of our capabilities.

MS. BROWNE: Can you explain any more about what you will require from New Mexico Copper Corporation in their plan?

MR. REID: I can try that. Yeah.

The Copper Rule has a detailed description of what is required in the plan, and it's referenced in Section 20.6.7.17C.(1)(b). And it -- there's 10 -- 10 different components to that plan.

Would you like me to go through them or -- you know, there's an inspection protocol.

There's a -- they need to identify people responsible for overseeing the CQA/CQC program, and that person shall be a licensed New Mexico professional engineer experienced in liner system construction and installation.

There needs to be identification of field and laboratory testing equipment the facility has proposed to be used, calibration methods.

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Now I'm just reading.

The next part is the procedures for observing and testing the liner, subgrade liner bedding and other liner system construction material.

Part 5 is a protocol for verification of any manufacture's quality control testing and procedures.

Part 6 is the procedures for reviewing inspection test results and laboratory field sampling test results.

Part 7 is the actions to be taken to replace or repair liner material, subgrade liner bedding or other liner system construction materials should deficiencies be identified.

Part 8, procedures for seaming synthetic liners.

Part 9, reporting procedures for all inspections of test data.

And part 10 is the submission of a CQA/CQC report.

So that's what we'd be looking for in a CQA/CQC plan that would be submitted 90 days prior to installation of any liner system required.

MS. BROWNE: I might have missed it.

Is there something in there about the resin that they -- will be used and choosing the correct resin

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for the appropriate use for the place? Is that in there? Did I miss that?

MR. VOLLBRECHT: Ms. Browne, it doesn't get quite into that kind of specificity. There's -- I'm not entirely sure what you mean by the resin. The -- the materials that will be used, we would make sure that they are appropriate for the -- for the application.

MS. BROWNE: Is that in your -- is that in the permitting documentation?

MR. VOLLBRECHT: That -- the rule and the permit conditions don't get into that kind of specificity. That would -- that specificity would be in the plan itself. And the plan would be very detailed and, you know, a very voluminous document.

MS. BROWNE: Okay. Thank you.

MS. ORTH: Thank you, Ms. Browne.

Other questions of the Ground Water Quality Bureau panel?

Okay.

Oh. I'm sorry. Dr. Blair, I'm sorry. Folks can just go once.

Mr. Butzier.

MR. BUTZIER: Thank you, Madam Hearing Officer.

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CROSS EXAMINATION

BY MR. BUTZIER:

MR. BUTZIER: Mr. Vollbrecht, I have a follow-up question relating to some questions that Mr. de Saillan asked of you relating to the 100 years of monitoring.

Am I -- am I understanding that NMED has concluded that 100 years of monitoring is appropriate at copper sites?

MR. VOLLBRECHT: Yes. That would be a fair statement.

MR. BUTZIER: And what's the -- what's the monitoring period for the Little Rock Mine, Freeport's Little Rock Mine, postclosure?

MR. VOLLBRECHT: I can't pull that off the top of my head, but it's associated with the Tyrone Mine, which effectively at the Tyrone Mine there will be pumping and treating groundwater in perpetuity. So the Little Rock Mine is a component of the Tyrone Mine, and so it would fall under those same requirements.

MR. BUTZIER: And would it surprise you if it -- if the monitoring period for Little Rock is 30 years?

MR. VOLLBRECHT: The Little Rock is a peculiar case. As I said, it's a satellite mine to Tyrone. The

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groundwater flow direction at Little Rock is into Tyrone. It falls within the umbrella of the Tyrone Mine. Something specific to Little Rock could go away at some point in time, but the larger, long-term monitoring care associated with the Tyrone Mine would eventually encompass that.

MR. BUTZIER: And would you agree with me that each mine site is -- has unique characteristics in terms of things like drawdown periods and that monitoring is something that is appropriately evaluated based upon the science for a given property?

MR. VOLLBRECHT: Certainly, yes.

MR. BUTZIER: And when you indicated to Mr. de Saillan that it would be your expectation that at each five-year renewal you would continue to require 100 years of monitoring, that wasn't any kind of predetermination by the agency, you would look -- at the time of the closure and the completion of the reclamation work, you would evaluate the data and science that you have at that time and make a judgment as to what would be appropriate; is that correct?

MR. VOLLBRECHT: That is correct, yes.

MR. BUTZIER: And the same would be true at each five-year period?

MR. VOLLBRECHT: That is correct. Yes.

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MR. BUTZIER: Okay. Thank you.

Ms. Barncastle asked you about some of the timing of inspection requests and when those were responded to in relation to extensions of time and the like.

Do you recall that?

MR. VOLLBRECHT: Could you repeat that? I'm sorry.

MR. BUTZIER: Do you recall the questioning from Ms. Barncastle relating to extensions of time for the comment period and inspection of public records requests and when those were responded to?

MR. VOLLBRECHT: Yes.

MR. BUTZIER: Does NMED post on its web site materials from a particular project at any point?

MR. VOLLBRECHT: Well, we do in the case of when we have a hearing request. We have a lot of sites that fall under our purview, over 700, and so we don't post them all. We couldn't post them all without some kind of a legislative appropriation to digitize our records.

MR. BUTZIER: Do you know whether information on the Copper Flat was posted on NMED's web site?

MR. VOLLBRECHT: It was. I believe it was posted on July 10th or July 9th.

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MR. BUTZIER: Okay.
And item number 410 in the index to the administrative record refers to EBID comments regarding the Copper Flat Mine on May 3rd, 2018.
That was within the extended comment period, correct?
MR. VOLLBRECHT: Yes. That is correct.
MR. BUTZIER: Okay.
Mr. Reid, I'd like to return to the topic of the scraping of alluvium or colluvium materials in relation to the Waste Rock Stockpile Number 3.
MR. REID: Sure.
MR. BUTZIER: Do you recall the line of questioning from Ms. Barncastle on that topic?
MR. REID: I do.
MR. BUTZIER: Is it your understanding that -- looking back to the John Shomaker & Associates slide 36, that the materials you identified as daf on that slide -- is it your understanding that that's alluvium material?
MR. REID: No, it's not. That -- no.
MR. BUTZIER: And in fact, the slide itself refers to it as artificial fill, correct?
MR. REID: That is correct.
MR. BUTZIER: And that's the area that the --

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Ms. Barncastle is wondering why it's not being scraped off, correct?
MR. REID: Correct.
MR. BUTZIER: Now --
MS. BARNCASTLE: Objection, Your Honor. That mischaracterizes completely what my question was.
I referred to the area in yellow, not the area in gray marked daf. The area in yellow is marked Qaf, and it's -- and also Qamh. Both of them are alluvial fan and alluvium.
MR. BUTZIER: Okay. Well, I'll withdraw that question.
Thanks for that clarification.
MS. ORTH: Thank you.
MR. BUTZIER: So can you pull that slide 36 up, please, Mr. Reid?
MR. REID: I have something similar up. Yeah.
MR. BUTZIER: So on my map, the yellow area that Ms. Barncastle just described is correctly viewed as alluvium, correct?
MR. REID: That is correct.
MR. BUTZIER: And that's the material that New Mexico Copper Corporation has agreed to scrape off down to bedrock, correct?
MR. REID: That is correct. All the material

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that's identified in yellow is what they've agreed to scrape.
MR. BUTZIER: Thank you.
Dr. Marcoline, I'd like to clear up some of the questioning from Mr. de Saillan relating to the andesite.
And in particular, can I draw your attention to your page 5 of Exhibit 4 that contains your direct testimony.
MR. MARCOLINE: Sure. I don't have that in front of me, but I can remember it.
MR. BUTZIER: Okay. Well, I can probably walk you through it.
I think the -- there's a statement in there that the -- where you're talking about a commenter and you indicate the commenter is in error about the hydraulic conductivity of the andesite. In that Table 5.2 -- wells in Table 5.2 that exceed 10 to the minus-5 centimeters per second are not completed in the andesite bedrock, rather in the quartz monzonite.
Do you recall that testimony?
MR. MARCOLINE: Yes, I do.
MR. BUTZIER: And what we're referring to in terms of Table 5.2 and then in the next sentence Table 6.1, those are tables not from the Stage 1 Abatement

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materials, but rather from the model of groundwater flow in the Animas Uplift and Palomas Basin, correct?
MR. MARCOLINE: That is correct.
MR. BUTZIER: Okay.
And so you'd certainly want to go back and review that again before you question your conclusion in this regard.
MR. MARCOLINE: Certainly.
MR. BUTZIER: Also, the exhibit Mr. de Saillan addressed that's Ranches Exhibit 39, which has a table that he drew your attention to, and he specifically focused on the first four -- I guess I would say completions, because there are actually two wells completed at two separate intervals each, correct?
MR. MARCOLINE: That is correct.
MR. BUTZIER: And the first two of those items are the two completions in Wells GWQ96-22A and 22B.
So it's one well, two completions, correct?
MR. MARCOLINE: That is correct.
MR. BUTZIER: And when you indicate in your testimony that well testing data presented in the Stage 1 Abatement Plan indicate the two wells in the andesite, and then you list 96 -- GWQ96-22 and GWQ96-23 tested at 6 times 10 to the 9 -- negative-9 centimeters per second and 9.5 times 10 to the minus-7 centimeters per second

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respectively -- do you recall that sentence, or can you find it?
MR. MARCOLINE: Yes, I do.
MR. BUTZIER: Is it possible that your testimony just was a misstatement to refer to the Well GWQ96-23 and that, in fact, what you were intending to refer to were the two interviews -- or two intervals in the completion of Well GWQ96-22?
MR. MARCOLINE: That -- that is possible. I'd have to go back and look at it.
MR. BUTZIER: Okay. Thank you.
And you made a number of references to literature in terms of leak analyses related to liners, correct?
MR. MARCOLINE: That is correct.
MR. BUTZIER: And you've referred several times to -- excuse me -- I'm not sure how you pronounce it, or I'm not even sure how it's correctly pronounced, but Giroud and Bonaparte; is that correct?
MR. MARCOLINE: That is correct.
MR. BUTZIER: And that's the -- that's the reference material that was used by both John Shomaker & Associates and SRK in considering the potential for leakage from the lining at the tailings facility; is that correct?

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MR. MARCOLINE: Not exactly.
MR. BUTZIER: Okay.
MR. MARCOLINE: That's -- that reference that was there, the 1989 reference, was -- excuse me. Pardon me. That 1989 reference was in the SRK work. It was also, I believe, in New Mexico Environmental Law Center's direct testimony that was submitted -- or in the NOI, I should say.
The -- there was -- there has also been reference to other work by the same authors, by Giroud himself in 1987 and Bonaparte himself in 1989.
There was also -- and it's pretty likely to assume that these authors are publishing pretty similar -- and I did look at all three of those documents. It's pretty similar. Those equations were -- it's basically Darcy's law, looking at a simple radius and assuming X number of defects over an acre.
New Mexico Copper did something different. They took that -- the Bonaparte, I believe, '89 reference and modified it with a more recent 2010, I believe, reference by Coffey, which essentially is a little more sophisticated approach. It's still basically Darcy's law analytical solution. Fairly simple.
Basically, you know, you look at the radius of

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the -- of your defect, you look at your hydraulic conductivity of your upper material, your tailing, you look at the hydraulic conductivity of your material below the tailing -- well, the liner, and that's where you divide by your perm -- or basically divide by, I think, essentially the head in the liner or head in the tailing above the liner plus the head in -- or minus the head in the liner below the liner. I'm sorry. The head in the material below the liner.
So essentially it's Darcy's law looking at -- but it's taking account the different hydraulic conductivities in material.
MR. BUTZIER: Thank you.
And based upon what your testimony was just now on that point, is it fair to say that the assumptions as to the potential leak rate from the liner in this case that was taken into account by New Mexico Copper's consultants was reasonable and was taking into account sophisticated, more recent information than the earlier Giroud and Bonaparte materials?
MR. MARCOLINE: That is correct.
I will say I did qualify that in that the QA/QC plan is essential because the same authors have shown that with newer testing than was around 25 years ago, newer testing than was around in 2010 even is

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showing that these can be significantly decreased. The same authors also discussed that most of these barriers are not seams, but mostly defects, puncture defects.
MR. BUTZIER: And as I understand Mr. Vollbrecht's testimony, that QA/QC work is going to be done at this facility.
MR. MARCOLINE: I believe so. Yes.
MR. BUTZIER: Okay. I have no further questions.
MS. ORTH: All right. Thank you.
Mr. Knight, do you have any redirect?
MR. KNIGHT: Madam Hearing Officer, I do not.
MS. ORTH: All right. Thank you.
So we will excuse the bureau --
MS. BARNCASTLE: Madam Hearing Officer.
MS. ORTH: Oh.
MS. BARNCASTLE: I do have two follow-up questions --
MS. ORTH: Okay.
MS. BARNCASTLE: -- following Mr. Butzier.
MS. ORTH: Go ahead.
MS. BARNCASTLE: Thank you.

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FURTHER RECROSS EXAMINATION
BY MS. BARNCASTLE:
MS. BARNCASTLE: Mr. Reid, I'd like to go back to the scraping of the alluvium.
My understanding is that Waste Rock Stockpile 3 is an existing waste rock stockpile; is that correct?
MR. REID: There's two Waste Rock Stockpile 3s. There's an Existing Waste Rock Stockpile 3, and there's a proposed Waste Rock Stockpile 3.
MS. BARNCASTLE: And my understanding is that the existing one is the one that sits on the alluvium that will be scraped; is that correct?
MR. VOLLBRECHT: Let me try and clarify this. It might be best to look at that figure that shows gray material which is that waste rock stockpile in question and yellow material which is alluvium.
MS. BARNCASTLE: The slide 36 from the JSAI?
MR. VOLLBRECHT: I'll trust that you're correct on that.
The yellow material will be scraped. The gray material will not be scraped. And I think where the confusion is coming in is that the gray material does overlap onto some old alluvium. The old alluvium that is underneath the gray material will not be scraped.
MS. BARNCASTLE: And so there is -- there are

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lines for Waste Rock Stockpile 3 that overlap onto the yellow material.
And my question is is the waste rock stockpile that's existing going to be removed so that the alluvium can be scraped from underneath it?
MR. VOLLBRECHT: No. The material that's currently exposed as alluvium will be removed. The alluvium that is sitting beneath the existing waste rock stockpile will not be removed.
MS. BARNCASTLE: That is finally what I was after. Okay. I finally have the answer. Thank you.
The last follow-up question I have is, Mr. Vollbrecht, you just testified that the administrative record for this proceeding, Copper Flat's proceeding, was put on the NMED web site on July 10th, but you did not say a year.
What year was that?
MR. VOLLBRECHT: That was 2018.
MS. BARNCASTLE: Thank you.
Nothing further.
MS. ORTH: All right.
Mr. Knight?
MR. KNIGHT: Nothing further.
MS. ORTH: Okay. Great.
So we will excuse the bureau panel.

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Thank you very much, gentlemen.
And let's take a 15-minute break.
(Proceedings in recess from 10:54 a.m. to 11:12 a.m.)
MS. ORTH: We are back after our morning break, and we do have a gentleman who has asked to make public comment. So we'll do that before we go back to the technical case.
We do have an interpreter with us throughout the entire hearing. She's been here all morning. We now have more people in the room than we did when we began this morning so we'll have a statement from the interpreter.
Ma'am.
THE INTERPRETER: Good morning.
If you would like interpreter services into Spanish, please let me know. I'll be making an abbreviated announcement as we have several people here who were here previously.
(In Spanish.)
Everybody is still good in English?
No requests.
MS. ORTH: Thank you very much.
Sir, we'll ask you for your name and then to be sworn in.

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MR. BYRD: Thank you.
My name is Robert Byrd. I'm from Las Cruces.
MS. ORTH: How do you spell that?
MR. BYRD: B-Y-R-D.
ROBERT BYRD
having been first duly sworn or affirmed, gave public comment as follows:
PUBLIC COMMENT
MS. ORTH: Go ahead.
MR. BYRD: Thank you. I appreciate this opportunity to address this group.
I'm a retired engineer living in Las Cruces. My family is from the old Hot Springs area, which is now, of course, T or C. My father worked in mining in New Mexico at Magdalena and later Grants before moving out of state. Actually my great grandfather was the guy that built Elephant Butte Dam back about 100 years ago.
I would like to commend New Mexico Copper for their planned mine at Copper Flat. New Mexico has mineral resources that can and should be developed in a sustainable fashion that are entirely compatible with other important economic activities, farming, tourism, manufacturing as well as high-tech.
The technical plan that New Mexico Copper has presented details how much water it will use and how it

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will be managed. This isn't rocket science. This isn't exotic, untried or especially expensive technology, but it is modern and represents the state-of-the-art in an industry that deals with the same concerns all over the world.

I made some quick comparisons with the water that will be used at Copper Flat, which is equivalent to about the same amount of water consumed by a large pecan farm covering two sections of farmland. But the social benefit return on the water use in mining vastly dwarfs that in pecan farming, in terms of good-paying jobs, local business rejuvenation, tax revenues and potential follow-on support industries.

And I'd just like to reiterate that I strongly support Mr. Smith and his company, and I hope that this region will soon see the benefit of this type of operation.

Thank you very much.

MS. ORTH: Okay. Thank you, Mr. Byrd.

If you're willing to leave your written statement with the court reporter, she can refer to it.

Before we get back to the technical case, is there anyone else here who has not yet made public comment who would like to offer public comment at this time?

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I see no hands.

I believe we're moving to your case, Mr. de Saillan.

MR. DE SAILLAN: Thank you, Madam Hearing Officer.

Good morning.

I'll proceed with an opening statement.

Again I'm Charles de Saillan with the New Mexico Environmental Law Center, and I'm representing the Turner Ranch Properties which owns the Ladder Ranch, and I'm also representing the Hillsboro Pitchfork Ranch.

Madam Hearing Officer, as you will see, the Ladder Ranch borders the Copper Flat Mine permit boundary immediately to the north and to the east, and the Hillsboro Pitchfork Ranch borders the Copper Flat Mine immediately to the west.

These ranches oppose the issuance of the groundwater Discharge Permit for the Copper Flat Mine at least in its current form. And they oppose the mine permit not because they are unfriendly neighbors, but because they fear the consequences that the mining operations will have on the water resources on their property. They fear the consequences that copper mining will have on their businesses and on their way of life.

This may be an emotional response, but it is

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also a rational one and a reasonable one. It is based on the facts, and it is borne out by experience.

As our witnesses will testify, there is a significant likelihood that the mining operations will result in water contamination in excess of New Mexico water quality standards to the detriment of the environment. There is a significant likelihood that mining operations will reduce the flow of water around the mine, again to the detriment of the environment, and the mining operations will pose an undue risk to property.

Despite the presentations that you heard the other day from representatives of New Mexico Copper Corporation, this application for a groundwater Discharge Permit is seriously flawed in several ways.

The andesite bedrock underlying the proposed waste rock piles has not been well characterized.

A very real possibility of substantial leaks from the tailings and other mine facilities has not been fully evaluated.

The proposed groundwater monitoring system, even with the addition of the two wells that the Environment Department has proposed -- and we appreciate the Environment Department doing so -- is nevertheless inadequate. It's insufficient to detect potential major

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plumes of groundwater contamination.

The proposed approach for dealing with the pit lake that will form after the closure of the mine is ill-conceived, fraught with uncertainty and immersed in unresolved legal issues.

The proposed financial assurance is woefully inadequate to cover the likely costs of closing the mine once the mining company has gone out of business and mining operations have ceased.

The proposed financial assurance is based on best-case predictions that are unlikely to come true. It is based on the assumption that after 25 years the company will be able to walk away from the mine and all will be fine.

Unfortunately, if these predictions do not turn out to be correct, the state and ultimately the taxpayers will be stuck with the cleanup bill. And the ranches will be largely without recourse.

So today, Madam Hearing Officer, we will begin with the testimony of Stephen Dobrott, who is the former manager of the Ladder Ranch. He will describe the unique ecosystem of the Ladder Ranch and its abundant wildlife. He will focus particularly on Cave and Las Animas Creeks and particularly on the avant -- the avant pasture.

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He will describe the businesses of the Ladder Ranch, its bison ranching, its hunting expeditions and it's ecotourism. He will explain that clean water is essential to the ecosystem and to the businesses.

Next Robert Cunningham will testify. He is a part owner and manager of the Hillsboro Pitchfork Ranch. And he will particularly focus on Grayback Canyon. He will also describe his cattle ranching business and his hunting business at the ranch. And he will explain the importance of water to his businesses.

Next James Kuipers, a mining engineer, will testify. Mr. Kuipers is known to most of the people in this room. He has been involved in hardrock mining since he was in his teens.

He will begin with a brief history of the Copper Flat Mine. He will explain the potential for mining-influenced water that the -- that could be generated at the mine. He will also discuss the likelihood of seepage from the liner system at the tailing storage facility and leaks and spills from the other mine facilities.

He will also discuss the inadequacy of the proposed financial assurance.

Finally, Dr. Tom Myers, a hydrologist, will testify. He will also testify about the likelihood for

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leaks and spills from the mine facilities. He will explain the inadequacy of the proposed groundwater monitoring system at the -- at the mine site. And he will also explain that the pit lake that will form after closure of the mine will likely encroach on public property and also that the pit lake will combine with -- with other waters.

Thank you, Madam Hearing Officer.

I now call my first witness, Mr. Stephen Dobrott.

MS. ORTH: Let's swear him.

STEPHEN DOBROTT

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DE SAILLAN:

Q. Could you state your name and current occupation, please.

A. Yes.

Good morning, Madam Hearing Officer, members of the public.

My name is Stephen J. Dobrott. I am currently the ambassador for Ted Turner Expeditions, a New Mexico ecotourism business.

Q. Okay.

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Mr. Dobrott, I'd like to discuss your qualifications, starting with your education and then moving on to your professional experience.

First, could you describe your postsecondary education, please.

A. I have a bachelor of science degree from the University of Arizona, majoring in wildlife biology.

I have also received specialized training from US Fish and Wildlife Service in refuge management, wildlife management, endangered species restoration and habitat management. I also received fire suppression training and prescribed fire management training. I also was trained in rangeland evaluation and monitoring.

Q. Now, could you describe your work experience since college?

A. I worked for The Victorio Company as a range and wildlife specialist on the Gray Ranch in Southwest New Mexico.

Q. And how long were you at this job?

A. Five years.

Q. And what were your responsibilities there?

A. I inventoried range and wildlife resources. I also inventoried all stock water resources. I developed range management plans and recommended stocking capacities based on range evaluations that I conducted

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on 325,000 acres.

I developed and managed 15 hunting programs based on game surveys that I conducted. I planned and supervised various range management programs, including prescribed burning for rangeland improvement.

Q. Okay.

And your next job after that?

A. I worked for the Gray Land and Cattle Company as a game manager and commercial hunt program coordinator.

Q. Is that the same Gray Ranch?

A. Yes, under different ownership.

Q. And how long were you there?

A. Three more years.

Q. What were your responsibilities at that job?

A. I was responsible for promoting and supervising the big game hunting programs. I worked closely with the New Mexico Game and Fish Department in planning and implementing game surveys and research on rare and state endangered species.

Q. And where did you work next?

A. The United States Fish and Wildlife Service.

Q. How long were you there?

A. Six years.

Q. And what were your responsibilities at Fish

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and Wildlife?
A. As a refuge biologist, I was responsible for the recovery of the endangered Masked Bobwhite on the Buenos Aires National Wildlife Refuge in Arizona. I participated in the development of the Refuge Master Plan and start-up of the new refuge. I planned and implemented the reintroduction of pronghorn to the refuge.
I was responsible for all of the biological surveys on the refuge. I also planned and conducted biological surveys in Sonora, Mexico, related to the recovery of the endangered Masked Bobwhite.
Q. And what did you do next?
A. The Ladder Ranch.
Q. All right.
And what was your position at the Ladder Ranch?
A. I was manager of a 150,000-acre ranch managed for bison and wildlife with special emphasis on imperiled species.
Q. How long did you work as manager of the Ladder Ranch?
A. Twenty-four years.
Q. What were your responsibilities as manager of the Ladder Ranch?

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A. Under the direction of the general manager, I was responsible for all aspects of managing the ranch, including hiring employees, annual budgeting and administrative duties, coordinating native species recovery programs, hunting and fishing programs and raising bisons for market.
I also coordinated ecotours with other ranch operations.
Q. And then where did you work next?
A. I am the ambassador for Ted Turner Expeditions.
Q. So that's your current position?
A. Correct.
Q. What does it mean to be ambassador for Ted Turner Expeditions?
A. I promote and participate in the ecotourism business on Turner properties in New Mexico. My job is to connect people with nature by introducing them to some of the finest and best managed ranch properties in the Southwest. I guide tours on the Ladder and Armendaris Ranches. I also assist with the tour development -- with tour development and the training of guides.
Q. And how long have you been ambassador for Ted Turner Expeditions?

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A. Since March, 2017.
Q. Okay.
Now, Mr. Dobrott, Kendra is going to hand you a document that's been marked as the Ranches Exhibit Number 3 and ask you if you would identify that, please.
A. Yes. This is a copy of my resume.
Q. And is that accurate?
A. Yes, sir.
Q. And current and up to date?
A. Yes, sir.
Q. Okay.
Madam Hearing Officer, at this point, I would like to qualify Mr. Dobrott as an expert in biology, ecology and ranching.
MS. ORTH: Objections?
MS. BARNCASTLE: No objection.
MR. BUTZIER: No objection.
MR. KNIGHT: No objection.
MS. ORTH: All right. He's so recognized.
MR. DE SAILLAN: Thank you.
Q. Now, Mr. Dobrott, I'd like you to address the interests of the Ladder Ranch in this proceeding.
First, if you could tell me what is the mission of the Ladder Ranch?
A. The management of the Ladder Ranch is based on

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its mission to manage and enhance Turner lands in an economically sustainable and environmentally sensitive manner while emphasizing the conservation of native species and habitats.
Q. Okay.
And let me refer you now to a number of documents that are collectively marked as the Ranches Exhibit 4. And it contains several maps.
Could you identify these maps, please?
A. These are all maps of the Ladder Ranch.
Q. Okay.
And did you compile the maps?
A. Yes, I did, with the help of our company technician.
Q. Okay.
And are they accurate, to the best of your knowledge?
A. To the best of my knowledge, except for one -- one exception.
Q. Okay.
Could you explain what that exception is?
A. First of all, I'd like to orient everybody as to where we are on this map.
The location of the Copper Flat Mine is right here, and you can see the boundary of the Ladder Ranch

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right here.
There is a well right here called the Feedlot Well, and -- if I can hold my hand straight here. The full -- this, I believe, was an error in printing, but the well itself is about a quarter mile to the southeast of the location on this map. The storage for that well is right here.
Q. And when you say right here --
A. Well, it's about another -- it's about a half mile from the identified location of the Feedlot Well on this map.
Q. Okay.
So, Mr. Dobrott, does the Ladder Ranch border the mine permit boundary?
A. Yes, it does.
Q. And approximately how long is that boundary along which the -- to the -- how long is that boundary along which the Ladder Ranch borders the Copper Flat Mine permit boundary?
A. Well, approximately eight miles, including a portion of the mine well field.
Q. Okay.
Now, could you take a minute to describe for us the Ladder Ranch?
A. Certainly. What makes the Ladder Ranch

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sustainable from a business perspective is the diversity and quality of rangelands, wildlife and water resources that occur there.
The ranch consists of 150,000 acres of private land, 100,600 acres of National Forest and wilderness lands, 20,079 acres of state lands and 11,480 acres of BLM lands, totalling 289,159 acres, or 451.81 square miles.
So on this particular map, I'd like to point out Hillsboro is right about here, which is -- as you can see, it's a little bit out of focus. But this --
Q. Mr. Dobrott, if you could -- excuse me. Could you identify which map you're referring to just for the record?
A. I'm not sure if there's a number on it, but this is slide number 4, and this particular map is a map that encompasses the whole ranch, whereas the one previous was one that shows the southern one-third of the ranch, but this map shows the entire boundary of the Ladder Ranch, including the forest allotments relative to the Copper Flat Mine located right about here.
Q. Okay.
And again so it's clear in the record, the map that you're referring to says in little white rectangle Ladder Ranch, New Mexico in the upper left-hand corner,

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and it shows the Ladder Ranch area in gray and some surrounding land in green; is that correct?
A. That's correct.
Q. Thank you.
Please proceed.
A. Okay. Its proximity to the Black Range, in this area of the map, on the western edge of the -- of the ranch, and the Black Range watersheds and elevations from 10,000 feet down to 4,500 feet provide a suite of biological life zones unmatched on any one property in New Mexico. Thus the biological diversity on the ranch is remarkable and highly regarded by biologists and ecologists alike.
Q. Okay. Mr. Dobrott, I'd like to focus now on a particular portion of the ranch, the southeast portion, and in particular there's a rectangle that sort of juts down to the south on the southeast end of the ranch.
Could you describe that area?
A. Certainly. This area is named the Avant Pasture, is the entrance to the Ladder Ranch off of Highway 152. The area includes approximately 5,250 acres of productive Chihuahuan Desert grassland. It has native rangeland grasses and vegetation typical of this region.
Q. Okay. I'd now like to ask you some questions

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about the surface water resources at the Ladder Ranch.
Could you describe for us some of the major natural surface water features at the ranch?
A. The ranch is incised by five semi-perennial creek systems. From north to south, it is the Cuchillo Creek, shown here, the Palomas Creek, Seco Creek, Cave Creek and Las Animas Creek, that all drain into the Rio Grande Basin.
Each contributes greatly to the biodiversity and richness -- the biological richness and productivity of the ranch. Of the five creeks, Las Animas is the most notable for its biodiversity and importance to the ranch.
Las Animas and Cave Creek systems -- the Las Animas and Cave Creek system is crucial and is the lifeblood of the ranch. Its surface and groundwater supply pristine, dependable water for central ranch operations, including administrative facilities, employee, guest housing, livestock, farm irrigation, wildlife and imperiled species programs, all within four miles distance of the Copper Flat Mine.
Notably, Las Animas Creek has been nominated as one of New Mexico's scenic waterways, and its environmental importance has been documented in scientific publications and the book River of Spirits, A

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Natural History of New Mexico's Las Animas Creek, which I coauthored.

This remarkable riparian corridor has also been designated as an important bird area, or IBA, by the Audubon Society. One of the creeks' most unique features are the ancient Arizona sycamore trees that occur only on this creek within the entire Rio Grande Basin.

Q. Okay.

Mr. Dobrott, referring back to the Ranches Exhibit 3, there are four photographs that appear to depict a stream.

Could you identify those photographs?

A. These photographs are all of Las Animas Creek.

Q. And did you take those photographs?

A. Yes, except for one, taken by Matilde Holzwarth for the book River of Spirits, which was my opening slide.

Q. Okay.

A. And it's this slide right here.

Q. Okay.

And could you describe that for the record just so that it can be distinguished from the other photographs?

MS. ORTH: 17.

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MR. DOBROTT: It is slide number 17, and it depicts a quiet portion of Las Animas Creek, above Headquarters, I believe.

MR. DE SAILLAN: Okay. That's -- I think that will suffice.

Q. Now, as to the photographs that you took, they're a fair and accurate representation of what you observed at the time?

A. Yes, sir.

Q. And how would you describe the quality of the water in -- first of all, in Cave Creek?

A. Excellent and pristine.

Q. And what about the quality of the water in Las Animas Creek?

A. Also excellent and pristine.

Q. Okay.

And Cave Creek -- is it correct that Cave Creek is a tributary to Las Animas Creek from the south?

A. Yes, sir.

Q. Okay.

And are these creeks used by ranch livestock for drinking?

A. Yes, by bison.

Q. And have you personally observed bison drinking from these creeks?

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A. Yes, many times.

Q. And are the creeks used by wildlife for drinking?

A. Yes, sir.

Q. And have you personally observed wildlife drinking from the creeks?

A. Yes. Numerous kinds of wildlife depend on the availability of good quality surface water in these creeks.

Q. And are the creeks also used by birds for feeding and drinking?

A. Yes, they are.

Q. And have you personally observed birds feeding at these creeks?

A. Yes. These creeks provide streamside, or riparian, vegetation and food used by waterfowl and migrating, breeding bird populations unique to the Southwest. These riparian corridors connect migrating birds along the Rio Grande with the upper reaches of the Black Range. Food cover and good quality water along these creeks are used by many bird species, including the Yellow-billed Cuckoo, currently listed as a federally threatened species.

Q. Okay.

And do the creeks support fish populations?

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A. Yes, they do.

Q. Could you --

A. Okay. These creeks currently support four native species of fish. They are the Rio Grande chub, the Rio Grande sucker, the Rio Grande cutthroat trout and the longfin dace. These species depend on pristine water for reproduction and the production of macroinvertebrate food sources made possible by these pristine waters.

Q. Okay.

And are there springs and seeps on the Ladder Ranch?

A. Yes, there are.

Q. Could you describe them, please?

A. Within the area nearest to the Copper Flat Mine are Animas -- Animas Warm Spring, the Manager House Spring, Garden Tank Spring, Myers Animas Spring, along with several unnamed springs and seeps along Las Animas Creek.

Q. Do some of the springs feed into Cave Creek or Las Animas Creek?

A. Yes. The most -- mostly Las Animas Creek Spring and Cave Creek contribute to the water flow in Las Animas Creek.

Q. And could you describe the water quality of

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these springs?
A. Excellent and pristine.
Q. And are the springs used by ranch livestock for drinking?
A. Yes, they are.
Q. And that's based upon your personal observation?
A. Yes, sir.
Q. And have you observed wildlife drinking from the springs?
A. Yes, sir.
Would you like me to point out where these springs are on this map?
Q. Sure.
A. Okay. For -- Animas Creek is running right through this -- the map from southeast to northwest. Ranch Headquarters is located in this location, approximately three miles north of the Copper Flat Mine.
The springs that I mentioned are within the four -- four-mile stretch here along Las Animas Creek. And the Warm Spring is -- well, probably our most important spring, the Warm Spring is just above Ladder Headquarters.
Q. And is that marked on the map there?
A. It's not marked on -- with the large

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lettering, but on the original topo map, it's very hard to see, it's right in this area right here.
Q. And when you say this area right here --
A. Well, it would be approximately one mile northwest of Ladder Headquarters --
Q. Okay.
A. -- along the Animas Creek.
Q. I'd now like to discuss groundwater resources.
Could you describe some of the groundwater resources at the Ladder Ranch, please?
A. Certainly. Within the area closest to the Copper Flat Mine are five livestock wells, four irrigation wells and three domestic wells. These are west to east Myers Well, John Cross Well, Wanda Well, Evans Well and Feedlot Well. The irrigation wells are -- from east to west are Shipping Pens Well, Higgins Well and Orchard Well. The domestic wells are three wells at Headquarters. And I only have slides of two.
Q. Okay.
Now, I'd like to look in particular at the Feedlot Well.
Could you indicate where that well is located?
A. This is where it's located on this particular map, but as I indicated, the actual location is about one-quarter mile to the southeast on this map.

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Q. One-quarter mile to the southeast from where the map indicates that it's located?
A. Correct.
Q. Okay.
And that's in the Avant Pasture?
A. Correct.
Q. And what is this well used for?
A. Along with the Evans Well, it is used to supply drinkers for quail and stock tanks used by bison and large game for drinking. It also provides water to two important conservation facilities, the endangered Bolson tortoise facility, where young tortoises are raised, and the Feedlot steel rim water storage that is used for maintaining threatened Chiricahua leopard frogs.
Q. And have you observed bison drinking from these tanks?
A. I have.
Q. And have you observed game drinking from the tanks?
A. Yes, mule deer, pronghorn and elk.
Q. And what about quail, have you observed quail using the drinkers?
A. Yes, sir.
Q. What is the quality of the water from the

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Feedlot Well?
A. Excellent.
Q. Now, Mr. Dobrott, have you noticed fractures in the rocks near the southern boundary of the ranch?
A. Yes, I have. Relative to the mine location on this map is Animas Gulch, which is just across the boundary line to the north, which drains into Tank Canyon, the next canyon north, which drains into Las Animas Creek.
Along this range there are exposed fractures of -- in the Santa Fe Group filled with carbonates and silicates, indicating past channels of groundwater. These fractures tend to run north and south from the mine area and appear to continue north into Las Animas Canyon.
Q. Okay. Now I'd like for us to focus on the plant and wildlife at the Ladder Ranch, which you have already mentioned.
First, let's look at the document that's been marked as Ranches Exhibit Number 4, which Kendra is going to hand you in a second. Okay.
A. I think I have it.
Q. Okay.
A. Yes. The first is a list of mammal species that have been identified at the Ladder Ranch. The

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second is a list of bird species identified at the Ladder Ranch. The third is a list of plant species that have been identified at the Ladder Ranch.

Q. And did you put these lists together?

A. Yes. However, they are based on observations and studies of other mammalogists, ornithologists and botanists that provided these information lists after their studies.

Q. Okay.

And then going back to Exhibit 4, that document also contains several photographs of wildlife.

Did you take those photographs?

A. Yes, sir.

Q. And were the photographs taken on the Ladder Ranch?

A. Yes, they were.

Q. And are they a fair representation of what you observed?

A. Yes, sir.

Q. Now, could you describe the wildlife at the Ladder Ranch in a little bit more detail?

A. Wildlife abounds on the Ladder Ranch. Healthy populations of elk, mule deer, Coues Whitetail deer, pronghorn, javelina, black bear, mountain lion, turkey and three species of quail occur there. That's the

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Gambel's, scaled quail and Mearns' quail.

Q. And you're referring to your slides here?

A. Yes, sir.

Fifty-seven species of mammals and over 250 species of birds have been recorded on the ranch. Each suite of species is considered a biological treasure and an economic asset to the ranch. Bison are managed as livestock and coexist with other wildlife species ranch-wide.

Achieving a balance between conservation and sustainable business has been the goal for 25 years.

Q. Okay.

Mr. Dobrott, can wildlife also be found in the Avant Pasture?

A. Yes, sir. Elk, mule deer, pronghorn, javelina, mountain lion, turkey and quail inhabit the area seasonally. Black bear also pass through the pasture.

Q. All right.

And does all this wildlife and plant life depend on pristine water from the springs and creeks that flow in the Ladder Ranch?

A. Absolutely.

Q. Okay. Then the next -- next I'd like to ask you about habitat conservation programs.

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Is the ranch currently implementing any programs to protect wildlife or to preserve wildlife habitat?

A. Yes, sir, in accordance with its mission statement and the owner's desire to save everything.

Q. Could you describe those programs?

A. The nonprofit Turner Endangered Species Fund partners with United States Fish and Wildlife Service and New Mexico Game and Fish Department in imperiled species restoration projects like the federally listed Chiricahua leopard frog, the Mexican gray wolf, the Bolson tortoise and the Yellow-billed Cuckoo. Its mission is to conserve and restore imperiled species with an emphasis on promoting wild, working landscapes.

Additionally, the Turner Biodiversity Division works closely to restore less imperiled species like the Rio Grande cutthroat trout and other native fish -- other fish native to the Las Animas Creek system.

Q. And do these programs depend on pristine water from the springs, creeks and groundwater wells at the Ladder Ranch?

A. Absolutely. The propagation of threatened Chiricahua leopard frog depends on pristine groundwater for the frog propagation facility at Headquarters and multiple water storage facilities deemed suitable for

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holding endangered frogs like the one that is supplied by the water from the Feedlot Well.

Pristine water quality is also important to this species in the wild on Cave Creek and Las Animas Creeks. The captive endangered Bolson tortoise depends on pristine groundwater within the tortoise facility. The captive endangered Mexican gray wolf depends on pristine spring water within the US Fish and Wildlife Service/Ladder Ranch Wolf Management Facility. The threatened Yellow-billed Cuckoo depends on pristine surface water in Las Animas Creek.

Q. Okay.

And you mentioned that the Bolson tortoise facility uses water from the Feedlot Well.

Is that the well that we discussed earlier that's in the Avant Pasture?

A. Yes, sir.

Q. Okay.

Next, Mr. Dobrott, I'd like to ask you a little bit more about the businesses of the Ladder Ranch.

Now, is the ranch operated as a business enterprise?

A. Yes, it is.

Q. And could you please describe those -- the

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business enterprises of the ranch?
A. Since 1992, the Ladder Ranch has been raising bison -- been raising and selling bison meat commercially in markets and restaurants. The ranch also conducts big game hunts for mule deer and elk through Turner Ranch Outfitting.
The ranch also is a popular destination for guests of Ted Turner Expeditions, an -- an ecotourism enterprise based in Truth or Consequences. Guests who visit the ranch for the day will stay at our sister property, the Sierra Grande Lodge, an 18-room historic hotel in Truth or Consequences. Each enterprise depends on healthy, well managed environments to operate successfully and to accomplish their objectives in concert with each other.
It is important to note that all these businesses contribute to the economy of Sierra County through taxes and purchases of goods and services. The Ladder Ranch has been doing this on a sustainable basis for 25 years.
Q. Okay.
And the big -- the big game hunts, do they utilize the Avant Pasture?
A. Yes. We often pursue game in the Avant Pasture.

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Q. And does the ecotourism business use the Avant Pasture?
A. Yes. We take tourists there to observe wildlife and to enjoy the quiet, open spaces and scenic views.
Q. Okay.
Now, these business enterprises that you mentioned, do they also depend on pristine water from the springs, creeks and groundwater wells on the Ladder Ranch for their existence?
A. Yes, they do, absolutely.
Q. And how many head of bison occupy the ranch?
A. The ranch bison herd averages around 1,000 head.
Q. And how many people do the businesses -- the businesses employ?
A. The ranch employs between 15 and 20 people depending on the season and type of work.
Q. Now, Mr. Dobrott, in your opinion, what would happen to these business enterprises if water quality at the Ladder Ranch were significantly compromised, say, by contamination from the Copper Flat Mine?
A. Any change in the quality of water derived from ranch stock wells, domestic and irrigation wells, springs and impoundments within this area would

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significantly impact any or all of these programs, enterprises and environments within the range of potential groundwater contamination emanating from the Copper Flat Mine.
If the assumptions and calculations of the mine's experts are wrong and contaminants from the Copper Flat migrate towards the Ladder Ranch, it would be a disaster and is one of several reasons why the Ladder Ranch opposes the mine so strongly.
These businesses and programs could potentially collapse. Without clean water, bison ranching on the southern portion of the ranch could be seriously compromised and potentially dangerous to our bison and human staff. The fish and wildlife would die out or move elsewhere.
Without abundant game within this area, our outfitting business would be significantly affected. Contaminated water at Headquarters would affect our guest accommodations and staff residences. Without a healthy, vibrant ecosystem to show our guests, the ecotourism business would be significantly affected.
Q. Now, in closing, is there anything that you would like to say to the Environment Department staff that are here today and to the Hearing Officer?
A. Yes. The Ladder Ranch urges the Environment

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Department to consider the unknown and irreversible negative impacts that the Copper Flat Mine could have on not just the Ladder Ranch, but its neighbors, ranchers, farmers and all downstream water users in the Lower Rio Grande if contaminants from the mine enter into the groundwater system.
Our experts contend that there is sufficient evidence of hydrological conductivity between the aquifers of Copper Flat and Las Animas Creek to raise a major concern over possible contaminant drift onto the Ladder Ranch and ultimately to Las Animas Creek and to the Lower Rio Grande basin.
Therefore, the potential of this occurrence does not justify the issuance of this permit, and to do so would be irresponsible and would pose an unacceptable risk to those of us who depend on clean, uncontaminated water for our citizens, our communities, our ranches, our wildlife and environment. The risks are just too great to allow.
Q. Thank you, Mr. Dobrott.
I have no further questions.
Madam Hearing Officer, I now would move for the admission of Ranches Exhibits Number 3 and 4.
MS. ORTH: Objections?
No?

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MR. BUTZIER: I'm just a little confused on Exhibit 4.

Is Exhibit 4 the one that starts with this picture or this picture?

MR. DE SAILLAN: I can't see very well from here, Mr. Butzier. It should be marked as Exhibit 4 as opposed to Mr. Dobrott's slides, which we are not --

MR. BUTZIER: I see.

MR. DE SAILLAN: -- seeking to introduce as an exhibit. Those are just demonstrative.

MR. BUTZIER: Thank you. That clears it up.

MR. DE SAILLAN: Okay. Thank you.

MR. BUTZIER: And I do not have any objections.

MS. ORTH: Okay.

Anything?

MS. BARNCASTLE: No objection.

MR. KNIGHT: No objections.

MS. ORTH: All right. Thank you.

Exhibits 3 and 4 are admitted.

(Exhibits Ranches 3 and 4 admitted into evidence.)

MS. ORTH: Mr. de Saillan, we can turn to cross-examination, or we can take a lunch break and pick up cross-examination after lunch.

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MR. DE SAILLAN: I have no preference at this point. Perhaps we could ask the witness how he's doing.

MR. DOBROTT: I'm fine.

MS. ORTH: You're fine.

MR. DOBROTT: How's the audience doing?

MS. ORTH: Let me ask if there would be extensive cross-examination of Mr. Dobrott.

Mr. Butzier, I would turn to you first.

MR. BUTZIER: I'm not sure about extensive, but I do have a number of questions.

MS. ORTH: All right. Let's take a lunch break, then, so that we're not interrupting that.

Let's return at 1:15.

(Proceedings in recess from 12:01 p.m. to 1:19 p.m.)

MS. ORTH: Okay. We are back after a lunch break and about to go to the cross-examination of the ranches' witness, Mr. Dobrott.

However, before we turn to that cross-examination, we're going to take the opportunity of the lunch break to accept some public comment.

Edna Trager --

MS. TRAGER: Yes.

MS. ORTH: -- was the first to sign in and to request that she give public comment after the lunch break.

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I have some other names here which I will call on when we're done with Ms. Trager.

If you would please -- and I understand that's T-R-A-E-G-E-R?

MS. TRAGER: No E. T-R-A-G-E-R.

MS. ORTH: Okay. Thank you.

MS. TRAGER: Yes.

MS. ORTH: If you'd be sworn in, please.

EDNA TRAGER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. TRAGER: Thank you for this opportunity to speak.

As I was introduced, I am Edna Trager. I'm a City Councilor with the City of Elephant Butte.

Our mayor would also have been here except that she is out of town. So she does send her regrets.

Coincidentally, it's been 20 years since our city became a city, and 20 years ago you'll hear people talk about how that was back in the day when the lake here, Elephant Butte Lake, the water was going over the spillway, it was wonderful, the boating industry was fabulous.

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I don't know if any of you are on Facebook, but there are pictures going viral of all the -- all the boats and how here it was 20 years ago, here it was a year ago, and here it was a week ago, and they're quite dramatic pictures.

Right now there -- if you go out on a -- on a kayak, you can hit a sandbar. Boats are hitting sandbars with their propellers. Fishing is great. There are huge fish getting stuck out there in ponds that are having to be relocated.

The reason I bring that up is because this is all about the economic impact on Elephant Butte and Sierra County. That's why I'm mentioning it. So in the past 20 years, the city has grown to the size of about 1,500 full-time residents. Over the years on key summer holidays, we host as many as 100,000 visitors. It has represented a lot of revenue.

Over those 20 years, we have striven to diversify. We do not want to be not only a lake community, but we have tried to be open to tourism and a retirement community offering a lot of other services.

But again back to Facebook, right now with all of these pictures and the lake being down, people are surmising that, you know, the business is going to go away, the people are going to go away. One woman was

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guessing, boy, what are the home values going to be? How low do you think the prices are going to go? It's almost impossible to guess what the impact is going to be.

As I said, we have striven to diversify and bring other business here. We do have a great golf course, but right now the importance of the mine is -- just keeps growing in to us. This is a business that is here. It's here right now. They're in our county.

We do support the opening of the mine. We see jobs here. We see a future for some of the people that live here, their kids. The idea of having a boat storage and boat mechanics and fishing and that is all of a sudden not looking quite as viable as it did yesterday.

People are talking about how this drought just isn't going away. There are a lot of people involved in the lake and tourism industries. EBID, I know, does a great job, and they work hard to manage the water and get the water down to the farmers to the best of their ability, but no one is saying that they're going to keep the water in there for the City of Elephant Butte.

So what are we going to do to keep people here working and buying groceries and, you know, keeping kids in the schools and, you know, keeping teachers here and

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just looking for the overall future of Sierra County.

So to maintain our infrastructure, we are looking for industry. And again we talk about economic stimulus, and we look at the political situation and -- and the pressures. And again the idea that the mineral deposit is right here. It's not something that's you're going to find someplace else. It's in Sierra County.

We've talked to them. We've -- they've been our community. We've listened to them. By all accounts, it seems that they have done everything that's been asked of them.

It looks like they're going to provide jobs, you know, truck drivers, accountants, engineers, you know, things that offer, you know, a future for the people that live here, and even if people come here, it's -- it's a good opportunity. It's paychecks. It's family need. It's clothing. It's gasoline. It's GRT to this area.

Again by everything that we've seen, it looks like the company has done its part going through the requirements, that they've looked at the environment, that they have said they will post a significant bond to assure that this operation and the infrastructure is protected during the operations and going forward into the future.

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We believe that we need to seize this opportunity for our residents, for our community and for our future. We've looked at things that could be of benefit to us. We did invest in Spaceport. We still think that that's going to benefit this area in the future, but maybe not at the levels that we hoped for, and definitely not as soon as we had hoped.

We think that without the Copper Flat Mine project our future sustainability of our communities will be difficult and definitely challenging. The City of Elephant Butte needs and supports the approval of the groundwater protection Discharge Permit for the Copper Flat Mine project and encourages the New Mexico Environment Department to complete their analysis and issue this permit as soon as possible.

Thank you.

MS. ORTH: Thank you, Ms. Trager.

If you would leave your written comments, they will be beneficial to the court reporter.

MS. TRAGER: Oh, okay.

MS. ORTH: Thank you.

MS. TRAGER: There you go.

MS. ORTH: Next on the sign-in sheet is Don Steinnerd.

Sir.

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DON STEINNERD

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. STEINNERD: Good afternoon.

My name is Don Steinnerd. I'm a resident of Socorro, New Mexico.

I'm a retired petroleum engineer. I have a degree from the University of Missouri at Rolla as a -- in geological engineering, bachelor of science, but I'm not here as an expert by any means on anything. I'm here just to throw my support and say a few comments that I hope the mine gets permitted.

In my humble opinion, you had a mine already in the area in the past. This is essentially trying to restart the mine over again. It should be as near a no-brainer as possible to get through the permitting issues, I hope. And I encourage and hope that all of the permitting agencies review and approve this permit as soon as possible so all of the benefits of the mine can start taking place as soon as possible.

And I think the negative impacts, if any, are so minute that this will be just a great benefit in general to the community and the state.

And again I encourage everything to be

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reviewed and the permits be issued as soon as possible.
Thank you.
MS. ORTH: Thank you, Mr. Steinnerd.
Jim Lommen.

JIM LOMMEN

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. LOMMEN: My name is Jim Lommen. I'm also down from Socorro.
And the -- we certainly encourage getting the mine open, and certainly Sierra County, Socorro County, all of us have been looking for any kind of economic development that can come to the area. Certainly having this mine will be -- will generate a lot of economic impact around it, from my experience. And I have had 50 years in the mining and mineral processing industry.
So I do encourage getting the permits in line and approved.
MS. ORTH: Thank you, Mr. Lommen.
Vern Jones.
MR. JONES: Good day.

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VERN JONES

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. JONES: My name is Vern Jones. I'm from Los Lunas, New Mexico.
I'm retired, in engineering department.
We have a small claim out here, and we work out there, and we work with and alongside the Copper Flat -- Copper Flats Mining Corporation. They have been nothing but very nice to us and everything else. So we support them 100 percent.
I don't think the impact that they will have on the environment or anything is going to affect anything from there clear down to the Rio Grande, and it will dissipate by the time it gets down there.
And I -- that's it.
MS. ORTH: Thank you, Mr. Jones.
MR. JONES: Thank you.
MS. ORTH: Larry Brooks.
MR. BROOKS: Thank you, Madam Chair, provide comments on this public hearing.
MS. ORTH: We need to swear you.
MR. BROOKS: Okay.
I'm Larry Brooks.

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LARRY BROOKS

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. BROOKS: So I'm a native New Mexican. I have lived here my entire life, been a lifelong resident. I have traveled this state from Cloverdale to Des Moines. Some of you may know where that's at. And Jal to Farmington and every -- every single state highway in between.
I made a good living, kind of a blue-collar living in the paint and coatings industry. And so I'm -- I've been by many mines, been by many beautiful vistas that we have in our state. And I love this state.
I presently am -- I train contractors, and I still work part-time in the roof coating business, even though I've got one foot in Kingston, I have a part-time residence there, and the other foot down in Las Cruces.
One of the types of roofing that we work with is single-ply roofing. And it's similar to the type of liner that I think is being proposed. The single-ply roofing material comes in PVC, TPO, EPDM. It may vary a little, I mean a little different than the liner that's proposed being used. But it goes down very similar --

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in fact, on the piece right here, there's even a weld, really nicely done, and it's super strong.
It's the type of roofing material that's used on large, large installations, like, for example, a Wal-Mart or a large industrial building, sometimes even on residential.
And after a -- a job like the Wal-Mart's done, an engineered roofing system is installed, and seams are welded, and everything is put together by trained professionals. But very frequently at the end of that job, after the first rain, that's the real test, you may get a few leaks. Either someone inadvertently poked a hole in it or maybe one of the seams wasn't exactly as it should be. With thousands of feet on a roof of seams, there's always the potential for a leak.
So I train contractors on how to repair seams and leaks like that. Like I said, it's similar to the type of pond lining material. This one here is actually only -- I think this is a 60-mil thickness. I believe the one proposed in the mine is 80 -- 80 mils.
A lot of damage can happen on a roof after a rain. You get a slow leak that gets in, and water will infiltrate underneath that liner. And hopefully it drips through, and then you find where the leak's at and then go back and repair that spot and you see --

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physically see the puncture or the damaged installation seam.

So a lot of damage can happen even up to hazardous stuff, like some of the mildew and molds and black mold can get on it.

Once you locate that, it can be fixed. But if a liner is used in this tailing pond -- I'm -- I'm concerned with the system of coming in and putting fill over the top of that. Because you have the liner, and then you come in and put the fill on the top. And the potential for tailing rocks, crushed rocks or even equipment -- in fact, I believe that the Truth or Consequences dump was closed because of the damage to their liner. I'm not positive on that, but that's what I was told.

So these liners are not uncommon.

Once you get a hole in the liner, it can continue to seep and leak. And I understand that the mine has proposed some monitoring wells to take care of some of the seepage, or at least be alerted about the seepage.

I actually -- if I may, I'm a little dry.

I may say that if we had a single-ply, that is one-ply, liner, and we took and filled that liner with water, just, you know, regular water, and in that water

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is pollution which is represented by this coloring. You can see what it would be. It almost duplicates the appearance of the pond that's in the existing mine site.

And if you -- if you would imagine taking some aggregate or rocks and putting on that site, packing it in, however that's done -- I'll try not to make a mess here -- and if you have this single liner that slowly seeps and goes on, you only have one layer of defense. And that layer of defense is this single ply, supposedly protected by all the gravel and the tons and tons of yardage of dirt and soil and crushed rock.

And then you put millions of gallons of water on top of that, thus pushing down the weight, the potential for sharp rock and other objects to get down in and penetrate that, to me, is extremely high.

You know, if a person would come in and take another -- a double liner and have underneath the first liner, and put that polluted chemical in there, if you do get a puncture from the rocks, then it would spill through, at least have another catchment.

At least then we have the double protection, knowing that the water that is being pumped out of the ground, the water that we drink, the good water, and the water that we may have that seeps back in -- this is actually holding -- that is polluted and potentially

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could get down into the water supply, is of great concern to me, that we're taking drinkable water and potentially polluting that water with this tailing pond in its design.

I'm not an expert, but I've been -- in mine linings, but I've been around a lot of industrial roofs and I've seen some disasters with one ply, single ply. I'm very concerned about it.

I listened yesterday to Representative Dow, and I -- I'm, like I said, a working class kind of a guy. I worked my whole life in and around the construction business, and I understand jobs. I work in the coatings business. In fact, I've even supplied all of the paint and coatings on this building and most of the public buildings here in this town.

I like the idea of the jobs. But at what cost? What's the cost to us, the people? What's the cost to the next generation? And not to mention the impacts ecologically on the environment, the wildlife, the vegetation, the sheer beauty of our state.

So with that, I'm done with my comments, but I'm getting a little dry. I don't want to drink this water. I would rather use the water that's in the ground as it is.

Thank you.

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MS. ORTH: Thank you, Mr. Brooks.

I see the name Andrew Maloney here but then a comment that he'd prefer to go this evening.

Is that still true?

MR. MALONEY: Yes, ma'am.

MS. ORTH: Okay.

Is there anyone else whose name is not on this sheet of paper who has not already made public comment who would like to offer public comment at this time?

No?

All right. Thank you.

Mr. Dobrott and Mr. Kuipers, if you would return to the table.

MR. BROOKS: What do I do with the waste?

MS. ORTH: There's a trash can by the coffee table.

MR. DOBROTT: Sorry.

MS. ORTH: That's all right.

Okay. Mr. Butzier, do you have questions of Mr. Dobrott?

MR. BUTZIER: Thank you, Madam Hearing Officer.

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STEPHEN DOBROTT
having been previously duly sworn or affirmed, was examined and testified further as follows:
CROSS EXAMINATION
BY MR. BUTZIER:
Q. Good afternoon, Mr. Dobrott.
A. Good afternoon.
Q. Thank you for your testimony.
I am curious.
Are you the person with the Ladder Ranch who has the most responsibility for the wells that you described in your testimony?
A. Not anymore.
Q. And who would that person be?
A. The new manager of the Ladder Ranch is John Hurd.
Q. Okay.
But when you were involved, you -- did you have that role?
A. Yes.
Q. Okay.
And is the Las Animas -- is Las Animas Creek its own water basin, to your understanding?
A. Yes.
Q. Is that an underground basin according to the

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Office of the State Engineer?
A. I believe it is.
Q. And do you know is that a fully appropriated basin?
A. It's an adjudicated basin.
Q. It's also an adjudicated basin?
A. Yes.
Q. So --
A. Las Animas basin.
Q. And so you -- you as the ranch manager of Ladder Ranch are presumably aware or were aware of the extent, the quantification of the water rights associated with those wells?
A. Yes, sir.
Q. Okay.
And are you also familiar with how those wells were completed and in what -- to what depth, that type of information?
A. I'm very familiar with that. Yes.
Q. Okay. Thank you.
And the Las Animas basin -- or the Las Animas Creek area is considered to be in a different surface watershed area than the Grayback Arroyo basin; is that correct? Or area?
A. Yes, geographically.

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Q. And there's -- topographically there's -- there's a higher elevation ridge, in essence, between the Grayback area and Las Animas Creek; isn't that correct?
A. Correct.
Q. Does the Ladder Ranch meter its wells?
A. Yes, sir.
Q. And is that information that is supplied to the Office of the State Engineer?
A. Yes, sir. I believe it's quarterly.
Q. Is it also sampled for -- you talked a lot about how pristine the water is from those wells.
Is that based upon just general understanding, or is there a sampling program on any kind of regularity that confirms that fact?
A. We don't take regular samplings. Excuse me. But our biologists, who are concerned with the endangered species such as the Chiricahua leopard frog, do take samplings because that's -- there are very fine parameters there that exist for the -- for these frogs to be able to exist in the stream. So there's mostly pH and other -- TDS and that type of thing.
But from what I understand, they do do -- our biologists do regular water analyses in order to make sure that whether either taking frogs from or moving

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frogs to that it's suitable.
Q. And can I assume from your answer that in some of the wells at least there's elevated pH and TDS?
A. I do not know that.
Q. What made you bring up those two --
A. I was mostly -- I thought maybe you were talking about -- maybe it was my fault. I was thinking more of the creek, of the creek itself, and the springs. The wells are still important to our facility at Headquarters that we propagate frogs, and so that water has also been evaluated --
Q. Okay.
A. -- its suitability for raising amphibians.
Q. Okay.
And is there considerable amount of fluctuation of water in the Las Animas Creek from one part of the year to the next?
A. There is.
Q. And can you describe that? Is there a pattern? Is there a time of year when it's more water flowing than other times of the year?
A. Yes. A lot of it depends on the drought conditions that we have. As you know, probably 65 percent of our rainfall comes within the monsoon season, and that is where we have more flashing water

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events. And then if we get a snowpack in the winter, then we have snowmelt and run-off from the snow.
We haven't had a whole lot of that lately. In fact, I don't think -- the Animas Creek maybe ran once this summer, and we've had very little run-off from snowpack last year. So that's seasonal.
Q. Okay.
And you mentioned the proximity to the Black Range in your testimony.
Do you recall that?
A. Yes, sir.
Q. Am I correct that the predominant source, if you will, of water that feeds the Las Animas Creek system is the result of run-off from the Black Range or snowmelt from the Black Range?
A. I would say in normal years, yes, it is the predominant source.
Q. Okay.
A. However, the Warm Spring, the Animas Warm Spring, keeps us going for our -- our irrigation during the dry season, and that's just above Headquarters.
Q. Okay.
And do the springs also fluctuate like the flows in the stream itself?
A. Not necessarily.

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Q. So they're pretty reliable, but that -- you went through a series of pictures of springs.
A. Um-hum.
Q. Is that water that's pretty reliably --
A. Yes, sir.
Q. -- of the same volume that we can see in the pictures?
A. Very similar, yes.
Q. And that's -- that's not so much affected seasonally?
A. No, sir.
Q. And do you have an understanding of where the water comes from to feed those springs?
A. No, sir. I don't know exactly.
Q. Okay.
Does the Ladder Ranch have any dams that it uses in connection with either Cave Creek or Las Animas Creek?
A. Not directly fed by either one of those two creeks, no.
Q. Does it have dams on the Ladder Ranch?
A. Oh, yes.
Q. And can you describe what -- where those are located?
A. Well, there is probably 35 earthen dams on the

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ranch that are constructed in locations to capture rainwater or run-off, but none of them are in a situation where they're pulling in water from creeks or springs.
Q. Are they in locations that would otherwise lead to recharging of those springs and creeks?
A. No, sir.
Q. And how is that? Are they just randomly placed in dry areas on the ranch?
A. Yes, sir.
Q. Is that to capture mostly just natural precipitation?
A. That's correct.
Q. And it's for the purpose of feeding livestock and wildlife?
A. Correct.
Q. And there are 35 of them.
A. Roughly.
Q. Okay.
Could we pull up the slide that has a little 24 that's part of your slide presentation?
That's it.
A. Okay.
Q. Looking at this map, I'd like to -- even though it might take a little time, and I apologize, but

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I'd like to go well by well and collect what information you know about it, both in terms of how deep the well is, how deeply it is completed or, you know, at what interval it may be completed.
And let's start with the one we talked about the most, which is the Feedlot Well, in the little rectangular area that juts down to the south from the ranch.
What can you tell me about how deeply that well has been completed and what you know about what formation it's been completed in?
A. I -- if my memory is correct, this well is approximately 100 to 125 feet deep. It has been there since the 1950s. It has serviced in the past a feedlot, thus the name, Feedlot Well. As far as I understand, it's within the Santa Fe Group geologically. It is on -- it is on electric power.
Q. And it also has a storage tank to the south --
A. Yes, sir.
Q. -- of it?
A. There's a 40,000-gallon storage tank just to the south of it.
Q. And tell me about what's the -- how often is that storage tank needing to be refilled or used?
A. It's on an automatic float where it fills

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whenever it's -- when it gets down to the point where it needs to fill, because we need to keep the water levels up for the frogs that we have in that storage.
Q. So there are frogs right in that area?
A. Yes, sir. They're in the storage.
Q. In the actual --
A. We use that particular storage, as other storages that we have on the ranch, for frog refugia, or a place to maintain them while they're in captivity. And these are different genetic sources, frogs from different locations around the Southwest.
Q. Okay. I'm going to get to a question about where the --
A. Okay.
Q. -- threatened and endangered species that you admirably, you know, helped take care of -- I'm going to get to where those come from and when --
A. Okay.
Q. -- and that kind of thing.
But what can you tell me about the quality of the water? Can you tell me any more specifically than you have already about the quality of the water that comes from that Feedlot Well?
A. I -- I can't give you anything other than the fact that it's good enough for frogs.

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Q. Okay.
Is there anything else but that refuge -- what was the --
A. Refugia.
Q. -- refugia that is serviced by that Feedlot Well?
A. The Feedlot Well is supplemented by the Evans Well.
Q. Okay.
Then let's move to the Evans Well next.
A. Okay.
Q. So moving to the west, the next well we come to is the Evans Well.
What is it that you mean when you say it's supplemented by that well?
A. We do have a pipeline that runs from the Evans Well, that connects to the Feedlot Well, and then in between those two are other storages that we can divert to. So it's a supplemental. We use either/or on that particular pasture.
Q. Okay.
And how often is water drawn from the Evans Well?
A. I would say probably once every couple of weeks.

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Q. And do --
A. According to storages.
Q. And do you know in what volumes?
A. No, sir.
Q. How often is the Feedlot Well -- how often is water drawn from the Feedlot Well?
A. Well, as I said, it's -- it draws it automatically in order to keep the water levels up. So it's -- I can't give you an exact figure.
Q. And it's -- in the Feedlot Well, I think you said it was -- it was completed to 150 feet?
A. Roughly.
Q. Roughly.
And is that how -- is that where the well is completed or --
A. Yes. It -- most of the stock wells on the ranch are roughly 100 feet, 125 feet.
Q. Okay.
Is there anything else that the Evans Well is used for?
A. No, sir.
Q. So its primary purpose today is to supplement --
A. Yes.
Q. -- the Feedlot Well.

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A. Yes. And that's for livestock and wildlife.
Q. Tell me about beyond the frogs what -- what makes use of water from the Feedlot and Evans Wells.
A. There is a facility about two -- one-and-a-half miles of the Evans Well and about a mile north of the Feedlot Well where we have -- where we raise Bolson tortoises, which is an endangered species.
Q. Okay.
A. And those wells supply water to that facility, as well.
Q. Okay.
And the Bolson tortoises make use of that water how? Just drinking --
A. Drinking.
Q. Okay.
And let's move now further west to the John Cross Well.
Is that also in the 100-feet-deep range?
A. Yes, sir.
Q. Now, in this topography, we're talking about uphill from the Las Animas Creek, obviously --
A. Correct.
Q. -- but all of the wells we've talked about so far are on the other side of the topographical feature that I described as sort of a hill that divides --

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A. Correct.
Q. -- the properties? Okay.
And what is the water from that well used for, and how often is it drawn?
A. That's a livestock and wildlife well. It's on a solar power so it operates as much as it needs to.
Q. Are there drinkers associated with it?
A. Yes, sir.
Q. How many?
A. There's a tire drinker right next to it, and then downstream there are quail drinkers.
Q. Okay.
A. About every half mile.
Q. Let's move now farther west to the Myers Well. How deep is that one, to your knowledge?
A. That well is a lot deeper. It's around 400 feet.
Q. And does that -- do you know if that taps into the regional groundwater table?
A. I assume it does.
Q. Do the other ones that we've already talked about, to your knowledge, tap into the regional well?
A. I assume -- I assume that it does.
Q. What is -- what is the Myers Well used for?
A. The Myers Well is used for watering bison and

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wildlife.
Q. And have you -- for either the John Cross Well or the Myers Well, can you tell me what you know about the quality of the water that is drawn from those wells?
A. I cannot, other than it's -- it seems to be good quality.
Q. Good quality? Okay.
A. I don't have any measurements.
Q. Okay.
Is there any piping of water from either of those two wells, the John Cross Well or the Myers Well, to any other location?
A. Well, yes, sir. The Myers Well boosts water up to the Myers Mesa, up to another steel rim storage.
By the way, the Myers Well has a storage there, another 40,000-gallon storage --
Q. Okay.
A. -- and a booster pump that pumps up the hill to the top of Myers Mesa. And gravity flows back down for bison drinkers.
Q. And is that -- is that on an automatic kind of arrangement, or is that periodic?
A. It's solar -- it's solar, and -- it's managed, but it's solar, and it's pretty much automatic.
Q. Okay.

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Let's talk about the Wanda Well next, moving back east and a little bit north.
How deep is that well?
A. The Wanda Well is around 100 feet.
Q. And what is that well used for?
A. It's used for livestock and wildlife.
Q. Is it similarly stored in any kind of container?
A. Yes. There is a -- there is a storage container nearby, and it is pumped -- the water is pumped from the well to the container, and then it's gravity-flowed downhill to a series of drinkers for quail.
Q. For quail. That one's primarily a quail well?
A. (Nods head.)
Q. Okay.
And do you know anything about the quality of the water drawn from that well?
A. No, sir, other than we haven't seen any dead animals around it.
Q. Okay. Fair enough.
Let's go a little to the north and look at the Shipping Pens Well.
Now, that looks to me like it's very close to Las Animas Creek; is that correct?

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A. It is. Yes, sir.
Q. And how deeply is that completed?
A. I can't say off the top of my head, but most of those irrigation wells along through that area are around 100 feet.
Q. Okay.
A. It's just a little higher static water level.
Q. Okay.
A. And the water level does vary with the groundwater table.
Q. And what is that well used for?
A. That well is an irrigation well.
Q. And what gets irrigated from that well?
A. The -- there's farms in that vicinity of that well, and the purpose of that well was to pump water into those farms for irrigation.
Q. Okay.
So those are supported by an agricultural water right of some kind?
A. Yes, sir.
Q. Okay.
And what about the Higgins -- well, first of all, do you know about the quality of the water from that well?
Maybe I already asked that.

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No?
A. I can't give you exact parameters.
Q. Okay.
And what about the Higgins Well just to the north of that?
A. Same purpose.
Q. And that's also pretty close, it looks like, to the Las Animas Creek streambed?
A. Yes, sir.
Q. And then we get to the Ladder Headquarters, looking farther north.
Is that its own well, or is that just the Headquarters?
A. That's just the Headquarters, and there are domestic wells. And what is not shown on there is the Orchard Well.
Q. Okay.
And that's located very close to the Headquarters?
A. Yes.
Q. Okay.
Now, tell me about -- you mentioned there's a -- I think you said that the Cave Creek is tributary to the Las Animas Creek; is that correct?
A. Correct.

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Q. And it comes down from the Black Range to the west --
A. Correct.
Q. -- and then feeds into the Las Animas Creek?
A. Yes, sir.
Q. Are there other tributaries that feed into the Las Animas Creek, to your knowledge?
A. Not major. There are a lot of minor tributaries, such as this area here, Tank Canyon, Wanda Canyon.
Q. What is the topographical elevation in general terms of the Cave Creek as compared to, say, the Ladder Headquarters?
A. I know the Ladder Headquarters is approximately 5,280 feet, or 5,200 feet. And the elevation of -- I can't read it from here -- is -- I don't know if I can read it.
Q. Just looking from the lines on this topographic map, it looks like it's quite a bit higher in elevation? Is that your understanding?
A. There we go. Cave Creek -- I'm looking -- I don't see -- I don't see an elevation.
Q. And is Cave Creek sort of down in a -- in its own little creek valley below the Myers Mesa that's --
A. Yes, sir.

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Q. -- that's indicated on this map?
A. Um-hum.
Q. Okay.
So it's kind of between Myers Mesa and Cave Creek Mesa.
A. I'm sorry. Animas Creek is north of Cave Creek Mesa.
Q. No. I was talking about Cave Creek.
Cave Creek is kind of between -- runs kind of between Myers Mesa --
A. Oh, yes, sir.
Q. -- to the south and Cave Creek Mesa --
A. That's correct.
Q. -- to the north.
And again it's coming from the Black Range, essentially?
A. That's correct.
MR. BUTZIER: Can we pull out again on that map, Jim? Thanks.
Okay. Let's turn back to the wells.
Well, let me ask -- since we're on creeks, let me ask about Seco Creek.
Am I interpreting this map correctly that Seco Creek is not tributary to Las Animas Creek, at least as far as we can see on the map?

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A. Yes, sir.
Q. And it's to the north of Las Animas Creek?
A. Um-hum.
Q. And Crews Well looks like it might be in close proximity to the stream channel; is that correct?
A. That's correct.
Q. And what -- is that also about 100 feet or so deep?
A. I believe so.
Q. And what is that well used for?
A. That is used -- that well is used for livestock and wildlife.
Q. Is water stored in tanks from that well?
A. Yes.
Q. And where are those located, in what volume?
A. I don't know if it's on this map, but there is a pump that pumps water from the Crews Well north approximately one mile to another steel rim storage facility, and from that storage facility it's gravity-flowed out to the east, the eastern part of the ranch, which would be this country out here to the -- on the north portion of this map.
Q. And that looks like relatively flat terrain kind of?
A. It is.

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Q. Gently sloping toward the Rio Grande?
A. Yes, sir.
Q. And coming back down Seco Creek to Seco Well, also appears to be in or close to the stream channel, correct?
A. Correct.
Q. Is that also about 100 feet deep?
A. I believe all these wells were drilled about the same depth.
Q. And are the Crews Wells and -- well, is the Seco Well also supporting a tank of some kind?
A. Yes, sir.
Q. And that's used in connection with livestock?
A. Yes, sir.
Q. And wildlife?
A. Yes, sir.
Q. Okay.
What about the Wild Horse Well that's way off on the upper right corner of this map?
A. Wild Horse Well is not being used at this time. It's being fed by the Seco Well and pumped across, and the pipelines run towards Wild Horse Well.
Q. Okay.
And let's jump all the way now over to the upper left corner and tell me about Number 2 Well and

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Number 3 Well.
A. Both wells are again stock wells. Number 3 Well is -- has a fairly deep well, that's about 400, 450 feet, and it's pumped by solar.
Q. Any tanks?
A. There's a storage there. Most of these storages that were put in in the '50s were about 40,000 gallons.
Q. Okay.
A. Number 2 Well, same thing. It has a windmill and solar pumping. These are getting water out of the ground and a 40,000-gallon storage. And then we boost that water upslope to other storage facilities and then gravity-flow back.
Q. To drinkers and that type thing?
A. Drinkers and for wildlife and livestock.
Q. So of all these wells that we just talked about, it sounds like really only one of them is used for purely agricultural reasons; is that correct? Or did I misinterpret?
A. There are three --
Q. Three. Okay.
A. -- along Animas Creek that we use for agriculture, the Orchard Well, the Higgins Well and the Shipping Pens Well.

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Q. Okay.
And the farmland that is irrigated with that, is it on both sides of the creek or one side or the other?
A. Typically the farmland is on the north side -- well, north side of the wells; however, the Orchard Well is right in the middle of the -- of the farm operation.
Q. Okay.
And what's grown in those farms?
A. Most of the crops are for wildlife, to attract wildlife. So it's native grasses or pasture grasses. We attract a lot of elk and deer and javelina and turkeys. So we try our best to plant foods that wildlife would be attracted to.
Q. Okay.
A. And that's about it really.
Q. And I guess I see that I missed three other wells on this that I'd like to ask you about.
Let's turn to the 53 Water Well, which looks like it's a little downstream in the Las Animas Creek streambed area.
A. I have no -- no information on that well, and this -- this well I'm not even sure it exists, because I never could find that, where the information came from on that.

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And then the 54 Well looks to me off the property. So I have no information on that, as well.
Q. Do you know if that's -- that infrastructure belongs to the Ladder Ranch?
A. The -- this well here is not on the Ladder Ranch.
Q. It's not on the ranch?
A. It's not on the ranch.
Q. So it's somebody else --
A. Some of the neighbors -- some of the neighbors ranch.
Q. Okay.
And I assume the same would be true of the 27-27 3 Water Well.
A. Yes. I have no -- no idea. They're all off the ranch.
Q. Now, am I correct that there are a number of residential properties along the lower reaches of Las Animas Creek?
A. Yes, sir.
Q. About how many people live in that area?
A. I'm thinking there's probably 100 people.
Q. And do they all have their -- essentially their own well or share wells?
A. Most -- most people do have their own wells.

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Q. All right.
Now, you talked about concern about contamination possibly making its way somehow to the -- to the Ladder Ranch.
I'd like to have you, if you would, tell me the areas and the wells that you are most concerned could be somehow impacted by the mine.
A. The Feedlot Well is the well that -- right now that we're most concerned about in terms of any contamination that could come from the tailings pond. The other wells to the north -- any of these wells to the north I'm concerned about any -- any possible connectivity of the mine pit lake to those wells.
Q. Okay.
And you referred to the fact that some of your experts or your hydrologists have given you cause for concern about what might happen and might come from the mine; is that correct?
A. Yes, sir.
Q. Can you tell me more about that? What are the experts that you're talking to saying could be the pathway to -- to reach any of those wells?
A. Well, they have told me -- and you have to understand I've been through this quite a while, and so there's a lot of modeling that I have looked at, and

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from my experience on the ranch, and the information that I have read and studied pertaining to this particular project, there is in my -- my understanding is that there is -- and also from our experts that told us, two different hydrologists, that said that there -- there is -- there could be a connection, there could be some connectivity between -- at the -- especially at the faults or the fractures.
And so that's -- that's what the basis is -- my basis of understanding is from, and also my personal experience on the ranch dealing with water for 24 years.
Q. And can you elaborate on that? What about your experience in 24 years has contributed to --
A. Well --
Q. -- your concern about this project?
A. I pretty much know where water runs and where it doesn't in terms of surface water. The groundwaters, you know, I'm not an expert in that area, but we've had to accommodate our livestock through drought periods, and I'm pretty well versed on what wells are strong, what wells are weak, and how that -- how those wells respond to drought conditions.
And so it's my opinion that -- that there could be some connectivity based on the information that I have read and the hydrologists that I have consulted

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with, and that's where -- and that's what I am led to believe that that is possible.
Q. And just to be clear, you yourself are not a hydrologist, right?
A. No, sir.
Q. And do you know whether the Animas fault that -- were you -- were you present in the room when Steve Finch was testifying?
A. Yes, sir.
Q. And do you know whether the Animas fault feature that he identified in some of his slides extends to the Ladder Ranch?
A. I do not know exactly.
Q. Do you know roughly --
A. I know roughly where.
Q. -- where it is?
Can you --
A. Based on the maps.
Q. Can you -- on this map, can you use your pointer to show where you understand that to be.
A. Let's see. Roughly in this vicinity here, and it could make its way up this way.
Q. But I think you said you don't know --
A. I don't know --
Q. -- how far north?

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THE REPORTER: Excuse me.
MS. ORTH: You have to speak one at a time.
MR. BUTZIER: Sorry.
MR. DOBROTT: Sorry.
THE REPORTER: Please repeat.
MR. DOBROTT: I don't know how they know, or would know.
MR. BUTZIER: Okay.
MR. DOBROTT: For the last 24 years, nobody has looked on the ranch.
Q. (BY MR. BUTZIER) Has there -- have there been requests coming from consultants for the company to gain access to get information on the Ladder Ranch?
A. There have been.
Q. And have those been granted by the ranch?
A. Not always.
Q. Can you tell me how often and when it was granted and when it wasn't?
A. I think years before we were -- we were allowing people from INTERA, I believe, to come --
Q. Alta Gold?
A. -- Alta Gold to come in and do some surveys.
Q. Oh, from INTERA. Okay?
A. From INTERA.
Q. Sorry.

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A. INTERA.
And after a while, we stopped doing that.
Q. And why did you stop doing that?
A. I was told to.
Q. Okay.
Now, is there any kind of -- apart from the concern about contamination finding its way to the Ladder Ranch from the mine facility, is there any kind of philosophical problem that your boss or the owner of the ranch has with mining?
A. Figured you'd ask that.
No --
MR. DE SAILLAN: I'm going to object to that question --
MR. DOBROTT: Yeah. That's --
MR. DE SAILLAN: -- Madam Hearing Officer. That goes way outside the scope of his testimony, his direct testimony.
MR. BUTZIER: I'll withdraw that question.
MS. ORTH: All righty.
Q. (BY MR. BUTZIER) Okay. So you had identified an area of the Ladder Ranch that I think you indicated in response to a question from Mr. de Saillan was immediately adjacent to the property boundary of the Ladder Ranch.

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Can you show me where the permit boundary for the Copper Flat Mine is immediately adjacent to the Ladder Ranch?
A. I believe it's right along this line.
Q. And the Copper Flat Mine is the little sort of whitish area beneath the --
A. Well, that --
Q. -- Copper Flat Mine?
A. Yes. That's the permit.
Q. So the permit boundary is actually in a very small -- on this map --
A. Yeah.
Q. -- in a very small, little formation within that, right?
A. Yes.
Q. So the permit boundary itself is actually perhaps as much as a couple of miles away from the -- from the southern boundary of the ranch; is that correct?
A. Correct.
Q. All right. Now, let's talk about the bison.
You've mentioned the frogs need pristine water.
Is it your understanding that bison require pristine water to survive?

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A. Yes, absolutely.
Q. Okay.
And are you familiar with the bison in the Yellowstone area?
A. Yes.
Q. And do you know anything about the quality of the water that they drink?
A. No, sir.
MS. ORTH: Mr. Dobrott, please wait until he's done asking his question.
Q. (BY MR. BUTZIER) So now I'd like to turn to again your admirable efforts to help the threatened and endangered species.
Are most of those species brought to the ranch, or are any of them -- I guess that's kind of a double -- compound question, but can you tell me what wildlife are indigenous to the ranch that you take care of in your conservation programs, or that the Ladder Ranch takes care of?
A. All of the conservation programs on the Ladder Ranch deal with indigenous or native wildlife.
Q. That started at the Ladder Ranch or that were brought to the Ladder Ranch?
A. There is -- the Bolson tortoise is a project that we -- that began in Arizona. It's a -- it's

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actually indigenous to Mexico, but it was prehistorically in New Mexico, and we -- we -- Turner Endangered Species Fund got involved in propagating these tortoises and hopes to return them back into their prehistoric range in New Mexico.
And so we are involved in a breeding project right now. So that's the only -- only species that we deal with that has been brought onto the ranch that has not been there in historic times. Put it that way.
Q. Okay.
Part of your presentation, you indicated that the Las Animas Creek goes from the southeast to the northwest.
Do you remember that testimony?
A. Except for it flows from the northwest to the southeast.
Q. That was my point of clarification.
It's actually flowing from the northwest to the southeast, correct?
A. Correct.
Q. Okay.
And so things that happen on the Ladder Ranch potentially affect the neighbors to the lower reaches of the Ladder Ranch; is that correct?
A. That's correct.

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Q. Have there been any complaints that the Ladder Ranch has experienced that you're aware of about anything having to do with water management associated with the Ladder Ranch?
A. I think in the early days and back in the '90s, there was concern about the Ladder Ranch holding water back for any purpose at all, but then we -- we had a nice tour and showed people that were concerned that there was no reason to be concerned, that all of the impoundments that were -- that are on the Ladder Ranch Headquarters area have been there for several -- for years, and even prior to the adjudication of the Las Animas water basin.
Q. And what year was that? I'm sorry. What year was that?
A. I believe it was 1964.
Q. Okay.
Were you --
A. I was not there then.
Q. -- there then? Okay.
We heard yesterday from a public commenter concerned about salinity of the Las Animas Creek.
Have you ever heard any complaints or concerns about salinity of the Las Animas Creek water?
A. The only time I've heard that was from the Las

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Animas nursery, from Lee Newman.
Q. Okay.
And was that something that you talked with him about?
A. No. I haven't. He offered that at the public testimony.
Q. Do you have any understanding of why there might be salinity in the lower reaches of the Las Animas Creek?
A. No, sir.
Q. I'd like to go back to the beginning of Exhibit 4, if we could. Well, at least to the -- to the part of the exhibit -- part of the slideshow that showed the wells.
If we could flip through those photos, I'd appreciate it.
Now, which infrastructure is this?
A. This is Myers Well.
Q. And I note -- I can't help but notice it's pretty -- pretty dry terrain around it.
Is that -- there's nothing, obviously, that's irrigated in that area, it's the water is used in the tank --
A. No, sir. That's a stock -- stock well.
Q. Okay.

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Can we go to the next one?
That one has a little more riparian vegetation.
Which well is that?
A. That is the John Cross.
Q. Is that higher up, that is higher up in elevation?
A. It's -- it's -- no. Down canyon from the Myers.
Q. Okay.
And then let's go to the next picture.
Which one is that?
A. That is Wanda Well. That's in Wanda Canyon.
Q. And that's slide number 27. I guess I should be doing this for the record.
All right. And then let's go to the next one.
Slide 28 is what well?
A. Slide 28 is the Evans Well.
Q. Okay.
Slide 29?
A. Slide 29 is the Feedlot Well.
Q. Okay.
And -- is that it for the well photos?
A. There are irrigation well photos after that.
Q. In number 1 where you had sort of a concrete

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squared --
A. That was a spring.
Q. Oh, that was a spring. Okay.
A. Um-hum. That's the Manager House Spring.
Q. Okay.
Can we go back to the map, please.
Of the springs that you identified in your testimony earlier, can you use your pointer to show where those are and just -- and mention the name of the spring in connection with slide 24?
A. Okay. In slide 24, the Animas Warm Spring is just above Ladder Headquarters, about a mile.
The Manager House Spring is right at Headquarters on the north side of the canyon.
The Garden Tank Spring is just across the canyon from the Higgins Well.
What else do we have.
The Myers Animas Spring is in this location. It's almost two-and-a-half miles downstream from the Ladder Headquarters.
Q. Okay.
A. And then there are several springs that emanate from these canyons that are unnamed, all the way along here.
Q. And those canyons rise in elevation to the

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north from Las Animas Creek?
A. That's correct.
Q. Now, Mr. Dobrott, are you aware of or have you been following what BLM or the Fish and Wildlife Service have been doing in connection with the Copper Flat project in terms of analyzing threatened and endangered species?
A. In regards to the -- the draft environmental assessment?
Q. Correct.
A. Yes.
Q. You've been following that, and you're aware of it?
A. I've been following it and am aware of it.
Q. And what's your understanding of what sort of the analysis of the potential for impacts to some of those species is in that -- through that process?
A. I'm not sure if there's been -- since there's not a final draft -- or final EIS out, I don't know what the results are, from comments that I know were given by the Fish and Wildlife Service, the Game and Fish Department. So I really don't know what the BLM's final view was on that.
Q. And would you or the Ladder Ranch expect to essentially be comfortable that that was a full process

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and was a good analytical process that resulted in conclusions that are supportable?
MR. DE SAILLAN: Objection, Madam Hearing Officer. I think that calls for a lot of speculation on the witness' part.
MS. ORTH: Mr. Dobrott, can you answer the question without speculating?
MR. DOBROTT: I believe I can say that our team has not been satisfied that BLM has taken into consideration the comments that we sent in.
MR. BUTZIER: Okay.
Q. And you mentioned earlier in your testimony a number of models or a number of modeling work that's been done on groundwater? Is that -- am I remembering that correctly?
A. That's correct.
Q. Is any of that modeling work -- has any of it been made a part of the Copper Flat permitting record in this case?
A. I think it has in the past, in the '90s, late '90s.
Q. And so was that in connection when Alta Gold was --
A. Yes, sir.
Q. -- pursuing this project?

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A. Um-hum.
Q. But it has -- to your understanding, it hasn't been submitted as part of this process.
A. Not to my understanding.
Q. Okay.
I think the sort of final conclusion or final part of your testimony, you had some testimony that was sort of in the nature of some of the wildlife and conservation programs and maybe perhaps even the businesses conducted on the ranch could -- I think your term was could be affected if there is contamination that comes from the mine to the Ladder Ranch.
A. Correct.
Q. And it's not -- there's no assertion that it will or that it has, it's just there could be an impact if contamination comes to the Ladder Ranch.
A. That's correct.
MR. BUTZIER: Okay. That's all the questions I have.
MS. ORTH: All right. Thank you.
Mr. Knight, do you have questions of Mr. Dobrott?
MR. KNIGHT: I have no questions for this witness.
MS. ORTH: All right. Thank you.

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Ms. Barncastle?
MS. BARNCASTLE: No cross. Thank you.
MS. ORTH: Mr. de Saillan, do you have any redirect?
Oh, wait. Sorry.
Does anyone else in the room have a question of Mr. Dobrott based on his testimony?
All right. Mr. de Saillan.
MR. DE SAILLAN: Thank you, Madam Hearing Officer. I just have a couple of questions.
REDIRECT EXAMINATION
BY MR. DE SAILLAN:
Q. Early on in your cross-examination, Mr. Butzier asked you about what the Feedlot Well was used for, and I don't think you fully answered his question.
You mentioned the -- the endangered frogs, and you mentioned the endangered tortoise, but I don't think you had a chance to continue, and I think there were some other things that you testified about before that the Feedlot Well is used for.
Could you just go over those again, please?
A. Thank you, sir. Yes. The -- the pipelines that emanate from the storage from that well also feed a number of wildlife species, the deer, the elk, the

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pronghorns, all the wildlife that occurs in that pasture, and numerous quail feeders that are put out every half mile.

It's -- it's not just for frogs and tortoises. It's a wildlife and bison store -- well.

Q. Okay. Thank you.

And you were explaining to Mr. Butzier at one point the facilities -- the proposed facilities at the Copper Flat Mine that the Ladder Ranch is concerned are going to contribute contamination that may flow to the -- to the Ladder Ranch. And you mentioned the tailing storage impoundment -- or the tailing storage facility, and you also mentioned the open pit.

Are there any other facilities that you left out?

A. Most likely the waste rock piles and the possibility of the acid drainage from those.

Q. Right. Okay.

Thank you.

That's all the questions I have.

MS. ORTH: All right. Thank you.

Unless there's some reason not to excuse Mr. Dobrott?

Thank you, Mr. Dobrott.

Would you like to take a brief break before

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your next witness, Mr. de Saillan?

MR. DE SAILLAN: Sure. That would be helpful. Thank you, Madam Hearing Officer.

MS. ORTH: Let's take 10 minutes.

(Proceedings in recess from 2:36 p.m. to 2:49 p.m.)

MS. ORTH: All right. We're coming back from the break now.

Mr. de Saillan, would you call your next witness.

MR. DE SAILLAN: Thank you, Madam Hearing Officer.

The ranches' next witness is Mr. Robert Cunningham.

MS. ORTH: And you'll be using a microphone.

MR. DE SAILLAN: I will.

ROBERT CUNNINGHAM

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DE SAILLAN:

Q. Could you state your name and occupation, please.

A. My name is Robert Cunningham. With my sister I am the co-owner and manager of the Hillsboro Pitchfork

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Ranch, owned by our family since 1906.

Q. Mr. Cunningham, let's begin by discussing your qualifications. So I'd like to start with your education.

Could you please describe your postsecondary education?

A. I would be pleased to.

I have a bachelor of science in general studies from the University of New Mexico.

I might add I began my education in a two-room grade school in Hillsboro, New Mexico, and I completed grades 1 through 6 at that community school. This unique beginning to my education fostered my interest and understanding of the history, cultural diversity, economic basis and ecology of the Hillsboro New Mexico area.

Q. And could you describe your work experience since college, please?

A. I worked for the United States Forest Service until September the 18th, 2007.

Q. And how long did you work for the US Forest Service?

A. I worked for the US Forest Service for 34 years.

Q. And what were your -- what was your position

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or your job title with the Forest Service?

A. My position title upon retirement was supervisory fire management technician.

Q. Okay.

And what were your responsibilities in that position?

A. There were several. Regarding forest management, I had participated in NEPA planning efforts and fuel management activities as a fire management specialist.

In fire management, I worked as a line firefighter and as a Helitack crew member, which is a person who is transported to a wildland fire in a helicopter. I worked as a hotshot crew member. And I spent 22 years as a smokejumper, parachuting into wildland fires.

In addition, I have aviation management experience. I managed complex aviation operations, to include over 80 large wildland fire incidents in the United States. I have also managed complex aviation operations on all hazard incidents. The most noteworthy are FEMA's response to the 9/11 Twin Towers attack in New York City, Hurricanes Opal, Rita and Kartina -- Katrina, rather, where I spent six weeks in Baton Rouge.

In addition, I also had responsibilities in

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wildland fire and incident management training. I managed an interagency wildland fire Incident Command System training program in the Northwestern United States. I was responsible for a staff that developed and delivered wildland fire ICS training to an interagency audience.

Q. Okay.

And what other work experience do you have?

A. I grew up on the family ranch, learned to ride, rope, brand, fix windmills and fences, in general learned about cattle and to care for the land and improve the land. When working for the Forest Service, I returned to the ranch often to assist my father in running the ranch.

Upon the death of my father in 2003, my sister and I became the owners and caretakers of our family ranch and legacy.

Q. And what responsibilities do you have as manager and caretaker of the Hillsboro Pitchfork Ranch?

A. Business and financial management, care and improvement of the land, cattle and game management, hunt guiding, wildlife habitat improvement and facilities management.

Q. How much time have you spent on the ranch?

A. If I may, sir, may I continue just briefly?

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Q. Sure.

A. Thank you.

The primary responsibility of any ranching family is to understand, monitor and foster the ecology of the land and its care. An understanding of the native vegetation, to include such grasses as black grama, side oats, vine mesquite, shrubs such as sumac and mountain mahogany, and tree species such as the Rio Grande cottonwood and black walnut is key to the successful stewardship of the land.

Subsequent ranching economic success comes from care and improvement of the land.

Q. And how much time have you spent on the ranch?

A. I estimate about 30 years.

Q. Mr. Cunningham, I'd like to show you a document that's been marked as the Ranches Exhibit Number 5 and ask if you would identify that.

A. Yes. That is a copy of my resume.

Q. Okay.

And is it accurate?

A. It is.

Q. And is it current and up to date?

A. It is.

MR. DE SAILLAN: Madam Hearing Officer, I'd like to qualify Mr. Cunningham as an expert in ranch

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management, native game and wildlife and ecology.

MS. ORTH: Are there objections?

MR. BUTZIER: No objection.

MS. BARNCASTLE: No objection.

MR. KNIGHT: No objection.

MS. ORTH: He's so recognized.

MR. DE SAILLAN: Thank you.

Q. Now, Mr. Cunningham, I wonder if you could describe for us the business at the Hillsboro Pitchfork Ranch.

A. I would be pleased to.

Cattle ranching is a primary activity of the ranch. The ranch is a cow/calf operation. Currently we have about 210 head of mother cows. We utilize a pasture rotation system and supply supplemental feeds as necessary to maintain good cattle condition. We manage and improve grazing lands to ensure good range conditions for today and improved ranch conditions for future years.

We have partnered with the National Resource Conservation Service, an agency of the United States Forest Service, for the previous nine years to implement improvements to ranchlands for livestock and wildlife use.

Hunting is another primary activity of the

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ranch. Hunting species include mule deer, elk, dove and two varieties of quail, Gambel and Mearns. My sister and I have personally guided hunting trips for some 29 years, providing good -- providing big game hunting experiences to over a hundred individuals.

Noteworthy is beginning this year we will host our first Wounded Warrior hunt, where we will donate a big game hunt to a service member who has suffered injury while defending our country.

Q. And so you're personally involved in these businesses?

A. Yes. I do things like negotiate leases, maintain and upgrade facilities, maintain financial documents, pay the bills and the taxes. As I stated earlier, my sister and I are personally involved in the hunting/guiding aspects of the ranch. Again, as I stated earlier, we are actively involved in the cattle ranching aspect of the ranch business.

Q. Okay.

And do these businesses depend on freshwater?

A. Absolutely.

Q. And could you describe the location of the Hillsboro Pitchfork Ranch in relation to the location of the proposed Copper Flat Mine?

A. The ranch is to the west of the mine area,

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adjacent to the west property boundary of the proposed Copper Flat Mine.
Q. Okay.
Does the Hillsboro Pitchfork Ranch border the mine area for the Copper Flat Mine?
A. Yes, it does.
Q. And as the process for permitting and other regulatory requirements for the Copper Flat Mine operation has progressed forward, have you reviewed documents and maps on the proposed mine?
A. Yes, I have. Primarily documents and maps from the Draft Environmental Impact Statement prepared by the Bureau of Land Management dated November, 2015.
Q. Okay.
You have been provided a copy of a document that's been marked as the Ranches Exhibit Number 7.
Is that the document that you're referring to?
A. Yes, it is.
Q. And have you read the Draft Environmental Impact Statement?
A. Yes, I have, very thoroughly.
Q. And is there currently -- go ahead.
A. I'm sorry. I apologize about my pauses.
Yes, I have, very thoroughly. As a result, we have submitted 50 pages, that is five-zero pages, of

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comments to the BLM regarding the Draft EIS.
Q. Is there -- is there currently a pit lake on the Copper Flat Mine?
A. Yes, there is. We can see it from our property.
Q. And have you measured the distance from the eastern boundary of the Hillsboro Pitchfork Ranch to the pit lake?
A. Yes, I have. And --
Q. Is that illustrated on one of your slides?
A. Yes, sir, it is.
Q. Okay.
And is that slide 6? What slide number is that?
A. That would be Exhibit 6 Alpha.
Q. And what is the distance?
A. I calculate the distance to be 680 feet.
If I may at this point, Madam Hearing Officer, may I spend a moment with this slide?
MS. ORTH: Yes.
I see 1,680 on there.
MR. CUNNINGHAM: Did I mispronunciate that?
Yes, ma'am. That would be 1,680 feet.
MS. ORTH: Okay. Thank you.
MR. CUNNINGHAM: Thank you.

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What I wanted to do here is briefly describe this slide so that everybody understands what we're looking at here.
This white line indicates the property boundary of the Hillsboro Pitchfork Ranch, which again lies upgradient in the Grayback Canyon Arroyo system from the proposed Copper Flat Mine. And I have calculated the distance from the center of the existing pit lake to the property boundary from that corner post right there.
Of course, here we have the existing pit lake. And this is from a Google Earth photo I suspect to be probably, oh, eight or nine months old.
This is the original abraded spring -- stream channel of the Grayback -- major component of the Grayback Arroyo system. And prior to the development of the -- of the initial mine by the now -- now defunct Quintana Mining operation, the natural spring -- natural course of Grayback Canyon was down approximately through here.
There is another couple of other tributaries in the Grayback Canyon drainage system from the ranch. One of them you can see partially here, and another one flows from the north, and it's out of this photo. During the initial mining operations, this cut was cut

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through this bedrock here, and the natural flow diverted around the pit.
Q. (BY MR. DE SAILLAN) Does the Hillsboro Pitchfork Ranch rely on any groundwater sources along the eastern property boundary of the ranch?
A. Yes. The Pitchfork Ranch owns and operates two groundwater wells near the eastern property boundary.
Q. And could you describe those two wells, please?
A. Yes. This first well is what we locally call the Rogers Windmill. As you can see, it was operated by an old -- is operated by an old wooden windmill tower, again known as the Rogers Well. Based on historic records, we believe this well was developed around the year 1900.
Q. So what is the depth of the Rogers Well?
A. The depth of the Rogers Well is 150 feet.
Q. And what is the Rogers Well used for?
A. The Rogers Well provides drinking water to livestock and wildlife. And as you can see from this game camera photo, here are some elk cows watering at the drinking trough associated with that windmill last November.
Q. Okay.

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And could you describe the second well?
A. Yes. The second well is the Grayback Well. The Grayback Well was originally developed in 1950.
Q. What is the depth of the Grayback Well?
A. 200 feet.
Q. Okay.
And what is the Grayback Well used for?
A. The well utilizes a solar pumping system, numerous water lines, storage tanks and water drinking troughs which have been installed to supply water to remote areas of the Grayback drainage. This water source is used for drinking water -- excuse me. This water source is used for drinking water for the use of livestock and wildlife.
And here we have a photo of a black bear that's taking his biannual bath.
Q. Okay. Mr. Cunningham, I'd like to discuss now the proximity of these wells to the Copper Flat Mine.
Have you measured the distance from the Rogers Well to the pit lake?
A. Yes, I have.
Q. And how far is it?
A. The Grayback Well -- would you mind asking that question again, sir?
Q. Yes.

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My last question was how far is it?
A. Okay.
Q. What is the distance from the boundary of the Pitchfork -- Hillsboro Pitchfork Ranch property to the pit lake?
A. From the Hillsboro Pitchfork spring --
Q. Excuse me. Excuse me.
The distance from the wells that you just described to the pit lake.
A. Very good. Thank you.
That is approximately 8,070 to 8,084 linear feet.
Q. Okay.
And which well is that?
A. This is the Grayback Well.
Q. Okay.
And the distance to the Rogers Well?
A. The distance to the Rogers Windmill is 3,270 linear feet.
Q. Okay.
Now let's talk about Grayback Canyon.
Where is Grayback Canyon located on the Hillsboro Pitchfork Ranch?
A. Grayback Canyon is located on the eastern portion of the Hillsboro Pitchfork Ranch. The canyon is

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bounded on the north by the Ladder Ranch and on the east by the Copper Flat Mine. The headwaters of the Grayback Canyon are primarily on lands owned by the Hillsboro Pitchfork Ranch. The drainage area of Grayback Canyon owned by the ranch is indicated by the aqua-colored area on the slide.
And so in general, these are ranchlands that lie within the Grayback drainage watershed owned by the Hillsboro Pitchfork Ranch.
And if I may talk a little bit more about this, as you will see, this is a relatively complex polygon. In some places, it looks somewhat angular. But I will assure you that I have physically walked this property many times and that indeed this polygon is an accurate representation.
As an example, this somewhat rectangular area here is actually a draining -- drainage system that flows northward into Tank Canyon on the Ladder Ranch and subsequently northeasterly to the Animas drainage near the Ladder Headquarters.
These -- these boundaries here on the western edge of the polygon flow into a couple of different drainages. Right there where the cursor is, there is a small saddle, and that's the dividing line of the -- excuse me -- the drainage system. Again this area here

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flows ultimately into Tank Canyon.
From here to the south, these areas flow in a southerly direction into Warm Springs Canyon and then into Cold Springs Canyon and ultimately into North Percha Creek, just south of the Percha Box, east of Hillsboro, New Mexico.
The drainage area of the Grayback Canyon lease from the BLM by the ranch for grazing purposes is indicated on the green-colored area on the slide.
And again this is somewhat of a complex polygon, but again I would like to assure you, Madam Hearing Officer, that based on my personal knowledge of this property this is a clear and accurate representation of the watershed.
And as you can see, we've got about 1,254 acres of private land and about 493 acres of leased BLM land associated with the ranch that flow into Grayback Canyon.
Now, if I could, I'd like to -- nobody get seasick here.
These areas also flow into the Grayback Canyon Arroyo system, adjacent to and/or upgradient from the Copper Flat Mine. But since I have no direct knowledge of land ownership, I chose not to identify those areas on this map.

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Q. Okay. Why don't we move on.
Mr. Cunningham, have you spent much time in Grayback Canyon?
A. Yes. I have ridden horseback, walked on foot, ridden in vehicles in the Grayback Canyon area.
Q. Okay.
A. I have worked cattle, hunted, guided, improved wildlife habitat, built fences, installed solar-powered pumping systems, drinking troughs and pipelines in the Grayback Canyon area.
Q. Okay.
And are there natural sources of water in Grayback Canyon?
A. Yes. There are intermittent streams, springs and seeps in the canyon system.
Q. Okay.
And do these springs and streams and seeps help support the ecosystem of Grayback Canyon?
A. Yes.
Q. Could you describe Grayback Canyon in terms of its water resources and its plant and animal life -- its ecosystem?
A. The intermittent springs, seeps and streams in Grayback Canyon support a varied natural ecosystem habitat for wildlife and a forage area for livestock.

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The canyon has particularly good grasses, including side oats and black grama. Livestock feed upon these grasses.
It also has an abundance of forbs, Gambel oak and thick concentrations of mountain mahogany. Wildlife feed on the forbs. Mountain mahogany is the preferred and primary food source for mule deer.
Both wildlife and livestock utilize the area year-round due to good forage, thermal cover. And I might expand a little bit on thermal cover. Thermal cover is basically an opportunity for animals to be shaded if it's particularly hot. It's also an area for animals to seek shelter if it's particularly cold or particularly wet.
And access to disbursed water from the Grayback and Rogers Windmill. Because the deep canyons make the area very private and because the canyon has good feed and good water, the area has become a premier mule deer habitat.
Representatives of the New Mexico Department of Game and Fish refer to this section of the ranch as a nursery, as a substantial number of mule deer doe live and fawn here. For the last 11 years, the Pitchfork Ranch has partnered with the New Mexico Fish and Game in a program to improve mule deer habitat. Much of these

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mule deer habitat improvements have been conducted in the Grayback Canyon area.
The Grayback Canyon upstream of the existing mine pit is a primary mule deer hunting area for both the ranch and the public who hunt on adjacent Bureau of Land Management lands.
This area's flora and fauna depend on the naturally-occurring and the manmade water sources in the canyon for freshwater.
Q. Okay.
And do you have an understanding of where the proposed open pit will be at the Copper Flat Mine in relation to the segment of Grayback Canyon that's on the Hillsboro Pitchfork Ranch?
A. The proposed open pit would be immediately to the east-northeast of the Grayback Canyon on the ranch.
Q. And have you estimated that distance?
A. I have. I would like to return to the slide that I showed earlier.
But to answer your question specifically, sir, I calculate the distance to be 1,739 feet. And I had thought about potentially putting that in, but having never testified in a -- in a setting like this, I wasn't sure how much I should alter my initial exhibits.
But I'm calculating the distance from where

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the cursor is here to that existing pin in the middle of the existing pit lake.
Q. Okay.
And do you have an understanding of how construction of the open pit will likely affect water resources in Grayback Canyon?
A. Yes. The proposed open pit at the Copper Flat Mine will be hydrologically immediately downgradient of Grayback Canyon area of the Hillsboro Pitchfork Ranch.
Given the groundwater gradient and given the proximity of the Pitchfork Ranch to the proposed open pit, groundwater from beneath the Grayback Canyon system will be drawn into the pit lake. Our wells may produce less water, or they may go dry. We don't know. The intermittent streams and seeps in Grayback Canyon will most certainly be affected. Their flows will be reduced. They may dry up.
And, Madam Hearing Officer, if I may at this point, I'd like to spend a little bit of time describing this -- this slide. I developed this slide myself, and I'm not a hydrologist, so I'd like to spend a little time describing it.
First of all, I'd like to note the X and Y axis are not to scale. So this scale has no relationship to this scale.

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What I'm showing here is above mean sea level, MSL, elevation changes from the bottom of the ranch wells to the bottom of the proposed pit.

The information as to the elevation of the bottom of the proposed pit -- and this would be at the end of construction -- or excavation of -- of ore from the pit, before the pit is refilled during the rapid refill process. I found -- I got this figure from the draft -- draft EIS produced by the Bureau of Land Management.

So what we have here is above mean sea level change from the bottom of the ranch wells to the bottom of the proposed pit.

So we've established the bottom of the proposed pit at an elevation of 6,587, and the way that I've derived that is by the elevation provided me -- the existing ground elevation provided to me in Google Earth Pro, and then I deducted 780 feet from that base elevation, where I get this elevation.

I have done a similar calculation for the Grayback Well, where we spoke earlier the Grayback Well is 200 feet in depth, and so the elevation -- the actual ground elevation of the Grayback Well would be 5,718 feet.

And all -- done the same thing for the Rogers

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Well, although the Rogers Well depth is 180 feet.

So I just wanted to spend a minute describing this slide, but it does show, you know, the potential groundwater depletion caused by the -- by the pit in relationship to our family's ranch wells.

Q. Okay. Mr. Cunningham, the effects -- the potential effects you described a minute ago on water resources, if they were to occur, how would that affect the business of the Hillsboro Pitchfork Ranch that you described earlier?

A. Without a plentiful supply of water, the ecology of Grayback Canyon will be harmed. Vegetation will change. Less water will be available for game and livestock for forage and drinking purposes. We will be reduced, no doubt, to reduce our cattle numbers. Wildlife, including game species, will become less abundant.

The resulting loss of income will result in less income available to maintain and improve the ranch and its lands. This will result in less revenue to local, state and federal government in tax revenue, loss to local businesses in gross receipt -- revenue receipts and less or no income to those employees and contractors we utilize for ranch operations.

MR. DE SAILLAN: Thank you, Mr. Cunningham.

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I have no further questions.

MS. ORTH: Thank you, Mr. De Saillan.

Mr. Butzier?

MR. DE SAILLAN: At this point, I'd like to move for the admission of the Ranches Exhibits 5, 6 and 7, please.

MS. ORTH: Are there objections?

MS. BARNCASTLE: No objections.

MR. BUTZIER: No objection.

MR. KNIGHT: No objection.

MS. ORTH: Thank you.

5, 6 and 7 are admitted.

(Exhibits Ranches 5, 6 and 7 admitted into evidence.)

MS. ORTH: And, Mr. Butzier, do you have questions?

MR. BUTZIER: I have a few.

CROSS EXAMINATION

BY MR. BUTZIER:

Q. Good afternoon, Mr. Cunningham.

I noticed --

Could you pull the slide back up that showed the elevation change in the blue box that you had -- there. Thank you.

I noticed, and you correctly point out, that

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the X and the Y axis are not to scale in that depiction, correct?

A. That is correct.

Q. And although it doesn't say it, on Exhibit 6 that we've just admitted to the record, the same is true for Exhibit 6, correct? The X and Y axis are not coordinated to scale.

A. I'm sorry, sir. We're currently looking at Exhibit 6 Foxtrot.

Could you ask that question again?

Q. Well, what Mr. de Saillan just moved into evidence is a document labeled as Exhibit 6 that looks very much like what's on the screen.

MR. DE SAILLAN: Stuart, the -- excuse me. Mr. Butzier, that is essentially the same document, and we would stipulate to the question that you're asking.

MR. BUTZIER: Okay. Thank you.

Q. And the -- from looking at Exhibit 6D, which is the distances from the center of the pit to the two wells you've identified --

A. All right.

Q. -- that reflects in one case 3,270 linear feet in the case of the Rogers Windmill from the pit and 8,084 linear feet from the Grayback Well to the center of the existing pit lake, correct?

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A. Correct.
Q. And it's not a big point, but all I want to point out is if this -- if this Exhibit 6 had the same scale on the X axis as is on the Y axis, this would be a fairly long document with a less severe change shown by the large white line on that document, correct?
A. I am in agreement with that statement.
Q. Thank you.
Now, I'd like to turn back now to slide -- the slide that shows the ranchlands and the BLM lands.
Correct. Thank you.
I noticed that you've sort of described those two shapes that are colored in turquoise and green as essentially, as I understand it, watershed areas that go from your ranch to the Grayback Arroyo diversion; is that correct?
A. To be sure I'm certain what you said, you said the Grayback diversion structure?
Q. Well, I think you've indicated that those are basically part of the watershed, all of which ultimately feeds into the Grayback Arroyo.
A. Correct.
Q. And on the map -- or on the Google Earth depiction, you've indicated that those are two affected areas, one of which is private ranchlands and another of

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which is BLM leased lands; is that correct?
A. Correct.
Q. What are you referring to when you say Affected Ranch Private Land and Affected Ranch Leased BLM Lands?
A. Again I am proposing that the watershed in the Grayback Canyon area, upgradient of the proposed Copper Flat Mine will to some degree be watered by the construction of the pit.
Q. So in this slide, we're sort of combining two concepts, one of which is the additional groundwater draw toward the pit that I think you testified to, and also the surface watershed; is that correct?
A. That is correct.
Q. Now, in terms of the surface watershed, leaving aside the groundwater, would you agree with me that there could be no effect to the actual watershed in terms of precipitation falling on the surface in that part of your ranch from the deepening of the open pit?
A. I would agree that there is no correlation between the amount of precipitation that falls in that drainage and the depth of the proposed pit.
Q. Okay. Thank you.
And would you also agree that the intermittent springs and seeps that you've identified occur within

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one or both of these two areas are the result of shallow precipitation-related recharge in the areas that are depicted in turquoise and green?
A. If I may, I want to return here to my document.
The streams, springs and seeps in the Grayback -- that I'm aware of in the Grayback Canyon Arroyo system do not fall all the time. Commonly after a rainstorm. As a consequence, they are intermittent.
Q. Okay. Thank you.
And so the primary concern that I understand you to be expressing is the impact that the deepening of the pit may have on groundwater in this part of your ranch; is that correct?
A. That is correct. And subsequent to the loss of groundwater comes the loss of water that is available for forage and drinking water purposes for both livestock and wildlife.
Q. And is that -- is that because the Rogers Well and the Grayback Well are pumped and provided in the kinds of drinkers that were depicted on some of your slides?
A. If I may here --
May I return to this slide in more detail --
MS. ORTH: Yes.

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MR. CUNNINGHAM: -- Madam Hearing Officer?
Again nobody get seasick.
All right. I'm going to try and zoom in a little bit here.
So approximately right here where this white cursor is is the location of the Grayback -- Grayback Well, 200 feet deep, powered by the solar pumping system. And there's a pipeline that moves -- well, I'm going to go back to the original here.
I don't know how to do that. Anyway, we're approximately right in here.
And so there's a pipeline that goes up on a ridge here. And again I may not get this quite right, due to the availability of these slides. But it's a high-pressure pipeline. It's about 320 PSI at the wellhead. And it goes up to two 2,500-gallon storage tanks that are located on a high ridge in a remote area in the northern part of the Grayback drainage water system.
From there, flow to additional pipelines, one that comes down a major ridge just to the north of the main -- main channel of Grayback Canyon. The other one goes north into a ridge somewhere in this area.
There is little to no naturally-occurring water in those areas. And as -- my sister and I

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recognized an opportunity to improve the utilization of our family lands in that area by building this -- this water -- this water-handling system, and we are able to supply water into remote areas of the range where cattle will not generally forage and --

And also subsequently now we have a greater mule deer population. I won't say there weren't any mule deer in that area, but now we have a greater mule deer and most probably elk population, because of access to drinking water in these remote, relatively arid areas.

MR. BUTZIER: Thank you.

Q. So just so that I'm sure that I understand, so is it the case that the concern you have with impacts to the livestock business and the mule deer habitat is a concern that at some point you may not be able to operate the Grayback Well in order to feed those pipeline systems?

A. That is correct. Based on my understanding, my readings of the various documents associated with the proposed development of the mine and the potential dewatering of the Grayback Canyon system, and in addition listening to testimony provided by expert witnesses this week, I feel confident that ultimately we're faced with the prospect of losing some or all of

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our water sources in the Grayback Canyon area as a consequence of the mine development.

Q. From the two wells that you've identified.

A. Yes, sir. That is correct, the Grayback Well and the Rogers Well.

Q. And I think you indicated the Rogers Windmill Well was developed around 1900?

A. To the best of my knowledge, that is correct.

Q. Do you know where in the -- in the water table that is completed? Is that -- is that completed at the very top of the water table in that area, or is it somewhere farther deeper into the -- into the aquifer?

A. I'm not sure if I understand your question, sir, but let me rephrase it to you, see if I've got it right.

Are you asking as to the -- the general static water level in the well?

Q. Let's -- that's a better way to ask it. Thank you. Yes.

A. I would have to look back at my records, but there is some variability in -- in the static water level of any well. Of course, if it's being pumped, certainly, if it's being pumped aggressively, you know, you'll see a reduction in the static water level.

The other variability is indeed in -- what

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would be a good term -- in the -- in my understanding is in areas that have geology like this, the amount of annual precipitation that you receive on a particular piece of land or indeed the intensity or duration of that rain event or precipitation event will -- can greatly affect the static level of -- of a well, if that's getting anywhere near close what you're asking.

Q. It is.

And I'll have a follow-up question, which is is it your understanding that the water levels in those wells are primarily the result of water coming down through the annulus of the well to the well from surface precipitation, or is it coming from an aquifer subsurface or some combination of both, if you know?

A. I do not know.

Q. And I'd have the same question for the Rogers Well. Do you know the answer to that question?

A. I do not know in regard to the Rogers Well, as well.

Q. And the Rogers Well, I think, was -- you said was drilled in around the '50s; is that right?

A. No, sir. Possibly we miscommunicated there.

The --

Q. I -- I'm sure you've got it, but I probably didn't get it right.

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A. The Rogers Well, we -- based on historic records, we believe the Rogers Windmill was originally developed around 1900.

Q. Okay. I was confusing the two.

A. Sure.

Q. Thank you for clarifying.

So it was the Rogers that was 1900 and the Grayback Well was when? Drilled when?

A. The original -- now you're getting me confused.

MS. ORTH: Your testimony was that it was developed in 1950.

MR. CUNNINGHAM: 1950. Thank you, ma'am.

MR. BUTZIER: Okay. Thank you. I got them reversed. I apologize.

Q. So in the case of both wells, you don't know the answer to the question I asked about whether those levels are coming from water coming down from -- from the surface versus water coming from some underground source.

A. Correct.

Q. Okay.

Where in relation to the -- what we have on the screen right now, which is Exhibit 6E, is the -- is there a Headquarters of this ranch?

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A. Yes, sir. The Headquarters is approximately one-half mile north -- west-northwest of Hillsboro, New Mexico, in the North Percha drainage system. So it is -- well, quite some ways to the south-southwest, off this -- off this graphic.

Q. And given the answers that you've already given, you may not know the answer to this question, as well, but is there a possibility that by deepening one or both of these wells, that even if there is an impact to the static level in those wells, they could still remain operational and fulfill the purposes of livestock and mule deer habitat purposes?

MR. CUNNINGHAM: Madam Hearing Officer, may I ask a question?

MS. ORTH: Of me? Certainly.

MR. CUNNINGHAM: Yes, ma'am.

MS. ORTH: Yeah.

MR. CUNNINGHAM: Again this is a relatively new venue to me, and so I -- I really think that question may be outside of the -- of the venue of this -- of this hearing, in all due respect.

MR. BUTZIER: And I appreciate that, and I will go ahead and withdraw that question, and that's all the questions I have.

MS. ORTH: All right. Thank you, Mr. Butzier.

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Mr. Knight, do you have any questions of Mr. Cunningham?

MR. KNIGHT: I do not.

MS. ORTH: Ms. Barncastle.

MS. BARNCASTLE: No cross.

MS. ORTH: No?

Does anyone else have a question of Mr. Cunningham based on his testimony?

I see no hands.

Mr. de Saillan, do you have any follow-up?

MR. DE SAILLAN: Yes.

I just have one question here, Mr. Cunningham.

REDIRECT EXAMINATION

BY MR. DE SAILLAN:

Q. Just have one question, Mr. Cunningham.

Mr. Butzier asked you if you were concerned about the water level -- change in water table affecting the wells.

Are you also concerned about the potential for a change of water level affecting the streams or seeps along the Grayback Canyon?

MR. BUTZIER: Madam Hearing Officer, I think that question's been asked and answered.

MS. ORTH: So Mr. Butzier, I thought, established with him that the seeps and springs came

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from precipitation rather than the groundwater. That's my memory of their conversation.

MR. DE SAILLAN: I --

MR. BUTZIER: I would just say, Madam Hearing Officer, that that's the basis of my objection. I don't have a problem with Mr. de Saillan proceeding and having his question answered --

MS. ORTH: Okay.

MR. BUTZIER: -- but I do object on the basis that I described.

MS. ORTH: Okay. So I remember something about that conversation, but go ahead.

MR. DE SAILLAN: No. I agree, but I'm trying to clarify that point with the witness.

MS. ORTH: Okay. Go ahead.

MR. CUNNINGHAM: I have -- I have no knowledge of any permanent spring or seep or stream in the Grayback drainage area system.

The -- for lack of a better term, the geology of that canyon, in particular its main branch, quite commonly the -- the foundation rock in that area is exposed in the streambed. Upstream of that, commonly there are large -- large deposits of sand, gravel, alluvial materials. And when we have a large precipitation event, the water will flow through those

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alluvial materials, meet the -- meet the bedrock and then flow over them for a period of time.

Now, I cannot address, you know, whether that flow is a combination of -- of surface water or, let's say, groundwater that has -- has -- has flown from the slopes of the canyon and, you know, the connectivity.

So in all candor, I don't know -- to go to the direct question, I don't know, you know, whether the -- the deepening of the pit would -- would have any direct effect on those streams, seeps, springs. But I can't imagine under any circumstances how it would help.

MR. DE SAILLAN: Okay. So you're not sure one way or the other.

MR. CUNNINGHAM: I am not.

MR. DE SAILLAN: Okay. Thank you.

I have no further questions.

MS. ORTH: Anything further before we excuse Mr. Cunningham?

No?

Thank you very much, Mr. Cunningham.

Do you need a break before your next witness, or are we still going?

MR. DE SAILLAN: Let's ask the witness.

MR. KUIPERS: Five minutes.

MS. ORTH: Okay. Short break. Short break.

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(Proceedings in recess from 3:50 p.m. to 4:00 p.m.)
MS. ORTH: We are back after a break, and we'll hear from the ranches' next witness.
Mr. de Saillan?
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
Is it working? No?
JAMES R. KUIPERS
having been first duly sworn or affirmed, was examined and testified as follows:
DIRECT EXAMINATION
BY MR. DE SAILLAN:
MR. DE SAILLAN: Before we get started, Madam Hearing Officer, there's a request that I'd like to make here.
MS. ORTH: Yes, sir.
MR. DE SAILLAN: If in the unlikely event that this hearing continues beyond this week, there is a possibility that Mr. Kuipers might not be able to join us, at least for certain parts of that week. So we would like to put on his rebuttal testimony at the end of his direct testimony, although we would reserve the right to do additional rebuttal testimony if he turns out to be available, if that would be all right.

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MS. ORTH: Okay.
Other counsel?
We've done it both ways, saving rebuttal for a whole second round or just going ahead and having folks do rebuttal as soon as their direct is finished.
Any objections to doing it this way?
MR. BUTZIER: Madam Hearing Officer, I have no objection to going ahead with his rebuttal today. I guess I would reserve the ability to object to further rebuttal later if it's on some topic that he's already covered, I guess.
MS. ORTH: So I think further rebuttal is properly reserved only if there is more evidence --
MR. BUTZIER: After he gives the --
MS. ORTH: -- offered.
MR. BUTZIER: Okay. That's a better way to preserve it.
MS. ORTH: Right?
MR. DE SAILLAN: Okay. I was trying to reserve a little bit more because we've had relatively little time to prepare for rebuttal here.
MS. ORTH: Right.
MR. DE SAILLAN: And I guess I would prefer your original approach, Madam Hearing Officer, which is that we will limit any further rebuttal to items that

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Mr. Kuipers has not already covered.
MS. ORTH: I see. All right.
How about, then, Mr. Butzier, if there's a particular objection you have, in the event we even get to this point, where he's trying to offer additional rebuttal on something he's already covered, that you -- or could have been covered -- excuse me -- that you raise it at that point?
MR. BUTZIER: I'm fine with that.
MS. ORTH: All right. We're getting a little attenuated there.
MR. DE SAILLAN: We are. We're starting to split hairs.
MS. ORTH: All right.
MR. DE SAILLAN: But I appreciate your indulgence.
MS. ORTH: Mr. Knight, any objections?
MR. KNIGHT: No objections.
MS. ORTH: Ms. Barncastle, we're going to then hear Mr. Kuipers' rebuttal following his direct.
MS. BARNCASTLE: I'm good with that. Thank you.
MS. ORTH: Thank you very much.
Please go ahead.
MR. DE SAILLAN: Thank you, Madam Hearing

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Officer.
Q. Good afternoon, Mr. Kuipers.
Could you please state your name and occupation.
A. Yes. My name is James R. Kuipers. R is for Ralph. My occupation is consulting engineer.
Q. Okay.
And have you prepared a presentation for today's hearing?
A. Yes, I have.
Q. Could you go ahead and give your presentation, beginning with your qualifications.
A. Yes. I want to use this page just to kind of summarize my experience. Madam Hearing Officer has heard me go through my experience several hours, I think, in the past.
But I essentially was raised in a mining family, and I -- my mining experience actually began when I was 12 years old, and at the end of a summer after remodeling a cabin, my grandfather decided we should call our dad so that he could go ahead and continue mining through the winter.
So I actually spent a couple weeks working as a gopher when I was 12 years old outside of an underground mine. Proceeded to work with my grandfather

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throughout the 1970s. By the time I was 16, essentially he had taught me to drill muck and blast. Those are terms we commonly use in the mining industry for what we do underground.

He and I had a bit of a debate about what I was going to do for college. He won that debate, and I'm a mine engineer as a consequence.

A good example, though, I think of why the support, when I was between my freshman and sophomore years at the university, he felt it was very important if I was going to be a mineral processing engineer for me to actually build and operate a mill.

And so he had the equipment to build a 25-ton-per-day mill, where we did crushing, grinding, flotation separation, which we've been discussing with this project. It involved gravity separation.

It also involved a tailing storage facility. And I can tell you that was also my first tailing storage facility that overflowed. My grandfather didn't do things quite the way we hope to do them today.

So I went on to university at Montana School of Mines. It actually changed names midway through the time I was there to Montana Tech. Graduated in 1983 with a bachelor's of science degree in mineral process engineering.

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Now, I need to take folks to 1983. Essentially we didn't have environmental engineers yet. There were just a few programs beginning in the United States that involved environmental engineering. And so graduating as a metallurgist, essentially you understand things like aqueous chemistry, analytical chemistry and the various facets that, in fact, environmental engineers have since then been trained to address.

But it was very common in the 1980s, in particular as environmental regulations began to be put in place, for the metallurgical engineers to actually take those responsibilities.

So a good example is one of the first jobs I had was with Cumberland Mining Corporation. I was a junior metallurgist with that company, but amongst my responsibilities were the monitoring of the tailing storage facility, which was a clay-lined facility, that leaked.

And so essentially I've been dealing with tailing storage facilities, various types of liners, various situations since 1983. And during the course of my career as a senior metallurgist, chief metallurgist, mill superintendent and ultimately mine manager, I've always spent time having to deal with tailing storage facilities, waste rock dumps, open pits, underground

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mines, all the features that are typically associated with a mine.

And so essentially during the approximately 14 years I spent working directly in industry, from 1983 to 1996, it was in these type of activities that I've described that I gained the experience, if you will, from an environmental standpoint as well as a mineral processing and mining standpoint.

In 1996, I decided to take a bit of a turn in my career, after having spent -- well, kind of the first third working with industry, and I felt it was very important -- as I listened to things like this hearing, as I attended them representing industry, I felt the public was not adequately represented. They could use somebody who had the qualifications to speak on their behalf.

And so I actually decided in 1996 to begin working with the public interest community. And since that time, I've provided assistance to over 80 different public interest organizations.

Now, when I describe these public interest organizations, they include environmental groups, conservation organizations. It also includes in many cases groups of ranchers or farmers or other folks that may be concerned about impacts from mining.

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In addition, I've done a lot of work for tribes and first nations, both in the US as well as in Canada.

I also do quite a bit of work for local, state and federal governments. Local-wise I was the Anaconda Superfund site director for the Anaconda Deer Lodge County institutional controls program from 2006 to 2012. During that time, I actually expanded my company to approximately 12 employees.

And during that time, we actually provided the county about a $1.5-million-a-year service contract to run their Superfund program. And it was intended to protect the remedy.

Now, this is something we oftentimes forget at reclamation and closure. When we do all these activities, they're not going to last forever. And there may be, in fact -- a good example is different land uses than were originally intended.

So if we have a postmining land use, for example, for wildlife, but then somebody buys that property and goes into development, in the development of that property they could actually alter various things at a site. So they might take the covers, for example, that were intended to protect acid rock drainage and simply scrape those covers off to build a

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house. Nobody was protecting that remedy.
Similarly, we have stormwater conveyances. If somebody were to block the stormwater conveyance or otherwise building a road, that could impact the remedy.
So one of the things that at least the Superfund programs provide is what we call an institutional controls program. Of course, a kind of substitute for that in reclamation and closure is our long-term monitoring and maintenance programs that you'll hear us describing at length today.
I should mention I've also worked for the State of New Mexico as part of their damage control program on lawsuits, and I've actually represented the Environment Department and the Mining and Minerals Division in the Manning v. New Mexico case.
I've worked for USEPA since 2003. I should mention I presently do not have a contract with USEPA as of January 1st of this last year.
But I spent essentially 15 years as EPA's primary advisor in Region 9 and Region 10, which is essentially the West Coast region, California, Nevada, Arizona, and then also Alaska, Oregon, Washington and Idaho. And my responsibility was to basically assist them in all their NEPA reviews, National Environmental Policy Act reviews, for environmental impact statements

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for mines.
During the course of that time, I probably assisted them in somewhere in the neighborhood of 50 to 60 different environmental impact statement reviews, both for existing as well as new mines.
I should also mention I do work for national institutions. I've got a list of publications that I've provided over the past 15 or more years. Amongst those publications or presentations you'll find work on geochemistry, tailing studies, financial assurance and all the type of things that we're talking about and I'll be testifying about today.
There are areas of specific technical expertise that I've developed either through my education or -- you know, an engineer really is a practical scientist. So a lot of this is about theory.
But what I've done essentially is spent my career working with the people who are experts in the field, learning from them, and in particular working with them on actual site situations, where we're either trying to permit a mine, remediate a mine or otherwise address these type of issues.
As a result of that, I've had the opportunity to work with, I believe, some of the world's foremost experts on things like geochemistry, tailings facilities

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and reclamation and closure in general.
One of the areas I spend a lot of time in is financial analysis. I think understanding the financial aspects of a mine are very important, and that's a part of my testimony today that I'll be going into.
Things like site characterization, the idea of being able to indicate what the geochemistry is, acid drainage, the hydrology. We understand today, and I don't think we understood this perhaps even just 20 years ago, how important it is in site characterization to recognize the need for adequate information, both geochemistry and for water, to combine into our characterizations.
Many of the studies that I've done in looking at why we failed to get predictions right came back to doing inadequate geochemical and geohydrological characterizations. And that's why getting those right -- and we've spent a lot of time discussing that already -- is very important.
Also an area that I want to mention is the whole idea of monitoring and adaptive management planning. This is an area that really is one of the newer areas that the mining industry and others who work in this type of thing have been looking at as a way to address the uncertainty -- the inherent uncertainty in

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all these different predictions and things we do.
We're scientists. We like to think we know what the outcome will be. But all these models, tools, data inputs, we have to admit there are still things we don't know, and it's those things we don't know that we can never hope to accurately predict.
So one other area I'll just mention, I have been involved in New Mexico working on behalf of public interest organizations in this state since 1998. That's included involvement in the Questa, Chino, Tyrone, Continental/Cobre and Mt. Taylor Mines.
I also wanted to mention that I participated during the entire Copper Rule period. I was both a member of the Technical Advisory Committee, but I also was a member of the Citizen Advisory Committee that also was involved in those rules. I believe I may have missed one session during the time you did that.
And my participation in the rules was funded by the Turner Ranch Properties, who had an interest in and are participating in that process.
Q. Mr. Kuipers, just to elaborate a little bit, you mentioned in your testimony the Chino, Tyrone and Continental/Cobre Mines in New Mexico.
Were those also open pit copper mines?
A. Yes, they are.

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Q. And could you describe in a little bit more detail your involvement in those three mines?
A. Yes. My involvement in those three mines dates back to approximately 1999, when I first started working for the Gila River Information Project, or GRIP. The initial work I did was to review --
I should mention to folks that what we were doing in New Mexico in '98, '99, 2000 was really all the mining companies were putting in place their closure/closeout plans that were required under the Mining Act which had just been essentially promulgated in 1996.
So during that period, all of the 60 mines in the state needed to put in place current Reclamation and Closure Plans, address all the different things that we are today addressing for a new mine.
I developed a separate Reclamation and Closure Plan independent of that of the company -- in this case, I think it was Phelps Dodge at the time, Freeport-McMoRan today -- as well as participated in hearings, various meetings with the company and regulators, and ultimately in resolution of those matters, although it's still fair to say that we're still resolving some things from those hearings even today.

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Q. Okay. Thank you.
Mr. Kuipers, you've been provided with a document that's been marked as the Ranches Exhibit Number 8.
I'd like to ask if you could identify that, please.
A. Yes. Ranches Exhibit 8 is my professional resume.
Q. And is it accurate?
A. Yes, it is.
Q. And is it current and up to date?
A. Yes, it is.
MR. DE SAILLAN: Madam Hearing Officer, I would like to qualify Mr. Kuipers as an expert in mining engineering, the effects of mining on the environment, including water quality, mining remediation, financial responsibility for mines and the New Mexico Copper rule.
MS. ORTH: Okay.
Objections?
MR. BUTZIER: Madam Hearing Officer, may I do a brief voir dire?
MS. ORTH: Yes.

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VOIR DIRE EXAMINATION
BY MR. BUTZIER:
Q. Good afternoon, Mr. Kuipers.
A. Good afternoon, Mr. Bustamante.
Q. Butzier.
A. Bustier. I'm sorry.
Q. The T comes before the Z. Butzier.
Now, I've had the pleasure of meeting you in many of the proceedings you've already described, have I not?
A. Yes, you have.
Q. And I'd like to ask you a few specific questions about your qualifications.
A. Sure.
Q. You do not have a hydrology degree, do you?
A. No, I do not.
Q. You do not have a geology degree, do you?
A. No, I do not.
Q. You do not have a hydrogeology degree, as well?
A. No, I do not.
Q. And you do not have any kind of geochemistry degree.
A. I do not have a degree. I have extensive practical experience, and I have published publications

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and coauthored those publications with others who are geochemists, and I do consider myself to be qualified in geochemistry.
Q. But you're not a geochemist, correct?
A. I -- no. But I just have to qualify that, that most of the geochemists I know are not geochemists. They're civil engineers or other folks like myself who have taken that knowledge and applied it to geochemistry and have been recognized as experts in the field. And the best example is Kim Lapakko with the Minnesota Department of Natural Resources, one of the most respected geochemists I know of. Kim has a degree in civil engineering.
Q. Mr. Kuipers, I have worked closely with geochemists myself, including some ex-great geochemistry experts at SRK, but I would not qualify myself as any kind of geochemist.
And I wonder if you could elaborate on why we should consider you a geochemist.
A. Absolutely.
Are you familiar with metallurgy and the fact that most of us metallurgists have extensive knowledge in aqueous chemistry?
Q. I will take your word for that, but I don't think that necessarily makes you a geochemist.

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A. Well, let me explain what aqueous chemistry is, if I may, please. It's essentially geochemistry. What we study in the processing is the dissolution of minerals. And when those minerals dissolve, whether they be in a mineral processing circuit or in a natural environment, they essentially behave exactly the same, because it follows fundamental chemical understandings.

And so again a geochemist is one who combines geology and that aqueous chemistry, if you will, and through the work I've done in mining, I believe I've gained a fairly extensive knowledge of both the geology related to geochemistry and the chemistry itself.

Again I testified I was not a -- a degree with a geologist. But, Mr. Bustier, I have spent the last 35-plus years studying geology almost every day, reading that, applying my knowledge of geology.

Q. And I think a bustier is a women's garment --

A. I'm sorry.

Q. -- and my name is Butzier. But that's okay.

A. I thought so.

MS. ORTH: And actually, Mr. Butzier -- and I have, I think, a lot more practice pronouncing your name -- he wasn't offered as an expert in geochemistry.

MR. BUTZIER: Okay. I'm just establishing sort of contours of what we're going to consider him to

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be --

MS. ORTH: Okay.

MR. BUTZIER: -- testifying about.

MS. ORTH: I can -- I can read what he was offered.

MR. BUTZIER: And that's fine. I just also would like to establish certain other things that are somewhat related, because he's done a lot of sort of blurring of lines between various disciplines, and I know that from him from experience, and I just want to try to clarify for the record so that if I make objections to particular parts of his testimony later it will be understood where I'm coming from.

MS. ORTH: All right. Go ahead.

Q. (BY MR. BUTZIER) Mr. Kuipers, do you recognize a distinction between the disciplines of mineral processing engineering and mining engineering?

A. Yes, I do.

Q. And your degree is in mineral process engineering, correct?

A. Yes. My degree is in mineral processing engineering. My PE is in mining.

Q. And I understand that you have been involved in the construction of a 25-ton-per-day mill.

A. Yes. That was just one that I've been

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involved in. I've probably been involved in the construction of dozens of mills.

Q. Have you ever been in the lead as an engineer in the construction of a tailings facility?

A. As the engineer of record, no. As the lead engineer on behalf of the company, yes.

Q. Okay.

And were you involved in -- as an engineer in the tailings facility that you described you worked with with your father that failed at one point?

A. Well, again that was not an engineered facility. It was not even a jurisdictional dam.

Q. Okay. Thank you. All right.

And you're not an economist, correct?

A. I do have expertise in engineering economics. So I do consider myself to be qualified in the area of engineering economics.

Q. Have you ever -- have you ever been an engineer in the structural design of a tailings dam?

A. Presently I am part of the engineering design review team for Stillwater Mining Company. This is not an outside review team. This is actually an internal review team. As part of the Good Neighbor Agreement with Stillwater Mining Company, I actually work with the company on all phases of engineering design prior to

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permit submittal. We actually began that work.

So I -- in a sense, I am working as a member of the engineering team not as a structural engineer, but providing my expertise relative to my experience and knowledge.

Q. But you've never been the lead engineer in the structural design of a tailings dam, correct?

A. Well, again I would -- I think I -- do you mean the engineer of record?

Q. Let's start there. Yes.

A. Yeah. So let's first make sure we understand what engineer of record is. The engineer of record is typically hired by the company, and they are an outside engineering firm.

And so for example, when I was working -- or best example would be right now, the work I'm doing with Stillwater Mining Company, I'm part of the design team, we have three or four other engineers who are working for the company and others, and then Knight Piesold, which is the firm that is actually the design firm, they have a designated engineer of record.

So there's multiple responsibilities. In terms of ultimate responsibility, you have both the engineer of record, but also the other engineers who contributed to that effort. But the engineer of record

would be the, if you will, person in charge, essentially.

MR. BUTZIER: Madam Hearing Officer, I would like to have the acceptance of this witness as an expert limited to mineral processing engineering as opposed to mining engineering, and I think the effects of mining on environmental issues, to me, is not really a sufficiently delineated discipline to actually admit him as an expert in that category.

MS. ORTH: All right.

And how would you describe the distinction, Mr. Butzier, between mining engineering and mineral process?

MR. BUTZIER: A mineral processing engineer is somebody who is involved in the processing or beneficiation processes associated with turning a mineral that has been mined into a commodity or product or a concentrate.

A mining engineer is somebody like Mr. Smith who is familiar with all phases of excavation, of mining, tailings facilities, et cetera, et cetera.

MR. KUIPERS: If I could, Madam Hearing Officer?

MS. ORTH: Yes. Go Ahead.

MR. KUIPERS: I would have to say that

Mr. Butzier -- correct?

MR. BUTZIER: Correct.

MR. KUIPERS: Okay.

MR. BUTZIER: Thank you.

MR. KUIPERS: You're actually incorrect. The mining engineer does not do tailing storage facility work. And in fact, in most cases at most mine sites, the mineral processing engineer is, in fact, the person in charge of the engineer of record.

So my entire work as a mineral processing engineer when I've worked at sites, I'm the one responsible for that tailing storage facility, for the safe, proper management of it on behalf of the company.

MR. BUTZIER: Okay. If that's Mr. Kuipers' understanding of what's within the scope of mineral processing engineer, I still would like to have his expertise accepted as an expert in mineral processing, not mining -- not mining engineering.

MS. ORTH: All right.

So, Mr. Kuipers, do you have anything further to say about the distinction that Mr. Butzier is drawing here?

MR. KUIPERS: No, not distinction. I'd just mention that again in the same way as the mine manager that I have had the role in various other aspects, I

have been involved in the mining side of the operation. So I'm not claiming to be a mining engineer, but again I do have practical knowledge with respect to mining engineering that I believe is valuable.

MR. DE SAILLAN: Madam Hearing Officer, if I may.

MS. ORTH: Mr. de Saillan.

MR. DE SAILLAN: Thank you.

The standard for qualification of an expert is specialized knowledge which may be of value to the decision-maker, and it can be gained through education, it also can be gained through experience.

And I think Mr. Kuipers has demonstrated in the last 15 or 20 minutes of his testimony that he has lots of expertise as testifying in mining engineering.

MS. ORTH: Okay. So I think perhaps with cross-examination, Mr. Butzier, you'll be able to do what you need to do with Mr. Kuipers' testimony.

MR. BUTZIER: Thank you.

MS. ORTH: So I do take your point that effects of mining on environment is not a discipline in and of itself, if you will, but I also believe that Mr. Kuipers' education and experience especially provides him with the base of knowledge on which to offer opinions in that area, even if it's not a

discipline.

MR. BUTZIER: Thank you, Madam Hearing Officer.

MS. ORTH: All right.

Anything else?

MR. DE SAILLAN: Yes, Madam Hearing Officer.

If I could, I would point out that expertise in the New Mexico Copper Mine Rule is also not a discipline, and we have qualified Mr. Kuipers in that expertise, and Mr. Butzier qualified several of his experts without objection in that discipline.

So, you know, expertise doesn't need to be limited to a specific discipline from which somebody can get a degree from a university. The concept is a broader one than that.

MS. ORTH: Okay. And I agree with you.

MR. DE SAILLAN: Okay.

MS. ORTH: Yeah.

So he'll be recognized in the areas you mentioned, mining engineering, effects of mining on environment, remediation, financial assurance and the Copper Rule, to give the testimony and render the opinions he'll render in each of those areas.

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DIRECT EXAMINATION (Resumed)
BY MR. DE SAILLAN:
Q. Okay. Mr. Kuipers, have you prepared any reports for the purposes of this groundwater Discharge Permit hearing?
A. Yes. I prepared written testimony. Or I actually prepared a written report some months ago, in addition to written testimony.
Q. Okay.
And what was the date of that report?
A. The date of the report was May 1st, 2018.
Q. Okay.
And you've been -- you've been provided a document that's been marked as Ranches Exhibit 9? Can you identify it?
A. Yes. Ranches Exhibit 9 is titled Copper Flat Mine Draft Discharge Permit 1840 Technical Comments, prepared by myself.
Q. Okay. Thank you.
Can you please then proceed with the technical portion of your testimony.
A. Yes.
Madam Hearing Officer, there are five things essentially that we want to address in my testimony today.

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The first is we want to briefly touch on the Copper Flat project history. We feel it has important bearing on the risk of this project to potentially requiring financial assurance. And it relates to why we think getting this right in terms of financial assurance is very important. It's very important for any mine, but as I'll talk, I think, in this particular case, given the mine history, it takes on added importance.
The second thing we want to talk about is the potential for mining-influenced water. And mining-influenced water, as I believe Ms. Griffiths explained, that's really the term we use today to not just limit ourselves to discuss the acid drainage, but also to make sure we've addressed saline drainage and neutral drainage. Also during that discussion I'll talk specifically as to the potential at the Copper Flat Mine.
The third thing we want to talk about today is the tailings storage facility liner seepage. As I've said, there's a great deal of literature out there and a lot you've heard about liner seepage. Then there's the actual practical experience that goes with liner seepage. And this is a good example of where a theory and practice oftentimes don't meet.
Fourth thing I want to talk about is the

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potential for leaks and spills. These are leaks and spills from tailings facilities, pipelines, chemicals, things of that nature. This type of incident in varying degrees happens at all mines, and so it's very important that we account for those leaks and spills.
Similarly in financial assurance, we usually want to have something set aside to address those, knowing that to some degree they'll happen, even though we can't predict exactly what they may be.
Then the final thing I want to talk about is financial assurance for closure. And essentially I consider financial assurance to be a way to wrap all these different issues that we're talking about into really one focused discussion.
Because what we're really trying to demonstrate is if we get this wrong and by some chance -- we're not saying it will happen, we don't want it to happen, but if by some chance the mining company goes bankrupt -- and mining companies do that all the time -- we want to make sure that the citizens of the State of New Mexico are protected in terms of liability, that the environment will be adequately addressed.
We don't want to be in a situation where if a mine were to close we're sitting here 20, almost 30 years later, 30-plus years later, still not having the

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mine remediated. That's the history of the past. What we're all about trying to do today is to make sure that can't happen. And in fact, that's the intent of good practice when it comes to characterization, mitigation and financial assurance in combination.
So just a bit about the Copper Flat project history.
We've heard quite a bit about the historic aspect, et cetera. But really the Copper Flat project in the modern context started with Inspiration Copper owning the property back in the 1970s.
I actually worked for Inspiration Copper as a strategic acquisitions analyst for the company, and the Copper Flat Mine was provided to me as -- on my first day of work within that position by the company as an example of mines that essentially they had determined weren't the kind of mines that major mining companies like Anglo American wanted to invest in. And Anglo American was the owner of Inspiration Copper.
Essentially Inspiration leased the mine out to other parties to develop because it wasn't a type of project they had confidence would make money.
In 1980, the -- I believe it was Quintana Mining proposed the open pit mine. At that time, it was very similar to today, with primary crushing, SAG and

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ball milling, flotation. The main difference was the original proposal in 1980 did not include a lined tailings impoundment. It was unlined.

Now, in March, 1982, the Copper Flat Mine went into production. And in the United States, the Copper Flat Mine is well noted as the only major mine that's gone into production and then within three months ceased production. There were a couple different factors.

One of the difficulties in mining is you can begin to propose a project in 1980, but you can see it takes several years before you put it into production. Even when you put it into production, you don't know what the price of copper is going to be later.

And literally what happened was they had two -- a combination of two things happen at once. The copper price went down, and they were saddled with very large and heavy debt load from having constructed the project, and those two things essentially resulted in a determination within a few months of operation that they were not, in fact, going to be able to make money.

The site was originally placed on care and maintenance, but then eventually the company decided to remove the surface facilities and equipment. I think in particular the equipment was sold to pay back some of the debt from the capital loan.

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And then in 1987, final reclamation was concluded, and essentially the site was abandoned.

After 1987 for some period of time, there really wasn't an active owner. There were various people that held the property. But when you went to the site, there was no ongoing activities related to mining or maintenance or other aspects of the reclamation.

In 1994, Alta Gold acquired the property. Alta Gold was primarily involved in gold mining. I'm not ever really quite sure why they decided to get into a copper property.

But a couple years after they acquired the property, they proposed again an open pit -- it's not a pen pit, but an open pit mine, primary crushing, SAG and ball milling, flotation. And again in 1996, they proposed an unlined tailings.

Not long after they just got started, Alta Gold declared bankruptcy. Now, again Alta Gold didn't go bankrupt because of their investment in Copper Flat. Alta Gold went bankrupt because of some investments in some other projects as well as the gold market going down.

But they invested in the project, and essentially the EIS process was discontinued, and again the property was to some extent abandoned.

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I actually went to the property in 2003, following one of the hearings on the Chino or Tyrone mines, and essentially the property had no signs, no security, and I took a mine tour on my own in 2003. And got to look at the pit lake, looked at the site, and again it had every resemblance of an abandoned mine.

Now, since then, New Mexico Copper Corporation has arrived. They invested in the project, and they proposed in 2015, and really prior to that as we've heard, again an open pit mine, primary crushing, SAG and ball milling, flotation. The main difference is lined tailings.

I think it is important to note that the -- during the course of these different activities the amount of material ton -- the amount of material that would be mined and processed has approximately doubled, from about 80 million tons in the 1980s to around 160 million tons today.

The concern I have -- and again I'm not predicting this mine will go bankrupt. That's not anybody's desire. It's just not what should happen. But the future tends to repeat itself. And this particular mine has some characteristics that I'll touch on later in my rebuttal based upon a slide Mr. Smith provided that I think is real critical to look at in

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terms of understanding the potential risk of this mine failing at some point.

So I want to move on here to mining-influenced water. There are a few slides in here that I'm going to spend a little less time than I originally had intended to because Ms. Griffiths did an excellent job of describing some of these aspects. And in fact, I feel that she really provided us with some good basic background information that I certainly don't need to repeat.

You might remember the Ficklin diagrams that were mentioned, and essentially where they showed the different types of drains in terms of acid rock drainage and neutral drainage, but also the metals concentration. And this is really what I call a generalized or simplified Ficklin diagram, not for a specific site, but for mines in general.

And many people have heard us for a long time talk about acid rock drainage. And the focus in most discussions, I'd say particularly 20 years ago, even up to current, oftentimes focus on acid rock drainage. And we talk about that as if it's the only potential pollutant that might result from a mine.

What's become an understanding -- and this really -- you can see this was 1999, so almost 20 years

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ago. There were people like Jeff Plumlee -- who is a good example of a geochemist I've worked closely with. Now --

MR. BUTZIER: Madam Hearing Officer?

MS. ORTH: Sir.

MR. BUTZIER: Would it be okay, so that I don't have to interrupt his testimony, that I place a continuing objection to testimony on geochemistry issues?

MS. ORTH: You can have that objection, certainly.

MR. BUTZIER: Thank you.

MS. ORTH: Please go ahead, Mr. Kuipers.

MR. KUIPERS: So as Ms. Griffiths explained, what we look at in this type of thing is the concentration of metals, and what this does is it combines the concentration of zinc, copper, cadmium, lead, cobalt and nickel into parts per billion. And essentially if you have a billion parts per billion, that's 100 percent, 100,000 parts per billion is 10 percent, and et cetera.

So down here we have one part per billion. It should say million in this case, now that I look and see how it's -- it's billion. I'm sorry.

So what we're doing is basically taking the

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combined concentration of the metals and comparing that to pH. Now, acid rock drainage, we talked about that generally being waters that have a pH of less than 6, and you can see that within the range of acid rock drainage you can have metals concentrations that go all the way from almost 10 percent to down to 10 parts per billion.

What we also, though, recognize today is that we have what we call neutral drainage or saline drainage. And so even though we may not be dealing with acid rock drainage and reduced pH, we oftentimes are dealing with this, well, circumneutral pH, and in that we still have the ability to have drainage.

And importantly, that drainage can have high concentrations of metals, as much as essentially a million parts per billion, which would be one part per million again.

So in looking at it -- I should -- that should be one part per 10,000. Let me change that.

So when you look at this, the whole point is I've been working with mines and assessing their need for water treatment and actually developing water treatment plans over the last 35 years, and in particular, I've collected a large database of information from all the different mines in the United

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States that I'm aware of that are treating water. And I actually did this activity more at USEPA, collected that information in a database.

And what we discovered that I think was quite telling was that when you look in the United States today at what's being treated for at mine sites, it's actually about 50/50.

Yes, there are a lot of mine sites that have acid rock drainage, things like sites in Colorado that we hear about. But if you go, for example, to Nevada, you'll find that it's not a matter of acid rock drainage, but it's rather neutral drainage containing things likes arsenic, selenium, thallium, a number of other things that are more soluble or have less precipitation tendency at a neutral pH.

MR. BUTZIER: Madam Hearing Officer, I'd like to also, if I could, place a continuing objection to sort of broad-ranging discussions that are drawn from all sorts of mining operations, all of which are from periods that -- from other places and from periods that do not include compliance with the highly prescriptive Copper Rule.

MS. ORTH: And is this a relevance objection?

MR. BUTZIER: Yes.

MS. ORTH: All right. Thank you. It's on the

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record.

Go ahead, Mr. Kuipers.

MR. KUIPERS: So the next slide shows the same kind of diagram, but the focus here is on sulfate. And again what we're really trying to show here is that when we deal with sulfate, sulfate is definitely an issue with acid rock drainage, again with very high concentrations potentially possible, but it's not limited to acid rock drainage. We still have high sulfate with saline drainage and neutral mine drainage.

And I think that's important, because one of the things that is different about New Mexico than most states I work in is your groundwater standards address sulfate, and sulfate easily in neutral and saline drainage can exceed 600 milligrams per liter.

When you look at what the potential treatment, for example, might be related to the Copper Flat Mine, while there may be some treatment potential for acid rock drainage, I think the real potential has more to do with, for example, saline or neutral mine drainage from the tailing storage facility, potentially even from the waste rock pile, that contains higher concentrations of sulfate.

The metals, I think they may or may not be an issue, but I think we can have much more confidence that

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it's things like TDS and sulfate that we will need to pay attention to at the site.

We can't ignore at the same time, for example, selenium. You've heard folks talk about selenium evapoconcentrating in the pit lake. Well, that's really a good example of neutral mine drainage. The pit lake may not be acid, but we're still getting neutral mine drainage and it contains selenium at concentrations potentially exceeding standards.

I just want to mention that when we talk about mining-influenced water it also includes process solutions. This would include leach solutions. It would also include process supernatant, such as the tailings impoundment supernatant water that will be in excess and recycled back to the mill.

We also include things like waters affected by nitrates from explosives. And we haven't identified that as an issue here, but it's just something to mention that we do have sites where -- I'm working at where the nitrates from explosives have actually turned out to be a significant contaminant.

Now, this is a flow diagram that I've taken from various other sources and modified for the work that I do and presentations that I make, but essentially the source is -- it's from both the GARD Guide, the

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Global Acid Rock Drainage Guide, which I think has been referenced before, as well as from the work that I did with Ann Maest in a 2005 basically report on predictions and dealing with uncertainty in predictions.

I just want to use the next page to make it a little easier for all of us to see.

The way this starts is we have the Mine Plan. And so every mine when they first -- you know, company when they first look at a project --

Q. (BY MR. DE SAILLAN) Mr. Kuipers, excuse me.

Could you explain the relationship between this slide and the previous slide?

A. Yes. So the reason I have the second slide is just to enlarge the flow diagram on the right-hand side to make it easier for folks to see as I explain it. So this is slide 10, which is the same flow diagram as the previous slide.

The flow diagram starts at the top with the mine planning process. And again essentially this -- every company when they have a mine, they begin to develop it based upon exploration information, other predeveloped information, they start with a conceptual plan. This is what the mine should look like, might look like.

And that conceptual plan, oftentimes the

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presumption is it's fairly ideal outcomes. If we do this, everything will be okay.

But what we do in modern mine development is we actually go ahead and we determine prediction objectives and develop the site conceptual model.

So the first thing we want to do with our objectives is what are our prediction objectives? And that can work two different ways. One, if your objective is to prove an already preconceived outcome, such as this mine will not have an issue, you're going to get one result. But if your objective is to find out what might happen without a preconceived notion, then you get another result.

It's very important going into this process that a preconceived notion not ultimately overwhelm the actual information.

So what we do is we take, as I've said before, two key things, and I believe Ms. Griffiths similarly showed the same thing. The two key impacts into a prediction are the geochemical characterization as well as the geohydrological characterization. And of course, that -- we've spent quite a bit of time already hearing testimony on those two items -- aspects.

We then conduct the modeling to determine the concentrations at receptor locations. Now, those

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receptor locations could be, say, for example, at the edge of a pile. They might be midway between a pile and, say, for example, a valuable water resource such as a spring or surface water groundwater source, or it might actually be at those sources themselves. And we talk about modeling for various receptor locations.

Now, what we want to do is ask ourselves what are the concentrations at those receptors. And if we don't allow ourselves the "what if's," what if we get higher flow, higher rainfall, various things, we'll probably come back and say, no, the concentrations of receptors, they're not greater than standards, they're known.

Well, if that happens, we then go ahead and mine. We conduct the operations, we get to closure, we start monitoring. But concentrations could end up greater than the standards at the mine closure.

Well, the problem is if that happens, you can't go on implementing the Reclamation and Closure Plan, because if you predicted no problems here, but you have problems here, after the operations, a big -- no problems, as part of your, if you will, testing, but then after the operations, if it turns out that you do have places that exceed standards, you have to go back and redesign the Mine Plan.

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So what we've come to do more often now is recognize that it's not a bad idea to go ahead and say, well, let's do a sensitivity analysis, let's look at things that might happen, even if we don't think they're necessarily likely to happen, and let's run them through this process, as part of the design process.

And what that allows us to do is to take a look at what might happen if the answer is yes, closure, run that back through with additional mitigation, consider redesigning the Mine Plan, and then incorporate that.

Now, if you haven't thought about what might happen, trying to come up with this plan after the fact is very difficult. So what this process really tries to emphasize is a risk assessment process, that says if we will go ahead and allow ourselves to consider the possibility of standards being exceeded, then that also would give us a chance to think about whether our Mine Plan still is capable of addressing that situation.

And in many cases, what we do is we actually redesign the Mine Plan before we begin to make sure that if this happens we've got an already identified mitigation measure, and ideally we actually have also identified financial assurance necessary to carry out those measures.

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I was going to replace this one, and I didn't. So the reason I was going to replace this, by the way, is there was some "See Section 5" and "Details in Section 4." This was actually something I used in another publication, and I just simply haven't had time to remove those.

So if you will, I would just ask the folks ignore these "Details in Section 3," "Details in Section 4," "See Section 5" and "Details in Section 4," realize those were simply referring to something else in the work that I borrowed this from.

This is a figure that's contained in the report -- the 2005 report I wrote with Dr. Maest.

Essentially what we do at the conceptual site model is we want to identify all the different sources at the site. Now, with respect to those sources, you can see we have quite a bit of data requirements, and those include things like physical properties of material, whole rock analysis, geology/lithology/mineralogy -- I happen to think that is a very important aspect of geochemistry that oftentimes gets ignored -- whole rock analysis, acid base accounting and the metal leaching potential.

I should mention these are essentially the same tests that were described by Dr. Griffiths. Metal leaching potential is really what we're talking about. There are both the short-term and the long-term kinetic tests that she discussed.

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Now, we also need to make sure we understand the pathways. Again I'm not here to testify as a geohydrologist today, but there are many people testifying in that regard and their testimony is very important, because understanding the sources is one thing, the receptors is another, but it's these pathways that are very important and critical, in fact, to understanding what may potentially happen.

You can see those pathways can occur from a host of things. Process water draindown, that's essentially the tailings storage facility draindown that we're talking about here. We have draindown from infiltration. This would be from meteoric infiltration and really drainage.

We have infiltration that can go through the soil and vadose zone. So we still may have vadose zones that are 10 feet thick or hundreds of feet thick. This describes the infiltration through that zone, that's essentially the dry zone, down to the water table.

There's the transport within groundwater, transport from groundwater to surface water, uptake biota, et cetera. So these are all things that it's critical to understand how to get from here to here to understand. And again there's all kinds of different information.

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I would mention in my experience groundwater preferential pathways are very important to understand. We've heard a lot about Darcy's law. Darcy's law basically doesn't account for this. And these are, in fact, the majority of sites that I've worked at where we've ultimately seen pollution travel great distances.

And there's an example I'll bring up during my rebuttal having to do with Bingham Canyon Mine that is somewhat infamous or famous for looking at this preferential pathway issue.

Now, we'll talk later about mitigation, but this is essentially things like the minor interceptor systems, various other things we would do to try to disrupt the pathway between the sources and the receptors. And so a good example is putting a liner in as a mitigation for that pathway, but understanding that liners again -- they're not a perfect solution.

I frequently recommend liners in the projects I work on. A number of projects I worked on, for example, at Stillwater mines, we have three tailings impoundments. They're all lined. In fact, two of them are not only lined, but very identical construction

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technique with an internal drainage system to what's being proposed for Copper Flat.

So liners are very common, but what we've discovered is liners don't prevent, they reduce. And in many cases, what they accomplish is they make the amount of water pollution handleable. Instead of hundreds of thousands of gallons, those liners can reduce it to tens of gallons. But they don't reduce it typically to a point where we no longer have to address them.

And also, liners it's -- you know, as I'll discuss later, there's just so many different things that can go on and happen with them.

So importantly, what we've heard a lot of -- excuse me -- a lot of testimony from citizens in particular about the importance of the receptors here, groundwater seeps and springs, surface water, wetlands. We talked about the pit lake. We hear people talking about aquatic life, wildlife, vegetation, humans.

Again this is what we've recognized for some time now in these conceptual site models that we need to identify and ensure we've addressed to be protected.

Now, just in general, what we see happening at mine sites is they'll typically occupy a drainage. Within that drainage, we'll locate mine workings, we'll have underground mines, open pit mines.

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You know, a good example would be the Copper Flat Mine. Who knows? Maybe the second phase of mining would be underground.

Q. Mr. Kuipers, if I could interrupt you just a second.

As you go through these slides, could you identify the slide that you're referring to, either by the title or the number of the slide, because you're moving pretty quickly, and the record is not going to reflect where in the slides you're at.

A. I apologize for not having done so already. I know better.

So I'm on slide 12 currently.

The tailings piles, for example, end up seeping, end up in many cases with historic mines that weren't properly contained, where we end up with tailings waste rock actually going into the streams and rivers. We have tailings impoundments that are oftentimes located very close to sources of water, et cetera.

MR. BUTZIER: Madam Hearing Officer?

MS. ORTH: Sir.

MR. BUTZIER: May I add another continuing objection?

MS. ORTH: Yes.

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MR. BUTZIER: A lot of this testimony insofar as it does not even relate to the Copper Flat Mine I think is more prejudicial than it is probative, and for that additional reason, I think it should be not allowed.

MS. ORTH: All right. I'm going to hear it regardless. I think he's setting up the context for his future testimony.

Please go ahead, Mr. Kuipers.

MR. KUIPERS: Thank you.

This is an important drawing actually with respect to the Copper Flat Mine. When we take a look at tailings piles being located in the -- in the area of essentially watershed, essentially what we have going on here is meteoric infiltration from precipitation, be it from large storm events, more continuous storm snow events, things of that nature.

Essentially what can happen is the infiltration goes through the -- onto the piles, some of the water comes off the piles, some of the water goes through the pile. This is very much exactly what happens for an unlined impoundment in all cases.

And what can happen, and we've discussed it here as a possibility at least, is that infiltration from the tailings pile can go into groundwater, and

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provided there's conductivity, it can end up in surface water. Again recognizing that we have relationships between groundwater, alluvial aquifers and surface water is very important when we take a look and understand this.

The idea, of course, of putting a liner is to limit and try to shut off that infiltration into groundwater that occurs. So essentially part of what we're trying to do with mitigation is disrupt this situation where we can have pollution going below the surface, or through here. Also, reclamation is intended to address this phenomena of the surface run-off.

Now, what we're ultimately also very interested in doing is protecting --

Q. Which slide is this?

A. Slide 14, and this is titled Source and Pathway Overview.

And essentially what I'm trying to show here is what happens if this relationship between sources and receptors goes so far as to result in pollution to surface water. And essentially once we get metals into surface water, some of them are going to be dissolved.

We may also have basically particles of minerals that are also there that can adsorb but not -- are not necessarily dissolved. Some of the particles

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settle out in the bed of the stream. Some of it remains suspended. And then whenever we get storm events and other things, it can scour.

Now, in extremely polluted systems, we see this phenomena essentially killing aquatic life, because aquatic life is very dependent upon these sediments.

Again I'm not saying this will happen here, but this is the type of thing that we're concerned about and want to make sure through a robust analysis can't occur, or at least if it can occur, we've addressed what kind of mitigation would be necessary, and we've also addressed having the resources to apply that mitigation.

Now, in looking at a particular site, we typically take that same information from our conceptual site model diagram and draw it out for the site.

Q. We're on slide 15 now?

A. I am sorry, Counsel. I will endeavor to state the slide number.

This is slide 15, titled Conceptual site model.

And what we're showing here are the typical various features of a mine site. I should mention this is not specifically intended to represent the Copper Flat Mine. This is a generalized diagram that I use in a lot of different presentations; however, it has a lot

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of similarities to the Copper Flat site.

We have an open pit, waste rock and tailings. And one of the things I think is very important about this conceptual site model is it recognizes that there is the potential for transport from the waste rock down into the groundwater. Same for the tailings down into the groundwater.

And I would note that that potential and showing that potential is something we always do regardless of whether it's being lined or not. So that line -- it's recognized as being very important, and even if we have a liner in a conceptual site model -- and I'll show you some drawings by others doing the same thing -- we always make that provision for that seepage happen.

Now, the same model shows what can happen if we get pollutants into groundwater. Those pollutants can end up showing up in springs and seeps that can come out on a hillside with respect to the water table. You also can have transmission directly into surface water.

The next slide is slide 16, titled Mine-Impacted Water characterization process.

Now, this again is another way of demonstrating this idea of looping through the process rather than just taking what comes at you.

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So again we start with a Mine Plan site conceptual model. I should mention that on the top we're showing the project phase. So again something very important we do today that we didn't do in the past, we look at the entire mine life cycle. There was a failure in the past to consider the life cycle through reclamation and closure.

So when we design the mine, we want to actually be designing for reclamation and closure. That's a key thing we do today that wasn't done in the past.

In order to do that, again we have to characterize the geology, mineralogy and lithology. We do sampling analysis. We conduct the various static tests you heard about, the kinetic tests, which are the humidity cell tests. From there, we also need our hydrological characterization.

We take all that information and do modeling. And, you know, a lot of folks have done a lot of modeling of this project. We typically do a sensitivity analysis. And I'm going to mention later that that's one aspect that I think needs to be performed for this project.

I'm not saying it hasn't been performed at all, but we have not performed a robust sensitivity

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analysis for this project. I think it's critical if we want to make sure that we've identified the various mitigation necessary and how to implement those. If necessary, we need to take more time to do more sensitivity analysis.

And then as the mine goes into operation, we do verification monitoring.

And you can see all during these tests what we're trying to indicate here is this information needs to keep looping back up in the mine site conceptual model. If we don't do sensitivity analysis, we don't get that particular loop.

So again just trying to make the point of how we go through a whole iterative process, and we typically don't make assumptions that everything is going to be best case or ideal.

MR. BUTZIER: Madam Hearing Officer, could I ask for a clarification?

MS. ORTH: Sir.

MR. BUTZIER: Mr. Kuipers continually refers to "we" like it's a royal "we." I'm not sure exactly who he's referring to when he says "we."

MR. KUIPERS: The mining community or industry, the -- for example, the information I'm taking is from the Global Acid Rock Drainage Guide, which was

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written by the industry and is used extensively by the industry, and I consider myself part of the industry, and the people who have contributed to these documents.

MS. ORTH: Okay. Thank you.

Slide 17.

MR. KUIPERS: Slide 17, titled Mine-Impacted -- Mine-Influenced Water characterization uncertainty.

So this is the real gist of why I just went through all these slides, was to try to get folks to understand and make sure the Hearing Officer understood that there's a lot of different inputs, a lot of different things we're doing in here. It's good science. It's great that we've actually developed the means and the ability to utilize these models and do these.

But what we can't forget, and this is so critical, there are inherent uncertainties in all water quality bodies. We can't get rid of that. And so the suggestion that we've got predictions that are going to give us exact results? I could make a lot of money, I believe, betting against those predictions. That's not what we want to do. We don't want bad predictions.

But it's very important to note these are -- these are well-known people in the industry, they're

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respected folks, all of whom have suggested that this uncertainty needs to be considered by regulators as well as policymakers.

And I would note that the one concern I have about the Copper Rule, the assumption that -- it's not the one concern, I should say, but it was one of the major concerns, this idea that we can permit by rule when the rule does not contain any requirements for a risk assessment. And without that risk assessment, I don't know that we can really say that we follow the current science.

MR. BUTZIER: Madam Hearing Officer, now I'm going to have to make an objection that this is an attempt to relitigate the Copper Rule, which the agency has already indicated is a permit by rule approach and a very prescriptive one at that, and I think Mr. Kuipers participated in that proceeding, and I would object to him reinjecting the same issues into this proceeding.

MS. ORTH: All right.

So, Mr. Kuipers, I know you understand this isn't a hearing on the Copper Rule, but the application of the Copper Rule.

MR. KUIPERS: Yeah.

MS. ORTH: So please go ahead.

MR. KUIPERS: So I believe what I'm trying to

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say is the Copper Rule as written and applied does not include risk assessment. And the risk assessment process is, in fact, how -- again we, the industry, when you read the Global Acid Rock Drainage (GARD) Guide, has determined we should address this type of uncertainty.

So what I'm trying to make sure we understand is when we talk about these mine-influenced water prediction models, they're best used as a comparative tool and not for determinative predictions. And what I mean is we use them to compare one option versus another.

And these tools are very good at telling us whether we get an improvement. But where these tools fail is when we try to say I'm going to end up with exactly 4,897 feet of elevation or I'm going to end up with exactly 990 milligrams per liter concentration, they're almost always wrong.

And work that I've done in particular for EISes suggests that as an overall approach these determinative predictions are wrong about greater than 80 to 90 percent of the time.

There is something to say about the site specifics added to this. I can tell you the sites where we have a lot of the surface water, a lot of

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groundwater, that percentage of being wrong actually goes up. It's almost always that those are wrong.

We do have a better chance of doing things at a drier site. I want to recognize that. So there are things about the site that help us, but they don't eliminate this concern at all.

So a little bit about the Copper Flat mine-impacted water history.

Q. (BY MR. DE SAILLAN) We're on slide 18 now?

A. Yes. Slide 18, titled Copper Flat Mine-Influenced Water History.

We have past intermittent mining activities that have affected water quality, and while we recognize that those activities weren't performed at the same standard as what's being proposed today, one of the things that all of us that worked in this field understand is when you have site-specific information available from historic mining operations or other things, that's very important and valuable data.

It gives us a good indicator of what might happen. Again indicator, but not an actual predictor.

So we want to talk about the four identified sources, pit lake, the surface water in Grayback Arroyo, groundwater quality in the vicinity of the existing pit and groundwater in the former mineral processing and

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tailing storage facility areas.
I'm on slide 19, titled Copper Flat Mining-Influenced Water History.
I should mention all of this information came from the 2017 EIS, Draft Environmental Impact Statement, and it is up here verbatim, the same as the language in the Environmental Impact Statement.
So the EIS -- Draft EIS, I should say, indicated that pit lake water quality is subject to requirements, et cetera.
The existing water quality in the pit lake exceeded applicable surface water quality standards for aluminum, cadmium, copper, lead, manganese, selenium and zinc in at least one of the baseline water quality samples collected from 2011 through 2012.
The pit lake water quality also exceeded water quality standards for cadmium, copper, manganese and selenium during all baseline water sampling events. I assume that's from the same period, during 2011 and 2012.
The EIS concludes that based on this data the existing pit lake does not meet the water quality standards for the designated uses of warm water aquatic life, livestock watering or wildlife habitat.
The next slide is slide 20, also titled Copper

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Flat Mine-Influenced Water History.
Going on, the pit lake -- according to the 2017 DEIS, the pit lake water contained high total dissolved solids which ranged from 7,770 to 9,680 milligrams per liter in samples collected during 2010 and 2011.
And as we've discussed before, we see evapoconcentration occurring in this pit lake with the TDS, total dissolved solids, concentration, increasing from approximately 3,500 milligrams per liter to 9,500 milligrams per liter during the period 18 -- 1989 to 2011.
So for a period of approximately 22 years, what we saw -- and again we would see and have evapoconcentration in a smaller pit lake. We actually saw a near three times increase over those 22 years. And this is the phenomena of evapoconcentration which we raised and are very concerned about.
The EIS goes on to say that the concentrations of cadmium, copper, manganese, selenium and sulfate also increased over the period of 1989 to 2011. So again this wasn't just total dissolved solids, but it was also these elements in addition to TDS.
And again the EIS basically notes that increasing trend in TDS is caused by concentration

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through evaporation, removing water from the lake and essentially this evapoconcentration phenomena that we've talked about.
They also noted that periodic dissolution and flushing of products from mineral oxidation in the high walls surrounding the pit lake also affects water quality. So part of what's happening here is as the meteoric water keeps falling on the area surrounding the pit lake, it also is leaching materials from those pit lake -- the pit high walls, walls even though they're relatively small in this case, and that continues to be an additional source for the pit lake.
Q. Mr. Kuipers, if I could interrupt you just for a minute.
You're referring here to the existing pit lake?
A. That's correct.
Q. Thank you for that clarification.
A. Slide 21, titled Copper Flat Mining-Influenced Water History.
In this slide, we're bringing in the information from the 2017 DEIS on Grayback Arroyo.
What the DEIS says is that the site data from SWQ-3 suggests that the surface water in the arroyo is affected by not only natural weathering of the Copper

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Flat ore body, but also previous mining of the ore body. Essentially they're saying that the pollution in -- of surface water at Grayback Arroyo is both due to natural, but also to manmade, or anthropogenic, causes, and those anthropogenic causes were the past mining.
Going on to groundwater quality in the vicinity of the existing pit, the EIS says that according -- during the 2013 sampling program, water quality at GWQ11-24A, which is the shallower of the paired monitoring wells, did not meet New Mexico groundwater quality standards for pH, TDS, sulfate, fluoride, aluminum, cadmium, cobalt, copper and manganese.
It also indicates that groundwater quality at the shallower of the two wells, GWQ11-25A, does not meet New Mexico water quality standards for pH, TDS, sulfate, fluoride, aluminum, cadmium, cobalt, copper, manganese and zinc, noting that providing a measurement indicator of 10.
Now, BLM actually has a measurement indicator of 1 to 10 for water quality, 10 being the worst. They considered this groundwater quality to basically rate a 10, or the worst water quality in their rating system.
Notes that the groundwater quality at 11-25B exceeds New Mexico water quality standards for TDS,

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sulfate and fluoride. So I think this -- we have two different intervals being sampled here perhaps. I'm not that familiar with the wells, I have to admit.

The observed water quality effects at these locations, according to the EIS, may be due to oxidation of sulfide minerals in near-surface rock units -- again these would be the material at the pit walls -- and leaching of previous products of sulfide mineral oxidation with subsequent infiltration to the water table.

Slide 22, titled Copper Flat Mining-Influenced Water History.

This slide talks about the groundwater in the former mineral processing and tailing storage facility areas. This is again mainly focused on the tailing storage facility area.

And what the EIS shows is that groundwater quality at some monitoring wells located downgradient of the former mineral processing area and TSF also show evidence of mining-influenced water.

Essentially they identify elevated concentrations of sulfate and TDS. I believe that's consistent with some of the testimony we've heard over the last few days. And they note that the metals concentrations meet the groundwater quality standards.

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Again I would not disagree with some of the characterizations we've heard that we would expect the tailings to have less potential for metals concentrations because the flotation process is intended to at least try to remove as much of those metals as possible.

That doesn't mean there's no potential, though. It is possible that the ongoing discharge of mine-impacted water from the TSF are occurring, but the EIS noted that there is not enough site-specific data -- or no site-specific data, according to the EIS, regarding that ongoing seepage of mine-influenced water from the site.

So I think that's -- I'll let the department address why the BLM came to that conclusion.

Slide 23, Copper Flat Mining-Influenced Water Predictions.

Now, in the same Environmental Impact Statement, they also reported on what the future pit lake water quality would be. So this slide is actually referring to the future pit lake, not the existing pit lake.

So with respect to the future pit lake water quality, they noted uncertainties that are not fully quantifiable due to existing technologies. I hope I've

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made that point enough now, but if I haven't, it's quite notable that the Environmental Impact Statement goes out of its way to identify this issue.

And I might also note that when they identify this issue I'm amongst the authors' reports that they're referencing when it comes to this, but I'm certainly not the sole author of those reports.

In order to address those uncertainties, the BLM in the EIS recommends the following.

First, the rate of mineral oxidation and -- or really they're -- I shouldn't say recommends the following. What they're doing is identifying why these uncertainties exist.

So first, the rate of mineral oxidation and associated contaminant release from the mineralized rocks in the pit high walls, which controls the chemistry of inflowing water. So trying to predict that rate of mineral oxidation and the associated contaminant release. We have tools to do that. I believe those tools -- Ms. Griffiths' analysis is consistent with those tools. But it is an issue in that it's a difficult prediction to make.

We have issues with potential seasonal or permanent stratification, for example, at pit lakes and uncertainties associated with the mixing of pit lakes.

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We've seen oftentimes instead of a mixed chemistry throughout, we get stratification, where we may see a lower pH at the bottom, for example, with a higher pH at the top, but then we can simply see a temperature change, and the lake mineralogy will cause it to flip over.

Again this is common, but it's the type of thing that can happen and creates uncertainty in what it is we're trying to predict.

The third bullet, the chemistry and inflow rate of groundwater after mining is complete. Again we have estimations, we have models for this project that have attempted to do that, but what the BLM is recognizing here is there are still uncertainties in what it is we essentially predict in this regard.

The rate of removal of dissolved solids in the pit lake. So as the pit water begins to get more evapoconcentrated, even if it's not necessarily evapoconcentrated, some amount of those pollutants that are in solution begin to form minerals and end up precipitating out. Now, that would actually decrease the concentration, for example, of a given constituent if that were to happen.

So we -- in a lot of our models, we allow for that, but that can also create an additional

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uncertainty. Again these models are very sophisticated, they're attempting to mimic the natural processes, but we don't know everything about the natural processes. That's one of the reasons our models aren't necessarily as accurate as we like them to be.

We also have primary and secondary mineral species that will be present on the pit high walls, and with these, we can have various associated thermodynamic parameters for these minerals. The most example -- best example is basically the minerals going from ferric to ferrous and converting a form of iron in this pit lake to different forms.

Potential changes in the climate that may occur. We heard talk a lot about the potential for climate change, that these may be due to either natural or anthropogenic factors. What is recognized in the GARD Guide is we need to account for it regardless.

Slide 24, Copper Flat Mine-Impacted Water Predictions.

This is also addressing the pit lake water quality, and I believe this is the report that was discussed here this week.

The SRK report predicts that the pit lake water quality 100 years in the future will be near-neutral pH -- so we're not talking an acid pH,

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we're talking that circumneutral range we identified -- but have high TDS, calcium-sulfate water, similar to the water in the existing pit lake.

And they also note that it predicts the new pit lake will meet many water quality standards, but would exceed the currently applicable water quality standards for copper, lead, manganese, selenium and zinc if no control measures applied. It's very important to note, I want to clarify this is not using the rapid refill scenario. This is if we actually just let the pit lake fill naturally.

They note that if the new use -- or use designations or water quality standards do not change in the future the pit lake would not be expected to meet the designated uses of warm water aquatic life or wildlife habitat again if no control measures are applied based on the predictions.

They also note that the water quality standards that would apply 100 years in the future -- we don't know what that will be. So that's just simply another area of uncertainty.

Well, the BLM also goes on to note that because both future pit lake water quality and the water quality standards that will apply to the pit lake decades or centuries into the future are uncertain they

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recommended a set of mitigations be developed to provide for postmining compliance with water quality standards.

So the first thing they did was the proponent shall modify the Mine Plan of Operations to include the appropriate mitigations to protect pit lake water quality. Certainly the proposed rapid refill would be an example of that type of mitigation. Whether it will actually accomplish everything it needs to or not is questioned.

They also ask that the proponent shall provide a preliminary pit lake water management -- or water quality management plan, and it needs to describe the reclamation, water quality management and monitoring activities that will be conducted to facilitate compliance with applicable water quality standards during the postmining monitoring period.

Essentially this is the same monitoring that we've been discussing at length already, and one of the key issues is whether that monitoring should continue for 25 years or 100 years or really just simply as long as necessary.

The BLM also addressed some other mitigation. They suggested the pit lake water chemistry should meet -- or shall meet the water standards during 30 years after completion. Not really sure how they're

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going to force it to meet those standards, but that was the idea of a plan that would meet it.

And at least one year prior to closure, the proponent shall update the pit lake water quality management plan and provide this final plan to the BLM for review and approval. That final plan is supposed to indicate how the reclamation activities would be conducted to facilitate compliance with the applicable water quality standards during the post-mining period.

But note this is one year prior to mine closure. If the company by some bad circumstance went bankrupt, there would not be an opportunity for the agencies to get a revised Mine Plan based upon the knowledge that would be gained during the coming years of mining and revise that plan to ensure we have satisfactory postmining water quality.

And they also note that the proponent shall provide a cost estimate for implementation of the pit lake Water Quality Management Plan. BLM has made tremendous progress over the last 20 years with respect to bonding. They are, actually, for the financial assurance.

I cite their guidance and basically follow their guidance extensively. And they've dealt with a lot of pit lakes. For example, in Nevada, I believe

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there's something in the neighborhood of 20 different pit lakes that are in various stages of formation today, and I think quite a few more even forming in future years.

So the BLM isn't -- hasn't just dealt with one or two pit lakes. They've dealt with a lot of pit lakes. And their guidance is very much based upon their experience and knowledge in how to deal with this.

So the real question I think we're trying to answer here is what is the appropriate postmining period?

Twenty-five, 30 years, it only works if all the water quality standards are met. If the water quality standards aren't met at 25 years, we're going to need to continue. So an assumption that it's just simply going to be 25 or 30 years exposes a tremendous liability if, in fact, that's not the case. And we don't have any actual, you know, data yet. We won't have that data until it's mined.

That same approach also doesn't account for spills, leaks, infiltration and eventual pit lake evapoconcentration. I get the idea sometimes the idea is to go ahead and say everything is fine after 20 years, leave the site, and then this pit lake is going to sit there and evapoconcentrate.

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And if nobody is responsible for monitoring, much less dealing with mitigation, we're going to have a problem at some point in the future. And again that's what we're trying to address here. When you really consider the amount of money we're suggesting needs to be put up, it is not exorbitant, but it's reasonable.

And it's the type of thing that if we don't do it I think we can -- my prediction would be that there's a greater than 50 percent odds that the public will eventually be liable on this project, even if the company doesn't go bankrupt. Just simply because at some point we're going to let them go, say everything is fine, and then 50, 75, 100 years later, who knows when, discover that wasn't the case.

The idea of modern reclamation and closure practice is not to leave liabilities for future generations. It's to recognize these liabilities, account for them, have a plan for financial assurance and try to avoid these legacy issues from the past. So again I respect that there's a lot of legacy mines that we can talk about, but even with new, modern mines, the key is to make sure we've addressed these things.

So if the water quality standards are not met as predicted, then the postmining period could be indefinite or perpetual. And I do understand the mining

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companies' reasoning for not wanting to end up with a prediction that has that scenario, but I'm not sure how we cannot do that and still protect public liability.

Slide 25, also -- let's see.

I think I might have gone up, didn't I?

Okay. Slide 27, titled Copper Flat Mine-Impacted Water Predictions.

Just a few other things from the 2017 EIS with respect to surface water and groundwater quality impacts.

As we heard --

Q. Excuse me, Mr. Kuipers.

The EIS you're referring to, is that 2017 or 2015?

A. I believe it's the 2015 -- you know, could you hand me the EIS again. I may be misquoting the date.

I apologize, Madam Hearing Officer. In each case that I've been citing the 2017 Draft Environmental Impact Statement, I should have been citing the 2015 Draft Environmental Impact Statement.

MS. ORTH: Thank you.

MR. KUIPERS: I review a few too many of these.

Okay. So from the 2015 Draft Environmental Impact Statement -- we're on slide 27, titled Copper

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Flat Mining-Influenced Water Predictions.

With respect to surface and groundwater quality impacts, the EIS also suggests that in the transition zone there's a high potential to generate ARD or other metals leaching if percolation occurs. And again what we've heard from the company is that they plan on taking this higher-potential ARD material and encapsulating it within the waste rock dump.

Good idea, but one of the things we need to note that if by some chance they don't complete the Mine Plan that encapsulation doesn't get done. And presently in the financial assurance proposal that we have, there's nothing in there to complete that encapsulation if the mining company doesn't go all the way to closure.

Also in the sulfide zone, we've heard some suggestions that it's not going to be acid-generating or weak acid-generating or other things.

I think it's important to note that basically what we're talking about here is material that's going to oxidize slowly, neither acid generation nor release of other deleterious leachate would be expected in the short-term, years to decades; however, that slow oxidation rate could, in fact, end up leading to issues in the long-term.

And while I don't mention it here, I certainly

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don't preclude it. It is one of the things we've seen. I would note that we -- at the Chino and Tyrone sites both, some of those predictions have us not generating deleterious materials for 200 to 300 years in the future. And we've seen that at other sites.

So it may take decades, in some cases even centuries for the sulfide waste rock ore to oxidize sufficiently to produce ARD or other deleterious leachates. So we need to not just be looking again five or 25 years in the future. This is something that we really won't know what the ultimate outcome of this mine will be potentially for decades or even centuries in the future.

Q. (BY MR. DE SAILLAN) Mr. Kuipers, I'm not sure if I heard you, but did you explain what you mean by ARD?

A. Yes. ARD stands for acid rock drainage.

Q. Thank you.

A. Slide 28. Here I'm going to switch to talking about tailings storage facility liner seepage.

Okay. Again I mentioned before the Global Acid Rock Drainage (GARD) Guide. This I'm hesitant to say is the Bible, but in many ways it is, because it's a very comprehensive guide that addresses all kinds of aspects, not just mine-influenced water leaching, but

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also mitigation of mine-influenced water, mine design, mine-influenced water treatment, and many other aspects.

It's a very valuable guide, and I think it's some -- one of the more important things that industry has actually produced in the last 10 years.

The GARD Guide provides us some information on tailings, and they mention a couple of different things about tailings.

One, that they are a primary source of acid rock drainage and can also be a source of mining-influenced water, neutral and saline drainage.

They note that the discharges with tailings facilities includes run-off and seepage for all disposal methods.

The run-off and seepage quality are a function of the tailings composition, reactivity and contact time. So time is a very important factor in all this.

The seepage rate is a function of the permeability of the underlying natural or engineered materials and the infiltration rates through the tailings. So we need to look at both the infiltration through it, but also what happens with that solution when it gets through those materials.

Now, this is a figure from the GARD Guide.

This is slide 29, titled Tailings Storage

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Facility Liner Seepage.

Figure 1 cites sources and pathways of ARD/mine-influenced water, acid rock drainage/mine-influenced water, in a slurry tailings storage facility. And again this is taken directly from the GARD Guide. So it's really talking the type of facility that the Copper Flat Mine is proposing to build, which is a wet slurry facility.

It's -- as you would note from the plans, they're talking about building the dyke as they go. So this is a good example of starting with a starter dyke, and then as the tailings is raised, they'll raise it by lifts. This particular design shows a downstream tailings design. Actually this could be a combination downstream and centerline, one could suggest.

You can see where you have tailings supernatant water, and then we have various layers of sand -- of tailings.

Now, one of the things that they always note in the GARD Guide is, for example, we have fine-fraction slimes and coarse-fraction sands.

What happens in tailings is if they all were mixed perfectly and homogenous it would be kind of easy with tailings to predict what the permeability might be, but what we end up finding is when tailings get

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deposited in tailings impoundments -- and I've spent a great deal of my career looking at this phenomena and being responsible for deposition tailings here -- we get segregation of the tailings.

And typically in a dam like this, we get coarser fractions of sands towards the area where we're depositing the tailings, and then you get finer materials in the center.

What's important to note is the finer materials are going to have a low or lower permeability, but the sands would have a higher permeability. If we assume they're mixed together, then we get something in between.

So when we just take one number, for example, for infiltration through tailings or the permeability through tailings, that one number would be trying to represent the middle of this, but not either extreme. Very important, because what we find oftentimes in these seepage predictions is we accounted for an average, but we didn't account for the variability, and with the sands that actually we're allowing a much higher rate of infiltration through the tailings and subsequently through a liner.

Now, you might notice that the GARD Guide shows this particular design with a liner, and they also

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include, I would note, a boldfaced seepage indicator. This isn't a dashed line that says sometimes it's there, sometimes it's not. It is this small, thin line saying it's insignificant. It's got the same flow as we talked about the toe seepage evaporation precipitation.

It's important to note they didn't minimize in any way, shape or form seepage. We recognize as people who work with tailings facilities all the time today that accounting for the seepage in our work is extremely important, not just with respect to the environment, but also this can be a factor in a catastrophic failure. Typically isn't, but again we always account for it.

Just a bit on the storage facility liner seepage requirements in NMAC -- in the New Mexico Mining Act -- excuse me. NMAC is the Copper Rule.

Again this is slide 30, titled Tailings Storage Facility Liner Seepage.

What we're showing here is the general engineering and survey requirements for new tailings impoundments in NMAC 20.6.7.22. And what I've done here is rather than have four slides containing the actual regulations, I've just gone ahead and tried to more generically describe what it says to do.

And I think we've heard the Environment Department similarly go through this in exactly more

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detail through the regulations.

But the first step essentially is to address TSF seepage and make sure it's captured through construction of headwalls, impoundments, diversion structures, interceptor systems. So this is kind of a general assumption that we're going to have TSF seepage, and it needs to be captured by the various mechanisms.

The second step is to conduct an aquifer evaluation to determine the potential nature and extent of impacts on groundwater from the tailings storage facility. And we've heard that the aquifer evaluation is performed for the Copper Flat Mine.

A design report is then required for a proposed interceptor system for containment and capture of groundwater impacted by the tailings impoundment based on the aquifer evaluation. Now, of course, if the aquifer evaluation doesn't say you need the interceptor system, then you wouldn't design it.

That's why it's very important that this aquifer evaluation not be based on, if you will, desired outcomes, but rather be based upon a robust sensitivity analysis that addresses not just what we would like to happen, but what we think could happen if our designs don't go as planned.

Finally, if the department determines that the

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proposed tailings impoundment, seepage collection and interceptor systems when constructed and operated in accordance with the plan in this paragraph would cause groundwater to exceed standards, then the department shall require additional controls which may include but are not limited to a liner system.

So this has turned out to be a bit of a convoluted process in that we describe interceptor systems as a first aspect. We also mention that they may be needed here, but then if they -- you know, we may throw them in here.

Now, what the company did -- and again I actually believe this is a good decision on their part, a correct decision, particularly for the recycle of water and to ensure that they don't lose a lot of water from this operation, putting a liner system in -- actually we oftentimes do that not for pollution control -- but to maximize the amount of water we can recycle. Particularly in dry climates like this we see that done.

And so simply doing it for that reason I think was a good idea.

We also would expect that it would reduce infiltration, but again where we have some concerns with the aquifer evaluation and the fact that it wasn't as

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robust as I think it needed to be to look other than at, if you will, outcomes that would result in a need for treatment.

So this is slide 31, titled Tailings Storage Facility Liner Seepage.

One of the things I noted and I was surprised about -- I'm referring here to the Golder Associates Feasibility Level Design report, which Mr. Kidd described and has been developed by Golder for the mine application -- essentially skips some steps. It doesn't provide us really an explanation of why we have the liner design. And it does address seepage from the underdrain above the liner.

So one of the things we have in this design -- and again this is a good idea -- is above the liner we have a drainage network that is intended to reduce the amount of water head on the liner. And what it really does is it gives us two-dimensional drainage versus one-dimensional, and it speeds up the rate at which we can dewater the tailings.

But ultimately it doesn't alleviate all the pressure, all the potential for leaks or seepage to go through the liner underneath it.

I'm working with several different impoundments. Again I mentioned the Stillwater mine.

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We have an impoundment that does not have an underdrain in it. That impoundment actually operated from 1985 to 2001, and we're presently closing out that impoundment because the company no longer uses it for ancillary storage.

That impoundment during its history has actually exhibited fairly low seepage, I'd estimate at various times ranging from five to about 20 gallons per minute of seepage that we've seen through that lined tailings impoundment without an underdrain.

So one of the ideas on the second tailings impoundment at the Stillwater mine, which we call the Hertzler Impoundment, was to improve that design, put in an underdrain. The underdrain was actually not so much put in to address seepage, but to assure that we could get good consolidation of the tailings.

And -- but what we've seen is even though we have the underdrain, this new impoundment -- and I'll discuss it a bit more later -- it actually -- and this was -- began operating in 2001 -- we're seeing steady-state seepage of 20 GPM that we've essentially been dealing with now for over 10 years, and we see periodic seepage that happens, either liner defects, accidents, various other features, that increases that to as much as 50 gallons per minute.

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This is on a 230-acre tailings impoundment, approximately one-third the size of the proposed tailings impoundment at Copper Flat. So --

What I can say is EPA addresses this in a number of publications, and it's also been addressed by folks in industry in various publications. But we can estimate seepage inevitably if it does occur. Leakage particularly through a liner, it's one to two, sometimes even three orders of magnitude greater than was estimated theoretically.

So we're not saying we should do the theoretical estimates, but experience shows that when we do have seepage it doesn't resemble the theoretical estimates, it's always orders of magnitude higher.

So it's standard practice to include -- TSF liner design to include both seepage resulting from permeation, but also from liner defects.

We heard how the plan is when the design is increased in engineering effort, essentially -- as Mr. Kidd described it, the present engineering effort is approximately -- I think he described it's 40 to 50 percent. When we increase that design effort to the necessary levels, submit it to the Office of State Engineer -- I should say when Mr. -- when the company does, they have suggested that they do plan on

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addressing seepage through the liner as part of the design report.

But I do have to say it was disappointing that that same seepage, because it would need to be addressed in the OSE report, was not addressed in this report explicitly.

Part of the problem with that is where we're sitting now is as a result, because of the seepage fact that we're assuming, it's not an issue at all. Essentially we've taken that line that's shown in the GARD Guide and said it's not going to happen at this site.

Neither planned nor the resulting financial assurance can be adequate to mitigate liner seepage if it is anything other than best case. I view the 0.5 GPM estimate truly as best case, particularly based upon my experience.

MS. ORTH: Sorry, Mr. Kuipers.

I don't want to interrupt you, but we need a break soon. So if you'll identify a good breaking point.

MR. KUIPERS: Why don't we get through tailings facility and liner seepage, and then that would be a good breaking point.

MS. ORTH: Thank you.

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MR. KUIPERS: This is slide 32, titled Tailings Storage Facility Liner Seepage.

You've heard quite a bit of discussion already today about Giroud and Bonaparte, and every one of us will pronounce Giroud's name differently. In fact, I'll use two different pronunciations two different times.

You know, these are the folks that we have been relying upon for a long time to discuss and describe liner seepage. As Dr. Marcoline discussed, they continue their work, and their work is very valuable in the industry.

But the main thing is to understand that geosynthetic membranes, which are essentially what we're talking about here, under ideal conditions, they do have very low hydraulic conductivities. In fact, from an ideal standpoint, 2 times 10 to the minus-15 meters per second. That's -- that's an incredibly low permeability, but that's an ideal number.

What they also recognize is that the permeation rates estimated can be several orders of magnitude less than the rates resulting from geomembrane defects. As I just said before, that's been my experience, that even though we have leakage rates estimated, that when we do have leaks or seepage, it's almost always orders of magnitude greater.

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If you don't account for that, you're basically going to get it wrong, or at least if you don't account for that possibility and account for how you might mitigate it, then you could end up with a situation that becomes quite costly.

It's very important to realize that when these calculations are done there's a number of different factors that weigh in.

So one of them is, of course, the area covered by the tailings. So if you have a 100-acre pond versus a 500-acre pond, more area means potentially more seepage.

We also want to address the pore pressure conditions within the tailings mass. This is where the basin underdrain system is very beneficial because it helps to relieve that pore pressure. It does not eliminate the pore pressure, though.

The thickness and permeability of the tailings stored within the TSF are important. And again I mention how the permeability can depend upon the materials. And if we have sand fractions separating from slime fractions, that sand fraction can actually be the overriding permeability material that allows seepage to work its way through.

The permeability of the constructed basin

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liner and embankment is important, but it's not the only factor here.

The permeability of the materials underlying the basin liner are also important. So that's materials that are beneath the liner that would essentially act potentially as a secondary liner depending upon their character.

And then, finally, this is driven by the hydraulic head within the basin, and that hydraulic head we could predict it to be one level, but the best example is -- let's say, for example, we get into a wet period and we end up filling the impoundment up with more water than we expected. That would increase that hydraulic head.

So there are really six different factors that play into this that you have to look at. Again it depends on the number and size of defects and the permeability of the subgrade.

I oftentimes tell folks about the Golden Sunlight Mine tailings impoundment, and I was involved in a lot of issues that surrounded lining that impoundment. In fact, I worked for the company when their first impoundment was lined with clay, which, by the way, glad we're not talking clay liners here, because I could really talk a lot of seepage.

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But the second impoundment they constructed was an HDPE geomembrane liner, and the phenomena that happened here that was quite interesting was that the liner company got through with all the installation, had everything laid out, they left for the evening.

When they came back the next morning and looked out on the tailings impoundment -- and this was -- all the liner was completed, they thought it was ready to go -- one of the employees noticed that it kind of looked like something had run through the tailings impoundment and poked a few holes.

Well, they got to looking, and what had happened is the night before a small herd of deer, probably 10 or 15 head, had gotten spooked and had run through the tailings impoundment. Every single hoof print basically represented a defect more significant than this.

Now, they went through that tailings impoundment and basically practically relined the whole thing as a result of this. But even the relining, et cetera, didn't work.

Today the Golden Sunlight Mine tailings impoundment, which is a lined facility, there are approximately 23 pumpback wells that have been installed to take seepage from that lined facility and circulate

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it back to protect the Jefferson River. The original EIS prediction was that no pump access would be required.

Again I could just go through a litany of many, many different sites where this has been the case. It's the reason I am, you know, really pushing this from an idea of a precautionary approach.

So we've heard a bit about the equation. And I am not going to run through this equation. But again Mr. Marcoline did address it, and the short of it is that if any of these factors, a the area of the hole, h the hydraulic head, hydraulic conductivity and the section area -- if any of those increase, Q, or any amount of seepage coming from there, will also increase.

And so they're taking various factors, all are not of equal importance, but the whole concept here is that if you increase the hydraulic head, Q can increase, you increase the area of the hole, a -- or -- excuse me -- here a, it increases.

So a lot of it depends upon these assumptions or inputs, and if you take some of these up by just an order of magnitude of one or two, such as the hydraulic conductivity of the material, you line the membrane, it can change the results significantly.

Just wrapping up the tailings storage facility

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liner seepage discussion. This is slide 35.
The conclusions or recommendations that I have are as follows.
Neither the permit application materials or the draft permit identify or address TSF seepage that would be expected to occur from a lined TSF. They have provided us a seepage estimate, but I view it as a best case, ideal case estimate, and I don't think it provides the robust approach that would be necessary.
I'm not sure you can do this with an estimate. This is why we oftentimes do it with what I call failures mode and effects analysis, where we assume a worst case rather than something is best case.
The NMED should have identified this deficiency in its technical completeness review, but they didn't.
NMED should require NMCC to revise the Copper Flat TSF report to recognize and perform a more conservative, robust seepage estimate, consistent with current industry practice, which would include a sensitivity analysis. And so if nothing else, I would have expected a sensitivity analysis to be formed around that .5 GPM number, but it was not.
And if warranted, I believe NMED should require NMCC to propose additional mitigation measures

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such as a groundwater interceptor system. The idea here is that if we required a groundwater interceptor system as part of the original design, we would include the cost of it in financial assurance. We would not necessarily need to build it.
And if at the end of operations after some time we knew it would not be necessary, then that money could be returned to the mining company. But the problem is if the mining company's not there, we don't do this, we're not going to have the money.
So this is a good example, and I'm seeing a lot of different cases occurring in the United States.
The PolyNet NorthMet Mine in Minnesota is a good example, where even though they could have argued that they didn't require water treatment after 40 years, the original Mine Plan did, in fact, suggest that as well as their financial assurance.
The company made a conscious decision to go ahead and include the cost of water management treatment for that mine and not put that burden on the taxpayer and agreed that only if and when it's proven in the future it's not required would they seek to not have that included in the financial assurance.
So similarly here, I think including a groundwater interceptor system as part of the design,

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it's reasonable, I think it is not overly expensive, and it's the kind of thing that if the company were to do it would provide folks a lot of assurance and, in fact, might allow us to put this issue to bed.
I'll stop now.
MS. ORTH: All righty. Thank you, Mr. Kuipers.
Let's break for 15 minutes.
(Proceedings in recess from 5:59 p.m. to 6:17 p.m.)
MS. ORTH: All right. So we are back after a break, and we have four people indicating a desire to make public comment. Because we really do want to finish up by 7:00 so that folks can get dinner at the local restaurants and get on with the rest of their evening, Mr. Kuipers has agreed that the public commenters can go, and if we still have time before 7:00, he can cover another topic or not.
In any event, we will be back in this room at 9:00 a.m. to finish Mr. Kuipers' testimony regardless.
So Andrew Maloney signed in earlier today.
Mr. Maloney.

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ANDREW MALONEY
having been first duly sworn or affirmed, gave public comment as follows:
PUBLIC COMMENT
MR. MALONEY: Hi, everyone.
I'm Andrew Maloney. I represent THEMAC and also the major investor, Tulla, Tulla Group.
Tulla is an Australian family. We have a history of investment in mining and mining services.
In the business we have been involved, we like to build a strong relationship with the local community, through sponsorships, donations, purchasing goods and services. We've done a bit of that today here in -- in the community here, but we expect that would increase significantly over time.
I'm personally a big believer in ensuring we protect the environment. Where we have an opportunity to reduce the impact at the mine, I have encouraged the team to consider making these options. I actually applaud the conservation work that's being carried out by our neighbors. I think it's fantastic that they're doing this work.
The Copper Flat team has worked very, very hard over a number of years to develop a plan to meet the requirements of the agencies. They have engaged a

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great team of consultants to assist us through this process.

I see the future of the copper market is very bright. All of the commodities -- out of all the commodities globally, I think copper has the brightest future.

On the supply side, all the major mines' head grades are reducing to keep up with the mine -- new mines in the area.

On the demand side, this is where it gets very interesting. In addition to traditional uses such as housing and electrical infrastructure, new industries such as electric vehicles, wind and solar power are predicted to grow significantly, placing more and more demand on copper.

This mine will be well designed and modern -- a modern operation. I believe it will be -- provide -- it will provide a lot of -- create a lot of opportunity for the local community, operate in an environmentally responsible way, and once rehabilitated this site will be actually better than the current condition it is right now.

Thank you. Thanks for the opportunity to say some words.

MS. ORTH: Thank you very much, Mr. Maloney.

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The other names I have indicating a desire to make public comment include Mike -- and is that a Skichmore?

Please correct me when you come up.

MIKE SKIDMORE

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. SKIDMORE: Well, thank you for the opportunity to speak today.

My name is Michael Skidmore. I am the owner of the Butte Propane Company, and I am here today to express my support for the Copper Flat Mine.

Sierra County is my home. I moved here over 35 years ago from Oklahoma. At that time, I had an electrical construction business. And we moved down here because we loved the climate and the community.

When we moved here, the Copper Flat Mine -- the old Copper Flat Mine was operating, and things were going well. About a year after I moved here, the mine closed, and people moved away, the economy crashed, real estate prices went down, businesses closed. We have not ever completely recovered from that shutdown. Our community has shrunk in size.

What THEMAC Resources is asking is -- what I

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can see is not really a new mine in the sense of something that never existed, because we have a history of mining in our county, and they're not asking to do something brand new, but rather use the existing resources that have been successfully mined in the past.

I believe THEMAC is doing all that they can to meet or exceed all the safety requirements and environmental codes that -- that they are required to do, and I see no reason to deny them the right to operate on land that they own.

I would like to state some obvious reasons the mine -- that I feel the mine should be operating.

First, the economic impact on our local community and indeed the state government in Santa Fe is obvious. Almost 400 full-time, permanent, high-paying jobs will generate much needed income for all. The taxes the mine will pay to the state as well to the local community would be a tremendous asset for us.

Second, instead of having a dying county with aging residents gradually reducing our population, our children would be able to stay and not have to move away from Sierra County. It would infuse Sierra County with a new vibrant energy and life.

Third, I'd like to say that there are those who oppose the copper mine I feel are biting the very

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hand that feeds them. 90 percent of the products in automobiles are from mined metal ores, steel, aluminum, silver, copper, titanium, et cetera.

Those who advocate for electric cars but oppose copper mining are opposing themselves. One can't have cars without having copper.

Those who advocate for wind energy but oppose copper mining oppose themselves. Wind turbine needs copper. Where will the copper come from? It comes from the ground. It comes from the mine.

Those who advocate for solar energy surely must realize solar is impossible without copper.

Computers, cell phones, televisions, cameras, video equipment, literally every field of technology is dependent on a secure, safe, continuing supply of copper. The demand for copper continues to grow and escalate. In addition to the technical fields' dependency on copper, our nation's power grid, electrical generation stations, power lines, electrical wiring for homes and businesses all need copper.

Surprisingly, even my propane business uses copper extensively in tubing and for other aspects, regulators and tanks.

As new technology advances, the need for copper will only increase. It will not decrease.

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When America is forced to import copper from other countries to supply the growing demand, not only does the cost increase, but our national security is threatened. A country could simply shut off our copper supply, and America would grind to a halt, and it wouldn't take long.

What good is the valuable resource in the ground if we don't use it? It's as though we do not have it. Why not use the resource that is local, less expensive to mine, provides great-paying jobs, much needed tax revenue and advance the technological age in which we live?

Do everyone a favor and open the mine.

Thank you.

MS. ORTH: Thank you, Mr. Skidmore.

If you'll leave your written comments with the court reporter, she can refer to them.

Jack Diamond.

JACK DIAMOND

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. DIAMOND: My name is Jack Diamond. We have a farm up Animas Creek.

We have two wells that are -- one is about 100

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feet, one is about 210. The -- I'm a firm believer in multiple use. We also have a cattle ranch where we run cattle. We have an outfitting business. So I'm a firm believer in multiple use.

However, I'm very concerned about what's going to happen to our wells. As stated, we have a pecan farm, and our trees are about five years old and will start producing in about another year. Our water is not great there.

The problem is -- excuse me -- we have artesian water, and we're not able to go deeper into the artesian water simply because of the state regulations that we have. So our wells are up above the artesian water, except for the two old artesian wells that we have.

My wife's family is -- was -- has been in Animas Creek and the Caballo area where they ranched and farmed the last Indian raid. So they've been here a long time, and that's what they've done all these years.

So my big concern is what's going to happen to our two wells that are 100 and 210, because we can't go any deeper, because of the State Engineer will not let us get into the artesian water. If we do get into the artesian water, we have to cement around to keep the artesian water from getting into our wells.

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So that means we would have to go deeper, and the problem with going deeper is the electricity would then be three-phase and we would be pumping from somewhere probably around 400 or 500 feet. I'm not a hydrologist, just what I've read.

So the big issue that I see is who is going to pay us? What's going to happen if we cannot water our trees? Who is going to be liable for that? Is the State Engineer going to let us go deeper? Or do our trees just die?

So I'd like somebody to answer that question for me. If not tonight, maybe down the road.

Our big concern is that this mine -- which I'm not against mining. I'm not. I'm not against logging or ranching or any multiple use. The problem is they're going to be taking a lot of water, and my fear is that the farms that we have in Animas -- which we do hire people, we do buy products in this county. We try to support this county 100 percent.

But if we can't do anything, the only thing left for us to do would be to subdivide our property, and we do not want to do that. We've been there a long time, and we want to stay there. And our big concern is that our only alternative would be to subdivide. And we will, but that's not what we want to do. And I don't

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think that's good for the creek or for anybody that lives up there, because it is a pristine place.

So my comments would be I'm not against multiple use, but I'm just afraid of the water drawdown that's going to occur in Animas Creek. I think that it could be very, very bad for the people that use the water there, which we do hire people, and we do try to support this community 100 percent.

The other thing that I would like to say in closing is that you talk about the mine only being open for 12 years. Okay. I get it. All the jobs, kids need jobs, and I get all that. The problem is after 12 years what's going to happen then? They're going to have to move on anyway.

If you were telling me this mine was going to stay for 30 or 40 years, I would be much more inclined to support it. But the problem that I see is if it only lasts 12 years, you have somebody out of high school that goes to work for the mine, what's he going to do in 12 years? He's going to have to go find another job.

So those are the issues that I have. Again I'm a believer in multiple use, but this is going to take a lot of water, and that's my family's concern.

Thank you very much.

MS. ORTH: Thank you, Mr. Diamond.

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No one else has indicated a desire to make verbal comment this evening.

Is there anyone else out there who would like to do that?

This is not your last opportunity. There will be other opportunities tomorrow, and if we go into the next day, the next day as well.

No?

All right. It's 6:30.

Mr. Kuipers, would you like to break for the night or take us to 7:00?

MR. KUIPERS: We're willing to go to 7:00 or break, whatever your pleasure is.

MS. ORTH: Mr. de Saillan, do you have a preference?

MR. DE SAILLAN: I leave it up to my witness, Madam Hearing Officer.

MS. ORTH: It's up to you, Mr. Kuipers.

MR. KUIPERS: We would like to use the remaining time.

MS. ORTH: All right.

(Discussion off the record.)

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JAMES R. KUIPERS

having been previously duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION (Continued)

BY MR. DE SAILLAN:

MR. KUIPERS: Okay. The topic I want to turn to now is the potential for spills and leaks

We have a reference that we're using for this. That's the publication US Copper Porphyry Mines, that was written by Bonnie Gestring with Earthworks and revised in November, 2012.

And I might mention with respect to this exhibit, I had occasion on behalf of another client, USEPA, who asked me to actually go through this report, obtain every single reference and verify all the references for this report. And so I just wanted to note for folks that I have done that, and if by some chance anybody has need for any references in the report, I would be more than glad to provide those.

MR. BUTZIER: Madam Hearing Officer, I would like to just lodge my set of continuing objections because I think they apply here, as well.

MS. ORTH: All right. The record shows that.

MR. KUIPERS: Okay. This report shows that copper porphyry mines, copper mines in general, are

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associated with water pollution. We have acid mine drainage, metals leaching and releases of toxic metals that have occurred at essentially all of these mines.

And one of the most important points of this investigation is this isn't something that happens as an isolated event, but, in fact, all the mines that were looked at had at least one failure, most of the mines experienced multiple failures. And we have some examples of that from New Mexico to share with you.

So one of the things the report addresses is the Chino Mine, here in New Mexico. This particular slide contains a lot of information. My intent is not to go through every bullet point, but rather just to point out the nature of what we have seen here.

Let me just describe it. This is slide 37, titled Potential for Spills and Leaks.

And what the slide does, the top report is the most recent event that occurred at the Chino Mine. That was one involving 1 million gallons of acid mine waters overflowing a containment sump into a stormwater diversion channel. This is not something that would necessarily occur here given a similar situation, but it is a great example of the kind of the magnitude of what can happen at these mines.

You see different volumes. For example, in

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2000, they had a 480,000-gallon spill of tailings slurry.

But then in 1999, there was a -- what I would call a major spill of over 3.25 million gallons of tailings spilled in Whitewater Creek. And as many folks are aware, that ended up requiring some mitigation efforts.

You go back to 1996, there was a small-scale spill.

1988 I think is very notable in that heavy rains -- and again these are the kind of extreme storm events that we're talking about needing to be accounted for. A heavy rain led to the release of 180 million gallons of acidic wastewater. At the time, I'm sure the system was not designed for those type of rain events. And the result was the type of thing that required quite a bit of mitigation expense so --

So you can see essentially again Chino -- I don't want to go through these in infinite detail, but there's a history essentially from 1988 through at least 2007 where spills occurred from pipeline failures.

Now, there's also basically failures in water treatment and collection.

There was a consent decree that was issued in 2011 dealing with these releases. And if you go to the

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second bullet, basically found that surface water and associated sediments are exposed to hazardous substances released from the Chino Mine through a variety of pathways, including leaks, spills of process water, tailing spills, run-off and infiltration or percolation from tailings and waste rock piles.

So all the kind of things that we've been emphasizing that could occur at the Copper Flat Mine, in fact, have occurred at the Chino Mine. And that's one of the reasons we think it's important to not take this analysis lightly, but rather to make sure it's as robust as reasonably possible.

They also reported groundwater contamination from the Tailings Pond Number 7, and then various other exceedances that occurred from groundwater contamination at various parts of the mine site.

This is slide 39, also labeled Potential for Spills and Leaks.

And this slide addresses the Tyrone Mine, which is a sister mine, if you will, to the Chino Mine. There we similarly have a consistent history, if you will, of pipeline failures and other accidental releases.

And by the way, I want to clarify that I don't view these as being due to negligence, due to poor

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operation, due to some deficiency in the operations. This is just what happens. And we have to plan for accidents and those type of things to occur because we're human beings, we're not infallible.

So I know that the mining company did not intend for any of these to happen, they were not planned. The point is they happened nonetheless. And they're the type of thing that we need to account for the potential of happening at Copper Flat, and we can account for that by addressing it in the financial assurance, which I'll talk about tomorrow.

So again from 2012, we see a diesel spill that occurred, of diesel fuel.

One of the things I'm going to mention with financial assurance is the need to allow for that type of thing to occur in financial assurance. Oftentimes it's a line item without a great deal of expense, but if we forget that line item, that expense, we have nothing to deal with on the public side. So we'll talk about that more.

But just as an example -- well, I'll wait for the financial assurance until tomorrow.

We see also spills for -- of tanker trucks providing reagents, spills of various solutions and other things.

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Now, a lot of this is due to the leaching that's done at Tyrone, a lot of these are associated with leaching. But in particular, things like chemicals, we're still going to have chemicals being supplied at Copper Flat, and those chemicals need to be addressed from the potential -- standpoint of potential spills.

And I should mention I'm not aware of any mine sites that ultimately don't have some level of diesel fuel contamination. There are sites today they're building, if you will, asphalt pads to park the equipment on so that if it does leak hydraulic fluids, diesel, various other things, it's contained. But even then I would expect some at least minimal cleanup of contaminated fuel areas, for example, around fueling and other areas would be necessary.

Now, at Tyrone, we also have, similar to Chino, examples of water collection treatment failures. Same consent decree I mentioned for Chino also addresses Tyrone.

And they noted with the case at Tyrone, second bullet, that according to the investigation groundwater in both the regional aquifer and the perched groundwater aquifers at the site have been exposed to hazardous substances through a variety of pathways. Very

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important here, one of the things that they're recognizing is it's not just the -- it's both the regional aquifer as well as perched groundwater aquifers that can potentially be contaminated.

By the way, this is slide 40.

The assessment at Tyrone showed 14 different mine areas that have affected water quality, essentially all mine areas.

And in response to this, Tyrone and Chino have both developed comprehensive closure and closeout plans that include addressing of these spills and hazardous materials.

One of the key things is -- and we all should recognize this about Chino and Tyrone, most of these mines -- they were similarly not predicted to require water treatment in perpetuity; however, as you note here, in 2012, a groundwater assessment concluded that the seepage through the mine will require water treatment in perpetuity.

And I think it was essentially recognized even back in 2001 and before that that was a likelihood. But again these mines didn't start out with that presumption.

There's some other examples at the Tyrone Mine that are worth noting.

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We talked about tailings storage facility catastrophic failures. And essentially what happened at the Tyrone Mine Tailings Dam Number 3 in 1980 was classified as a catastrophic failure, spilling 2.6 million cubic yards of tailings into the Mangas Valley. That's a lot of tailings.

Flowed 8 kilometers downstream and inundated farmland. One of the things that's key to understand is that when these tailings do break, particularly slurry tailings, they can travel quite some distance, and depending upon the gradient and other characteristics, we've seen them travel literally hundreds of kilometers once they meet major rivers.

So one of the goals is to understand what could happen in a catastrophic failure, do everything we can to prevent it, but also, as Mr. Kidd recommended, we need to plan for it. And so that's a big part of what we do today.

You can see also we have 2.6 million cubic yards, we have also five tons. So you can have small and large type spills. Each of them take a different level of measure.

I would mention that our goal absolutely has to be in every case preventing that large spill. We can mitigate to deal with smaller spills, but we absolutely

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have to prevent large spills, particularly where they can cause loss of human life.

So just a few things to wrap up with on potential for spills and leaks.

We have to recognize there's a high likelihood -- I would actually suggest there's a certainty -- of spills and leaks. The difficulty is in anticipating what size they'll be. I would not suggest we take into account a worst case, but I do think that in the plan for reclamation and closure as well as in the financial assurance there should be something that accounts for this potential.

In a reasonable scenario, and we've got lots of examples in other mines with financial assurance where they have included line items that would allow us to address this if necessary.

It's important to recognize that these leaks and spills while in many cases they may be just limited to the site itself, there have been instances where they've led to impacts of offsite property. And it's very important. We've heard a lot of concerns about that. I believe that can be addressed.

But again these are things that take a robust analysis, a robust engineering effort, and that's something that I think the agencies need to help us

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assure.

The impacts could be severe enough to lead to long-term groundwater mitigation.

Again we see what happened in the Tyrone and Chino Mine cases where repetitive and multiple leaks and spills ultimately have led us to at least partly contribute to the need for long-term groundwater treatment.

And again I still think one of the keys -- I will always think one of the keys to these issues, particularly the uncertainties, unknowns, not in all cases, but to a great extent, we can address these in the financial assurance and provide for the agency to go in and mitigate things if necessary and to provide for protection of public liability.

And this is true whether we're talking about a hazardous waste spill or ultimately needing to conduct water management at this site.

I'll do this one tomorrow.

MS. ORTH: Okay.

MR. KUIPERS: So that concludes my direct testimony for today, and I would like to continue tomorrow morning.

MS. ORTH: All right. Well, thank you very much, Mr. Kuipers.

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We will see you in this room at 9 o'clock tomorrow morning.

(Proceedings adjourned at 6:48 p.m.)

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, CHERYL ARREGUIN, the officer before whom the foregoing proceeding was taken, do hereby certify that the witnesses whose testimony appears in the foregoing transcript were duly sworn or affirmed; that I personally recorded the testimony by machine shorthand; that said transcript is a true record of the testimony given by said witnesses; that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this proceeding is taken, and that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in the action.

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STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT
No. GWB 18-06(P)

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840

TRANSCRIPT OF PROCEEDINGS

Volume 4

BE IT REMEMBERED that on the 27th day of September, 2018, this matter came on for hearing before FELICIA ORTH, Hearing Officer, at the Ralph Edwards Auditorium in Truth or Consequences, New Mexico, at the hour of 9:03 a.m.

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E X H I B I T S (Continued)

ADMITTED

E X H I B I T S (Continued)
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TURNER RANCH PROPERTIES, LP, and HILLSBORO PITCHFORK RANCH, LLC (Continued):

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TURNER RANCH PROPERTIES, LP, and HILLSBORO PITCHFORK RANCH, LLC (Continued):

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TURNER RANCH PROPERTIES, LP, and HILLSBORO PITCHFORK RANCH, LLC (Continued):

E X H I B I T S (Continued)
ADMITTED
TURNER RANCH PROPERTIES, LP, and HILLSBORO PITCHFORK RANCH, LLC (Continued):

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MS. ORTH: Good morning.
We are on day four of the hearing in the matter of the application for a groundwater Discharge Permit for Copper Flat, Discharge Permit 1840, docketed by the hearing clerk as GWB 18-06(P).
When we broke last night, we were not in the middle, but in the middle of Mr. Kuipers' testimony.
Are there any preliminary matters we need to address before we go back to Mr. Kuipers?
I see nothing. Thank you.
Mr. Kuipers.
MR. KUIPERS: Yes, Madam Hearing Officer.

JAMES R. KUIPERS

having been previously duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION (Continued)

BY MR. DE SAILLAN:

MR. KUIPERS: I'm starting with slide 43, titled Tailings Storage Facility Catastrophic Failure.
In the last three or four years, we've had several catastrophic failures that occurred in the tailings storage facility industry, or tailings dam failures, if you will, that highlight the need for us to be sure we address this.
And I might preface this by the day the Mount

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Polley dam failure occurred, I was actually working at the Questa Mine with a group of five other professional engineers. I might mention they were all structural engineers and I was the sole nonstructural engineer, working on the Questa waste rock facilities design for closure.
And this group of folks who are very well known in industry, one of the first comments they made when the Mount Polley disaster occurred -- we heard about it the day it occurred -- was "This will change the face of the industry."
And why that was important is we essentially as engineers or a group of people involved in the tailings areas had begun to address tailings failures in North America, and it put in place a system of engineering that was described by Mr. Kidd, but it wasn't completely in place.
It was very obvious that while we thought we had the answer solved, these two disasters in particular taught us a lesson, and that is that we can't suggest anymore that these kind of things won't happen. We have to acknowledge they will.
Talk about --
MR. BUTZIER: Madam Hearing Officer?
MS. ORTH: Sir.

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MR. BUTZIER: I may need to turn the speaker on. Excuse me.
MS. ORTH: All right.
MR. BUTZIER: Sorry about that.
In addition to the continuing objections that I've already stated, I'd like to make an objection to discussing Mount Polley and Samarco on the basis that there's been no foundation laid to show that there's any reasonable similarity between the circumstances at those operations and the tailings design at this operation.
MS. ORTH: All right. Thank you.
Mr. Kuipers, you can certainly add that sort of detail if you'd like. Mr. Butzier's objection is on the record.
MR. KUIPERS: I will be glad to do so. I was actually going to do that on the second bullet. So --
Catastrophic failures of this nature can have extreme impacts on surface water quality and lead to both short-term and long-term groundwater impacts.
Now, going back to the Mount Polley tailings failure, it's a copper mine, a copper mine in British Columbia. Its tailing facility was a different design, but all tailings facilities share design aspects that led to situations that ultimately resulted in these failures. There's not a difference between an unlined

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facility and a lined facility in terms of that potential for failure. It changes things slightly, but they still are both equally subject to failure ultimately.
So in that respect, I think it's very important.
Now, I wanted to mention the Mount Polley is a good example of where because the tailings were relatively clean, there was an immediate impact on surface water quality in terms of sediment, TDS, various other things. This was a discharge of tailings into surface waters.
But one of the things that I would expect with Mount Polley because the tailings were fairly clean is that we probably won't have extreme or significant impacts to groundwater. Now, again those tailings are -- I would say in my experience exceptionally clean. These tailings here certainly have limited sulfides and other things, but that's something we need to address.
The Fundao tailings was an iron mine. And again the real principal at the Fundao tailings is describing the failure mechanisms so we can understand what to do to ensure the public, which expressed a lot of concern in these hearings, that we will not allow these tailings to fail. And I do believe that's possible. It's something I wanted to, you know, express

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here.

So -- excuse me. What's important in understand this, why I think it's important in this Environment Department hearing is to recognize that these failures did not result because of a single action. It wasn't something where they had a major earthquake or major storm event or one single thing caused these failures.

What it is was basically what we call a systematic failure, where due to a sequence of events that if we would have been able to disrupt that sequence, if you will, ultimately the failure wouldn't have occurred, or at least if it had occurred, the consequences would have been much different.

When we look at this, in the same way we're connecting hydrology and other considerations with groundwater, we also have to connect that with the stability analysis. This is the real key, and it's the second from the bottom.

And you might notice that I saw this morning that I had not emphasized how high the level of interaction, and I meant to do that. The high -- so the red type in my presentation today, we advise that there be a high level of interaction between the regulators.

One of the things that I can tell you with

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respect to Mount Polley in particular was there was a lack of putting together the necessary permits relative to allowing the tailings facility to not have to maintain an absolute full pool of water. And basically different agencies were not speaking to each other, and also there were lawsuits and other things that got in the way.

That could happen here. I'm not saying it will happen here, but it could happen here if the regulators between the Environment Department, which is looking at groundwater and surface water, we have the Mining and Minerals Division in charge of reclamation and closure, and then we have the Office of State Engineers.

Now, Montana has passed recent new regulations for dam storage facilities, and those regulations are the only other than British Columbia, the only jurisdictions that have passed those two regulations. But one of the keys that those regulations all recognize is let's not have this bifurcated regulatory system, but let's actually try to put it all under one house because of their relationship.

So again we're emphasizing here that with respect to a catastrophic failure we can't ignore that it might happen, but later when I get to commenting on

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Mr. Kidd's presentation, I want to go further a little bit more with addressing what we can do to prevent this.

So again the main emphasis, if we had a catastrophic failure, we can't ignore certainly the impacts to surface water, and we also might see impacts to groundwater. In the case of tailings, it may simply be TDS and sulfate, but that's still a significant impact.

Next slide is slide 44, and what I'm doing here is essentially changing the subject to financial assurance.

Now, as I've explained before, financial assurance really brings all these facets together, because in order to accurately estimate financial assurance, you need to have an accurate Reclamation and Closure Plan. To have an accurate Reclamation and Closure Plan, you need to understand the geochemistry, mitigations, the pathways and all these things.

And so this is in a way -- having worked in the financial assurance area for 22 years now, this is why I've literally had to take advantage of the opportunity to work with many different experts and become -- I'm not going to say necessarily the best expert, but I do have a reasonable level of expertise to be able to apply all these principles ultimately to try

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to get the financial assurance cost estimate right.

We have what I would call a preliminary financial assurance cost estimate from the company. I think they certainly haven't termed it as their, you know, final offer, by any means. Those of you who know financial assurance, it's a negotiated process. It's not simply one where we have a tried and true formula, we always supply it and it just comes out with a number.

However, I have worked with industry since 2002 on developing, if you will, best practice for financial assurance cost estimation. I've been involved with the Forest Service in their guidance, Bureau of Land Management, the development of their guidance for 3809. And I have also worked with SRK in development of the standard reclamation cost estimator model.

Jeff Parshley, who is the person I would credit with having developed the model -- he actually was involved in -- in, I think, several meetings of the Copper Rules. And one of the things that I would start with is complimenting the company for having submitted and having SRK use the standard reclamation cost estimator methodology for doing this.

It allows folks like me who do this every day to not have to spend my time going back and making sure they're using basic fundamental principles that are

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accepted by basically everybody on how to do this. And by using that estimator, they've allowed us to focus really on what are the key assumptions that go into this, not how did they calculate the estimate.

What I can assure you is in terms of a relatively accurate estimate for equipment costs, for fuel, for the cost of doing revegetation, dirt moving, building stormwater -- those are within a reasonable range. We could argue that they could be 10 percent higher or lower, but I -- I would accept those numbers.

So it allows us to focus on the real key issues in any reclamation cost estimate, which are what are the key assumptions that went in and how do they affect the estimate.

This is just a breakdown of the estimate by facility type.

With respect to direct costs, they provide different costs individually for waste rock dumps, tailings storage facilities, draindown management, and then other costs for things such as buildings, pits. You see the pit rapid fill, about the sixth item from the bottom under Direct Costs. Then you have other things like -- smaller things like roads, yards, wells, et cetera.

Towards the bottom, you see that we also have

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line items for monitoring and for reclamation maintenance.

More typically in the cost estimates of this type, we do combine monitoring and maintenance because we see the two activities as being somewhat synonymous in that it's the monitoring that tells us we need to go out and do the maintenance.

So monitoring when we discuss it in the context of reclamation and closure, it's not just limited to groundwater and surface water monitoring. But a good example would be going on the site after storm events and at least once a year regardless and determining if your stormwater channels were blocked or beginning to sediment in or something other was happening that might prevent them from functioning properly.

It's also monitoring your covers. And if your covers start to show rilling and compromise of what they're supposed to do, then you go in and do maintenance on the covers. So they really are something that has to be taken hand-in-hand. That's how it's typically treated. I'll stop at that for now.

The other thing -- so they ended up with about $44 million in direct costs for this mine.

This isn't a mine where we're going to expect

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to have $500 million or billion dollar end costs, but this is a mine in which the cost estimate could end up for this mine being in the 1 -- $150 million range, by the time we get done with it, and it accounts for all that might be necessary.

I'm not going to say what that final figure is going to be. I will be, I believe, presenting a much more accurate estimate of what I think it will be when we testify to the Mining and Minerals Division. But at this point, we're really basing our comments on a preliminary review.

So just want to touch on what I think are the key assumptions that are relevant to long-term protection of groundwater and surface water quality.

The first part of the estimate that I would call your attention to is that of draindown management. And you've heard a lot of testimony already this week about how that will continue for a total of 25 years.

The first five years are active water management, where they will take the seepage that's coming from the tailings impoundment, pump it back up to the surface and evaporate. That's a standard procedure. It's, in fact, how the majority of the tailings impoundments I've ever been involved with are closed, because the first thing we need to do is simply get rid

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of the water and control it.

And then they're suggesting that we'll be able to go to an evaporate -- a passive evaporation system after year five and beginning out through 20 more years, for a total of 25 years.

Now, again there are a number of locations in the United States where -- and I'd suggest this might be one of them, where ultimately passive water management may, in fact, be appropriate.

That really depends upon the amount of water that's coming out of the system, whether you can put in an effective passive water management system, such as a constructed wetlands or -- in Nevada, they've actually invented kind of a wetlands cell, where they take their lined ponds they use during operations and put some vegetation in them, various other things, and drain -- excuse me -- draindown goes into them.

Sorry for going so fast.

And there it evaporates, both through evapotranspiration and otherwise.

One thing I would note is in all the cases they're working on in Nevada where they're proposing that, we have replacement costs figured in. We also have things like bird netting costs figured in, the replacement costs, because if you're draining solution

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to a contained system, it's going to evapoconcentrate again.

That's why you can't just simply count on these passive devices. It's not only going to need to work for 20 years, but it may need to work for a lot longer than that.

So this is where in a typical mine Reclamation and Closure Plan that we might see today in Nevada, Montana, Alaska, a number of other jurisdictions that have advanced their attention they're paying to this, we will see that these activities are projected for anywhere from 100 to even 500 years.

So the whole idea here is they've provided us with five years of active and for 20 years of passive. Ends up providing the agency if the company goes bankrupt -- again that's the thing we have to always remember in financial assurance, this is a scenario that's predicated on the company going bankrupt.

We don't expect that to happen here. We don't want that to happen. But it's something that -- you know, that's the whole idea of financial assurance, is so the public won't be liable.

So they've estimated 4.5 million.

Now, just to, you know -- some of the comments again. You've heard us talk a lot about inherent

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uncertainty and the period for which active and/or even passive water treatment might be necessary.

The idea in a draindown situation is 80 percent of the water will drain down in the first several years, and that would typically be the five years that's projected. But then the draindown typically doesn't go to zero. It continues on. And whether it be two gallons per minute, five gallons per minute or 10, that typically does need to be treated, because it's a -- kind of a concentrated solution.

Now, if -- even if it doesn't again contain metals. In this case, I would expect it to contain greater than 600 milligram per liter sulfate based upon the information we've seen.

So it's typical again in situations that I'm seeing where we have this occurring, and again Nevada has a very dry climate. It's actually very favorable for the things we're describing in terms of evaporation. But they nonetheless on those sites where they're counting on this for long-term have required a replacement cost, a bird netting cost, in addition to maintenance costs that occur every year.

What we're concerned about is -- in a lot of respects, you've seen that we -- again the company's consultants, they have suggested that given the site

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characteristics it might be probable -- might be possible is a better way for me to put it -- that we have very limited seepage from the tailings, from the waste rock, and other things like the pit lake ends up being the projected water quality and height.

But if it isn't, then we would have no ability without that being accounted for in the financial assurance for the state to actually conduct those activities.

So again I -- in this case, because of the inherent uncertainty, what I'm recommending is a more precautionary approach be taken. I'm hoping ultimately the company may see that by looking at this longer term. It's not so much an additional cost as it is an ability to assure the public that if they don't continue the operations as planned, if some, you know, unfortunate circumstance happens and the market falls out for copper, that the public isn't liable.

The pit rapid fill is another important aspect of this closure/closeout plan with respect to groundwater and surface water.

Q. (BY MR. DE SAILLAN) Mr. Kuipers, you're now on slide 47?

A. Thank you, Mr. De Saillan. Yes. I'm on slide 47, titled Closure/Closeout Plan and Financial

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Assurance.

The company, as we've heard, is proposing to use the pit as a hydrologic sink based upon projections that without doing some kind of mitigation the pit lake would not reach a suitable water quality. They have gone ahead and proposed the rapid fill approach.

And that approach has been proposed at other mine sites, and, in fact, has been conducted at other mine sites for the very reasons they have suggested, that it will, in fact, help us mitigate the effect of the wall rock leaching into the pit water, in very simplistic terms, as Dr. Griffiths explained it much more accurately.

But when we do this rapid fill, we have to have water to do it. And again if the company's in place, everything goes according to plan, they have the necessary water rights, they can do that. But in a bankruptcy scenario, where they're not here, it's now the state's responsibility to do that, and you're sitting there competing with a bankruptcy judge, who, quite honestly, if they have water rights is going to be interested in selling them, it can be an issue.

Now, you can go to court and perhaps end up arguing that the water should still belong to the state for mitigation, but that can take years to deal with,

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and so you again don't want to find yourself in that situation.

One of the concerns we have is simply with respect to whether they have the water. They've estimated a cost for the rapid fill of 446,769 based on using existing equipment and based upon having the water rights necessary to go ahead and do this.

And again, the bankruptcy trustee, if he can sell that equipment, will have an interest in doing so, may or may not end up being something they can remove. But at the very least, we would want to see the water addressed, because I would imagine in any situation where that water is not clearly owned, there's going to be a lot of interest in that water.

So what they've suggested is that they're going to fill the pit at a rate of 3,000 GPM. I believe they suggested that would go on over six months and be approximately 2,300 acre-feet in that year of rapid fill.

Again I emphasize existing equipment may not be available, and we don't know right now if NMCC has the necessary water rights to do this. I'll leave it up to others to address that, but I don't believe that's a certainty. And therefore, it's something that I believe the state should address in the financial assurance.

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The suggestion would be if nothing else, what is the cost of that water in current market rates, and apply that amount to the financial assurance. Now, I don't know how much that would add to this financial assurance. That's something that I think we will try to look at more closely over the -- before we testify in the MMD hearing, but it is likely to be significant.

The next slide is slide 49, Closure/Closeout Plan and Financial Assurance.

This slide addresses monitoring. Again we've discussed what they proposed in terms of a monitoring program. And just to kind of summarize it again, this is a table that's taken from the appendix that was provided in the financial assurance cost estimate as support for the monitoring costs.

So they're showing in this table the year. It begins on the top with years 15, 16, then goes through 17, 18, 19, then it goes 20, 22, 23 to 30, 31 to 40. So basically accounts for the 14 years prior to reclamation, and then this shows reclamation beginning in year 15 and reclamation and monitoring continuing through year 40 and then ending.

With respect to reclamation work on the site, in order to -- again I think it's very important to understand that. In order to protect groundwater, we

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have to make sure that the surface reclamation features are addressed, so things like the covers, stormwater channels and anything else critical to maintaining that cover in place so it protects groundwater quality.

They're planning on doing the reclamation work in years 15, 16. According to the schedule, they would say years 17, 18, 19 they're contouring at the tailing storage facility.

So essentially what we're seeing here is the waste rock and other features would begin reclamation initially. While the tailings facility was being initially dewatered and other things, they would begin doing contouring at that facility. And then they're suggesting that it would be passive or minimal reclamation work from years 20 through 40.

I reclaimed a few mine sites. I've reclaimed the US Hill Mine here in New Mexico for the Picuris Pueblo. The suggestion that we can simply walk up and not do a lot after we do reclamation, that's very risky, particularly where we have such a dry climate subject to these high-frequency storms and high-volume storms. You need to go in and, for example, do maintenance and other activities at the site.

I know the pueblo for quite a number of years initially did activities, and I think some folks were

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out there recently. They haven't done a lot in probably three or four years now. But I would suggest that -- this is a very small mine site. I'm talking about 60 acres. Even that site over time they're going to need to ensure that that reclamation continue to be monitored and maintained.

In the case of Copper Flat, this is a large mine. This is not a small mica mine. They're suggesting that in the financial assurance estimate after year seven there would not need to be any additional reclamation and closure maintenance expenditures.

So essentially it gives me the impression at least, and I -- this is the type of thing where you need to sit down with the company ideally and have a long conversation about this -- but it gives me the impression at least that they're suggesting after year seven they're going to walk away from the surface of the site, and all that remains is monitoring. Nothing further is at least budgeted in their financial assurance proposal for activities beyond year seven.

At least as I understand it. And if it's different, I'd appreciate them clarifying that.

You can see that we have after the reclamation work the number of groundwater wells. Those wells start

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with 25, and then go to 24, reduce to 22, and then finally 20, years 31 to 40. But then suddenly there's nothing, nothing in the estimate, nothing in the plan, beyond year 40.

Now, I would be very surprised, given mine sites I've worked on and the postmonitoring plans we put together, if we simply went from 20 to zero. That suggests somehow all 20 wells indicated total compliance. That would be nice. We're not saying that wouldn't be a great outcome. But the likelihood -- I don't think there's a high likelihood of that.

We also -- excuse me. We also notice that the groundwater sampling frequency starts quarterly for the first four years, years 15 through 18. Then it goes to biannually years 19 through 22, and then annually years 23 to 40.

Now, the only reason you decrease the frequency is the results are showing no issues. If you're showing potential for impacts, certainly if you're showing exceedances, that frequency would continue at the quarterly frequency. And I know sites where because of what we've had we've actually gone to monthly frequency.

So this again schedule, it's possible, but it's ideal. Everything that would have to just turn out

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right in order for us to agree, I think in order for the agency potentially to agree, to decrease the frequency.

You'll also notice the number of surface water samples. They have five in terms of years 15 through 18 during reclamation, but then it goes to zero after those four years of reclamation.

Now, again if we do everything right, and we get all the contaminants covered, three foot of cover, everything's functioning perfectly, after -- well, I hesitate to say even after four years, but at some point, we can quit sampling surface water.

How we normally do that, though, is to allow for, depending on the jurisdiction, anywhere from five to 25 years of continued surface water sampling once standards are being met.

And I might mention that's the same standard in a lot of jurisdictions for groundwater. Until that groundwater, in fact, has been cleaned for five and some cases 25 years, we still continue monitoring. We don't just kind of assume it's already getting there.

So I also would note that they're only proposing to sample one spring. One thing I like to see done, it will have to be worked out, is ultimately all the springs and other features should be monitored by the company as the project goes forward. And again that

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monitoring should continue well beyond the period of reclamation so that folks get a real sense of confidence and so regulators can get a sense of confidence that our reclamation has actually worked.

And the schedule kind of says we do it, it works. Again I -- that's not the way good science works out.

So what they've done is estimated a cost for this sampling program, and again it's only limited to groundwater and surface water sampling. There's nothing in this plan about monitoring for other features. And I'll discuss that in a minute.

So again -- going back to slide 49 a second, they -- so the estimated cost for the 25-year period is 1.8 million. Now, that estimated cost you might note does assume they're able to just simply phase this down. And under a more typical assumption for financial assurance, we would not make that assumption, but when that happens, that's when the financial assurance is released.

So the idea is that we actually need financial assurance for if this doesn't happen. And if this scenario occurs, then I will be the first one to make a recommendation to the state that they release the financial assurance. That's the way this is supposed to

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work.

So in my experience, there is not a basis for NMCC only requiring monitoring for a 25-year period. We worked hard, and ultimately I believe the folks have accepted the fact that mines like Chino, Tyrone and Questa, and albeit they are significantly larger than this mine, they're not different in this facet.

The policy has been that we now need to recognize a 100-year monitoring and maintenance period, and the BLM in particular has, I believe, taken a very significant step forward in this regard in requiring 500 years. And it -- I need to address why they did that.

We heard, I believe, some prior testimony that 100 years represents enough money for perpetuity. That's not exactly right in that the way we do financial assurance is we have a pot of money ultimately. This is for long-term costs. The state would invest it in a fund. That would collect interest. There would also be inflation going on.

And we assume that for that 100-year period those numbers remain exactly static, and also that our expenditures -- excuse me -- are exactly the same -- not the same, but they go through that 100 years.

Now, in fact, if that is the exact discount rate or the interest rate is what we estimate, inflation

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is what we estimate for 100 years, right on the nose, and all of our costs are correct, we will have $0.0 on the 100th -- or the first day of 101th year. Okay. And that's why we're doing financial assurance estimation.

What the BLM started to look at is when you look at that in a net present value basis, we're probably getting something in the neighborhood of 90 to 93 percent of the total amount that if we had that total amount to invest we might, in fact, be able to make this last significantly longer.

So what they did is simply extended it out to 500 years instead of 100 years. Typically when you do a net present value estimate, that takes your 100-year estimate and increases it by approximately 7 percent.

And 7 percent more to assure the public for 500 years instead of 100 years -- but more importantly, I do believe it's an approach that can create a permanent trust fund -- I think that's something that's very important. And again that's protecting future generations, and that's part of why I do what I do.

So again I wanted to emphasize, as I said, no costs are included for vegetation monitoring. So we're just assuming apparently the vegetation is all going to grow. I know we -- it costs money to do vegetation monitoring, it needs to be done, because there are

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specifications required by the Mining and Minerals Division as well as the Environment Department related to that.

Again I described the need to do erosion monitoring. If you don't do erosion monitoring, you don't know you need to do maintenance. And there are standard procedures for going in on an annual basis and actually doing erosion monitoring at mine sites. Those are in place, in fact, at Chino and Tyrone, Questa, and we have accounted for the potential cost of that.

Wildlife monitoring. This isn't being addressed literally by anybody, and it's not going to end up being addressed at all if somehow the Environment Department and the Mining and Minerals Division don't assume the responsibility for wildlife.

And you saw at Chino and Tyrone that we have wildlife issues there. That's ultimately what drove the settlement describing what happened with those various leaks and spills and other things. So wildlife monitoring I believe is very important.

The pit lake, another good example. Where's the monitoring for the level of the pit lake? And how are they going to get down there to monitor that pit lake if the high walls begin to assume unsafe conditions?

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Again the tailing storage facility, there's nothing there for monitoring of the actual surface of the facility, other characteristics such as stability. Until the tailings impoundment is completely drained down, and assumes essentially an unsaturated state for the most part, there still is some possibility of failure.

It certainly increases once we begin to close a tailing facility. It increases significantly, I might add. But until we get that done, you will want to continue monitoring -- the OSE will want to continue monitoring that stability.

I don't know that the OSE has financial assurance capacity. I certainly am not aware of any financial assurance presently required by the OSE of other tailings facility operators for that critical monitoring of that structure's stability.

And there's probably some other monitoring that I've forgot that we oftentimes end up looking at at various mine sites. And I'm going to be describing later some of why that's so important when I speak to some of the other experts' presentations.

This is slide 51, also titled Closure/Closeout Plan Financial Assurance.

This slide talks about maintenance.

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Now, this is something that's essentially missing from the Reclamation and Closure Plan. I did not see any description of maintenance of these various features. I guess if the monitoring all says everything is fine or if you don't monitor you don't need maintenance, but that's not again what we do with monitoring, reclamation and closure programs.

Maintenance is recognized as critical. What they do have again, as I described it, is a one-time cost for reclamation maintenance in year 20, which is postmining year seven, and that consists of 10 percent of the area requiring reseeding and 6 percent of the area requiring growth media.

They may have -- and again I would appreciate the clarification for -- Madam Hearing Officer, at some point by the company, and they may have intended that to represent a fund that the Mining and Minerals Division could bank and continue to do some reclamation maintenance. I just -- the way they put it in the financial assurance, though, it doesn't provide for that knowledge.

They estimated a cost of reclamation and maintenance at $686,000. Again I would note that the policy in New Mexico, the policy with the BLM and, I believe, the policy in general of those states,

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jurisdictions and industry where they're choosing to be progressive on this issue -- they are doing these things for at least 100 years and 5 -- up to 500 years.

This is slide 52.

Again I'm just following up with some comments on maintenance.

I just provided the first bullet in terms of stating that the other agencies at other mines in New Mexico have used this approach.

Again there is no cost in here for road maintenance. And just even to get to a monitoring site and install -- you know, fire up the pump and things like that, you have to be able to access that by road. So most reclamation cost estimates provide for that maintenance.

You get a big stormwater event, something happens, it blows out the road, how are you going to get to that well? Again these don't have -- these aren't big costs, but they're costs that if the agency doesn't have them, it's everybody in the room that pays for them. And the idea is let's see if we can make sure the company pays for it.

With respect to stormwater maintenance, I'll talk in a few minutes about Grayback Arroyo. This is key. There are a lot of assumptions being made about

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what may or may not happen. Those assumptions in almost all cases I believe would have to be predicated on there being an actual maintenance program in place to ensure that the features that are being depended upon are, in fact, still there 100 years, 500 years, perhaps even longer in the future.

Some of these features are very critical to maintaining, for example, the contention that we don't have surface water from offsite flowing into the pit. And I'll talk about that more in a few minutes.

There are no costs included for long-term pit lake mitigation or the long-term tailings capture and passive treatment, as I mentioned. We -- those features need to be maintained if they are employed. So -- if, for example, we end up having to do something with the pit lake, there will need to be costs to access that pit lake.

So what I've described really are aspects of the direct costs. And, you know, again what's important to understand in financial assurance is that the amount is driven by the assumptions. And so the assumptions on draindown management, water quality, pit lake rapid refill, those are all assumptions that if they don't turn out to be as portrayed, then the agencies would need to do something different. There would be an

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expectation of that.

I don't think it would be accepted that if this mine site were abandoned at some point in the future after it operated, that we could 20 years later still be looking at things not having been addressed. That's not the idea here. We want to make sure now that that same kind of thing can't repeat itself.

So they've estimated about $44 million. Again this is a preliminary review on our part. We're looking forward to -- and one of the things I need to be working on is a more detailed estimate. But based upon my preliminary review -- and I might mention that I've probably reviewed 200 to 300 of these similar estimates over the last 10 years. I'm not aware of a financial assurance estimate that's actually been made in the US and most of Canada that I don't have in my files and haven't reviewed.

My sense of this, based upon my professional judgment, is we're probably going to end up closer to 100 million for this project. It will be somewhere between 44 and that figure, I suspect, for direct costs, and then we'll need to add indirect costs.

Part of why --

If I could go back to slide 53 for a second.

Part of why I think that's important to note

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is we're not talking about a billion dollars here. We're simply talking about more or less twice the money that's been suggested would provide a level of financial assurance that would remove this consideration of uncertainty, that would allow us to have the things in place if anything about their suggestion is wrong, and that would ensure the public wasn't liable.

I just want to touch for a minute on indirect costs. These are essentially costs that we don't account for in the direct cost estimate.

Q. You're on slide 54 now?

A. Yes. Slide 54. Thank you.

In the indirect costs, what we're trying to account for are a number of things that are shown in the first column, Indirect Cost Category. Those include things like mobilization and demobilization, engineering, design and construction plans, contingencies, contractor profit and overhead, liability insurance, performance and payment bonds, agency management/contract administration and agency overhead.

Now, I'm not going to go through and describe each one of these categories in detail. It would take considerable time, and there's lots of guidance out there available. For example, the Office of State -- or Office of Surface Mining with -- federal Office of

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Surface Mining developed guidance for indirect costs a number of years ago.

The BLM as again part of their 3809 guidance developed the indirect costs that you see over in the fourth column in this table. I actually was involved in providing recommendations to the BLM in their development of those costs.

We also have costs here showing -- what we've done in the table -- excuse me -- is the first column is Indirect Cost Category.

Then the next columns all represent the indirect cost percentage for first New Mexico Copper Corporation Copper Flat. So these are the indirect costs they proposed in their initial financial assurance estimate.

Then Mining and Minerals Division guidance for indirect costs. And this is an important guidance that the Mining and Minerals Division has developed. It's a draft guidance, and it considers indirect costs more from a -- I would say New Mexico experience. New Mexico does have some experience with having to deal with some abandoned mines over the years.

And then the -- again the BLM costs are in the fourth column -- third column under Indirect Cost.

So just briefly, when you look at the

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mobilization and demobilization, those essentially are oftentimes not part of this cost and buried in the direct costs. That's the case with this estimate as well as BLM. I wouldn't look for that cost to be of controversy.

An interesting thing that I noted was that the company in their estimate used a direct cost for engineering, design and construction of 6 percent -- or 4 percent -- excuse me -- whereas the guidance from the Mining and Minerals Division as well as the BLM suggested 3.

Now, the cover letter from the company said they would -- essentially "We're following the agency's guidance." So I would note that somebody might want to be a little more careful to review the agency's guidance.

But then we go to contingency, for example. There we see the company estimated 6 percent. The Mining and Minerals Division guidance suggests 15 percent, the BLM suggests 10.

Now, just to mention something about contingency, this is not what if the dam fails or what if the tailings liner leaks. This is what we call an engineering cost estimation contingency, and it's based upon how many of the widgets that we ultimately are

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going to need to use to build this did we count.

And the reality is that as cost estimators we don't get down to every nut and bolt. We don't have time for that. We don't have a 100 percent design in front of us. So we use contingency to make up for the lack of detail of the estimate. It's not there for the "what ifs" that might happen. Those are the things I'm saying need to be looked at more in a precautionary approach.

Contractor profit and overhead, they estimated 10 percent, whereas the Mining and Minerals Division guidance is 15, and the BLM's is 10 percent. We need to make sure there are things like liability insurance for that contractor who is going to be working for the state, and the state would require them to have that insurance. We could identify that in their estimate.

Similarly, performance and payment bonds. Again if you're a contractor working for the state, you're going to be required to have performance and payment bonds, and those are typically included as indirect costs.

Then we have agency management and contract administration. Interestingly, this one was basically consistent with guidance. This cost really addresses what the agency's costs would be if they manage the

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Reclamation and Closure Plan.

And then there is an agency overhead, really says, well, if Mining and Minerals Division, for example, and Environment Department manage this, well, there's other folks like the state procurement office, other, you know, places that -- the motor pool, various other things that also end up incurring costs. So that's the agency overhead.

The important point that I would come home with is their suggestion of indirect costs was 26 percent, which is significantly lower than that of the Mining and Minerals Division and also lower than that of the Bureau of Land Management.

If the intention is to, in fact, comply with the guidance or requirements of these two -- of the various agencies, then my expectation would have been that at the very least it would have been consistent with the Bureau of Land Management's guidance, and in fact, I believe if they truly were intending to meet the letter of what they said, it would be consistent also with the Mining and Minerals Division.

I believe that concludes my direct testimony.

Q. Mr. Kuipers, I have a few more questions for you.

First of all, while we're still on the

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financial assurance topic, would you comment -- provide any additional comments you have on the form of the financial insurance instrument?

A. Yes. The company did not identify the form of financial assurance that they will actually use. They indicated that it would comply with the Mining Act requirements for that.

We would have a great concern, however, if the company were to propose a corporate guarantee. We hope that the company will, in fact, propose a real form of financial assurance in the form of a surety bond, letter of credit or other -- some other form that the agency can, in fact, access and use, that represents actual dollars.

Q. Thank you.

Then I have just a few more questions about the adequacy of the Discharge Permit application.

And first of all, I'd like to ask you how many groundwater Discharge Permit applications in New Mexico for hardrock mine facilities you've reviewed.

A. I've reviewed the discharge application permits for the Questa Mine, Chino Mine, Tyrone Mine, Cobre/Continental Mine and a few other mine sites in the state. I would note that in each case those are not single discharge plans, but in many cases, they're

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multiple discharge plans.

So I would estimate, you know, perhaps I've reviewed 30 or so of the discharge plans issued by the department over the past years.

Q. Okay.

And what is your opinion of the adequacy of the permit application that the New Mexico Copper Corporation has submitted to the Environment Department for the Copper Flat Mine?

A. Let me predicate my comments with I do respect the company having employed consultants that are highly capable. These are folks whose opinions I respect, and I, you know, don't want to suggest that that's not a part of this.

But as presented, the plan as well as the financial assurance associated with it represents an almost best or ideal outcome. Now, I think it's important to note that they were driven in some respects to probably do that knowing that we need to talk about at some point the Mining Act and the fact that it doesn't suggest an allowance for this long-term treatment.

But that's, to me, not relevant today, because what we're talking about is what will actually need to be done in terms of groundwater and surface water. And

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so what we've been handed today has a lot of inadequacies. It has not addressed, in my opinion, the inherent uncertainties that are present from a project like this.

And I believe that in some form -- I'll leave that to others to address exactly how, but in some form this application needs to be supplemented, and in particular it needs to be supplemented to address the uncertainty and risks that we've identified.

Q. Okay.

And then, finally, I have a document that you should have received that's been marked as Ranches Exhibit 38.

And can you identify that?

A. Ranches Exhibit 38. Correct.

Q. Can you identify that, please?

A. Yes. It's titled the State of New Mexico, County of Dona Ana, Third Judicial District Court, State of New Mexico ex rel. New Mexico State Engineer, Plaintiff, v. Elephant Butte Irrigation District, et al., Defendants.

Q. And are you familiar with this proceeding?

A. Yes, I am.

Q. Okay. Thank you, Mr. Kuipers.

I have no further questions on your direct.

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And at this point, I move for admission of Ranches Exhibits 8 through 13, 15 through 21 and 38. So we're dropping what was originally Exhibit 14.

MS. ORTH: Are there objections?

MR. BUTZIER: Do you mind if I just take a moment?

MS. ORTH: Please go ahead.

MR. BUTZIER: Mr. de Saillan, could I take a look at Exhibit 38?

I'm not sure I have a copy of that.

MR. DE SAILLAN: Sure.

Yeah. Jim, if you could just hand him -- thanks.

MR. BUTZIER: The only exhibit that is in the ranges Mr. de Saillan indicated that we would object to is Ranches Exhibit 16, which is a US Copper Porphyry Mines Report from Earthworks, a well-known anti-mining organization. I don't think that there was any foundation laid for that to be entered.

MS. ORTH: All right.

Mr. de Saillan, would you like to address the foundation for Exhibit 16?

MR. DE SAILLAN: Yes, Madam Hearing Officer.

Q. Mr. Kuipers, are you familiar with that Earthworks document?

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A. Yes, I am.
Q. And was that a document that you used in preparation of your testimony?
A. Yes, I did.
Q. And are you familiar with the background documents that went into the preparation of that report?
A. Yes, I am. And I, in fact, actually mentioned that during my testimony, that because of similar concerns to that of Mr. Butzier, the USEPA requested that I obtain and verify every single reference in that document.
And again I would be glad to provide folks those exact references; however, I can assure you I have verified them, and the ones that we testified on are, in fact, matter of record in the State of New Mexico.
So I believe that should provide adequate foundation.
MS. ORTH: Mr. Butzier, do you have voir dire on that?
MR. BUTZIER: I do. Thank you, Madam Hearing Officer.
VOIR DIRE EXAMINATION
BY MR. BUTZIER:
Q. Mr. Kuipers, are either of the mines mentioned in that report mines to which the Copper Rule in New

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Mexico applied at the time of the operations that are addressed in that report?
A. There are periods of time, for example, for the Chino and Tyrone mines in the information I presented that have been since the Copper Rule -- no. Excuse me. No. That's a good -- actually -- no. I revise -- I was not thinking specifically the Copper Rule. I was thinking of the -- so from the Copper Rule standpoint, I believe you're correct.
MR. BUTZIER: Okay. So I will just maintain my objection on the basis that this report surveys mines and activities at mines that have nothing whatsoever to do with the regulation of mines under the Copper Rule.
MR. KUIPERS: If I could respond.
MS. ORTH: Yes, please.
MR. KUIPERS: So it's important to note in the Copper Rule that what we did was we went out and took best practices from the existing jurisdictions that were out there. These are the same jurisdictions in which accidents occurred, that included New Mexico practices.
So the Copper Rules are a set of best practices that we put together that essentially would suggest ways to minimize or limit these spills and leaks, but nobody -- excuse me -- nobody that I know in the Copper Rule, as I was working with that, suggested

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we could eliminate to zero any spills or leaks or particularly accidents.
Again the Copper Rule doesn't prevent human error. The Copper Rule sets forth the best practice, but everything is subject to human error, and things can happen that we didn't plan on.
MS. ORTH: All right.
So, Mr. Butzier, I think your objection goes more to weight than admissibility, and he did rely upon it for his testimony.
Ms. Barncastle, do you have objections to the exhibits?
MS. BARNCASTLE: No objections.
MS. ORTH: Mr. Knight?
MR. KNIGHT: No objections.
MS. ORTH: All right.
So Exhibits -- Ranch Exhibits 8 through 13, 15 through 21 and 38 are admitted.
(Exhibits Ranches 8 through 13, 15 through 21 and 38 admitted into evidence.)
MS. ORTH: Are you moving now to rebuttal?
MR. DE SAILLAN: Yes, Madam Hearing Officer. And I wasn't sure whether the process you're -- your process would be for cross-examination to occur now on the direct or for that to wait until after the rebuttal

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has been presented.
MS. ORTH: So I would think it would be more efficient to wait until after rebuttal is presented.
Does anyone disagree with that?
MR. BUTZIER: I don't have a strong preference. I was thinking we would go ahead and cross-examine based upon the direct and then go to rebuttal, but I guess it doesn't matter that much.
MS. ORTH: Okay. I just feel like you would be repeating at least some of your cross --
MR. BUTZIER: Okay.
MS. ORTH: -- if we did that.
MR. BUTZIER: Thank you.
MS. ORTH: All right. Please go ahead.
MR. DE SAILLAN: Thank you.
DIRECT EXAMINATION (Resumed)
BY MR. DE SAILLAN:
Q. Mr. Kuipers, have you prepared a presentation in rebuttal for this proceeding?
A. Yes. I do have a brief presentation.
Q. Could you present that, please.
A. Yes. I'm looking at -- I've got -- it's entitled slide 55. I believe we attached it as a continuation to my previous testimony.
I'm really going to just testify mostly

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what -- from this slide. Occasionally I will flip to some other slides with some demonstrative exhibits or otherwise.

The first thing I want to address is the Jeff Smith slide 7, talking about the project economics and likely worst case.

And do we -- I'm sorry. I thought I had that -- oh, shoot.

Madam Hearing Officer, I need to call up that slide.

MS. ORTH: All right.

MR. KUIPERS: It will take me just a couple minutes to do that.

MS. ORTH: Should we take a brief break?

MR. KUIPERS: That would be my suggestion.

MS. ORTH: All right. Let's just take five minutes.

(Proceedings in recess from 10:04 a.m. to 10:10 a.m.)

MS. ORTH: Okay. We are back after a break.

Mr. Kuipers.

MR. DE SAILLAN: Madam Hearing Officer, if I could ask one last question regarding the foundation for that Earthworks report.

MS. ORTH: Okay. That's fine. I mean, it's

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admitted.

MR. DE SAILLAN: Correct.

MS. ORTH: Okay.

MR. DE SAILLAN: But I just want to preserve our position.

Q. Now, Mr. Kuipers, you testified a little bit about the Copper Mine Rule in response to questions from Mr. Butzier.

Is there anything about the Copper Mine Rule that is actually less stringent than the requirements that were in place for the Chino and Tyrone mines at the time of the various spills that are listed in the Earthworks report?

A. Yes, there are.

Q. Could you describe that, please?

A. Well, the main thing is in dealing with the open pit capture zone as well as the surface water capture area that are described in the Copper Rule.

First, those are not typically -- and I have never seen those terms used prior to this in a process of regulation or permitting. There is recognition of the overhaul phenomena of a hydraulic capture zone, but the Copper Rule very explicitly brought those in in a way that in particular would allow a company to do less reclamation in certain areas, and so in many ways

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perhaps compromised the previous circumstance with the Copper Rule in that case.

Q. Thank you.

That's all I have.

MS. ORTH: Okay.

Q. (BY MR. DE SAILLAN) If you could proceed with your rebuttal testimony, Mr. Kuipers, please.

A. Yes. So I'm on slide 55, and again this just indicates the various subjects I'm going to speak of.

The first one that I want to address is Jeff Smith slide 7, which is the project economics and likely worst case.

I'm flipping forward to my slide 59, which is a replication of that slide in Mr. Smith's presentation.

Just as a bit of foundation as to my ability to speak to this type of information, all engineers, whether they're mining engineers or processing engineers or otherwise, at least in the school I went to, took several courses in engineering economics, and those courses allowed us to have the ability to essentially design, plan and conduct a mining operation, shut it down and determine the cost of doing that.

But in addition, I worked as the project manager of several mines, also as a superintendent. In all those capacities, I was part of a team of people who

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on a daily basis were looking at the economics and adjusting the operations, doing various other things. And in the same way that Mr. Smith is -- I would recognize is an expert in this matter, I similarly have had the same experience in applying this information throughout my career.

But also, when I've worked for Anglo American Corporation, which was one of the largest mining corporations, I spent two years as a member of their senior acquisitions team, working with essentially a group of much older professionals, and because I was the one who knew how to use spreadsheets, and computers were just being developed, I was put in charge of doing all the engineering economic -- engineering economic analysis with their inputs.

So this is something that I have a high degree of familiarity with. I presently on my computer have, I think, three different financial analyses for other mines that I'm actually evaluating in much more detail.

So going to the actual slide itself, what Mr. Smith presented was a figure that shows on the left-hand side the annual copper production in terms of tons and also on the right-hand side the copper equivalent grade. And these are both on the Y axis.

The annual production goes at the bottom from

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0 up to 50,000 tons. I believe this is set up per year. And then on the right-hand side in terms of grade, we see it goes from 0 percent up to 0.6 percent. Again this is on the right-hand side, the Y axis. And then the X axis on the bottom describes each one of the 12 years of operation, years 1, 2, 3 through 12.

Now, just to begin with, one of the reasons we don't see a lot of small copper mines is because of these rather short lifetimes. And when you look at the vast majority of copper that's produced throughout the world, it comes from very large mines, the vast majority of which have been operating in terms of historic mines for 100 years or more.

When you take a look at mines like Chino and Tyrone, Butte, where I'm from, the Bingham Canyon pit in Utah, all of those are very large mines, they're historic, and they've been operating for a long period of time.

Now, there have been a large number -- I'm not saying large -- some -- yeah. By no means it would be. But in comparison, you might have, you know, 20 large mines, but you also have 20 small mines that have occurred. Those 20 small mines have a history of bankruptcy associated with them. And if not bankruptcy, in the majority of cases, they simply didn't make money.

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And so in my opinion, Mr. Smith has a real job ahead of him, because what he's doing and -- you know, again this is what we have to do sometimes in the mining industry, is his job is to take a, in my opinion, marginal deposit and turn it into a profit for the people who own it.

Now, the risk here that I want to point out -- and this is very important again from a financial assurance standpoint, because financial assurance is there in case the company were to go bankrupt. But what you see here is there's a period of high grade up front where they're saying it will be .46 copper, they'll produce annually about 35,222 tons of copper.

The profitability of this project depends upon what happens in this five-year period. If the copper price is high, they can pay back their capital, I believe there's a chance they'll go all the way to year 12.

But if during this period, similar to what's happened in the past, it costs them a lot of money to get capital -- and by the way, capital is not cheap right now -- and the copper price doesn't rise significantly from where it is today, what we really have to worry about is this inflection point right here.

And, you know --

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Q. When you say right here, you're referring to year six?

A. Year six, yes.

So in year six, midpoint through here, what you see is we basically drop from the scenario where they're mining relative high grade, and then all of a sudden we're at a period from year six through 11 where the grade you can see is varied, or that's actually the production. And then I believe this is still tended to represent the grade.

So you can see we're considerably lower, approximately about 60 to 70 percent of what that original grade was.

So I have worked for, unfortunately, a number of companies that went bankrupt. My first employer when I got done with college didn't actually -- well, actually it did go bankrupt, come to think of it. They just declared bankruptcy after they paid us all.

My second employer went bankrupt while I was managing a mine in the State of Nevada. I actually had to sell the company truck -- or give it to the sheriff so he could sell it to pay the bills that we had left behind in this small town in Nevada.

I've also seen big companies go bankrupt.

And part of my work in financial assurance,

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I've analyzed what it is that potentially causes companies to go bankrupt, and we use that information in making sure that we recognize where these inflection points are.

Now, also, it's notable that the Office of Surface Mining, and again most other jurisdictions that do financial assurance, recognize that we need to find where we have the reasonable worst case result. Now, reasonable worst case means we're following the plan. It's not that we get -- again this isn't the tailings facility failing or the liner leaking. But we're following the plan and suddenly they go bankrupt.

And a key example of that is the encapsulation of the sulfide materials that was described as part of their plan.

So if we're basically mining at the surface the transition materials which have been acknowledged as the potentially more reactive materials here, we start to put it in a repository, as been described. And again the idea is to put it inside the waste rock pile.

But if the waste rock pile has only been half constructed and the encapsulated materials aren't encapsulated but left exposed, the agency would need to come in and figure out how to cover that with -- let's say, for example, 10 foot of nonreactive material as is

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planned by the operator. The financial assurance as it presently is would not contain the money for that.

Similarly, the pit would not have been completely dug to the ultimate level. Quite likely the pit lake would be higher and as a result almost certainly encroach on public land and not remain entirely on private land.

Well, if that were to happen, that not only would trigger the fact that it wasn't completed, but in fact, I think, would result in an entirely different water quality standard being applied. And if that were the case, have we accounted for the water treatment that might be necessary if that standard is applied.

So in understanding risk and why we need to make sure we get things right, this is a very, very important graphic, because again I think counting on financial assurance here, in the event they go bankrupt early, we can't -- you know, as much as we want to, we can't ignore the history of this project. We would find ourselves, I believe, way short.

And this is a scenario where instead of suggesting being 100 million short, it could well be higher than that amount, significantly higher, because we simply didn't get done with what we thought needed to get done.

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And again this is an analysis that I think needs to be performed as part of the negotiations between the state and the company to ultimately consider what would happen here and determine if that actually does represent a higher cost case than end of mining and require the financial assurance to account for at really either case. That's what we need to take a look at.

Just want to mention Mr. Smith suggested that copper is a strategic mineral. I certainly wouldn't argue with him that it's an important mineral. I think it also is going to be an important metal or mineral as we address climate change that's caused by us humans here. It's going to take some technology to approach this.

However, it's important to note that we have an actual definition of strategic minerals here in the United States. That strategic mineral list is published by the USGS, and under the Trump administration, it was recently revised.

There are some 35 or so strategic minerals on that list. The strategic minerals that are on the list are identified as being based upon supply and demand as well as domestic production. And so a key factor is if we really -- if we don't have domestic production to meet the demand, then we need to consider that those

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need to be supplied, and we're listing those as strategic. USGS is listing those as strategic, I should say.

So they have this very list of minerals. Neither copper, molybdenum, gold or silver are recognized as strategic minerals on the USGS list.

And mainly copper -- just to explain, copper -- US is one of the world's leading producers of copper. I'm not sure this year whether we're number 2 or number 3. We have tremendous domestic resources of copper. There are numerous untapped, very, very large, rich resources of copper still in the US that are known.

For example, I'm aware of a group that is working on a new deposit in Montana that might be about the size of the Butte deposit, which is known as the richest hill on earth. Copper is abundant in US. And I think it's good that it is, because I think we're going to need it. But I just want to clarify. It's not a strategic mineral in terms of that we don't have the capacity to already produce it in this country.

So the next things that I want to speak to are the testimony of Steve Finch. To some extent, the same -- my same comments apply to all the testimony we've heard.

And that's the -- again I want to be clear

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that I respect the testimony of Mr. Finch. I've known him and worked with him in the past. But again his job, I believe, was to some extent predicated on coming up with a plan that suggested there would simply not be long-term treatment.

And there has to be recognized that within a plan like that, because it's based upon a lot of preferable circumstances, if you will, could call them ideal or best case, that it really doesn't account for this uncertainty.

And what we've done in the industry for quite some time now is recognize that again when we have risk or when we have uncertainty, the best way to address that is through risk analysis.

And the biggest thing I think I'd recommend to the company, to the other parties to this proposal are that if we could go through and conduct a rigorous failure modes effects analysis, it would help to not only make sure we've addressed many of these issues and provide confidence in that, but just as importantly, would give us a tool to communicate to the public accurately and confidently what is going to happen with this mine.

Now, just to describe the failure modes effects analysis a second, this is a process that I

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don't feel that, you know, it's really been used since the 1940s with respect to airplane accidents. And if you go back and realize the degree to which airplanes used to crash, literally every time you took off you were taking your hands in your life.

It was through examining these accidents and looking at the failures, coming up with either fixes to the failures or in many cases redundant systems, so that if something failed, you at least thought about how to take care of it.

And I always relate the experience I had that I was on a plane, flying into Butte, Montana, and as we were getting to approach the runway, apparently the lights came on, and the pilot realized that his reverse thrusters no longer were functioning, weren't going to be available.

We took on up -- back up into the air, headed for Bozeman, Montana, which has a little bit longer runway, for those of you familiar with the area, and once we got to Bozeman they had us assume the position as if we were going to crash and everything else.

But what the pilot said that gave me confidence was, "Well, we've looked it up in the book. We've got a procedure. We know what to do. We're just going to Bozeman to make sure if the procedure doesn't

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work we're well cared for." So --

And again we landed safely.

This is -- and when we look at this same thing in mining, we're simply trying to do the same thing with these failure modes effects analysis, is instead of assuming based upon our analysis that it can't happen, what we do is say, well, you know what, we can't say it can't. I mean, that's -- we don't know what we don't know.

But -- so we need to go ahead and allow for that to happen and see if we can address it, if we can -- if that does happen, can we come up with a procedure.

So, you know, the best example here, if seepage occurs from the tailing storage facility, well, we know -- we know that we can address that with a contaminant system, with a pumpback system. That's how we've done it every mine site that I'm aware of.

So if we allow for that in the plan, we allow for that in the financial assurance, then if it happens, we can address it. If we don't allow for it, then we may see a crash of some kind.

So again that's the whole principle here, is to do that. When we do failure modes effects analysis, we typically convene a group of experts. We like to see

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a group of high-level experts if we can.

I participate in these -- with industry and regulators numerous times a year. In fact, I'll be doing one for the Stillwater mine tailing storage facility at the end of this month.

And so you get a group of people together, and you sit there and basically go through the, for example, structural failures. We look at environmental failures, not just liner leaks, failures of the cover, for example. We haven't talked a lot about it, but this cover system is supposed to actually get us less than 2 percent infiltration. That's a pretty hard task.

And, you know, I think if we had more time, it's an example of something we would have spent a lot more time analyzing than probably brought forth in our testimony this week. It's the kind of thing that we need to take a look at in a net risk analysis.

We consider also what we call administrative failures, and a good example of administrative failure is the company goes bankrupt, do we have a plan to address that. There are other failures such as if the regulations were to change, things like that, that we also address.

So it's very important and I'd say critical in any structure, such as a tailing storage facility, that

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you do a failure modes effects analysis. And I would be very surprised if, in fact, Mr. Kidd did not plan on recommending that to his client, if it's not already written in part of the process they plan on.

But I'd suggest to go beyond the tailings and that we use this very useful process to also evaluate the environmental risks and to address what the likelihoods of those risks would be, in addition to the failure modes, what the consequences of those risks would be. And when we look at those consequences, we need to not just consider one factor, but typically we consider six factors, regulatory, environmental, public acceptance, number of other factors that need to be included in this analysis.

And again I would just point out that this is an analysis that in my experience for mining companies, situations where we're trying to do this right, it's become a standard in our process. And again this type of risk analysis doesn't have to be exactly this, but until we do a risk analysis, this permit is fraught with uncertainty, this proposal is fraught with uncertainty. And I believe this is perhaps the best way to address it.

So the next bullet is with respect to the testimony of both Mr. Finch and Dr. Griffiths. Both of

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them -- as you recall, we talked to them and questioned them about long-term geomorphic change.

And just let me make sure folks understand what we're talking about when we use the term "geomorphic." Essentially it's the idea of how does the landscape or landform change over geologic time. So we're not talking years, even decades. This is what occurs beginning years and decades, but can basically continue forever.

And what we do in mining, in particular when we do pits, is we -- we essentially build a cliff, if you will, and we leave that cliff when we're done. You know, when you go out mountain climbing, there's some cliffs that are good to climb because the rock's been there for a long time, it's well solid. There are other cliffs that you look at and you say, you know, that's going to fall down on top of me.

Having tried to go down in a few of these pits over the years, you don't want to do it, because ultimately from the time mining ceases, basically going forward indefinitely, that pit wall is going to start sloughing off, changing and doing various things.

And in particular on sites where we've seen pit lakes develop, we've seen fairly large sloughing occur because as the water rises -- we've dewatered all

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this material. Now as the water rises, we're actually putting pore pressure back into rock behind these walls, and that additional pore pressure as the water rises actually can cause movement in that wall.

So in recognition of that -- and we actually have examples of that. I just want to show folks.

This is the somewhat infamous Berkeley Pit. This is the pit that every once in a while we get a flock of geese landing on it. We had a flock of about 10,000, and many of which died just a couple of years ago. Originally there was a flock back in 1993, I believe it was, that landed on the pit and died. And actually as a result of that, they have since then employed all kinds of mitigation measures and other things.

Then we kind of relax for a few years when we don't have problems, and suddenly a flock comes in due to bad weather, and here we are again. So they actually spend 24 hours a day, they have monitoring surveillance, flying drones, boats, the whole works, on this.

But what's important here is as this pit lake rose -- and this was not predicted, but I think today we would predict it to continue to happen. As this pit lake rose, it did what I'm talking about in terms of the water table started to come back, got pressure behind

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here, and essentially this started to cap off and slough.

Well, this actually sloughed quite a bit all at once. A wave traveled across the Berkeley Pit, estimated to be about a six-foot wave. And over here is all the pumping for the pit. This pit gets -- above there all this water starts flowing down the Columbia River. Essentially we're at the headwaters of the Columbia in Butte at the Clark Fork River.

So the remedy is to not let it rise above here. But what we're seeing now is we get these sloughs, it creates a danger for the personnel, and so they actually had to rebuild their pumping system over here after it got wiped out, and they've had to set it up so that they are ensuring employees' safety while they're down there in the event this happens.

So the actual expectation at Butte is we will end up seeing this slough complete at some point, lose all the benches.

And what happens is when you look at the geochemical characterization program and how they characterize the pit lake water quality as it came up, the assumption is that we'll have a limited reaction in the pit wall with waters, that they'll only move in less than a meter.

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And so the kind of chemistry as you go up the pit lake is to only account for what's happening in that first meter or so pit wall. In fact, in this case, I think it was slightly less than a meter.

But if -- excuse me. If you get sloughing, like we see here, then not only is that limited distance reacting, but all that material that could go back tens or even hundreds of feet has now entered into the water and becomes part of the water chemistry.

The other thing that happens is if you put material down in the pit, it can raise the overall water level, and that could be a permanent raise if looking at an equilibrium level. And the amount of rise -- that's a bit of a function of how much goes in, but also how it alters the water table.

And so you have the potential as these things happen to safely do that.

I apologize for the poor quality of this slide here, but this is an actual picture of the Bingham Canyon slide in Utah. This --

Q. What number is that, Mr. Kuipers?

A. This is slide 58. I'm sorry.

And this is a picture of the slide that occurred at the Bingham Canyon pit on April 10th, 2013.

Now, this slide was predicted to occur. The

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mining company had been monitoring it for some time. They were aware that it could go, but nobody expected it to go when it did. And even more importantly, nobody expected it to be so big.

It was nothing short of a miracle that nobody was killed here, because they had an entire truck fleet and other things parked right down here. Clearly the company was not expecting this slide of this nature to occur. It did occur, and again it was huge.

Quite interestingly, because the mining company was there and still could -- had valuable resources -- and I look at this as one of the really success stories of modern mining in some respects -- they were able within a few months to clear this slide and begin mining again.

So these kind of things happen. They happen all the time. In fact, it's a certainty. Gravity isn't going away. Natural degradation of cliffs happens all the time. But these mine pits are highly susceptible to degradation afterwards, and a prediction for either water chemistry or water levels can be drastically altered if this type of event happens in predicting a postmining pit lake.

The next comments I want to provide are with respect to David Kidd's testimony.

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You know, first, I want to express that I think it's a really good thing that the company got Golder on board. Golder knows what they're doing. Golder is an international consulting firm. I actually worked with Golder, one of their engineers, on their redesign of the Mount Polley tailings.

So just speaking briefly of some of my experience working with tailings storage facilities, at the Mount Polley facility I was brought on as the tribal liaison to the independent review panel, but in addition to that capacity, I also represented them as one of three engineers who worked together on the redesign of the facility so that the remaining 50 percent or so of tailings in the facility wouldn't wash out at the next storm event. So I essentially was part of the mitigation design team.

In doing all this work, there are certain things we've learned. And I was with a Golder employee as a lead engineer. So again they know what happened at Mount Polley, they're very aware of what happened at the Fundao Dam. And I believe they're committed, and Mr. Kidd will be committed to making the likelihood of a catastrophic tailing storage facility failure not just unlikely, but what I would term as very likely.

Even if he does, that doesn't mean it can't

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happen. So again I would expect that we'll do a failure modes effects analysis.

Just as important, a few other things that I'll mention just briefly here. So these -- I might mention these are really recommendations in a way, because as we recognize, we kind of have this bifurcation between the Environment Department and OSE.

These are things that I believe are important to protect groundwater, but they're really more things that need to be incorporated as the design goes forward with the OSE. And this is really -- to our knowledge with the process from the OSE, this is maybe our opportunity to provide comment, because there is no formal public comment process, to my knowledge, in the OSE permitting.

So, you know, again we would make this point. I know I'm working with Stillwater Mining Company and actually in a couple of other sites, as well, as part of the design process to basically bring it up to a 70 percent design with all the things I'm -- that we're describing as part of the application package.

So at least in the cases where I'm working, where we are dealing with tailing storage facilities, the level of design reviewing at this point in the application package would be consistent with that, with

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what the OSE is going to require in the future as they proceed.

So again I would just point out that -- and I think this process could have benefitted by the company having proceeded with the OSE design already and having submitted that level of design to us. Certainly we'd recommend that that's what we tried to get in the future in such cases.

The second bullet, and this is again slide 56, we need to perform an inundation analysis. Because again even though I believe strongly that we can design this to make that failure very unlikely, and that's a pretty -- pretty good place to be, we can't say it won't happen at the risk of, you know, suggesting -- I'm quoting Donald Rumsfeld, we don't know what we don't know. And that's actually what engineers in particular have to recognize.

So that's why, as he suggested, and the State Engineer requires, and I believe as engineer of record he would do this anyway, do an inundation analysis. That inundation analysis I expect will be done both for a worst case, for example, storm event, et cetera, but also, very importantly, for what we call a blue sky event. That's basically a day when the earth doesn't quake, storms don't roll, but the tailings just for some

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reason go. It's actually part of the guidance that those of us who do this work use.

We need to revise the hazard potential classification if warranted. It is important that it be based upon the hazard it represents.

I would mention that I have some concerns with the New Mexico OSE's classifications. If you look at the classifications recommended by the Canadian Dam Association -- and that's the reference most of us doing this work use -- it would suggest there actually need to be five classifications instead of three, and has, I think, better specificity between those classifications. So that's certainly something that should be considered by the applicant.

And then we need to develop a robust Emergency Action Plan. Mr. Kidd mentioned these plans, and I actually have been participating over the last two years in some of the first actual planned exercises conducted with county and state agency officials in the country. And it's a real interesting process when you take these plans and you sit down with a group of people that in the unlikely event the tailings failed would need to respond.

It's a good exercise. It gives you a real sense after you've done it. At least in the cases that

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I've been involved, that these are professional people, they know what to do, and they're going to do the best what they could do to make sure that if it does happen, the least damage, particularly loss of life occurs.

And then, finally, we've got to share this information with the public. This isn't something we want to sit here and wrap up as engineers, wrap up as regulators. We listened to persons testimony -- persons testify one after another, their concern about this. They should be concerned about it.

But if we do all this right, if we produce this information, we conduct the type of failure modes effects analysis I'm talking about, these also serve as incredibly good information to go then sit down and talk with the public and help them to understand and convey to them why it is we have the confidence we do once we get to that point. But we need to get to that point first.

One thing that I mention in my comments on this, in my written comments, was a recommendation for a maximum credible earthquake. I believe Mr. Kidd might have a response to that. But I'm not necessarily suggesting that that be the design basis. The OSE requirements perhaps would be the design basis, but I do believe that at the very least that has to be included

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in a sensitivity analysis.

We've seen the faults that occur here due to the Rio Grande Rift. We have a sense of the age of those, the impacts of those, but I don't think we can have absolute confidence in that. The approach that we generally use that I've heard that is to either do a one in 10,000 year earthquake or what we call a maximum credible earthquake, or MCE.

Essentially the idea of the MCE is to look at the geologic record and establish essentially what was the maximum we have seen and apply that going forward so we're not guessing as to the intervals. Because again what we started to recognize is the science that we're using to estimate these earthquakes, it's not necessarily 100 percent accurate or dependable.

So as a precautionary measure, it's something that tailings facilities that I'm working on, the engineers either use this as a design specification, or at the very least they apply the maximum credible earthquake. And really what we're doing is this isn't talking about the seismic magnitude so much as what is the acceleration, what is the ground movement for gravity going to be.

So that's what we're trying to estimate here, and then we apply that to our stability calculations.

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And it's just a way of saying, okay, even though we don't think we'll have a big earthquake, we do see somewhere in the record that we had this big earthquake, let's apply it to the stability, and let's see what happens.

And at least in my experience, something that passes a one in 5,000-year event has a good chance of also being able to stand a 1 in 10,000 or MCE. Let's analyze that, and let's let the public know what the results are. Ideally results say, hey, even in a worst case, even in an MCE, the dam will still be stable. That would be the result that I would like to see, that then allows us to say this is a very unlikely probability of tailings failure.

Now, we've heard a lot of testimony, I think, about 80-mil liners, seepage and quality assurance/quality control.

State of Montana, where I do the majority of my work, we've had experience with this over the years. The state has, similar to the Copper Rule, put together essentially QA/QC program. In fact, I'm quite certain that the State of Montana's guidance was part of what we used in developing the Copper Rule.

Those that aren't aware, the Copper Rule really contains the best of the best -- that was the

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idea -- of places like Montana, Nevada, Alaska, other places we looked to to help us put this together.

The Copper Rule does not specify a thickness of liner. It says that's something the engineer needs to do.

I just want to make a suggestion to folks that we need to look at 100- to 120-mil liner as an option. In my experience in working with the manufacturers and the installers, they have suggested that if we can use 100-mil in particular, that it allows us to have better confidence both from not having defects, but also, very importantly, allows for better seaming, using heat seaming, other welding methods.

Sorry.

And it's just something that again is a design feature. If we could build a little more robustness into this, provide some additional assurance that it won't leak, that's always better. And the cost typically is not too much greater. And this is the kind of thing that we really, you know, based on experience, I think -- at least my recommendation would be that they seriously consider a thicker liner.

The mention that the New Mexico Office of State Engineer. I agree with Mr. Kidd's characterization.

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I've actually had occasion on behalf of USEPA to in detail evaluate the regulations of all of the states in the United States which have mining tailing storage facilities. And in reviewing that, one of the states that I actually used in the -- in a four-state table -- actually it's not four states. The table is Mount Polley, British Columbia, Montana, and the fourth state is New Mexico.

And I use that to show that New Mexico really outside of British Columbia and Montana has in terms of existing regulations close to where it would be today. But as anybody who is familiar with the recommendations of the Mining Association of Canada and the Canadian Dam Association, we're still not quite there.

And so it's very important that in addition to the OSE guidance we look at the -- what we call the MACT guidance, Mining Association of Canada guidance, and the CDA, or Canadian Dam Association, guidance. At least in the northern hemisphere, these are the two primary references that are typically used in putting together the mines, the operations and maintenance manuals, he mentioned the TOMS -- I call it the TOMS, tailings operations, maintenance -- excuse me -- tailings operations, maintenance and surveillance program.

And that's a key document. I mentioned that I

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worked for years as the operator of tailings storage facilities. We didn't have that. The engineer built it. He and I might meet for an afternoon before they left the site. That was it. Next time I talked to the engineer of record literally is when I needed to build an expansion to the tailings impoundment.

As a result, I didn't understand what I was supposed to do as an operator to ensure the stability of my tailings storage facility.

Now, the reality is there were no failures that was post grandpa, but the idea is that we should have had that information. And again it was a critical aspect of what happened in some regards at the Mount Polley and Fundao failures. So again very important.

A final recommendation to the company -- and again this is intended to give confidence to the Environment Department, Mining and Minerals Division and the public. We should create an independent review panel. That's part of the Mount Polley recommendations. It's also part of the Montana legislation to do that.

And in doing that -- this is typically an independent review panel of what I would consider world-renowned experts if you can get them, and they would basically review the engineer of record's work and provide him recommendations and inputs as to his design.

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And this is a very effective process.

Stillwater Mining, we actually have a three-person independent review panel, one of whom is Dirk Van Zyl. Dirk Van Zyl was one of the members of the Mount Polley independent and expert review panel. A number of other people who we respect. I worked with that panel.

And my recommendation would be if the company were to set up such panel that they consider allowing the public interest community to actually nominate one of those people. And that wouldn't -- I wouldn't recommend be me, quite honestly. What I would look for is to recommend somebody who basically is the highest caliber level we could possibly get.

Because again I believe somebody who has been doing this, for example, for 50 years -- I've only been doing it for 35 -- is the best opportunity for all of us to make sure their experience and knowledge helps us ensure that this dam will not catastrophically fail.

So the last three comments I have go to the Reclamation and Closure Plan that was presented, essentially the Closure/Closeout Plan that the Environment Department and Mining and Minerals Division need. There were a couple aspects of it that I think we need to address.

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The first is the current storm event design practice relevant to anthropogenic, or manmade, climate change.

When we look at what's happening, it's undeniable, at least for those of us that work out on these sites, that we are seeing storm events consistently above what is being predicted.

Zortman-Landusky Mine in Montana is probably the prime example. Since the mining company went bankrupt in 1998, there have been seven storm events which exceeded the projected 100-year periodicity.

You go to mine sites throughout the country, and you find this happening, and what we see is damage to the infrastructure and other things being done. The majority of the design engineers that I've worked with, folks with Knight Piesold, Golder in Canada, elsewhere, their design recommendations have consistently been, to my knowledge, to their clients 200-year storm events should be -- should be applied because of the kind of climate situation we're in today.

Now, again that's in the interest of simply preserving the capital vestment of the company. That's a -- that's a very rational recommendation. That same recommendation is an example of what we did with the Copper Rule and where a permit by rule can be flawed, is

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we said in the Copper Rule 100-year. I can tell you we argued about that at the time of the Copper Rule. I argued for a 200- or 500-year. I can tell you today I would argue even more strongly for that.

And there are jurisdictions that are beginning to require that, particularly Canada, but we're beginning to see that in the US. And what I have seen is many cases where the design engineer has sat down with the owner and said, "Yeah, they only require 100. We're submitting a design for 200 years." That's the Knight Piesold design for the Stillwater mines, and they're a lot less of concern than this mine is.

So again I think it's very important we do that.

And -- yeah. I also wanted to mention that in Montana -- and again a number of states have done this, that actually put together extreme storm event workshops, knowing that it will take the National Oceanic -- NOAA, the agency that actually does all this work -- it will probably take them another 10, 20 years to revise their standards. And particularly with the present administration, quite frankly, they may never revise those standards even though the evidence is preponderous.

So what many states have done -- and I would

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really hope that New Mexico would pick up on this soon -- is they have in the interim gone ahead and convened workshops of the knowledgeable people in the state and brought in people nationally and developed interim guidance for extreme storm events and put that in place in lieu of NOAA doing their revisions.

What we've seen at least in the case of Montana is a 100-year storm event typically went up by about 25 percent, not greatly, but significantly. The 200-year storm events and 500-year storm events went up similarly. But where it's very important actually is in terms of what we call the probable maximum flood, or probable maximum precipitation, those estimates typically doubled.

And that's what we're learning from these extreme storm events, is that there is -- there is very significant increases.

So again current practice, I call it the best practice -- certainly I'm not going to suggest everybody is doing it, but I'd suggest those that are trying to stay ahead of things going wrong are -- is to in their designs incorporate greater than just the regulatory standard.

A very important aspect that we heard was with respect to Grayback Arroyo dyke breach. Now, we

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heard -- I believe Mr. Stein testified that the Grayback Arroyo dyke breach -- he basically said it wasn't possible in the event of a storm event, suggested that because a 500-year event analysis had been performed, I believe in his opinion, he expressed it may not be possible.

Now, a couple of different things on here.

One, I have called out previously the Reclamation and Closure Plan contains no provisions for monitoring or maintenance. When you look at the Grayback Arroyo dyke breach -- or dyke itself, I should say, and you consider how it's shaped around the mine site and how the inputs come in from arroyo, from the Grayback Arroyo, that bypass is very likely going to sand in or sediment up. It also could simply be over time a compromise by continually having storm events come up against it.

So this is the kind of thing where, you know, it may be able to maintain it indefinitely, but without a monitoring and maintenance plan and the dollars to do that, because the company is not going to be around forever, I believe, in my opinion, that there's not only a likelihood, but I believe a high probability that over time the Grayback Arroyo dyke will erode or otherwise be compromised and will end up with surface water from

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outside the mine area going into the open pit.
And, you know, again it's something where all of us in -- as engineers know that nature -- it's why it put it there. Well, nature is going to want to put it right back there sometime in the future, particularly if we don't maintain that artificially manmade construct that's intended to take it around.
Q. Mr. Kuipers, if I could ask you to elaborate on one point there.
The point that you're making is that Mr. Stein was referring to a single 500-year storm event, and are you referring to multiple storm events over a short period of time?
A. It could be multiple storm events over a short period of time or a long period of time. And again the principle with the idea of maintenance is all of these storm events, even a 10-year event, causes some erosion, gets us to a point where it's eating away at it.
Now, certainly repetitive, larger events or one great big event could do the same thing. You know, we could see something significantly greater than a 500-year storm event.
I would note that Silver City, New Mexico just about a month ago, day after I left from a meeting there, they had what the city has characterized as a

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storm event in excess of 500 years, and it blew out a whole bunch of city infrastructure. It made the headlines because the city had built their infrastructure for much smaller storm events.
So yeah. These are what we refer to in the engineering business as critical structures. This is a structure that at the least has to be built, quite honestly, to withstand a 500-year event, but that's for during operations. If it's supposed to sit there and keep water out of this pit indefinitely, then without monitoring and maintenance, I simply don't believe that's possible.
So the last rebuttal point I'd like to make is just with respect to the Bingham Canyon Mine.
Those of you that aren't familiar with the Bingham Canyon mine, it's a very large, very old, significant mine in Utah, well over a 100-year mining history, one of the, you know, large -- the 10 or so mines here in the US that produce copper. They're almost done producing copper, and they're actually going to go to producing molybdenum underneath the mine soon.
But apparently Mr. Stein -- I believe he testified that Bingham Canyon was an example of a mine, to his knowledge, that did not have any groundwater or surface water long-term treatment requirements.

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I -- apparently he's not aware of the CERCLA site action. The Bingham Canyon Mine has been a Superfund site for many, many years now. And it is actually noted throughout the world as the site that demonstrated to many of us how finger flow works.
So I described previously how Darcy's law, which assumes homogeneity with the materials and more or less even flow throughout. That's an ideal approach. But what happens is you get what we call preferential pathways. Everything is not totally the same and mixed up perfectly.
Well, at Bingham Canyon, they have very large waste rock dumps up against the Oquirrh Mountains. These are huge waste rock dumps. Those same waste rocks dumps, it turns out, have been seeping acid rock drainage since their inception, and ultimately there are groundwater flow paths exceeding more than 10 miles -- I believe some are as far as 16 miles -- from the mine site, down into the Salt Lake Valley.
And under the CERCLA action, I believe the most extensive groundwater pump and treat system that I'm aware of anywhere for mining purposes has been installed, and it's operating and is expected to operate indefinitely.
So Bingham Canyon, just as the other mines

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that we're talking about -- they do, in fact, have long-term perpetuity requirements.
Thank you.
I believe that concludes my rebuttal.
Q. Thank you, Mr. Kuipers.
Just a couple of follow-up questions here.
The two photographs that you included in your presentation, could you tell me what the sources are for those photographs?
A. Yes. The first photograph was done by Mr. Fritz Daly. Fritz, for folks who don't -- well, I wouldn't think folks here would know, but if you lived in Montana, you'd know. Fritz was the mayor of Walkerville, Montana, which is a little town above Butte.
Fritz has actually been a local activist, if you will, to make sure we get this pit cleaned up and other things. Fritz is a friend of mine, I know him very well, and I have Fritz' permission to use any and all of his photos at any time. So he was the source of this particular photo. And again he's the mayor of Walkerville, Montana.
And in -- this photo actually is a file photo from one of the newspapers in Utah, the Deseret News, that I obtained this from.

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Q. And when you say this photo, you're talking about the Kennecott Utah Copper Company Bingham Canyon photograph.
A. Shown on slide 58. Correct.
Q. Okay.
And you're familiar with the events that you described with reference to these photographs?
A. Yes. I have a very high degree of familiarity with the Berkeley Pit sloughing that occurred as I work with a number of organizations and groups on that Superfund site. I have since studied the reports that have been issued for this particular slide to gain a better understanding of the mechanisms of what caused it and applied that to my knowledge.
Q. Okay.
And again when you say this slide, you're referring to the --
A. Slide 58.
Q. Right. Okay.
Madam Hearing Officer, I'd like to move for the admission of Ranches Exhibit Number 43.
MS. ORTH: Objections?
MR. BUTZIER: No objection.
MS. BARNCASTLE: No objection.
MR. KNIGHT: No objection.

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MS. ORTH: All right. Exhibit 43 is admitted.
(Exhibits Ranches 43 admitted into evidence.)
MR. DE SAILLAN: Thank you, Mr. Kuipers. I have no further questions.
Thank you, Madam Hearing Officer.
MS. ORTH: Thank you, Mr. de Saillan and Mr. Kuipers.
Shall we take a short break before cross-examination?
All right. Let's take about 10 minutes.
(Proceedings in recess from 11:05 a.m. to 11:18 a.m.)
MS. ORTH: We are back after a break.
Mr. Butzier, do you have any questions of Mr. Kuipers?
MR. BUTZIER: I do, Madam Hearing Officer. Thank you.

CROSS EXAMINATION

BY MR. BUTZIER:

Q. Could you please pull up the slides that show the Berkeley Pit and the Bingham Canyon mine?
A. Yes. That's slide 57 and slide 58.
Q. And those are Ranches Exhibit 43, correct?
A. Correct.
Q. What can you tell me -- you addressed the

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long-term geomorphic conditions and the possibility of sloughing and used these as examples of that, correct?
A. Correct.
Q. What can you tell me about the difference of the geology between the Berkeley Pit, the Bingham Canyon mine and the Copper Flat andesite/monzonite quartzite environment?
A. Sure. And you -- I might recall folks' memory to a graphic that I believe was shared during Dr. Griffiths' testimony showing some of the concentrations of the constituents at these mines.
As that graphic indicated, the Berkeley Pit is very reactive in terms of the geology or geochemistry. It's a porphyry copper deposit, high-sulfide deposit. And in comparison to the Copper Flat, while Copper Flat in reading the literature has perhaps some characteristics of copper porphyry, its characteristics are really that of a copper breccia mine more so.
And so, in fact, as has been described, the Berkeley Pit is a much more reactive geology, more likely to result in geochemical changes. I would also grant that it has a higher potential, for example, for degradation of pit walls; however, again we see these same features to varying degrees at all mine sites, not just at this mine site, due to its highly reactive

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geology.
Speaking of the Bingham Canyon, Bingham Canyon is similar to the Butte deposit, a copper porphyry deposit, and similar to Butte it has very similar geochemical characteristics. I do not believe it is quite as reactive as Butte in terms of geology, but it is, in fact -- if you will, it has a lot of sulfide ores, there's a lot of gouge or clay and a lot of other things that go on with this similar to Butte, which is part of what makes it susceptible to massive failures like this.
And I would point out that -- again I'm not -- I apologize for not having taken the time to provide -- I can provide another 20 slides basically showing the degree to which this happens all through these. These are more dramatic just mainly because -- I used the more dramatic examples because your witnesses suggested that this was something that might not happen.
So again my point would be that I don't expect the same massive type degree of failures as we certainly would see in Bingham Canyon. I do think in a similar context, though, to Butte, particularly as the water rises, there's that potential for some sloughing to occur. Again sloughing is not a huge massive failure, but something that just simply starts to occur with

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these pits over time.
Q. So as I understand your answer, you were -- you were really assuming my question kind of had two components to it, one related to the acidic nature of the Berkeley Pit water, and the other relating to the susceptibility to sloughing of the -- of the walls of the pits in those instances; is that correct?
A. That's correct. I may have tried to answer two things instead of one, not understanding --
Q. You answered more than I asked, but it was helpful because I understood your answer to be that the Copper Flat pit lake, unlike the Berkeley Pit example that is often dredged up as an example of a real problem at an operation -- the Copper Flat pit lake is not expected to become an acidic lake like we have at the Berkeley Pit in Butte, Montana.
A. I would agree with that characterization.
Q. All right.
And are you aware of -- are you aware of whether there is -- are you -- do you understand the term "argillic alteration zone"?
A. Yes, I do.
Q. And can you describe what that is?
A. Essentially when we talk about an argillic alteration zone, what we're referring to is

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solidification of the deposit. Argillites are essentially harder, silicified materials that can exhibit different characteristics.
Q. And is that a condition or a situation that was present at -- either at the Berkeley Pit walls or the Bingham Canyon walls?
A. As a dominant feature, no. I couldn't speak as to whether it might have been small amounts, but certainly, you know, that -- to my knowledge, that was not part of the areas in particular that these slumps that I'm showing occurred in.
Q. And you're --
A. So when I --
Q. I assume you're also aware that that's not a part of the conditions that would be expected to be present at the Copper Flat pit walls.
A. Yes. Again my testimony is that a similar occurrence, but not the same type of occurrence. I would not expect it to be as severe as we're showing on these photographs.
Q. Thank you.
I'd like to read a provision of DP-1840. I think it's from the August version that was attached to the statement of intent to present technical testimony offered by the New Mexico Environment Department. And

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in particular I'm referring to what's renumbered C117, Financial Assurance.
And the paragraph I'm going to read is A. And I'd like you to just listen to that paragraph and then ask you whether in your view that complies with the Copper Rule as it -- as it came out after the process that you were involved in.
The paragraph reads "The permittee shall maintain joint financial assurance with NMED and the Mining and Minerals Division of the New Mexico Energy, Minerals and Natural Resources Department to cover costs associated with closure and post-closure activities approved under this Discharge Permit."
In your opinion, is that -- is that consistent with the Copper Rule?
A. I believe it is.
Q. And I think you've also acknowledged that there's a process ongoing to include not only NMED and the New Mexico Energy, Minerals and Natural Resources Department, but also the Bureau of Land Management; is that correct?
A. Yes. That's my expectation.
Q. And you understand that to be an ongoing process that will likely be farther advanced in time for the hearing that is already scheduled involving the

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Mining and Minerals Division in the latter part of October?
A. I was not aware of that, and I would just mention that in similar circumstances there have been invitations to the public to attend such meetings so that we can provide comment and not have to wait for a hearing. Such an invitation has not been extended in this case.
Q. So although your --
A. To my knowledge.
Q. Although your presentation regarding financial assurance, I'm sure, was very helpful and useful for people to hear, it's not something that necessarily needs to hold up the issuance of DP-1840 given the compliance with the Copper Rule in Section C117A, correct?
A. No. I don't agree. I -- my personal opinion is that particularly given the nature of the financial assurance estimate, the fact that it has obvious deficiencies with respect to, you know, Environment Department issues, for example, I would advise the Environment Department to not get -- if they intend to grant a permit, because that's really the only leverage they're going to have, to negotiate and end up getting the right amount.

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And so to do so, I believe would be a mistake in giving up their leverage to conduct an effective negotiation.

Q. Now, Mr. Kuipers, was the Copper Rule-making process that you participated in one that was mandated by a 2009 amendment to the Water Quality Act?

A. That's my understanding.

Q. And that change, at least for the copper industry, changed the groundwater program from a regime where the Water Quality Control Commission could not specify methods of preventing pollution to one where the Water Quality Control Commission shall specify methods of preventing water pollution from mining operations; is that correct?

A. I would -- I would actually have to read that. I'm --

Q. Okay.

A. I can't say that I'm that familiar with it.

Q. But you testified that you did participate in the stakeholder process, correct?

A. Yes. And if I might describe something relevant to that, but that's very relevant to this discussion.

The original stakeholder process, we put together a financial assurance set of regulations for

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the Copper Rule. We, in fact, have those financial assurance regulations for the Environment Department, in my opinion, finalized and ready to go.

Folks who work with the Environment Department are quite aware that they initially did put together a draft financial assurance guidance, I believe, clear back in the 1990s, at some point, and that had never been revised.

It was our understanding initially starting the Copper Rule to avoid this issue that we're talking about, of making sure that under the Copper Rule we would address financial assurance. We originally had proposed and had again developed complete financial assurance.

What happened, bluntly, was the Mining and Minerals Division showed up with their attorney and, from what I could see, basically informed all of us that they were the financial assurance authority and that they basically told them, ED, not to develop the financial assurance regulations.

So if the Environment Department had, in fact, developed their own regulations, it would make sense to go ahead and use those regulations to finalize the financial assurance as part of this permitting process. But in fact, because of that decision by the State of

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New Mexico, apparently, we now need to wait for the Mining and Minerals Division to do their work under their regulations for the Environment Department to have any confidence whatsoever that this has been addressed.

Q. I think inherent in your answer is that you're acknowledging that there are no financial assurance specific requirements that are tied to the Copper Rule as a result of the circumstances as you understand them.

A. That's right. Despite the fact that we developed very thorough, very competent financial assurance regulations, in fact, the Environment Department has no such regulations today.

Q. And you heard the testimony from one or more of the NMED witnesses that the ongoing process to negotiate financial assurance for the Copper Flat project is one in which essentially the Mining and Minerals Division takes the lead, although NMED takes a careful look at the financial assurance before signing off on it.

A. I should mention, Mr. Butzier, I'm involved in the financial assurance discussions and have been involved intimately in the financial assurance discussions for the Questa Mine, the Chino Mine, the Tyrone Mine, the Continental/Cobre Mine, and I sit in on the meetings with the company and the agency, and I'm

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extremely familiar with MMD's process and the negotiations and ED's role in those processes, as well.

Q. Thank you.

I'd like to go back to one of your slides that was part of your rebuttal that's not a picture but text. Let's go to the first of -- it must be 55.

Okay.

All right. Can we go back to the last slide of your direct presentation. I think that might be the one I'm thinking of.

A. Slide 54?

Q. Yes. Thank you.

Now, this slide I think you testified was sort of comparing the Copper Flat's financial assurance cost estimate with New Mexico Mining and Minerals Division guidance and Bureau of Land Management guidance, correct?

A. Yes. Slide 54, what you're -- what it refers to is actually indirect cost estimate --

Q. Okay.

A. -- more specifically.

Q. More specifically. Thank you.

And you pointed out on this slide that the total indirect cost percentage in the Copper Flat proposal was 26 as compared to 46 percent under the

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NMED -- MMD guidance and 32 percent under the BLM guidance, correct?
A. That's correct.
Q. And both the MMD guidance and the BLM guidance are just that, they're guidance; is that correct? They're not actual regulations.
A. The -- I believe that's correct in both cases. Yes.
Q. And were you aware that the Mining and Minerals Division guidance is only a draft guidance, it's not even a guidance, it's a draft guidance at this point?
A. Mr. Butzier, I clearly testified to that previously, that I recognized, in fact, it was a draft guidance.
Q. Okay. I apologize if I missed that. I just wanted to emphasize that.
So as part of the stakeholder process that you were -- you participated in and in the development of the Copper Rule, much of what was involved in that was an intention to draw upon the experiences, both good and bad, from decades of open pit copper mining activity in the New Mexico -- in New Mexico as well as other parts, correct?
A. That's correct. And I just would expand a bit

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that it wasn't just copper, but we took into account regulations that were applicable to gold mines, molybdenum mines, all kinds of mines, recognizing that copper and what we do with copper is not explicit to only copper.
Q. And in much of your presentation over the last two days, you've talked about some sort of policy notions like adaptive management principles, performance of sensitivity analyses, taking into account uncertainties, taking extra precautions related to those uncertainties. I'm sure you recall all of that testimony.
A. Yes, I do.
Q. And as a participant in the Copper Rule-making, you had the opportunity to advocate for many of those same kinds of policy-oriented concepts, correct?
A. I advocated for some policy concepts to be brought into regulation, but I also recognized and advocated that many of those same concepts in the same way as exist in other agencies are better provided as guidance.
Q. And you would acknowledge that they did not find their way into the Copper Rule itself, would you not?

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A. Again I think the decision was made that -- again consistent with recommendations that some aspects belonged in the rule and some were better left to guidance, as -- and many of these things, I might mention, more importantly, this is what industry and the folks in industry who are trying to address these issues have recommended that industry, in fact, incorporate.
And so my real hope would be that the agencies would not need to, in fact, put this kind of information in regulation, but rather a good, responsible, progressive mine operator would go ahead on their own and ensure this was already the fact.
Q. Now, in your participation in the Copper Rule-making and the working groups leading up to the rulemaking, your participation included many of the same sort of parade of mishaps, unfortunate mishaps that you've described in your testimony in this proceeding, correct?
A. I absolutely don't recall having done that. If anything, my parade was to bring in other examples of regulations and policy from other jurisdictions given the fact that I work in so many jurisdictions, both in the US as well as Canada.
Q. And your purpose in this proceeding was to focus on mishaps, and you didn't, for example, make any

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effort to acknowledge, for example, the extensive reclamation awards and recognitions that have been received, for example, by the Tyrone and the Chino operations.
A. Certainly, I would acknowledge that they have received awards, and I would acknowledge that they have done some very good work.
Q. And are you aware that Mr. Stein of Golder, who has participated in this proceeding, has been involved in much of those reclamation efforts that have resulted in awards at Tyrone and copper?
A. I was --
Q. And Chino. Excuse me.
A. I was not specifically aware of his involvement as -- at least in the exposure I've had to the company, he's never been involved in the discussions.
Q. And going back to the Copper Rule, when the WQCC -- or the Water Quality Control Commission adopted that rule after it was proposed by the New Mexico Environment Department, following the stakeholder working process, that all was appealed, was it not?
A. Yes. That's my -- yes. It was.
Q. And the rule -- the Copper Rule was upheld by a unanimous panel of the Court of Appeals as well as the

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unanimous opinion from our New Mexico Supreme Court, correct?
A. I've heard that testimony from others. Yes.
Q. And you recall the testimony from the New Mexico Environment Department characterizing the rule as a very prescriptive rule, setting forth requirements just as the legislature mandated in 2009, specifying methods to protect and prevent water pollution, correct?
A. Yes. And I provided comments relative to that where I talked about this kind of permit by rule approach. That's really in general the approach that you've just described.
Q. Now, I noticed that when you were -- when you had up on the screen the graph showing 12 years of expected production by New Mexico -- by New Mexico Copper Company --
A. Would you like me to pull that up?
Q. I guess, yeah, why don't you pull that up.
Thank you.
In the context of talking about that, I think you referred to the New Mexico Copper Corporation Copper Flat project as essentially a small copper mining project?
A. Yes, I did.
Q. And I think elsewhere in your testimony do you

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recall referring to it as a major -- major mine?
A. Yes. To explain, within the category of major mines, and it's a fairly well established category, we have mines that range anywhere from 100 tons a day to well in excess of 100,000 tons per day.
Within major mines -- it's really only a division between small miners, which typically are folks like my grandfather, who might be an individual or family-owned mine, or may even be a mine with just a limited number of employees, five to 10. Typically small mines are classified by the acreage they disturb.
And I believe -- for example, here in New Mexico, we have some -- I'm not sure it's called small mines, but there's another term we use for it here, and I can't remember the term right -- exactly right now, but --
Q. Minimal impact.
A. Minimal impact. Thank you. I should have remembered that.
But the minimal impact mines are essentially similar to what we call small mines in other jurisdictions, albeit New Mexico allows for quite a significant more acreage for these mines. For example, in Montana, it's limited to five acres. I believe the minimal impact was revised to allow for 60 acres --

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Q. Correct.
A. -- as I recall testifying in that hearing.
So in this case, what we have here at the Copper Flat Mine is, in fact, a major mine. It's not a small mine. But when we look in the category of major mines, it's -- I think I would classify it as a medium to small within that category, probably more properly classified as medium-sized.
Q. And I couldn't help but notice that many of the mines you referred to in the course of talking about the policies that you're promoting through your testimony in the last couple of days those are -- those are very significant major mines that you -- that you talked about, correct?
A. Yes. And primarily because that's the experience we have in New Mexico. Unfortunately, we don't have examples of these medium-sized mines having operated in New Mexico to provide experience with.
I, however, do have knowledge of quite a number of other medium-sized copper mines that have been developed and operated and subsequently closed in the United States, as I previously described. Many of those operations have been marginal operations, and there are many examples of all the things that I've addressed here similarly occurring at medium-sized mines, as well.

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Q. And where --
A. Certainly not to the same magnitude, I want to be clear on that, but they still occur.
Q. And where would you put the mica mine that you referred to that way back when was once a Franklin Industrial Minerals mine, then it became an Ogelbay Norton mine and then -- and then other things on the Picuris Pueblo? Where would you put that on the scope of size of mines that we're talking about?
A. It wouldn't be classified a major mine. It might be minimal impact today in New Mexico, but at its time, it would not be considered a small mine. But in the realm of major mines, because it was approximately 60 acres, I would -- and I did characterize it as a small mine in comparison during my testimony.
Q. And you talked about long-term monitoring that is occurring at that mine; is that correct?
A. Well, there was a plan to do long-term monitoring and maintenance, some of which got done for some period of time, and then some of which I would acknowledge has not been conducted for some time.
Q. And are you aware that the monitoring that was required at that mine by the New Mexico Environment Department was five years?
A. Well, since we actually did the Reclamation

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and Closure Plan without an approved permit -- and I might explain the rationale for that was I worked with the state for two years on behalf of the pueblo, trying to get the US Hill Mine Reclamation and Closure Plan permit completed so we could perform reclamation.

I and my clients had managed to obtain the monies to obtain the mine and perform the reclamation. We had 600,000 in the bank to do the work. After two years of negotiation, I realized it might take several more years. So we decided at our risk, as the owners, if you will, to go ahead and do the reclamation and closure without receiving a permit from either agency.

So that may have been their intention, but, in fact, the work was done without a final approved permit.

Q. Thank you. I may have misspoken on that. I appreciate the clarification.

So the company itself went through a five-year postclosure monitoring period, correct?

A. The mine shut down, and the company went bankrupt, and literally the mine had been operating the year before they went bankrupt. So no, they did not. They were not there to do it. It's an example of where there was a transition, and much was lost in the transition.

Q. I'd like to turn back now to the very major

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mines that you referred to throughout your testimony, including the Tyrone and the Chino Mine, the Bingham Canyon mine and others.

And am I correct that literally all of those operations were initially permitted under something other than the Copper Rule?

A. You are absolutely correct. In fact, most of those operations were started before there were even environmental regulations in existence.

Q. And most of them were not only started, but fully developed and in the throes of significant production activity.

A. Yes.

Q. And in contrast to those, which -- which I think you would recognize to the extent there are copper mines in New Mexico fit the category of an existing copper mine under the Copper Rule. Okay? Is that correct?

A. Yes.

Q. So in contrast to that, Copper Flat's being permitted as a new mining facility under the very prescriptive requirements that apply to new mining facilities under the Copper Rule, correct?

A. Is there a question?

Q. Am I correct?

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A. I didn't catch the question. I'm sorry.

Q. Copper Flat is -- there's a contrast between those that were initially permitted before the Copper Rule and Copper Flat.

A. That is what we would anticipate. It's -- I think we need to keep in mind that since the Mining Act has been put in place I don't believe we've had a new metal mine permitted in the state. So we really just simply don't have the examples that I would prefer to have used because of the situation here.

There certainly -- I could provide numerous examples from other states, though, that were -- provide better similarities.

Q. And there are at least two or three other important contrasts between the New Mexico Copper Corporation's Copper Flat Mine and -- let's just stick to the three Freeport-McMoRan mines, Tyrone, Chino and Cobre/Continental. Would you acknowledge that?

A. Well, you said there are --

Q. There are three -- there are three significant other distinctions.

Can you anticipate what I'm talking about, or do you want me to walk through them?

A. I'm not going to speculate as to --

Q. Okay.

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A. -- what your three might be, Mr. --

Q. Well, one of those -- one of those is that at those operations there's -- there are acid leach processes and leach stockpiles, and that's not going to occur at the Copper Flat Mine, correct?

A. I believe that's true for the Chino and Tyrone Mines. I do not recall those at the Continental/Cobre Mine.

Q. And New Mexico Copper Corporation proposes to line its tailings facility, and that's a distinction, as well, none of those other operations have lined tailings facilities; is that correct?

A. That's correct.

Q. And there's -- would you acknowledge that there are much different drawdown considerations that come into play when a facility is lined versus not lined?

A. Actually, I've just completed an analysis for that on several tailings impoundments. Well, drawdown -- draindown you mean -- I'm sorry --

Q. Draindown. Yes.

A. Draindown. Yes.

Again if you're unlined, you assume that there's no really capture, if you will, or otherwise, and you allow the seepage to go into the groundwater,

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and then somewhere downstream you would collect that seepage along with any groundwater that that seepage had mixed with.

Q. And then what happens when you collect it downstream?

A. That water is then typically recycled back to the milling facility for reuse.

Q. And then ultimately finds its way back to the tailings facility?

A. Yeah. It goes in a cycle, around and around.

Q. All right.

I'd like to talk and ask you a few questions relating to your experience at the Golden Sunlight Mine.

Do you recall referring to that in your testimony?

A. Yes, I do.

Q. And that's a Barrick operation some number of miles from Butte, Montana, correct?

A. Yeah. Originally owned by Dome Mining, and then it became Placer Dome Mining, and then, yes, Barrick is the most recent owner of that mine operation.

Q. And that's a gold mining operation, correct?

A. Gold and silver, correct.

Q. And am I correct that although there's a carbon and pulp process as part of the processing of the

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ore in that case, there's also a crushing component that includes cyanide heat leaching in that operation; is that correct?

A. No, sir. There was historic cyanide heat leaching. A good friend of mine, Carl Martin, was actually part of that operation, and I don't recall exactly, but I believe that operation occurred in the 1970s, the fourth current major mining phase at the Golden Sunlight Mine. They are a carbon and pulp processing plant, and their current operations do not include any heat leaching.

Q. During what period of time were you employed there?

A. I was employed there 1982, I believe -- it was '82 or '83. I'm not looking at my resume. But it was essentially the year before I graduated from the university.

Q. So it was for less than a year?

A. Actually it was just for a summer.

I have been involved -- I might mention that my family's mining properties are contiguous to the mine. My family's mining properties in part were purchased by the mine. My uncle, who is a rancher, has the land directly adjacent to the tailings facility. And I have been employed continuously for quite some

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time in various capacities, either in industry or otherwise, and involved in Golden Sunlight.

So it's a mine I pretty much have continuous involvement in one way or another, for its mine life pretty much goes along with mine, professional history of almost 35 years.

Q. Okay.

Is it your testimony that after the summer that you worked there, that there has not been any cyanide heat leaching at that mine?

A. You know, if there was, Mr. Butzier, to my knowledge, it was not part of the major production. And again I'm quite certain when I was there in 1982, '83 there weren't -- they might have done some experimental or small scale that I'm not familiar with. But I would be quite confident in suggesting that greater than 99 percent of the production that has resulted from the Golden Sunlight Mine since 1983 came from conventional carbon and pulp processing.

Q. And at the time that you worked there for a summer, was there one tailings facility?

A. The first year I was there, in fact, a large part of what I spent the summer doing was actually putting slots in the pipe for the tailings underdrain that was going to lay on top of that clay liner that was

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part of the original tailings facility design.

Q. Okay.

And I think -- I think your answer is there was one tailings facility --

A. Yes. There was --

Q. -- when you worked there?

A. Initially there was one tailings facility lined with clay.

I'll go ahead and explain. That facility was built on an area where we had what we call frosting, and in Montana we get periods of cold, could be below zero for some period of time. We kind of get what you almost refer to as a -- as a kind of intermittent permafrost. What happens is the clay soils essentially freeze and begin to heave, and it compromised the clay liner severely.

So that yes, they had initially a clay-lined tailings impoundment that was -- you know, we used to describe it leaking like a sieve, and that is why they decided to install the lined impoundment, to my knowledge.

Q. And I think you testified to a pumpback system that -- some kind of a pumpback system or collection system that then put materials back onto the unlined tailing facility.

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A. Well, actually the materials don't go back to the unlined -- the pumpback system that we're talking about, that pumpback system returns back to the milling circuit.
Q. Okay.
A. Typically, to my knowledge, that was how it was set up. And as I described, between the initial tailings impoundment and the second one, there is a pumpback system of -- it may be 57 instead of 60, but it's a large number of wells that have been required to be installed around both of them to account for the basically constant seepage.
Q. The -- are you aware that the pumpback system that you're describing exists at the unlined facility but does not exist at the lined facility?
A. I would dispute that contention. The records I have suggest that at least part of that pumpback system is also in place and is in seepage that potentially is coming from the lined. There may be some suggestion that we don't know exactly which one every gallon is coming from, but I've never heard a contention that none of that pumpback system is related to Pond Number 2 at the Golden Sunlight Mine before.
Q. But the pumpback system that's in place at the Golden Sunlight Mine is a system that was put in place

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in connection with the first tailings dam that's unlined, and it has not been expanded or further emplaced after the completion of the lined tailings facility, the second dam facility at that site; is that correct?
A. That's not my exact recollection. I do know the initial pumpback system was installed relative to the first impoundment; however, again I would need to go look at the actual files I have -- I have them here on my computer if I needed to -- to actually verify whether there was or wasn't for the second.
But I'm -- at least to my recollection, I'm quite certain that at least some -- and again the existing pumpback system today is there in order to deal with solution -- or seepage that's coming from the newer of the impoundments.
Q. And if I'm correct that at least part of the process at that mine is sort of a secondary crushing and cyanide heat leach process, that would be an important distinction between that facility and the Copper Flat facility, correct?
A. Well, again I actually suggest that simply the cyanide leaching versus flotation is a -- is an important distinction. I'm not sure where I -- heat leaching versus carbon and pulp relative to this

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conversation would have any bearing, because what we see at mine sites that employ either are very similar characteristics in terms of groundwater seepage capture and various other matters.
I will suggest that we don't see seepage as often on heat leach piles.
Q. I'd like to turn now to the draindown management discussion you had relating to Copper Flat.
And you acknowledged that the draindown period that's proposed is 25 years from cessation of mining, correct?
A. Yes. That's the five years of active management of draindown. I should say the draindown treatment. That doesn't mean the draindown is limited to 25 years. Just simply they propose treating the draindown either with active evaporation or passive evaporation for a period of 25 years.
Q. And you testified that the five years of active management was standard procedure in the industry, correct?
A. Well, the standard procedure is actually to do a draindown calculation and to base the actual requirements and process fluid stabilization program, which is again basically what we're describing here for the tailings, on those results.

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So when you look, for example, after that, you got results from probably 10 different tailing storage facilities, I've seen that estimate be anywhere from three years to -- I think as long as 10 years for that more active draindown management.
That's typically a function of size as well as the material characteristics. Finer material, for example, finer ground might take longer to drain down, whereas coarser materials drain down more quickly. If you have an internal drain such as we're talking about here, that does help us drain down more quickly.
In fact, an analysis that I just reviewed last week suggested that the drain will increase or decrease by half the amount of time required to drain down.
Q. So as I understand it, you'd like to change or at least expand upon your earlier testimony that a five-year active management period was pretty standard in the industry.
A. Well, again if I had to kind of average out everything that I've seen, I'd say five years is an average what industry sees.
Q. And then the other part of the 25 years is a passive evaporation period.
Do you recall testifying about that?
A. Yes, I do.

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Q. I didn't hear you say whether you thought that was standard procedure, and I'd be interested to hear your thoughts.
A. I do believe I did say that it, in fact, was. Again I described a sequence that's being done as a similar sequence to what I'm seeing being done in similar climates such as Nevada. And I'm not in any way, shape or form suggesting that it's not, in fact, what I would recommend.
The main thing that I am testifying is a difference is I just have not had experience, have not seen those circumstances where it just -- everything came out perfect and it just suddenly ended at year 25.
Where they have similar features, we always see follow-up, long-term monitoring and maintenance, recognizing that necessity when we put together these type of systems.
Q. Thank you.
Now, I would like you to return to the slide on your rebuttal of David Kidd, if you would.
On that first bullet point, you acknowledge that the testimony from Mr. Kidd was that the Copper Flat, New Mexico Copper Corporation was planning to go through the OSE dam safety process, and you acknowledge that's separate from this process, correct?

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A. Yes, I did.
Q. And you indicate on your bullet point with an exclamation mark at the end that you would have preferred that that happen prior to this hearing, correct?
A. Absolutely.
Q. That said, you would not dispute the fact that this proceeding can come to its conclusion before that process is completed.
A. You know, that I think would require a legal conclusion on my part --
Q. All right.
A. -- and I don't think I should do that.
MR. BUTZIER: Thank you.
That's all I have, Madam Hearing Officer.
MS. ORTH: All right. Thank you, Mr. Butzier.
Mr. Knight, do you have questions of Mr. Kuipers?
MR. KNIGHT: I do. Just a few.
CROSS EXAMINATION
BY MR. KNIGHT:
Q. Good morning, Mr. Kuipers.
A. Good morning, Mr. Knight.
MR. KNIGHT: Madam Hearing Officer, if I -- I think we can get done probably in the next 15 minutes

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if -- depending on the length of the answers.
MS. ORTH: That's fine.
MR. KNIGHT: Okay. I just realized that it's just about lunchtime.
Q. Mr. Kuipers, on slide 18 -- if you'd go to slide 18.
A. Yes.
Q. Let's see. I believe on slide 18 you provided --
Excuse us just for a moment. We're trying to make sure we have the right slide here.
One of your slides you provide a statistic of 90 percent, where you say 90 percent of predictions are incorrect?
A. Yes. Let me see if I can find that.
You know, you're going to have to remind me what it is, unfortunately. I --
Q. Okay. You have to go through them a little slower.
A. Yeah. I'm sorry.
I was talking about uncertainty. I'm sorry. That's -- so I need to go back.
There we go.
Q. Thank you. Okay. Slide 17, not 18. Thank you.

1142

On slide 17, you provide a statistic of 90 percent related to predictions ending up significantly wrong.
Where did that statistic come from, and can you describe what you mean by a determinative model, and might you actually be speaking of a deterministic model?
A. I forgot -- it would have been better to use that word, deterministic, rather than determinative; however, I have seen that same phrase used elsewhere. So -- but I do understand what Dr. Marcoline may be referring to there.
But just to clarify what I was testifying on, this opinion, if you will, results from the 2006 study that I did together with Dr. Ann Maest where we collected information from environmental impact statements and basically compared the predictions made in those environmental impact statements to the actual water quality results that occurred on those mines following those statements.
Now, folks familiar with environmental impact statements and other regulatory processes realize that one of the things that they force, in my opinion, the company to do is basically come back with a prediction that they're going to meet water quality standards. If that's not your prediction, you don't get a permit.

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It's that simple.
That requires a deterministic evaluation of what you think that actual water quality will be. And I can't tell you how many EISes I've reviewed where, for example, the water quality for arsenic, that standard may be three parts per billion and the prediction comes back and says, oh, it will just be 2.
That's, unfortunately, what the permitting process forces us to do, is to take these models with highly uncertain aspects and predict an exact number.
So what we did is we actually looked at those, if you will, exact predictions in the EISes and said, well, what actually happened at the sites. And what we discovered was that in nearly again all cases there were changes in water quality, in many cases quite significant, but in, you know, again nearly all cases, 90 percent or better, where we had exceedances or other nonpredicted water quality impacts that were showing up.
Now, if you read the study, it's very important that -- and I did testify to this earlier, that the characteristic we identified for those mines that had this characteristic most predominantly was near surface -- near surface water and/or near groundwater. Okay? Without a preference of either one of those, one might appreciate the likelihood doesn't occur.

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The Copper Flat mine, while we don't have, if you will, near surface water in terms of streams -- we would typically classify near as being adjacent to or actually going through the site -- we do have what we would have classified as relatively shallow groundwater in the system, groundwater essentially at the surface. So that would qualify this mine as having potentially that same very high probability as with other mines.
Now, I've also since 2006, and I have been hoping to replicate the study or somebody else would replicate the study, but continued to look at the same EISes, other mine sites' EISes, look at the water quality data. I remind folks that I essentially almost did this for 15 years continuously for EPA on all the projects in Region 9 and 10.
And we continued to see, even with more modern sites, some of the same type of results. I do think using the practices that we're recommending can decrease that likelihood significantly, but again my testimony is that it will not prevent that from happening entirely, based upon my knowledge and experience.
Q. Thank you.
When speaking about waste rock predictions at the Chino and Tyrone Mines, and you mentioned that based on predictions it is not expected to have -- see if I

1145

got your testimony correct -- you testified that those were not expected to have acid rock drainage for 250 to 300 years?
A. There were parts of it. I believe more specifically the predictions for the delays were related to the tailing storage facilities. If I didn't make that clear, I take that opportunity to do so now.
I believe there were some -- some prediction of delays in the waste rock dumps, but I believe the more specific ones that were predicted to occur decades or even centuries in the future were more typically related to the tailing storage facilities.
Q. Okay. Thank you.
Let's see. On your slide 30 -- go to slide 30.
Your subtitle is Steps addressing liner seepage.
A. Yes.
Q. Is that right?
Can you explain how this slide relates to -- how this slide relates to addressing liner seepage?
A. Well, essentially what again this slide does is take the requirements of the Copper Rule, and essentially I just paraphrased those requirements in these four steps. And those requirements are specific

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to addressing seepage, as noted.
Q. I might not agree, but I'll take that as your answer.
On slide 32 of your presentation, you suggest that the industry standard practice is the Giroud and Bonaparte, 1989?
A. The industry standard as described by Giroud and Bonaparte. Again as I've testified, this is not the only way in which we address liner seepage. We also typically address it as well from a failure mode effects analysis standpoint and allow for other than this simple calculation to guide us.
And again as I testified, what is recognized is that when we do have seepage and we base those seepage estimates on this technique in nearly all cases it's at least one, if not two orders of magnitude greater than were estimated by this theoretical technique.
And where I said permeation rates less or more, which may be somewhat confusing, what I really would have been better to refer to is seepage rates. So the seepage rates are estimated to be several orders of magnitude higher than the results resulting from the membrane defects.
And so I think I may have -- now that I look

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at this, that language I have here may be a little confusing. So -- yeah. What I intended to make clear was that when we do estimates such as the .5 gallons per minute that were estimated in this case, using essentially this method, a theoretical equation, that when we have a deserved seepage occurring in mine sites, it has almost always been 1 to 2 orders of magnitude greater in terms of the volume of seepage than was estimated using these equations.

Q. Thank you for that clarification.

In your rebuttal testimony, you indicated that the Copper Rule requirements leave the determination as to the thickness of a liner system to be placed under a tailing impoundment -- that's left to the judgment of the engineer, and I believe you suggested they should use a -- or your recommendation was for a 100- to 120-mil liner; is that right?

A. Yes. And there is a phrase about "or equivalent to" in the Copper Rule, which to me says you don't -- you know, it can be different than what's required -- or what's used as the kind of minimum standard in the rule.

Q. Now, does the Copper Rule require that a tailing impoundment be lined at all?

A. No.

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Q. Is it correct that the Copper Rule allows for an unlined tailing storage facility with an interceptor system instead?

A. Yes. I believe that actually was the result, if you will, of the ultimate decision by the courts, was to accept the Copper Rule with that as part of it. That, in fact, was, I believe, the major issue that my clients had with the Copper Rule at that point.

Q. So would you agree with me that the liner that's being proposed for the Copper Flat Mine tailing storage facility goes beyond the requirements of the Copper Rule?

A. I would have to look more carefully, but I would not disagree that it, in terms of the design of the liner system, meets requirements of the Copper Rule.

Q. Thank you.

You stated in your -- you stated in your testimony -- in your rebuttal testimony that the department is giving up its leverage, as it were, to -- over decisions relative to financial assurance. Perhaps that was during the cross-examination.

Do you recall Mr. Vollbrecht's testimony that Mining and Minerals Division cannot issue a permit without a determination from NMED that all environmental laws and requirements of those laws have been met?

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A. Yes. I'm extremely familiar with that requirement in the Mining Act.

Q. Are you aware that the department can withhold providing that determination if there is a disagreement over financial assurance?

A. I'm aware that they could.

MR. KNIGHT: Okay. That's all the questions I have.

Thank you.

MS. ORTH: Thank you.

Ms. Barncastle?

MS. BARNCASTLE: I have a brief cross-examination.

MS. ORTH: Okay. Please go ahead.

MS. BARNCASTLE: I don't have a microphone. Should I have one?

MS. ORTH: Yes. It's coming your way.

(Discussion off the record.)

MS. BARNCASTLE: Thank you.

CROSS EXAMINATION

BY MS. BARNCASTLE:

Q. Mr. Kuipers, my questions are directed to you being an expert on the Copper Rule.

Are you aware that the Copper Rule provides that, quote, the secretary shall approve a Discharge

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Permit provided that it poses neither a hazard to public health nor undue risk to property?

A. Yes, I am.

Q. And that section is New Mexico Administrative Code Section 20.6.7.10 subsection J, as in Julia? Are you aware of that?

A. Yes, I am.

Q. In your opinion, does that provision -- and I'm addressing my question now to your slide 43, the final bullet point on that slide. No. I'm sorry. The second to the last bullet point on that slide.

A. Yes.

Q. In your opinion, does that provision facilitate the agency cooperation necessary to ensure that this Discharge Permit is not issued before other agencies have an opportunity to perform their required analysis or otherwise that this permit could be issued with key conditions requiring agency cooperation?

A. I'm really sorry. I'm going to have to ask you to repeat that.

Q. Okay.

In your opinion, does the provision that we just cited facilitate the type of agency cooperation you're talking about here on your slide 43?

A. Yes, it does.

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Q. Such that -- okay.
Such that this Discharge Permit could either not be issued before other agencies have an opportunity to perform their required analyses or that this permit could be issued with key clinicians requiring agency cooperation?
A. That's my understanding.
Q. And would you agree that one such form of agency cooperation can be found in this discharge draft permit at C105C.2, where NMED is seeking to require compliance with Dam Safety Bureau requirements before initiation of construction of any portion of the tailing storage facility?
A. Yes.
Q. Are there any more opportunities for agency cooperation such as for water rights permitting or financial assurance?
A. With respect to financial assurance, I believe so. I'm not sure with respect to water rights.
Q. Can we determine if there is an undue risk to property or a hazard to public health without doing a dam breach analysis for the tailings dam?
A. Well, I think in order to really make that judgment, it's not only necessary to do a dam breach analysis, but, as I mentioned, I would actually consider

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the failure modes effects analysis to be as critical if not equally critical.
And again I think in terms of how we treat this tailings impoundment, lacking that information and inundation analysis -- for example, I would think that if this facility were to fail and it could potentially result in the loss of human life, we might want to go back and look hard at what the design was and other features.
So in my opinion, experience, an inundation analysis is a fundamental almost first principle that needs to be performed as part of the conceptual dam siting decision, not as something after we've already studied where we're putting the dam.
Q. And in your opinion, is issuance of this Discharge Permit premature where we cannot determine whether compliance with the hazard to public health or undue risk to property provision of the Copper Rule has been achieved?
A. Yes. It is absolutely my opinion that that information should have been available, included as this permit at the level required by the OSE, as I previously testified.
MS. BARNCASTLE: Thank you.
I have no further questions of this witness.

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MS. ORTH: Thank you, Ms. Barncastle.
Is there anyone else present who has a question of Mr. Kuipers based on his testimony?
All right. Mr. de Saillan, do you have follow-up?
MR. DE SAILLAN: Just a few, Madam Hearing Officer.

REDIRECT EXAMINATION

BY MR. DE SAILLAN:
Q. Mr. Kuipers, Mr. Butzier asked you a few questions about the Mining and Minerals Division guidance on financial assurance.
Do you recall those questions?
A. I do.
Q. And he emphasized the fact that the MMD guidance is a draft?
A. That's correct.
Q. And is it unusual in your experience for an agency to use a draft guidance essentially as a guidance?
A. It is not at all unusual. In fact, that happens in almost all cases that I'm familiar with.
Q. Okay.
And what's the point of using a draft guidance as a guidance?

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A. Well, the main thing is for some reason through the various bureaucracies and other things, I found that getting from a draft guidance to a final guidance can take periods of years, even decades.
You know, best example I can give you is I have rewritten EPA's draft guidance for both mine-impacted water prediction and for tailing storage facility designs. Those first draft guidance was actually done in 2013. The latter was done at the end of 2017. I would not expect to see either one of those as final guidance, perhaps not even ever.
But in the meantime, I do know the agency internally does use that to guide what they do.
Q. And so effectively the draft guidance serves the same purpose as a final guidance.
A. Yes.
And, you know, I'd even point out another example. I did the 2005 mine cleanup and financial assurance guide for the USEPA, in 2005. And EPA has actually put that guide out on their web site and made it available to the public even though it's a draft guide because they recognized the value of what's in there and realized that even if there's formal guidance it's something they still wanted to make sure that their regulators were aware of.

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MR. DE SAILLAN: Thank you.
I have no further questions.
MS. ORTH: All right. Thank you.
Any reason not to excuse Mr. Kuipers?
No?
Great. Thank you very much, Mr. Kuipers.
MR. KUIPERS: Thank you for the opportunity.
MS. ORTH: And we are on break until 1:30 for lunch.
(Proceedings in recess from 12:20 p.m. to 1:38 p.m.)
MS. ORTH: We're back after a lunch break.
We have one request for public comment before we begin our next technical witness.
Ms. Diamond.

CRYSTAL DIAMOND

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. DIAMOND: Madam Hearing Officer, I appreciate the opportunity to comment.
My name is Crystal Diamond.
I'm the director of Sierra Soil & Water Conservation District, a division of state government, governed by a board of officials elected by all

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registered voters within the district boundaries, in our case Sierra County, Catron County, Socorro County and parts of Dona Ana County.
By state statute, our district is charged with furthering the conservation, development, utilization, flood prevention and disposal of water and thereby preserve and protecting New Mexico's land and water resources.
Earlier in testimony, a representative from Turner Properties spoke of protection and conservation measures implemented on the Ladder Ranch. The term "pristine water" was referenced throughout.
Ironically, it was our district and community landowners that seemed most concerned for water quality of Animas Creek when just four years ago the ranch proposed the poisoning of our creek waters, including rotenone, to kill out all fish inhabitant of our stream in an effort to introduce the Rio Grande cutthroat trout.
The poisonous waters would reach Caballo Lake, effectively killing fish species the ranch classified as undesirable. Additionally, it was not disputed that the protected species such as leopard frogs within the waters would be killed in the process.
Impacts to irrigation and livestock waters

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were unknown. The community pushback was extreme. The project was abruptly halted when a federal judge ruled that the cutthroat trout did not warrant protected species designation, a ruling that pleased many within Sierra County, specifically respondents along Animas Creek who were not pleased at the attempt made by their upstream neighbor to poison the water.
Our orders to promote sustainable conservation through multiple-use practices is a mission we take seriously. Therefore, we were not quick to support the opening of Copper Flat Mine without first being confident that our land, water, air and wildlife would not be negatively impacted.
Like the Ladder Ranch proposal, the conservation district was equally concerned about the impact Copper Flat proposal would have on our natural resources, specifically water quality. We have carefully reviewed the proposals and studies and called numerous meetings with Copper Flat representatives, including onsite visits.
Our concerns and the concerns brought to us by the many farmers and ranchers we serve have been thoroughly and adequately addressed. We are confident that the mine has put in place measures of adequately protecting our waters and land.

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It appears the effort to stop the opening of Copper Flat Mine is not based on genuine concern for the environment. The opposition seems spearheaded in an attempt to profit from protections generated of an ecotourism business that relies on quiet open spaces and views.
Sierra County welcomes this business, just as we welcome the business opportunities of another, to use the land responsibly and wisely, generating profits for themselves while conserving the lands for future land stewards.
This mining project has met what is required of them. We urge for the permitting to be granted. Together with the overwhelming majority of our citizens, Sierra Soil & Water Conservation stands in full support of Copper Flat Mine.
MS. ORTH: Thank you, Ms. Diamond.
If you'd leave your paper on the table there.
MS. DIAMOND: Sure. Thank you.
MS. ORTH: Thank you.
Mr. de Saillan, we turn to your next technical witness.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
Our next witness is Dr. Tom Myers.

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And, Madam Hearing Officer, if there are no objections, we would also like to present the rebuttal testimony of Dr. Myers at the end of his direct testimony as we did with Mr. Kuipers.

MS. ORTH: I continue to think that's a good idea.

MR. BUTZIER: No objection.

MS. BARNCASTLE: No objection.

MR. KNIGHT: No objection.

MS. ORTH: All right. Thank you very much.

TOM MYERS

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DE SAILLAN:

MR. MYERS: Before I get started, I've got the wrong presentation loaded up here. It's -- my rebuttal presentation got loaded rather than my regular presentation.

MS. BARNCASTLE: Madam Hearing Officer, I have to excuse myself. It's that time again.

I will not have any objections to qualifying this particular witness as an expert.

MS. ORTH: Thank you, Ms. Barncastle.

MR. MYERS: Now I think we're ready.

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Q. (BY MR. DE SAILLAN) Good morning, Dr. Myers.

A. Good morning.

Q. Excuse me. Good afternoon, Dr. Myers.

A. Yes. It is afternoon. Good afternoon.

Q. Could you state your name and occupation for the record, please.

A. My name is Tom Myers, and I'm a hydrologic consultant based in Reno, Nevada.

Q. Now, let's begin by discussing your qualifications.

Could you describe your postsecondary education, please.

A. Yes. I have a bachelor's degree in civil engineering from University of Colorado at Boulder, and I have a master's and PhD in hydrology/hydrogeology from the University of Nevada at Reno.

Q. Okay.

And could you describe your professional experience, please.

A. Sure. After my bachelor's degree, I worked for five years for the Bureau of Reclamation, based in Boulder City most of the time. In that -- in that job, I was a hydraulic engineer, working on planning and design occasionally of Bureau of Reclamation projects.

After that, in 1988, I returned to graduate

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school and was employed as a research assistant, research associate and occasionally a teaching assistant through my graduate level work. The research was in support of some of my dissertation work and involved a lot of fieldwork and stream morphology and things like that throughout the Great Basin.

Beginning in 1993 and overlapping partly with my graduate schoolwork and university work, I began to work as a -- as a hydrologic consultant on a part-time basis.

After graduation in 1997, I began to consult a lot more, and I have been working as a consultant ever since.

For a period of time between 1999 and about 2004, I was the executive director of a nongovernmental organization known as Great Basin Mine Watch, which was a group -- sort of a coalition of ranchers, environmental community and Native Americans working in -- on reforming mining in the Great Basin.

As a hydrologic consultant, I have worked on quite a few types of projects. I've worked on mining, natural gas development, water rights, water supply issues.

Specifically with regard to mining, I have done groundwater modeling, contaminant transport

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modeling for a variety of mine sites. I have -- well, I've had two groundwater models used in EISes in the past. One was a mining project, one was a water rights project.

I have a couple of papers written regarding contaminant transport that I've published in journals, one on sulfate transport in Minnesota and one on selenium transport in Idaho.

I've done a lot of work as a consultant also in -- on monitoring wells and monitoring well designs.

I should have mentioned a lot of my clients as a consultant have been as -- have been conservation groups and other Native American groups.

I've also worked for state government of California, and I've worked for several counties, including White Pine in Nevada, Pima County in Arizona and Routt County in Colorado, doing a variety of things.

I think that --

Q. Okay.

Now, Dr. Myers, you've been provided a document that's marked as the Ranches Exhibit 22.

Could you identify that, please?

A. That is my curriculum vitae.

Q. And is it accurate?

A. Yes, it is.

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Q. And is it current and up to date?
A. To the last month or two, yes.
MR. DE SAILLAN: Madam Hearing Officer, I would like to qualify Dr. Myers as an expert in hydrology and hydrogeology and in mine remediation.
MS. ORTH: Objections?
MR. BUTZIER: No objection.
MR. KNIGHT: No objection.
MS. ORTH: He's so recognized.
MR. DE SAILLAN: Thank you.
Q. Dr. Myers, have you prepared a presentation for today's hearing.
A. Yes, I have.
Q. And could you give us an overview of that presentation, please.
A. Certainly. I have about five different major topics that I'm going to talk about today.
The first one has to do with seepage from waste rock, including addressing the idea that andesite serves as a natural liner beneath the waste rock.
The second thing I'll very briefly just mention on the leaks that -- through liners and seepage from unlined ditches.
Then the third thing I'm going to talk about rather extensively is monitoring wells and the necessary

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spacing and placement of those monitoring wells. And in doing so, I'm going to present some calculations and the estimates of plume development from potential leaks. I'm going to estimate the size of plumes in different formations, travel time for contaminants, as well as then use that information to make some monitoring well placement recommendations for this application.
Then I'm going to talk a little bit about pit lake encroachment on public property.
And also the mixing of public and private waters in the poor-quality pit lake waters.
Q. Okay.
And before we get into your presentation, have you prepared any technical reports with respect to the proposed groundwater Discharge Permit for the Copper Flat Mine?
A. Yes. I prepared a review of the application that I submitted back in May, I believe it's May 1st, of this year, and I've prepared a technical memorandum describing the calculations -- the numerical calculations that I performed as part of my testimony today.
Q. And you've been provided a document that's been marked as Ranches Exhibit 23.
Could you identify that document, please?

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A. Yes. That is my review of the draft Discharge Permit and application dated May 1st, 2018.
Q. Okay.
And then I have another document that you've been presented which has been marked as Ranches Exhibit 24.
Can you identify that?
A. Yes. That is a technical memorandum concerning -- that describes the calculations that I'm going to present in my testimony, titled Contaminant Transport through Groundwater at the Proposed Copper Flat Mine.
Q. And what is the date on that report?
A. August 24, 2018.
Q. Thank you.
Now, let's go ahead with your first topic item, which involves the andesite bedrock. Could you begin with that, please.
A. Sure. My first slide, slide number 3, is simply an overview of -- of the mine site.
And I wanted to -- I wanted to do this because many of the slides that I present further along in my testimony will refer to areas and parts of areas within -- within the -- within the mine site.
I draw your attention to the boundaries, this

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white hash line that goes all the way -- all the way around the property, and you'll see that white -- that line on many of the other maps and figures that I use.
Q. Excuse me, Dr. Myers.
That white line that you're referring to, is that the property --
A. No. I'm --
Q. -- boundary or the permit boundary?
A. No. I'm sorry. It is the permit boundary. Yes.
Q. Thank you.
A. It is -- it's the mine permit boundary.
And the large blue area in the southeast corner of -- or southeast area of that permit boundary is the tailing storage facility.
The orange-ish areas are -- are the proposed waste rock areas. I'll frequently be referring to the waste rock area -- storage area 2 and 3, and that's the one that's due north of -- or northwest of the tailing facility and that lies in the north of the site.
I will also -- the proposed pit is the red-ish area on the far west of the permit area.
And I'll also refer to the purple that flows as -- this is the diversion for the Grayback Arroyo through part of the site.

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And I will point out that this slide is drawn from the 2015 Draft Environmental Impact Statement.

My second slide, slide number 4, is titled Waste rock seepage: Andesite is not a natural liner.

And I just wanted to start off with a couple of definitions and clarifications, I guess, because I find myself using some of these things interchangeably. I just thought it would be worthwhile laying out some definitions.

First of all, we often -- we refer to permeability and conductivity, and it's usually used interchangeably, and it is throughout the application as well as my presentation. But it is really important to understand that the difference -- the difference between permeability.

Permeability is a feature of the material itself which describes the porosity and the conductivity of the pores, whereas conductivity takes into account the property of the fluid that is flowing through the material, the -- the formation.

Transmissivity, then, is the product of the conductivity and the thickness of the aquifer.

Primary permeability versus secondary permeability, that's a fairly important concept in this application and permit, primary permeability being what

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is the permeability of the bulk media of the formation, whereas secondary permeability is that of the -- of the fracture zones.

Infiltration is the rate that water enters the ground surface.

And recharge is the rate that enter -- that water enters an aquifer, and it's the amount -- it's -- the difference between infiltration and recharge is often the amount lost during passage through the unsaturated zone, otherwise known as the vadose zone.

Andesite very simply is extrusive igneous or volcanic rock. It forms when magma reaches the ground surface and quickly crystalizes. Many witnesses have referred to -- or at least some of the witnesses for the mining company have referred to the volcano in the area of the -- of the mineral deposit.

And there's approximately 230 acres of waste rock at the proposed Copper Flat Mine. Most of it is in the waste rock outside the pit lake capture zone.

Now, first off, slide number 5, titled Andesite is not a natural liner.

The application referred to andesite as a natural liner system, and in doing so, it reference -- it provided a reference to SRK, 2013, for the claim that andesite has a permeability of less than 10 to the

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minus-6 centimeters per second.

Well, I -- you know, you go to SRK, and they reference JSAI, 2012, for the same information. That is a conceptual flow model report. The conceptual flow model report actually doesn't discuss the andesite permeability, at least not as a liner. It although provides a table of pressure tests that does not specify andesite. In other words, it puts monzonite and andesite values in one table.

So initially it was difficult to even separate -- in the initial review of the application made, it was actually difficult to even determine whether, you know, the different -- these different observations.

Ultimately, the -- some of the best information regarding the permeability was provided in Shomaker, 2011, which was an appendix to Jones, et al., 2014, which is a numeric -- which is the report of the numerical model that was used for the Draft Environmental Impact Statement. And this referred -- this described the pressure injection test that was done on well GWQ-5R.

And I'm going to talk very briefly about that, because an awful lot was -- the table that -- that I referred to as well as testimony -- as well as the

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state's decision on accepting this as 10 to the minus-6 centimeters per second somewhat set this -- the permeability of this particular well at zero.

Now, the pressure injection test was -- that was done was -- is what is called -- what is known as a standard Lugeon test, which the normal usage of a standard Lugeon test is actually for estimating the permeability of a foundation of their dam. It's not even a common hydrogeologic method, in my research and a little bit of training I've had with it years and years ago.

But what it does is -- is it -- you take the well, a borehole, and you collar off a section of the -- of the borehole so that water cannot enter from above or below in the borehole, and you pump water under pressure into that collared-off area and then measure the rate at which you are -- the pressure and flow rate that you are -- are injecting -- injecting at.

And simply it determines the conductivity required to maintain an injection rate of one liter per minute per meter of open interval. And you determine a thing called a Lugeon interval, which is equal to 1.3 times 10 to the minus-5 centimeters per second.

Now, for this well, the test was performed between 64 and 100 feet below ground surface, and that

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was below the water table.
Now, initially -- I have two figures on the far right here. These come from the Shomaker, 2011, report.
The upper figure -- I mean, they look very similar, but the difference is the -- the -- on the Y axis, this is -- the -- I believe that one is the injection rate versus the total head of -- that was being applied to the well.
And the one at the bottom is the -- the apparent permeability in Lugeons versus the total head of water being applied.
I mean, they're essentially mirror image of each other, as you can see.
What this shows at the top is that initially after 200 feet of head there was no water that was being injected, but after it got to 200 feet of head for almost -- for one, two, three -- for five different intervals of injection, it was relatively steady around 0.1 gallons per minute. And this is in gallons per minute, not liters per minute. And then after about 300 feet, it jumped.
What that indicates is that -- I mean, once it began to enter the fractures, it flowed at rates that resulted in about .04 to 0.1 Lugeon units. That is this

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lower table here. You can see that that's 0.4. It bounces back and forth in here. And so between .04 and .1 you have a permeability that would be measured from 5.2 times 10 to the minus-7 to 1.3 times 10 to the minus-6.
Now, that's not saying this is incredibly conductive, but it's a whole lot higher than 0. And that -- that's my point in showing this.
And I also will point out that between 200 and 300 feet the injection rate was relatively constant. For head varying -- for the head varying from 200 to 300 feet, the injection rate was relatively constant, which indicates that water was flowing into the well, into this -- into this section of the well and flowing into the fractures.
It -- and it also suggests that the flow rate at that point was relatively laminar until it jumped here, and then it may have gone turbulent at this higher injection rate.
So anyhow this observation is more appropriate -- I mean, this estimate here of 1.3 times 10 to the minus-6 to 5.2 times 10 to the minus-7 centimeters per second is more appropriate than calling this a 0 value.
Q. Dr. Myers, if I could interrupt for just a

1173

second.
That pressure test that you're referring to, is that -- just to tie things together, is that the same thing that Dr. Marcoline was referring to as a slug test?
A. No, it is not. A slug test is where you allow water to -- I mean, depends on exactly how -- there's a lot of ways of doing a slug test, but in general, you're not applying additional pressure.
Q. Are we talking about the same test on the same well even though you're using different terminology?
A. No. We're not talking -- a slug test on -- I don't know that a slug test was performed on this particular well.
Q. Okay.
A. I'll say that with the permeabilities that we've seen there, the slug test would take so long to -- it would not be -- it's outside the range at which a slug test is appropriate, I think.
Slide number 7, Inappropriateness of the pressure injection tests for estimating surface infiltration.
For one, the test was completed at a depth that's not representative of conditions at the ground surface on which the waste rock will be stored. I mean,

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we're considering infiltration into the ground at the ground surface or at the level after which colluvium will be scraped off the top of the andesite. It's not a -- that is not representative of andesite -- or I should say andesite between 60 and 100 feet is not necessarily representative of andesite at the surface, due to weathering and other considerations.
It's only one sample. I mean, there were a couple of other tests performed, slug tests, but this was only one sample. We can -- or -- excuse me. It's one sample. It's one observation. We cannot understand the variability in permeability if you're considering just one -- one observation.
And the standard Lugeon test is usually performed on a shorter section, and I believe in order for this to have -- test to have more validity, it should have been accompanied by geophysical logging of -- to know whether we're dealing with one fracture or half a dozen in that -- in that range. I did not see anything that suggested that geophysical logging was done in that -- along with this test.
Slide number 8, titled Low permeability of andesite is not reflected in the observed 1982 mine dewatering.
There are several ref -- there are several

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references that suggest that the -- that observed mine dewatering in the -- that when the mine operated in 1982 showed that this andesite is very low permeability.

And I'll point out -- I show the hydrogeologic map from the numerical model report. It shows the bedrock that surrounds the pit. Here in the middle of what's called the Animas Uplift, it's the green area, and you can see the permit boundary here, and the green area encompasses about the western three-fifths of that permit area.

The green is bedrock. It is both monzonite -- excuse me. It's both andesite, which is the larger area -- I'll draw your attention to the cross-section here, that goes through the middle of the pit area. That cross-section is shown over here on the right, and it shows that the andesite surrounds the monzonite in which the mine would be constructed.

So when they were dewatering the original pit, they would have been dewatering an area here that consists of andesite and monzonite, but they -- it's referring to this overall pit area right here in the middle.

So there were several different observations of dewatering.

One was dewatering rates were from 22 to 50

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gallons per minute.

And another one was that as the pit lake has -- has varied since 1982 it has evaporated from 16 to 45 gallons per minute. And that -- those are flow rates that would have had to enter this -- the existing pit there.

And then there's also an estimate of six to 10 gallons per minute of estimated groundwater inflow.

Now, I wanted to use that information to show what an effective permeability or conductivity is for flow into the -- into the existing pit lake, which is -- the slide on the right here is also -- is a slide showing existing contours, groundwater contours around the pit.

It -- what I've done is I've determined the area for flow to the pit lake. This being the pit lake here, groundwater has to flow through -- come to it from all different directions, as these -- as these arrows indicate. And the lake itself appears to be a -- there's a scale bar right here. It's about 500 by 500 feet, which I believe would coincide with the five to six acres, that the pit lake is at right now.

If you then figure that the perimeter of this pit lake is somewhere around 2,000 feet, and depth for flow to the lake is about 20 feet, so you could have

1177

groundwater flow into this pit lake, through the perimeter and up from the bottom. So that's this overall area here of 290,000 square feet.

Then you determine the gradient for flow from -- from all around, and -- and anyone can see that these contours that -- are steeper in some areas than they are in the other.

And so as I -- as I've tabulated here, from the east, there's a drop of about five feet in 500 feet, for a slope of .01. From the west, it's about 10 feet in 300 feet, for a .033. North we've got about .025. And from the south, about .0167. For an average gradient of .02125.

Now, I've taken Darcy's law, which I've rearranged here in beneath -- beneath the map. I've rearranged and solved it for conductivity. Conductivity is equal to the flow rate divided by the area times the gradient.

And if you run -- run this calculation for all -- for four different flow rate scenarios. Let's say I'm not going to argue about which is -- you know, which was an accurate and -- is accurately representing the groundwater inflow to the pit lake. But we've ended up -- I've ended up with K values of from .19 to 1.56, or in centimeters per second 6.6 times 10 to the minus-5

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to 5.5 times 10 to the minus-4.

That -- I mean, reasonable people could sit down and would probably come up with different -- different numbers for some of this -- some of these things, but none of them are going to be of large enough magnitude to have this consistently below 10 to the minus-6.

Since I -- so I would argue that a -- sort of a large-scale representation of andesite conductivity is that it's much higher than 10 to the minus-6.

My next slide is slide number 10, and this slide just merely points out -- or it's titled Groundwater model recharge: If the andesite is a natural liner, why would there be any natural recharge?

And I will point out this slide over here is a slide of the boundary conditions used in the numerical model for the site. And -- and the colors along this area over here, the green, the brown and the purple, or chartreuse or whatever that color is, represents different recharge rates.

Now, the one that applies over the monzonite, andesite area of the mine is .14 inches per year. Now, that is not a very large recharge rate. But I would -- if indeed geology has any control over recharge, why wouldn't -- they're showing no recharge at all out here

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in this -- where it's Santa Fe Group. And thus I would argue that if it's truly impermeable there should be no recharge in this particular area right here at all.

And if indeed this is a relevant number and -- there's more of an opportunity for seepage to enter the ground beneath a waste rock pile than there is -- than there is in a -- in natural recharge.

I mean, natural recharge on a site like this only occurs during the few hours that you have -- that you have rainfall that exceeds -- you know, that is substantial enough to actually enter the ground, overcome the soil moisture and enter the -- enter the ground, whereas under a waste rock pile it provides a lot more opportunity for that -- for seepage to enter the ground.

So slide number 11 states Seepage through ground surface beneath waste rock is much higher than natural recharge.

Basically -- and this slide I'm not necessarily arguing about the -- you know, the modeling of flow through the waste rock. I'm simply saying that if -- if flow -- if precipitation enters unreclaimed waste rock, it will flow down through the waste rock, to the ground surface.

During an event or over time, it would pond --

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by pond, I don't mean inches or feet. I mean just a very small amount. But it would begin to either flow across the surface or it would enter the ground.

If it flows across the surface, it could -- it could flow to a zone where there's a higher infiltration capacity or eventually reports to the edge of the waste rock where -- where it would be captured in a -- in one of the -- one of the ditches that surround the -- surround the waste rock.

But overall the average infiltration for a waste rock area is based on an area average, and it would be highly affected by the fact that some of this -- by water that flows underneath the waste rock would intersect zones that have higher conductivity than the overall area.

I mean, if it's 10 to the minus -- it may be 10 to the minus-6 in certain areas, but other areas it may be a lot higher, and that overall -- that average infiltration is going to be a lot higher than just simply assuming the one bulk rate.

Now, this slide here I'm actually going to use on rebuttal so I'm -- it's in the packet that I've passed out, but I'm going to skip over this slide for now and use this is on -- in my rebuttal presentation.

So a Summary of Waste Rock Seepage and

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Andesite Conductivity.

The NMCC estimate is dependent really on one pressure injection test performed at depth that is not representative of the ground surface. And I also suggested that the results of the test may have been misinterpreted.

Pit dewatering suggests that an effective conductivity ranges from about 5.5 times 10 to the minus-4 to 6.6 times 10 to the minus-5 centimeters per second.

Groundwater modeling used a recharge rate that suggests the potential for much higher infiltration rate based on there being more seepage entering the ground at the base of the waste rock.

Thus I would conclude by saying that NMCC has not justified that andesite permeability as affecting seepage into the ground is less than 10 to the minus-6 centimeters per second.

Q. Okay, Dr. Myers. Do you have any recommendations as to how to address the issue that you've identified with the andesite characterization?

A. Yes, I do.

Madam Hearing Officer, I've got several recommendations here.

One is that the andesite should be better

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characterized before treating it as a natural liner. I suggest infiltrometer tests or some additional permeability tests of the andesite at the very near surface, which is what's -- where it's affected by the -- or where the seepage through waste rock would actually encounter the andesite.

I think that either NMCC should withdraw the application and complete the necessary tests or that alternatively the NMED should add a condition to the permit requiring the tests that just as delineated be performed.

And I would say I'm not recommending the number of tests that should be performed, but that that should be determined based upon professional judgment to minimize the variability, yet you get to collect enough tests that you have a good confidence in that the variability is -- and that you understand the variability in these observations.

The goal should be to collect measurements until the calculated standard deviation becomes stable.

Q. Okay.

And, Dr. Myers, have you with the assistance of counsel prepared a proposed permit condition to require further characterization of the andesite?

A. Yes, I have.

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Q. And you've been provided with a document that's marked as the Ranches Exhibit 30.
Is that the proposed permit condition?
A. Yes, it is.
Q. And would you recommend any changes to this proposal at this time?
A. Yeah. I mean, only that the NMED use their experience and use their understanding of the tests to determine the number of them that need to be performed and --
Q. The number of tests?
A. -- and the appropriate ones.
Yeah. The number -- the number of tests as I -- as I referred to in my previous slide.
MR. BUTZIER: Madam Hearing Officer, would it be possible to get a copy of that?
I don't think it's in my materials.
MS. ORTH: Exhibit 30?
MR. DE SAILLAN: Everyone should have it. I think we can probably find another copy of it if you can't find it, Mr. Butzier.
MR. BUTZIER: Was it included with the statement to present technical testimony?
MR. DE SAILLAN: Yes, it was.
MR. BUTZIER: Okay. Well, maybe my notebook's

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not complete. I only go up to 25.
Thank you very much.
MR. KNIGHT: Exhibit 30.
MR. BUTZIER: Okay. I have it. Thank you.
MS. ORTH: Thank you.
Is there a pending question? I'm sorry.
MR. DE SAILLAN: No.
Q. Dr. Myers, if you could proceed with the next topic in your prepared testimony.
A. Yes, I can.
I've just got a couple of slides here just to somewhat echo Mr. Kuipers' testimony actually, referring to the likely leaks through the tailings liner, and then also I'll mention briefly the potential for contamination through unlined stormwater ditches.
Discharge Permit application Section 20.6.7.11J.(2) describes the tailings impoundment underdrain and liner system, but it does not provide a discussion for the potential of leaks or leak rates. The Probable Hydrologic Consequences report estimated flow through pinhole leaks.
And I have no issues with the estimate of flow through pinhole leaks, but what -- what I did have an issue with is that it did not discuss in any way the rate of flow that could -- that could come through leaks

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and tears that have been observed to occur in the past. And for this, I will refer to the testimony that Mr. Kuipers has provided, including reference to some of these references that he had -- that he had referenced.
And I'll simply note that the DP application does not estimate the amount of potential leaks, nor does it consider their fate if those leaks were to occur.
Now, unlined ditches around the site, around the waste rock could also be a source of -- and very specifically there -- I mean, this is -- this is during operation. So I want -- I want to be clear that during operations, before we -- before the mining company has reclaimed the waste rock, it is exposed, and -- and rainwater could run off of the site -- run off of the waste rock.
And you can see around -- the figure I have shown here is sort of a detailed design drawing for Waste Rock Storage Pile 2 and Waste Rock Storage Pile 3. It shows a stormwater conveyance channel that comes around on the east and northeast side of the waste rock as well as from the south and southeast side of the waste rock, and it will flow to what's labeled here as Impacted Stormwater Impoundment C.
Now, the impoundment I believe is lined, but

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the cross-section that is shown here for the stormwater conveyance channel does not have a liner.
And I would point out that there is a potential during -- due to relatively -- I mean, if there's a significant storm, there -- there could be several feet of water, several feet of head in that -- in those channels, and, frankly, you could have -- you could have percolation through the -- through the bottom of those channels.
Q. Okay, Dr. Myers. Could you proceed with the next topic of your -- your prepared testimony?
A. Yes, I can.
My next topic is -- and I'm on slide 18 now, and this is sort of an introductory slide titled Interpretive Calculations of Plume Development.
And I've got four different topics I'm going to briefly -- or -- I'm going to discuss, I mean, not quite so briefly, in the -- regarding the calculations that I did.
First off, I'm going to consider Santa Fe Group and andesite hydrogeology briefly.
Then I'm going to develop and explain how these interpretive calculations were performed.
Then I will discuss the areal spread of the contaminant plume based upon these calculations,

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longitudinal spread, lateral spread.
And then I will discuss some implications for monitoring well spacing for DP-1840.
Now, slide 19, also titled Interpretive calculations of plume development.
The purpose for doing this is to determine the required number of monitoring wells and spacing based upon dispersion that could occur from a potential substantial leak at the site.
This is not based upon predicted 0.5-gallon-per-minute leak rates or something like that, but this is based upon the fact that, you know, monitoring wells are used to detect a leak or detect a problem. And if there -- if there's an -- insufficient monitoring wells, it is very possible that they will not detect a major problem. And that's -- that is what I've tried to assess here.
And then secondly, the purpose -- the second purpose is to assess whether contaminants from a substantial leak beneath either facility could reach offsite resources, specifically groundwater on the Ladder Ranch.
Slide 20, Interpretive Calculations of plume development.
Now, the method of doing this is I've

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completed interpretative transport calculations for a simulated leak into a hypothetical aquifer which is representative of the Santa Fe Group, and then I've also done it for waste rock seepage into the andesite.
I've done this using a standard groundwater modeling code known as MODFLOW-2000 with a transport code known as MT3DMS with Groundwater Vistas graphical unit interface, GUI, or GUI they refer to it as, for the calculations and for -- and for preparing some graphics to show later.
The domain size that I'm considering are -- and properties were similar to those at the Copper Flat site.
I have included a fault to consider whether the effects that a fault would -- could have on -- on contaminant transport.
And I've simulated leaks based on there being a significant tear in the -- in the TSF liner or a preferential flow zone allowing seepage into the andesite beneath the waste rock facility.
Now, what are interpretive calculations? Slide number 21, Interpretive calculations of plume development.
I'm talking about a reference, a standard groundwater modeling book, Anderson, et al., 2015.

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An interpretative model is a screening model and a generic model. Now, I prefer to use the word "calculations" because this is not a calibrated groundwater model, this is not a model that is specifically designed to meet a specific observation at the site.
It is -- it is a screening model that can help the modeler develop an initial understanding of the groundwater system and to test hypotheses about the system. And the hypotheses tested here include the potential rate of transport and dispersion for -- for the development of a plume.
This might be the first cut of an analysis that could later lead to a more detailed model if necessary, but you take a look at -- you take a look at how contaminants could move across an aquifer that has the properties of the Santa Fe Group.
Slide 22, Interpretative calculations of plume development, continued.
Generic model -- a generic model can explore processes in a generic hydrogeologic setting. It helps to understand the processes apart from some of the uncertain complexities. Complexities -- and I'm going to calculate and consider some dispersion that occurs in a homogeneous aquifer. These complexities would make it

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worse than I'm -- than -- generally make it worse than I -- than I end up simulating here.
I mean, understanding these processes can help establish appropriate monitoring well spacing.
And it can help to determine the extent that contaminants could affect nearby property.
Now, a couple of slides to set the -- to set the setting or the domain that I have considered.
The slide on the left is from the Probable Hydrologic Consequences report. It shows -- you know, once again the permit boundary is shown in yellow. And in the chartreuse color shows the waste rock facility. And in the -- the yellow-ish-green shows the tailing storage facility.
The material -- the brownish material on the -- on the east side of the map is Santa Fe Group. The green-ish material is mostly -- is bedrock, mostly andesite which underlies the -- which underlies the waste rock.
The slide on the right shows the existing -- the contours as they were at the site I believe in 2012 or -- these are observed groundwater contours at the site. And you can see that the general flow path here, the general flow direction is from west to east. I mean, it -- just to the east of the site, which my

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cursor is outlining the permit boundary again, the contours are a little steeper than they are further to the east.

I also will note that this shows a fairly significant ridge in the groundwater, or shall I say it's almost a plateau, about four miles wide here, and then -- and then it shows a fairly significant gradient sloping off to the north and sloping off to the south down here toward Percha Creek, but -- and sloping off to the north toward Animas Creek.

And I'll also point out on the right -- on the groundwater contour map on the right that it does ultimately reach Caballo Reservoir over here, on the far east.

Q. Caballo Reservoir is where on that map?

A. It's on the far east of the map on the right side, slide 23.

Q. Thank you.

A. It is approximately 20 -- approximately 12 miles from the permit area, from the permit boundary. I mean, the permit area is a couple miles across so it's like 12 to 14 miles down to there.

Now, I'm going to reuse this slide to go over the geology and how I'm considering it in my -- with my interpretative calculations.

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Here again is the permit boundary. This -- the figure on the left shows the permit boundary and shows that we have -- there's Santa Fe Group essentially extending all the way from the bedrock to the Caballo Reservoir.

It shows a fault at the -- at the east boundary of the -- the east part of the permit boundary, and it flow -- and it flows -- and it shows that the -- I mean, it is Santa Fe Group all the way until you reach some -- some more alluvial material down by the Rio Grande.

The cross-section on the right, which again is this -- which again is labeled AA in the plan view, shows the Animas Uplift. It shows the fault on the -- on the east side of the Animas Uplift. It shows -- it shows that the Santa Fe Group is -- that there's some Santa Fe Group within the Animas Uplift, and -- but that it continues more -- it's more continuous to the east, down toward the reservoir.

And the other point -- important point here is that the Upper Santa Fe Group is about 1,000 feet thick. I mean, it varies, but it's approximately 1,000 feet thick.

Now, I took almost all of the properties that I used in this -- in this analysis from existing

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studies, existing reports. Very specifically I took it from -- a lot of it from the Jones, et al., 2014, which is a numerical model report. That's the numerical model that went into the -- that was used for the Draft Environmental Impact Statement.

Now, I'll just note that it was not developed -- that model was not developed as a transport model, and I don't believe it could be -- would be used as a transport model because the cell sizes are too large and the layers are too thick. But it's otherwise a very fine, very good flow model for the area.

The Santa Fe Group is represented by numerous formation zones, and I say see Table 6.1, but that is Table 6.1 in Jones, et al., 2014.

There's about 20 different formations -- or 20 different parameter zones in the model that are used to describe Santa Fe Group, and in those parameter zones the conductivity varies from about 0.2 to 20 feet per day.

The conductivity within the uplift and within their model layer 2, which is the uppermost active layer for most of the model domain, is generally less than one foot per day. I say below the fault. I should say east of the fault in the Palomas Basin the conductivity ranges from about .9 to 20 feet per day. The

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conductivity under the TSF is .2 feet per day.

Vertical anisotropy, which is the ratio of vertical to horizontal conductivity, it was generally .01.

And then when we consider the andesite, the andesite layer 2 at the site is .0 -- it's considered .0002 feet per day.

This slide's titled SFG and TSF simulation, and it's slide number 26.

This slide shows quite a lot of detail regarding how I did the simulations. The figure is a screen capture using the Groundwater Vistas processing software.

And I just want to point out that many of the slides -- many of the figures that I use here are screen captures that -- and they're simple and easy to use, and most of the slides -- the figures also in my report that -- that outlay -- lines this particular analysis are also screen captures from this processing software.

The bottom part is a plan view. The top part is a cross-sectional view. I will try to show where that cross-sectional view is on here. It doesn't always -- it's not always obvious on here -- on the actual cross-section. But that -- that is what this show -- the way this -- this -- these figures are laid

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out.
Now, I'll show -- the domain from the tailing storage facility to the reservoir, the distance from the far left to the far right is 68,000 feet, and the north/south distance is 21,000 feet.
I chose this to be representative of the full distance to the reservoir, and I allowed simulations to run so I could see if -- if contaminants reached or what conceivable time it would take for the water -- for anything to get to the reservoir.
21,000 feet wide was chosen for two reasons. It was approximately the width of that groundwater plateau that I showed on the -- the groundwater contour map a few slides ago, and it's also the width that I believe was far enough away -- I did not want no-flow-boundaries. The boundaries on the north and south are no-flow, meaning the water cannot go across them. I did not want that to affect the dispersion calculations which were going to be occurring in the middle of the domain.
Q. Dr. Myers, when you say a no-flow boundary, that is a modeling term?
A. That is a modeling term, and what it essentially means is that the groundwater flow is going parallel to it. There's no flow that goes across --

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that goes across that boundary. The -- the groundwater flow is set to go -- to be running parallel to it at that point.
Q. Okay.
And that's for purposes -- again that's for purposes of your model, it's not necessarily the real world.
A. Oh, yeah, exactly. That -- it is very common in establishing a groundwater modeling domain to establish it between two flow -- flow paths that you assume that the pumping in your model, or whatever you're doing in your model, is not going to change these flow paths. Okay. It's common to do that.
Q. Thank you.
A. And I was -- I did not want anything that's happening in this area here, where I'm analyzing leaks, to be affect -- I did not want what happens in them to be affected by this -- by these boundaries. So it's set far enough away.
Now, the domain, as I said, is 68,000 feet long.
In the west, the elevation is -- the ground surface elevation is 5,400 feet. The green -- the vertical green line on the plan -- on the profile view is the fault, is the ground -- is the fault that I've

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simulated. And that fault, the ground surface is 5,200 feet. Between the far west and the fault, the surface gradient is .0378.
Then east of the fault, it goes all the way down to the reservoir, where the elevation is approximately 4,200 feet -- well, it's exactly 4,200 feet in the model, and the gradient is .0159.
The cell size used in this model -- or for these calculations were 50 by 50 feet near the source on the far west side. Out here they're 100 by 100, and then where they overlap they end up being a different -- some of them are 50 by 100, and -- and right at the fault I had a transitional size of 75 by 75.
There are four layers in this model -- in -- for these calculations. Each of them is 250 feet thick. So I would point out that that is approximately the thickness of the Santa Fe Group. And 1,000 feet thick is also approximately the -- they layer -- the thickness of layer 2 in the numerical model I used before I -- the Jones, et al., numerical model.
The uppermost layer is assumed to be -- or is set to be unconfined, which means it doesn't go dry. Water level doesn't go below that -- doesn't go below the bottom. And then layers 2 through 4 are set to be confined.

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Slide 27 is SFG and TSF simulation.
And this shows a plan view and a profile view on the right side that shows the parameter zones as I use them. I have three different hydrogeologic parameter zones.
Well, first off, the far west side and east side of the mod -- of the calculations are established with constant head boundaries, which establish a head -- a flow through the -- through the domain. The one on the west is set 100 feet below the ground surface. The one on the east is set 10 feet below the ground surface, which is approximately the reservoir level on the east side.
The conductivity set to provide flow through the system was set to provide a flow similar to what was observed from the NMCC model. K1, which is the orange -- the large orange area east of the fault, is one foot per day. K2, which is the yellow, is .4 feet per day. The fault itself was set to have a conductivity of .01, but with a thickness of 20 feet.
So that determines a conductance that is -- you know, it prevents flow. I mean, it definitely solos the flow through here. I set that based on a drop in contours. I wanted to simulate a drop of about -- of about 30 to 40 feet through the fault zone. That was

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how this was established.
And then I also wanted to consider whether a fault fracture zone could have an effect on the flows. So there actually is a third parameter zone that runs -- that's right here at the fault. It is to the west of the fault, it's one column wide, and it has a conductivity of 50 feet per day.
Now, I want to -- I want to mention that I didn't just say 1.4 and just set it and be done. I used what's -- I used steady-state simulation to come -- to come up with flow -- to come up with groundwater contours that -- and to come up with a flow rate that was relatively close to what was observed going through the NMCC model.
I ended up with about 275,000 cubic feet per day, or 2,300 acre-feet per year, discharging through this system to -- and coming out here at the lower end, 20 -- which is about 20 percent of the simulated discharge in -- through -- from the Palomas Basin into the reservoir in the NMCC model.
But I did this through a process where I -- I had several goals, and I think it is important I describe this a little bit. I had several goals.
One is that we -- was that there's a 30- to 40-foot drop through the fault.

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Second, that at no point did what was a surface flooded.
And third, that I hit -- that I hit approximately this flow rate.
And that's where I -- how I ended up with these two different -- these two different conductivity values. Plus I wanted them to be very close to what was used in the NMCC model, as well.
After I -- after I established that and I -- and a steady-state simulation was the starting conditions or the initial conditions for all future analysis.
Simulation of leakage from the site. I did two different simulations.
One is for four gallons per minute, which is 700 cubic feet per day, over a 50-foot-square model cell. It comes out to about 0.3 feet per day.
20 gallons per minute, 1.54 feet per day, which is consistent with the rate expected from a substantial leak as estimated in the Kuipers testimony.
Now, I established the source to be about 2,400 feet west of the fault. I will show that in a couple -- that exact location in a couple of slides.
But considering that the tailing storage facility is about 6,000 feet across and the leak could

1201

occur anywhere within that -- within the TSF, I was unable to test every possible location. So I tried to -- so I established it just based on approximately 2,400 feet west of the fault so that there wouldn't be that much flow before it got to the fault.
I used a conservative contaminant. I set it at 1,000 milligrams per liter. I'm not necessarily thinking of any specific -- specific contaminant, more -- more than I'm thinking of a tracer.
The contours that I will discuss could be scaled. If you want to consider something that comes out at 100 micrograms per liter, you could consider -- you could scale it, these contours, to -- to consider that -- I mean, for that type of a -- of a consideration.
Dispersivity. Longitudinal, horizontal and vertical dispersivity was set at 25, 5 and 2.5 feet. That's based upon some standard textbook numbers. And I did test to variability, and ultimately the thing was not very sensitive to these actual values.
I will also note that I used a porosity of .1 for the Santa Fe Group and a specific yield of .1 and a storage coefficient of .001.
I have two different type scenarios. There's a 100-year scenario for a four-gallon-per-minute leak

1202

just to consider long-term transport properties, and a 15-year leak followed by a 100-year recovery period. That's designed to consider a leak that lasts for much of the mine life, then reclamation covers it, stops it, just to show what could happen continuing after reclamation seals off the leak.
The first -- this slide, Simulation of baseline: 4 gpm grains for 100 years, slide 29.
This shows the concentrations that I got for a simulated leak at this point here. This is about 2,400 feet from the fault. This is the whole model domain, by the way, all the way down to the reservoir. The different plan views that I will show will have different lengths and consider different areas so they're not always -- and in most cases, I have a scale bar so that it should be obvious what I am -- I am considering.
What this shows is -- I mean, the mass is -- the contours as I show them are -- go from 100 to 10 to 1 to .1 to .01. So this is showing that the mass is primarily in an area that's about 500 feet wide and about, what, 5,000 feet long from this particular area here.
But dispersion has caused some contaminants after 100 years now to reach all the way down and just

1203

begin reaching the reservoir. Now, this is at .0 -- .01 contaminants. So it's -- it's not a whole lot of load reaching the reservoir. In fact, it's very little load, but it does show that -- that particles have gotten that far.

Now, the one on the right side is showing what happens if I made the fault 0.1 times as conductive. You can see that it did not change the transport all that much. That in other words, the transport was not seriously affected by a lower conductance in the fault.

It slowed the transport marginally. It also caused the water to back up a little bit. It came out and flooded on the ground surface.

I also added some heterogeneity to the fault to try and charge it, cause it to show flow away from the fault, and it did -- ultimately did not cause a whole lot of transport to go parallel to the fault, but in general that's because I don't have -- I think that's because there's not really much of a gradient going north or south along the fault.

So now I'm going to consider the 15-year leak scenarios with 100-year recovery.

The first slide I'm showing here is -- what should I do?

(Discussion off the record.)

1204

MR. KUIPERS: Madam Hearing Officer, this might be a good time for a break.

MS. ORTH: Okay. Let's take a break, 15 minutes.

(Proceedings in recess from 2:48 p.m. to 3:02 p.m.)

TERI CATES

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. CATES: Hi.

My name is Teri Cates, and I own TLC Pest Control. I'm a local small business owner here in Sierra County.

And I'm here to give my full support towards the mine. We need jobs here, and we need our economics to go up. It's very low. We don't have a lot of jobs. We don't have very few piping jobs at all. And I think the mine is going to greatly benefit us in all aspects of our community.

And that's all I have to say.

MS. ORTH: Thank you, Ms. Cates.

MS. CATES: Thank you.

MS. ORTH: Ms. Schneberger.

1205

LAURA SCHNEBERGER

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MS. SCHNEBERGER: My name is Laura Schneberger. We ranch in the western end of the county, and we have raised three children on an extremely remote ranch.

We've watched as our community and our area has struggled to survive with the impact of a well-hunted environmental movement pushing to remove livestock from the land, and we have watched our neighbors go under. And it has been very detrimental to my family and my children. It has cost a lot of money in the long run.

You don't think that losing your neighbors will have that high of an impact, but it does. It puts a lot of burden and a lot of cost back on our little operation.

I think that a cumulative impact from not being allowed to have this mine open up would be very detrimental to the survival of this little county. We live in an area where it's starting to be -- meth is the biggest economic boost for this community. And I would really love to see my kids have an opportunity to have a

1206

job that this mine might provide.

I trust that the environmental -- I guess documents have been done. I see that they're on the web site. I've downloaded them. I've started to read them and gone back to work, and I haven't gotten done what I need to do. I understand that I haven't.

But I do want to give you all my full support and hope that one day soon that the kids in this community will have somewhere to go get a job, so they don't have to leave this county to find a job that will take care of their families.

Thank you.

MS. ORTH: Thank you, Ms. Schneberger.

No one else indicated a desire on the sign-in sheet to offer public comment, but if there is anyone else, this is a good time, who has not already spoken.

No?

All right. In that case, we will return to the technical witness.

Thank you, Dr. Myers, for letting us slip that in.

MR. MYERS: Oh, absolutely.

Ready?

MS. ORTH: Yes.

1207

TOM MYERS
having been previously duly sworn or affirmed, was examined and testified further as follows:
DIRECT EXAMINATION (Continued)
BY MR. DE SAILLAN:
MR. MYERS: Well, before we were so rudely interrupted by the projector, I was starting to describe the simulations I did of four gallons per minute and 20 gallons per minute into Santa Fe Group.
The first slides that I'm showing here are a slide of the change in the groundwater level due to these leaks. This is after 15 years. And contour intervals, as you see, are two footers.
And I will just point out that the simulation that I have run for four gallons per minute ends up with approximately a nine-foot groundwater mound forming on top of the water table at -- underneath the source. And for the 20-gallon-per-minute leak, it's approximately a 39-foot mound that forms under the tailings facility.
And I don't think that's an uncommon thing when you -- when you have a significant leak beneath a tailings facility.
I've got a series of slides here that show the development of concentration contours emanating from a -- a source, which is this -- this red -- little red

1208

dot here is a 50-foot-square model cell, and that is the source.
This shows for the four -- and the left side is the four gallons per minute, the right side is 20 gallons per minute. And the contaminant contours are as I mentioned before, the inner one being 100, then -- and then 1, then .1, .01, and sometimes it actually goes out to .001 if that's what the software decided to do.
This shows that after one year the dispersion along the flow path. And I'll note that the flow path is directed west to east.
And I'll also show that you -- some of the -- you'll see some monitoring wells on here. These are simulated monitoring wells that I'm going to use later to show some hydrographs on.
But this -- this shows that the -- the plume, however you may define the plume, after one year has gone, a little over 500 feet for the largest contour, and out to about 1,500 feet would be -- would begin to detect it.
For the 20-gallon-per-minute leak, you don't see a great deal of difference on the longitude -- in the flow path, in the direction along the flow path. But you do see more lateral dispersion, which is north/south, and that is because dispersion is partly

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affected by a -- by a concentration gradient, because there's more -- I think because 20 gallons per minute puts five times the mass of contaminant into the ground, it allows it to disperse off of the flow -- off the main flow path more quickly.
Same information after two years.
And by the way, I will point out that you see dispersion actually going upgradient against the flow. And that is what -- that's -- typically dispersion does that. Dispersion -- part of it is due to the concentration of -- of the contaminant. So you have some flow in this direction, but for the most part, it is going in this direction. It is going in this direction, and it becomes --
Q. (BY MR. DE SAILLAN) When you say -- excuse me, Dr. Myers.
When you say "this direction," could you give us a direction?
A. The -- most of the flow -- I mean most of the dispersion is along the flow path to the east, and it spreads out because -- more in that direction because that is where the -- the groundwater -- the flow is naturally going.
Again I'll note that longitudinally there's not a lot of difference between four and 20 gallons per

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minute, but the lateral -- the lateral transport there's a bit more at 20 gallons per minute.
The next slide shows what happens after 15 years. You can see that it has expanded further.
This is down -- this -- there is a monitoring well here labeled MW9500. That means 9,500 feet from the source. And so you can -- one can use that to consider the magnitude. So what we've got at 20 gallons per minute is a 100-milligram-per-liter contour, covering an area that's almost two miles long and about half a mile wide.
Now, the leak stops at 15 years, and everything recovers for 100 years. Well, there's no more contaminant around the source, but it does continue to flow. And it -- after -- so after 100 and -- 100 years after the leak is ceased, it is about -- about two miles from -- the centroid of the plume is about two miles from the reservoir.
And there's not a lot of difference. This is only a 10-milligram-per-liter contour. The one on the right side for that 20-gallon-per-minute leak is a 100-milligram-per-liter contour.
Now, I've also considered seepage from the waste rock -- waste rock seepage in the andesite, and there's a couple of assumptions that go into the model

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for that -- or go into the calculations for that.
This says same domain as for the tailing storage facility. I actually shortened it because there's so little flow through the system that it was not going to go anywheres near the reservoir. So the domain is only 12,000 feet long.
I used a conductivity of .01 feet per day.
And dispersion coefficients remain the same as for the SFG.
The seepage rate and properties of the seepage were the same as for the four-gallon-per-minute TSF leak. I did not try to run 20 gallons per minute into the andesite because it simply wouldn't take it.
It ended up with a domain flow rate of about 2,500 cubic feet per day, which is like one-hundredth the flow rate that the calculations had going through the Santa Fe Group.
So similar concentration diagrams.
After one year, you see that most dispersion is directly around -- it's almost circular dispersion. There's very little longitude natural dispersion along the flow path because there's -- because the flow rate is so little. But dispersion has caused -- has caused the contaminant to go maybe 300 feet from the source, both up- and downgradient.

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After 100 years after the leak -- this is after the leak has ceased and 100 years later, there -- there still is a substantial mass, but it's only centered at about 2,500 feet from the site.
So this is -- the difference between contaminant movement in the andesite and contaminant movement in the SFG is that it moves a whole lot slower, but that it covers a larger area. It just doesn't dilute as much because there's a -- because there's much less flow to dilute it, as well.
And dispersion is almost as important as -- as advection, advection being the movement of the contaminant with the groundwater flow.
And that was slide number 30.
MS. ORTH: 36?
MR. MYERS: Oh, 36. Yeah. Thank you.
Now, for a summary of the slides that showed -- showed the development of the plume.
First, the length of the plume from west to east did not vary substantially among leak rates because it is controlled by the flow rate in the aquifer. There were some minor differences due to dispersion along the flow path.
Second, a higher leak rate into the Santa Fe Group had a much higher lateral dispersion near the

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source due to the concentration gradient, but the difference began to disappear downgradient as the plume moves with the flow.
Then third, lateral dispersion is much more important for the leak into andesite because the downgradient flow rate is much lower and there is much less flow for dilution.
Now, slide number 38 starts to show some concentration hydrographs for monitoring wells that I showed on a couple -- a couple slides ago.
These monitoring wells are spaced with -- downgradient. These -- this slide is directly along the flow path. So if you can see the legend, it is labeled MW500L1. What that means is monitoring well 500 feet downgradient from the source in model layer 1, and so on. The furthest one is 9,500 feet from the source.
And what -- you see kind of what one would expect, that you start to -- that the concentration is first detected at about 60 days at 500 feet. After about -- takes about three years for it to reach its full concentration at 800 milligrams per liter. And then it stays relatively flat, then, for a period -- for about the length of the leak. And then it drops off relatively quickly, as it moves -- as it moves through.
Further downgradient the peak is lower, and

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it's more spread out. So at 9,500 feet, the peak is only 200 milligrams per liter, and you don't -- but you don't detect it for about 12 to 13 years. That's something to consider when placing a monitoring well probably.
If you look deeper into the aquifer, 250 to 500 feet below ground surface, the wells -- the monitoring points closest to the source actually have a lower peak than the ones further from the source, and that is because with distance one ends up with more -- ends up with more mass reaching deeper into the aquifer.
And I'll -- I'll actually summarize some numbers in a minute or two here that -- for distances and times to detection.
If you look at the 20-gallon-per-minute scenario, you see more or less the same thing only higher concentrations. I mean, the time to detection is approximately the same between the four-gallon-per-minute and the 20-gallon-per-minute because again, as I've said, it's the -- it's the flow rate along the flow path that really controls that.
And for the higher -- for the 20-gallon-per-minute scenario, there was actually detectible tracer in layer number 3.
Considering in the waste rock -- considering

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the four-gallon-per-minute leak -- or I should say seepage from the waste rock on the andesite, again by distance from the leak, you see at 500 -- 500 feet it's almost -- it's -- it's over a year before it's even really detected, and it peaks at about -- well, it peaks almost what the source concentration is after 15 years, over 950.

And at 1,000 feet, 1,500 feet, it -- it more or less shows it moving fairly -- you know, without being diluted that much, but it moves slowly downgradient. I'll point out this -- that at 80 years -- it's almost 80 years before it's detected at 3,500 feet.

In layer 2, you get a much higher concentration. Because of the slower movement, you end up with more contaminant into -- into the deeper layers.

Now, a summary with -- of transport with distance from the leaks.

For the four-gallon-per-minute leak into the Santa Fe Group, concentration peaks with distance from the source. But contaminants initially appear at the monitoring wells within 1,500 feet within a year, but at 3,500, 75 -- or 5,500, 7,500 and 9,500 feet, initial detection occurs at four, seven, nine and 11 years respectively.

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Now, the 20-gallon-per-minute leak into the Santa Fe Group, the time trends are similar to the four-gallon-per-minute leak, but the peaks are higher, and with distance and time the contaminant reaches deeper into the aquifer.

Then hydrographs become horizontal as the transport becomes steady-state with the flow.

And finally, the four-gallon-per-minute seepage from the waste rock into the andesite, the contaminant moves much slower, there's a much longer time to detection and to peak, and the peak is higher than for the tailing storage facility at short distances due to a lack of dilution. There should -- that should be -- should say "dilution" after "lack" there.

Now, I have one more slide that shows these hydrographs, and what this shows is the hydrograph for concentrations transverse to the flow path.

So if you consider that the flow path was directly west to east from the source, you go -- and I've already shown how the concentration decreases with distance along that -- along that pathway.

What about away from the flow path? Does -- I mean, if your monitoring well is not directly on the flow path, you're certainly not going to see the concentrations that are at the flow path. These

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slides -- or these hydrographs give an idea of what the dispersion is lateral to the source.

And what we -- and what these graphs are, the uppermost one is for -- is a concentration hydrograph on the flow path at 2,000 feet from the source. So this is not a repeat of one of the hydrographs -- or concentration graphs I had on the previous slide because I went -- I went from 1,500 to 3,500 feet.

At 2,000 feet, you can see the four-GPM leak peaks out at a little over 500 milligrams per liter. But if you move 100 feet transverse to the flow path, it has -- it's approximately 15 percent lower. It's about 460 milligrams per liter. If you move 200 feet away from the flow path, it's down to 300. And if you move all the way down, say 400 feet from the flow path, you're down to 80 milligrams per liter.

So if your monitoring well is on the flow path, it really has a chance to pick -- to see something, to capture that -- to capture something, but at 400 feet off, huh-uh, it's going to -- it's such a low amount that even if you see that you may not realize it as a -- as a significant change in what the background concentration would have been.

Now, if it's a larger leak, if it's a, you know, 20-gallon-per-minute leak, you know, at

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400 feet -- 400 feet is almost 80 percent of the peak.

And I'll note here that -- that the peak flow and the -- the monitoring well 100 feet from the flow path is essentially -- it's only about five milligrams per liter difference so they plot on top of each other. So here you get, you know, the larger leak at about 600 feet down to half -- down to just a little more than 50 percent. Okay. And then it drops off even more, but -- so it's all a function of how far you are from the flow path.

Over here on the far right, we show a similar information only for the andesite, and this is for a .500 feet from the source, but then lateral -- or transverse to the flow path you can see that these are very closely -- or the biggest difference for up to about 500 feet from the flow path isn't so much the peak -- the ultimate peak, but it's the time to first detection and the time to when that peak is discovered.

So if you're monitoring along the flow path, you may not see it for a couple of years, but eventually you will see it, you know, up -- you'll get the peak at about 15 years.

But if your monitoring well is almost -- is 40 -- or if your monitoring well is -- let's say this blue one here, 500 feet from the flow path, you'll still

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eventually get a very high contaminant concentration, but you won't see it for 40 years.

Now, Summary of transport transverse to the leak.

For the four-gallon-per-minute leak into the Santa Fe Group, at least three years to detect and five years for its concentration to approach steady-state. There is a substantial lateral decreases begin at about 100 feet from the flow path.

20-gallons-per-minute leak into the Santa Fe Group peaks are higher near the flow path, but they drop quickly about -- beginning 400 to 500 feet from the flow path. The concentration drops very quickly.

The four-gallon-per-minute leak into the andesite is not detectible at 2,000 feet for 40 years, and therefore I've considered 500 feet from the leak detectible concentrations occur in about four years.

400 feet from the flow path the concentrations decrease just slightly, with peaks after 16 years remaining high to about 60 years.

800 feet from the flow path concentrations exceed 30 percent of the leak -- of the leak. This is that they -- it's 1,000 milligram per liter from the leak, although detection -- you didn't really see it initially for about 15 years.

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Overall Summary of these numerical tests.

The peak concentration occurs on the flow path from the source, regardless of the media, the formation.

The concentration decreases with distance from the source.

The concentration at depth increases with distance from the source.

The shape of the plume depends on the conductivity and the dispersion.

High conductivity has a higher flow rate and therefore a much more elongated plume. There's less dispersion transverse to the flow path, and the plume shape is not dependent greatly on what -- on the exact leak rate, but the total mass of concentration, of course, does vary.

The lower conductivity has a lower flow rate and more compact plume. Lateral dispersion is much more important.

And lower conductivity -- yeah. Lower conductivity also has less dilution.

Now, Dispersion from a leak - the effect on monitoring.

Dispersion occurs longitudinally, laterally and vertically.

If wells are spaced too widely, contaminant

1221

plumes will pass through undetected. Some of these plumes were 500 to 600, 700 feet wide. If your well was in that, you might have seen them. But if your spacing is 1,000 feet, it's very possible for the contaminant plume to pass through undetected.

Monitoring wells will not likely ever detect the full contamination because it's very unlikely that the wells are on the flow path.

In andesite, dispersion causes a high concentration lateral to flow path, but only after a long period. Thus the distance from the source for monitoring is critical.

And contaminants will continue to flow even after the leak is stopped. I mean, the contaminants are in the ground, and they'll continue to flow, and you'll continue to detect them for a period of time, and therefore monitoring must continue until the leak passes.

Q. Dr. Myers, have you with the assistance of counsel prepared a proposed permit condition to address the -- the problem of inadequate monitoring?

A. Yes, we have. Yes, I have, but it was based on the recommendations. I think it was based on the recommendations that I had originally come up with for DP-1840, based on the transport calculations.

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And that's kind -- that's what this slide number 46 shows.

And that is for a tailings impoundment which is over 6,000 feet across. So it's important to remember that the source may have -- may actually have to flow 6,000 feet all the way across the tailings storage facility, along the potential flow path before it even reaches the perimeter.

Thus I believe that the recommended spacing based upon my plume calculations should be 500 feet, and if you take the perimeter from the south side to the north side, and I'm sort of scaling -- I'm just scaling the distance, it appears to be about 8,500 feet -- there would be about 18 monitoring wells needed along the perimeter down -- the downgradient perimeter of the tailing storage facility.

The waste rock facility is roughly 3,000 feet across, which, you know, considering the slowness -- slowness of the transport under the leak -- I mean under the -- in the andesite, I would -- I will recommend monitoring wells based on there being a leak 500 -- or a seepage source 500 feet from the perimeter.

Monitoring wells should be spaced at about 500 feet. I mean, larger spacing might be okay, except it will take a very long time for it to be detected, and

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that's ultimately why I don't recommend a larger spacing for -- at the waste rock.

And thus based on the perimeter of about 5,000 feet, there should be about -- downgradient of WRSP-2 and 3 there should be about 10 monitoring wells.

I will note that I'm not specifically commenting on any specific proposed monitoring well in -- in the plan when I say 10 monitoring wells or 18 monitoring wells.

I also note that this analysis is based upon -- is not based upon there being fractures. And -- and the fractures are observed in either of the formations. That is a cause for an additional monitoring well, not to get rid of one of the proposed -- one of the ones that I recommend.

And as with many things in my presentation, there are more details in my May report.

Q. Okay.

And you should have been provided with a document that's marked as Ranches Exhibit Number 34?

Is that the proposed permit condition that you prepared?

A. Yes, it is.

Q. And would you like to make any changes or revisions to the proposed permit condition at this time?

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A. Yes, sir. There are two things I would like to point out with regard to this.

As I just mentioned, I realize that it's better to have a spacing at the waste rock storage facility of 500 feet rather than 800 feet. So I would -- I would change that part of this and add a couple of monitoring wells to what's recommended here.

And I would also point out that the spacing is not exact, that I recommend that the -- that the NMED use their experience to -- and to actually establish the -- you know, the locations. You know, if there's a better facility or even an existing well that lands on -- on -- that would be close would be acceptable.

So this is an average spacing of 500 feet based upon field observations -- or taking field observations into consideration.

Q. Okay.

And then you mentioned that the analysis that you have done, the calculations that you have done here don't take into consideration fractures.

Could fractures provide a conduit for the movement of contaminants in unpredictable ways?

A. They very often do, they -- absolutely.

Q. Okay.

Could you elaborate on that a little bit?

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A. Well, I mean, fracture -- fractures are, you know, secondary permeability, like I mentioned up at the beginning, and often in a zone that has a much higher permeability. And if a -- if the groundwater flow is in any way transverse to a fracture, the fracture could intercept that groundwater flow and cause some or all of it to move along the fracture.

And thus it could -- it could move in directions not necessarily predicted using a homogeneous aquifer model calculations as I -- as I used in my interpretative calculations.

Q. So potentially there could be a more northern or northeastern component to the -- the flow direction that your calculations depicted?

A. Absolutely. There -- I mean, the fault continued -- the fault on the east side of the tailings -- I'm sorry. I forget the name right at this second. But it moves -- you know, it is inferred to move all the way north along -- as far as the Animas Creek and beyond. If it -- if it has a fracture zone, at some point it could definitely transport --

Q. And are --

A. -- contaminants.

Q. And are fracture zones common in fault areas?

A. It is very common that faults are both an

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impedence to flow and a conduit for flow, usually an impedence transverse to the flow and a conduit one -- along the flow. I mean, that is -- if it wasn't for faults moving water, there wouldn't be a lot of water moving around parts of the Great Basin. That's for sure.

Q. Okay. Why don't you proceed with the next section of your presentation, Dr. Myers.

A. Sure.

I have a very brief section here on the effects on Ladder Ranch.

And simply contaminants from both waste and tailings source could reach and cross the ranch boundary due to dispersion and due to fractures.

We kind of just discussed this a little bit, but I will point out using the layout of the -- of the mine here and the tailing storage facility and the waste rock storage facility, as shown on this map, which I drew from the Draft Environmental Impact Statement, and showed up in my second or third slide.

And this is slide number 48, and it shows -- it's titled the Effects on Ladder Ranch.

And it shows as -- as a base map it shows the map of the Ladder Ranch, it shows the approximate location of the Copper Flat Mine. And I would like to

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draw your attention to where a couple of these facilities in the -- on the mine would lie on this map.

If you see this blue line here that goes right beneath Copper Flat Mine and it goes south and then it veers back north and then goes south, that is the Grayback Arroyo. That is the same as this feature right here on the Draft Environmental Impact Statement.

So the tailing storage facility would tuck itself -- would be tucked right up in this vicinity --

Q. Excuse me, Dr. Myers.

A. -- right here.

Q. For the record, when you say "this" and "that," it's not going to be clear.

So if you could go through that last explanation again and identify features on the two maps that you're referring to so that we have a clear record.

A. It's -- the tailing storage facility on the map of the mine site would be directly south of this northern point in the Grayback Arroyo. It would straddle two sections. I believe the one on the east side is section 30. So that would make this one over here 36 of a different township. And it's just above the label on the map called Golddust Tank. That's where the tailing storage facility would be.

The waste rock facility would be to the north

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of Grayback Arroyo, to the right or to the east of the -- of the -- the Copper Flat Mine label and to the south of an old mine labeled Sweetwater.

The Ladder Ranch is just north and northeast and is almost directly east of some of where this tailing storage facility would be, and with dispersion -- dispersion would easily get some contamination up into -- up into the southernmost portion of the Ladder Ranch. I am -- I am showing this area on the Ladder Ranch which I believe is called the Avant Pasture.

And so the contaminant contamination based on dispersion calculations I've just done could reach across this boundary. Clearly if dispersion -- I mean, the seepage from the waste rock would move only very slowly in this direction, but if it hits a fracture, it can move much more rapidly in this direction.

And one other point is I have had several different slides. The one slide that from the Probable Hydrologic Consequences report shows actually postmining groundwater gradient with a gradient going in this -- it shows a flow arrow going in this direction.

Q. When you say "this direction" --

A. To the northeast from the waste rock storage facility area, into the -- the waste rock storage

1229

stockpile on -- it would -- northeast would head onto the Ladder Ranch.

And -- and so that -- so just to read what I've written up here, less than half a mile downgradient of the north half of the TSF with dispersion more contaminants will -- could reach the ranch, and any north-trending fractures will increase the flow to the ranch.

Q. Okay. Thank you.

Please proceed with the next section of your testimony, which I believe involves the pit lake.

A. Okay. Now, I've got three short sections to consider regarding the pit lake.

First of all, the pit lake probably will encroach on public property.

The pit lake will draw groundwater from surrounding public and private property.

And the pit lake will have water quality that exceeds standards.

I'm going to go over this slide which kind of outlines what I'm going to show on the next three maps.

Q. And that's slide number --

A. This is slide number 50, and it's titled The pit lake encroaches on public property.

The pit lake will stabilize at elevation

1230

4,897. That's after rapid fill which I believe will take it to 4,894. The 4897 is a long-term, steady-state lake. The estimated steady-state level is based upon there being constant recharge and evaporation.

And I'd like to point out that there really is no such thing as steady-state because recharge changes -- does not account for seasonal change with recharge being maximum during the monsoon season. I realize there's very little snowmelt in this area. And with evaporation being the least in the winter. So you've got a seasonal fluctuation.

It also does not account for long-term fluctuations including there being years with no recharge or there being very wet years where there's a lot of recharge.

Fluctuations in precipitation and evaporation would cause a pit lake to fluctuate around the steady-state level assuming it is correct.

And now I'm -- the next several slides allow me to compare the pit lake on a contouring map to property lines, but I'd like to point out I'm going to go into a little more detail on -- because it was discussed a lot in previous testimony, I have a couple more rebuttal slides regarding seasonal change, as well, and long-term change.

1231

And so I have at 4,800 -- or 897 feet the pit lake will encroach on public property.

Now, this is a map of the pit, and the source is -- this -- it came from an E-mail, I believe it was, written by -- sent by Mr. Smith of NMCC. It's labeled -- it's number -- it's Figure 3. NMCC Future Open Pit With Property Boundary.

And what we're seeing here is a contour map of the final open pit configuration. All these lines inside the open pit are contour lines. The purplish color is the open pit, which I believe is intended to be drawn at elevation 4,894 feet. The purple hash lines are an outline of the property lines with lines -- with property on the west and outside of this area being either public land or Hillsboro Pitchfork Ranchland to -- to the southwest, or more or less to the west of this area.

I am going to contend, and I will explain why in the next two slides, that this pit lake area is probably drawn incorrectly and that it will ultimately overlap with the property -- with public property boundaries right there on that bench.

Now, to do that, I've -- I've blown up the center of that previous map. Okay. Again you can see the contour interval, the contours around -- around it.

1232

Q. And what slide are you on now?

A. I am on slide 52, which is -- which shows two maps, both contour maps of the pit lake, and the one on the left being the one I described on the previous slide, the one on the right being Figure 3-. -- 3.13 from the Probable Hydrologic Consequences report.

Unfortunately, this contour map that shows the property boundaries does not label the contours. So one could look at this and not really know what elevation any of these points are at. So -- but the contours as shown on this map to my right are very specifically labeled, and you can see that's the exact same -- if you follow down the ramps, you can see it's the exact same map.

On the east and southeast side, the contours are a nice -- every 25 feet these are labeled -- these are 25-foot contours. As you go around to the south and the -- and the west, the contours -- they come -- they don't necessarily merge, but they come very close together. So it looks like you've almost got 50-foot contours on this side, but they come very close together.

And you'll be able to see that on a cross-section map on the next slide, cross-section being this -- this one that goes across the center of the pit

1233

right here.

But I think it's clear this -- this contour right here, this innermost one is labeled 4,900, which means the next one to the right is 4,875. That means this one right here is 4,900 and -- and this one right here is 4,875, meaning that at some point through here the ground surface drops.

Now, I realize on another slide -- this is called a -- it's considered a flat bench, but the way you draw contour lines is that for this to be flat there has to be a closed 4,900-foot interval -- or 4,900-foot contour in here. So it -- this map is not precise to draw this -- precise enough to draw this pit lake. I mean, this pit lake is drawn at the 4,875 level, not the 4,894 level.

And here is another rendition. This is a slightly larger version of slide 53, shows a slightly larger version of the pit lake map from the Probable Hydrologic Consequences report as well as the cross-section that goes -- that's shown through there.

I contend that for the purpose -- that the 4,900-foot bench as seen in this cross-section here is drawn incorrectly, because if it were flat, that 4,900-foot contour would have to be closed, but it is not closed as you can see here. There -- at some point,

1234

there is a slope from 4,900 to 4,875.

Q. And when you say "it's not closed as you can see here," could you identify a little bit more specifically what you mean by "here"?

A. Okay. I am -- my cursor is showing a bench on the west side of -- of the pit, and it's also on the west side of where the drawn -- the pit lake was drawn on the map on the preceding slide.

The contour on the -- on the west side of the bench is 4,900. The contour on the east side is 4,875. The way you read a contour map is that -- is that the ground surface slopes from one contour to the other. So if this were -- if this bench on the west side were really flat, the contour lines -- there would have to be a contour interval in here that closes.

That is -- that is a -- it's being -- by -- when I say closed contour, it would mean -- I don't want to say circular, but it would -- but it would go around -- be able to trace around it. That is the only way you can have a flat surface. And that -- and to show a flat surface on -- on a contour map.

Thus what I am saying is that there's an error in the way the pit lake was drawn and at some point it -- it's going to be on this bench. And the only -- the way to have shown this -- this should have been

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shown with a two-foot contour map.
I mean, I -- I can't be certain that the map -- that the lake will -- will intersect with the property boundary, but these maps don't show it. And the property boundary is about a third of the way across this bench. And if it's just a simple flat slope across there, the pit lake would go across it. If it's -- if it's -- if it's perfectly flat, it won't, but they've got to draw the map properly.
And then, finally, the pit lake will draw groundwater from the surrounding private land, including the Ladder Ranch and the Hillsboro Pitchfork Ranch.
This map is a contour map with postmining groundwater elevation. The arrows show that groundwater will flow toward the pit from off the permit area. I mean, this arrow here shows that it's coming from the southwest. The permit boundary is the yellow line here. Clearly there will be flow coming from the southwest, including from the Hillsboro Pitchfork Ranch, north toward the pit.
There will be -- there will also be water drawn from north of the -- of the permit boundary, including from where the Ladder Ranch is, down towards into this pit lake, and it will mix with the -- with the water that is -- that is in the pit lake.

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And then, finally, from the -- these two figures are from the -- the pit -- the pit lake model. These should -- simply I'm just -- I'm just showing them -- it's been said many times no one -- no one has claimed that the pit lake would be perfect water quality.
This -- this is just showing from the models that the future pit lake will have poor water quality and that the groundwater that's being pulled into them will become -- will reach these concentrations instead of the previous cleaner concentrations they had.
The table below here shows -- compares a variety of parameters from cadmium, mercury, lead, manganese, zinc, selenium, and it shows the various surface water quality standards as published in the Draft Environmental Impact Statement.
And it shows the pit lake at 100 years. These are just different -- different ones that will exceed the different standards at different points. And that's all -- all this is showing.
And I'll point out that under cadmium that should be -- that slash under Warmwater aquatic life -- that should be 5.38 not 5/38.
And that concludes my presentation.
Q. Okay, Dr. Myers.

1237

I'd like to just clarify a couple of points.
If you'd go back to the previous slide, which is -- 54, I believe? The one you're on now, is that 54?
MS. ORTH: It is.
MR. DE SAILLAN: Thank you.
MR. MYERS: Yes. That's 54. I'm sorry.
Q. (BY MR. DE SAILLAN) So you were referring to the -- the open pit drawing water in from the west and from the southwest and from the northwest.
The contour lines there have been lowered; is that correct?
A. Have been --
Q. As a result of the -- as a result of the pit lake drawing that water in?
A. Yes, absolutely. I mean, most maps that are provided show drawdown. They don't show -- this is the only map I've seen anywhere that actually shows the postmining groundwater elevation. And the drawdown map you can't necessarily draw flow lines on it, because drawdown doesn't necessarily mean you're pulling water from one direction.
This shows exactly where you're pulling water from, because it shows what the water table would look like. And so for example here, there's a 5,400-foot contour just west of the pit prior to mining. That

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would have been higher. And so it has been lower.
Q. Okay. Thank you.
I have no further questions, Dr. Myers.
Thank you very much.
Now, Madam Hearing Officer, I'd like to move for the admission of the Ranches exhibits 22 through 37.
MS. ORTH: Okay.
Objections?
MR. BUTZIER: No objection.
MS. BARNCASTLE: No objection.
MS. ORTH: Okay. Ranches Exhibits 22 through 37 are admitted.
(Exhibits Ranches 22 through 37 admitted into evidence.)
MR. DE SAILLAN: Okay. And just to wrap things up, we also had Exhibits Number 1 and 2, which were sort of more general exhibits.
The first one is the August 10th, 2018, version of the proposed Discharge Permit, a clean copy without -- without the revisions shown from the previous draft.
And then Exhibit 2 is our -- the -- the ranches' comments on the initial proposed permit.
And I'd like to also move for the admission of those two exhibits.

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MS. ORTH: Any objections?
MR. BUTZIER: No objection.
MS. ORTH: No?
MR. KNIGHT: No objections.
MS. BARNCASTLE: No objection.
MS. ORTH: All right. Thank you.
Ranch Exhibits 1 and 2 are admitted.
(Exhibits Ranches 1 through 2 admitted into evidence.)
MR. DE SAILLAN: And then there's one more item, and that was the exhibit that was the testimony from the Tyrone hearing that Mr. Butzier had at least a tentative objection to, and I was wondering if he's had a chance to review that document.
MR. BUTZIER: I have, Madam Hearing Officer. I was provided with more context, not full context, but more context, and I will withdraw my objection to the admission of what was originally proposed.
MS. ORTH: All right. Thank you.
I have it here, as well. It says V3 10/29/2003 at the top of it. All right.
MR. DE SAILLAN: And that is Exhibit 41, Ranches Exhibit 41.
MS. ORTH: Okay. Thank you.
Are there other objections?

1240

No?
MR. KNIGHT: No objection.
MS. BARNCASTLE: No objection.
MS. ORTH: All right.
Ranch Exhibit 41 is admitted.
(Exhibit Ranches 41 admitted into evidence.)
MS. ORTH: Are you moving now to rebuttal?
MR. DE SAILLAN: Yes, I am.
MS. ORTH: All right.
MR. DE SAILLAN: Thank you, Madam Hearing Officer.
Q. Dr. Myers, have you provide -- excuse me -- prepared a presentation in rebuttal --
A. I have prepared --
Q. -- for this afternoon?
A. Yes, I have. I've prepared a fairly brief presentation in rebuttal. Yes.
Q. Could you go ahead and present that, please.
A. Yes, I will.
I notice that mine is laid out just a little bit different than Mr. Kuipers. He listed everything on the first -- on one page that he was going to refer to. I bring up the different exhibits and different things slide-by-slide as I go through.
The first -- my first rebuttal -- or first --

1241

yeah. My first rebuttal starts with Griffiths slide 47 stated that particle tracking indicates that any seepage from the facility would remain in the immediate area for several hundred years with no migration or plume generation. And the reference was to JSAI, 2012.
I mean, it's a very important claim, but there was no -- the citation, JSAI, '12 -- 2012, is not to anything that has a particle tracking calculation done in it. JSAI, '12 -- 2012, is the conceptual model report.
And their numerical model had not been -- none of the reports showing a numerical model had been done until 2013. And at least my review of the model doesn't show that there was ever a particle tracking reported in those numerical.
So I -- I -- but it's important to point out that there's a difference between particle tracking and what I just did in my -- in my testimony, is that particle tracking is strictly movement of the advective flow. It's simply the movement of groundwater with the -- you know, through -- through the groundwater flow. It does not include dispersion in any way.
Second rebuttal refers to Finch slide number 40 and 41. I'm going to refer specifically to the comment that low moisture content and high negative soil

1242

porewater pressure of the coarse-grained waste rock prevents downward migration of surface infiltration, more on andesite permeability being less than one times 10 to the minus-6 centimeters per second, and that infiltration through the waste rock storage stockpiles is not expected during the operation period, consistent with 30 years of observations from the existing waste rock storage facility.
There is -- there is information in the record that suggests that seepage occurred through existing waste rock out there in less than two years, and I -- I will present that in just a second here.
And then slide 41, vadose zone modeling indicates discharge to groundwater will be nil when considering. And this -- this is because it goes in line with the previous slide. Limited time between operations and reclamation for development of conditions for net infiltration. That just simply wouldn't be the case as shown -- as I'm going to show in a second here regarding existing waste rock at the site.
First, seepage -- slide number -- I see this one doesn't have a slide number to it, but labeled Seepage through waste rock to ground to groundwater, during operations.
And I'm really only concerned with during

1243

operations, because after that I'm assuming that the -- that that cover would be somewhat -- would be somewhat operative. And the graph I'm -- I mean the figure I'm using here is from Griffiths slide 41, but I'm only partly rebutting part -- what's on this particular slide. It's partly demonstrative and partly for rebuttal.

First off, there's no reason that the waste rock would be dry. It was said many times the waste rock would be dry. And if the -- because the water table is at the existing pit lake -- the water table is at the existing pit lake, and as they excavate the pit lake, the area, it will be dewatered, but it's not going to dry as if it's exposed to the desert air. It -- until it's actually removed and piled.

When -- during excavation -- I mean during dewatering, the air -- the waste -- the rock drains, but it would still be at a field capacity. It's not going to be bone dry, which is the implication, I believe, that the -- that the hearing was given previous -- in previous testimony.

It would still be partially wet, because just -- just like draining through -- you know, through a column of sand. I mean, it can be saturated, but you let it drain, it's still wet, but there's just no water

1244

dripping through. That's the difference between -- you know, that's what happens in dewatering.

Now, the seepage to -- into the waste rock would not have to be wet, unsaturated waste rock. A lot of times -- flow into an unsaturated zone has to wet the existing rock -- or the existing material that's there. That doesn't have to happen here because it should already be at least partially wet.

We heard often that air acts as a barrier, but there was no citation or reference to this claim and the information needed to actually assess it. I mean, I understand what that means. Unsaturated flow often does seem to have -- to have a barrier and seems like air acts as a barrier.

But to assess that, you know -- you know, for unsaturated flow through the waste rock, you need to know the drain size distribution for the waste rock, you need to know the soil water characteristics of the waste rock, you need to know the unsaturated conductivity measurements. And none of that has been provided for this -- you know, to actually consider flow through waste rock.

So this is just -- it just doesn't -- it's not right to just say air acts as a barrier and there could be no infiltration. There's been no calculations

1245

actually using what the -- what the material properties will be.

And that's my next bullet, is no reference or simulation of seepage through the vadose zone either, which is the zone between the base of the waste rock and the groundwater.

Considering the slide to the right here, there was no, you know, assumption of the 30-foot mixing zone. We don't know where the basis for that is.

After closure, seasonal variability would apply. And I'm just basing this -- saying there's not enough information for the -- for NMED to act on this Discharge Permit application.

This slide here shows that there's -- that there has been observed leaching from existing waste rock at the site. This is from the 2013 Stage 1 status report.

Q. And what slide is that?

A. This is -- it's -- the title is Leachate from existing waste rock. I don't have a -- I don't have a slide number on this. Sorry. We didn't -- it didn't get one on.

I'm going to read the section in the upper right which comes from 2013 Stage 1 status report, and it's from page 13 of that, and I've listed the Bates

1246

numbers here that are relevant for this information, too.

"Results from GWQ-1, GWQ-3, and GWQ-8 provide evidence that a sulfate-TDS plume exists in the alluvium and Santa Fe Group sediments below the waste rock and mill site area along Grayback Arroyo." Reference to Table 6 which I don't show.

"Time-series sulfate concentrations for these three wells and historical data from SWQ-1 through -3 are shown on Figure 7. The source of the sulfate-TDS plume is likely leachate from the waste rock and mill site area that has commingled with storm-water runoff and infiltrated in the alluvium along Grayback Arroyo."

I believe the statement that it's likely leachate is an observation that there's been leakage through this waste rock.

Now, the slide -- the time-series here -- this is Figure -- Figure 7 that I referred to -- the -- the dots -- these are observations of surface water quality at SWQ-1, which is shown on the map on the right side of the figure. SWQ-1 is sort of an upgradient or above waste rock area. SWQ-2 is midway between the tailings impoundment and the pit. And then SWQ-3 is just above the tailings impoundment.

But these are areas -- these are points along

1247

the Grayback Arroyo. The lines on the graph that show -- show concentrations in the three wells that I read before, and show that they have increased with time, and these wells are over -- they're either in alluvium or Santa Fe Group over here further downgradient and along the Grayback Arroyo.

And the argument that is made by Shomaker & Associates in the status report is that it's -- it's leachate from waste rock getting into the Grayback Arroyo, sinking into the ground and causing the -- causing this plume, which is shown on this slide here.

This is -- the next slide, and it's -- it is a slide that shows Figure 4. West to east hydrogeologic cross-section through the waste rock and mill site area, Copper Flat Mine.

Now -- now I'm going to show that -- I'm -- in the next slide, this slide shows a map of groundwater monitoring wells around the site, and this is andesite -- this -- the location of andesite well GWQ96-22A is shown on this map as being west of the pit. It -- it's right up just on the far west side of the permit boundary. It's upgradient of any influence of -- of the mine or of the existing mine.

Now, this is one of the wells that Dr. Marcoline used in his testimony for the state in

1248

support for the andesite having low permeability.

That well is shown in this particular slide here. It clearly -- on the left side of the -- this is -- this is Figure 60 -- or slide 65. I see for some reason it's now giving me slide numbers.

Anyhow, it's -- shows a well log for GWQ96-22, shows that it's in totally andesite, and that the well is screened from 174 to 244. This is 96-22A which -- A and B I think in these wells primarily mean shallow and deeper.

The --

Q. That refers to the shallower and deeper screens?

A. Yes. I mean A usually is referring to a shallower screen, with B referring to a deeper screen. Sometimes it's alluvium and bedrock, but I don't think that applies at most of the sites around this -- this project.

The hydro -- the graph shown on the right here shows that total dissolved solids in blue and sulfate in yellow-ish have varied quite substantially at this well over time. This is a well with extremely low permeability, and it's used as support for extremely low permeability, but the hydrograph is showing that we have very, very significant changes in concentration.

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That means that there has to be some way for -- groundwater has to be flowing through this material, getting into this monitoring well. And this is simply evidence that the conduct -- that the conductivity is higher than is being presumed for andesite.

Now, I'm going to go back and just refer to this one little statement I have over here, also back in the testimony from -- from the state and from Marcoline, that we -- we had a table that should -- listed a whole bunch of monitoring wells that had been shown, and there -- there were quite a few of those wells that were water supply wells, and quite a few of them were developed in andesite.

And what I wanted to point out simply was that that -- it didn't come out in the testimony yesterday, because a lot of these wells they didn't show that -- what the screening interval was, but the one column showed that the total depth -- that showed the depth in most of them were less than 100 feet.

So the point is that these water supply wells, which were developed in andesite, which I believe we would argue is a sign that the andesite is -- is well less than -- is less low conductivity than would be -- than would be expected, you know, or also shallow, which

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is more representative of near surface -- of near surface conditions.

Now I'm -- now I'm moving down to a slide that is labeled Seasonal/annual variability with respect to pit lake level.

And what I'm going to discuss for a minute here is the potential sources of variability in the pit lake. And I mentioned in my earlier rebuttal slide that I would discuss variability -- you know, the variability and why would the pit lake vary more than one or two feet, which is what the -- testimony by several people, but I more specifically remember it being stated by Finch -- Dr. Finch yesterday -- or on -- I guess it was Monday, that it would be more than -- possibly more than a foot or two.

The only source of variability that has been considered is monthly rainfall at the Hillsboro gage, and for estimating rainfall and run-off into the pit. So did they use the monthly gage to estimate the -- how much rain enters -- you know, reaches the surface of the pit lake. And I am referring to -- that reaches the surface of the pit -- of the pit lake. And I am referring to the future -- you know, the future pit lake here.

So -- so this -- that was considered a

1251

variable input.
And run-off, I believe, if I understand the way they did that, they -- they considered that the precipitation at Hillsboro 12.6 of that would run off. 12.6 percent of that, not considering anything about antecedent conditions or whether it was a large storm and a very large -- you know, more than 12 percent would have become run-off.
They hold recharge throughout the domain constant. Part of the argument -- I mean, there's no consideration of recharge variability even within the pit. I mean, if you have rainfall that falls within -- that falls within the boundaries of the pit, which are shown here on the right -- I mean, you have water that runs off.
Whether it's 12.6 percent or a higher amount, the remainder of that rainfall enters the ground and either enters the -- enters the groundwater very close to the pit lake, and it's reasonable to argue that most of that would flow directly into the pit. That would be an amount in addition to what is being considered throughout the groundwater model domain.
It's called interflow. You get a little groundwater enters -- a little precipitation infiltrates into the ground, flows lateral to the ground surface and

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into the pit lake.
So, I mean, basically -- I mean, the other thing to keep in mind is that the pit itself will only be reclaimed -- the only place there will be reclamation is on the -- the ramps. And so you have exposed pit walls in perpetuity. So the rainfall will be hitting exposed pit walls, and to say that that -- that only 12.6 percent of that will infiltrate just doesn't -- that seems like a very low number.
And -- or only 12.6 of it -- excuse me -- will run off. It seems like a very low number. But again, as I just said, whatever infiltrates is going to make its way to the pit lake quickly anyhow.
The only other consideration of variability was that a 100-year storm or one-year period of no run-off would -- had been considered. And I'll simply point out that as -- as been testified by Mr. Kuipers and others, the 100-year storm in the future may be quite a bit larger.
And I just point out the evaporation was considered steady.
I think my conclusion here is that one to two feet if you -- if we made a really good consideration of variability on a seasonal and annual basis, even -- if steady-state is actually correct -- and I'll -- for the

1253

sake of argument, I'll say it is correct -- rather than plus or minus a foot or two, it's probably more likely two to five to eight feet, which still -- which puts it way up into public property.
Now, the next bit of rebuttal I would like to make is the consideration of the fault on the east side of the tailings storage facility as a barrier, or at least as a -- as significant a barrier as has been implied through testimony by the -- by the mining company.
I believe this is the only slide in any of the documents that shows this very steep groundwater -- I'm going to back up.
The title of this slide is Fault as a barrier?
And the slide on the left side here is from -- is Finch slide 15. It -- it's showing -- it shows groundwater contours, and it shows a very steep groundwater contour just to the east of the permit boundary which more or less coincides with the fault zone on that side.
And the implication is that this fault acts almost as a dam, slowing the flow through here considerably. And this is a -- they -- I believe they have -- it's been said this is a 120- to 140-foot drop in the groundwater. These are 20-foot contours. So you

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draw the contours small enough, it can look very steep.
But I want to point out that this is based on only one well, and it -- and there's a lot of -- I would like to suggest that maybe it's -- it's not quite -- it's not interpreted quite properly, as I'll show in the next couple of slides.
But the slide on the right here is the -- is the -- I've used several times before, but this shows the premining groundwater contour levels, and it does not show anything at all like this drop. Now, it definitely shows a little bit that the gradient is steeper just east of the permit boundary, but it's nowhere as near as steep as -- as what's shown on this slide here.
Now, this slide here just very briefly shows --
Q. Which slide is that?
A. This is -- this is -- my next slide is a clip of Finch slide number 20, which shows the geology through the tailings storage facility.
And I'm only really using the slide to show where the cross-section goes through the tailing storage facility here on the lower southeast portion of the permit boundary.
And that is the -- this slide here shows --

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shows the fault -- this slide is labeled Finch slide 21, and it's a cross-section through tailings storage facility.

And what I'm showing here -- what it shows is a cross-section that shows andesite with -- with a clay, and it -- it shows andesite, and it shows the Santa Fe Group. The tailing storage facility is primary on this -- primarily on the Santa Fe Group, and it shows in a vertical dashed line through the -- sort of the middle of the cross-section it shows the location of the fault. And it -- it's the low -- it's the dashed line that has the -- that has the vertical up and down arrows on it.

And to the left or to the west of that fault zone, it shows an almost triangular area that's labeled as clay. Okay. And that clay -- the -- the tip of that -- of that triangle is at the -- where the -- is at the fault, and on the other side of the fault is -- there is drawn a very extensive layer that's also -- a very extensive area that's also layered -- labeled red clay. And they almost touch.

I am going to argue that there's no justification for showing this clay below approximately a point on well log -- on the well log for this particular well that I'm pointing to, a well that is just to the west of the fault. There's no justification

1256

for showing clay below that point, nor is there justification for showing it as clay on the east side of the fault.

I -- the well diagram shown here is Figure A1 -- A14. It's a well diagram for Monitoring Well 4, MW-4, which is this well right here. It's the furthest -- it's the one shown furthest to the right in the cross-section.

And I'll just repeat that the top is sand, then silt-sand, then sand-clay, then silt-sand, then sand and some clay. Sand and clay the way -- the way these well logs are shown, this implies more sand than clay, and they would -- and if it was extremely dense clay, it's unlikely that this would have perforations ranging from 125 to 1,500 feet.

I'm not saying that this is highly permeable gravel or something, but to call this impermeable red clay does not follow from this -- from the well log of the only well that they have -- that is -- that is available that shows what is in that clay.

And the next slide that -- the next two slides I have are the well log for well GWQ94-21A, which is the well just to the west of the fault. So the next two slides I've actually -- it -- the next two slides show a clip from the well log for GWQ94-21 -- I'm sorry --

1257

94-21. I see that I have mislabeled -- that should be 94-21, not 94-11. And it's from -- it's from the Abatement Plan.

And what this shows is -- it shows that approximately 160 feet -- let me -- that -- it shows clay through this uppermost area. I mean, it just -- it shows justifiably clay through this uppermost area, although I'll point out at the near surface it is not -- it is not labeled as clay.

But it shows -- but it shows clay ending at approximately 160 feet, and below that you're read -- you're seeing gravel and sand, all the way down. And as I flip back up to the cross-section, that's what this area is here, the lower part and where the GWQ-21A is screened.

So my point is simply that there's no justification for showing this as clay at the fault, either on -- below about 160 feet or on the east side of the fault.

Now, I acknowledge that I was -- agree that this definitely shows a -- a drop in the water table from -- from here to here, but it -- these are -- the -- these are confined wells. And it's -- it's not unreasonable to see some of that -- you know, to see some change in that distance. It -- it is not proving

1258

that this fault is a huge barrier to flow.

And I believe --

Q. Okay. Thank you, Dr. Myers.

I have a few more questions, but first, Madam Hearing Officer, the testimony reflected that there was a mislabeled -- well logs on these slides, and I would like to have the opportunity to provide the Hearing Officer and all of the other parties a corrected page for that slide. We'll do that tomorrow.

These are demonstrative exhibits, but I still want them to be correct.

MS. ORTH: All right. Thank you.

Q. (BY MR. DE SAILLAN) And then, Dr. Myers, I just have a couple more questions on rebuttal.

You were here yesterday for the testimony of Dr. Marcoline for the Environment Department?

A. Yes, I was.

Q. Okay.

And you -- do you recall his -- him testifying about a well on which a slug test was performed?

A. Yes. He was referring to slug test.

Q. Okay.

And I want to -- I asked you about this a few minutes ago, and I think you misunderstood my question.

Now, that was on -- that -- the well that he

1259

was referring to I think was labeled GWQ-5R; is that correct?
A. I -- I remember that as being in his testimony. Yes.
Q. Okay.
And that testing event that he was referring to, is that the same testing event that you were referring to earlier in your testimony when you talked about the pressure test?
A. Well, that is the only testing event I'm aware of on that particular well, is the pressure test. I do not -- I'm not aware of there having been a slug test also performed on it. So yes. I have to believe that he was misreferring to the -- the pit pressure test as a slug test.
Q. Okay.
And earlier you emphasized the distinction between a slug test and a pressure test.
A. Yes.
Q. And could you explain what that difference is just briefly?
A. Well, I mean, simply for the -- it's the amount of pressure that's ultimately applied. I mean, a slug test -- I mean, there's lots of different ways of doing it, but you apply water, and you -- and you

1260

basically watch how fast it drains from the well. I mean, it -- just fill it and -- you know, to a certain level and watch how fast it drains. And you -- and there are formulas that you use to determine the conductivity based on that.
At this particular well, they had to apply 200 feet of head. A slug test would not have likely shown any because they would not have applied 200 feet of head.
Q. Okay.
And a pressure test in contrast?
A. Well, a pressure test, they -- they have -- they collar off a section of the borehole, and they -- and they -- to prevent water from leaving those collars, or leaving the zone that's collared off, and they apply pressure, and they measure the flow rate that is going into -- that is going into the fracture. I mean, the difference again is just the fact that there's a pressure applied.
Q. Okay. Thank you.
And then your last slide, I think we really addressed that issue in -- at the end of your direct testimony.
A. The slide that's -- that's shown here that I'm not talking about?

1261

Q. Yes.
A. Yeah. Yes. We've addressed this already.
Q. Okay. Thank you.
That -- that's all the questions I have for rebuttal.
Thank you, Dr. Myers.
Thank you, Madam Hearing Officer.
MS. ORTH: Thank you, Mr. de Saillan.
Let's take a 15-minute break, and we'll begin with cross-examination.
(Proceedings in recess from 4:25 p.m. to 4:41 p.m.)
MS. ORTH: All right. We are back after a break.
If you would please take your conversations out of the room.
Thank you. We're coming back from the break now.
We will begin with cross-examination of Dr. Myers.
Mr. Butzier, do you have questions --
MR. BUTZIER: Yes, ma'am.
MS. ORTH: -- of Dr. Myers?
MR. BUTZIER: I do, Madam Hearing Officer.
MR. DE SAILLAN: Madam Hearing Officer, if I

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could just for a second, my understanding is there was a little bit of confusion about what the Exhibit 41 was to be, and I think Mr. Butzier is withdrawing his objection to the short version of that exhibit, and so that's what we introduced.
MS. ORTH: Oh. Then I was confused. Maybe no one else was confused, but I was confused.
Okay. So Exhibit 41 that's going into the record is the short version, not the full version.
MR. BUTZIER: That's correct.
MS. ORTH: Aha. Okay. I'll correct my record.
MR. DE SAILLAN: Thank you.
MS. ORTH: Thank you.
Mr. Butzier.
MR. BUTZIER: Thank you, Madam Hearing Officer.

CROSS EXAMINATION

BY MR. BUTZIER:
Q. I apologize if my voice waivers. I seem to be coming down with something.
Good afternoon, Dr. Myers.
A. Good afternoon, Mr. Butzier.
Q. I'd like to ask you a question about slide 4 of your presentation, the direct presentation.

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In the second bullet point from the bottom, you -- the bullet point that starts with Andesite, you've indicated that that's an extrusive igneous or volcanic rock, correct?

A. Yes.

Q. And just in general terms, for my own benefit as a layperson, could you describe what that means and then also how you would expect that to compare to what's being referred to in this proceeding as the Santa Fe Group of materials?

A. As -- as a Santa Fe Group?

Q. How would extrusive igneous or volcanic rock compare, in your view, to Santa Fe Group material?

A. Well, it's -- it is much less -- well, it's more of a crystalline rock. I mean, the Santa Fe Group is more of a -- of a consolidated sedimentary rock, or more of a consolidated alluvium. I mean, they're -- they're vastly different, I mean, hydrogeologically speaking.

Q. And can you elaborate on that? What does that -- how would that translate in terms of the relative expected hydraulic conductivity of the two -- two forms of material?

A. One would expect the un- -- one would expect the bedrock to be a couple orders of magnitude lower in

1264

conductivity than you would the Santa Fe Group, and that's kind of what's been found in the modeling that's been done out there.

Q. Thank you.

Have you ever been to the -- to the proposed copper mine permit area?

A. I have been all around it. I've never had a formal tour of the property, but I've been on the Ladder Ranch, and we've driven as close to the boundary as we could.

Q. Okay.

I'd like to turn next to slide 6, the last bullet point.

And here we're talking about the pit area pressure injection test in Q -- in GWQ-5R, correct?

A. Correct.

Q. You've -- I think the point of your -- your slide here is that the permeability that's -- that you determined for -- from that test was -- was much greater than zero? Is that -- was that -- did I catch that correctly?

A. That is the primary conclusion of -- of this slide. That's correct.

Q. And where do these figures 5.2 times 10 to the minus-7 and 1.3 times 10 to the minus-6 centimeters per

1265

second -- where do those fit --

A. Right.

Q. -- in terms of the findings that were made by Jones and Finch?

A. Where --

Q. Is it more -- is it a greater hydraulic conductivity figure or same or less or -- where does it fit?

A. I'm sorry. Jones and Finch, which report are you referring to?

Q. Well, let me just start with the testimony of Steve Finch.

I think you were here for the testimony --

A. Yeah.

Q. -- of Mr. Finch, correct?

A. Yes.

Q. And just how does that compare to what Mr. Finch was saying in his testimony was the hydraulic conductivity of the andesite?

A. Well, I mean, he's saying it's less than 10 to the minus-6, I mean, and -- and using that -- and using that to justify calling the andesite a liner. I'm -- I'm not sure if there's some specific quote that I'm not remembering, but -- I mean, most of the testimony has been that the permeability is less.

1266

In fact, I think it was -- you know, we've seen a range all the way down to 10 to the minus-11, based upon test -- you know, this is the only test -- direct test that was really performed of the andesite.

Q. So are you saying that you yourself have not independently attempted to test any of the andesite?

A. At the site? No. I've not been out and testing the andesite. No.

Q. Okay.

And did I hear you correctly to say that the calculations that you performed and presented in a series of slides starting at -- I guess around slide number 29, that there was -- you made no attempt to calibrate any of the data used or assumptions made with anything related to the site itself?

A. I attempted to make -- that -- you know, to use conditions, formation parameters that were similar to the site itself, and I -- you know, the gradient of the flow from one point to another.

But did I -- I did not attempt to calibrate it in the sense that I had the well observation and I tried to match it. I attempted to match some of the data and some of my understanding of the Jones, et al., 2004. So, I mean, that's kind of almost what an interpretive model is, is a way of trying to -- of trying to

1267

understand the site, but it falls short of a fully calibrated model.
Q. And other than the Jones, 2014 -- well, first let me ask, did you thoroughly review the Jones and Finch, 2014, report that you've referred to a couple times?
A. I -- it's actually Jones, et al., or something --
Q. Okay. Thank you.
A. -- on that particular one.
I'm sorry. I only -- there is a Jones and Finch report for 2018.
Q. My apologies --
A. That's okay.
Q. -- for confusing the issue.
A. I have reviewed that report -- rather I reviewed it originally for the EI -- the EIS in 2015, and I reviewed it, and I have -- I'm not actually -- I'm not being critical of that report. I'm using information from that model for the work I've done here.
Q. And is it your understanding that that report presented information based upon modeling that included calibration with data at the site?
A. Oh, absolutely. It did have calibration.
Q. And are you aware that there was -- there is

1268

an existing sulfate plume at the site?
A. Yes. I -- I have testified about it a little bit.
Q. And are you aware that that sulfate plume, at least one, came from the former unlined tailings facility?
A. Yes.
Q. And would you expect that this -- the rate of seepage from that tailings facility back when Quintana constructed that facility and used it for a period of time was likely substantially greater than the rate of any leakage or seepage that could be assumed to be coming from beneath a lined tailing facility?
A. Yes. I've seen some numbers that suggest that it would have been quite a bit higher than anything I modeled, anything that I had in my calculations.
Q. Okay.
And have you -- do you know where today that plume sits at the site?
A. I believe it -- it is -- there's -- some of it's still there.
Q. And isn't it the case that it stayed to the west of the Animas fault?
A. I don't believe that there's any data that supports that.

1269

Q. But you would acknowledge that it hasn't moved to the other side of the fault in any distance toward the Caballo Reservoir?
A. I am -- I'm not sure I have seen evidence to that. There are only those two wells below the fault, and I don't recall if one of them showed sulfate or not. There's -- there is sulfate -- I mean, there are contaminants in that series of wells to the west of the fault. I -- I honestly don't recall if that -- if the one well east of the fault has sulfate or not.
Q. Did the John Shomaker & Associates groundwater flow model -- are you familiar with what I'm referring to there?
A. That's Jones, et al., 2014.
Q. Okay.
Do you understand that that simulated the historical pit, the pit that's there today?
A. Yes.
Q. And in your view, does that model -- I think you've indicated you don't have any criticism of that model.
Does that model correctly simulate flow to the pit?
A. Well, you can check my DEIS comments as to criticism of the model, but I did -- because I did have

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criticism, but I used the model -- I accepted the model for the -- my -- my -- as a basis for my calculations here.
I'm sorry. Would you repeat your question about that?
Q. Does that model, the John Shomaker & Associates groundwater flow model, correctly simulate flow to the pit using an assumed conductivity?
A. I believe you mean the -- the existing pit, correct?
Q. Correct, yes.
A. I -- it was part of their calibration, and I -- I don't recall a specific problem with that -- with that aspect of the calibration.
Q. Okay.
Now, I'm referring now to slide 9 from your direct testimony.
A. 9.
Q. Bear with me. I just have to find one other slide here.
MS. ORTH: Okay.
Q. (BY MR. BUTZIER) On slide 9, the part of slide 9 that I'm looking at is your little, shaded box, Dewatering Flow.
Is the third column of that -- well, explain

1271

to me what the third column shows.
A. The third column shows conductivity as calculated using the four different flow rates into the pit, using Darcy's law as shown in -- on the -- you know, on the slide south, below the map.
Q. So the column that has a heading K and then in parentheses feet per day and has 0.69, under that 1.56, under that 0.19 and under that 0.31 -- since we're talking about flow into the pit, does that reflect what you understood or somehow came up with as the hydraulic conductivity of the andesite surrounding the pit?
A. Well, it -- it is the effect of conductivity of the bedrock that controls flow into the pit, and because a great deal of that bedrock is andesite, it reflects on the andesite -- I don't think they excavated all of the monzonite. So I believe there would be some monzonite included in that, but it -- overall it is the bedrock that is controlling flow into the pit.
Q. And can you tell me just generally what -- what you understand the hydraulic conductivity of the Santa Fe Group materials to be?
A. Well, I --
Q. Expressed in the same way that that column expresses --
A. Anywhere from .2 to 20. It is -- it is

1272

basically saying that it's just slight -- slightly lower -- I mean, this column -- and the more important numbers are probably the two at the bottom, the .19 and the .31.
The reason that is the case -- I say that is that six and 10 gallons per minute were estimates for groundwater flow. I -- in case there was a higher value, I -- I considered the 50 and the 22, but on the preceding slide, I had specified that that included run-off -- or may include some run-off into the pit.
So the .19 and .31 are at the very lower level of the Santa Fe Group K.
Q. Okay. So there's an overlap between your understanding of the hydraulic conductivity of andesite and the range of hydraulic conductivity you would expect for the Santa Fe Group.
A. There is an overlap between what I've calculated for the bedrock around -- around the pit. And I get that -- and there is a reason I'm -- I'm kind of -- there -- there's a scale factor here.
When -- when you consider the conductivity of a formation, you can look at a point, and you can get a very low number, but if you go into the fractures, you get a much different number, and if you combine them, you end up with a higher average. And it's not uncommon

1273

for the -- for 90 percent of the formation to have one low form -- conductivity.
This could all be due to fracture flow into the pit. So the overall average ends up being higher, but a lot of the andesite -- a lot of the bedrock could still be a very low number.
Q. I guess I've gotten myself confused, then, because I didn't understand the information in the shaded box on Exhibit 9 -- or on the slide number 9 to be -- to indicate anything that was -- that was actually measured. I understood that that was information that came out of the model that you -- or the calculations you were performing.
A. Oh. No. The information in this shaded box doesn't have anything to do with the interpretive calculations that I'm -- that I performed later on.
Q. Okay.
Then where does this information --
A. This is --
Q. -- derive from?
A. This information derives simply from -- from information presented on this slide. It is -- this is an estimate of conductivity for the bedrock surrounding -- surrounding the pit. It is based upon observed -- an observed cross-sectional area for flow --

1274

for groundwater flow into the existing pit based upon what I admit is an imprecise measurement of the area.
But I came up with 290,000 square feet as well as the gradient for flow into the pit.
Then I used Darcy's law as shown over there to calculate -- but that is giving me an average conductivity for the bedrock controlling flow into the pit. And that's -- would be an area of about -- it would be representative of an area that's about, what, 1,000 feet square.
Q. Okay. So that's an average. Those are averages.
A. Those are average. I mean, by -- almost by -- that's why I brought up the scale thing, is this is an estimate of conductivity for a bedrock section, you know, 1,000 or 1,500 feet square, as opposed to the -- you know, some of these specific tests which only go for a couple of feet.
Q. And where does -- on slide 9, where -- you mentioned a little bit ago that some of the values that you show there for conductivity could relate to fractures, I think you said.
Where on this slide is anything relating to fractures taken into account?
A. Well, there are -- there's not a specific

1275

fracture here. When -- I'm determining a conductivity based upon data that I'm collecting from this slide -- I mean from this map, the data being the observed -- the gradient as observed. I mean, this is an existing -- these are existing groundwater elevations, and so therefore the gradient estimate is data.

The area estimate -- and so whether there are fracture -- those flow arrows don't represent an exact location that flow is going into the pit. They're -- they're representing a general direction of flow toward the pit. It could be from one big fracture, or it could be perfectly homogeneous coming through -- through the bedrock.

My estimate would not be any different. If it was one big fracture, though, and the rest of it completely impermeable, the average conductivity would be as shown here.

Q. Would you agree with me that the existing pit acts similar to like a very large well and that it serves to provide very valuable data about the hydraulic conductivity of the surrounding material?

A. Yes, I would.

Q. Okay. I'd like to move to slide number 35, please.

This slide, as I understand it, indicates some

1276

assumptions you made about seepage into andesite from the waste rock dumps; is that correct?

A. Um-hum.

Q. The second bullet point there identifies a hydraulic conductivity for andesite -- an assumed hydraulic conductivity of andesite that's 0.01 feet per day, and that looks to me quite different from the hydraulic conductivity figures we were just looking at in the shaded box on slide 9.

A. Oh, well, absolutely.

Q. Can you explain that, please?

A. I mean, they're -- they're like two completely different arguments and points of my -- my -- of my testimony.

I mean, the -- the first -- that second section regarding andesite was I was making arguments as to whether it should be considered as a natural liner. Here I am -- I was -- this -- this section -- these calculations have nothing to do with the pit. They are assuming flow starting east of the pit. They have -- they have nothing to do with the pit at all, and I'm assuming I'm outside the pit -- the pit zone.

I'm -- I'm sorry if I didn't say that earlier.

But the .01 is slightly more conductive than what was simulated in -- in the Jones, et al., model,

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under -- for the andesite -- at least for some of the andesite. But I'm not -- you know, what was used there was extremely low. I've used it -- a higher value for the andesite.

Just, you know, to consider -- I mean, to consider -- to accept the fact that what -- I mean, that what I had -- I had presented earlier suggested that the permeability of andesite is higher than 10 to the minus-6. I didn't want to use -- I didn't then want to do dispersion calculations for an andesite permeability that I don't believe is -- is correct. I -- but I also didn't want to get extremely high.

I mean, that is fairly -- this is a fairly impermeable value that I'm using.

And it suggests that the -- you know, and as my calculations show, it suggests that in Animas wouldn't move very fast or very far.

Q. So the difference in the two is largely based upon what specific argument you were making from the data?

A. The -- the argument with the pit -- you know, with calculation -- calculating the K around the pit was just one more example of how the bedrock conductivity over a relatively large area -- because like I say, it's over maybe 1,000-foot-square area -- is a lot higher

1278

than 10 to the minus-6.

Q. Okay. I'd like to turn now to the slide that I think is an unnumbered slide in your rebuttal that has the heading Fault as barrier? And it shows two different slides, one of which is Finch slide 15.

A. I'm told they're actually numbered now.

Q. Okay. You just passed it. Go back one --

A. Oh, oh. The barrier. Okay.

Q. Okay.

Now, I don't know that you said from what report the slide to the right came from.

A. That is actually -- I believe it is -- it's -- it's from the Jones -- the numerical model report, the Jones, et al.

Q. Okay.

A. I used it so many times up above, and I did reference it. I am sorry. I should have put one on here.

Q. And I see that the -- I see that the permit boundary in the left slide, which is slide -- Finch slide 15, is the yellow boundary, correct?

A. I believe my cursor is on it right there.

Q. Okay.

And on the slide to the right that's from some other report, could you show me the outline of the

1279

permit boundary on that slide?
A. Well, it somewhat coincides with some monitoring wells and one of the contours, but it appears to me to be just about there where -- at the point where the contours change from being blue-ish on the right side to being yellow-ish on the left side, or the west side.
Q. I guess the point I'm making is that the permit boundary in the left slide is a much more zoomed-in permit area than in the slide on the right; am I correct?
A. I would agree with that.
Q. Okay.
And I notice that the contour lines that run throughout the permit area on the left are quite -- quite a bit more numerous than the contour lines that go through the permit area in the slide on the right.
A. That is -- that is because they are in different contour intervals. The one on the right is a 50-foot contour interval, the one on the left is a 20-. So you have two-and-a-half times as many on the left.
Q. That's what I thought was the case.
And so when you in your testimony pointed out that there seems to be a greater bunching of lines right along the fault in the left slide as compared to the

1280

right slide, that's a false equivalency, isn't it? They're not the same contours?
A. They're not the same contours, but I can read the same information off of that. You can see -- here's your scale bar, down here on the lower left, and that's about 1,500. I -- I see a change of about 100 feet from over about -- over about 1,500 feet.
Whereas on this side -- slide, I see about 120 feet -- that's over half -- that's only over a few hundred feet. This is -- this is the change of over 100 feet in a much shorter distance than what I would interpret off of that.
Q. Dr. Myers, I'd like to turn now to slide number 29 in your direct testimony.
First let me ask you -- I think I understand you to dispute that the Animas fault acts as a barrier, but I -- but I also understood you to indicate that it does inhibit flow across that barrier; is that correct?
A. Yeah, absolutely. It -- I established it -- its conductance so that there would be a drop of about 30 to 40 feet across it. In other words, I didn't want -- because I knew that -- I mean, Jones, et al., had assumed some drop. I think my primary argument is that 120 feet, this deep, is much more of a barrier than what had been previously assumed.

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Q. Now, in a series of slides starting at 29 and then -- let's also go to slide 32 and 33.
I notice that you've got various assumptions made about a possible plume from an assumed leak from the tailings facility, and I -- am I correct the vertical line running through these depictions is the Animas fault?
A. Yes, you are. And it is 2,400 feet from the source. Because the location of a leak from a tailing storage facility could be anywhere over a 6,000-foot area, I kind of had -- I mean, I couldn't analyze all possible locations. I -- I made some -- you know, an assumption that it would be about 2,400 feet from the fault.
Q. And I notice on these three slides that I just called out, 29, 32 and 33, that as the plume, or whatever you want to call it, passes through the fault there's no indication of any disruption in the flow.
Am I interpreting that correctly?
A. Well, let me -- I go back to 29, and this one does show that there -- that the fault has an effect. I mean, in part because of the way that this is a perfectly east to west flow path, it doesn't show this big convolution in the -- in -- in the contaminant contours, but you see almost a 20 percent difference in

1282

the -- in the area of -- of the contours and the one on the right.
And that is just by changing the conductance, making it one-tenth as -- as conductive. So it is definitely having an effect.
And let -- let me also -- if you don't mind, I'll use that slide right there, something I don't think I pointed out.
This is the groundwater mounding. You can see that this -- or the ones with the 20-gallon-per-minute into the SFG, you can see that it becomes very elliptical. The -- the fault is slowing the flow. You can see that by the shape of the mounding contours around -- around my source, with the source being there. It becomes elliptical. And so it is having an effect.
Q. Okay. So I -- I must have misheard, because when you were describing these kinds of slides earlier, I had understood that the lateral dispersion was greater in -- when it was greater gallons per minute assumed leak, and that the reason for that was because of the volume. I didn't hear you say that --
A. Well --
Q. -- it was because of the fault.
A. Well, the fault has an effect, but I didn't necessarily distinguish between -- distinguish its

1283

effect between 4 GPM and 20 GPM. I mean, the difference -- the reason that the 20 GPM fault has -- and you can see -- like you -- let's look at this one here.

This is after two years. You see that the -- that this is a wider -- this is wider, you know, about -- let's say 500 feet downgradient from the source, there is a wider plume than here. And that is because there was more mass in the plume, and there being more mass means there's more of a concentration gradient, which is one of the things that controls dispersion.

Q. Could we go to slide 29 again, please.

I'm not sure that this was the slide where you said it, but at some point in your testimony, I understood you to say that in the -- are you calling it interpretive calculations?

A. Interpretive calculations.

Q. In the interpretive calculations that you made, you weren't able to force those calculations to result in anything going north and south along the fault line because the contours were parallel to the fault line.

Did I get that correctly?

A. Almost. I don't have -- because of the

1284

symmetry in the way I did this, I don't create a gradient along what -- I mean, there is a -- I did simulate a damage zone along this fault. I mean, it -- because of the scale of these figures, you can't see it, but there is a -- a 75-foot-wide zone of very high conductivity, 50 feet per day.

And the reason for that was to see if something would move along that, but ultimately because I don't have any -- because of the symmetry that I have north/south. I didn't get any gradient showing -- move anything in that direction.

Q. So I assume, then, based upon your interpretive calculations that you do not conclude that there would be northward migration along the fault line to the Ladder Ranch?

A. Because -- I cannot use the interpretive calculations to prove that there's movement along -- along a fracture because the interpretive calculations just didn't consider -- just weren't -- weren't adequate to consider that. There are -- there is evidence that there is gradient potentially in that -- in that direction.

For one, the mounding, if not confined by the -- by the boundaries, would cause a gradient. So just the by virtue of there being a mound forming

1285

underneath it, you could have an increased gradient to the north.

And if -- if you'll -- the one slide -- I can't remember the closest point I have for it. If you look at -- this slide right here shows --

MR. DE SAILLAN: What slide is that, Dr. Myers?

MR. MYERS: This is slide 23. And I'm going to the contour map that -- from Jones, et al., 2014, that shows -- that does show the existing contours.

I mean, I have made an assumption of just straight east/west movement, but this actually shows that there is -- it shows that the contours bend and that there is a northeast gradient that -- that would lead -- you know, coming off of this site. And if you add to that gradient by putting a -- you know, a 20-foot or 40-foot mound, you -- there is a potential that -- that these existing gradients could drive some flow if a contaminant got to them.

MR. BUTZIER: Okay.

Q. So is this another example of it just was a function of what you were -- the point you were arguing?

A. I -- the calculations were designed more -- to consider dispersion in a homogeneous system as opposed to a fracture flow. I did try to fault -- I wanted the

1286

fault to be there to show that it could slow -- to slow things down, and the one slide shows that it does -- that the fault does slow things down.

MR. BUTZIER: Thank you, Madam Hearing Officer.

That's all the questions that I have.

MS. ORTH: All right. Thank you, Mr. Butzier.

Mr. Knight, do you have questions of Dr. Myers?

MR. KNIGHT: I do.

Let me get a microphone here.

CROSS EXAMINATION

BY MR. KNIGHT:

Q. Good afternoon, Dr. Myers.

A. Good afternoon, almost evening.

Q. Almost.

Have you reviewed the draft Discharge Permit in this matter?

A. I have reviewed parts of it. Yes. I -- specific to some of the issues that I'm referring to. I've not -- I can't recite it word by word, though.

Q. Would you agree with me that nor does the Discharge Permit refer to the andesite beneath the waste rock piles as impermeable, nor does it ever refer to it as a natural liner for the waste rock pile?

1287

A. No. Well, the permit doesn't -- doesn't describe it as impermeable. I got the -- the term "impermeable" came from the table that showed it as being 0, and that is someone saying that it's impermeable -- impermeable was my word based upon both the table showing it as 0, and I also believe based upon -- I mean, based upon essentially being shown as 0, at least from that one -- at that one site.

Q. But would you agree with me that the Discharge Permit does not oppose the andesite as a liner of any type, does not use the word "liner" when referring to the andesite beneath the waste rock stockpiles?

A. It doesn't refer to a liner at all. It doesn't require one, either. So yes. I agree with you.

Q. Thank you.

Could we go to slide 17?

Slide 17 in your testimony -- your testimony here does not contain any quantification of the amount of stormwater that could percolate through the channels carved into bedrock around the waste rock piles.

And would you agree with me that thus there's really no basis for arguing that these channels could be a significant source of contaminants or that they could have any measurable impact on groundwater?

A. I think there's too much -- too many unknowns

1288

to -- for me to agree with that. I don't know what would necessarily be -- you just said carved into the -- carved into andesite?

On the far east side of that, I'm not -- I'm not sure that it would be in andesite.

Q. I'll move on.

On slide -- could we go to slide 14?

On slide 14 --

MS. BARNCASTLE: It's a sign from above. It happened to me.

MR. KNIGHT: Well --

MS. BARNCASTLE: See, told you.

MR. KNIGHT: Oh, we got something here.

MS. ORTH: Got it.

MR. KNIGHT: It's very tenuous.

Q. Slide 14, you recommend additional characterization of the andesite --

Madam Hearing Officer, could I make use of your microphone?

MS. ORTH: Yes.

(Discussion off the record.)

Q. (BY MR. KNIGHT) On slide 14, you recommend additional characterization of the andesite using infiltrometer tests? Have you conducted infiltrometer tests on bedrock or fractured bedrock?

1289

A. I have not on -- on bedrock. No.

Q. Have you conducted double-ring infiltrometer tests on fractured or nonfractured bedrock?

A. No.

Q. Can you suggest an applicable method for testing field permeability of a bedrock unit?

A. Well, a very shallow slug test might work, or more pressure tests that -- like were done for some of the other monzonite.

The -- the reference I used for the pressure test earlier, Mr. Knight, was the -- they had done a bunch of it on monzonite and ended up with much higher permeabilities. If they did it -- if they did more of those in andesite, that would be very useful.

Q. On slide 16, you referenced -- could we go to slide 16?

On slide 16, you referenced the work of Abigail Beck and Giroud?

Are you aware of the conclusions that these same authors have made on liner leakage prevention that are modern and physically based?

A. I -- mostly I'm following the Kuipers testimony. I am not aware of that -- of what you're asking. No.

Q. You're not aware of more recent publications

1290

by those same authors?

A. No.

Q. Stating that with modern methods minor leakage can be greatly reduced below those levels?

A. That does not surprise me. I have in the past done reviews of liner -- liner leakage, and I do know that due to weathering and other reasons liners still leak, even -- even using GCL liners from the 2000s and beyond. I did not testify to that specifically today. So -- but I am aware of the leakage through the liners.

Q. Could we go to the permit condition you propose in Exhibit 30. I don't know if that corresponds with a slide or not.

But Exhibit 30 you -- you're proposing -- is it slide 30? No. It's -- this is -- I'm not sure if it was one of your slides.

But Exhibit 30, you are proposing a new permit condition, C103, and in this permit condition you are suggesting that if the results of the -- of a study of the andesite indicate infiltration greater than 5 times 10 to the negative-6 then the permittee would be required to construct a liner system beneath the waste rock pile?

A. That is -- that is correct.

Q. And does that -- does this permit condition

1291

take into account any information about the quality of the water that might be emanating from the waste rock piles and the fact that that water is predicted to be fairly good water and not to exceed any standards except for -- with the exception of fluoride, which is naturally elevated in local groundwater?

And I guess my question on that is is it -- are you -- do you think it's a good idea to recommend a liner without any consideration of the chemistry or the quantity of leachate?

A. Well, as I've testified other -- in other places, I think there is a substantial -- substantially more leachate than -- than has been estimated.

I -- I did not directly consider the geochemistry, but I testified on rebuttal a few minutes ago about leachate from the existing waste rock, which I presume will be similar to future waste rock, and that leachate is causing -- is responsible for one of the plumes beneath the Grayback Arroyo that's subject to the abatement, current -- current abatement.

So -- so yeah. I believe that there -- that there is a reason to put a liner under that waste rock, based on potential water quality from it.

Q. You state -- can we go to slide 25?

You state in the -- on slide 25, you state

1292

that the Jones numerical model -- you state that this is not a transport model; is that correct?

A. That's correct.

Q. But then up here you are using that as a transport model in your later testimony; is that right?

A. No. That is not correct. I used hydrogeologic parameters from that model to use in my -- in my transport calculations. There are parameters that would be the same in a -- let me back -- allow me to back up.

My calculations have a -- include a flow model and then a transport model. The flow model is -- is parameterized using hydrogeologic parameters that I assumed partly on the -- on the basis of Jones, et al., 2014. The transport part of it did not come from -- did not come from that model at all.

Q. Thank you.

Dr. Myers, you -- you talk a lot about dispersion of contaminants in your testimony and in your technical memo.

And in fact, there -- well, there seem to be conflicting statements about dispersion in your testimony, and I'd just ask you to clarify for the record how do you define dispersion.

A. How do I define dispersion?

1293

Q. Yes.

A. It -- dispersion is the movement of contaminants other than -- I mean, in general, it is the movement of contaminants through -- through the -- as affected by the tortuosity of the -- of the pore spaces. It -- it's -- it's affected by several things.

It can be affected by the concentration, by concentration gradient in -- in the contaminants.

It's also affected by the fact that groundwater -- a molecule of groundwater does not flow in a straight line, unlike the flow paths that -- that we draw on -- on our maps. It -- it flows around, and it -- and it --

And then third, it also is affected by the fact that the pore spaces are only a few percent, to up to 10 or 15 percent of the actual cross-sectional area when we talk about Darcy's law.

Q. For the record, can you distinguish between mechanical and hydrodynamic dispersion?

A. It's almost the same thing. I'm not sure what you -- I'm not sure that there's a difference.

Q. Is your definition of dispersion and, for that matter, the modeling that you've presented -- is that based on a Fickian definition of dispersion?

A. I don't think so. I can't remember that term,

1294

actually.

Q. Okay.

Can you -- could you briefly discuss the difference -- the difference in groundwater flow versus solute transport, particularly in relation to scale?

A. Sure. Oh, I could really go on for a long time about this. I'll try not to.

Q. Thank you.

A. Groundwater flow is in general -- we generally think of it as a Darcyan flow, something that follows Darcy's law, and that you have a certain flow rate through a cross-section of an aquifer. That cross-section is made up of solids and pore spaces. So the water actually only flows through the pore spaces, and hence the water moves much faster than the estimated Darcyan velocity.

I mean, a Darcyan velocity is a -- is the flow divided by the area -- by that total area, but the effect of velocity of groundwater, which is also the -- which is -- which is what contaminants go along -- and, you know, which is also the average rate of contaminants moving with the advective flow -- is much faster.

Now, when you get to dispersion, you've got -- you've got the fact that contaminants also -- that disperse away from the -- from that flow path because of

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the tortuosity, is the proper term, of the -- of the connected pores.
Q. Does -- okay. Specifically does pressure propagate rapidly or slowly in a porous media?
A. Does pressure?
Q. Yeah.
A. Pressure can -- pressure propagates relatively fast.
Q. Okay.
Being fast, would you say averaging and Darcy's law can be scaled to be applicable at a large, even regional scale with some confidence?
A. I'm not sure I understand you.
Would you say that again, please?
Q. Yeah.
Would you say that averaging and Darcy's law can be scaled to be applicable at a large, even regional scale?
A. Well, it -- well averaging and -- and calculating a conductivity over a regional scale is commonly done using -- using Darcy's -- using the Darcy equation.
For example, you can -- if you somehow measure the discharge from an aquifer, and you have a known cross-section of that aquifer, it is common to calculate

1296

a conductivity for that entire cross-section. You know, maybe it's a mile wide and you come up with a conductivity of 10. I mean, it's -- that's commonly done. So that gives you a scale of a mine.
And you've asked me to address scale so I'll just go for one more second here, if that's okay.
You could put wells along that cross-section, let -- let's say you space them every quarter mile or so and perform a pump test and determine the conductivity. It may be different than the average that you determine for that area because the pump test only applies to a small portion of that cross-sectional area.
And so the way -- when you're testing, the smaller -- you have a whole scale of tests. Like the pressure tests only applies for directly right around the borehole that you're dealing with. So in other words, you can estimate conductivity for a mile using the method I just described.
You can estimate conductivity over the area that's influenced by a pump test -- a 72-hour pump test using that method, but it only applies for that area. And then you can estimate pump -- conductivity based upon a borehole, which may only be -- you know, apply for a few feet.
Q. All right.

1297

Given that, what about concentrations of constituents in groundwater? Do they propagate as fast as pressure does in a porous medium?
A. Absolutely not.
Q. Okay. Thank you.
Let's turn to slide 48.
Slide 48, when you say that contaminants could reach the Ladder Ranch, does that include any of the wells on the Ladder Ranch, and do -- is there any -- have you made any calculations as to the quantity or concentration or resulting possible exceedances at -- and is there -- have you -- is there a time frame for this theoretical event?
MR. DE SAILLAN: Object to the form of the question.
MR. MYERS: I also want to know that for some reason part of my slide is missing.
Is it -- doesn't this slide also have a map of the Ladder Ranch on the left side?
I'm not sure what happened to my slide.
MR. KNIGHT: I think we've all seen the map of the Ladder Ranch enough times to have memorized it.
MS. ORTH: Would you please rephrase your --
MR. BUTZIER: I think it's a sign from above.
MR. KNIGHT: I guess I would ask

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Mr. de Saillan to elucidate the nature of his objection. Object to the form, how --
MR. DE SAILLAN: It was a multiple compound question.
MR. KNIGHT: Okay.
MR. DE SAILLAN: There are at least three, maybe four questions --
MR. KNIGHT: That's --
MR. DE SAILLAN: -- in that one question.
MR. KNIGHT: That is fine.
Q. Let's start -- let's do one at a time.
So when you say that contaminants could reach the ranch, does that include any of the wells on the ranch?
A. The one well could -- could be affected by dispersion, but for the most part, it would require a fracture. But it would reach the ranch itself.
And I would consider that losing the -- you know, the southern half a mile of the property, you know, they -- they may want to put wells in there in the future, too. I think that's an appropriate piece of their property to consider.
Q. And again is there a particular predicted concentration or -- of any particular constituent that you're modeling here?

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A. No.
Q. And is there any particular time frame that you were contemplating for this?
A. Well, the time frames would -- would have been -- I could go into a lot of detail looking at the hydrographs and how fast contaminants could flow, because if you -- if you -- and then this map is -- for some reason, this slide is missing my map.
But if -- but a leak in the north end of the tailings here just -- and if the flow path is directly east, dispersion would have it up onto the south boundary of -- of the Ladder Ranch.
And the -- the mine -- the distances that I had calculated were on the order of years, not -- not decades or -- or centuries to get there. It would be on the order of years that it would -- that it would get into this Avent -- Avent Pasture, which is the southern part of it there.
And there is -- there is a well called --
MR. SMITH: Feedlot.
MR. MYERS: -- the Feedlot Well that is in that particular pasture. And, now, it's a little ways down, and so that may -- that's probably more on the order of decades before it would get to that particular well.

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But if it were to move in this direction and the dispersion as I've -- as I have simulated with my interpretive calculations would disperse it out into that area.
Q. (BY MR. KNIGHT) Do you have any data on the flow rate of the wells completed in the andesite that were characterized as supply wells, these wells that were completed during the 1920s and 1930s?
A. No.
Q. Do you have any way of knowing whether these were -- whether these so-called supply wells were good supply wells, or whether they were useful supply wells?
MR. DE SAILLAN: Object to the form of the question.
MS. ORTH: What's your objection?
MR. DE SAILLAN: I'm not sure what Mr. Knight means by good supply wells.
MS. ORTH: And then he clarified useful, useful.
Would you consider those supply wells useful?
MR. MYERS: Well, Shomaker Associates distinguished them as supply wells. They don't have a record for how long they were used, but I don't think they would be -- you know, they would have even been considered if they didn't produce some water in it.

1301

And if the conductivity is less than 10 to the minus-6 centimeters per second -- well, I haven't run a well calculation, but you wouldn't get much water out of it. You wouldn't get enough to call it a supply well.
MR. KNIGHT: Thank you.
MR. MYERS: Quite honestly.
Q. (BY MR. KNIGHT) How much faith would you put in a well log from a private supply well that was drilled in -- sometime during the 1920s or 1930s, where there was not even a trained geologist on the drill rig?
MR. DE SAILLAN: Objection, assumes facts that aren't in evidence.
MS. ORTH: I don't know that you've laid that foundation, Mr. Knight.
Q. (BY MR. KNIGHT) I guess I would just maybe more generally ask, how much faith would you put in the drilling logs for these particular supply wells drilled in the '20s and '30?
A. Well, it's ironic. I mean, I have a lot more experience working with well logs that were done in rural parts of Nevada than New Mexico, and I have actually found that well logs done in the '40s -- '40s and '50s especially, but the earlier ones, that they were very conscientious in showing -- so I'm serious.
I've actually seen -- some of the older well

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logs in my experience in another state are actually done better than ones that I've seen -- that are then done in the '80s and '90s, and you can't even read their writing. I mean, they're very meticulous in some of the old -- some of the old drillers were meticulous.
So I'm not sure I can make a conclusion based on your question there.
Q. All right. Thank you.
Isn't it true that most climate scientists are predicting that New Mexico and the Southwest in general will become drier rather than wetter in the next 100 years?
A. On an annual basis, yes, but not necessarily on a storm-by-storm basis.
Q. And let's see. I have one more question here.
Your testimony -- actually this goes back to the -- to the modeling. Your modeling on a -- showing a 15-year leak that was then stopped, showing the leak continuing to move downgradient. I think Mr. Butzier touched on this. Previous testimony indicated the existing plume beneath the tailing storage facility has not moved after 35 years and is, in fact, shrinking.
Do you recall testimony from Mr. Finch that wells on both sides of the fault east of that plume showed no sign of contamination after 35 years?

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A. I don't recall him specifically saying that, but I don't believe that one well, MW-4, the second well, is too far south. I would not expect it to show any -- show any. Plus it is screened way too deeply to pick up that plume.

The other well -- I'm sorry, I forget its name right now -- is only one sample. I don't recall what's in it, but one -- it's a fair distance below the fault. I don't believe that's enough to prove that it hasn't gone anywhere.

But honestly, if it's shrinking, that suggests that it's moving somewhere.

Q. Okay. Thank you.

That's all the questions I have.

MS. ORTH: All right. Thank you.

Ms. Barncastle, do you have questions?

MS. BARNCASTLE: Yes, I do.

(Discussion off the record.)

CROSS EXAMINATION

BY MS. BARNCASTLE:

Q. Okay. I believe we're on slide 48? Yeah.

A. We are.

Q. There's been a lot of discussion about what alluvium would or would not be scraped or removed.

Do you recall that discussion?

1304

A. Very much so.

Q. I think we finally got a clear answer from Mr. Reid yesterday.

Are you clear on what his answer was?

A. I think he said that it would be scraped where there's going to be new waste rock placed, but if there's little waste rock on it, it would not be scraped.

Q. Your understanding, then, is some alluvium will remain?

A. Yes.

Q. Would the seepage be faster or slower under the waste rock storage facility that sits on the alluvial material that's not proposed to be removed?

A. That would -- it would be faster -- it would resemble what's been observed and I've used on -- on rebuttal a while ago.

I don't know if there's andesite further beneath that alluvium or not. I don't -- I don't recall specifics of the geology, of the map. But there would definitely be an area and a potential for leakage into that -- into that alluvium and then potentially either to report to -- to the rerouted arroyo or report to groundwater downstream.

MS. BARNCASTLE: Thank you.

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I have no further questions of this witness.

MS. ORTH: All right. Thank you.

Is there anyone else who has a question of Dr. Myers based on his testimony?

Mr. de Saillan, do you have any follow-up?

MR. DE SAILLAN: I do indeed, Madam Hearing Officer. Thank you.

REDIRECT EXAMINATION

BY MR. DE SAILLAN:

Q. Dr. Myers, at the beginning of the cross-examination, Mr. Butzier asked you some questions about the andesite and asked you to compare the andesite to the Santa Fe Group.

Do you remember those questions?

A. Yes.

Q. And I think you responded that the andesite being an igneous rock would have a -- a K value of a couple of orders of magnitude less than the Santa Fe Group, which was more a sedimentary rock.

Do you recall that?

A. Yes, I do.

Q. And wouldn't that be determined in part based on the amount of fracturing that might exist in the igneous rock?

A. Oh, sure. Yeah. Yes, it would. I mean, but

1306

I would still expect the igneous rock to -- with the exception of a very prominent -- you know, with the exception of a fracture, specific fracture, the overall average conductivity would be a little less than the Santa Fe Group.

Q. Okay.

But it's still -- if you're -- if you're looking at the fractures, it could be quite a bit -- could have a -- quite a bit of a higher conductivity than if you're looking in an area that doesn't have a fracture.

A. Sure.

Q. Okay.

And then Mr. Butzier asked you some questions about the -- the conductivity that you used in your -- in your conceptual -- or your -- not conceptual model --

MR. BUTZIER: Interpretive calculation.

MR. MYERS: Interpretive calculation.

MR. DE SAILLAN: Interpretive calculation. Thank you.

Q. And is it the case that you selected a conservative K value in preparing your interpretive calculation?

A. I -- it was conservative in that I was trying to be representative of -- I was trying to be -- on the

1307

Santa Fe Group, I was trying to be true to previous -- to previous analyses. On the andesite, I was trying to be conservative, absolutely.

Q. Okay. And that's what I was --

A. Yeah.

Q. I should have been more specific, but that's what I was referring to, was the andesite.

So does that explain the difference that Mr. Butzier was trying to highlight between the K value that you used in your calculation versus the K value that you were referring to when you were looking at the -- at the andesite around the open pit?

A. Yes. I think so. I mean, around the open pit, I was -- it's -- I mean, again with that -- that scale factor that I was discussing with Mr. Knight a little while ago would come into play.

Q. Right. Okay.

Then I think Mr. Knight asked you some questions about the proposed permit condition that is Exhibit -- Ranches Exhibit 30, that involves testing of the andesite.

Do you recall those questions?

A. Yes.

Q. And he particularly asked you some questions about infiltrometers.

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Is it your intention in that proposed permit condition that infiltrometers would necessarily be used or borings would necessarily be used or some combination of the two?

A. I would say some combination of the two.

Q. Okay.

And could infiltrometers be useful in weathered bedrock at the surface?

A. Absolutely.

Q. Okay.

And would you use infiltrometers to make some initial determinations about the -- the conductivity of the bedrock that then could be used to inform the remainder of your characterization study?

A. Yes. I'm going to -- an infiltrometer will give you an estimate of an infiltration rate. It won't necessarily give you a conductivity estimate. The infiltrometer -- if you try it and you use it and you don't -- and so little water enters the ground that it's not measurable, then you're going to have to go and do something else, or you're going to use the infiltrometer over the more weathered parts of the site.

I mean, we're talking about 230 acres of waste rock. I really don't think it's going to be a perfectly -- a perfect -- it's going to be the same

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thing everywhere.

Q. All right. Okay.

And then Mr. Knight asked you some questions about supply wells that were drilled several decades ago.

And you indicated that there wasn't a whole lot of data on -- on how these wells were drilled.

Is that perhaps part of the reason why we -- you have suggested that additional characterization of the andesite is necessary?

A. Well, I mean, the fact that those were supply wells suggested that there had to have been a permeability higher than 10 to the minus-6. And so that is one of -- one of my multiple pieces of evidence suggesting that the andesite has a higher conductivity than assumed herein.

Q. Okay. Very good.

Then Mr. Knight also asked you a question about the predicted precipitation as a result of global climate change.

Is it your understanding that precipitation will occur in rainfall events as opposed to snow?

A. In --

Q. In the future?

A. In what location are we talking?

1310

Q. In the Southwest, in New Mexico?

A. Well, it is my understanding that -- that that's -- rather that snow is definitely shifting to be more rain, and I'm guessing that areas in the Southwest -- areas in the Southwest that would have some snowpack now are going to have much less and more of it will come -- will fall as rain. Yes. So there will be larger flood events in -- in wintertime periods.

MR. DE SAILLAN: That's all the questions I have.

Thank you, Dr. Myers.

MS. ORTH: All right. Thank you, Mr. de Saillan.

Is there any reason not to excuse Dr. Myers?

Okay. Thank you, Dr. Myers, for your testimony.

You're excused.

Counsel can certainly step away from the table. I need to take one public comment before we go on a break. When we return from the break, it will be Elephant Butte's presentation.

Sir, were you the one who had asked to make public comment?

Back there?

Did the gentleman -- is the gentleman still

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here?
Okay. He may have -- he may have left.
Let's go on a 10-minute break. Thank you.
(Proceedings in recess from 5:54 p.m. to 6:05 p.m.)
MS. ORTH: Okay. We are back after a break. We have approximately an hour left together.
Ms. Barncastle, did you have an opening statement that you'd like to make?
MS. BARNCASTLE: I do.
I actually have some preliminary housekeeping matters that I'd like to ask for assistance with prior to starting my opening statement.
MS. ORTH: All right.
MS. BARNCASTLE: And please forgive me, Madam Hearing Officer and counsel. I am not near as familiar with this type of proceeding as other counsel who are present.
And one thing that threw me off was the suggestion of rebuttal cases at some point in the future. And I -- I understand that Mr. de Saillan's rebuttal case is essentially done at this point, but I'm not sure what to expect as far as rebuttal from the other parties.
And quite frankly, my -- my case in chief

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included rebuttal, and so I'm wondering if I should change my ways.
MS. ORTH: So I'm certainly not opposed to hearing rebuttal as part of your direct case, or what we've been calling direct case, and -- although certainly I understood why the direct case, for example, from Mr. de Saillan and his rebuttal were presented separately, because, of course, his direct case was already set out, and the rebuttal was prepared after they heard from the other experts.
I think to the extent you are presenting them together, I certainly don't find that objectionable.
Mr. Butzier.
MR. BUTZIER: We would have no objection. In fact, we would -- we would appreciate going that route, because I think that might make our chances of finishing this week better.
MS. ORTH: Okay. Good.
Mr. Knight.
MR. KNIGHT: I certainly concur, and, you know, I agree they're slightly different circumstances. Our testimony was prefiled written testimony so I think it's entirely appropriate for them to present rebuttal as part of their -- part of their case over the next couple days.

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MS. ORTH: Okay.
MS. BARNCASTLE: And can we expect that other parties will present a separate rebuttal?
I mean, I understand maybe Mr. Butzier might -- may --
MR. BUTZIER: Yes. We do -- we will have one or two probably rebuttal witnesses that hopefully can be brief.
MS. BARNCASTLE: Okay.
MS. ORTH: Every party has the opportunity -- and I usually say it in my scheduling order. If I left it out of this scheduling order, I'm sorry, but typically my scheduling orders say that we'll take the direct case in a certain order and then rebuttal and/or surrebuttal, although I try to discourage surrebuttal in the same order.
MS. BARNCASTLE: I -- again I apologize. I may have been just a tad bit distracted with my personal situation over the last few weeks so I -- like I said, I was kind of taken off guard by the way things played out.
But --
MS. ORTH: Okay. I --
MS. BARNCASTLE: -- I think we are ready to proceed regardless.

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MS. ORTH: Great.
MS. BARNCASTLE: And so that -- I'll deal with some of my witnesses that will have rebuttal materials that we will admit into evidence that weren't provided in the statements of intent that was created throughout this week as we were listening to testimony, but it will be a combination of their direct and rebuttal, and we will not do two separate ones -- two separate presentations like Mr. de Saillan did.
MS. ORTH: That's fine.
MR. BUTZIER: May I ask, would that be for all of your witnesses?
MS. BARNCASTLE: At least one of them has a PowerPoint. I don't think the other three do. And so the -- just the one with the PowerPoint has been revising his -- his PowerPoint throughout this week. He actually created it as rebuttal material and essentially incorporated his direct testimony in with rebuttal.
MR. BUTZIER: Okay.
And you'll let us know if any other witnesses are -- are going into direct and rebuttal when they're presented?
MS. BARNCASTLE: Yes.
MR. BUTZIER: Okay.
MS. BARNCASTLE: Off the top of my head,

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though, I'm thinking -- ours is all wrapped up into one. It's all --

MR. BUTZIER: Yeah.

MS. BARNCASTLE: I mean, we're not going to do anything separate. That's why, I guess, I'm a little confused. I --

MR. BUTZIER: I'm fine with that. I just was wanting to know whether you were -- I couldn't tell if you were saying --

MS. BARNCASTLE: Essentially --

MR. BUTZIER: -- some of your witnesses would come back again in rebuttal or --

MS. BARNCASTLE: No.

MR. BUTZIER: Okay.

MS. BARNCASTLE: Essentially we've been adapting as we go this week.

MR. BUTZIER: And I'm fine with that.

MS. ORTH: Thank you for mentioning that. Is there anything else?

MS. BARNCASTLE: No, I don't believe so.

MS. ORTH: All right.

MS. BARNCASTLE: Madam Hearing Officer, for my opening statement, I'd like to start by introducing everyone to the Elephant Butte Irrigation District.

EBID, as it is called, is a political

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subdivision of the State of New Mexico with a primary responsibility to operate and maintain the New Mexico portion of the Rio Grande Project. The Rio Grande Project serves irrigators in the Lower Rio Grande in New Mexico and Texas and serves approximately 155,000 acres of farmland within the project boundaries. The Elephant Butte Irrigation District serves 90,640 acres within New Mexico, geographic New Mexico.

The Rio Grande Project is served by two major water storage reservoirs, Elephant Butte and Caballo. All surface water in the Lower Rio Grande is appropriated for use by the Rio Grande Project, and this has been the case since at least 1903, as recognized by the Lower Rio Grande Adjudication court, and that is in the Third Judicial District in New Mexico, Dona Ana County.

The proposed Copper Flat Mine is located within the Office of the State Engineer -- within what the Office of the State Engineer considers the Lower Rio Grande. The Elephant Butte Irrigation District operates in both Sierra and Dona Ana Counties, and that's in the area of the Lower Rio Grande.

The Elephant Butte Irrigation District's interest in protecting the future of water supplies for its irrigators has been placed in jeopardy by the

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proposed mine. EBID will have four expert witnesses, each of whom will discuss various issues with the proposed project as it relates to issues that NMED should consider as part of its analysis.

We have focused on the Copper Rule provision that provides that "The secretary shall approve a discharge permit provided that it poses neither a hazard to public health nor undue risk to property." That is New Mexico Administrative Code Section 20.6.7.10 subsection J, as in Juliet.

EBID's position is that based on the information available the proposed mine will pose an undue risk to property and may pose a hazard to public health, although there is inadequate information available to properly evaluate the risks to public health at this time.

The testimony of our witnesses will begin with Dr. King, who will introduce the Elephant Butte Irrigation District and its interests in more detail and will discuss the property rights and jeopardy downstream of the proposed mine and how the lack of coordination among agencies has further placed those property rights in peril.

Following a discussion of property rights EBID seeks to ensure protection of, our witness, Mr. Fox,

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will provide an overview of water rights administration in the Lower Rio Grande considering that under state law water rights are considered property rights, and will also discuss what water rights New Mexico Copper Corporation has and what they will need in the context of the impact of the project.

I'm sorry. And what the copper corporation will need in context of the impact the project will have on other water users.

This will not be the same type of discussion as would take place in an Office of the State Engineer proceeding, but instead will focus on the idea of risk to property as contemplated by the Copper Rule. So with all due respect, EBID disagrees with NMED's statement of the case and its limited scope. We, in fact, believe that the Copper Rule as it is written, taking into account undue risk to property, broadens these proceedings beyond what Mr. Knight stated in his opening statement.

Mr. Fox will also discuss the required coordination between NMED and OSE and specifically the lack of coordination that has taken place with this permit action and how that has impacted the Elephant Butte Irrigation District and its constituents.

Mr. Libbin will follow Mr. Fox with a

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discussion of the New Mexico Office of the State Engineer Dam Safety Bureau requirements and issues that -- such as what the Dam Safety Bureau may require as part of its permitting process.

Now, I -- I am aware that we've covered a substantial amount of that information already, and Mr. Libbin will endeavor to not duplicate that testimony; however, there are some ins and outs of how the Dam Safety Bureau operates and works that could be very important to a decision in this case, and so Mr. Libbin will lay those issues out.

Most importantly, however, Mr. Libbin will again discuss the lack of dam breach analysis, which is key to telling us whether a hazard to public health exists, and while we've already sort of heard some of that testimony, we will hammer that one home through Mr. Libbin.

Finally, Dr. Carroll will conclude with a discussion of Probable Hydrologic Consequences, including a rebuttal of much of the direct testimony offered by New Mexico Copper Corporation's witnesses and to a certain extent in response to testimony provided by NMED.

Dr. Carroll will discuss issues such as the need for remediation of existing -- the existing

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contamination plume, that proposed postclosure monitoring is insufficient and that a liner over the waste rock storage piles should be required upon closure.

EBID will conclude the issuance of the permit is at best premature at this time given that adequate information is unavailable to determine the risk to public health, a requirement of the Copper Rule, and further that the undue risk to property is clear and cannot be ignored. In other words, the application and corresponding permit are technically incomplete.

EBID does not oppose copper mining, however, and does not necessarily even oppose the Copper Flat Mine. EBID opposes the irresponsible permitting of the proposed mine through a process that does not properly consider other equally important economies, specifically for our purposes the farming economy in the Lower Rio Grande.

Also, it's improper to ignore other property rights, most importantly the potential to -- potential hazard to public health. Permit conditions can go a long way toward remediating those concerns, however, and that's what EBID seeks to -- seeks through its case in chief.

Planning and evaluation of the project has

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been from a favorable vantage point from New Mexico Copper Corporation or, as you've heard so far in the testimony, from a best case or ideal scenario basis. Such a view in light of what is at stake downstream is responsible. More vigorous evaluation is absolutely necessary.

Therefore, issuing the permit now under the current circumstances is premature, and instead we will be asking that additional work be provided, additional backup, additional data be -- I'm sorry -- I lost half of my opening.

Essentially what we're asking for is permit conditions to take care of EBID's property rights concerns, additional backup work and data be acquired to ensure that there is not an actual risk to public health and that permit conditions such as those imposed regarding the Dam Safety Bureau be imposed for issues like water rights to ensure that there is adequate coordination among agencies such that entities downstream are not adversely impacted.

And with that, I will call my first witness, Dr. King.

MR. BUTZIER: Madam Hearing Officer.

MS. ORTH: Sir.

MR. BUTZIER: May I renew and restate an

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objection that I have to much of the testimony being offered by the Elephant Butte Irrigation District?

MS. ORTH: Yes.

MR. BUTZIER: I think it sounds like the -- from the statement we just heard, that the -- the basis for getting into water rights issues and Dam Safety Bureau-related issues, which are -- I believe she admits are, generally speaking, under the purview of a different agency from NMED.

The language that Ms. Barncastle cited is that "The secretary shall approve a discharge permit provided that it poses neither a hazard to public health nor undue risk to property." That's what I believe she stated is the primary basis for offering this testimony.

I think it's important to put that language in context, and I think New Mexico law would -- would require that that language be read in pari materia, so to speak, with other parts of the regulation and the applicable regulations under the state's groundwater program, and also view it in the context of the statute which serves as the basis upon which the Discharge Permit program is established, namely the Water Quality Act, the New Mexico Water Quality Act.

And as I know that the Hearing Officer is aware, the purpose of the Water Quality Act is to

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prevent or abate water contamination. That's recognized in explicit language in the Water Quality Act. It's recognized in the Bokum case that often is cited by the New Mexico Environment Department for that proposition.

Also, I want to point out that I think that Ms. Barncastle may be more broadly reading the term "hazard to public health" than is justified. And the reason I say that is that the term "hazard to public health" is defined in the general groundwater program regulations which, of course, must be read in conjunction with the more specific copper industry-related Copper Rule.

And I'll just read what that -- what that definition is. And it appears in 20.6.2.7AA, the definition of hazard to public health. That provision says "'hazard to public health' exists when water which is used or is reasonably expected to be used in the future as a human drinking water supply exceeds at the time and place of such use, one or more of the numerical standards of Subsection A of 20.6.2.3103 NMAC, or the naturally occurring concentrations, whichever is higher, or if any toxic pollutant affecting human health is present in the water; in determining whether a discharge would cause a hazard to public health to exist, the secretary shall investigate and consider the

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purification and dilution," et cetera, et cetera.

So my point there, Madam Hearing Officer, is that's a fairly limited concept of what is meant by the term "hazard to human health." It's explicitly defined in the groundwater program regulations, and we think and submit that as a matter of law the provision that Ms. Barncastle relies on has to take into account that definition because it's -- it's the exact same term, hazard to public health, that is defined.

There is no definition of undue risk to property. That I will acknowledge. But I think that given the overall context of the Water Quality Act, the groundwater discharge permitting program that is -- is in place in the State of New Mexico to protect against pollution to groundwater.

And I would also want to draw the Hearing Officer's attention to the stated purpose of the Copper Rule, which says, in 20.6.7.6, titled Objective, "The purpose of 20.6.7 NMAC is to supplement the general permitting requirements of 20.6.2.3000 through 20.6.2.3114 NMAC to control discharges of water contaminants specific to copper mine facilities and their operations to prevent water pollution. Compliance with these rules does not relieve an applicant or permittee of a copper mine facility from complying with

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the Mining Act rules in Title 19, Chapter 10 NMAC under the authority of the mining and minerals division."

Now, this provision, this objective statement in the Copper Rule doesn't explicitly refer to dam safety rules or water rights. And again it doesn't define undue risk to property. But I would submit that undue risk to property, like hazard to public health, needs to be read in the proper context.

And we're not talking about the possibility of somebody's house being overrun by -- by a dam break, for example. We're similarly not talking about depletions in water supply which are issues that are the subject of all sorts of proceedings that occur before the Office of the State Engineer.

And I think that the attempt to try to sort of merge those issues into this proceeding should not be allowed, and we would -- if that testimony is allowed, we'd like to state a continuing objection to its admission in this proceeding.

MS. ORTH: All right. Thank you, Mr. Butzier, for being clear in this evidentiary record about your objection. And we'll certainly grant you a continuing objection.

But I'd like to hear the Elephant Butte evidence and have asked only, as I conveyed at one point

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to Ms. Barncastle, that they be careful about avoiding duplication and avoiding an excruciating level of detail when it comes to areas not, if you will, directly applicable to the groundwater program of the New Mexico Environment Department.

MS. BARNCASTLE: If I may respond briefly.

Part of what the Elephant Butte Irrigation District seeks to do here is to clarify what that provision that I've cited in the Copper Rule means. And so the litigation that previously took place regarding the Copper Rule resulted in an opinion that the rule on its face is valid, but it as implied was left -- that question was left for a future date.

And that's what we seek to do here, is to determine if as applied that rule is going to remain valid, and specifically for Elephant Butte Irrigation District's interests the issue of the hazard to public health and undue risk to property.

Now, I will say I appreciate Mr. Butzier's legal arguments being made at least at this point in time. I completely disagree in some facets, primarily the issue of the definition of hazard to public health.

One of the things we will be discussing is the fact that there is an interconnected nature of ground and surface water in the Lower Rio Grande and the fact

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that multiple municipalities rely on the water that would potentially become contaminated if the copper mine were to have some sort of catastrophic event or otherwise, as you'll hear from Dr. Carroll, and as you've just heard from some of Mr. de Saillan's witnesses, that there is already contamination possibilities without a catastrophic event.

So we will stay focused, but what we seek to do is lay the foundation -- evidentiary foundation for litigation of whether or not the Copper Rule as applied is valid.

MS. ORTH: Okay. Thank you for that.

I won't invite, unless you want to insist, Mr. de Saillan or Mr. Knight, further argument. I'd rather actually hear the evidence and invite all parties to put any further legal argument on this question into your posthearing submittals.

MR. DE SAILLAN: Madam Hearing Officer, I do have some things to say on this subject, but I will, as you suggested, put them in our closing arguments. They'll be in writing. So I won't take up any more of our time this evening.

MS. ORTH: All right. Thank you very much.

MR. BUTZIER: And, Madam Hearing Officer, I'll be very brief, but there is one more thing that I want

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to say that perhaps will cut things to the quick a little bit, which is that New Mexico Copper would stipulate to the fact that a water right in New Mexico and under New Mexico law is considered to be an interest in real property and a property interest.

MS. ORTH: All right. I don't know if that helps Ms. Barncastle, but in the event that it does, some part of the testimony could be cut to the chase, perhaps.

MS. BARNCASTLE: I appreciate the stipulation. That's actually state law. So thank you, Mr. Butzier, but our testimony is going to go beyond that, actually.

MS. ORTH: All right. So your first witness to the table, please.

JAMES PHILLIP KING

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MS. BARNCASTLE:

Q. Dr. King, please state your full name for the record.

A. I am James Phillip King.

Q. And, Dr. King, I'd like you to give us a little bit of your background and experience so that I'm able to qualify you as an expert this evening.

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Let's start with your education.

A. I have a bachelor's degree in civil engineering from the University of California at Berkeley, I have a master's and a PhD in agricultural engineering from Colorado State University, and I have a master's in business administration from New Mexico State University.

Q. Please tell us about your work experience that would qualify you as an expert in this proceeding.

A. Okay. Between my bachelor's degree and graduate school, I served as a Peace Corps volunteer in Malawi, which is Southeastern Africa, where I worked on various water resources-related projects, including irrigated agriculture, land husbandry and refugee camp establishment.

As a -- I've been a professor at New Mexico State University since January of 1990. I am responsible for teaching, research and outreach as well as a -- heavy administration. I'm a professor and assistant department head in the civil engineering department there. My research has focused extensively on modeling of the surface and groundwater resources of the Lower Rio Grande.

In addition to my time as a professor at New Mexico State University, I have served as a consultant

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for Elephant Butte Irrigation District since the early 1990s. In that role, I have engaged in several different projects, things from development of flow measurement systems to allocation of surface water, to development of special policies, to facilitate the interaction of EBID with other water use sectors.

Q. Do you have any professional licenses and certifications?

A. I am a licensed professional engineer in New Mexico, License Number 12869, expiring December, 2019.

Q. Are you currently employed anywhere?

A. I am a professor and associate department head in civil engineering at New Mexico State University.

Q. And that's in addition to your consulting work for EBID?

A. Yes.

Q. Do you have any publications that you've been involved in, either directly or indirectly, that relate to the issues you're going to testify here today?

A. I have done many publications. Most recently, I am third author on a publication that came out this month on the relationship between surface water and groundwater use by farmers in the Rincon Valley, which is the northern valley within the Elephant Butte Irrigation District, the relationship between the use of

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surface water and groundwater and the aquifer response.
I have done many presentations on the water issues and both -- I should back up -- the history, the current practices in water management and the future of water management in the Lower Rio Grande, and again this is integrating surface water and groundwater across time and space within this region.
I've done many, many which are probably not well recognized or well represented in my -- in my resume, because they are kind of hard to keep up with, but my next one is tomorrow at 2:30 at the state meeting of the American Society of Civil Engineers in Albuquerque.
Q. Are you familiar with the Rio Grande Project?
A. Yes, very.
Q. Can you tell us a little bit about your familiarity with the organization, operations and accounting procedures for the Rio Grande Project.
A. Let me describe the Rio Grande Project first.
The Rio Grande Project is a reclamation project that was one of the earlier reclamation projects in the country. It was authorized by Congress in 1905.
The Bureau of Reclamation appropriated the waters for the project in 1906 and 1908.
Construction on the project was largely

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completed -- at least on the initial phase of the project was largely completed in 1916 with the completion of Elephant Butte Dam.
The Rio Grande Project provides water to -- to serve the needs of 90,640 acres of water-righted land in New Mexico, 69,010 water-righted acres in the State of New Mexico (verbatim) -- those water rights are managed by the El Paso County Water Improvement District Number 1, who for brevity we will refer to here as EP1 -- and to provide a delivery of water to the Country of Mexico under an international agreement that was signed by the two countries in 1906.
That international delivery of water from the United States to Mexico is a very, very important function of the Rio Grande Project, both in its initial -- the initial concept of the project and also to this day in the administration and allocation of water. The way we think of it is that is an international agreement so that is the top priority on the project.
And the two districts and our -- the federal agencies, which would be the US Bureau of Reclamation and the US section of the International Boundary and Water Commission, certainly hold that to be sort of the paramount duty of the project, is to ensure that Mexico

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gets their water.
The project again came functionally online in 1916. In the early years of the project, there was a plentiful water supply. There were various improvements done to it basically from the -- from the late teens into the 1920s and even the early 1930s. A drainage system was added to the -- to the Rio Grande Project to remove the excess water from the irrigation activities and return it to the river for downstream use.
The next significant development in the project I would say came around 1938, and a couple of things -- a couple of major things happened in 1938.
First of all, the Rio Grande Compact, which is an agreement among Colorado, New Mexico and Texas for the equitable division of water among the three states, waters of the Rio Grande, was agreed to by the three states and then ratified by Congress in 1939.
Also in and around 1938, Caballo Dam was built downstream from Elephant Butte -- Elephant Butte Dam. And the functions of Caballo Dam -- remember now this is 1938 so the project has already been operating for 22 years at this point. The purpose of Caballo Dam was to provide a regulating capacity for releases from Elephant Butte.
The original Elephant Butte Dam did not have

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power generation capabilities, but that was added in 1938. And since the releases for power generation would not match those for irrigation, Caballo Dam was put in to essentially reregulate power releases then to match the demand for irrigation in the two districts and Mexico.
Caballo Dam is also a flood control dam. It captures flood -- floods particularly coming from the west side of the Rio Grande, which would include flows from Animas, Grayback and Percha Creeks that flow in and provide a significant amount of water to Caballo, which is then distributed among the two districts and Mexico as project water.
In the period 1951 through 1978, the Rio Grande Project was ripped by a period of recurrent drought. I think of it all as one period of drought with a few fairly wet years interspersed.
I think from 1979 through 2002, the Rio Grande Project had a full supply each year every year. In fact, they had a full supply by January 1st of each year, which these days seems pretty exceptional.
And in 2003, we returned to persistent drought periods similar to what we saw in 1951 through 1978, and we've been in such generally water-short situations ever since 2003.

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The administration of the project -- and you'll pardon me if I run back and forth in time here. There's several inexorably weaved things that run through here, and I'll try to untangle them one at a time.

The administration of the project when it was originally built and one of the aspects of the -- the construction of the project was it was financed by the farmers of Elephant Butte Irrigation District and EP1. They essentially put liens on their farms to finance the construction of the project by the federal government, and they subsequently made payments to pay off that debt to the federal government.

While they were paying it off, the federal government, particularly the Bureau of Reclamation, ran the project from top to bottom. They -- they controlled the release of water from Elephant Butte Reservoir. Once it went online, they controlled the release of water from Caballo Reservoir.

They controlled the diversion of water from the Rio Grande at several points along the river, points that we still use, to put into the irrigation systems, and, in fact, they operated the irrigation systems all the way down to the individual farmer turnouts.

So in the early years of the project, that --

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they really did run it. The ditch riders, that are very familiar to irrigators in the district now as district employees, were at that time Bureau of Reclamation employees, and so the Bureau of Reclamation ran the show all the way from top to bottom.

That is one of the reasons why in 1938, when they were coming up with the division of water among the three states, they very logically made the delivery point from Colorado to New Mexico at the state line. So -- and this is getting into a little bit of compact now, but that's a necessary part of the picture here.

The -- the measured flow at a couple of index gages in the upstream part of the Rio Grande in Colorado indicate how much water Colorado is obligated to deliver to the State of New Mexico. And that delivery is made essentially at the state line between Colorado and New Mexico.

There's a gage there on the Rio Grande called Lovatos. The upstream index gages tell Colorado how much they were -- they are required to deliver to the Lovatos gage. They take the actual flow at the Lovatos gage. If Colorado delivers more than they were required to, they get a credit. If they are delivered less than they were required, they get a debit. And so there is an annual accounting that has both debit and credit

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balances for the upstream states.

At the time of the compact, the Rio Grande Project was run as a single unit by the federal government, and it was this remote and almost forgotten outpost of New Mexico down here, some would say still kind of remote. And so the -- the drafters of the compact placed the delivery point for New Mexico to deliver water to Texas at San Marcial gage, which is at the upper end of the Elephant Butte Reservoir pool.

So what that did is it put Elephant Butte Dam, Elephant Butte Irrigation District, EP1 and Mexico all in Texas.

In the very wet and wild years of the 1940s, they had very major problems -- oh, let me back up one step.

The delivery that New Mexico has -- the delivery obligation New Mexico has with Texas is determined by the flow at Otowi gage, which is a gage in the Rio Grande that is just downstream of the confluence of the Rio Grande and the Rio Chama. So the flow of water past Otowi gage determines how much water New Mexico must deliver to Texas each year. If they deliver more, they get a credit. If they deliver less, they get a debit.

But in the 1940s, they had such large flows

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that they had a great deal of difficulty metering them at the San Marcial gage. In fact, it wasn't just the high flows, it was also the high sediment flows that came in at that time. And so it was extremely difficult for them to determine New Mexico's compliance based on gage flows.

So by agreement of the three states, they moved the delivery point from San Marcial gage to Elephant Butte Dam effective in 1948. The delivery point has remained at Elephant Butte Dam ever since.

So we find ourselves in the strange situation here being in geographic New Mexico, but in Rio Grande Compact Texas. And this has led to many unusual situations that we find ourselves in, and it is a factor in the issue at hand here with the -- the future impairments of the potential mining activity on the Rio Grande Project and how they will impact the individual beneficiaries of the Rio Grande Project.

The two districts paid off their construction loans, which was very unusual. Most of -- most of the reclamation projects in the Western United States had very attractive interest rates, and so they were not all that anxious to pay them off.

But particularly due to the drought of the '50s through the '70s, the -- the farmers thought that

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they could do a better job of managing the resources so they paid off their construction loans and began taking over operations of the irrigation systems in the 1990s. So that the bureau would control the release from Elephant Butte, the release from Caballo and the divergence from the river at the various diversion points.

And let me -- to give you a little geography here, the delivery points for the Rio Grande Project that go back to the original design were Percha Dam, which irrigates the entire Rincon Valley.

There is Leasburg -- the Percha Dam irrigates entirely in New Mexico.

There is Leasburg Dam, which irrigates the Upper Mesilla Valley, which is essentially north of Las Cruces -- a little bit south of Las Cruces.

Then the Mesilla Dam which irrigates -- the Mesilla Dam is a little more complicated. It irrigates the Southern Mesilla Valley, which includes acreage -- primarily acreage in New Mexico, but also acreage in Texas. So Mesilla Dam is well within New Mexico, geographic New Mexico at least, yet it does make delivery to farmers in Texas.

And because the bureau designed the project with very little concern for where the state lines were,

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there is acreage in New Mexico the EBID system cannot deliver water to. They take water delivery from the Texas system, but they are a constituent of EBID.

And similarly, there are irrigators in the Mesilla Valley and Texas that El Paso Number 1 cannot reach with their canal system so EBID delivers water to those acres. And this is all done by contract between the two districts and reclamation.

In the very wet period of the '80s and '90s, a feud -- a lawsuit started up. It is referred to as a quiet title suit in federal district court. And this was initiated by the Bureau of Reclamation.

And to simplify it a great deal for both relevance and time here, the Bureau of Reclamation was asserting essentially that while the districts had paid off the infrastructure of the Rio Grande Project, the water that flowed through it remained the property of the United States. And Elephant Butte Irrigation District agreed with that.

At the same time, the El Paso Irrigation District followed -- or filed a cross-claim, stating that groundwater development in New Mexico was depleting the surface water supply of the Rio Grande Project so that it was taking larger releases of Elephant Butte Reservoir water to make full deliveries to the two

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districts and Mexico, and were we to go back into a short supply, we would get there sooner than if that groundwater development had not taken place.

That initial lawsuit was dismissed in the early 2000s, and, of course, we went back into drought in 2003, back to short -- short supplies.

We sort of coasted through the first couple -- and -- well, the first three years of that short supply, 2003, 2004 and 2005. And in 2005, EBID realized, due to my pointing it out, that, in fact, the performance of the system had changed significantly from the previous drought, that for a given level of release from Caballo Reservoir, we were seeing less water available for diversion from the project.

And those are the EBID diversions -- oh, I'm sorry. I didn't -- I didn't finish my run down the river. Let me back up.

Below Mesilla Dam, there is the American Dam in Texas, and that delivers water solely to the El Paso Irrigation District. So they get water in the Mesilla Valley from Mesilla Dam and in the El Paso Juarez Valley from the American Dam.

Then a couple of miles downstream of that is the International Dam where Mexico takes delivery of their water, Acequia Madre.

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Previously there was another diversion downstream of International Dam, which was Riverside Dam. That was damaged in the floods of the '80s and '90s, and basically they replumbed their system, the El Paso District did, to take full delivery at American Dam of their lower valley waters.

So getting back now to the -- to 2005, looking at the -- the diversions available for a given level of release in Caballo -- or from Caballo, we could see that they had shifted systematically downward. The available water would have decreased relative to what it had been in 1951 through 1978.

And that was a major concern to EBID because the most obvious culprit was the groundwater development that took place in New Mexico that was now depleting more water in the New Mexico reach from Caballo Dam down to the state line than had been occurring in 1951 through 1978.

Q. Dr. King, let me stop you right there. We'll come back to the interconnected nature of the surface and groundwater. I want to clean up a few things.

I thought I heard you mention that the El Paso Number 1 district is in New Mexico?

A. I'm sorry. I did not mean to say that. El Paso Number 1 is in El Paso County, Texas.

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Q. Okay.
And yet EBID, El Paso Number 1 are both considered legal Texas under the Rio Grande Compact; is that correct?
A. That is correct.
Q. When you refer to the bureau in this proceeding, you're referring to the Bureau of Reclamation; is that right?
A. Yes. If I -- if I do -- if I say reclamation or bureau, I would mean the US Bureau of Reclamation.
Q. Okay.
Do you consider yourself to be an expert in the field of riparian and irrigation system hydrology, water resource management and Rio Grande Project organization, operations and accounting?
A. Yes.
Q. Have you been qualified as an expert in those fields before?
A. Yes.
MS. BARNCASTLE: Madam Hearing Officer, I would like to tender Dr. King as an expert in those three fields, riparian and irrigation system hydrology, water resources management and Rio Grande Project organization, operations and accounting.
MS. ORTH: Okay.

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Objections?
MR. BUTZIER: No objection.
MR. KNIGHT: No objection.
MR. DE SAILLAN: No objection.
MS. ORTH: Thank you.
He's so recognized.
Q. (BY MS. BARNCASTLE) Dr. King, I'd like you to look at what's been marked as EBID Exhibit Number 1.
Do you have that in front of you?
A. Yes.
Q. Do you recognize that document?
A. 1 is my resume.
Q. Did you create that document?
A. Yes, I did.
Q. Is it current?
A. Yes.
MS. BARNCASTLE: Madam Hearing Officer, I move the admission of EBID Exhibit 1 at this time.
MS. ORTH: Objections?
MR. BUTZIER: None.
MS. ORTH: Okay.
MR. DE SAILLAN: No objection.
MS. ORTH: Exhibit 1 is admitted.
(Exhibit EBID 1 admitted into evidence.)
Q. (BY MS. BARNCASTLE) All right, Dr. King. We

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have about five to 10 minutes before we start going too long tonight.
I'd like you to pick up where you left off with the interconnected nature of the surface water and groundwater in the Lower Rio Grande system.
A. Okay.
The various -- the two irrigation districts and -- and Mexico -- I should mention that the delivery to Mexico is managed by the federal government through the Bureau of Reclamation and the International Boundary and Water Commission, and that does occur at the International Dam.
But in 2005, we realized that the groundwater development and other factors in the New Mexico portion of the Rio Grande Project were affecting the surface water supply relative to what it had been in the period 1951 through 1978, which was the last historical period. We didn't worry about it too much in the '80s and '90s because we had so much water, there was plenty of water to go around, but certainly when we got into those drought years, it became evident that there was a problem.
In 2006, Elephant Butte Irrigation District proposed an allocation method -- no. I guess I better describe the allocation method that was used before

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that.
When the -- during the '80s and '90s, when we had full supply -- Elephant Butte Irrigation District has 57 percent of the US lands in the Rio Grande Project. The El Paso District has the other 43 percent. And so the surface water diversions were divided between the two districts in those proportions. EBID got 57 percent, El Paso Number 1 got 43 percent.
Well, the problem is if -- if groundwater depletions in New Mexico are causing a shortage in the surface water supply of the Rio Grande Project El Paso was paying for, that is their -- the -- their allocation would be reduced by 43 percent of that shortage relative to what it would have been in the period 1951 through 1978.
What EBID proposed in 2006 then was to allocate water to the two districts by giving El Paso Number 1 43 percent of what would have been available in the 1951 through 1978 condition to basically keep them whole to that baseline, and EBID would take whatever was left. If we were seeing less water, then EBID would get less water.
And the intention here was to keep the effect of those depletions in New Mexico so it did not affect Texas, because there is a long history of litigation in

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the Supreme Court between upstream states and downstream states where the downstream state sues the upstream state saying that the groundwater depletions in the upstream state were depleting the surface water reaching the downstream state.

And that was exactly the situation we were facing here. So in order to avoid that, we essentially -- Elephant Butte Irrigation District essentially agreed to use surface water allocation that they would have gotten under that historical method to keep Texas whole, but maintain access to their use of groundwater.

Now, one thing that's important to understand is that when EBID entered into that, they knew that they were offsetting the impact of their own farmers' groundwater pumping on the surface water supply, but also the groundwater pumping of everybody else in the New Mexico reach of the Rio Grande Project.

The intention in doing this was to take an external problem with Texas and make it an internal problem within New Mexico that we then hoped to sort out through administration with the State Engineer and the agencies within New Mexico.

Q. Would it be fair to say that the operating agreement and litigation surrounding the operating

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agreement assumed or otherwise it was proven that the groundwater and the surface water are interconnected in the Lower Rio Grande?

A. Yes. There is no question. And this is not a new concept. It was not new in 2006. In fact, you can find -- you can find very eloquent explanations of exactly this effect described by hydrologists for the US Geologic Survey in the 1950s. And even early studies -- early conceptual studies in the early 1900s recognized that there was this interaction between surface water and groundwater.

Q. Now, what happens to Mexico in this deal between EBID and EP Number 1? How is New Mexico taken care of?

A. Well, you can think of New Mexico is upstream and El Paso Number 1 and Mexico are downstream. What the operating agreement essentially did is flipped them so functionally Mexico is first on the river, then EP1, then EBID.

The allocations to both Mexico and El Paso Number 1 are based on the amount of project water storage in Elephant Butte Reservoir and Caballo Reservoirs. And so the -- they're -- the release is what determines their allocation.

The release and the performance of the river

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determines EBID's allocation. So if the river more efficiently conveys water down to Texas and Mexico, then EBID gets more water. If the river is less efficient at conveying water down to the Texas and Mexico delivery points, EBID gets less water. But it's all keyed off what is releasable at Caballo Dam.

Q. So would it be fair to say that all three, EBID, El Paso Irrigation District and Mexico, all rely on Caballo?

A. Absolutely. The release from Caballo is the key -- well, the actual or anticipated release from Caballo is the primary input in determining both the allocation to El Paso Number 1 and to Mexico.

Q. Now, is the fact that EBID and El Paso Number 1 are part of legal Texas under the Rio Grande Compact the reason that the compact commissioner for the State of Texas is so involved in this particular proceeding here?

A. Yes.

MS. BARNCASTLE: Madam Hearing Officer, I think we've reached a logical stopping point at this point. Now, I could -- I think it's -- I think it would be better if we stop for today.

MS. ORTH: That's great. Thank you so much for identifying a good stopping point.

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We will reconvene at 9:00 a.m. in this room. Thank you.

(Proceedings adjourned at 7:03 p.m.)

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, CHERYL ARREGUIN, the officer before whom the foregoing proceeding was taken, do hereby certify that the witnesses whose testimony appears in the foregoing transcript were duly sworn or affirmed; that I personally recorded the testimony by machine shorthand; that said transcript is a true record of the testimony given by said witnesses; that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this proceeding is taken, and that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in the action.

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STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT
No. GWB 18-06(P)

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840

TRANSCRIPT OF PROCEEDINGS

Volume 5

BE IT REMEMBERED that on the 28th day of September, 2018, this matter came on for hearing before FELICIA ORTH, Hearing Officer, at the Ralph Edwards Auditorium in Truth or Consequences, New Mexico, at the hour of 9:03 a.m.

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E X H I B I T S (Continued)

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MS. ORTH: Good morning.
We are on day five of the hearing in matter of the application by New Mexico Copper Corporation for a Discharge Permit for Copper Flat. Discharge Permit is Number DP-1840.
When we broke last night, we were in the middle of the Elephant Butte's witness.
This morning it appears we have just one public commenter.
Is that Ted Caluwe? Caluwe?
If you would, sir, come up.

TED CALUWE

having been first duly sworn or affirmed, gave public comment as follows:

PUBLIC COMMENT

MR. CALUWE: My last name is C-A-L-U-W-E.
Early on in the presentation, I believe it was the first day -- Mr. Smith, was it? The first presenter?
Thank you. This is my memory so --
Said that they had a report prepared -- New Mexico Copper Corporation had a report prepared for them on reclamation costs.
Now, if I remember correctly, that report is already three years old. We're still looking at many,

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many years in the future. They had set aside about 55 million, as my memory serves me, for reclamation.
I would like to strongly suggest that if that money is ever needed, that they figure in those three years plus the future and an inflation rate, because in -- let's say 2028 dollars, that money is going to be completely inadequate for reclamation.
Thank you.
MS. ORTH: All right. Thank you very much, sir.
I don't know that I see anyone else not affiliated with a party, but is there anyone else who would like to offer public comment at this time?
No?
Also, I may have forgotten to put it on the record yesterday, but our interpreter continues to spend the entire hearing with us. She does check in with people as they come into the room if she doesn't recognize them, as does the hearing clerk, John Baca. But in the event you are aware of someone who would be more comfortable in a language other than English, please let Sandra know or me or John Baca. Thank you.
Ms. Barncastle.
MS. BARNCASTLE: Thank you.
Good morning, Madam Hearing Officer.

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I would just start by saying that this particular witness has to leave for Albuquerque no later than 11:00 a.m.
MS. ORTH: Okay. Thank you.
And I also forgot to say if you would just let us know when a break would be best for you, that's when we'll take a break.
MS. BARNCASTLE: Okay. Thank you.
So I'd like to continue with Dr. King's direct.
MS. ORTH: Thank you.

JAMES PHILLIP KING

having been previously duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION

BY MS. BARNCASTLE:
Q. All right, Dr. King. I believe you left off you were discussing the interconnected nature of the surface and groundwater systems in the Lower Rio Grande in connection with the operating agreement and allocation procedures for the beneficiaries of the Rio Grande Project.
So if you wouldn't mind, why don't you start us off this morning with reminding us how do the allocation procedures work for the beneficiaries who are

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beneficiaries and give us a general overview of that which we will then tie into your further testimony.
A. Okay. It occurred to me that I -- it might be prudent for me to define a few terms that are very common colloquially, but they mean very specific things when I'm talking here.
There are basically three phases -- or three steps in Rio Grande Project water management accounting.
There is release, which is the release of water from Caballo Reservoir into the Rio Grande.
There is diversion, which is the -- the various diversion structures I covered last time, taking water out of the Rio Grande into the canal system of an irrigation district or Mexico.
And then there is delivery, and delivery is the flow of water from the canal system into a farmer's field at their headgate and the diversion to Mexico. So the diversion to Mexico counts both as a diversion and as a delivery. In the United States districts, the diversion is from the river, delivery is to the farm, or in the case of El Paso, El Paso Water Utilities for treatment.
In project operations, water is allocated to the two districts and Mexico.
The allocation to Mexico is based on the

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planned release from Caballo Reservoir, and it is tied to the 1951 through 1978 relationship between release and delivery.

The allocation to the El Paso Irrigation District is tied to the releasable water, or the usable project water, the allocation is, and it is all -- it is based on the relationship between release from Caballo and diversion from the river.

EBID's allocation then is based on the releasable water from Caballo and the performance of the river in terms of conveying water efficiently.

Q. And all of this is important because it recognizes that the groundwater and surface water systems are interconnected and we owe a duty to get water to the downstream state and country?

A. Exactly. And so we entered into an operating agreement in 2008 which codified this allocation method, and that agreement is what we use to allocate water on a month-to-month basis.

Generally we'll consider the allocation each month during the release season. The release season varies when it starts and when it finishes. Coincidentally, the release from Elephant Butte ceased -- I believe it was on Tuesday of this week, and the release from Caballo will cease this weekend.

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So we were -- we're right at the end of the season now, but we do consider allocation all the way up to the cessation of release from Caballo.

Q. I'd like you to take a look at Exhibit Number 6, EBID Exhibit 6. I believe you have it in front of you.

A. Yes.

Q. Do you recognize that document?

A. I do.

Q. What is that document?

A. This is the operating agreement that was settled -- it settled litigation among EBID, El Paso Number 1 and the United States. This was basically laying the foundation for current project allocation and operations.

Q. And those are the current allocation and operation procedures you've been discussing?

A. Yes.

Q. Are you familiar with the contents of the document?

A. Yes.

Q. Did you, in fact, participate in writing parts of the document?

A. Yes, I did.

MS. BARNCASTLE: I'd like to offer EBID

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Exhibit Number 6 into evidence at this point in time.

MS. ORTH: Objections?

MR. BUTZIER: No objection, although the relevancy objection that I made earlier would apply to this. No objection to having it admitted to this proceeding.

MS. ORTH: Thank you.

MR. DE SAILLAN: No objection.

MR. KNIGHT: No objection.

MS. ORTH: All right. It's admitted.

(Exhibit EBID 6 admitted into evidence.)

Q. (BY MS. BARNCASTLE) Dr. King, you just referenced litigation that was resolved by that document that's in front of you.

Is that document currently still the subject of litigation?

A. Yes.

Q. And are you aware based on -- well, let's back up.

You regularly communicate with the El Paso Irrigation District and the Texas compact commissioner regarding allocation procedures and Rio Grande Compact accounting, do you not?

A. Yes, I do.

Q. Are you aware based on your communications

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with those entities of any concerns they may have related to this proceeding?

A. Yes.

MR. BUTZIER: I think that calls for hearsay.

MS. ORTH: Ms. Barncastle?

MS. BARNCASTLE: I'm going to tie this to documents that are in the administrative record, particularly a letter that came to you this week from the Rio Grande Compact commissioner, and also start to tie it into concerns that EBID has.

MS. ORTH: All right. Go ahead.

Q. (BY MS. BARNCASTLE) Dr. King, before you answer, are the concerns that are expressed by the Rio Grande Compact commissioner that we're going to discuss the same concerns that EBID has?

A. Yes.

Q. Okay. I'd like you to discuss those concerns.

A. All right. The Rio Grande Compact commissioner for Texas -- and recall that according to the Rio Grande Compact EBID is in Texas, but the compact commissioner, who is Pat Gordon, issued a letter earlier this week expressing his concerns over the -- the proposed dam and the threat that it poses to the Rio Grande Project.

I understand that that will be part of the

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administrative record. It was -- he is an attorney so I assume he did things right to have that submitted as evidence.

His concern goes directly to the substance of the other lawsuit that is ongoing right now, which is Texas versus New Mexico in the Supreme Court.

Q. When you say Supreme Court, are you referring to the Supreme Court of New Mexico?

A. The Supreme Court of the United States.

Q. Thank you.

MR. BUTZIER: Madam Hearing Officer, if there's going to be a letter that's going to be admitted as part of the administrative record, I think it should speak for itself and we don't need to have this witness characterize what appears in the letter.

MS. ORTH: Okay. I believe she's pursuing his own feelings or the feelings of Elephant Butte Irrigation District now.

MR. BUTZIER: That wasn't the way I understood it, but that's fine if that's the way she proceeds.

MS. ORTH: All right. That they share those concerns in the letter. All right.

MS. BARNCASTLE: We're still laying some foundation. This particular witness will lay foundation for not only his own testimony but for our next witness.

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So that's essentially what we're getting at.

MS. ORTH: Okay.

MR. KING: The -- the claim that Texas has filed in the -- in the US Supreme Court is claiming that while New Mexico is making its required compact deliveries to Elephant Butte Reservoir, the compact water delivered to Texas is then released from Elephant Butte and then Caballo Dam, and before it reaches the state line, it is being intercepted by groundwater diversions in New Mexico.

In his letter earlier this week, Commissioner Gordon stated that his concern is that New Mexico is making delivery of water of a certain quality, then releasing it from -- releasing it at Elephant Butte Reservoir and placing it at risk of quality contamination, as well.

So it's a very parallel argument for impairment of water quality in addition to the prior claim of quantity, of impairment and quantity.

Q. (BY MS. BARNCASTLE) And -- so backing up just a little bit, the Rio Grande Project operates based on two appropriations of water.

Is that your understanding?

A. Yes. I think it was -- it's an appropriation action that had two distinct steps in it.

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Q. And those were the 1906 and 1908 appropriations?

A. That's correct.

Q. And significantly in the 1908 appropriation, the language "all tributary flow" was included?

A. That is correct.

Q. And does the State of Texas consider tributary flow to include a portion of the groundwater?

A. Yes. In the -- what they've said in many of their arguments is that the interception of hydrologically connected or tributary groundwater is the concern.

Q. All right, Dr. King. I believe we've thoroughly, probably too thoroughly for this proceeding, discussed the Rio Grande Project operations as a foundation for moving on in your testimony, but before we move on, is there anything else you feel is necessary about operations accounting or project organization that we need to cover?

A. I think I've covered sufficiently that I can -- I can express the concern.

Q. Okay.

Did you review documents to form your opinions for -- that you're about to give regarding the impact of the Copper Flats's project on the Rio Grande Project?

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A. Yes, I did.

Q. What were those documents?

A. It's been a bit of a moving target. I -- let me get this turned on here so I can get my dates correct.

We had several -- I guess what I would call waves of data that came in. The first was in March of this year in response to an IPRA request and a -- let me see what I've got in my notes.

Q. Who was the IPRA request to?

A. The IPRA request, I believe, was filed with the New Mexico Environment Department by EBID.

Q. Okay.

A. And we had a -- in mid-February, we issued a request and a -- request for an extension. What we received in -- on the last day of March, then, was a very large bunch of documents that were not indexed or particularly organized. So I did spend some time back in April trying to sort out what was in there.

We had a subsequent -- hold on.

Q. Did EBID subsequently determine that the initial IPRA response was incomplete?

A. Right. In addition to being unorganized, it was incomplete. So we requested further information in May -- I'm sorry. Our initial -- initially our

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extension request was granted to May 4th. We had a follow-up request -- request for more information in April, which we, I believe, received in May.

And then I have further documents. I'm not sure of the request history. But finally what we got, which was indexed and Bates indexed, came in on July 9th.

Q. Was the response received in May organized and indexed?

A. No.

Q. Okay.

A. It may have had an index file in it, but it was still sort of a -- the -- it was not as organized, obviously, as the Bates indexed one.

Q. Were you able to make it through all of the documents that were received from NMED regarding this project?

A. No. That would be 18,000 pages, I believe is the number being thrown around, and I did not.

As a result, I focused on as -- I guess the point that I will be putting forth here is -- is really focused on a sort of a big picture and conceptual take on it. I will be primarily referring to the hydrologic consequences report by Shomaker as -- let's see -- starting with the December, 2017 and then amended May

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of 2018 version.

Q. Okay.

So in reference to that Probable Hydrologic Consequences report by JSAI, why don't you delve into your discussion of the nature of the impact of this project -- the Copper Flats project on the Rio Grande Project, the impact on the accounting, the concepts of capture and issues raised in Texas versus New Mexico and give us a five-minute, quick summary of -- of your concerns.

A. Okay. I'm going to -- again I'm going to make this as simple as I possibly can, because I think it's a fairly simple and straightforward concept.

In the model that the -- both the model developed in 2014 and in the 2018 reports from Shomaker, one could argue about the parameters and the itty-bitty details of it, but I believe that there is a consensus among all parties that mining activity will affect the Rio Grande Project water supply, and it will affect that water supply both in Caballo Reservoir and in the river below Caballo.

And this is clearly stated in Tables 3.3 and 3.4 of the 2018 Shomaker report on hydrologic consequences. This is starting on Bates index page 17304.

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Now, I'm -- to keep it simple and brief, I'm not going to get into haggle about model parameters or model assumptions or anything. The fact is that there is a hydrograph there of the impacts on the Rio Grande Project water supply, and by arguing about those parameters, we could -- we might, you know, argue about where the peak -- when the peak occurs, how high the peak is and things like that.

Just the shape of that -- of that impact hydrograph and -- and for what I'm saying is that there is an impact, and that's what we need to go forward with, and that does not seem to be at issue. So I'll keep it as simple as that.

Now, my concern is that the way that allocation is done, as I mentioned, both -- or both districts and Mexico have -- their allocation of project water is determined, firstly, by the releasable water releasable from Caballo Reservoir.

So depletion of water that would otherwise have reached Caballo Reservoir, this concept of hydrologic capture, where -- again it is not pumping water out of Caballo Reservoir, it is intercepting water that would otherwise have been tributary to Caballo Reservoir -- would reduce the amount of releasable water and therefore reduce the amount of allocation to EBID,

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to El Paso Number 1 and to Mexico.

And that is of great concern, number one, because Mexico is the subject of international treaty, the 1906 convention on the -- with Mexico; and then, secondly, because it will reduce the available water available for allocation to the two districts for delivery to their constituent farmers to exercise their project water rights.

MS. BARNCASTLE: My mic is dead again.

(Discussion off the record.)

Q. (BY MS. BARNCASTLE) Okay. Where was I?

So is it your understanding -- okay. I'll try to be very still.

And now I completely forgot where I was.

Is it your understanding that -- so let me just make sure I understand. You're not going to quibble with the timing and magnitude of impacts. We're just saying there are impacts on the Rio Grande Project.

A. Yes.

Q. Okay.

A. And if I could add. There is the impact on the reservoir which would impact all three project beneficiaries, the two districts -- the two US districts and Mexico, but there are also significant impacts on the river below Caballo, and that impact would be borne

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solely by EBID because that is now below the point of release and affecting the river conveyance efficiency.
Q. And based on your participation in the Texas versus New Mexico Supreme Court case, your communications with the Rio Grande Compact commissioner and the Rio Grande Compact commissioner for Texas' letter this week, it's your understanding that Texas shares those same concerns.
A. Yes.
MS. BARNCASTLE: Now, this is going to delve a little bit off into water rights, but it's to lay the foundation for my next witness. So I understand I'm going to draw an objection.
Q. There are offsets -- offset water proposed for the impacts that you've just discussed through the -- what's called the Jicarilla lease; is that correct?
A. That's correct.
Q. Can you explain what that lease is?
A. It is an agreement or a contract signed by -- let's see -- New Mexico Copper, Jicarilla Apache Nation and the Bureau of Reclamation.
Q. And are you familiar with the contents of that document?
A. Yes, I am.
Q. What does that document propose as the offset

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for the impacts on the Rio Grande Project?
A. It is a lease of water from Jicarilla Apaches, who have a -- in the settlement of their federal water rights claims, the Jicarilla Apaches received 6,500 acre-feet of water delivered to the Rio Grande through the San Juan-Chama Project, which takes water from the Chama -- or -- sorry -- from the San Juan River and the Colorado River system through tunnels under the Continental Divide into the Rio Chama, which then is tributary to the Rio Grande.
And so there is a proposal to lease Jicarilla Apache water to offset the impacts of the mining activity.
Q. In your opinion, is that offset -- the proposed offset sufficient?
A. It is certainly not sufficient in terms of development in detail, and I believe there would be necessary some problematic issues with implementing it.
Q. Would that offset be sufficient to quiet the State of Texas?
MR. BUTZIER: Objection, calls for speculation.
MS. BARNCASTLE: Dr. King is an expert involved in the Texas versus New Mexico case. EBID is aligned with the State of Texas in that case because we

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are in legal Texas for compact purposes, and he will be called as one of the State of Texas' witnesses in that case.
MS. ORTH: That's fine. Go ahead.
MR. KING: As it is stated, definitely not. One of the weaknesses of this and in the -- in the 2018 Shomaker report, the description of how the water will be used for offset is that it -- it basically just says here's some water and we're going to use that for offset.
It's, unfortunately, not that simple. In order for water to be moved from the diversion point at Azotea Tunnel on Rio Chama all the way down to Caballo Reservoir or the river below Caballo -- it's not clear -- first of all, it would have to go through the accounting of the Rio Grande Compact, because in Elephant Butte Reservoir, when calculating the usable amount of water, we take the physical amount of water in storage, and we subtract out Rio Grande Compact credit water, and we subtract out San Juan-Chama water.
Now, I am not sure -- it's not detailed enough that this would be handled as San Juan-Chama water. If so, San Juan-Chama water has never been moved down to Caballo Reservoir. If it is a new flavor of water stored in Elephant Butte Reservoir, I'm not aware of any

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accounting mechanisms that have been made for that accounting.
And running it through the accounting of the Rio Grande Compact is by no means a trivial matter. Any such changes to the accounting for the compact would require consensus of the three compact commissioners, compact commissioners for Colorado, New Mexico and Texas.
That has not always been easy. In fact, since 2011, we have -- the compact commission has been keeping two separate sets of books on compact accounting because they disagreed over the handling of some credit water back in 2011. So to this day, we have one set of accounting that's supported by the -- by Colorado and New Mexico and another that's supported by Texas and the United States, and that also is the subject of litigation in another venue.
Q. So would it be fair to say that this Jicarilla lease offset or this water supply agreement that would serve as an offset is taking us into uncharted territory in the water rights realm?
A. It certainly is. And it's further complicated because if you put water in Caballo Reservoir to offset the effects on the three constituents due to depletions from -- from Caballo Reservoir, that does not take care

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of depletions downstream, which would be borne solely by EBID.

And to -- if you were to then add more water to take care of EBID's concern, that would increase the releasable water from Caballo, which would add allocation to New Mexico and El Paso. And this gets to be a very strange set of accounting. So not only must you square this with the accounting of the Rio Grande Compact, but also with the allocation process of the Rio Grande Project.

And because of the difference in the impacts, it's -- it is -- it is by no means trivial.

Q. Would it be fair to summarize your testimony so far as stating that this NMED permitting process has impacts far beyond just groundwater quality contamination issues?

A. Yes.

Q. Okay.

Are there any effects of climate change on what you're discussing now with the offset issue?

A. Yes. The San Juan-Chama water is again from the Colorado River Basin, and in a full year there's about 100 and -- let's say 110,000 acre-feet transferred from the Colorado River Basin to the -- to the Rio Grande Basin through that project.

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And it is contracted to users up north, including the Jicarilla Apaches. Should the Colorado River run short, which it is in the process of doing right now, those diversions into the San Juan-Chama Project are very likely to be reduced, also.

This is very likely to be a persistent problem with the -- with the project. It will do two things. It will reduce the supply of water from the Rio Grande -- or -- sorry -- from the San Juan-Chama Project, and it will very likely drive up the price of San Juan-Chama Project water, as well.

This is a -- again a problem because in the agreement the lease -- the price of the lease is $125 per acre-foot, which is extremely low for water in this project. For example, right now in El Paso, El Paso Water Utilities is paying something just over $300 per acre-foot for Rio Grande Project water for treatment in their plant.

In the agreement, also, if the Jicarillas find a better deal -- and at $125, they will find a better deal -- the copper company has first right of refusal, but to plan for offsetting these impacts at $125 per acre-foot is simply not realistic.

Q. Did you base your opinions today in part on the water supply agreement between the Jicarilla Apache

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Nation and New Mexico Copper Corporation?

A. Yes.

MS. BARNCASTLE: Madam Hearing Officer, I'd like to move the admission of EBID Exhibit Number 7 at this time.

MS. ORTH: Objections?

MR. BUTZIER: Same relevance objection, but I have no problem with it being admitted into the record.

MS. ORTH: Thank you.

MR. DE SAILLAN: No objection.

MR. KNIGHT: Likewise.

MS. ORTH: It's admitted.

(Exhibit EBID 7 admitted into evidence.)

Q. (BY MS. BARNCASTLE) All right, Dr. King. Let's circle back now to the discussion that's taken place over the last week in this proceeding, and that's water quality again. And so we're going to be tapping into your riparian and irrigation system hydrology and water resource management expertise now.

We have heard testimony that -- I believe it was from Mr. Myers yesterday that contaminants are migrating and will reach Caballo.

Were you here for that testimony?

A. Yes, I was.

MR. BUTZIER: Madam Hearing Officer, that

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mischaracterizes the evidence.

MS. ORTH: I'm sorry. Say it again, please, Ms. Barncastle.

MS. BARNCASTLE: Contaminants are migrating and will reach Caballo.

MS. ORTH: That is a -- perhaps an overstatement of what I heard yesterday.

MS. BARNCASTLE: Why don't we ask the witness -- can I ask the witness to just then state what he understood the testimony to be?

MS. ORTH: Certainly.

Q. (BY MS. BARNCASTLE) Go ahead and state, Dr. King, what you understood Mr. Myers' testimony to be.

A. I took it to mean that there is a high likelihood of contamination from the dam -- or from the copper mine reaching Caballo Reservoir, looking at a spread through the groundwater system.

Q. And is that consistent with your understanding of the interconnected nature of the surface and groundwater system in this area?

A. If -- if there is a contamination plume forming, then yes.

Q. And that's contamination that would occur without some sort of catastrophic spill?

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A. Right.
Q. Okay.
So what would happen -- let's assume a catastrophic spill for a second.
What would happen to a farmer's field in the Lower Rio Grande?
A. That would be very difficult to say. I'm not -- if there were a catastrophic spill, we would be looking at some sort of emergency action that I -- I'm not aware of any plan for such -- such a catastrophic event in the Rio Grande Project.
Q. In other words, if a large amount of contaminants were to reach Caballo, there is no Emergency Action Plan in place to address that contingency?
A. Not that I'm aware of.
Q. And it's true that the City of El Paso relies on that same water from Caballo?
A. Yes.
Q. So it's not just farmers that would be affected.
A. That's correct.
Q. It's drinking water issues, also.
A. Yes.
Q. Okay.

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And isn't it true that the City of Las Cruces pumps their drinking water from the Lower Rio Grande interconnected surface water and groundwater system?
A. A good bit of our water supply does come from it. Yes.
But if I could get back to your question, it really depends on how we responded to the event.
The only analogy I could draw was a much more minor event, but in late 2016, we had a bit of a crisis with a release from Caballo when the outlet works at Caballo became obstructed with vegetation that presumably washed down the Animas and Percha Creeks from the fires that had occurred in previous years and actually plugged the outlet works so that we could not make full release from Caballo Reservoir to meet the downstream demand.
In that case, reclamation pulled together the two districts and implemented a plan to coordinate what we could release -- well, first of all, we shut Elephant Butte down, coordinated the release to draw Caballo down to essentially dead storage, and then reclamation brought in a clamshell bucket to excavate the debris out from the Caballo outlet.
That did affect our ability to release water, but I -- I really do not have an Emergency Action Plan

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in mind for how we would -- we would deal with a large-scale -- large-scale chemical contamination of Caballo, because my first reaction would be to shut Caballo, which would mean that City of El Paso would immediately have to switch from surface water to groundwater, which they don't do very -- they don't do immediately.
They have to phase it in because of the different chemistry of the surface water and the groundwater, and even the different temperature of the surface water and the groundwater. They have to phase it in slowly so as not to physically shock their delivery system.
The districts would shut down diversions and switch to groundwater. That would be a problem for EBID farmers who -- it gets complicated, but they would have to rely more on groundwater, which is certainly not the preferred alternative, surface water is. And El Paso, I suspect, would even be worse because they would be using much saltier groundwater and municipal effluent, which really needs to be blended with a surface water release.
So that would be the immediate reaction. I don't know what you do then, though, to get that cleaned up and get Caballo back on line, because if you do release that contamination and the current hydrology of

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the system, the river between Caballo and American Dam is taking -- depending on the time of year, anywhere from -- let's say 200 to 50 -- 50 to 200 cfs of infiltration of river water, which would be then taking contaminated water directly into our groundwater system where it would reside indefinitely.
And the impact on farmers would really depend on the nature and magnitude of the contamination. There is always the TDS issue, the total dissolved solids, which the biggest advantage to surface water is its comparatively low TDS.
But if you do get trace minerals, trace metals or anything like that, the uptake by the crops would vary from crop to crop and crop stage even by crop stage. So it gets very complicated.
But I don't know how you get it cleaned up to where you would say it's okay to release water from Caballo now.
Q. What would happen to Mexico in the event we shut Caballo down here in the United States?
A. When we shut Caballo down, Mexico shuts down.
Q. Could that create an international incident?
A. It could well.
Q. Could a permit condition to require an Emergency Action Plan in the event Caballo was

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catastrophically contaminated solve this problem?
A. I would have to see the Emergency Action Plan, I'm afraid. I mean, it's -- that would be one way of approaching it, but it -- understand that the stakes for the downstream players are extremely high, and I would not venture to suggest an Emergency Action Plan without consultation and collaboration with the other project beneficiaries.
Q. And potentially other state agencies?
A. Yes.
Q. Do you believe you have enough information to -- to give a complete opinion on all of the impacts to -- all of the potential impacts to the Rio Grande Project of this new copper mine?
A. One of the things that working on the Rio Grande Project for this long is a strong sense of humility. So no. I don't believe I've foreseen all of the potential impacts.
Q. Is there sufficient data on which to rely to properly determine impacts at this time, to properly determine impacts to the Rio Grande Project?
A. I think --
MR. BUTZIER: Madam Hearing Officer.
MS. ORTH: Sir.
MR. BUTZIER: I object. That's a completely

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vague and ambiguous question, and I'm not even clear where to begin to start to object to it.
MS. ORTH: All right. So he said that he can't foresee all impacts, and then the follow-up question was is there enough data to foresee potential impacts.
Is that --
MS. BARNCASTLE: Right.
MR. BUTZIER: And my question is, you know, data about what? What assumptions are going into the -- behind the question?
It's just a very -- very broad-brush question that I think is improper in this proceeding.
MS. ORTH: All right.
Dr. King, do you think you can answer the question as it's posed, or do you need it narrowed?
MR. KING: I think I can answer it as posed.
MS. ORTH: Go ahead.
MR. KING: It may not be a very satisfying answer.
With any emergency response or Emergency Action Plan, there is necessarily a great deal of uncertainty no matter how much data you have. For example, you don't know, you know, what you assume about the nature of the breach or the -- the event, both the

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hydrology and the chemistry of it. You honestly really don't know until it happens and you have to live with it.
MS. BARNCASTLE: I have no further questions for this witness.
MS. ORTH: All right. Thank you, Ms. Barncastle.
Mr. Butzier, do you have questions of Dr. King?
MR. BUTZIER: Thank you, Madam Hearing Officer. I'll try to be brief.

CROSS EXAMINATION

BY MR. BUTZIER:
Q. Dr. King, if New Mexico Copper were to acquire or establish or affirm a sufficient water rights to conduct its operations, would you still have any problem or concern or objection on the water rights side of things?
A. It depends on the nature of those water rights.
Q. Can you elaborate on that, please?
A. Certainly. If -- if, for example, the copper company were to look to offset the impact of the copper mining activity on the river below Caballo, which is now affecting EBID and is -- the impact is essentially

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confined to New Mexico -- if they were to try to address that by acquiring and retiring groundwater rights in the Lower Rio Grande, I would have a few problems with that.
Number one, if they are groundwater rights that are not currently being exercised, then that depletion on the system is still a depletion on the system. If they are groundwater rights that are currently depleting project water, then the mine would basically continue that depletion of project water.
If -- so those would be my two concerns with the river below Caballo, is that this -- you know, you're looking at the Supreme Court issues which EBID is somewhat involved in. The groundwater rights that you are retiring will almost certainly have a priority date much junior to the EBID priority date that we're working with right now which is 1903 or before.
So I don't think that retirement of groundwater rights is a valid approach for the impacts below the river -- or -- sorry -- below Caballo Dam.
On the impacts at Caballo Dam, it -- there are -- I mean, I would never say never. There are ways where one could secure water rights from the Middle Rio Grande to move down and offset. The Jicarilla lease is one, but it's not nearly firm enough to aleve my concerns over it.

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So I guess the short answer is no.
Q. Okay.
And, Dr. King, the concerns that you've just identified with acquiring and retiring rights below the dam versus other means of acquiring water rights, when -- if and when that occurs, you'll have a forum at the Office of the State Engineer or perhaps as part of the Interstate Stream Commission compact proceedings to fully express and vet the kinds of concerns you're raising here today, correct?
A. Yes.
Q. Okay.
When you talked about impacts from a dam breach and your concerns about impacts to the Caballo Reservoir and what that might mean for farmers, Mexico, Texas, New Mexico, EBID, EP1, those are all -- those are all basically assuming that there is some impact to the -- to the Caballo Reservoir, correct, from something that happens at the mine?
A. Well, yes. There will be the potential for a catastrophic event, which would require some sort of an Emergency Action Plan, and then there is a concern for the chronic -- potential chronic loading of contaminants in the reservoir due to just a spreading plume.
Q. But you're not attempting to testify as an

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expert that there will be impacts to the Caballo Reservoir if there is some type of failure of the dam, are you?
A. I am enough of an expert to say that I would not say that there will be 100 percent -- 100 percent certainly -- certainty, but I would say that there is a significant possibility.
Q. And were you present in these proceedings when Mr. Kidd testified about the Dam Safety Bureau process at the Office of the State Engineer that is designed to ensure the sufficient structural integrity of a tailings dam?
A. I was not.
Q. Okay.
No further questions.
MS. ORTH: All right. Thank you.
Mr. Knight, do you have questions?
MR. KNIGHT: I do.
I need a microphone, though.
CROSS EXAMINATION
BY MR. KNIGHT:
Q. Good morning, Dr. King.
A. Good morning.
Q. Dr. King, are you aware that the discharge -- the groundwater Discharge Permit that is the subject of

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this hearing does not allocate any water whatsoever for use at the Copper Flat Mine?
A. Yes.
Q. Are you aware that the groundwater Discharge Permit that is the subject of this hearing does not give New Mexico Copper -- New Mexico Copper Corporation any right to -- or any ability to pump any water from their production wells?
A. I believe I can say yes.
Q. Okay. Thank you.
That's all the questions I have.
MS. ORTH: Mr. de Saillan?
MR. DE SAILLAN: No questions, Madam Hearing Officer.
MS. ORTH: Is there anyone else present who has a question of Dr. King based on his testimony?
I see no hands.
Ms. Barncastle, do you have redirect?
MS. BARNCASTLE: No, I do not.
MS. ORTH: All righty. Ready to excuse Dr. King.
Thank you very much, Dr. King.
Safe travels to Albuquerque.
Shall we take five minutes before your next witness?

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MS. BARNCASTLE: Actually, I'd like -- I'd like -- if he didn't just pull a disappearing act on me, I would like to start immediately, but I guess we should.
MS. ORTH: All right. Five minutes.
MS. BARNCASTLE: Madam Hearing Officer, I will need to take a 20-minute break about 10:45.
MS. ORTH: That's fine.
(Proceedings in recess from 9:57 a.m. to 10:03 a.m.)
MS. ORTH: Okay. Please take your conversations out of the room. We are back after a short break.
Ms. Barncastle, please call your next witness.
MS. BARNCASTLE: Thank you.
I'd like to call Mr. Erek Fuchs.
EREK H. FUCHS
having been first duly sworn or affirmed, was examined and testified as follows:
DIRECT EXAMINATION
BY MS. BARNCASTLE:
MR. BUTZIER: Madam Hearing Officer, at the risk of annoying everybody, I'd like to again interject my continuing objection.
MS. ORTH: You're not annoying. That's fine.

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It's on the record.
Q. (BY MS. BARNCASTLE) Good morning, Mr. Fuchs. Would you please state your full name for the record.
A. Erek Hollis Fuchs.
Q. You might consider spelling your last name for the court reporter.
A. Good point. That's F-U-C-H-S.
Q. Thank you, Mr. Fuchs. Are you -- oh, this thing. I am not a still person, and it wants me to sit still. I'll try again. Could you please start out by telling us a little about your background and experience?
A. Sure. I can begin with my formal education. I have a bachelor of science degree in range and watershed science from New Mexico State University. I did some research with that effort concerned with, among other things, turbidity in the Gila River, up here in the Black Range, pretty close by. I also have a master of science degree, likewise from New Mexico State University, and that was concerned with range hydrology, and my concentration there was sediment transport and soil physics. I jump ahead, oh, gosh, a good, what, 15, 16 years or better, and I initiated a PhD that is almost

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finished in the water science management program, likewise at New Mexico State University, where my focus is agricultural water resources, but in particular groundwater and surface water interactions with particular emphasis on the physics associated with those interactions. My employment is such that currently I am the groundwater resources manager for the Elephant Butte Irrigation District. I've been in that capacity now going on seven years. Prior to that, I was the Lower Rio Grande Basin supervisor and intermittently the district supervisor for the District 4 office of the New Mexico Office of the State Engineer located in Las Cruces. I was in that capacity from November of '99 until 2011, '99. Many of my duties with the OSE, I'll abbreviate, in addition to personnel supervisory matters with scientists and engineers in my charge, was the technical facets for water rights administration, in particular performing either myself or overseeing modeling efforts, MODFLOWs, superposition versions of the water flow packages specific to the Lower Rio Grande underground water basin. A lot of analytical work, a lot of

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interpretive work, authored scores of technical memoranda specific to water rights applications of both surface and groundwater, but principally groundwater. Prior to that, I was with Kansas State University in Northeastern Kansas, where I was the lead researcher for an extension and outreach program specific to grazing land water quality considerations. So I've been back -- back home, so to speak -- I didn't think it would happen that way -- but in Las Cruces ever since.
Q. Do you consider yourself an expert in water rights administration?
A. I do. I've been qualified as such on numerous different occasions. It's a learned practice indeed, exposure to administrative protocols, but certainly a lot of rule regulation, working with attorneys. It's the kind of thing that, gosh, if a college degree were offered in it, I'm not too sure very many people would pursue it. But indeed, yes, I do consider myself an authority on the subject.
Q. And when you say you've been qualified in it a few times, you mean qualified as an expert in a court proceeding?
A. Yes, ma'am.
MS. BARNCASTLE: I'd like to tender this

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witness as an expert in water rights administration at this time.
MR. BUTZIER: No objection.
MR. DE SAILLAN: No objection.
MR. KNIGHT: No objection.
MS. ORTH: He's so recognized.
MS. BARNCASTLE: I would note for the Hearing Officer and remind my witness that although he is possibly an expert in other areas he should not render such opinions today.
MR. FUCHS: Yes, ma'am.
MS. BARNCASTLE: All right.
Q. Well, before we move on, I'd like you to look at Exhibit Number 2 -- EBID Exhibit Number 2 in front of you.
A. Yes, ma'am.
Q. Do you recognize that?
A. Yes, ma'am.
Q. What is that document?
A. This is my current CV and resume.
Q. Did you write that document yourself?
A. Yes, ma'am, I did.
MS. BARNCASTLE: I'd like to offer Exhibit Number 2 into evidence at this time.
MR. BUTZIER: No objection.

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MR. DE SAILLAN: No objection.
MR. KNIGHT: No objection.
MS. ORTH: It's admitted.
(Exhibit EBID 2 admitted into evidence.)
Q. (BY MS. BARNCASTLE) Okay, Mr. Fuchs. Did you review any documents or records to form the opinions you're about to give today?
A. Yes, I did. Among those include many of the documents that Dr. King mentioned earlier. Indeed it was -- it remains a plethora of material that I feel I've gotten through most of, but the documents that I concentrated on in particular included the Jones and Finch work of 2014, certainly also the December, 2017 Shomaker report regarding probable hydrologic consequences, and then the refinement of that showed up -- I believe it was May, 2018.
But in addition to that, I reviewed other older documentation in my possession specific to OSE material, and that would include a particular letter of understanding between the NMED and the OSE. That was back in 1999. I also looked at the recent Third Judicial District Court subfile order specific to adjudication proceedings, and in this instance that are specific to water rights that are currently owned by New Mexico Copper.

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Q. And did you listen to the testimony of Dr. King this morning?
A. Yes, I did.
Q. Okay.
I'm going to ask you the same questions that NMED asked of Dr. King, but before we get there, I'd like you to lay a little bit of foundation for the answers you're going to give to those questions.
So can you please give us a general overview of the regulations that are relevant here for your testimony?
A. Okay. Well, certainly the State Engineer is guided by, of course, the Constitution, statutes as they're, of course, passed via our legislative body from time to time, but also rules and regulations as they are also promulgated from time to time, but then in particular guidelines and the basic specific criteria.
Now, indeed not every square stitch of the state or particular groundwater basin or even stream system, if you will, is the subject of specific water rights administrative criteria; however, once principles and guidelines that seem to have indeed a common understanding are developed, then it becomes as much a case of evaluating proposals, applications or otherwise on a case-by-case basis with reference to pertinent

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technical considerations.
So there are a few things that the State Engineer is required, certainly, to be attentive to in evaluating water rights proposals and related applications.
Among those would be, first and foremost, is there unappropriated water available. And to the extent there is or perhaps isn't, then other considerations indeed include public welfare, conservation of water, but the one that typically receives the most attention, at least from a technical perspective, is impairment.
Now, impairment is not terribly well defined other than where it exists in specific basin guidelines or criteria. But generally speaking, it is approached in a couple of different fashions, one of which is local impairment, which would include, for example, drying up a neighboring well.
Other forms of impairment would include more generalized considerations such as stream completions that would affect a great many others.
So those are effectively the backdrop that the State Engineer is required to consider in ultimately formulating decisions on applications.
Q. Now, you did say that impairment is where they typically focus, but they also have a duty to focus on

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public welfare; is that correct?
A. They do. They do. And that brings to mind a number of considerations that I remember in my tenure as the basin supervisor in the Lower Rio Grande, and that often involved a collaboration, coordination with other entities, be they other state agencies, and at times federal interests and related agencies, and, also, certainly in the Lower Rio Grande, the Elephant Butte Irrigation District.
Q. Now, you have in front of you an exhibit marked EBID Exhibit 10.
Do you recognize that document?
A. Yes, I do.
Q. What is it?
A. This is the Mesilla Valley Administrative Area Guidelines for Review of Water Right Applications, dated January 5th, 1999. I remember this well because it was hot off the press not long before I started with the OSE.
Q. Are those regulations still the governing regulations for water rights applications in the Lower Rio Grande?
A. Generally speaking, they are. As other technical tools become available or better data is available, then certainly it is brought into

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consideration. But otherwise, the principles that are outlined in the Mesilla guidelines as we're discussing here are generally taken to be applicable elsewhere in the Lower Rio Grande to the extent they're applicable.

Now, there are instances where they perhaps are not applicable. One example would be the -- what we call Jornada del Muerto subbasin of the Lower Rio Grande. Hydrologically it is rather different from the Mesilla, but otherwise where stream-connected systems are concerned in the Lower Rio Grande, the Mesilla criteria is considered to be a persistent guideline.

Q. Did you rely on the guidelines shown in Exhibit 10 to form your opinions today?

A. In part.

MS. BARNCASTLE: Madam Hearing Officer, I'd like to move the admission of EBID Exhibit 10 at this time subject, of course, to Mr. Butzier's relevance objection.

MR. BUTZIER: No objection subject to that same objection.

MS. ORTH: All right.

MR. DE SAILLAN: No objection.

MR. KNIGHT: No objection.

MS. ORTH: It's admitted.

(Exhibit EBID 10 admitted into evidence.)

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Q. (BY MS. BARNCASTLE) All right. Mr. Fuchs, let's talk a little bit about the NMED's questions and one of Mr. Butzier's questions of Dr. King.

Let's start with Mr. Butzier's question, and I hope I don't mischaracterize this, but I believe the question was will EBID have an adequate opportunity to vet these water rights issues before the State Engineer?

A. Well, one can only hope. I would offer, however, that a proposal or activity of this nature, particularly of this magnitude and given its geographic situation, would be such that a high degree of collaboration and coordination from an interagency perspective would indeed be expected. Otherwise what we get into -- and I've seen this -- I remember this in my tenure with the OSE -- is a rather fragmented circumstance.

And I would further offer that given events, circumstances as they are prevalent today of indeed interstate dimension, if not international, as I believe Dr. King testified regarding litigation before the United States Supreme Court, that indeed includes certainly the State of New Mexico, Texas and our upstream brother in Colorado, that the stakes are really -- really quite high, and that in the context the public welfare of the State of New Mexico, while, as has

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also been testified, EBID and, for that matter, most other water use interests in the water use community in the Lower Rio Grande are, for all intents and purposes, in compact Texas.

We are still proud New Mexicans, and we would hope to work together, collaborate in the interest of public welfare and the taxpayer harmony.

Q. Now, NMED asked Dr. King if he was aware that the groundwater Discharge Permit does not give New Mexico Copper Corporation any right to pump water from their production wells.

Do you have an opinion -- a water rights administration opinion on that question?

A. Well, yes, I do. To the extent that the Discharge Permit permits discharge of wastewater in whatever volume, the water originating to produce that wastewater and the subsequent discharge indeed would be an appropriation of water to begin with. And therefore, I do believe that there is a close relationship.

Q. And since the New Mexico Copper Corporation is going to be retaining all contaminated water on site, would that be considered a wastewater reuse in your opinion? Or --

A. Yes. I believe -- I believe so, to the extent that it is being retained, as I have read and understood

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the proposal, essentially recycled, if you will, as part of the mining and mill process. Certainly there's an evaporative component of that. But yes, for all intents and purposes, that would be a reuse.

Q. I'd like you to look now at what's been marked as EBID Exhibit Number 8.

Do you recognize that document?

A. Yes. I mentioned this, I believe, earlier, this letter of understanding between the NMED and the OSE.

Q. How do you know about the existence of this document?

A. Well, again, as I mentioned regarding the Mesilla Valley administrative criteria, or guidelines as it were, this letter of understanding seniorly was produced along about the same time that I joined the OSE, and I remember that it was the subject of an effort to promote interagency collaboration and activities at that time.

And in fact, I remember the State Engineer himself -- at that time it was Tom Turney -- had made a trip, and one of the trips -- or stops along the way was District 4, Las Cruces, where he discussed this very letter and encouraged his staff, certainly myself as the basin supervisor, to be rather mindful of it, and that

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other such -- or similar types of arrangements, if you will, or understandings might be expected in the future.

So -- and for a while, I remember that it was indeed prevalent because I recall getting phone calls, not many, but periodically, from NMED staff. I don't remember their names specifically. It's been many years ago. But I do remember some phone calls and related where proposed discharge permits were concerned.

Again there weren't very many, because in the Lower Rio Grande most discharge permits, if my memory serves, were the subject of renewals. So they were existing discharge permits, and therefore the presumption was that, well, then, there must be an existing water right associated with that.

But the few times, as I remember, that there were new -- there were proposed new discharge permits, I remember some conversations where the -- the question was, well, what's the story, if you will, on rights to water. So me and my staff from time to time, again not very often, but I do remember a few times where there was some research underway and some communication in keeping with the letter of understanding.

Q. As a state government employee, were you trained by the Office of the State Engineer on implementation of this letter of understanding?

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A. Not specifically. It was really more general guidance. The idea was that the -- the letter, if you will, and the plain language of it should speak for itself.

In other words, the direction I recall we received was that if in doubt or if there is any question in your mind, call them, ask, communicate, and especially do so if something big or new comes up that is, you know, proposing a transfer, if you will, to retire the use of water in one location and change the purpose of that to perhaps something else that would be perhaps of an industrial nature that would then have a discharge component.

And if that were the case, that we're getting into water quality, if there's -- we should be mindful of those, and given the intrinsic relationship between quality and quantity, the direction I recall we received was to communicate.

And so that would have been about the extent of training, if you will, but we did not, in my recollection, have, for example, a hard and fast protocol. The idea was that use good judgment whenever something comes up that would indeed seem to necessitate collaboration.

Q. Would the New Mexico Copper Corporation proposed mine project be one of the projects that you would have been instructed to collaborate with NMED on as an Office of the State Engineer employee?

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MR. BUTZIER: Objection, calls for speculation.

MS. ORTH: It does, but go ahead if you can answer the question.

MR. FUCHS: Yeah. I think I can answer the question.

And the answer is yes, indeed, and I could give other examples.

Q. (BY MS. BARNCASTLE) Please do.

A. Yeah. I mean, one such example included -- oh, let's see. It would have been in the early 2000s. Dona Ana County received a sizeable grant from the Environmental Protection Agency to construct and operate two large -- relatively large wastewater treatment plants in what we call our South Valley, in Dona Ana County. In other words, the Southern Mesilla Valley.

And the idea there was to take a great many of the colonia settlements, if you will, in related communities in the South Valley that were otherwise discharging raw septic, if you will, via septic tanks, to instead connect them to an actual wastewater treatment system so that that wastewater could then be

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properly treated, rather than risking the potential for contamination -- ongoing contamination, nitrates related, of the shallow alluvium in groundwater.

And so as that project proceeded, contractors on behalf of Dona Ana County immediately discovered that in order to lay pipeline, if you will, to serve as collection points to receive wastewater, to otherwise take people off septic, that to excavate and lay that pipeline was such that they were regularly encountering the water table, that they would regularly find themselves exposing groundwater.

And so as this issue presented itself, what they initially were doing was excavating and then just installing, you know, a hurricane pump or, you know, a sump pump or wastewater pump, whatever was convenient, and then discharging that water wherever, however they might.

And so that presented several questions or potential problems, one of which is, well, to the extent that you're exposing groundwater and you're pumping it out of the ground, for whatever purpose, you're appropriating groundwater. So that raises a water rights consideration, which in the Lower Rio Grande is something that always was and indeed should remain of keen concern, because the Lower Rio Grande stream system

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is indeed fully, if not overappropriated.
So whenever this event presented itself, we had not only a water rights consideration to have a look at, well, gee, how do we handle this, but, also, well, what do we do if this water that's being discharged is -- is there any question about the quality associated with it, and the manner and means by which it's being pumped and discharged?
And so my recollection was that there was collaboration at indeed the highest levels. I do remember that elements in Santa Fe were engaged. I believe that the NMED was engaged, both Ground Water and Surface Water Quality Bureaus.
I don't remember the specific direction or input that NMED Ground Water or Surface Water may have opined, but indeed the OSE response or reaction was that we can't just waste that water. We certainly need to support the project, because it makes perfect sense, but we need to find a beneficial use of that water, because it would otherwise then be contrary to conservation of water in the state.
And arguably a question of public welfare as far as further depletions, if you will, or sending water unnecessarily, if you will, to our friends in Texas.
So what we worked out there was a circumstance

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where dewatering was permissible, but only under permit. Okay.
And that such a permit would require a plan such that each contractor would then have to coordinate with what we found to be the most workable arrangement, and that were farming interests, where the groundwater that was being dewatered to lower the water table for purposes of laying the pipeline was such that that groundwater could then be applied to actually irrigate.
And the idea was that to the extent that that groundwater was being pumped and appropriated to irrigate, that existing groundwater rights owned by existing farming interests would then be relaxed for the time being. In other words, substituted to the extent practicable to use the water that was being dewatered.
So that, I think, would probably be one of the foremost examples that comes to mind, and that was a project that ran for at least a full year, as I remember. So it wasn't just a weekend or, you know, week long or a few days kind of thing. So --
Q. Now, Mr. Vollbrecht of NMED testified -- and I'm sure Mr. Knight will keep me honest here -- Mr. Vollbrecht testified that the Office of the State Engineer did send a person by the name of Mr. Myer to some of the NMED meetings regarding the Copper Flat

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project, but that OSE did not provide any comments regarding the project beyond that.
Do you recall that testimony?
A. I do.
Q. Is that the level of agency coordination EBID would like to see here?
A. No, it certainly is not. I think that -- well, I know that as the groundwater resources manager for Elephant Butte Irrigation District, my recommendation has been and remains that the OSE needs to be engaged at the highest level to sort out any and all permitting issues with respect to water rights in particular, and to explore the degree to which impairment, be it local, stream system or otherwise, is indeed an issue, and then how we could perhaps effectively address that.
Q. Mr. Fuchs, did you rely on the contents of Exhibit 8 to form any of your opinions for your testimony today?
A. Yes. Yes, I did.
MS. BARNCASTLE: Madam Hearing Officer, I'd like to move the admission of EBID Exhibit 8 at this time.
MR. BUTZIER: No objection.
MR. DE SAILLAN: No objection.

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MR. KNIGHT: No objection.
MS. ORTH: Exhibit 8 is admitted.
(Exhibit EBID 8 admitted into evidence.)
Q. (BY MS. BARNCASTLE) Okay. So, Mr. Fuchs, you just stated that you'd like to see more coordination to sort out water rights permitting issues in the context of impairment, and I believe also public welfare; is that correct?
A. Yes, ma'am.
Q. What are those types of water rights issues where NMED and OSE should be coordinating in this situation?
A. Well, as I've alluded, if not to try to make reasonably clear, I think that the quality and quantity aspects of this proposed activity are indeed intrinsically linked and related.
I think, also, that the discharge component that this proceeding is certainly specific to certainly does relate back to an appropriation of water to begin with and that the nature and magnitude of that appropriation needs to be explored and understood in much, much greater detail than I think it is at this point.
One of the reasons that I believe I can offer that perspective is because having reviewed New Mexico

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Copper's current rights to water as they fairly recently have been adjudicated, it's quite clear that at least from a freshwater perspective the volumes that have been recognized are substantially insufficient for the activity as proposed, at least relative to the proposed total freshwater production that is contemplated at this time.

There really is no concentration or discussion that I have noted that is specific to the dewatering associated with the -- the open pit itself over the duration and course of the mining activity other than that indeed that water would be impounded and safeguards are apparently contemplated as to any potential contaminants associated with that.

But I would offer again that that dewatering activity in and of itself, if, in fact, were to take, you know, what is it, 25 million gallons per day of wastewater, potentially, discharged, that's, what, about 28,000 acre-feet annually.

I understand that, yes, that in all likelihood comprises the bulk of the volume contemplated in the Discharge Permit, but again that is an appropriation of groundwater by itself, and indeed a portion of that necessarily will be evaporated, depleted and removed from the system.

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So I think that it's really difficult to separate out the quality aspects of this, at least in the context of discharge, you know, for volume per unit time relative to water rights, volume per unit time. And so I really think that there needs to be some close coordination there.

Q. Am I understanding you to say that some of the activities proposed in the Discharge Permit that NMED proposes to issue are de facto appropriations of water?

A. That is what is contemplated as I have reviewed the material at this point.

Q. Now, the New Mexico Copper Corporation does have some water rights; is that correct?

A. They do. Yes. I believe it was February of -- of this year that their -- their claims.

Q. I'd like you --

A. Their claims that New Mexico Copper has come to own were adjudicated February of this year.

Q. I'd like you to look now at what's marked as EBID Exhibit 9.

A. Okay.

Q. Can you identify those documents, please?

A. Yes. These are the two subfile orders in question that reflects New Mexico Copper Corporation's groundwater rights as they were adjudicated in February

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of this year.

Q. Are you familiar with those documents?

A. Yes, somewhat.

MS. BARNCASTLE: Madam Hearing Officer, I'd like to move the admission of Exhibit 9, EBID Exhibit 9.

And what I will say is that Mr. de Saillan actually admitted one of these two documents in his direct case. I'm bringing in the second that's also relevant and tied to the one that Mr. de Saillan admitted into evidence.

MR. BUTZIER: No objection.

MR. DE SAILLAN: No objection.

MR. KNIGHT: No objection.

MS. ORTH: Both orders in Exhibit 9 are admitted.

(Exhibit EBID 9 admitted into evidence.)

Q. (BY MS. BARNCASTLE) Mr. Fuchs, are you aware of another permit application to appropriate new water pending on behalf of New Mexico Copper Corporation?

A. Yes. There was an application filed by New Mexico Copper earlier this year with the Office of the State Engineer. The copy that I am in possession of is not date stamped specific to the exact day earlier this year that it was filed. That reflects a processing protocol on behalf of the local district office. Why it

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does not reflect a date stamp I do not know.

That application for a new appropriation of groundwater from the existing wells that New Mexico Copper owns has not been subject to, or, near as I can tell, the OSE has not ordered advertisement as required by law regarding that application.

But otherwise, yes, an application for a new appropriation of 5,234 acre-feet of groundwater was applied for.

Q. Now, you've heard testimony that there is no dispute that the mine will have a hydrologic impact on the Rio Grande Project.

Do you recall that testimony?

A. I do. I arrived at a very, very similar conclusion of my own. Yes, ma'am.

Q. But we're not providing that --

A. Yes, ma'am.

Q. -- expert opinion today, correct?

A. Yes, ma'am.

Q. Okay.

The issues that will be front and center, then, in the OSE application that is currently pending will be something similar to the hydrologic impact that the Shomaker report suggests exists?

A. It would have to be, at least to build on

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that.
Q. And, now, does that other permit application provide an avenue for NMED and OSE to further coordinate on this project?
A. I would certainly think so.
Q. But isn't it also advisable that a permit condition requiring further agency coordination similar to what NMED has suggested in the form of a permit condition requiring compliance with Dam Safety Bureau regulations could be imposed here to also deal with the water rights issues?
A. Yes. And as a matter of fact, in my written testimony, I offered a recommendation specifically suggesting that.
MS. BARNCASTLE: Let me just correct for the record. I had my witnesses create written testimony for me that I did not submit in the form of written testimony, I then incorporated into a statement of intent. So that's what Mr. Fuchs is referring to, is his written testimony that he prepared that I then incorporated into our EBID's statement of intent.
MS. ORTH: Okay. Thank you.
MS. BARNCASTLE: I believe that's all the questions I have of Mr. Fuchs today.
MS. ORTH: All right. Thank you.

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Mr. Butzier, do you have questions?
MR. BUTZIER: I do, Madam Hearing Officer. Thank you.

CROSS EXAMINATION

BY MR. BUTZIER:

Q. Mr. Fuchs, is the Lower Rio Grande considered by the Office of the State Engineer to be a closed basin?
A. Closed would not be the appropriate term. Closed is different than fully or overappropriated. If it were closed, there would be issuance of no new applications or permits for anything including simple domestic well applications.
So technically it is not closed in the context of an administrative order from the State Engineer, but otherwise there is no unappropriated water available in the Lower Rio Grande, and that has been documented and well known for quite a few years.
Q. And what's your basis for your opinion that it's been fully or overappropriated?
A. Well, it is stated quite clearly in the Mesilla Valley Administrative Area Guidelines that I referenced earlier, dated back in 1999. In fact, the development of those guidelines was prompted in no small part due to the concern and discussions at the time that

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certainly have not been relinquished, if you will, that the stream system and associated interrelated groundwaters are fully appropriated.
Q. And has there been a hydrographic survey done of the Lower Rio Grande that's been completed?
A. Yes. There has been in support of the ongoing adjudication. However, I would offer that to characterize it as complete would be somewhat misleading, and the reason is because it is, for all intents and purposes, a bit of a moving target.
In other words, when the hydrographic survey was originally completed and filed with the District Court in 2000, it reflected at that time the surveyor's best estimate, if you will, of rights to water, surface, ground or otherwise, that were the subject of their inventory as they had done it through the mid- to late '90s.
However, as adjudication proceedings have been since been ongoing, the hydrographic survey has been updated, if you will, and adjusted to reflect new and otherwise unknown information, in other words, claims that have since come forward. To the extent that additional claims continue to come forward only intensifies, if you will, the otherwise fully appropriated, if not again overappropriated circumstance

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of the Lower Rio Grande stream system.
Q. Is it the case that the Office of the State Engineer continues to process permit applications for water rights or applications to appropriate water rights in the Lower Rio Grande?
A. They certainly continue to process applications. They are typically and in the overwhelming majority of instances to replace older or failing existing wells to continue the exercise of existing groundwater rights. There are a number of instances where new supplemental wells are granted, but those again are tied or limited to existing groundwater rights of record.
With respect to new appropriations of groundwater, in all of the time that I was the supervisor of the Lower Rio Grande, any such application would have been and were -- there were several instances I remember, that they were rejected and turned back for the reason that it was our position at the time that there is no unappropriated water available.
Therefore, unless an application were filed that contemplated a transfer, in other words, it's a new appropriation, but we're going to transfer in a water right from elsewhere, then such an application couldn't or wouldn't be considered.

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Now, the big problem with considering an application that contemplates a transfer from elsewhere is to what extent does that result in further depletion and therefore impairment in the system. Even though for accounting purposes, say, for example, on a statewide basis or regionwide basis, the numbers may all mass balance, it may very well be the depletions have effectively increased in the subject area.

So I think the short answer to your -- to your question, Mr. Butzier, is that in my experience an application for a new appropriation of a groundwater right, and certainly as it would consider any sort of surface water right, has not occurred in the Lower Rio Grande, at least not in my tenure and subsequent to that, other than simple domestic and stock well applications that are before -- before or under 72-12-1.

Q. And isn't it the case that even if OSE were not to itself reject an application because of the appropriated nature of the Lower Rio Grande, that in any event anybody who wanted to protest a new appropriation or a permit would have a forum to do so by initiating a protest proceeding at the Office of the State Engineer?

A. Yes, sir. That would be correct. However, the application would first need to be advertised and keeping with due process. In this instance, regarding

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the application that I referred to just a bit ago for a new appropriation, to my knowledge, no such advertisement has been ordered.

But I would further offer that -- as suggested in my earlier testimony, that it would behoove all parties involved to engage in a substitute discussion about how such an application could even be considered to begin with, and in particular how the impairment aspects of that could be handled from an interagency perspective.

And I think again that serves public welfare in the context of a much more efficient approach to things, Mr. Butzier, because, as I'm sure you're very, very well aware, protest proceedings typically tend to protract, they typically tend to be expensive, not unlike the current proceeding that we're engaged in now, except that in the case of water rights-related affairs, they have a tendency to find themselves in District Court pretty quick.

And one reason is because we have a general stream adjudication that's underway, as you're, I'm sure, very well aware, hence the expedited inter se nature by which New Mexico Copper's groundwater rights have been recognized at least to the partial extent they have been in the Lower Rio Grande.

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So in the interest of water use harmony, for lack of a better term, I would advocate for interagency collaboration, coordination, such that if a protest proceeding is entirely unavoidable, we at least go into it understanding some basic boundaries and what the framework looks like.

Q. And in reference to Exhibit 8, which is the 1999 letter of understanding, would you agree with me that that is basically a document that encourages coordination but does not necessarily drive a particular result of the coordination that's advocated in this letter?

A. I would not disagree with that characterization, and the reason is because my recollection was that -- and is that this particular understanding came about realizing that there are a great number of different circumstances that potentially could be encountered such that to become too terribly specific with it could lead to it being binding and other -- and otherwise with no particular effect. In other words, its intent perhaps then would not have been achieved.

Q. And in paragraph A.3 of that document, there's discussion of the parties agreeing to establish a task force to identify specific areas of concern and to

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develop policies, procedures and guidelines and subgroups as necessary to facilitate the parties working together in the areas identified.

Do you see where I'm reading?

A. Yes, sir, I do.

Q. I'm curious. Has that continued since 1999? Have there been policies, procedures, guidelines, subgroups formed, that type of thing, under this guidance -- or under this letter of understanding?

A. With specificity, not to my recollection. Again my recollection is that the State Engineer himself paid a personal visit and provided some instruction as to what his wishes were regarding the understanding, but as far as otherwise being, as is contemplated in the understanding, a task force or officials otherwise organized to further carry out the intent of the understanding, if that, in fact, ensued, I was not made aware of it or asked to be a part of that -- that group.

Q. Now, in the -- turning to the two Subfile Order and Judgments that are offered -- that were offered and admitted as Exhibit 9, those are orders and judgments arising from the interstate proceeding that you described, presided over by Judge Wechsler, correct?

A. That is correct.

Q. And EBID participated in that proceeding; is

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that correct?
A. Not actively.
Q. Okay.
And that was -- that was a proceeding that adjudicated in advance of adjudicating fully the Lower Rio Grande water rights, correct?
A. That would be one way to characterize it, which is to say that inter se is intended to -- and this is actually wading into legal interpretation that is a bit beyond my expertise, and so with that said and with that in mind, I think I should tread carefully, in wading into legal matters or terminology that is beyond my expertise.
Q. Fair enough.
And are you aware that adjudicated in that inter se proceeding before Judge Wechsler were a combination of different types of rights that were claimed by New Mexico Copper, including Mendenhall rights and other rights, other water rights?
A. Correct. That's my understanding.
Q. And I think your testimony is that some of the rights were adjudicated to be valid and other rights were not recognized in the inter se proceeding as valid, correct?
A. That would be correct.

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Q. And the issues in the inter se -- from the inter se proceeding are now pending on appeal, correct?
A. That is my understanding.
Q. And you don't have any concern about the legality of what New Mexico Copper is pursuing through both the inter se proceeding and the appeal that's pending?
MS. BARNCASTLE: Objection. I'd like some clarification.
When he says you, does he mean Mr. Fuchs, or does he mean the Elephant Butte Irrigation District?
MR. BUTZIER: That's a very good clarification. I do mean the Elephant Butte Irrigation District.
MS. ORTH: Yes.
MR. FUCHS: Well, to the extent that we are contemplating really rather junior claims to groundwater in this instance, and to the extent that the inchoate or Mendenhall component of this is to be the subject of appeal, then I think I would have to say, as the groundwater resources manager for Elephant Butte Irrigation District, that indeed the district does have great concern, getting back again to my point about the fully appropriated nature of the system and, as I believe Dr. King testified earlier, how it is that such

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effects are ultimately to be offset.
Q. But your concerns are not that the inter se proceeding occurred and that the appeal exists. Your concerns are more substantive in nature, that -- are concerns that can be expressed and pursued as appropriate within the context of those other proceedings.
A. I think that's a fair characterization.
Q. Now, I think you indicated -- if I understood it correctly, I think you indicated in answer to a question from Ms. Barncastle that DP-1840, the Discharge Permit in this case, itself authorizes or constitutes an appropriation of groundwater.
Do you recall that?
A. I recall having testified that there indeed is a clear and present relationship.
Q. But it's not seriously your opinion as a water rights administrator that that document issued by the -- that might be issued by NMED would itself constitute or recognize an appropriation of groundwater, is it?
A. I believe that such an issuance would necessarily have to assume that an appropriation of water underlies the permit, because otherwise how could there be wastewater generated to serve a Discharge Permit. But otherwise the Discharge Permit in and of

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itself is not, for example, an application for permit to appropriate water.
Q. Now, I think you alluded to, although maybe not by name, the hypothetical possibility of an interbasin transfer.
Did you -- do you recall that?
A. Yes.
Q. And I think your testimony was that's not likely to be accepted by the Office of the State Engineer, correct?
A. I think that it would be rather complicated and that there would be a number of significant technical considerations to explore and evaluate. But that's not to suggest or say that it is impossible.
For example, Dr. King in his testimony suggested that perhaps native Rio Grande water, such as originating from the Middle Rio Grande Conservancy District, might be something to have a look at. That again is not to suggest that there are not inherent complications associated with something like that.
All I am suggesting, Mr. Butzier, is that I think the OSE would have a lot to think about -- or necessarily should have a lot to think about, explore, contemplate and communicate to the extent such a proposal were put forth.

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Q. And that would all be vetted within the context of an application to have an interbasin transfer of water rights, correct? And that would occur before the OSE?
A. It could. And if that were the case, indeed it would. But that is not to say that it in any way precludes an interagency collaboration or even informal gathering of folks qualified otherwise interested to discuss such possibility.
Q. Now, it's also the case in a -- in a closed basin scenario that somebody could acquire water rights or retire water rights from one location and transfer the place and purpose of use to another location, correct?
A. That is correct.
Q. And that also would trigger a process before the Office of the State Engineer in which impairment and other considerations that you've addressed today would be fully vetted, correct?
A. It should, because again in the context of due process and advertisement as required by law, that indeed interested parties would be provided the opportunity to bring protest if they so chose.
Q. Okay.
And I want to talk for -- finally --

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Because I know that we wanted to take a break, right? That --
MS. BARNCASTLE: I would say we should probably just finish with this witness.
MR. BUTZIER: Okay. Very good.
Q. Finally, I want to talk a little bit more about impairment. We've talked in this proceeding about depletions, we've talked about impacts. I think you yourself have talked about impacts projected by some of the Probable Hydrologic Consequences or Jones and Finch reports from 2014 and amendments thereto.
And my question is isn't it the case that depletion and impact in a water supply sense is not necessarily the equivalent or there's not an equivalency between that and the legal notion of impairment as that issue comes up in OSE proceedings?
A. Well, to the extent, Mr. Butzier, that you may be seeking a legal opinion on that matter, I think I would defer to legal counsel. I could, however, contemplate that from a technical perspective, but I'm not sure that that's what you're asking.
Q. Let's go ahead and ask it from a technical perspective.
A. Well, why don't you do that, then.
Q. Okay. Same question from a technical

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perspective.
A. Well, could you repeat that question but from a technical perspective?
Q. My question is --
A. I don't mean to be short at all, but I just want to be clear on the question.
Q. Sure.
My question is is it technically the case that a depletion or an impact to water supply is the same as an impairment for purposes of OSE-related considerations?
MS. BARNCASTLE: I'll object and ask for clarification.
Are we talking about generally or in the Lower Rio Grande Basin?
MR. BUTZIER: Generally.
MR. FUCHS: Well, not necessarily. You know, you would have to characterize the impact, and indeed there are impacts that are considered to be de minimus but that might otherwise qualify as impairment.
For example, a strict interpretation of any new appropriation of water in a fully or overappropriated stream system would necessarily be impairment.
And the reason is because while you're taking

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somebody else's water, you necessarily would be, you know, having to do that, but there indeed are instances where, for example, simple -- they used to be simple, they're not so much anymore -- but what I refer to as 72-12-1, just in reference to the statutory authority that permits for such, that domestic and/or livestock wells that are routinely and regularly permitted in an otherwise fully appropriated system and are not considered to be the subject of impairment per se, but certainly could and would be the subject of priority administration if, in fact a priority call were brought about on such a system.
And if that indeed were the case, well, then, these inherently junior simple domestic and/or stock wells, if you will, principally domestic, and especially those that are intended to serve, say, minor subdivision and related types of activities, would be among the first, of course, subject to curtailment, but that otherwise would be considered and have been traditionally considered to be de minimus, at least as they were originally intended in more rural settings.
So I wonder if that might perhaps help with your question, Mr. Butzier.
Q. That does help. Thank you.
A. Certainly.

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Q. And isn't it the case that there -- that the OSE decisions are replete with examples of protestations of somebody's appropriation or permitting of a water right where just the -- the impact to the level of somebody's well is not found to be an impairment for purposes of a protest proceeding before the OSE?

A. It really depends. I think what you are getting at is local impairment, which is to say a -- borrowing from the example I offered earlier, a proposed appropriation or activity results in the lowering, if you will, of the water table or the water column available to, say, for example, a neighboring well of other ownership.

The question then might be, well, does it lower so much that the individual owner of that well and associated water right is, in fact, impaired. Maybe, maybe not. It would really depend on the circumstances at hand.

Now, if the well essentially dries up or it can be reasonably shown or proven via reasonable assumptions, whether it be application of an analytical method or modeling or otherwise, that, well, yeah, I mean, you're going to dry this up, then I think that most reasonable people as owners, if you will, of such a well and associated groundwater right would tend to

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argue, well, yeah, I'm impaired.

But it gets further complicated because, in my experience, if you get into issues of priority and time, you know -- for example, say for -- say a proposed activity does result in some degree of impairment, of, for example, a neighboring well of an ownership, and perhaps it can't be argued or shown that, well, yes, there is impairment, but there is a substantial lowering of the water column otherwise available to that well, but it doesn't completely dry up, and they retain some degree of recoverable capacity, maybe even enough to continue to basically meet the intended purpose of the well and water right in question, however, the water right and associated means of production of that water right, the well in question, is senior to the proposed activity, then I think a very good argument would exist, certainly also from a technical perspective, that, well, then, why should the senior appropriator be impaired in any amount, in any way.

But I think again those are matters that would really have to be addressed on a case-by-case basis. It would be difficult to provide a blanket catch-all, if you will, perspective on that.

Q. And the proper forum for getting into those questions would be the Office of the State Engineer,

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correct?

A. That would be the lead agency appropriate in such a matter, but again I would offer that it might behoove interested parties to collaborate and explore those possibilities well in advance, such that if a protest proceeding and further protracted, if you will, affairs can be avoided, or perhaps an understanding and agreement can be reached at the outset, then that might be a very, very good idea.

We used to encourage that regularly during my tenure and charge as the basin supervisor. Didn't always work, but --

Q. Fair enough.

Now, am I correct that water rights that exist within the Lower Rio Grande Basin, unless they have been adjudicated pursuant to an inter se proceeding, have not yet been quantified? In other words, there's a lot yet to be done in the Rio Grande adjudication in order to specifically quantify any particular water rights holder's rights within that basin?

MS. BARNCASTLE: I'll object to this question on the basis that New Mexico Copper's water rights have been fully quantified and those are what the court orders reflect.

MR. BUTZIER: My question wasn't relating to

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the court orders. It was more generally talking about the Lower Rio Grande, which is some -- is an issue that's being raised by EBID itself.

MS. ORTH: That's how I understood it, as well.

Can you answer the question, Mr. Fuchs?

MR. FUCHS: I think I can.

You know, one of the complications associated with adjudication proceedings, and one of the reasons why stream systems, not just in New Mexico, but throughout the West and the Southwest, tend to be loathe to pursue them is because you really can't just put on hold, if you will, the activities, demands, needs, changes, interests or otherwise associated with the water use community while you're adjudicating.

And that's also one of the reasons why, as I mentioned earlier, the hydrographic survey in the case of the general stream adjudication underway in the Lower Rio Grande remains something of a moving target.

And one of the reasons is because while you have adjudication proceedings underway, you also have water rights administration and related permitting activities underway, such as, for example, a transfer type scenario, as you referred to earlier, Mr. Butzier, that, well, gee, wouldn't it be convenient if we could

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just, you know, push pause and, you know, everybody kind of stop what you're doing, you know, with respect to water use, and let's get this all adjudicated, okay, and get a final decree, and then let's come back to a transfer scenario or replacing a well or drilling a supplemental well, because the water table is lowered or otherwise we need capacity, whatever the case may be, and for whatever the purpose of use it may be.

But where I'm going with that, Mr. Butzier, is that the permitting process in and of itself is indeed a quantification activity, and the reason I can say that with some authority is because I did it every day for 12 years consecutively even while indeed we had water rights adjudication proceedings underway.

So even there a degree of coordination, collaboration and communication within the agency is appropriate, which is to say that the Hydrographic Survey and Adjudication Bureau, if you will, of the OSE and the Water Rights Division and also in many instances the Hydrology Bureau all kind of have to work together to keep the cart moving, so to speak.

And in that process, again where a permit is concerned that would reflect an application filed for something, all of those fundamental considerations come into play.

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Is the water right valid to begin with? I mean, it's a claim we'll say, merely a declaration. Perhaps it's been adjudicated. Well, that's extremely convenient because then you have a court order that you could work from. If not, then State Engineer and his staff have -- ultimately make a determination.

Sometimes that determination is indeed not to the liking of the applicant, and in those instances, well, the applicant has the option to grieve that action by the State Engineer, ask that it be set aside and pursue an administrative hearing, not terribly unlike what we're doing here today.

My point being is that in that process there is a quantification that occurs from a legal perspective, and while I am not going to attempt to testify from a legal perspective, I would offer, though, that the way that the permit having reflected due process and the technical review associated with administration in and of itself certainly carries considerable consideration for purposes of adjudication.

And in fact, there are instances where you can have an adjudicated right to water that then is subject to an administrative activity and application to change some facet of it.

Now, to the extent that occurs, then the

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clock, if you will, sort of resets, which is to say, well, okay, it was quantified, adjudicated to begin with, that's wonderful, but if you're changing that, which is to say the place and/or purpose of use in particular, then you subject the right to further scrutiny or a period of uncertainty until you have, in effect, reestablished, if you will, reproven the validity of that right, even though it was adjudicated to begin with.

So what I'm trying to get at, Mr. Butzier, is that just because we don't have a final decree yet in the Lower Rio Grande general stream adjudication, and I would offer that we're unlikely to have one for many years to come, is in no way a matter or means by which a prudent administration, prudent communication, prudent collaboration and coordination between and among entities, including certain interagency coordination, shouldn't occur.

Q. And the collaboration and cooperation that you described is -- to your knowledge, I assume is not specifically required by any rule and in particular any requirement associated with the discharge permitting program administered by the NMED.

MS. BARNCASTLE: I'll object. Mr. Fuchs is not qualified as an expert in anything but water rights

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administration, and so his knowledge of the NMED regulations is calling for a legal conclusion that I'm guessing is going to be speculation on his part.

MS. ORTH: Okay. I think he can answer as to whether he's aware of a requirement.

And if you don't know, obviously, that's a perfectly legitimate answer.

MR. FUCHS: What I know is that there really isn't any hard and fast requirement that anybody collaborate, work together and attempt to get along, share information or otherwise.

But what I am suggesting, as strongly as I know how, and as I believe the letter of understanding that former State Engineer Tom Turney and former Secretary of Environment Maggiore came to agree on, was that we do need to work together.

But is it a statutory requirement? I don't think so. I mean, I don't see a reference to statutory direction to do that. I am simply suggesting that it really would be a good idea to do so and that this is not the first time that such a suggestion has been made between the agencies of the NMED and OSE.

Q. (BY MR. BUTZIER) And would you agree with me that since many of the challenges -- water rights-related challenges facing New Mexico Copper are

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challenges that are ongoing and will be ongoing into the future for some time that -- would you agree with me that that kind of collaboration and cooperation that you've described is something that could occur hereafter and is not dependent upon whether or not a DP-1840 Discharge Permit is issued?

A. I think that --

MS. BARNCASTLE: I'll object also in that it calls for a legal conclusion.

MS. ORTH: All right.

And again, Mr. Fuchs, I'm not -- I'm aware that you're not a lawyer so -- and I think you've done a --

MR. KING: Thank God.

MS. ORTH: I think you've done a good job so far of distinguishing the opinions you're holding as a water resource administrator from the opinion you might hold as a lawyer.

So if you can answer the question, please go ahead.

MR. FUCHS: Maybe you should restate it, Mr. Butzier.

MR. BUTZIER: Could we have it reread, Cheryl?

MS. BARNCASTLE: I might ask -- this has gone substantially longer than I expected.

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MR. BUTZIER: This is my last question.

MS. BARNCASTLE: Okay. I need to get out to my car soon.

MS. ORTH: Okay.

THE REPORTER: "And would you agree with me that since many of the challenges -- water rights-related challenges facing New Mexico Copper are challenges that are ongoing and will be ongoing into the future for some time that -- would you agree with me that that kind of collaboration and cooperation that you've described is something that could occur hereafter and is not dependent upon whether or not a DP-1840 Discharge Permit is issued?"

MR. FUCHS: That's an eloquent question, Mr. Butzier, well said.

Again I would come back to the recommendation that certainly I think it would have been prudent, you know, had there been further collaboration, coordination with OSE prior to these proceedings. I think it is to the credit of the NMED that they have indeed recognized and modified the proposed DP-1840 to reflect that, well, yes, coordination with the OSE Dam Safety Bureau makes a lot of sense here, therefore there is a condition in the permit that reflects that.

I am recommending that a very similar

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condition occur but with respect to the Water Rights Division of the OSE.

And to answer Mr. Butzier's question, I cannot see any particular reason why the communication, coordination, collaboration or otherwise that you're referring to could not indeed occur.

MR. BUTZIER: That's all the questions I have. Sorry.

MS. ORTH: Oh.

Did you finish your answer?

MR. FUCHS: I think so.

MR. BUTZIER: That's all the questions I have. Thank you.

MS. ORTH: All right. Thank you.

We'll take 20 minutes.

(Proceedings in recess from 11:19 a.m. to 11:40 a.m.)

MS. ORTH: Okay. We are back after a break. Mr. Knight, do you have questions --

MR. KNIGHT: I do.

MS. ORTH: -- of Mr. Fuchs?

MR. KNIGHT: I do.

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CROSS EXAMINATION

BY MR. KNIGHT:

Q. Good morning, Mr. Fuchs.

A. Yeah. It's Mr. Fuchs, like F-O-X but spelled F-U-C-H-S.

Q. Okay. I believe that's what I said.

A. Oh, okay. Very good. Thank you.

Q. Mr. Fuchs, are you aware that there was a cooperating agency process for six to seven years before today's hearing involving the Environment Department, the Office of the State Engineer, Mining and Minerals Division and the Bureau of Land Management?

MS. BARNCASTLE: Objection, foundation.

MS. ORTH: Is he aware that that occurred?

MS. BARNCASTLE: Well, I guess the objection goes to there's no evidence in the record to suggest that the evidence in the record was much more limited than that.

MR. KNIGHT: Mr. Vollbrecht testified to the cooperating agency meetings and referenced those in his testimony.

MS. ORTH: Right. That's what I heard.

MS. BARNCASTLE: Understood. And I'll make this a continuing objection, then, because my understanding of the testimony was that OSE was only

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nominally involved.
MS. ORTH: Okay. Well, he can explore Mr. Fuchs' knowledge of that.
Go ahead, Mr. Knight.
MR. KNIGHT: Thank you.
Q. Well, I guess we -- can you go ahead and answer the question?
MS. ORTH: Go ahead.
MR. FUCHS: Yes. I am aware that there was a cooperating agency agreement. I think that was specific to the Draft EIS process that was underway, and I did see some E-mail correspondence and related exchange in the limited material that was made available to me that reflected the involvement of the parties that you just mentioned.
Q. (BY MR. KNIGHT) And I take it that you were not present or did not participate in any of those cooperating agency meetings?
A. I don't believe the EBID was invited or offered to participate as a cooperating agency. So no.
Q. So you would have -- you have no personal knowledge and thus no basis to testify about the extent of cooperation or coordination between the Office of the State Engineer and the New Mexico Environment Department in the six or seven years leading up to today's hearing.

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A. Other than the E-mail exchange that I saw in the record, no, I did not have personal involvement.
Q. Are you aware that the Office of the State Engineer did provide fairly extensive comments to the Bureau of Land Management during the NEPA process for the Copper Flat Mine?
A. I think again that refers to the Draft EIS.
Is that correct? Is that what you're referring to?
Q. I'm referring to the entire NEPA process, but yes.
A. I believe that there was some involvement, the extent to which I'm not personally knowledgeable of.
MR. KNIGHT: That's all the questions I have. Thanks.
MS. ORTH: All right. Thank you.
Mr. de Saillan.
MR. DE SAILLAN: Yes. I have just a few questions.

CROSS EXAMINATION

BY MR. DE SAILLAN:
Q. Good morning, Mr. Fuchs.
A. Good morning.
Q. I just have -- like I said, just a few questions.

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You testified earlier that when the Office of the State Engineer reviews a water rights permit application the office looks at conservation of water, public welfare and impairment of other water rights, correct?
A. Those are the principal considerations. In addition to that certainly would be whether or not there's water available to appropriate to begin with, but it largely depends on the application itself.
Q. Okay.
But those three things is what this -- the Office of the State Engineer would look at for an application regardless whether it's a new appropriation or an application to change the place or purpose of use or to change the place of diversion of the water rights?
A. Principally, that's correct.
Q. Okay.
And when the Office of the State Engineer reviews an application, it doesn't normally look at effects on ecology, for example, ecosystems or wildlife, except perhaps for threatened or endangered species; is that correct?
A. That is correct. In my tenure and experience, those were considerations that were not the subject of anything that the OSE could or would seek to quantify.

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So no.
Q. Right.
And then the document that is marked as EBID Exhibit 10, which is the Mesilla Valley guidelines, doesn't provide for consideration of those issues, does it?
A. No, sir, it does not.
MR. DE SAILLAN: Okay. Thank you. That's all the questions I have.
MS. ORTH: Thank you.
Is there anyone else present who has questions of Mr. Fuchs based on his testimony?
No?
Ms. Barncastle, do you have any follow-up?
MS. BARNCASTLE: Briefly.

REDIRECT EXAMINATION

BY MS. BARNCASTLE:
Q. Mr. Fuchs, you received several questions from Mr. Butzier about whether the public or protestants would have an adequate venue through the Office of the State Engineer to protest the water rights application.
Do you recall -- the pending water rights application for a new appropriation.
Do you recall those questions?
A. I do.

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Q. And you said that yes, but the application would first need to be advertised before public participation could be invited; is that correct?
A. Yes. That would be correct. For it to be a formal, if you will, and a substituted engagement, yes.
Q. Is there a risk that this particular application will not be advertised because it is one for a temporary appropriation?
A. I have seen a couple of instances where such has occurred, but the application in question that I recall was the subject of or couched as a lease, and the attempt indeed had been made to postpone essentially indefinitely advertisement, and that did result in some problems.
So I think it is fair to be concerned that it may be indefinite as to when or if formal advertisement would be ordered in this case or if it is going to be in the foreseeable future.
Q. So it is possible that OSE could decide not to advertise this application to the public.
A. That is possible, or perhaps postpone it indefinitely. I would think that to be highly problematic, but, you know, in terms of the State Engineer's discretion or guidance to his -- or instruction, rather, to his staff at this juncture, I --

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I can't speak to that. So it is possible.
Q. Would a temporary appropriation take care of the longer-term offset requirement to alleviate the impacts on the Rio Grande Project?
A. Well, it depends on what you mean by temporary. You know, an appropriation -- and it depends also on the magnitude of it, you know --
Q. Well, what I'm referring to specifically is the temporary lease application that's currently pending before the Office of the State Engineer in the form of an application that was submitted by New Mexico Copper Corporation.
A. Well, that is an application, of course, for a brand new appropriation, and as I understand it, there is contemplated a lease for offset purposes, as Dr. King testified to, that would in effect be a companion effort, if you will. I would think that to also have to be the subject of a formal application, but to my knowledge, no such application has occurred.
But in terms of the impact, or if you want to characterize it more specifically as longer-term depletion, to the extent that the appropriation is contemplated for -- I believe it's 12-some-odd years I think is pretty clear that the effects will persist for much, much longer thereafter.

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Q. Now, you were also asked about whether EBID's concerns related to the junior nature of the water rights claimed by New Mexico Copper Corporation could be adequately raised in other forums, to which you answered yes; is that correct?
A. Yes.
Q. One such other forum would be the Texas versus New Mexico Supreme Court case; is that right?
A. Yes. I believe that it would be.
Q. And you also received several questions about the letter of understanding and specifically that it does not drive a particular result.
Do you recall that question?
A. I recall.
Q. In your opinion with what's at risk for the State of New Mexico and Texas versus New Mexico Supreme Court case, isn't it advisable to encourage agency coordination within New Mexico at all levels and within all permitting?
A. I -- I believe that my testimony thus far has in several instances sought to encourage precisely that.
Q. Can you think of a better project than this one in which the type of agency coordination EBID is advocating for would be applicable?
A. Oh. Not offhand. This one would be right up

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there near the top.
MS. BARNCASTLE: Thank you.
I have nothing further.
MS. ORTH: All right. Thank you.
Any reason not to excuse Mr. Fuchs?
No?
Thank you very much, Mr. Fuchs.
MR. FUCHS: Thank you.
MS. BARNCASTLE: Madam Hearing Officer, we have about 10 minutes until noon. I believe I can put my next witness on the stand in -- and be done by about 12:30.
MS. ORTH: I think that's a good plan. I don't think we need to break at noon.
MS. BARNCASTLE: Okay. I'd like to call, then, Mr. Zach Libbin.

ZACHARY LIBBIN

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MS. BARNCASTLE:

MS. BARNCASTLE: I wanted to retrieve my prior witness' exhibits so that we avoid any unnecessary confusion.
Q. Mr. Libbin, please state your full name for

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the record.
A. Zachary Lowell Libbin.
Q. Now, Mr. Libbin, I'd like to start with your background and experience.
Please tell us about your education and work experience.
A. I've earned a bachelor's of science and a master's of science in civil engineering, a water resources emphasis, from New Mexico State University.
I've been employed by the Elephant Butte Irrigation District since 2010. I'm currently the district engineer for EBID and supervise the district's engineering department.
During my time at EBID, I've gained experience through the operation and maintenance of EBID's 25 flood control dams. I'm responsible for the inspection and prioritization of maintenance and quality assurance of maintenance of EBID's flood control dams. I oversaw the development of EBID's first approved Emergency Action Plan. I'm engineer of record for several dam breach analysis and flood routing reports in the district's Operation and Maintenance Manual.
I've also participated in many of the -- of the training opportunities offered by the Association of State Dam Safety Officials.

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Q. Mr. Libbin, are you familiar with the Office of the State Engineer's Dam Safety Bureau regulations?
A. Yes, ma'am. I'm familiar with the OSE dam safety regulations and Dam Safety Bureau nonregulatory guidance through EBID's desire to comply with dam safety requirements and nonregulatory compliance requirements. I am also familiar with the OSE Dam Safety Bureau regulations through my work developing dam breach analysis, flood routing models and EBID's Operation and Maintenance Manual.
I've been doing work with the Dam Safety Bureau through the New Mexico Watershed and Dam Owners Coalition and the South Central New Mexico Stormwater Management Coalition. My work and leadership of these coalitions of dam owners has given me the opportunity to work cooperatively with many area dam owners to address dam risk and compliance issues.
Q. Mr. Libbin, do you consider yourself an expert in the area of compliance with the Office of the State Engineer regulations pertaining to dam safety?
A. I do.
Q. I'd like you to look now at what's been marked as EBID Exhibit Number 3.
Do you recognize that document?
A. Yes, ma'am. That's my resume.

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Q. Did you create that document?
A. I did.
Q. Is it current?
A. Yes, ma'am.
MS. BARNCASTLE: I'd like to move the admission of EBID Exhibit 3 into evidence at this time.
MR. BUTZIER: No objection.
MR. DE SAILLAN: No objection.
MR. KNIGHT: No objection.
MS. ORTH: Exhibit 3 is admitted.
(Exhibit EBID 3 admitted into evidence.)
MS. BARNCASTLE: I would also like to tender Mr. Libbin as an expert in compliance with Office of the State Engineer Dam Safety Bureau regulations pertaining to dam safety.
MR. BUTZIER: No objection.
MR. DE SAILLAN: No objection.
MR. KNIGHT: No objection.
MS. ORTH: He's so recognized.
MS. BARNCASTLE: Thank you.
Q. Mr. Libbin, I'd like you to look at what's been marked as EBID Exhibit 11.
Do you recognize that document?
A. I do. It's the Rules and Regulations Governing Dam Design, Construction and Dam Safety.

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Q. Are you familiar with the contents of that document?
A. Yes, ma'am, I am.
MS. BARNCASTLE: Madam Hearing Officer, we could go into some detail to lay foundation, but I'm going to instead try to move the admission of Exhibit 11 at this time. We've already had substantial testimony regarding the Dam Safety Bureau regulations. I simply want to put them in the record at this point.
MS. ORTH: All right.
MR. BUTZIER: No objection, and I would note that we also already have admitted this through our exhibits.
MS. ORTH: All right. For convenience, it might be best to have them reflected as EBID Exhibit 11, as well.
Any objection?
MR. DE SAILLAN: No objection.
MR. KNIGHT: No objection.
MS. ORTH: All right. It's admitted.
(Exhibit EBID 11 admitted into evidence.)
MS. BARNCASTLE: Just for clarification, was this a separate exhibit that you admitted, or was it solely within one of the PowerPoints, Mr. Butzier?
MR. BUTZIER: I believe it was one of the

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exhibits offered in connection with Mr. David Kidd. And if you give me a minute, I can tell you the exact number of the exhibit.

MS. BARNCASTLE: I must have missed that, but certainly I didn't object at the time so no big deal.

Thank you.

MR. BUTZIER: Sure.

Q. (BY MS. BARNCASTLE) Mr. Libbin, would you tell us what a jurisdictional dam is.

A. A jurisdictional dam, as Mr. Kidd explained, is a dam that falls under the regulation of the Dam Safety Bureau. These dam safety regulations provide specific height and capacity requirements and make a dam jurisdictional.

Specifically 19.25.12.7D.(1)(a) of NMAC explains that a dam 25 feet or taller which impounds more than 15 acre-feet of water or a dam that impounds 50 acre-feet of water or -- or more and is six feet or taller makes a dam fall under the Dam Safety Bureau regulations.

Q. Now, did you review anything in preparation for your opinions that you're going to provide today?

A. I did. I reviewed pertinent parts of the Bates index records, including the 2016 Tailing Storage Facility Feasibility Study by Golder Associates and the

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2010 Conceptual Design.

Q. And based on those documents that you reviewed, did you come to the conclusion that this would be a jurisdictional dam?

A. Yes, I did.

Q. And by this, I mean the New Mexico Copper Corporation's tailing storage facility dam?

A. Based on the feasibility design, yes, ma'am.

Q. So because this is a jurisdictional dam, this means that this dam would be subject to the Office of the State Engineer's regulations?

A. Yes, ma'am.

Q. Okay.

And do you agree with Mr. Kidd's presentation regarding the potential classification for this dam?

MR. BUTZIER: Madam Hearing Officer, I'll object. I do think we might be missing a foundation for that question.

MS. ORTH: Would you like to lay some foundation?

MS. BARNCASTLE: You know, I'm trying to do both a direct and rebuttal while leaving out information that Mr. Kidd's already covered. So I guess what I'll do is risk the objections and go right straight from the top and just lay all the excruciating foundation.

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Q. Which regulations are most pertinent to this project, Mr. Libbin?

A. 19.25.12.11 of NMAC provides requirements that will apply to the design of any dam, including the tailings storage facility required by New Mexico Corporation Copper Flat.

Q. And what will the Office of the State Engineer Dam Safety Bureau require of this project before a permit is granted?

A. Well, first of all, the Copper Flat will require a permit to construct and operate the dam. This 19.25.12.11 describes requirements for design of a dam. It explains that anyone who is intending to construct a dam shall submit an application with some supporting documentation acceptable to the State Engineer.

This section primarily addresses the design and construction of abatement dams, but it clarifies that other types of dams shall conform to sound engineering practices, principles and current state of practice.

Quoting, it states the construction shall not begin until State Engineer has accepted the supporting documentation and approved the application with permit conditions. The application and supporting documentation shall include the application,

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documentation of water right, design report that includes hazard potential documentation by a dam breach and flood routing analysis, hydraulic analysis, spillway design, outlet design, geological assessment, geotechnical assessment, seepage and interior drainage assessment, stability analysis, seismic design analysis, dam geometry, erosion protection, structural design, construction drawings, construction specifications, survey, dam site security plan, an instrumentation plan, operation and maintenance manual and emergency action plan which also requires a dam breach and flood routing analysis.

Q. And what of that punch list that you just went through do we have currently from New Mexico Copper Corporation?

A. I'm going to -- I guess I'm going to say that I don't think we have any of that. A feasibility level design isn't -- isn't in the state that would be ready to submit any of these pieces to the Dam Safety Bureau.

Q. Should the complete design and all of the items on that punch list be considered by NMED?

MR. BUTZIER: Objection, calls for legal conclusion.

MS. ORTH: Mr. Libbin, can you answer the question without drawing a legal conclusion?

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MR. LIBBIN: I think I can.
MS. ORTH: Okay. Go ahead.
MR. LIBBIN: The OSE Dam Safety Bureau is specifically concerned with the safety of the dam and the risk of life and property downstream related to the dam. The Office of the State Engineer and the Dam Safety Bureau will have their own requirements specific to the dam structure and the safety of the dam. Potentially these requirements could make the dam look different in the end than what has been reviewed by the Environment Department.
The diversion channels in the Grayback Arroyo need to be analyzed for the same design storm as the tailings dam to ensure that these channels cannot overtop if such an event occurred within the contributing area.
If a storm exceeded the capacity of the diversion channels, the Grayback Arroyo run-on could contribute to the -- to the dam, in addition to the direct precipitation of the event. The capacity of the dam could be exceeded. If the capacity of the dam were exceeded, it could potentially overflow or breach, sending tailings downstream.
So I don't know what the Dam Safety Bureau will require, but it would be prudent to have their

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acknowledgment of the design, in my opinion, prior to the permitting of the groundwater discharge.
Q. (BY MS. BARNCASTLE) Is it possible, for example, that Dam Safety Bureau could require construction of the dam -- the tailings storage facility dam without a liner?
A. Again I don't know what the Dam Safety Bureau will require, but no doubt they'll have extensive comments and scrutiny. Again I don't know what they'll require, but certainly the dam could potentially end up different, even significantly different than the feasibility design submitted to the Dam Safety Bureau -- I mean to the NMED. I apologize. My understanding is it has not been submitted to the Dam Safety Bureau.
Q. So let's talk a little bit about a dam breach analysis.
What is a dam breach analysis?
A. A dam breach analysis -- and that -- a dam breach analysis leads to a flood routing model, which is important to show where flooding would go in the event of a dam failure.
The -- the flood routing modeling shows where -- shows what geographic area has potentially -- could potentially be impacted by a -- such a failure, including the potential loss of life, damage to property

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and environmental damage that's likely to occur in the event of a failure.
A dam breach analysis includes the potential failure modes and includes the -- the flood routing where the water will go.
Q. So in other words, you would assume that the dam is full, breach it and then see where the water flows from there.
A. Specifically you determine the worst case scenario for -- for that, whether it's piping or overtopping or what the worst case conditions would be, and then model that.
Q. Let's move on now to classifications of the dam.
What are the potential classifications for this type of jurisdictional dam?
And I mean the Copper Flat tailing storage facility dam.
A. I will try to avoid overlap of testimony so I'll be brief.
19.25.12.10 of NMAC explains that the hazard potential classification is a rating for a dam based on the potential consequences of failure. The rating is based on loss of life, damage to property and environmental damage that is likely to occur in the

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event of a dam failure.
Low hazard potential dams -- summarizing -- well, Mr. Kidd explained low hazard potential and significant hazard potential.
The only thing I'll add to what he said about significant hazard potential is significant hazard potential classifications are -- result in -- are not likely to result in probable loss of life, but can cause economic loss, environmental damage, disruption of lifeline facilities or an impact to other concerns.
High hazard potential dams are likely -- are those dams which failure and misoperation will probably cause loss of human life.
Q. Why is the classification of a dam important?
A. The classification's important because some of the design requirements and parameters change based on the classification of a dam, the design storm, spillway design and a few other design parameters in more extreme or high hazard dams than significant hazard dams.
For example, a dam designed for high hazard potential, the spillway must be designed with a capacity for the entire probable maximum flood resulting from a probable maximum precipitation without exceeding the dam's design freeboard, but for significant hazard dams, the spillway is only required to have a capacity of

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75 percent of this PMF.
Q. All right. Why don't you explain to us what a PMP and PMF are that you just referred to.
A. PMP stands for probable maximum precipitation. A PMP is the theoretical maximum depth of precipitation for a given duration and given geographic location.
The PMF, the probable maximum flood, is the flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in a particular drainage area.
Q. Now, back to my question that started all of this, do you agree with Mr. Kidd's assumption of the classification for this jurisdictional dam?
MR. BUTZIER: Madam Hearing Officer, I think Ms. Barncastle may have misinterpreted the nature of my objection to foundation.
The objection to foundation -- we haven't heard any kind of testimony to indicate that there has been -- that this witness has undertaken any kind of analysis or has familiarized himself with the particulars of the Copper Flat tailings facility in order to be able to offer an opinion as to Mr. Kidd's assumption about the classification that would be appropriate under the dam safety rules.

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MS. ORTH: All right. I --
MS. BARNCASTLE: Madam Hearing Officer.
MS. ORTH: Yes.
MS. BARNCASTLE: I respectfully disagree. My witness testified specifically that he did review the feasibility designed by Golder Associates and other documents in the record pertinent to the tailing storage facility design.
MS. ORTH: Right. I guess I thought I heard that, as well.
MR. BUTZIER: And that we would acknowledge, but I don't think just having reviewed some of somebody's feasibility study is sufficient foundation to say that he's willing to opine about it.
Now, if he testifies that he's familiar with the area, the floodplain beneath where the tailings dam is proposed and has done some sort of analysis, then maybe. But I still think I would have the same objection.
MS. ORTH: All right. So perhaps --
MS. BARNCASTLE: Let me ask a different way.
MS. ORTH: All right. Go ahead.
Q. (BY MS. BARNCASTLE) Mr. Libbin, do you have enough information based on what was provided in the NMED record to determine what the classification for

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this particular jurisdictional dam will be?
A. No, ma'am. There's not enough information available. No flood routing model or dam breach analysis has been done, as far as I can tell.
Q. And OSE could very likely come in and determine that the dam classification is something other than what has been assumed by New Mexico Copper Corporation; is that correct?
A. If that's what their modeling showed.
Q. Does the design of a dam affect what is discharged?
A. Certainly the -- the design of a dam could -- could impact the potential discharge to groundwater or otherwise. For example, the liner that's included within the dam is clearly included to -- to impact that -- to have an impact on that discharge, to reduce that discharge. So the design -- this dam constructed with the tailings could have different discharge based on how it was designed.
Q. And that, then -- would that be your understanding of why the NMED has now required the Dam Safety Bureau permit to be in place before any construction occurs at Copper Flats, because things could change and look substantially different?
A. I don't know if that's my understanding as to

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why they included that condition. Probably the risk to human health and making sure that was addressed is probably why that would be included.
My reasoning for arguing that that should be done in advance of the -- of the permit is for the reason that you -- that you mentioned, that following that review and design -- I won't say negotiations, but the comments by the Dam Safety Bureau, their requirements and their permit conditions, the dam could end up looking different than it does in the feasibility study.
Q. So the Elephant Butte Irrigation District is not just asking in this situation for a permit condition similar to what's been included, but that the Dam Safety Bureau permit be required prior to the issuance of the Discharge Permit; is that correct?
A. It would be my opinion that that would be prudent, to have that condition -- sorry -- to have the permit in place rather than the condition for later approval for that reason, so that the -- so that we can all see -- the Dam Safety Bureau, the NMED can all see what the dam will look like before the groundwater discharge is permitted.
Q. Let's talk about emergency response planning now.

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Why is the dam breach analysis important?
A. The dam breach analysis is important mostly to show what the consequences of a failure will be. Whether that's risk to life or risk to the environment, the dam breach analysis will show that.
The emergency action planning would be the next step of that. It would help prepare the community for -- and the Office of Emergency Management to be prepared for such a failure if it were to occur.
Q. And since that has not been performed, we don't know what a flood event from this -- a breach of this dam would look like, right?
A. That is correct.
Q. We don't know if it would reach five miles down the hill or 14 miles to Caballo Reservoir.
A. That is correct. I have not seen a flood routing study that would show that.
Q. Dr. King testified this morning that an Emergency Action Plan should also be in place in the event all -- all of the contamination reached Caballo.
Would you agree with that opinion?
A. I'm going to -- I'm going to say that that would be maybe an additional Emergency Action Plan. I think that the dam breach Emergency Action Plan is usually mostly specific to -- the concerns of the Office

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of Emergency Management, but I'll -- I'll add that certainly as part of that it would be a step in that process -- of that call-down process that the -- that the Rio Grande Project, the folks with Caballo Dam would need to be notified in the event of that.
So those -- those emergency -- I guess I'm trying to say that there are probably two different Emergency Action Plans, but they would be connected.
Q. Is it your opinion that the New Mexico Environment Department cannot adequately determine the hazard to public health downstream or the risk to property with just a feasibility-level design for this dam?
A. Yes, ma'am. I don't think that anyone, NMED or myself or anybody, can fully analyze the -- the hazard downstream to life or property without having a complete design with a dam breach analysis and flood routing model.
Q. Is that the basis for your opinion that the OSE Dam Safety Bureau permit should be acquired prior to issuance of the Discharge Permit?
A. Yes, ma'am.
MS. BARNCASTLE: I have nothing further for this witness.
MS. ORTH: Thank you, Ms. Barncastle.

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Mr. Butzier?
MR. BUTZIER: Thank you, Madam Hearing Officer.
CROSS EXAMINATION
BY MR. BUTZIER:
Q. I'm trying to make sure I get your name right.
Mr. Libbin?
A. Yes, sir.
Q. Yes. Thank you.
The hazard classification process under the dam safety rules that you've just outlined and that Mr. Kidd outlined, the highest classification is the hazard to human -- is it hazard to human health, or what's the name of the highest classification?
A. High hazard.
Q. High hazard.
That is a -- I apologize for getting, you know, very simplistic and fundamental on this, but just because a dam has been classified as a high hazard, that bears no relationship to whether -- whether a dam is going to have a greater or lesser likelihood of breaching once the design for the structure of that dam is designed in accordance with the classification requirements; is that correct?
A. No, sir. You are correct that the -- the

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hazard classification has no indication on whether it's more likely -- less likely to breach, only the impacts of the breach downstream.
Q. And isn't it the case that hypothetically if this dam -- if the tailings facility at the Copper Flat were to be deemed a high hazard dam, that there would be much more rigorous structural, civil engineering-related requirements that would apply to the design of that dam, specifically to avoid the risk of any kind of breach of that dam, correct?
A. Yes, sir. The analysis that I've seen so far is based on the assumption that it's significant hazard.
Q. Correct.
And the same would be true as if a dam is classified as a significant hazard, the civil engineering, structural design components required by this rule would all be designed to make sure that there's not going to be a breach of that dam, correct?
A. It would be required to follow the Dam Safety Bureau requirements and engineering practice.
Q. So in both of those examples, if a dam was deemed to be a high hazard dam or a significant hazard dam under the classification system of the Dam Safety Bureau of the Office of the State Engineer, we can expect as members of the public who are protected by

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these dam safety rules that it's not expected that there would be at the end of the day a breach of that dam; isn't that right?
A. That is true. It is noteworthy that a dam -- in any dam the reason that it's subject to these rigorous requirements is because it does increase risk.
Q. And that's a risk that's -- that assumes that there's a breach, right?
A. Yes. The risk that I'm mentioning is specifically the consequences of failure times the likelihood of failure. So the consequences of failure are increased by adding a dam to this location. Good engineering practice will reduce the chance that failure will happen.
Q. That's the case regardless of which classification the dam fits under, correct?
A. Yes, sir, or what type of dam.
Q. And when you as a civil engineer, district engineer for EBID design a dam for holding back water, you design it according to specification so that there won't be a breach of that dam, so that water won't go downstream and potentially cause damage to property or human health, correct?
A. Certainly we do our best, but that's -- there's always the potential for misoperation or other

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act of God.
Q. What is there about permitting by the New Mexico Environment Department that brings into the -- into play this issue of hazard to public health or undue risk to property if in both instances, whether it's a significant hazard dam or a high hazard dam, the goal and expectation is that the dam will be constructed sufficiently so that it will not breach?
A. I think that potential -- the potential that I just mentioned is the concern. There's always a potential for mismanagement or misoperation or act of God, a failure. There's always that potential.
MR. BUTZIER: I don't have any other questions.
MS. ORTH: All right. Thank you.
Mr. Knight, do you have questions?
MR. BUTZIER: Madam Hearing Officer -- I'm sorry.
For the record, the exhibit number of NMED -- or NMCC's exhibit is 89 that is the same as EBID 11.
MS. ORTH: Thank you for that.
Mr. Knight's going to borrow your microphone.

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CROSS EXAMINATION
BY MR. KNIGHT:
Q. Good afternoon, Mr. Libbin.
A. Good afternoon.
Q. You don't have any specific expertise with regard to the design of tailing storage facilities; is that correct?
A. I do not.
MR. KNIGHT: Okay. That's my only question. Thank you.
MS. ORTH: All right.
Mr. de Saillan, do you have questions of Mr. Libbin?
MR. DE SAILLAN: No questions, Madam Hearing Officer.
MS. ORTH: All right.
Is there anyone else present who has a question of Mr. Libbin based on his testimony?
Ms. Barncastle, do you have any follow-up?
MS. BARNCASTLE: No redirect.
MS. ORTH: All right.
Thank you very much, Mr. Libbin.
You're excused.
And shall we take lunch now?
MS. BARNCASTLE: Yes.

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And I will have my final witness who will go on quite a bit longer than my three previous witnesses, but he will be directly relevant, Mr. Butzier. So he -- we will start with him immediately after lunch.
MS. ORTH: All right. Thanks.
Let's break until 1:05, 1:10, somewhere in there. No. Sorry. What did I just say?
MR. BUTZIER: 1:45?
MS. ORTH: 1:45. Thank you.
MS. BARNCASTLE: That would be much better. Thank you.
(Proceedings in recess from 12:25 p.m. to 1:47 p.m.)
MS. ORTH: We did have one request for an opportunity to make public comment. So we'll take Mr. Bokich.
Is there anyone else who would like to offer public comment?
This would be close to your last opportunity. I'll ask again at the end of the day, but this is close to your last opportunity.
All right. Let's take Mr. Bokich, and then we'll return to the technical case.

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JOHN BOKICH
having been first duly sworn or affirmed, gave public comment as follows:
PUBLIC COMMENT

MR. BOKICH: Good afternoon.

My name is John Bokich. I'm president of the Board of Trustees for Sierra Electric Cooperative, based in Elephant Butte.

As background information, even though I'm not a technical witness, I do have a bachelor and a master of science degrees in biological and ecological sciences from the University of Texas at El Paso. I'm a certified wildlife biologist. I'm a licensed contractor in New Mexico. I'm certified a MSHA safety instructor. That's Mine Safety and Health Administration. I'm a certified auditor with the International Cyanide Management Institute.

I have 36 years of experience as an environmental professional in the mining industry. During my 36 years, I focused on environment and reclamation, and projects under my management received eight awards for excellence in reclamation, including one in the Province of British Columbia, one in New Zealand and six in New Mexico.

Sierra Electric Co-op was established in 1941.

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We're now in our 77th year of serving Sierra County. We serve all of Sierra County and some slivers of some other surrounding counties.

We've got about 3,000 to 4,000 members, but we've had the challenges of a lot of rural electric co-ops in that our membership is declining. As Mr. Swingle stated in his presentation early in the -- in the meeting, we've declined about 19 percent since 2000.

Why is that? A lot of it's because we don't have jobs. We're one of the poorest counties in New Mexico with a stagnant and declining economy and little industrial load for our co-op.

Our aging infrastructure with constant need to replace and upgrade is a significant financial drain on the co-op. We have nearly 900 miles of power lines with three lines per pole -- or per mile on average. We've got about 3,000 miles of wire in the air. We have 14,000 wooden power poles with the -- we have approximately 3,300 transformers, 600 regulators, capacitors and sectionalizing devices. We have two substations in Cuchillo and Caballo and a fleet of specialized vehicles for maintaining and repairing our -- our infrastructure.

Sierra Electric Co-op is primarily a residential base customer service co-op, and that's the

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toughest kind to make headway with, or keep your head above water. There's just not enough load, too much of the load comes during peak hours. What we're lacking in Sierra County is some industry.

If we were to be able to get the Copper Flat Mine online -- we went back and looked at when it was operating in the early 1980s -- it would almost double our load from today, significantly increase our revenues and allow us to reduce our rates to the rest of our membership.

In addition to that, the capital that would be generated during the operation at Copper Flat would give us some financial resources to upgrade our infrastructure without having to borrow the money, which is currently what we have to do.

When you got a declining population base and your infrastructure costs are constant or going up, because, like I said, we're in our 77th year, our only solution is to raise rates. And people already gripe about how -- how high their electric bills are in this county. But there is nothing we can do about it unless we get some economic stimulus like Copper Flat.

Copper Flat will run 24/7. You have to -- when you get those big machines going, they got to keep going. And that's a fantastic load for an electric

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co-op. And it will generate what we need to help our membership.

Sierra County Electric has ongoing requirements, as I stated, to upgrade or replace our aging infrastructure, and for large capital projects, after they are professionally designed, they go to bid, and they're constructed by licensed professionals specializing in electrical construction.

Once construction is complete, our own highly trained and specialized linemen support crews -- and support crews monitor and maintain the system, conduct maintenance and new small-scale construction projects.

New Mexico Copper has done the same thing with the design of this mine facility, including the tailing storage facility. It's been designed by professionals that have extensive experience designing tailings storage facilities. These professionals rely on their designs and construct their facilities to operate and work as designed in order to stay in business. And so will New Mexico Copper.

Sierra Electric Co-op is a working example of how when opportunity for good employment is available in Sierra County that our local youth and talented individuals who may leave from other areas but like living in a small town in New Mexico seek out these

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jobs.
They're then offered intensive and professional training programs to improve themselves and to build careers in Sierra County. This results in growth in the county, which is what Sierra County -- Sierra Electric needs to sustain and improve our service to our members.
New Mexico Copper is going to do the same thing. They're going to offer jobs for our youth, they're going to train them, they're going to give them opportunity for advancement and opportunity -- opportunity to stay close to their families, if that is what they choose to do.
I've been here all week. We've heard a lot of talk and opinion, but not fact, about the effects of mining on a community.
It's too bad that mining is so rare of an industry in New Mexico. Mining is a wonderful -- mining has a wonderful and unique history. It's much like a family. And employees of families feel like members of a team. It's not like a normal job. And for us that have been lucky enough to work in the mining industry as I was for 36 years, we make friendships that last a lifetime.
I'm sure that Mr. Kuipers can relate to this.

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Mining is an incredibly complex, technical and potentially dangerous industry. Mining has and continually upgrades a culture of safety. Like an electric cooperative, safety is number one.
Before you're hired, you will be required to take and pass a drug and alcohol test, and drug tests will likely be given randomly throughout the year or to any individual that has an accident on the mine that could have or does result in injury to an employee or to equipment.
This is to protect our workforce from someone who might come to work in an impaired state. We believe it's very important, and I think virtually every mining company does this.
A new employee will go through 24 hours, three full workdays, of specific training by an MSHA-certified instructor. All employees work together in these training classes. Administration, receptionists, accountants, human resources, are in the same safety class as the haul truck drivers, bulldozer operators, mechanics and mill workers. They're all part of the same team.
You will receive full pay for the training that you take for safety or that is required by your job. Every 12 months an employee must have an

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eight-hour refresher class to be recertified to work at the mine. Again this is paid for by the company.
Safety training is not the end of your exposure to safety at a mine. Every day before you start work you will meet with your -- your crew and your supervisor and have a safety tailgate meeting to discuss the day's work plan, any special hazards or conditions that should be avoided or repaired and more time and site-specific information to ensure that all employees are on the same page.
In addition, task training takes place and is required for anyone in order to operate a piece of equipment. You can't just dump on a dozer and say, oh, I've been running these for 15 years. You have to prove it. You have to operate it in front of a supervisor and demonstrate.
In addition, task training is given to those young people or not so young people that want to run a different piece of equipment. Maybe he's been driving a haul truck, but he wants to run a dozer. So he'll be trained how to safely operate that dozer so that he keeps it operating in a safe and efficient way.
In addition, they'll develop checklists to inspect the equipment before they use it at the start of the shift, and they'll do a checklist at the end of the

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shift before it goes to the next operator.
MSHA safety training and the safe culture will be practiced and required at the Copper Flat Mine and will make you a safer person in all aspects of your life. You could take home your safety knowledge and culture and integrate it into your family. We all do that. We love our wives and our kids, and we want to see them be safe.
And we learn things in the mining industry about safety that you won't learn anyplace else. No one in your family will ride in a moving vehicle, not even 50 feet, without attaching their seat belt. You'll be provided PPE, personal protective equipment, such as hardhat, reflective vests, hearing protection, eye protection, et cetera, by the company. You'll probably buy your own steel-toed footwear.
You'll teach your family the importance of using PPE around the home, for chores, and you'll likely prepare and keep a kit in your vehicle for emergencies. You and your family will be prepared.
If you're hired to work at Copper Flat, you will work hard and be compensated well. You'll go to work early, and you'll often stay late. It's a team, and you all function together and make sure you operate the mine in a safe and planned way.

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A mine team, because mining is a diverse industry and has lots of requirements for specialized people as well as equipment, will include things like the administrative staff, receptionists, accountants, human resources, et cetera.

Operations will require equipment operators, mill workers, road and infrastructure maintenance, blast hole drillers, blasters, operations support, environmental reclamation, drainage control, mine geology, surveying, grade control, warehouse, equipment maintenance, heavy equipment and mill maintenance.

And then you have your management, which is general manager, department heads, et cetera.

The mine team is made up of women, men, Hispanics, blacks, Native Americans, Asians and any other person legally able to work and live in Sierra County. Like all other mining companies, New Mexico Copper will not discriminate.

It's interesting to note that as the mining industry has developed and we're using bigger and more modern equipment all the time, that it's been identified that women make the best drivers of haul trucks, better than men. Why? Because they take care of the equipment better than men. They make it last.

If you ever go to a large open pit mine or

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even a small open pit mine, you mostly notice trucks drive on the left-hand side. That's because they want to be able to see the berm and where the wheels are in relation to the berm. Every tire costs 20,000 to 25,000 bucks so you want to make sure you take care of your tires. Women do a good job of that.

I've been a landowner in Sierra County through my parents since 1961, when they acquired a lot at Hot Springs Landing in Elephant Butte. I was 10 years old when we got that lot, spent a lot of family time there, have a lot of great memories.

But my wife and I got married in '73, and we've been here as much as we can be on a vacation basis, as we lived out of state most of that time because I couldn't find a job in Sierra County. And we visited when we could. We came back in '05 full-time and retired in 2016.

I've seen a lot of changes in Sierra County since 1961, and most of them are not very good. When I was here as a kid, T or C was a thriving place. People were working, stores were open and diverse. Things were happening, good things. And our newspapers weren't full of photos of people who had been arrested for drugs, murder, robbery and every other kind of vile act.

While tourism is important, a component of the

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future economy of Sierra County, it can't carry the county on its own, and this county's conditions today prove that. Tourism jobs tend to be seasonal, temporary, have little to no benefits, while the Copper Flat Mine will have full-time jobs with benefits, training and a future.

Tourism in Sierra County centers primarily around Elephant Butte Reservoir. Our lake level is currently at about 3 percent. That's as low as I've seen it since we first moved here in '61. A year ago the lake level was 12 percent. So that means we drew it down 9 percent from spring until now.

With the inflow and -- if we don't get a water snowpack in 2018, 2019, what's going to happen? Are we going to start out with the lake at 1 percent next spring? Or 0 percent? That's going to shoot what little bit of tourist economy this county has right in the head.

With the ever increasing acreage of pecan trees being planted in the Mesilla Valley, which is a high water use crop, and desert, riparian lands being converted to cropland, the issue of water for Texas and Mexico, will Elephant Butte ever again be a lake that is an engine for tourism in Sierra County?

I spent 36 years working in the mining

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industry, as I said, in New Mexico, Nevada and overseas. One notable observation I had in working at mine sites in different parts of the world is that wildlife species are not driven away from an area because of a mine.

In fact, in Nevada, in Northern Nevada, in the Independence Mountain range, first rifle shot of deer season, the deer, particularly the big bucks, came to the mine, because they figured out pretty quick the mine had MSHA protecting them. You can't hunt on a mine site.

So we had an area right in the middle of several pits that up high we called it the refuge, and that's where the big bucks went every year for deer season. So we protected the gene pool for the big bucks in that area.

As an environmental professional in mining, I've seen and been an active member of mine teams to plan and manage the construction, operation, environmental management, closure and reclamation of several large tailing storage facilities around the world, as well as heap leach pads and other mine facilities, using the same kinds of techniques and materials that are proposed for Copper Flat Mine.

I also managed an environmental auditing program for a gold company and conducted environmental

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audits and gold mines in the US, many in Canada, Chile, Brazil, Zimbabwe and Russia. Many of these mines were aged, and yet the tailings facilities and systems were -- were designed, built and operated to rigorous standards and were protective of the environment. I don't think a single one of them had a liner.

I've never known a project that I was involved with that was designed, constructed and operated as the Copper Flat Mine is proposed to be that has failed.

Copper Flat Mine project has been designed by the most advanced and proven technologies that we have today, will use the most advanced and proven materials to protect the environment while providing jobs, training and opportunity to local youth and working people and an economic engine for Sierra County.

The design, construction and operation of the Quintana mine in the late '70s and early '80s was a totally different area of mining and facility design. Consideration for the environment and our science has advanced significantly since that time.

When Quintana constructed the tailing storage facility, it had only a clay liner, as you know, and little else to prevent migration of fluids from the tailings constituents into groundwater. When they left the mine, they left the tailings in the tailings

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facility. As the liner dried up, avenues for the contamination from those remaining tailings was created to get into the -- the groundwater.

The result was a relatively small plume of water that did percolate from the TSF into the groundwater below and downgradient of the TSF.

I have reviewed data from the monitoring wells that intersect this plume. While the groundwater samples from the monitoring wells does have some elevated values for constituents, primarily TDS and sulfate, the values are really not very high, as Dr. Myers pointed out in his presentation yesterday.

And there's no samples that show copper as being above standards.

In the flotation process of copper milling, the metals are insoluble, or sulfides, and so they don't move in water like they would if they were oxidized. So they stayed in the tailings pond, the metals did, for the most part. At least I couldn't see any that were exceeding standards.

In contrast, in a report published by New Mexico Tech in 2013, samples taken from water discharge from the T or C Hot Springs District directly into the Rio Grande River at a rate of about 1 million gallons per day show some sulfate and TDS concentrations well

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above human health standards.

In addition, thousands of tons of ammonium sulfate fertilizer is applied to crops in the Mesilla Valley every year, which borders the Rio Grande south of the Copper Flat project.

A paper in the publication Chemical Geology in 2011, which studied sulfate levels in the Mesilla Valley, concludes that fertilizers containing sulfate were major contributors to elevate sulfur in groundwater -- or sulfate in groundwater, down to the depth of as much as 600 feet.

Also water samples reports -- reported by the USGS in 1998 for the years '92 to '95 showed elevated levels of many pesticides and volatile organic compounds and nutrients which were detected in surface and groundwaters in the Rio Grande Valley, with a significant increase of croplands that we've seen since '95. What are those values today?

I find it hypocritical. There's criticism of Copper Flat for potentially affecting groundwater with sulfate and TDS while the -- there's residue of nitrates, sulfate and other leachates in the groundwater in Mesilla Valley in much greater quantities.

In addition, there's been criticism of the design of the TSF and the material to be used, HDPE in

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particular. HDPE is used exclusively to protect groundwater in the environment -- or extensively. I'm sorry. Hazardous waste landfills, gold mines containing solutions with cyanide and many others utilize this material. There is no other known to man right now.

HDPE is estimated to last 500-plus years, and, of course, the numbers vary depending on who's doing the analysis. In its application, where there's a compacted subbase, an HDPE liner is protected from excess pressures by the solution drainage system and from UV light by the tailings itself, it could well last in perpetuity. We won't know.

Who's to say that the Elephant Butte Dam is going to last 500 more years? It's 100 years old right now. And if it is, if it does last 500 years, it's -- is it going to be a lake, or is it going to be a big mud hole? We know that it's silting in now. What's it going to be like in 500 years? Nobody knows.

Without the Elephant Butte Dam, from what I read and historically, agriculture in the Mesilla Valley will be a remnant of the past.

New Mexico Copper has followed the path of federal and state regulations required. They have engaged highly trained, experienced and professional teams to design a comprehensive project that will

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protect the environment, generate much needed opportunity and economic benefits to Sierra County and reclaim the land to a condition better than what it is today.

It's time to approve this project and let those in Sierra County that want to work to work, that want to see their children stay in Sierra County and work, let them stay, and want a county to be economically sustainable and receive what this project has to offer.

Thank you very much.

MS. ORTH: Thank you, Mr. Bokich.

We'll return to the technical case.

Ms. Barncastle.

MS. BARNCASTLE: Thank you.

Before we move on, I'd like to note for the record EBID's objections to the foregoing testimony -- public comment, rather. To the extent that that public comment was lacking in foundation related to claims made about farming in the Elephant Butte Irrigation District, we object. And further we object to the extent that that was offered as technical testimony that was not disclosed prior to today in compliance with the rules.

MS. ORTH: All right. Thank you.

MS. BARNCASTLE: I need to approach my witness

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briefly.

MS. ORTH: Okay.

MS. BARNCASTLE: All right. It's a race to the end.

THE REPORTER: That doesn't mean talk fast.

MS. BARNCASTLE: Dr. Carroll, would you please state your full name for the record.

THE REPORTER: Hold on.

MS. BARNCASTLE: Has he been sworn in, by the way?

THE REPORTER: No, not yet.

MS. BARNCASTLE: Okay.

KENNETH C. CARROLL

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MS. BARNCASTLE:

Q. Dr. Carroll, would you please state your full name for the record.

A. Yes. My name is Kenneth Cooper Carroll.

Q. All right, Dr. Carroll.

I believe you have prepared a presentation for today; is that correct?

A. Yes, that's correct.

Q. Is this presentation considered to be both

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your direct and rebuttal?

A. Yes.

Q. Why don't you go ahead and start out with your background and experience, please.

A. Okay.

My experience -- or my background in terms of training includes an undergraduate degree in geological sciences from Ohio University. I have a master's degree from Ohio University, as well, in aqueous and environmental geochemistry. I have a PhD from the University of Arizona in hydrology and water resources.

I have had experience over the years since that time. I -- well, most recently, I've been an assistant and associate professor at New Mexico State University in the plant and environmental sciences department. Before that, I was a research scientist at the Pacific Northwest National Laboratory. Before that, I was a postdoctoral researcher in the University of Arizona soil and water environmental sciences department.

Before that, I spent four years as a hydrogeologist and geochemist at two firms, Water Management Consultants and Hydro Geo Chem. And before that, I was a research assistant and teaching assistant in grad school.

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Q. I'd like you to look at what's been marked as EBID Exhibit 4.

Do you recognize that document?

A. Yes, I do.

Q. What is that document?

A. It's my curriculum vitae.

Q. Did you create that document?

A. Yes, I did.

Q. Is it current?

A. Yes.

Q. Does it contain all of what you just said and then some?

A. It contains more.

Q. All right.

I'd like to tender Dr. Carroll as an expert in environmental geochemistry, hydrogeology, mine closure and environmental impacts of mining related to groundwater.

MR. BUTZIER: No objection.

MR. DE SAILLAN: No objection.

MR. KNIGHT: No objection.

MS. ORTH: He's so recognized.

MS. BARNCASTLE: I would also like to offer into evidence EBID Exhibit Number 4 at this time.

MR. BUTZIER: No objection.

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MR. DE SAILLAN: No objection.
MR. KNIGHT: No objection.
MS. ORTH: It's admitted.
(Exhibit EBID 4 admitted into evidence.)
Q. (BY MS. BARNCASTLE) Dr. Carroll, did you review any documents in preparation for today?
A. I did. I wasn't able to get through all of the documents that are in the court record, but I spent a little bit of time.
I did find a document that I believe is relevant to this on -- from the United States Environmental Protection Agency on the Gold King Mine.
And then there was another document related to some of the copper mines that have been discussed in the testimony this week. It's from the New Mexico Office of Natural Resource Trustees from 2012 on Final Groundwater Restoration Plan for Chino, Cobre and Tyrone Mines.
I also reviewed the JSAI, 2013, Status Report for Stage 1 Abatement. We've been hearing about that report during this week.
I also reviewed the SRK, 2013, Geochemical Characterization Report for the Copper Flat Project, Volume 1.
I reviewed the SRK, 2018, Predictive Geochemical Modeling of Pit Lake Water Quality at the

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Copper Flat Project.
And I reviewed the JSAI, 2018, Revision 1, Probable Hydrologic Consequences of the Copper Flat Project.
I think that's all.
Q. Dr. Carroll -- hello.
Dr. Carroll, shown up here on slide 3 is something I believe different than what we're talking about now.
Do you want to explain what this slide is?
A. Yes. This is just kind of a follow-up, an inclusion of the CV, and I think since we've already admitted that, it's in the record, but it's just a brief background of some of the publications that I completed that are relevant, I believe, to this case, including sulfate plumes in groundwater.
MS. BARNCASTLE: And for the record, Madam Hearing Officer, I will provide copies of this presentation to all of the other attorneys and to the record, if necessary, if I go ahead and admit it. I don't have that ability today because my cell phone hot spot was not fast enough to be able to send this document via E-mail. So I apologize.
MS. ORTH: All right.
And if you would mark it so that it's easy to

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refer to, and if I could just offer a suggestion.
Did you remember what Mr. Knight did with the bureau witnesses where he had them adopt what they had submitted in the NOI under oath before they spoke?
That's often -- it's a good idea. It's a belt and suspenders kind of thing. It doesn't stop Dr. Carroll from whatever he'd like to say.
MS. BARNCASTLE: Okay.
Q. Dr. Carroll, are you familiar with the notice of intent to present technical testimony that EBID prepared and filed in this proceeding?
A. Yes, I am.
Q. Did you assist with preparation of your section?
A. Yes, I did.
Q. Do you adopt that testimony here today?
A. Yes, I do.
Q. Dr. Carroll, did you rely on what's been marked as EBID Exhibits 16 and 17 to form portions of your opinions for today?
A. Yes, I did.
Q. Are you sufficiently familiar with the information contained in those reports to be able to rely on that information?
A. Yes.

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MS. BARNCASTLE: I'd like to offer into evidence Exhibits 16 and 17 at this time, as well.
MS. ORTH: Okay.
The first was the Gold Mine -- sorry -- Gold King --
MR. CARROLL: Gold King, yes.
MS. ORTH: -- mine report.
And was the other from the ONRT?
MR. CARROLL: Yes.
MS. ORTH: Okay. For some reason, that's not in my packet.
But are there objections?
MR. BUTZIER: Madam Hearing Officer, Exhibit 17 is not in what I received either, but I have no objection to either document.
MS. ORTH: Would you provide that to me and Mr. Butzier and perhaps the other counsel, as well?
I didn't get it.
MS. BARNCASTLE: Did other counsel not get that?
MR. KNIGHT: I have it. Yeah. Exhibit 17 is -- was included with the materials I received.
MR. DE SAILLAN: I did not receive it.
MS. ORTH: Okay. So just to me, to Mr. de Saillan and Mr. Butzier, but it doesn't sound as

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though there are objections.
MR. KNIGHT: No objections.
MS. ORTH: All right.
So Exhibits 16 and 17 are admitted.
(Exhibits EBID 16 and 17 admitted into evidence.)
MS. BARNCASTLE: Thank you.
And at this point, I think it's safe to note that I am going to withdraw a few exhibits that I will not be seeking to admit.
EBID Exhibit 5 is the draft permit that was released by NMED on August 10th. That was admitted through Mr. de Saillan's case in chief. I won't duplicate that.
And then my mistake in including Exhibits 12, 13, 14, 15, and then 18, 19, 20 and 21, those are already part of the record. I listed them as exhibits because my experts relied upon them, but we will not be seeking to admit them separately.
MS. ORTH: Thank you for that clarification.
Q. (BY MS. BARNCASTLE) All right, Dr. Carroll. At this point in time, I think rather than a question and answer, I'm going to just let you take it away and proceed with the format that we saw of several of the other witnesses in proceeding with your PowerPoint, and

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I will interrupt you only as necessary.
A. Okay. Thank you.
So in preparation for this trial -- in preparation for the statement of intent, we had to develop some opinions. And so what I've tried to do here is summarize some of those opinions.
Also, I think I would try to mirror some of the comments that were specified earlier this week, that a lot of the intent of this trial is to support the -- the successful operation of this mine and the successful adoption of this permit through permit condition additions that will support the Copper Rule and protect the environment.
So what I've tried to do here is apply some of these observations and then apply some potential proposed permit conditions that might be able to alleviate those.
So the first bullet suggests that the current pit lake has proven to be contaminated by acid rock drainage and/or mine-impacted water. And this is from the pit walls, and it's also in the groundwater, and that was from a small time period of mining, three months.
And I think it's safe to say that the additional operation of this mine may have a likelihood

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of increasing contamination discharged to groundwater, inward migration of contaminants that are already in groundwater.
So the proposed condition would be to provide underlying liners and also overlying covers, and I would -- I would ask that they both be considered low-permeability materials, because that's not really been discussed for the covers this week in detail. And that would be for any of the mine waste materials or facilities that are outside of the open pit hydraulic sink.
The second observation is groundwater has been proven to be impacted by ARD and mine impacted.
So that's similar to the other one, and so the proposed permit condition would be underlining liners, which is proposed, and they talked about that as part of the plan, but also to have an overlying cover that has a low-permeability material in order to limit impact of clean water and conversion of clean water into mine-impacted water.
The next observation is that the current Reclamation Plan suggests to remove all of the mine-impacted water impoundments, and so -- and also to not include a groundwater interceptor system which is allowed under the Copper Rule. And I think NMED

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suggested they may require that as needed.
And so seeing as that the groundwater has been contaminated, that might be something to consider to avoid any future groundwater impacts and mobility of contaminants.
The next proposed permit condition is to include groundwater interceptor system to abate the contamination and also avoid mobilization of contaminants that are already in the system.
And I'd also like to recommend, as we've heard, I believe, yesterday, that additional monitoring wells might help not only detect future contaminants, but also assess the nature and extent of the current groundwater contamination.
The aquifer assessment also, in my opinion, did not really consider a lot of the uncertainty that was available at this site. In fact, the -- there was some nonconsideration of some of the available data that could be used to evaluate the impact to groundwater, and that's a -- that's a part of this -- that's a critical part of this permit, and the Copper Rule is assessing the impact to groundwater.
So I would suggest that the aquifer assessment include all of the available geochemical and hydrologic data.

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And also, I think I'd reiterate what some of the other experts have suggested, that appropriate financial considerations are required for this site.

In order to give a little bit of background, we did hear from Dr. Griffiths earlier, but I'd like to reiterate some of that in order to support some of the proposed permit conditions that I've just mentioned. So I'd like to talk a little bit about the potential environmental impacts, including those impacts to groundwater, that may potentially occur, assuming that this permit is approved and the mine operates.

So the main environmental contamination that we've been talking about so far is this acid rock drainage. So I wanted to go into that in a little bit of detail.

Mainly the sulfide minerals that are at the site include pyrite and chalcopyrite. And so we see here pyrite disseminated on a rock here. And what happens is when the pyrite is formed, it's formed in the deep subsurface of the earth, and it's not exposed to the atmosphere.

Through mining, this pyrite becomes basically in contact with both oxygen and water. When that occurs, the reaction that you see -- once the reactants on the left side are mixed together, it proceeds to the

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right, and you can see the product of the iron oxide solid material, this orange material, and then there's a sulfuric acid water, as well.

So there's both iron and sulfur which -- and acidity that's generated. So that's one of the environmental impacts that's been discussed.

And I would argue that this is an equilibrium equation, and we'll go into, you know, how kinetics can impact this type of equation, as well.

Just a little bit more detail on this. In reality, we're talking about iron and sulfide, and so you can consider this reaction at the bottom here, where your pyrite is interacting with oxygen and water, and you get your iron(II), you -- your sulfate, and then you're producing acidity, as well.

But this is not the only reaction that occurs. This is one chemical reaction.

There's actually several chemical reactions that occur, and this is only a few reactions that occur specifically with pyrite. So -- and these are all equilibrium equations.

So on the left side of the reactants when you bring them together, independent of time, these will thermodynamically proceed to the right, produce these products, given enough time to react. And so you can

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see that iron not only cycles through iron(II) to (III), but you get a significant amount of acidity that's generated. And that's shown here at this bottom equation with the 16 hydrogen.

Q. And, Dr. Carroll, we're on slide 7 now --

A. Slide 7.

Q. -- but please try to refer to the slide as you go for the record.

A. Okay.

Q. I know that that's difficult when you get to going, but --

A. Okay.

Q. -- try to make sure that you throw in the slide number every now and then.

Thank you.

A. Okay. Thank you.

I do note here that some of these reactions may be controlled by other ones, and that's in terms of the reaction rates. So let's go to that just in a little bit of detail.

I talked about the chemical reactions being equilibrium reactions. So -- and that being said, they're kind of independent of time, and so we don't really consider how long it might take for those to occur. But we do consider that with chemical kinetics.

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So that describes how long it will take for these reactions to proceed.

So this is an example where you can see concentrations changing on the Y axis versus time, and you can see it takes some time before the concentrations become stable, but at some point, they become stable until you've reached equilibrium. So kinetics really describes the time it will take to proceed to equilibrium, but equilibrium is the final state.

So for this acid rock drainage, these are some of the chemical constraints. This -- these are the rate coefficients on the right. You can see the chemical reactions on the left. And I would note that some of these reactions are actually sped up by nonchemical or actually biological processes so the microbes can actually speed up some of these reactions and facilitate them occurring.

Q. And that was slide 9?

A. Slide 9. I'm sorry.

Q. We're now on 10?

A. 10, yeah.

So this is an additional reaction. I'm not going to go through all of the potential reactions, but I wanted to illustrate some of the sources of acidity and some of the environmental impacts.

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So beyond the pyrite, there's -- there's also actually some minerals that will collect some of the acidity, and then it may be released later. And so this is an example where jarosite is a mineral shown down here at the bottom reaction, and that actually produces acidity, as well.

So there may be other reactions that would occur that may be generating acidity. So this process might take some time.

Slide number 11. So I think Dr. Griffiths mentioned that there is another set of reactions that actually helps mitigate the acid rock drainage, and so this would be acid neutralization and for -- I guess just as an example, we'll look here at the carbonate. So we have a calcite dissolution, and so the carbonates will actually consume the acidity. As you can see, we're consuming hydrogen on the top reaction. Then it's consuming sulfuric acid in the -- in the bottom reaction.

And so this is a full reaction at the bottom with the iron and the pyrite reacting.

So some of these reactions, both the generation of acidity and also the consumption of the acidity, may occur at the same time or -- or they may be in parallel or in series. But this is relevant for this

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site, as we have seen earlier this week, that there is both generation of acidity and also neutralization of acidity.

And so this is just another slide similar to Ms. Griffiths. It kind of summarizes that you have to consider at equilibrium both the acid generation and also the acid consumption or acid neutralization. And that's going to help you with your final water chemistry.

And so I think that has been shown, that that is kind of the approach that's been taken for the prediction of the geochemistry for this site for the aquifer assessment.

I'm sorry. That was slide 12.

For slide 13, the other potential -- one of the other potential environmental impacts that's been discussed, but probably not as much, is the impact of acid generation on metals mobility. So when you do decrease the pH upon the acid generation, you do increase the solubility of many metals, and they may be leached out of other minerals that are in -- in the rock.

And these metals -- some of them may be toxic, and so they are concerns for water quality.

Now, as the acidity tends to neutralize, you

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can precipitate and immobilize some of these metals. However, as Mr. Kuipers noted, we are seeing at a lot of mine sites or an awful lot of mine sites the impacted water being neutral and also having some metals. And so there is a potential for some metals to stay sable -- stable, in fact, some contaminants to stay sable -- stable after neutralization.

So one example would be sulfate.

Slide 14.

So this has been observed before, and I think Mr. Kuipers showed that there have been some potential environmental impacts at other sites, and so this is a slide showing more of a catastrophic event.

This was a -- back in 2015. A mine in Colorado, it was sealed -- the mine opening was sealed, and water had built up behind the seal, and it had contained mine waste. When monitoring was ongoing for this abandoned mine, the seal was released, and 3 million gallons of mine-influenced water was discharged into a river, the Animas River, that then discharged down from Colorado into New Mexico, across the state boundary, and so these mine wastes were dispersed across a large, large area.

And you can see this is the Animas River, there are kayakers there, and then on the right side is

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after the spill. I think this is very soon after the spill. The orange color in the water is that iron oxide that I showed in the slide previously.

And then we have talked -- this is slide 15.

We have talked earlier this week about some of the other copper mines that are in New Mexico, the Chino, Cobre and Tyrone, and so this report that I'm citing down here, the NMRT, 2012, does suggest that there is groundwater contamination associated with these sites, just as an example of impact to groundwater from some copper mines that are in New Mexico. And so these are plume sizes that are -- that this report is quoting for these mines.

And there is a note in this report that some of the concentrations in some locations in groundwater have not changed for 20 years, and specifically I think they're talking about sulfate. And it does note that there is a potential that they will not change for at least 100 years.

I'd like to note that one of the major reasons for that is that sulfate in groundwater as long as the groundwater is oxidizing is quite stable, and so we wouldn't expect the concentrations to decline due to, for example, chemical reactions.

So how does this relate to the Copper Flat

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site? Well, we can look at some of the data that was reported in the SRK, 2018, report. That's -- the Bates number is stated at the top.

This is Table 1-2. And this is the history of the existing pit lake. And what I've tried to highlight here -- and I've got on the right the water quality standards for selected constituents. And we can see what I've selected here on the table that is circled are the water concentrations that are elevated above these water quality standards.

And so you can see it's not just sulfate that the pit lake has been contaminated with. It has a pH at times been down to 3.6, and that is an acidic condition.

Additionally, the sulfate has been on average about 5,000 milligrams per liter and then a maximum above 8,000 milligrams per liter. So that's above the standard.

And then several of these metals here both on average and then the maximum have been above the standards.

And so, you know, obviously, this is on the private property, and we're considering this a hydrologic sink. So this water might potentially not be mobilized. But I would say, you know, there is a potential risk, because they're not likely to mine

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this -- this open pit with the water in the pit. They're likely to pump the water out.

When that occurs, that water will be outside of the hydrologic sink, and there is always a potential for release and discharge outside of that hydrologic sink since groundwater is flowing away from the pit outside of the hydrologic sink.

The other thing I'd like to note here is that we've focused a lot this week on modeling, both the hydrology and the geochemistry.

This site actually has an interesting component, because a lot of my experience has been in permitting mines before they are started, and it's difficult because you use these models, and there are not a lot of confidence in the models, but this is a site that actually has a pilot test.

This mine actually was operated for three months, and we have proof that the pit lake is contaminated and associated groundwater wells that are nearby are contaminated. We have proof that it's generating acid rock drainage from the pit walls.

So there is not really for this site any, you know, potential. I mean, there's a high potential that this mine will generate acid and generate contaminants in water. So I think that would be an issue.

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The other thing is that the pit wall that's generating these contaminants and this acidity, a lot of those materials will be mined, but a lot of the materials will be low enough ore grade that they will be placed in waste rock piles.

So this is another example of what might be in a waste rock pile for the proposed mine.

So what do we do and how do we protect the environment with this type of a contamination issue? I would treat -- I would suggest treating these mine waste materials as they are potentially generating contaminants for water as if they might be potentially hazardous waste materials, and if you have a landfill for hazardous waste materials, you would have a more impermeable cover.

The cover that's stated in the Copper Rule is a store-and-release cover, and as interpreted in this mine permit, it's a soil. And so I don't believe in my opinion it will really do the job of acting as a cover, which in some ways is described very similarly as an underlining liner which would reduce the flow of water through the waste materials.

This is an example of a cover system that's very similar -- I would say, in fact, that it has the geotechnical liner, it would be very similar to your

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liner system that's proposed for the tailing storage facility.

The tailing storage facility has been designed to have an underlining liner because there's a concern that contaminants might migrate below the tailings facility and go into the groundwater.

I would say that if we want to minimize the generation of acid and the migration of contaminants, we also might want to minimize water becoming contaminated. So minimize the amount of water going into the waste rock facilities and going into the tailings facility.

So this is, I guess, my attempt at trying to justify the need for overlying covers with low-permeability materials to decrease infiltration of water into these hazardous materials.

And I would also suggest that we may also need underlining liners to prevent contaminated water from discharging below these facilities, which is already considered for the tailings storage facility, but it's not really considered for the waste rock, because of the andesite that's been discussed earlier this week.

I'm on slide 17, by the way.

Okay. The next slide, I'm just trying to show here a little bit more information about the store-and-release cover system. It's been discussed,

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but I think we need a little bit more detail on that.
This is a schematic of -- the curve here shows just generally water content on the X axis and an elevation on the Y axis. And this is a type of schematic where you would have a water table or, you know, you would go to really high saturation at the -- at the base of this elevation. And then as you go increasing in elevation, you see fairly constant water content.
At the land surface, you may have precipitation and infiltration. That might locally at the land surface increase the water content, and you may store some of that water in the upper portion of the soil and the cover system.
The intent of the cover system is also to extract that water, and the only way that I know of that it will do that is through the vegetation. So the vegetation would need to decrease the water content back to its equilibrium or hydrostatic condition. If it doesn't do that, you would have potentially fluid flow both laterally and mainly vertically downward through the system.
And I think that has been discussed and confirmed, that there is a high probability that you would have at least some small amount of water that

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would migrate through the cover system, would not be evapotranspired, and would migrate in through the tailings facility and in through the waste rock facility.
So -- and just conceptually wanted to talk a little bit more about that and just show kind of what that would look like.
So these are again these water saturation and water content versus elevation curves, and they have the same shape. I have -- I have two placed on here. In fact, there's a couple of curves. The yellow curves are transient, and I would say that the blue curves -- the blue and the green curves -- I think this is -- it's not labeled, but -- this is slide 19.
So the blue and the green curves would show more of a steady-state, unsaturated water content distribution, and during transient infiltration, say you had a rainfall event, you might locally at the land surface increase the water content, but then as the water would move vertically, it would disperse, and there would be storage of the water pipe forces.
And so you can see it would kind of spread out and be absorbed into the -- into the soil.
But if you were to have a con -- more of a constant application of water, you would tend to have

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this steady-state behavior be a small steady-state behavior. It would be more like the blue. And I'm just talking in relative terms here. If you had a higher steady-state infiltration, you'd shift that water content to the right and have a higher one.
But, you know, in general, if you get to a steady-state, long-term condition, you would expect that these transient things would kind of average out. And your inflow and your out -- outflow for the water flow through the soil and/or the waste rock and the tailings facility would then become, you know, at steady-state, which means no storage change. So your inflow could equal your outflow.
So whatever we decide -- and I'm not going to speculate as to what exactly the infiltration rate would be, because I don't know that much about the cover soil or how the vegetation will extract the water, but I think there is definitely a plan and a -- it's been documented in the record that there will be some water that will migrate through and beyond the root zone for the plants and the cover system. So there will be some infiltration rate.
And so I would suggest that over time at equilibrium that would likely -- or at steady-state that would likely mean that that amount of water would also

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be discharging if we don't have an underlining liner system, which there is for the tailings storage facility.
So if we do have a waste rock conceptualization -- I'm on slide 20 here. This is a figure from the JSAI, 2018. I think this is the -- this is the Probable Hydrologic Consequences Figure 3-18. And we've seen this previously. I think Mr. Finch showed this.
So this suggests that there will be infiltration, but the arrows show that it's likely on the -- on the sides of the waste rock and not on the top. But as we just discussed, and I think was confirmed in testimony earlier this week, that there will be some infiltration from below the cover system, as well. So we could add another couple of arrows at the top.
And then there was also some discussion about the permeability or hydraulic conductivity of the andesite and having that be the liner. So if there is some infiltration into the andesite, that would also occur, and then there would be some -- some groundwater flow.
This does show that there will be some infiltration in the waste rock and some discharge from

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the waste rock, and it does show that there's a toe drain on the downslope edge which would collect the discharge water. I would suggest if the water is moving through these waste rock materials, it would likely have a potential to become contaminated.

And so in Mr. Stein's description of the Reclamation Plan, it was discussed that all of the process water, mine-influenced water collection and storage systems would be reclaimed after the reclamation had occurred.

So if that's the case, there may not be ability to collect mine-impacted water that's discharging through these facilities long-term after closure.

Q. Dr. Carroll, if I might interrupt you for a moment.

Would it be helpful to have a laser pointer?

A. Sure.

MS. BARNCASTLE: Do you mind taking that to him?

Thank you.

Q. And before you move on, if I might add a question or two.

Did I understand your testimony to be that you do not have a clear idea of what the cover plan is in

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this instance?

A. So they discussed the thickness of the cover and that the material would be likely excavated from the site, from the surface soils.

There is a discussion in the -- in the MORP. I wasn't able to read through the entire thing, but I have not seen any data describing the properties of the soil. I think Mr. Stein described it as a sandy loam, which is fairly high conductivity -- hydraulic conductivity soil.

So I don't think the -- the cover system is really going to be designed to -- to really inhibit water flow through the mine waste materials. It's mainly to store water upon precipitation and then allow for vegetation to extract that water. It's my -- I believe it's mainly used to establish a vegetation at the land surface.

So it would basically bring back the ecology of the vegetation.

Q. So if you wouldn't mind reminding us again what your recommendation is based on what you've just said.

A. My recommendation would be not to change that plan in terms of having a different type of soil. I think that soil may be useful for growing vegetation and

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adhering to the Copper Rule, but I think it would also be useful to have a cover that's also a low-permeability material.

You can have the HDPE liner on the top of the waste rock materials on top of the tailings facility and then add this soil on top, which would allow for vegetation to occur.

Q. Thank you.

Please proceed with your presentation.

A. Thank you.

I just also want to clarify since we mentioned the andesite, there's been some discussion of the hydraulic conductivity and the permeability of the andesite. I wanted to talk a little bit about more in detail what we were talking about just to make sure the record is clear.

And I think Mr. Stein mentioned a hydrologic law that we could discuss, and I think Dr. Myers mentioned it, as well. So it's Darcy's law. This is a very important principle in law for governing fluid flow through the subsurface.

And so this is a picture of Henry Darcy, and this is his experiment. He actually applied fluid flow through a column of porous media, he measured the hydraulic head as a function of length, and he

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determined this law, which I'm going to go into in a little bit more detail, and I think I'm going to try to explain how this relates to the mine site.

So this is a little bit more detail. I think Dr. Myers was also trying to apply some definition so we're clear on what things mean. There has been an interchange of the terminology "permeability" and "hydraulic conductivity" throughout this testimony.

And then I think Mr. Finch also mentioned that the changes in the hydraulic gradient were equal to the changes in the hydraulic conductivity. And so I just want to clarify that, because this is Darcy's law, and I have defined the units here.

The flow rate is this large Q, the capital Q. That's a volume per unit time.

Hydraulic head, we can also consider that's the groundwater elevation. And so that's measured at a couple of different points. It could be measured at many points.

The hydraulic conductivity is actually a length per unit time. The cross-sectional area as shown here for the column, that's the length squared. And then there's another length here which is the distance between the two hydraulic head measurements.

And so the hydraulic gradient is actually this

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term and/or this term. It's the difference in the hydraulic head divided by the difference in location or the length through which the groundwater flows.

So this is in measurements of length, and this is in measurements of length. And this is hydraulic conductivity. So the hydraulic gradient, if you have length divided by length, this is a nondimensional term, whereas the hydraulic conductivity is length per unit time.

So they're not actually equal to each other, and changes of these two terms are not equal to each other.

Q. And that's slide 22?

A. Slide 22.

And then just a little bit more detail on how this will actually relate to water quality.

So there are three forms that are commonly used for Darcy's law. This is the -- the top one is the one we saw in the prior slide.

This is slide 23.

So this is the volumetric discharge rate, which is equal to the hydraulic conductivity times the area times the hydraulic gradient. If you were to divide the volumetric discharge rate by the cross-sectional area, you'd have another discharge, and

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this is in length per unit time. If you then divide that by porosity, you would have a velocity. This is again in length per unit time.

And so the difference between these are this is a specific discharge which is water flowing through the bulk system, which is a combination of both the pore space where the fluid occurs and also through the solid material. If you divide by the porosity, you're actually getting the velocity of water flowing through the pore spaces.

So this is useful because this is the velocity that the groundwater actually travels. And so you can calculate the travel time of the water using this type of an equation.

Okay. Just a little bit more on how you would determine this. This again is that specific discharge. This is your hydraulic gradient. If you measure the specific discharge and you measure the hydraulic gradient at different values, you can plot a straight line. The slope of the straight line is then equal to your hydraulic conductivity.

So again this value is the slope, this hydraulic conductivity is the slope of the specific discharge and the hydraulic gradient. This is not -- the changes in this slope are not equal to changes in

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this hydraulic gradient.

That's slide 24.

Again with the permeability, comparing that to the hydraulic conductivity. I think Dr. Myers mentioned this, as well.

Permeability can be used interchangeably sometimes, but I just want to note the difference. The hydraulic conductivity is actually the ability of the medium to transmit water, and it includes both fluid properties and also the media properties.

And the media properties are really considered for the intrinsic permeability, which is the ease at which a porous medium can transmit a liquid, which could be a water or could be a different type of -- of fluid. So it's independent of the fluid and dependent on the coarse media properties alone.

That's slide 25.

So that kind of illustrates the difference between those two properties.

Now, I think Mr. Kuipers has noted a need to examine potential flaws or failures in the potential to look at uncertainties and potential variability in site conditions. And so this is a well-known variability in site conditions related to the hydraulic conductivity specifically.

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The spatial variability of hydraulic conductivity is termed heterogeneity, whereas a spatial invariation or the -- or the having one property can be constant as a function of distance called homogeneity. And so here's some examples.

And generally a rule of thumb is in natural subsurface materials most of the time you'll have subsurface variability. And this is a very cartoonistic sketch, but it illustrates you might have very different rock types, and they may be spatially variable. And so if you've collected samples at different locations, you would be able to measure hydraulic conductivity and get different results.

What we might even do is then map out a rock unit and say this rock unit has some variability in the hydraulic conductivity, but maybe it doesn't vary as much as another rock unit or another zone of a mine site, for example.

So we could say that, you know, one media might be effectively homogeneous or, in general, the changes in the hydraulic conductivity might not vary that much. But compared to another media, it might be different.

So this lends itself very easily to looking at geologic mapping, and I think that's what basically has

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been the approach that's been done at the site, is looking at the geological materials, we've taken the geological material homogeneity and applied that to the homogeneity of the hydraulic conductivity in order to do the aquifer assessments.

And this is a schematic of what you might observe if you were to measure hydraulic conductivity variability in multiple locations throughout a unit.

You might see a -- the black line where you see some variability here, and you may -- you know, if you sample here, you might have a high value of hydraulic conductivity. Here you might have a low value for the hydraulic conductivity.

But what you could do is you could -- you could bound the uncertainty, you could look at the range of possibilities. And then you might say, okay, I've got, you know, in one unit a -- a value that I could say is effectively constant throughout a spatial domain. Even though there is variability it might not vary as significantly as really is that important.

You can say this is an effective homogeneous unit, but I would say you also might want to consider the highs and the lows and actually the range of potential values that would occur at a site.

Q. And that is slide 27?

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A. Slide 27.

And let's get back to why it's important for this site. And there's been a lot of talk about the hydraulic conductivity at 10 to the negative-6 centimeters per second. That's a strange number. With the power -- with it being a negative power, it seems -- seems low. Right? It seems really low. So I wanted to see what that looks like in comparison to other materials.

And so this is a graphic that's borrowed from a USGS report by Heath, and so what they did is they looked at the range of different geological materials. So -- and then the line here is showing a range, a typical range for hydraulic conductivity. And then these correspond to the values along a scale here for hydraulic conductivity, and these are in different units. So this is meters per day, this is feet per day.

So I did the math for the conversion. We've 10 to the negative-6, and that equals about 6 -- or 8 -- 8.6 to the 10 to the 4 meters per day. So I put the red line where we would expect this 10 to the negative-6 centimeters per second to fall.

And, you know, we typically think -- you know, this is how you would compare it to other materials. You typically think that things on this side will be

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lower hydraulic conductivity and then things like this will be higher hydraulic conductivity. You might even say you have aquifers on the right side and aquitards on the -- on the left side.

Clay is an example of that. Clay is a -- commonly considered not an aquifer usually, it's considered a lower hydraulic conductivity material.

This line, if I've put it there correctly, is not even in a range of the clay. In fact, it's kind of in the range of sandstone, which for many people is considered an aquifer.

And then I'd also like to show here we don't have andesite on this slide, but we do have another volcanic material, basalt. And we have other igneous and metamorphic rocks. And it does range from unfractured to fractured. And I'd like to note that the basalt spans the full 12 orders of magnitude for hydraulic conductivity.

So there is a potential to have a very, very, very large range of hydraulic conductivities, and based on the third forum of the Darcy's law that I showed previously, where the velocity of groundwater is linearly dependent, all things being given the same is linearly altered, the velocity can be linearly altered by the hydraulic conductivity.

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So if your gradient stays the same, if your area and your porosities stay the same, if you have a change -- an increase, for example, in your hydraulic conductivity, you can see an increase in the velocity of contaminants.

And then I'd also like to note that for the cover systems, the term "sandy loam" was used, and we don't have measured values for those, but the NRCS has suggested that those values for the hydraulic conductivity could be 10 or 100 times larger than this value which we've been talking about as a lower-permeability unit that will inhibit contaminant migration below the waste rock and the tailings facilities.

Q. Dr. Carroll, for the record, would you say one more time -- to the left side of the red line is lower hydraulic conductivity --

A. Correct.

Q. -- and to the right side of the red line is higher hydraulic conductivity.

A. Correct.

Q. And the red line is something that you've added based on your calculation that's shown to the far left.

A. Yeah. The red line is really just this value

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of 10 to the negative-6 centimeters per second that's been discussed throughout this week. And so I just wanted to give people an idea of where that falls in comparison with other materials. Is it really a low hydraulic conductivity value, or is it not a low hydraulic conductivity value?

And if you have a cover material that maybe, you know, implies that it will inhibit infiltration, it's actually over here somewhere, it's actually a higher hydraulic conductivity material.

Q. And this 10 to the negative-6 is important when we were discussing what facet of this project?

A. Well, it was discussed both as a hydraulic conductivity for the liner and also a hydraulic conductivity for the andesite.

Q. Do you find it peculiar that the hydraulic conductivity for the liner was discussed to be similar or the same as the andesite?

MR. BUTZIER: Objection to the form.

MS. ORTH: What's your objection? The word "peculiar"?

MR. BUTZIER: Yes.

MS. BARNCASTLE: I'll withdraw the question for now and think about how to ask it again then.

MS. ORTH: All right.

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MR. CARROLL: Are we okay with this slide?

This is 28.

So I want to clarify, because I think I understand the testimony from Mr. Finch earlier when he said that there was changes in the hydraulic gradient that were equal to changes in the hydraulic conductivity, and I think it does relate to Darcy's laws. So that's kind of why I went back into this.

And this is a schematic. This is showing one hydraulic conductivity material and another hydraulic conductivity material, and they're -- they're layered in sequence such that you have no flow above, you have no flow below, and you're forcing flow from one material into another.

And what you would find based on Darcy's law, which is again shown up here, is if at steady-state if these two units are connected, Darcy's law occurs in this one, and it occurs in this one, and at steady-state the flow through this unit on the right has to be equal to the flow on this -- through this unit on the left.

So you have Darcy's law for unit one equal to Darcy's law in unit two. In other words, the flow is equal in this unit to this unit.

If -- if that is the case and the cross-sectional area does not change, in other words,

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the area through which the water flows through this unit and this unit does not change, then if you do have a lower hydraulic conductivity unit on the right, compared to the left, you would have to have a larger hydraulic gradient, which is this term.

So if A and Q are the same, and you decrease K, you'll have to increase this gradient. So you could see that there's a higher hydraulic gradient slope here, a lower hydraulic gradient slope here.

Okay?

Q. (BY MS. BARNCASTLE) Why is that important for purposes of this project?

A. Well, it was stated that the changes in the hydraulic conductivity were -- or changes in the hydraulic gradient were equal to changes in the hydraulic conductivity. That's not necessarily always true.

And so I want to show where it might be possible, where you might have a change in the hydraulic gradient in one material and then it have a different hydraulic gradient if you have an adjacent material with a different hydraulic conductivity. Just for clarification.

Now, I would say that's not always true. Here's an example for that.

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Your changes in hydraulic gradient are not always equal to changes in hydraulic conductivity. So if you have a water table aquifer system, and you decided to put in some wells, then you decided to pump these wells, you would create a cone of depression in the water table, you would draw water in to the well, and you would decline the hydraulic head at this well compared to adjacent to the well.

This actually increases the hydraulic gradient towards that well. So you've altered in this case the hydraulic gradient, but you haven't altered the hydraulic conductivity.

Okay?

Q. And that's slide 30.

A. Slide 30.

Okay. And then with the discussion of the East Animas Fault being a barrier boundary to flow, I think one of the concerns is the misunderstanding of that term may occur as in hydrologic sciences, boundary is used a lot of times for modeling, and sometimes it's considered for no-flow boundary.

I think Dr. Myers discussed his model yesterday and discussed that there were some no-flow boundaries.

So I wanted to show what no flow actually

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looks like with this. So this is a bucket of water. And you'll notice that this is a manometer showing a hydraulic head at this location. And then this is a plot of the total hydraulic head as a function of elevation. And it's actually broken out in terms of the elevation head, the pressure head, which if you sum these two will equal the total head.

As the -- if you were standing at the bottom of the bucket, you'll have the height of all of the weight of the water on top of you so you'll have high pressure. But as you move from the bottom to the top of this bucket of water, you would actually decrease the pressure, because the height of the water standing on top of you would decrease.

And at the top, relative to atmospheric, you would have no pressure, it would be 0 or atmospheric pressure. So your pressure as a function of elevation would propagate towards 0 at the top and then increase to higher levels as you went towards the bottom.

Now, the elevation head component would actually do the reverse. If your datum is here at the bottom, then your elevation is 0. And then as you increase from the bucket bottom to the top, you would increase in elevation, and that increase would increase linearly with the elevation.

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So those things being offset, your total head would not change throughout the elevation of this bucket. In that way, there is no change in hydraulic head, and therefore there is no flow.

And the reason that's important is because when we look at a map of groundwater elevation contours, there are places where the change in hydraulic head may not change, and then there's, obviously, locations where the change in the hydraulic head will change. And so I tried to describe that here.

Location in a groundwater elevation which is equal to hydraulic head in a contour map of contour lines of groundwater elevation, if you're moving along a contour line, then -- the hydraulic head and/or the groundwater elevation does not change as a function of distance. And that's the definition of a hydraulic gradient. So along those lines, you would have no flow.

But if you're moving between those lines or not along those lines, then you have a change in the hydraulic head as a function of distance which is a hydraulic gradient greater than 0 so you would have fluid flow. So you would have no flow along the contour lines, whereas you would have flow occurring perpendicular to those contour lines.

That's slide 31.

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Okay. So this is useful in introductory hydrogeology for figuring out the flow through a system, and as long as it's steady-state, what we can define as a simplified system, and we go through a series of sketches to draw flow net and calculate the flow through a system.

You would define your boundaries -- and for this simplified rectangle -- this, by the way, is from Applied Hydrogeology. You would have a no-flow boundary here. So flow would not occur across this boundary. And then you'd have a no-flow-boundary here, you would not have flow across this boundary.

But you would have a constant head boundary on this side and a constant head boundary on this side. But if this is a high constant head boundary and this is a low constant head boundary, flow would propagate from the left to the right.

This is actually not too different from the conceptual model that Dr. Myers did of the site propagation of water flow from the site towards the Caballo Reservoir.

In fact, if you imagine the site as a rectangle or moving from the site towards the Caballo as a rectangle, this could be similar to this, to the site where -- the first thing you would do is you would

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realize that there's no flow across this no-flow boundary. So you would have to put a directional flow line adjacent to this no-flow boundary.

And then you could add additional flow lines, and that would break up the domain into tubes of -- flow tubes. And then what I just discussed previously is you would have equipotential lines or groundwater elevation contour lines. And as I said before, those would be perpendicular to the direction of flow. So if this is a flow line, the contour line for the groundwater elevation would have to be perpendicular.

So you can see that these groundwater elevation lines have to terminate at a right angle with the no-flow boundary.

So that's -- that's important because when you have a barrier boundary, and you consider that as a no-flow boundary, your groundwater elevations would have to terminate at a right angle to those barrier boundaries.

That's slide 32.

Okay. So we've seen this slide before. This is the Figure Number 2 from the DP-1840. It shows, I believe, the end of mine life groundwater elevation contours for the site.

You'll notice here we have the open pit mine.

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And the pit perimeter is shown here. And we also have the East Animas Fault, and then there are some projected groundwater contour intervals to the east of the -- of the East Animas Fault.

Notice there are groundwater flow directions proposed on here, and we can see that they do tend to follow at right angles with these groundwater elevations. So if your groundwater elevation contours are in this area north/south, your flow would be east/west, and it would move from higher hydraulic head or higher groundwater elevation toward lower groundwater elevation, would flow from west to east.

And so that would occur in this part of the mine, on the southern side of the pit, on the northern side of the pit, as well, and then in the waste rock facilities to the north of the mine operation site. And then also through the tailings facility, the flow would be from west to east, as well.

Note that we do have what has been proposed as a hydraulic sink, and I think it is documented in the prior testimony. Here in the open pit, we see closed contours around the open pit area. So that would mean that there's no flow out of the pit, and then if there was flow into the pit, it would be along these -- the changes in the hydraulic gradient going towards the pit.

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But notice that the size of the hydraulic sink could likely be limited to the pit, whereas you have a green line here which is the surface water catchment for the open pit. So that's -- that's the open pit surface drainage area.

So I think in the Copper Rule mainly that open pit surface area drainage is used to describe where there's maybe not as much of a concern as far as migration of contaminants for -- for waste rock facilities.

So this would encompass a larger area and more waste rock materials, which you would imagine that surface water falling within the footprint of the green line would then propagate towards the pit, but groundwater discharge as a hydraulic sink would really be limited to a smaller footprint.

So groundwater contamination that's outside of this hydraulic sink in the groundwater may still propagate from the west to the east even though it's inside this open pit surface drainage area.

The other thing I'd like to note with this figure is that the contours for the groundwater elevation are running north/south so that groundwater discharge is west to east, both within the mine permit area, and then across the East Animas Fault. The

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hydraulic contours are still going north/south, and the groundwater flow is still from west to east across that fault, which I think was discussed at length in Dr. Myers' testimony, as well, previously.

That --

Q. So just to follow up, since we're not seeing the perpendicular lines where water starts -- water hits this fault and starts flowing a different direction, it's still flowing across the fault, does this fault actually constitute a barrier boundary?

A. It is not a no-flow boundary to -- to groundwater flow.

Q. Thank you.

Please continue.

A. So there's one more slide we've seen on groundwater elevation contours, and I know we've seen this before, but I just wanted to note a couple things to follow on from the prior testimony.

This, as was noted, is a larger scale groundwater elevation contour map, and it does show the contours which I just discussed, for groundwater elevation are going north/south in the area of the mine permit, and so the groundwater discharge is occurring from west to east, in the mine permit area.

But then if you extend outside of the mine

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permit area, I think we discussed that the variability in the directions of flow changes quite a bit based on this map.

So if you had discharge to groundwater, let's say, for example, from one of the existing or proposed waste rock facilities that's on the northern part, northeastern part of the mine property, the groundwater would occur and move perpendicular to these groundwater elevation contours. It would flow more toward this direction in the arrow shown on slide 34 to the northeast.

But if you had discharge from, say, the area near the tailings facility, it might flow more directly towards the -- towards the east despite some variability, you know, more to the east, but it might even propagate a longer distance -- I think it was discussed about 12 miles -- potentially towards the Caballo Reservoir.

And that was again a part of Dr. Myers' testimony. He suggested with his model that that was a possibility, that groundwater and/or contaminants could migrate from the mine permit property toward the Caballo Reservoir. And this groundwater elevation map does suggest that, as well.

And then if there were contaminants migrating

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maybe from the tailings facility or some other facility on the southern part of the property, they might migrate towards the southeast instead of directly to the east.

And I would like to note here there are some wells concentrated on the eastern boundary of the mine property, but there are very few wells to the east of the East Animas Fault, to the east of the mine permit boundary.

So I think we discussed this being one of the wells in previous testimony. But if you were to, say, for example, try to characterize groundwater plume, you would probably need more monitoring wells to map out the spatial variability in the groundwater plume and the directions of fluid flow if potentially migrating from the site.

There probably is not enough wells to really fully characterize the groundwater flow in this area, including solute transport.

Q. Dr. Carroll, are you basically saying there's not enough data to conclude what they've concluded on this issue?

A. Yes.

Q. Thank you.

A. That's slide 34.

And I would like to note before we end with

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this slide -- I think it has been discussed that there is a well, I believe, on the adjacent property, and I'm not sure if that's used for anything. I can't remember the testimony. But if there were a sulfate plume, let's say, just for example, migrating from a waste rock facility on the northern side of the site, if it were to have groundwater flowing offsite, which we discussed, and if that sulfate did migrate offsite, it would likely migrate toward this well.

And I haven't done any specific solute transport calculations, but based on the available data for the groundwater elevation contours, it would be not unreasonable to suggest that that's a direction of potential groundwater flow and contaminant transport migration.

This is -- I just want to get into a little bit more with the discussion of the sulfate plume. There has been, I believe, notes in the testimony that the sulfate plume is decreasing or shrinking, and I just -- I -- maybe it's available for that information. I have not seen the information to suggest that that's happening.

This is a table from the JSAI, 2013. I think this is the abatement report. Yeah. This is the Status Report for Stage 1 Abatement report.

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And so this is slide 35.

And you can see here there are several monitoring wells. And this is in -- this is more in the area of the pit. So it's near the open pit area. And you can see that there are some pH values in the groundwater that are quite low, below neutral. This is -- would be considered pH that may be acidic waters.

And you can also see all of the concentrations measured here are -- that are in bold are exceedances of the water quality standards that are noted here at the top. So there are several constituents in the groundwater at several wells, specifically this 24A and 25A, that do have contamination that is existing.

Can I go back a slide or two to show where those are just to remind folks?

So this is slide 35. This is slide 33. My understanding of those, this is the 25 well, and then this is the 24 well.

So those are adjacent to the pit area, and we did discuss the pit would have a hydraulic sink. And what that would mean is you have groundwater flowing into the pit from all directions. So that's actually a nice contaminant containment system because there's no groundwater discharge really away from this pit in this area. So any contaminants in this area would stay

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localized here.

But you note that the footprint is not as large as the open pit surface area drainage. So it may be possible -- I'd have to -- I'd have to really examine in more detail, and maybe, you know, the mine has done more examination, but I don't actually know if this hydraulic sink in the groundwater does actually capture contaminants from this 24 or 25 well.

In this area, they do have a groundwater direction flowing west to east near this well, and this is adjacent to a waste rock facility that's existing, I believe.

And then in this area to the south of this well, there is groundwater flow from the west to east, as well. It's just in between those wells there is a hydrologic sink. So it may be that if this hydrologic sink doesn't capture the contaminants that may be at these locations or migrating, those contaminants may migrate from the west to east, as discussed previously.

So that's slide 33, but let's move down back to slide 35.

I think I'm done with this slide. I just wanted to note that present in existing groundwater contamination that is at the site, and I would also like to note that this is likely due to the mining activity.

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I haven't seen any premining groundwater concentrations, but because of the acid nature of the contamination, I would suggest that it's likely associated with the premining -- three months of mining that occurred in the 1980s.

So the next slide, slide 35, is again from that same report, the JSAI, 2013, but it shows groundwater data from more downgradient. This is near the waste rock facility and the tailings facility.

MS. ORTH: 36.

MR. CARROLL: And I think Dr. -- what?

MS. ORTH: 36.

MR. CARROLL: 36 is the slide.

I think Dr. Myers also noted the sulfate plume in this area, and he noted that the concentrations were increasing over time. And I just wanted to reiterate that in this report Figure 7, and then here's the Bates index, it does show that for these two groundwater wells they are increasing over time from 1980 to 2014.

And these wells, 3 and 8, these are in the waste rock area. They're not actually in the tailings area. And you can't -- you can actually note that -- let's see. The sulfate -- if we're considering this to be a sulfate plume, there is concentrations that are exceeding the 600-milligram-per-liter standard in the

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groundwater near the waste rock.

The concentrations are elevated in the tailings facility groundwater, but it doesn't look from this table like there are any that are exceeding the groundwater standard. But they -- there are exceedances in the waste rock facility, and, in fact, rereading this report, it does suggest that the waste rock facilities are the likely source of the sulfate plume, as opposed to the tailings facility.

Q. (BY MS. BARNCASTLE) Dr. Carroll, do you have a recommendation about lining for the waste rock storage facility?

A. Yeah. The recommendation would be to try to decrease additional groundwater contamination, because we've already got groundwater contamination here, but to decrease additional groundwater contamination by minimizing water access to materials that generate contaminants. So that would be having an overlying and underlining layer which has low permeability which would mitigate water from entering and flowing through these materials.

I wanted to mention one other thing. Having a table like this, it's kind of hard to see where these are. Could -- oh. I think the next slide shows that.

Okay. This again has been shown before, but I

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just wanted to note additional aspect. This again is a figure -- Figure 3 from the JSAI, 2013, report. Here's the Bates number.

Here is the mine permit boundary tailings facility, and then the map here shows the geologic units. And so this is actually an aquifer. This is the Upper Santa Fe Group that's been discussed in this trial previously.

And it does show the -- the well locations. The wells that are elevated in terms of concentration are near the northern side where the waste rock facilities -- it's actually Number 3 and Number 8. So these wells are not exceeding the standard. These wells are elevated. And in fact -- which one was it? It was -- sulfate -- let's see this one. Number 3 is above the standard. So number 3 is actually above the standard.

And I just wanted to note, because it just seemed interesting to me, how close this is to the mine permit boundary that we have an exceedance of a groundwater standard at concentrations in an aquifer system.

So we already noted the idea that there is groundwater flow across the site. We noted that the groundwater flow for a lot of this site occurs from west

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to east. And then we have groundwater contamination that's right adjacent to the northeastern boundary of the property.

So theoretically any additional groundwater flow from west to east might have this contamination migrating across that boundary. And I think we've noted earlier that there's a well off to the northeast of the mine permit area.

Slide 37.

Q. Dr. Carroll, would adding additional contamination on top of the existing contamination cause any concern to you?

A. Yeah. I -- I think, you know, we should likely do our best to minimize additional contamination, but additional groundwater discharge, as Dr. Myers showed yesterday, would actually allow for more discharge to occur from west to east. And we already know that there is groundwater discharge from west to east.

So just having groundwater discharge would allow these contaminants to migrate potentially across that mine permit boundary. So additional contamination and additional groundwater discharge would exacerbate that, potentially.

Q. Is it your opinion that additional acid rock

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drainage contamination will occur as a result of the proposed mining activity?

A. That's a good question. I think I want to go into that in a little bit more detail with the aquifer assessment.

Q. Am I jumping the gun? Is that what you're saying?

A. That's, I think, a lead-in.

So I just wanted to also note, as we discussed before, across the eastern boundary of the mine permit area, the groundwater flow tends to occur from west to east, but then, as noted previously, on the northern side there could be components of the groundwater that might migrate in a direction that's more to the northeast.

Okay. So moving on to the -- to the waste rock tailings facility, the potential for acid rock drainage that would occur with the new mine.

These are some slides -- or some information from the SRK, 2013, Geochemical Characterization Report. And I think some of this has been discussed before, but I wanted to highlight some of my observations that weren't covered in Dr. Griffiths testimony.

I think this was shown that there -- there is some sulfide within the andesite here, and these are the

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mean values. These are the boxes. But -- and we do see that some of the waste materials do have sulfide, as well. And they're elevated relative to the -- to the andesite.

And that's really to be expected because the mine site is a mine site. It's been -- it's been mineralized so there is sulfide content there, and that's why there's an interest in mining it. This sulfide content is important because that's what's considered to be the content that generates acidity.

And I think Dr. Griffiths went into this a little bit of detail, where they had measured from geochemical samples the potential for acid generation using static tests. That's the X axis here. And then the potential for neutralization on the Y axis. And you can see fields here -- I think she mentioned this, as well -- where there's potential acid formation in this triangle, an area of uncertainty in this triangle and then acid -- nonacid-forming in this triangle.

And so I know that, you know, there's a -- already been a discussion that this transitional waste has a higher potential to generate acid. In other words, a lot of these red squares are occurring in this potentially acid-generating or more likely acid-generating field. And maybe some of the other

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samples may be characteristic of the other parts of the waste rock.

One thing I would like to note here is there's a lot of scatter. The data are all over the place. There is a large part of the data which are in uncertain, and there's actually, I would say, potentially fewer samples that are nonacid-generating.

So there's -- based on the acid base accounting, there's probably fewer samples that are confirmed to be nonacid-generating, there's a significant amount that are uncertain, and then there's several that are more certain of creating acidity. These areas of uncertainty may generate acid, and they may not generate acid.

So this just highlights Mr. Kuipers' note that there is some uncertainty here and we need to consider some of this uncertainty and not just use, you know, one prediction, two to address an aquifer assessment.

Q. And that was slide 39?

A. Slide 39.

This is just kind of a follow-on with that. The tendency for the samples they collected were that the net neutralization potential would decrease. In other words, the ability of the sample to neutralize acid decreases with the sulfide content. Remember

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sulfide is what generates the acidity.

Several of the samples were essentially acid-generating. There's a lot of uncertainty. And then I would say there's not as many samples that are nonacid-generating. So it's likely that a lot of the samples would potentially generate acidity and a lot of the waste rock may potentially generate acidity.

This was another plot showing the net neutralization potential versus the net acid generation. And this just again confirms that there are some samples that potentially generate acid and then there are a significant amount that have an area of uncertainty. And then it was noted that some of them are also nonacid-generating. At slide 41.

So this is kind of a summary table. I know it's already been discussed that the transitional waste material has been shown with the acid base static testing to generate acidity.

But I would like to note that with this legend the pink values and the yellow values are potentially acid-forming, and so that would suggest that most of these rock materials which will end up in the waste rock would potentially generate acid.

And the reason I want to discuss this is because I think there is a benefit in the static

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testing. In my impression, the static testing allows for completion of the acid generation and acid neutralization reactions. So that's the balance that I discussed earlier on in the slides where the reactions are allowed to proceed to equilibrium potentially.

And you can kind of figure out which is going to win, is there going to be more acid generation, or is the acid going to be consumed by the buffering and neutralization capacity of the material. And so this is useful for looking at long-term behaviors if you're considering an aquifer assessment.

That's slide 42.

The reason that's relevant is because we also have another type of geochemical testing which was the kinetic testing, or humidity cell testing, and that was discussed again by Dr. Griffiths. But we didn't, I don't think, get to see a lot of the data. So I wanted to show people what it kind of looks like.

These are weeks on the X axis, and then the pH is on the Y axis, but this might be concentration for contaminants in the water as reacted by materials from the mine site.

There are several samples here. Notice many of them have neutral pHes, and the pH is stable over time which is a good thing. There are a couple of

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samples which decrease pH and even went to lower pH. This might be considered acid-generating, and I think that's what we were talking about with the transitional waste.

So the kinetic testing is useful, and I think Dr. Griffiths also explained that that was useful for determining a rate kinetic that could be used for the modeling.

So one other slide here. The copper milligram or kilogram per week, this is a rate of concentration of copper leaching from a material, and that's used in the prediction of the pit lake. It's used in prediction of the -- of the waste rock and the tailings facility.

And you can see that over time some of the concentrations stabilized so you could pick a stable value, because some of the concentrations were declining over time, and some of them were increasing. And I think that's the reason why they let the test go on so long, over 100 weeks. And I think they noted that that was longer than typical for a lot of sites, and I think it's useful that they did that data collection.

Usually what you want to do is you want to have the concentrations stabilize to more of a constant value, and then you would use this constant long-term value as a long-term weathering rate that you'd use in

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your modeling results.

And I think that's what most people do in these types of geochemical modeling results, or modeling -- these are the data that are used as input to the geochemical modeling. But I would like to show here that there is some concentration that's increasing and some that are decreasing.

Okay?

So this is -- one more. This is uranium. And concentration on the Y axis and then time on the X axis. Notice that there are some higher concentrations early on, and then they decline. It's shown here that there is a standard for water quality in New Mexico.

Early on there were some exceedances, and then it declined, and the concentrations stabilized at low concentrations below the exceedance. So you would want to say, okay, let's look at the long-term data, and we can use that for prediction of the concentrations over the long-term in, you know, these facilities.

And I also want to argue that you could have also potentially looked at using this static testing as that also shows the longer-term equilibrium behavior potentially.

But this is a long-term, I would say steady-state weathering rate that could be used, and, in

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fact, they did. They used this data type for the input for all the geochemical modeling, as far as I know. That's what it mentioned in this report. And then this was also mentioned in the SRK, 2018, which is the geochemical modeling report.

But they did a little selection of the data that they inputted. They said they -- they wanted to use all of the data over all of the weeks for the major ions, and so those are listed here. And so what they did is they took an average of 0 to 100, or however many weeks they had, so it averaged out this higher concentration and the lower concentration. And then they used that result as the input to the modeling.

But for some of the water quality constituents -- and they're noted here, silver, arsenic, boron, barium, cadmium, cobalt, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium, uranium, vanadium and zinc -- they only used the data that were after the 20 weeks.

So they would basically take this data, these data to these data, and average these. So you can imagine a low concentration, steady-state average, and they basically ignored the early time which could have been a higher concentration.

And why that might be relevant is because a

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lot of these are the regulated toxic contaminants that would be considered in an aquifer assessment. And so if you don't average all of the data, if you just average these lower concentration late time data, you may be having a lower input into your geochemical model.

And I would say that might be potentially appropriate if they were to say that was the case for all of the data, but they did select these salts. And they used the average for the entire time period for those. So I just don't know what the designation is, why they decided to select the long -- the average through all the data for these constituents and only the after 20 weeks for these ones.

And I do want to note -- if somebody remembers what the predicted exceedance would be? Was it this one? Wasn't that the predicted exceedance?

The one that -- I believe that's the one -- we have to confirm that.

Q. Yeah. I believe that fluoride is already elevated in the groundwater in this area and that was the testimony.

MR. BUTZIER: Correct.

MR. CARROLL: So it's interesting that the one exceedance that they did predict was in the suite of elements that they decided to average the entire data

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set, and most of these others are not regulated of concern except for sulfate.

MS. ORTH: Ms. Barncastle, we need a break soon.

MS. BARNCASTLE: Whenever --

MR. CARROLL: This is probably --

MS. BARNCASTLE: I'll ask the witness.

MR. CARROLL: This is fine.

MS. BARNCASTLE: Okay. Thanks.

MR. CARROLL: Yeah.

MS. ORTH: All right. 20 minutes.

(Proceedings in recess from 3:41 p.m. to 4:02 p.m.)

MS. ORTH: Okay. When we broke, we were in the middle of Dr. Carroll's testimony.

Ms. Barncastle.

MS. BARNCASTLE: Thank you, Madam Hearing Officer.

And I would note that we have only about eight more slides to go on direct so we're close.

MS. ORTH: Okay.

Q. (BY MS. BARNCASTLE) Dr. Carroll, would you please pick up where you left off.

A. Yes. Thank you.

I do want to just summarize just a little bit

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more with this, because it -- the geochemical modeling that's done is to predict the concentrations in the water in the future that will be in the pit lake, that will be flowing through the waste rock piles and through the tailings facilities.

So it is important to consider what the inputs are for these models in terms of the aquifer assessment, and it's also important to consider the range of data that are available for modeling the potential range of environmental impacts to the groundwater.

And I have on occasion done a few geochemical models and specifically added this type of humidity cell test results to geochemical models, but not in my experience have I used part of an average solution and then part of another average solution to predict a water chemistry for a pit lake or a waste rock or a tailings facility.

So I'm not aware that this is used or has been used before in any other location, this approach of using a mixed input. Okay.

And that was slide 45.

This is slide 46.

I know that there was discussion in the past in the record about how long you should run these humidity cell tests, and one of the issues with this

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site is, as noted by Dr. Griffiths, the encapsulation of sulfide minerals within silicate minerals could delay the release of acidity. And so it was important for them, I think, to continue to run these humidity cell tests for longer periods of time than are even recommended.

And so 100 weeks is a long time, but it's not the longest time that someone might run that humidity cell test.

This is an excerpt from a paper in 1999 saying humidity cells, how many and how long, and it does suggest that some humidity cells have been run for three to seven years, and there's roughly a 50 percent chance that the cells will become stable over a short period of time, and then there's a 50 percent chance that some of the cells may have to be continued for three to five years.

And what we're talking about here in that middle paragraph is making sure you have a stable geochemical signature in terms of the concentration and that it average over -- averages to be a similar result over multiple weeks.

And so I know that that may have been the case for several of the elements, but I know that some of these materials are reactive, and they are reacting over

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time, as we discussed in the earlier parts of this presentation. You have the equilibrium chemistry which basically you can say you're going to have some materials generate acid, you have some materials neutralize acid, and which one wins will determine whether or not you're going to go acidic.

And the static test helps test that. And I showed slides earlier suggesting that many of the materials will potentially go acidic over time.

Now, the kinetics tells you how long that might take. And we need to do the humidity cell test in order to evaluate how long it may take, or at least to get the long-term steady-state weathering rates that can be used in the aquifer assessment prediction modeling.

So I would like to show here this neutralization potential remaining.

And again this is SRK, 2013, Figure 6-10, and the slide 47.

Many of these reaction cells still had declining neutralization potential even after the end of the test, towards the end of the test. Some of the cells in the upper part near 100 percent, you could say there's not much change, there's a trend, but not much change in the decline in the neutralization potential. But several of these tests were declining.

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I can see three of these humidity cells that did complete to zero neutralization potential, and those are the ones that had the lower pH that I showed earlier, I think.

And then the next slide shows the sulfide remaining versus time, and you could argue that these are very shallow slopes for many of these. You can see at least one that had a really steep slope and then a couple others that had, you know, intermediate slopes and then some that had not very steep slopes.

But I would argue that we know that this material does not react as quickly as some other mine sites, hence the encapsulation in the silicate minerals. But I'm not sure we have really examined the long-term weathering rates at steady-state.

That's slide 48.

And then this is a summary for consideration of a comparison of the kinetic tests with the static tests. So again the static tests are kind of like equilibrium. You have the acid generation versus the neutralization, you figure out which one, you know, wins over, and then you've got the kinetic test which tells you the long-term behavior, does it go acidic or not.

The SRK report does describe here that the humidity cell tests did not in general have that many

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results that generated acid, but the static tests had more results that generated acid. So there was a conflux between the data. They suggested -- you know, they don't match up.

And so what they decided was it's likely that the static tests overpredicted the acidity and that the -- mainly the humidity cells were more representative. So then they used the humidity cell tests for the geochemical modeling going forward in the future, and we know that the predictions for the pit lake and the other materials did not become acidic. Those are predictions.

One also could take an alternate approach or look at a range of approaches for data that are available. You could say, for example, that because of the silicate encapsulation of these minerals, the humidity cells did not run long enough to show the acid generation that was suggested or observed in the static tests. So it could be that the humidity cells actually underestimated the acid generation potential. It's an alternative interpretation of the results.

But I think that should be considered if you're doing an aquifer assessment.

If you do have a -- and I'll go through this pretty quickly. If you do have acid rock drainage, if

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you do have a neutral drainage, mine-impacted water drainage in the groundwater, you can apply some mitigation procedures, and I think in the Copper Rule it allows for a groundwater interceptor system.

This is just a flow diagram showing some potential methods for abatement of acid rock drainage. So part of it would be neutralizing the acidity. That can either be an active system or a passive system. Active system might be your pumping in groundwater potentially, passive maybe you have it flowing through a wetland or some reactive barrier or something like that.

That's slide 50.

Slide 51 is more specific to sulfate, because I think sulfate is more of a common problem for some of these sites, and it is, you know, observed here at this site in the groundwater.

So what can you do for a sulfate groundwater plume? You can do a groundwater interceptor system. There is a -- there are treatment methods for sulfate. There is -- there is actually some in situ methods, as well. You could look at reduction and removal of sulfate.

And then the last slide just kind of summarizes an excerpt from the JSAI, 2018. This is the Probable Hydrologic Consequences of the Copper Flat

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Project. And I think this has been noted a few times in the testimony before, but I just wanted to reiterate.

This is just a quote. There will be possible groundwater consequences to the groundwater both from the pumping the supply wells, but also due to the mining and the activities that occur at the site, there will be groundwater inflow to the -- to the pit area.

We will see potential groundwater discharges from the tailings facility and/or the -- or the waste rock stockpiles.

And I didn't write this. This was the JSAI's report.

I don't know how much of an impact these will be. I think people have had different estimates based on modeling results. But it is agreed upon, I believe, both in this report, and we've discussed it this week, that there will be hydrologic impacts, and these will not only be associated with water resources, but the flow of water also impacts water quality. And so these impacts could also impact water quality and environmental impacts.

And so this is just kind of a summary. This is the first opinion slide that I showed before, both observations that I hope I have described today, but also associated permit conditions that I'd like to

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propose.

We can see that there is a potential for acid generation and/or contaminant generation in waters that would be discharging from waste rock and tailings. There is already these types of contaminants in the groundwater system.

It would be best, I think, to try to mitigate the flow of water -- additional water through the waste rock facilities and through the tailings facilities. And I think the Copper Rule allows for a groundwater interceptor system to prevent the mitigating -- the transport of contaminants off the mine site property.

I think that's my last slide.

Q. I just have a few follow-up questions.

Dr. Carroll, does the lack of -- or the fact that there are very few wells give you any concern when it comes to detection and monitoring issues?

MR. BUTZIER: Objection, that assumes facts not in evidence.

MS. ORTH: If you would please explore with him what he understands about the wells out there.

Q. (BY MS. BARNCASTLE) Dr. Carroll, do you believe there are enough wells, detection and monitoring -- for adequate detection and monitoring purposes at this proposed mine site?

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MR. BUTZIER: I would also object. That's a fairly broad-brush question. I'm not sure what specific unit of the mine she's talking about. Is she just talking generally?

MS. BARNCASTLE: Yes.

MS. ORTH: Please clarify.

Q. (BY MS. BARNCASTLE) In general, based upon your experience in general, are there enough wells for an adequate detection and monitoring system at this proposed mine?

A. So I would think that, you know, the Mine Plan has -- has, as we discussed earlier this week, noted to add additional monitoring wells, and NMED has requested additional monitoring wells. So I think the effort is there, and I think those parties probably acknowledge that there's a need for additional groundwater characterization.

I think one of the things that I tried to highlight with this presentation is when you have a groundwater plume, typically in order to figure out if we can abate that groundwater plume, we have to characterize the nature and extent of the groundwater plume. That means defining the boundary and defining the transport directions.

So I'm not sure that there are enough wells to

1575

do that at this point.

Q. Dr. Carroll, if you would go back to your slide 45.

Would you agree that this is an example of what Mr. Kuipers testified was the use of best case or ideal scenarios in determining -- or in the predictions for how this mine will operate and the impact that it will have?

A. Well, I don't think that I would speculate as to an intent as -- as far as why certain data were -- were selected for this.

This report does describe -- and I didn't note it, but I'm glad you brought up this question. This report does describe the rationale for using a different approach for part of the water chemistry as the other part of the chemistry was that the original pit lake modeling did not match the observed pit lake. So that does get to Mr. Kuipers' testimony that these models may have some uncertainties in their predictions, but also in processes.

If the model does not include or accurately describe some process, it may not predict existing pit lake, they modified the inputs in order to match the existing pit lake. I would just suggest that there may be some uncertainty in the modeling and that maybe a

1576

range of input parameters might better help the range of predictions and help the range of estimated aquifer assessment impacts.

Q. Would you agree that many aspects of this project do not have sufficient data on which to rely to properly determine the effect of the proposed mine on the Rio Grande Project?

A. I think that's a fair assessment. We just talked about the groundwater wells. I think I had asked previously if there was any hydraulic testing in the wells adjacent to the East Animas Fault, and Mr. Finch said no, there hadn't been. I asked Mr. Stein about data for the cover, and I don't think I've ever seen data on the material for the cover in terms of its hydraulic properties.

So there are a few aspects that could use some more data to actually understand the uncertainty and the potential risks to groundwater.

Q. Now, there's always a concern about appropriate financial assurance being made available to address potential environmental impacts.

Do you have an opinion on that issue here?

A. Well, I don't know that I'm -- I've never really assessed in the cost of environmental impacts per se, but I have observed long-term contamination and

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remediation activities at -- and I know that it potentially could be costly.

So I just think that the final -- financial assessment should consider any of these potential environmental impacts and add them into the financial assessment, as Mr. Kuipers said up front, so we have them available, so we know that the mine will have the ability to potentially clean up any potential environmental impacts that would be occurring.

Q. Thank you.

That concludes my direct examination of Dr. Carroll.

MS. ORTH: Okay.

Mr. Butzier.

CROSS EXAMINATION

BY MR. BUTZIER:

Q. Good afternoon, Dr. Carroll.

A. Good afternoon.

Q. What was the point of the slide that related to Gold King?

A. Well, I think it was important to remind folks that there is a long history of environmental impacts associated with mining, both in general, but also in the state, and it is one example of an interstate environmental impact that's of recent history.

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And that leads a connection to Dr. King's testimony this morning, that if environmental impacts do potentially reach the Caballo Reservoir, which is, as Dr. Phil King mentioned this morning, an international water, it could potentially lead to impact both across states and different nations.

Q. Before putting that colorful slide up in front of the audience here, did you consider analyzing the distinctions between the Gold King situation and the New Mexico Copper Copper Flat proposal?

A. I'm not sure I did it in the detail you would desire.

Q. I've looked through your 43-page resume, Dr. Carroll, and I may have missed it, but have you -- have you ever worked -- have you ever provided any consulting services to the mining industry?

A. Yes.

Q. Can you please identify that for me?

A. Yeah.

MS. BARNCASTLE: Clarification.

Does he -- Mr. Butzier, do you want him to find in his resume those references or just state for you what his experience is?

MR. BUTZIER: Either way.

MR. CARROLL: Okay. I worked for a -- two

1579

consulting firms, one hydrogeochem and then also a water management consultants.

Q. (BY MR. BUTZIER) And what specifically did you do in connection with mining there, and were they your projects, or were you a junior assistant on the project?

A. I was a project hydrogeologist and geochemist for most of that time period. If you -- if you do have Exhibit 4, my CV, I have listed selected mining experience on page 2, and it does extend to 3, 4, and it ends at the top of page 5. So it lists specific mines and what I did for those mines.

And I did the math, and so as far as sampling of mine materials for geochemical characterization, I added up about 10 different mines for geochemical modeling for different mines for various mine facilities. Including pit lakes and waste rock and tailings facilities, that would include 12 different mines.

Q. How many geochemical models have you performed, modeling exercises have you performed?

A. It's hard to estimate that. I would say over that four years or 12 sites there could have been easily over 50 to 100 geochemical models.

Q. That you yourself --

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A. That I developed.
Q. -- developed and --
A. Yeah.
Q. Okay.
A. Their -- their PHREEQC models would be probably not too different from the models that were used for this site.
Q. And how many of those models involved the circumstances that we have at the Copper Flat where there's, for example, an existing pit lake where you're able to do calibration with respect to an existing condition at the site?
A. Very few.
Q. Okay.
And I think you -- you acknowledged that it's very helpful --
A. Absolutely.
Q. -- to have that kind of situation in order to be able to calibrate, correct?
A. Absolutely.
Q. Okay.
And although you didn't identify it in your direct, I think to your credit in response to Ms. Barncastle's question, you did acknowledge in connection with the slide that's up right now, which is

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slide 45, that the report that this was drawn from does include a rationale for why they took the approach they took.
A. Absolutely.
Q. And is that a reasonable approach?
A. In my opinion, I do not think it is a reasonable approach.
Q. And is it -- is the approach partly related to calibrating to the existing conditions at the site?
A. That's what it was noted in the report.
Q. And that's a very important thing to do when you have that available, right?
A. Yes.
Q. Okay.
Now, I'd like to go back to -- I don't think we need to go back to the slides, but let's talk a little bit about the static testing versus the kinetic testing.
Did you come to an understanding of SRK's use of static testing and the fact that that was a screening level test that was used to determine whether to go on to do -- to do additional kinetic testing?
A. I believe that is stated in the report.
Q. And what about static testing gives you -- I think you testified that you need to take into account

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the static testing to better analyze the long-term situation at the site? Could you elaborate on that, please?
A. Yeah. So with the static testing, what you're measuring is the acid generation and also the acid neutralization, and it does not involve time. So in my mind, that is potentially a good way to evaluate what will happen over the long-term. Over the long-term, if you don't consider time, the mine materials will potentially become oxidized and generate acid, and additional materials will potentially neutralize that acid.
So at long-term, you no longer have kinetic limitations, and therefore the static testing may be an appropriate evaluation of the long-term behavior.
Q. I think we've -- I've already acknowledged I'm not a geochemist in this proceeding, but isn't it the case that the kinetic testing is the more useful test to determine the long-term -- to be able to make long-term projections on the potential for acid drainage?
A. I would like to describe my understanding of the kinetic testing and use an analogy that I tried to illustrate earlier on in the slides in the difference between equilibrium and kinetics.
You can have some reactions where the kinetics

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are slow and it could take time to reach equilibrium for a chemical reaction. But thermodynamically, if you don't -- if you -- if time isn't a factor, the reactants will proceed to the products. And so the static testing does provide an estimate of how those reactions that generate acid would then react with products that neutralize acid.
And so over the long-term if time is not considered or at steady-state, you could potentially look at what the chemistry would be or if the acid would be consumed by neutralization.
Now, the humidity cell tests do provide an ability to look at the natural weathering process over time. The way they do that is they have a sample that is open to the atmosphere so it allows oxygen to be there, and they also add water. They equilibrate that each week, and then they collect a sample of the water, and they analyze the concentrations.
Q. Now, what --
A. I'm sorry. Can I finish?
I would say that over a mine life over 12 years and then closure over 100 more years, I'm not sure that the kinetic testing really describes the full kinetic or time-dependent nature of these reactions.
Q. Do you understand -- well, can you tell us

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what you do to materials that you apply static testing to in terms of attempting to establish particle size and what have you?
A. I'm sorry. Say that again?
Q. Isn't it the case that in static tests you basically pulverize the material before you perform the test?
A. Sure.
Q. Okay.
A. I think that is --
Q. And one of the reasons why static testing is a screening level test is that that doesn't necessarily portray the potential for acid generation of materials as they may exist in the -- in the environment, correct?
A. So what I think you're suggesting is that the grain size will -- if you have a larger grain size, you will get more neutralization of acid.
Is that what you're saying?
Q. No. I'm asking -- I'm asking you. I'm asking for your --
A. Okay. I will tell you that I do not think that if you have a large grain size you will have more neutralization potential. The grain size is a physical property of the -- of the material and not a chemical property of the material.

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Q. Okay.
Let me turn now to your idea of putting a geomembrane liner not just beneath a waste rock pile, but on top of a waste rock pile.
Do you recall that testimony?
A. Yes, I do.
Q. Are you aware of that being done in significant waste rock piles at mining sites? And if so, where?
A. I am not aware of that.
Q. And in arid environments in particular, isn't it a better approach and a more accepted approach in the mining industry to use a store-and-release cover of where you can rely on evaporation as well as evapotranspiration in order to take care of the water that's coming into the facility, precipitation water?
A. I would say that it could be. I would say that we would need to evaluate the effectiveness, and I just have not really seen any measurements for this cover material. And I just wanted to propose the idea that if you can minimize the reactions of water with these materials you can minimize the generation of contaminants.
I think having a liner underneath is an excellent idea, but I think it would be nice to minimize

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water going through these materials. And I'm not sure, because I really have not seen any data or any evaluation, that a cover material of a sandy loam will really do the job.
Q. Can we return to slide 5, please.
So this slide is basically part of the tutorial on acid rock drainage potential?
A. Yes.
Q. It's not specific to the Copper Flat site?
A. Are you saying that pyrite is not at the Copper Flats?
Q. I'm saying this is not an attempt to analyze the Copper Flat site.
A. Correct.
Q. And can we go -- just sort of go through the slides, because I think we went through -- you went through a number of slides with various equations.
Those are basically you as a -- as a PhD professor sort of giving us your perspective on general oxidation principles and other things, not specifically analyzing the Copper Flat site, correct?
A. Well, I think, as I tried to allude at the end, I also wanted to tie in those concepts of equilibrium and kinetics, whereas kinetics the both acid generation, acid neutralization could take time to

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occur, whereas at equilibrium it might be appropriate for long-term analysis.
Q. Did you review the supplemental soils investigation report submitted as part of Mr. Stein's report?
A. No. I didn't get time. I think we had about three weeks to review these materials, and there were 18,000 pages. I think I asked Mr. Stein when he was testifying, and he didn't show any data, and he didn't have data on the soil properties, but he -- he did describe the soil that would be used as a cover as a sandy loam.
Q. Isn't it the case that he described that cover material as a loam that ranges in texture from sandy loam to clay loam material, not just sandy loam?
A. I would have to check the record. I wrote down sandy loam.
Q. Now, at some -- one or two points, you referred to the uncertainty issue raised by Mr. Kuipers.
And can you recall what you were saying? Was that related to the use of the static test results in addition to the kinetic test results?
A. Yeah. There was several issues that I believe I brought up, both that there is a range of uncertainty in the groundwater fluid flow, the fluid flow through

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the rock materials through the tailings facility, and then, additionally, the geochemical data there is some uncertainty. And so I think a range of predictions might help better explain the potential impacts to groundwater.

Q. Could we return to slide 48, please.

Maybe it was 49.

I'm not sure I've got the right slide, but do you recall testifying I think in connection with modeling that not in your experience -- I think it may go back to the -- what you've described as sort of mixed data relating to using 20 years and beyond for some -- some constituents and the whole suite for the rest?

MS. BARNCASTLE: Can I clarify that?

I think we may be talking about slide 45.

MR. BUTZIER: That may be.

Yes. Thank you.

Q. So I think when this slide was up, Dr. Carroll, you indicated that not in your experience have you used this kind of mixed parameters in a modeling exercise.

Is that -- was that your testimony?

A. That is my experience.

Q. So you yourself have not used this kind of mixed parameter in your modeling.

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A. That's -- that's my experience.

Q. And I think you said you're not aware that it's been used.

Have you -- do you have knowledge of when this has been used on other occasions by other people who have done geochemical modeling?

A. No, I do not.

Q. You're not representing that you've done a thorough search to determine that as part of your testimony.

A. That's correct. I'm just testifying on my experience.

Q. Yeah.

All right. I don't have any more questions, Madam Hearing Officer.

MS. ORTH: All right.

Mr. Knight, do you have questions?

MR. KNIGHT: I do.

CROSS EXAMINATION

BY MR. KNIGHT:

Q. Good afternoon, Dr. Carroll.

A. Good afternoon, Mr. Knight.

Q. You were not a member of the technical advisory committee that included a variety of soil cover design experts who achieved a consensus in drafting the

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prescriptive cover system that is included within the Copper Rule; is that correct?

A. That's correct.

Q. And you wouldn't consider yourself to be an expert with respect to design and implementation of cover systems?

A. That's correct.

Q. Are you aware that the very prescriptive cover system requirements in the Copper Rule are based on experience gained from implementation and performance monitoring of these types of cover systems within both a landfill and mining industry that have demonstrated that they are effective at meeting New Mexico Water Quality Act requirements?

A. I would say that I'm not -- I'm not aware of that. I would hope that would be the case.

When I did read the Copper Rule, it does describe a store-and-release cover, but there, to my knowledge, is not a lot of specification on like how that's to be designed or any requirements specifically as far as -- the only requirement is, I believe, a certain percentage of the precipitation, percentage of the infiltration. So a storage capacity.

Q. Let's see. Could we go back to -- I believe slide 32. That's the -- oh, sorry. It's 33.

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Slide 33, in this slide, I think you're -- is it correct you were testifying that the capture zone around the existing open pit might not be sufficiently large to capture contaminants that are found at the two monitoring wells, one at the north and one to the south of the current open pit?

A. Based on this figure, there is a potential that the capture zone may not include those. I think it warrants further investigation. I have not done that investigation, but there is a potential.

Q. If there were some way to enlarge the capture zone in that area around the open pit, would that increase the likelihood of contaminants at those wells being captured and contained?

A. Absolutely.

Q. Thank you.

That's all the questions I have.

MS. ORTH: All right.

Mr. de Saillan.

MR. DE SAILLAN: Thank you, Madam Hearing Officer. Again I just have a few questions here.

CROSS EXAMINATION

BY MR. DE SAILLAN:

Q. Good afternoon, Mr. Carroll -- Dr. Carroll, I mean.

1592

A. Good afternoon, Mr. de Saillan.
Q. First of all, you testified a little bit about the permeability of the andesite.
Were you here when Dr. Myers proposed that additional characterization be done of the andesite bedrock at the Copper Flat Mine?
A. I was.
Q. And do you agree with that recommendation?
A. Yes. I think I noted in the testimony that I believe additional characterization of several aspects of this Discharge Permit could be conducted -- you could -- you could definitely collect more data, and I think it would help reduce the uncertainty or at least bound the uncertainty which would allow for a prediction over a range of potential environmental impacts.
Q. Okay. Thank you.
And then I don't remember if it was on this slide or slide 34 -- and when I say this slide, I mean slide 33 -- but you talked about the -- the distinction between the area of open pit hydraulic containment and the open pit surface drainage area.
Was that on this -- on this slide?
A. Yes. It is. So the -- this green line -- this is slide 33. This is the open pit surface area, surface drainage area. So this is a surface water

1593

foot -- collection footprint.
So the surface water precipitation that will occur in this area should drain and report to this pit. I think that was the testimony of Mr. Finch, also. And that's surface water, and that's useful, but you also have groundwater to consider. And the groundwater will report to the pit based on these closed contours. And where the groundwater -- where the contour -- where arrows that are perpendicular to these groundwater elevation contours would -- would be pointing towards the pit.
And so you can see that the arrows that are pointing to the pit may not be a large enough -- they may not be the same areal extent as the surface water. So although it's great to have the surface water collected into the pit, the groundwater outside of the hydraulic sink may not be collected in that pit.
Q. Okay. That's -- you're sort of getting where I'm going.
So the area of the surface water drainage that drains into the pit, because it's outside the area of open pit hydrologic containment -- because of that fact, water infiltrating in the larger area could get into groundwater, but not necessarily flow into the pit; is that correct?

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A. I think that's possible.
Q. Okay.
And then, also on this slide, you talk -- again you talk about the -- the flow of groundwater.
Were you present when Dr. Myers talked about the possibility of fracture flow moving water or transporting water to the northeast?
A. Yes.
Q. And do you agree with that?
A. I would have to rely on the groundwater contours that are shown here and the next slide.
Q. Okay. Thank you.
A. So --
MR. DE SAILLAN: I have no further questions.
MR. CARROLL: All right.
MS. ORTH: Okay.
Does anyone present have questions of Dr. Carroll based on his testimony?
All right. Ms. Barncastle, do you have any follow-up?
MS. BARNCASTLE: Briefly. Thank you.
REDIRECT EXAMINATION
BY MS. BARNCASTLE:
Q. Dr. Carroll, the attorney for the New Mexico Environment Department just asked you whether you were a

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participant in the cover system's design committee, and you stated that you were not; is that correct?
A. That's correct.
Q. What department and college are you a professor in at NMSU?
A. The college is the Agricultural College at NMSU, and then the soil -- the department is called plant and environmental sciences, but it is also the soils department for the college. So all of the soil scientists are in the plant and environmental science department of the College of Agriculture.
Q. And going back to your slide 45, Mr. Butzier asked you about the reason in the report regarding why New Mexico Copper averaged the high concentration chemistry when -- and then took the low concentration late time data for toxic heavy metals.
Do you recall that question?
A. Yes.
Q. And in connection with that, you were asked if that was a reasonable thing to do, and you stated no; is that correct?
A. Yeah. I stated that it's my experience that it would not be a reasonable approach.
Q. Could you elaborate on your opinion further?
A. Well, one of their reasons is that -- that the

1596

chemistry of a water especially with water-rock interactions is not really just one reaction. There are several reactions that are occurring. And what they're doing with these humidity cell tests is they're measuring several constituents that are dissolving from the rock.

So I would imagine that the water chemistry may have some dependence between the constituents in the water. So it's basically a function of several reactions, it's a function of all of the constituents in the water. I'm not sure it makes sense to only use part of the chemistry from a water sample and not use another part of it.

MS. BARNCASTLE: Thank you.

That concludes my direct and redirect for this witness.

MS. ORTH: All right. Thank you.

Any reason not to excuse Dr. Carroll?

No?

Thank you very much, Dr. Carroll.

MR. CARROLL: Thank you.

MR. BUTZIER: That's his rebuttal?

MS. BARNCASTLE: This concludes my case in chief and rebuttal, and -- yeah, with the exception of my closing argument which I'll submit in writing.

1597

MS. ORTH: In writing, yes. Thank you very much.

Let me ask now, since we've just finished the final technical witness and the direct case, if there is anyone who would like to offer public comment. This would be a good time. And it will be one of your last chances.

No?

All right.

Mr. Butzier, I invite rebuttal in the same order in which the direct case was made.

Do you have rebuttal?

MR. BUTZIER: I do, Madam Hearing Officer, but I've lost my mic.

MS. ORTH: Oh, yes.

MS. BARNCASTLE: You've lost your mind? What?

MR. BUTZIER: Yeah. That, too.

MS. ORTH: The communal microphone over here.

MR. BUTZIER: Madam Hearing Officer, we would like to just very quickly run through each of our expert witnesses in rebuttal. I don't expect it to take very long at all. So --

MS. ORTH: All right.

MR. BUTZIER: I don't want you to be afraid that since we're going to put them all five on we're

1598

going to be here until midnight.

MS. ORTH: All right. I'm here for it.

Do you need a short break in order for them to set up?

MR. BUTZIER: I don't think so. I think we're ready.

MS. ORTH: All right. Let's press on.

MR. BUTZIER: While we're getting our slideshow together, I'm going to pass out the slides we're going to use in the rebuttal.

MS. ORTH: Thank you.

(Discussion off the record.)

MS. BARNCASTLE: Madam Hearing Officer, I was remiss in -- I forgot to move the admission of Dr. Carroll's slides, and since those were primarily rebuttal, I don't believe they were required to be submitted beforehand with our statement of intent. So I'd like to move the admission of those slides now at this point in time.

MS. ORTH: And how would you mark them?

MS. BARNCASTLE: I would mark them, staying consistent with the previous numbering, even though I've decided not to admit several into evidence, Exhibit EBID Exhibit 22.

MS. ORTH: 22.

1599

Any objections to the slides?

MR. BUTZIER: I apologize. I missed what it was that we're --

MS. ORTH: She offered Dr. Carroll's slides as Exhibit 22.

MR. BUTZIER: Yeah. No objection.

MR. KNIGHT: No objection.

MS. ORTH: All right. Thank you.

It's admitted.

(Exhibit EBID 22 admitted into evidence.)

MS. BARNCASTLE: And I will send around a copy of that as soon as I get back to civilization with a faster Internet service. Mine doesn't work here. For whatever reason, my phone doesn't want to work at all. So unless someone has a hot spot for me to send this out right now, which I could do.

MS. ORTH: All right. Thank you very much for offering.

Mr. Smith, you remain under oath.

JEFFREY SMITH

having been previously duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Good afternoon, Mr. Smith.

1600

Am I correct that you've been present throughout the week-long hearing?
A. I have.
Q. And do you recall the testimony of Dr. Myers relating to open pit contours?
A. I do.
Q. And do you have a response to some of the points that he made in connection with that?
A. Yes. I just want to clear up some confusion that I saw in Dr. Myers' testimony about the contours.
This diagram on the screen is the same open pit outline that Dr. Myers showed in his testimony. What's missing is the water that was there that was present.
These contours in this pit are mid-bench contours. The confusion that I sensed during the testimony was they were confused perhaps with being the toe elevation of the bench. But standard practice in open pit design uses mid-bench contours to outline the pit benches.
The toe and crest lines are not shown. These will be -- these contours are drawn at the mid-bench interval. At the Copper Flat open pit, the bench height is 25 feet, and so the mid-bench interval will be 12.5 feet up the bench face.

1601

So the elevations that are shown are the bench elevations. This is the 4,900 bench here. And this contour line above the 4,900 is the bench elevation plus one-half of the bench height, or that is the 4,912.5 elevation contour, which circles the entire bench. The elevation of that contour on the outside of the 4,900 bench is actually 4,900 minus -- or -- I'm sorry -- 4,900 minus 12.5.
So the water level that we show is at the -- slightly below the 4,900 bench.
Q. And at reclamation and closure, what will happen on that bench?
A. That bench will stay dry.
Q. And will anything be added to cover that as part of the reclamation?
A. As part of the reclamation, there will be three foot of cover placed on that bench. So the final elevation will be raised three feet, to 4,903 elevation.
Q. And is part of the design of the pit intended to avoid having the pit lake extend onto federal public lands?
A. Yes. That's correct.
Q. And are you confident based upon the input you've received from your hydrology consultants that that will occur based on a steady-state pit?

1602

A. Yes, I am.
Q. Okay.
Now, you, Mr. Smith -- you have overseen basically all aspects of the consultant work and the development work in connection with this property, correct?
A. Yes, I have.
Q. Has there been anything that you've heard over the course of this week that causes you to feel you need to change your testimony or your approach?
A. No.
Q. In your view, would the granting of DP-1840 pose either a hazard to public health or undue risk to property as contemplated by the Copper Rule?
A. Granting the permit will not result in what you've described.
MR. BUTZIER: Thank you.
That's all I have for Mr. Smith.
MS. ORTH: All right. Thank you.
Mr. Knight?
MR. KNIGHT: I have no questions for this witness.
MS. ORTH: Okay.
Mr. de Saillan?
MR. DE SAILLAN: Yeah. Just -- if I could

1603

have just a second.
MS. ORTH: Yeah.
MR. DE SAILLAN: I need a microphone, as well.
CROSS EXAMINATION
BY MR. DE SAILLAN:
Q. Now, Mr. Smith, I think that the -- and, unfortunately, I don't have the other map handy, but there was another map that Dr. Myers referred to that showed different levels for the pit lake?
A. I'm not sure what you're referring to.
MS. BARNCASTLE: Can I just ask off the record just for my reminder sake?
(Discussion off the record.)
Q. (BY MR. DE SAILLAN) So, Mr. Smith, I've just provided you with an exhibit from Dr. Myers' slide presentation, and it shows side-by-side two depictions of the open pit. And the one on the right, I think, has labeled contours, which don't exactly correspond to the numbers that you've just suggested.
So I'm wondering if you can explain the discrepancy.
A. The labels on Figure 3.13, Jones and Finch, correspond to the contours, the bench elevations. So the contours are labeled. This flat bench is the 4,900 bench elevation.

1604

Q. Okay.
Thank you.
I have no further questions, then.
MS. ORTH: All right.
Ms. Barncastle?
MS. BARNCASTLE: I have no questions of this witness. Thank you.
MS. ORTH: Thank you.
Anyone else have a question of Mr. Smith based on his rebuttal testimony?
No?
Any follow-up?
MR. BUTZIER: No follow-up.
MS. ORTH: All right. Thank you very much, Mr. Smith.
MR. BUTZIER: I'd like to next call Mr. --
MS. ORTH: Are you offering 106?
MR. BUTZIER: Yes. Thank you.
I would like to offer into evidence Exhibit 106.
MS. ORTH: Any objections?
MR. KNIGHT: No objection.
MS. ORTH: Mr. de Saillan, do you object to the admission of 106?
MR. DE SAILLAN: No objection.

1605

MS. BARNCASTLE: No objection.
MS. ORTH: All right. 106 is admitted.
(Exhibit NMCC 106 admitted into evidence.)
MR. BUTZIER: I'd like to call our next rebuttal witness, Mr. Steve Finch.
MS. ORTH: You are still under oath, Mr. Finch.

STEVEN FINCH

having previously first duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Mr. Finch, have you been present throughout this week-long hearing?
A. Yes, I have.
Q. And did you prepare a series of PowerPoint slides to assist you in discussing and responding to some of the points made in the hearing?
A. I have, as rebuttal exhibits.
MR. BUTZIER: And could we call that set of slides up, please.
Okay. Thank you.
And going to the next slide.
Q. There's been a lot of discussion about the permeability or hydraulic conductivity of the andesite,

1606

and some witnesses have brought into question your assessment of the hydraulic conductivity.
Would you like to respond to those points, please?
A. Sure. I'll -- first I kind of want to revisit it wasn't just my idea of the low-permeability andesite. It's been well known for quite some time.
And up on this, which is slide 2 of my rebuttal exhibit, I have a list of references that play into that. So I'm just going to go briefly through each one.
Shomaker is the first one that really described the andesite block and the Animas Uplift as a low-permeability unit. And his observations were based on the local geology, mining workings and results of -- of dewatering efforts for mines within the andesite. So that's historical documentation. Then some selected hand-dug wells and things and mine shafts that he observed from that.
And then moving on, in 1996, there was a consultant, Adrian Brown, that did some of the testing that I presented the results for the andesite. So the slug tests were performed by -- by them. So that is documented in -- throughout our reports for this project and in the record.

1607

Then again SRK did independent analysis and came up with the same result.
Now, I put up here on number 4 JSAI, 2011, which was the Stage 1 Abatement Plan amendment. I had to abbreviate that. I apologize. And in that amendment, that was just the plan of what we're going to do for sampling under Stage 1 Abatement, but we also recognize there from the previous work that the andesite is of low permeability.
And the baseline data report, this is reflected INTERA -- by INTERA independently.
And then under number 6 here, it's described in detail in our Stage 1 Abatement. And unfortunately, I think some of the other reviewers have overlooked a lot of the information that's in the Stage 1 Abatement. I'll briefly go over that.
And then to further validate that, Mike Jones, one of my coworkers -- or who I work with at John Shomaker & Associates, did the model and calibrated the model and found that the andesite is of low permeability.
So those are the reference materials, and these are all throughout the reports that we have prepared for this project.
I'll just briefly go over Shomaker's concept.

1608

This is slide 3.
And I believe this was an exhibit out of my original direct. It's a regional geologic map. And the only thing I've done here is I've added the blue -- the blue flow arrows.
And so what Shomaker noted was that there was regional flow coming out from the west that went around this andesite block. So -- and that's also what creates springs. I believe there's a spring over here and the springs that go -- that come out of the -- the bedrock along the Animas Uplift to the north.
So therefore, flow to those springs does not come from the andesite -- that was his conclusion -- because of its low permeability and its extensive depth.
This is a table that Mr. Myers presented, and I did have to go back in time to figure out where this came from, but it's from the Stage 1 Abatement amendment that we did in 2011.
And he noted that a lot of the wells that -- in this table that had well type of supply and they were in the andesite. What you'll find, if you knew about these wells and if you've been to them, most of them are hand-dug, they don't yield water as you would think of as a supply well, and are not even operable as a supply well.

1609

Q. And, Mr. Finch, just to lay a little groundwork for that, have you personally been to all of these supply wells that were listed on this in the andesite?
A. I have in the course of, yes. All the other projects I've done at this site and area.
So I want to briefly point out some of these wells on this map, which comes out of the same report.
This is slide 5 out of the JSAI, 2011, Stage 1 Abatement Plan amendment.
In this map, the wells that were listed in the previous table are shown here. And you'll see these -- first of all, this is an areal map, and if you look at this color change, this is the andesite limits. You can see the circular nature of the andesite. Within that you'll -- there are -- these labeled here is Dolores, Pague, and then the Pitchfork wells we talked about, and then there's a couple of others out here.
If you look at all those wells that were -- those were the supply wells that were mentioned in the table. They're all in drainages. And what we found through detailed analysis of particularly this one, the Pitchfork, is that it's based on the chemistry that the water resembles surface water. So it's infiltrated surface water. And --

1610

Q. Mr. Finch, is that the Rogers Well?
A. I believe it is. I always refer to it as GWQ-4 back from the '93 study.
Q. Okay.
A. Many of these other wells are hand-dug. These are hand-dug mine shafts. And as Dr. Shomaker had explained to me, most of those are holes that fill up with near surface seeps that are resembling precipitation that has -- that's moving along the valley bottoms. And the alluvial material are the weathered bedrock horizon.
The only reason why they're labeled as supply wells is to differentiate them between their -- the construction of the other wells listed on here which are monitoring wells. And the monitoring wells have a specific -- they're specific to this project for monitoring groundwater and sampling.
The other thing to point out is that our area that we're talking about for the andesite is on the side of Animas Peak. It's not in a valley. Completely different. And the same as the results of GWQ-5R, which is over here. It's also out of the valley, which I believe Mr. -- Dr. Myers calculated the hydraulic conductivity of that as less than 10 to the minus-7 centimeters per second.

1611

Another line of evidence for the low permeability in the andesite comes from the Stage 1 Abatement report of -- I apologize. It's not -- I believe it's 2014. This is Table 3 out of the first year Stage 1 Abatement results.
And there are several tables that list the field data, and this is one of the tables. There's field data for each quarter of data collected.
And over here, these two wells are andesite, if you remember these numbers, GWQ96-22B, and then these are in the monzonite, 96-23A.
If you look over here in the far column under comments, you'll see pumped off, and then a micropurge in screen, pumped off. We're able to get -- each time we sample these wells, we never -- we rarely got anything more than a well volume.
And if I -- I believe I overheard Dr. Myers say something to the effect that that would constitute low permeability in his direct, if you looked at how much the well would yield.
You'll see the same results, I believe, I presented as far as the -- the ability of a well to yield water was in that graph I presented in my direct testimony for GWQ-5R.
Moving on to slide 7, I want to switch to a

1612

different topic, and that is the East Animas Fault that has been -- which we characterized as a barrier. But that's been questioned by others.

There's a lot of data that goes into that characterization and that I summarized in my direct that didn't really have -- go into great detail on in regards to how we evaluated that data.

This comes from -- this slide 7 is a graph that comes from the modeling report, which is Jones, et al., 2014. And these -- this hydrograph represents -- we have on the Y axis water-level elevation, and we have date on the bottom. And you can see this is every 10 years for the major date.

So they start the water levels for these wells for right below the tailings dam. And in these wells, you'll see when Quintana operated water levels went straight up, and there was a little delayed effect on a couple of these due to they're off more to the side.

But one thing we found was that the water levels stayed there. See out in time here, this is -- this represents baseline data. So they flattened out and stayed there. And so did the sulfate concentration resembled the same trend.

The groundwater model was calibrated to very exact response. We had estimates of seepage from the

1613

tailings impoundment, we calibrated to this data, and the only way we could get this data to calibrate was having a barrier boundary there representing the East Animas Fault.

Q. So, Mr. Finch, would it be incorrect, as a couple of witnesses have characterized, that the characterization of the Animas fault as a barrier was based on one well that was on the eastern side of the fault line?

A. Right. That's not the full picture.

Q. Thank you.

A. Presented here as slide 8 is -- we've seen this before many times. This is the cross-section through the tailings impoundment area.

This is slightly different. This comes from the Stage 1 Abatement. And the only difference here is I have sulfate concentrations shown in the wells that were sampled on either side of the fault below the tailings dam.

I'm going to zoom this up a little bit. I believe this is Figure 9 from the Stage 1 Abatement report of 2014.

The next slide, slide 9, will be a zoom-in on this. And this is the sulfate plume, actually probably likely extends up to the water table here, that resides

1614

currently beneath the tailings impoundment. As you can see from the data, it has not gone much further than -- than this zone because of this barrier effect. Even on the other side we have extremely low concentrations of sulfate.

So with all this line of evidence, that's what we have used to show that this fault acts as a barrier to flow and that the plume has not migrated beyond this fault zone.

The other thing I'd like -- the other lines of evidence, this well was intentionally put directly downgradient of this. And we believe if there was flow through the fault, it would have been at that well. That's why it was located where it was.

And if you took the results from Mr. Myers -- or Dr. Myers' interpretive model, when I -- when I looked at it -- I don't have his slides, but the one thing is it's -- you're forcing flow through the -- through the boundary that you created because you have these constant heads that simulate somewhere on the order of 1,300 gallons a minute.

Even though he's adding these little bits of -- you know, like 20 gallons a minute or four gallons a minute of seepage from the -- from some source, the system is simulating 1,300 gallons a minute through it,

1615

which, to me, is -- is not the proper way to do even an interpretive model of this as -- because we have no -- we have no mechanism with the hills behind there to force 1,300 gallons a minute through that -- that area of the model.

You can look at the model report. There isn't -- in that zone, there is nothing that you can -- you can't get 1,300 gallons a minute of recharge from the andesite block or even from the run-off from it. So there's a fundamental flaw in his interpretive model.

Another just quick line of evidence that would have been -- that would have been useful to check the interpretive model with so you can limit your uncertainty is you can take the baseline data and see if there's any signs of this contamination moving downgradient.

There are numerous wells going all the way out to Caballo. There's the production wells, and there's a series of test wells, MW1 through MW6, 7 or 8, I believe. They are all drilled out east of this area. And those were all sampled as part of the baseline data collection with no indication of elevated sulfate.

Q. Did you have anything you wanted to say, Mr. Finch, on some of Dr. Myers' conclusions relating to the spacing of monitoring wells?

1616

You had testified in your direct testimony that you thought the proposed monitoring wells that were originally proposed without the additional ones NMED has proposed were adequate.

Do you have anything you want to say? You don't have to if you don't want to, but --

A. I think the spacing is adequate, and even if you consider the theory that Dr. Myers had that you'll have some dispersion, then we're still going to detect contaminants even if it's not in the direct line of fire, and that will -- if you read the Copper Rule, that requires additional monitoring.

So there are safeguards in place with the Copper Rule that allows for additional investigation if something is detected.

Q. Now, you have served as a hydrogeologist consultant for New Mexico Copper on this project as well as for years prior on other projects related to this same site; is that correct?

A. That is correct.

Q. Did you hear any -- and were you here throughout the entire week of the hearing?

A. I was.

Q. Did you hear anything in the course of the testimony that came out in the hearing that causes you

1617

to change any opinion expressed or create any lesser confidence in the opinions you expressed in your direct testimony?

A. I have the same level of confidence as I expressed in my -- or demonstrated in my direct, and I have no change.

Q. And in addition to serving as the hydrogeologist consultant on this project, is it the case that you worked closely with and shared data and reviewed data with SRK, who is the geochemistry consultant on this project?

A. That's true. There's -- there's a lot of peer review amongst ourselves between my company, SRK, even New Mexico Copper employees and Golder, and it's -- it was -- and Dr. Shomaker, for that matter. I can almost treat him as a -- everybody knows him. He is like an independent reviewer within our company.

Q. And based upon that involvement -- and you were admitted as an expert not only in hydrogeology, but as geochemistry, as I recall; is that correct?

A. That is correct.

Q. Based on those disciplines and your involvement and review of others' work on this project, in your opinion, in your professional opinion, if DP-1840 were to be granted, would it pose a hazard to

1618

public health or undue risk to property, in your opinion?

A. It would not.

MR. BUTZIER: That's all I have.

MS. ORTH: I'm going to go first.

EXAMINATION

BY MS. ORTH:

Q. Mr. Finch, I have a question.

I think it was Dr. Myers who questioned the depiction on this slide of the red clay to the east of well GWQ94-21, and to the west of well MW-4 -- oh, which is projected, I guess.

Do you remember he questioned the depiction of the red clay there?

A. I do remember him questioning some aspects of our -- where we have the red clay.

Q. So my question would be what is that depiction based on?

A. What we have shown here?

Q. Yes.

A. The well logs presented. You see the data. So we have much more detailed data on MW-4 as than what was -- than what he looked at from the Stage 1 Abatement. Their original logs provide way more detail than what the summary has provided in the diagrams, I

1619

believe, of where he got the Stage 1 Abatement, as -- it's just a summary of geology next to the -- to the well completion diagram.

And our -- this was an effort that was not only done by me, but others in my office. Dr. Erwin Melis is a structural geologist, very familiar with this area, contributed to this.

So the red clay -- we do know it resides in MW-4, at that interval, and then the others to the west of the fault is defined by the -- the other well logs.

Now, there are -- this is interpreted right between that one well log and the fault zone, and -- but we -- we feel that that's a solid interpretation based on the modeling efforts and all the other data I showed, that there has to be some there to hold the water back, in these beds.

MS. ORTH: Okay. Thank you.

Mr. Knight, do you have questions of Mr. Finch?

MR. KNIGHT: I do not.

MS. ORTH: Mr. de Saillan.

MR. DE SAILLAN: Yes, I do.

Thank you, Madam Hearing Officer.

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CROSS EXAMINATION
BY MR. DE SAILLAN:
Q. Good evening, Mr. Finch.
A. Good afternoon or evening, however you define that.
Q. I'm sorry?
A. I said good afternoon or evening, however you define that.
Q. Okay.
Actually, Madam Hearing Officer, I was wondering if I could have like about two minutes to consult with one of my experts.
MS. ORTH: Certainly.
MR. DE SAILLAN: Thank you.
(Proceedings in recess from 5:27 p.m. to 5:33 p.m.)
MS. ORTH: Let's come back from the break. Mr. de Saillan.
MR. DE SAILLAN: Thank you.
Q. I want to go to your first slide after the title page, please, Mr. Finch.
And you listed a number of sources here, and, first of all, I want to ask you if these are all, to your knowledge, in the administrative record for this proceeding.

1621

A. I believe they are referenced. Some are -- the complete documents are in there, or they're referenced in those documents.
Q. Okay.
Do you know which ones are in the administrative record and which ones are merely referenced in other documents that are in the administrative record?
A. 4 through 7, I'm fairly certain all of those are in the administrative record. 1, 2 and 3 are references that come out of the Stage 1 Abatement and also the modeling groundwater flow which is -- well, actually 1, 2 and 3 are referenced throughout 4 through 7.
Q. Okay.
Now, you referred, first of all, to the Shomaker, 1993, report, and you said that that was based on -- I believe you said local geology and hand-dug wells; is that correct? Or was there more to it than that?
A. There was more to it that was -- there were -- Dr. Shomaker also looked at the pumping rates out of the Quintana pit and used that to calculate a hydraulic conductivity.
Q. Okay.

1622

But that information is not in the administrative record.
A. It is. It's all discussed in the number 7 reference here, or I believe there's a lot of it that's appended in Jones, et al., 2014.
Q. Okay.
And then the next one you mentioned is the Adrian Brown report, and you say he did -- I believe you said he did an independent analysis? When you say an independent analysis, do you mean he collected additional data and drew his own conclusions --
A. Certainly.
Q. -- or do you mean that he merely relied on the work that Dr. Shomaker had done?
A. He did his own analysis.
Q. And what data did he rely on?
A. Well drilling. So the wells that we've been talking about, the -- I believe the GWQ96-22 and 23.
Q. Okay.
A. Those were drilled and tested by Adrian Brown.
Q. Okay.
And then the 1997, SRK, I think -- I believe you said that was an independent analysis, also.
So what data did he rely on -- or did they rely on? Excuse me.

1623

A. They relied on all the previous data, so from Adrian Brown, Shomaker. And as far as what they collected on their own, I'd have to go back and -- and redo that. But their -- their report is independent of Adrian Brown and Shomaker.
Q. Okay.
But they were still relying on the same data, which is -- as far as the Adrian Brown wells, we're talking basically two data points.
A. Four, because each one --
Q. Okay. Each one had a deep and a shallow.
A. That's correct.
Q. Okay. I stand corrected.
Okay. Let's move on to the next slide, then.
I want to look -- I want to direct your attention to the left side of this slide -- and we're looking at slide number 3 here -- which shows a number of arrows on the left side, which seem to indicate the flow of groundwater around the pit?
A. No.
Q. Okay. Could you explain to me what those arrows mean, then?
A. Those are regional flow arrows around the andesite block that's in green. That -- that's a -- this map is more or less an illustration of how Shomaker

1624

conceptualized the andesite block within the Animas Uplift.
Q. So those arrows are not groundwater flows?
A. They are.
Q. Okay.
That doesn't seem to correspond to the other maps that we've seen throughout this proceeding that show groundwater flow through this area from the west to east.
A. That's --
MR. BUTZIER: Madam Hearing Officer.
MS. ORTH: Yes.
MR. BUTZIER: Do we have a specific reference?
Because I think some of those maps were on a much smaller scale than this one.
MR. DE SAILLAN: I -- I think that's true, Mr. Butzier, but certainly not true of all of them, and none of them -- none of them depicted anything like this.
MR. BUTZIER: Madam Hearing Officer, if he's going to be asking generally about how this compares to other maps, I'd like to know what maps we're talking about.
MS. ORTH: Yeah.
MR. DE SAILLAN: If I could have just a

1625

second, please.
MS. ORTH: Yes.
(Proceedings in brief recess.)
MR. DE SAILLAN: Okay. Let me try -- or let me move on to the next slide.
Q. You -- with reference to slide 4, you mentioned that some of the wells there were -- were hand-dug wells, but they were nevertheless dug below the water table, right?
A. It's difficult to determine if they were below a regional or perched water table without having an additional well next to it that's deeper.
Q. Okay. You also -- I think when you were testifying, you said most of these wells were hand -- hand-dug.
Could you explain which ones were and which ones were not?
A. I believe it's pretty close, although that was in 1993. I'll do my best here.
We -- under GWQ-6(N) and 6(S) -- this is slide 4 of my rebuttal exhibit -- those are the Hillshire House wells, which are on the mine site property there. Right west of the tailings impoundment, there's a house on top of the hill. That house has -- has not -- anybody in it, and those wells haven't been used, but

1626

one of those is hand-dug to about 30, 40 feet.
Q. Okay.
So --
A. It's in a drainage.
Q. So one of them is hand-dug.
Is the other one hand-dug?
A. The other one is cased to about the same depth, I believe.
And then moving down this -- I guess we have to go all the way down to the bottom here. The Dolores is a mine shaft. Pague is a hand-dug. The Paxton Well is a hand-dug well.
I believe LRG-4156 is probably Pitchfork Ranch, and that's not hand-dug. That one's drilled.
And -- what else do we have left here?
I believe that covers it, but I'm not sure if I got them all, but --
Q. Well, there are, I think, two more at the bottom there.
So those ones were not hand-dug?
A. I'm not sure about LRG-4159, is the only one I see at the bottom there. If you look at the depth, that's another key here. So that one is not hand-dug. So that one has a screen. Paxton is, obviously, a mine shaft given its size, or maybe it's hand-dug, either

1627

one. Those -- yeah. Okay. That covers it.
Q. Okay.
The next slide, you indicated that -- I think you said water chemistry data indicated that the Rogers Well was supplied by surface water?
A. That's correct.
Q. What kind of water chemistry led you to that conclusion?
A. Back in '93 we collected a sample. I don't believe they were allowed to collect a sample during the baseline data assessment, that being INTERA. So I used that data and collected through the stormwater samples that we get from SWQ-1, which is very close proximity to that well. And that was done -- it's not part of the administrative record, but it was done as a response to the EIS, the Draft EIS.
So we wanted to -- we were asked to look to see what the effects of this project would be on that well.
Q. So is it possible, in your view, that it could have been partially surface water and partially groundwater?
A. That's a possibility. Yes.
Q. Okay. Let's move on to slide number 7, please.

1628

And you reached some conclusions about mounding here from beneath the tailing storage facility, and you referred to a mounding of the groundwater when you -- when you discussed this; is that right?

A. That's correct.

Q. Now, wouldn't that mounding phenomenon have continued as a result of -- continued in time as a result of additional precipitation and additional draindown of the tailings?

A. Well, there really is not much tailings there to drain down.

Q. Okay.

Well, then, what about infiltration of precipitation?

A. It's so small in comparison to what was added during the start-up of the tailings impoundment, that was unlined. There are estimates of water at -- infiltrated from start-up of that that is in the model report.

Q. Okay. But precipitation would have still created a similar albeit smaller mounding occurrence.

A. It could have depending on the rain patterns.

Q. Okay.

And then the next slide, which is number 8 --

1629

maybe it would be easier just to go to number 9, because that's a little bit bigger.

I just want to make sure I understand the -- you have no data to support the -- the drawing of the red clay between the well marked GWQ94-21B and the fault; is that correct?

A. As I believe I explained to the Hearing Officer, that we do not have well data, but we have other data that supports the clay being there.

Q. Okay.

And how long of an area is that? In other words, what is the distance from that well that I just mentioned to the fault, according to this scale?

A. Based on where we have the fault located, which is somewhere between those two wells, it could be 200 to 500 feet.

Q. Okay.

And again the well -- I mean, the fault location is not precise, it's estimated?

A. Well, it's precise as you're going to get it here. I mean, it's way more precise than others that have been estimated.

Q. And I -- I also want to make sure I understand the labels on the data here.

It looks like most of the data that's

1630

indicated for the wells was collected in 1996?

A. No. We have 2010, and then 2013 is -- would be this well -- GWQ13-28.

So when you read these well numbers, and when you read GWQ then the number, that's the year in which it was drilled, and then -- then there's a number -- a dash and a number that follows that. So that well was drilled in 2013.

So there are a mixture. The ones without labels are from the Stage 1 Abatement and were collected in 2013.

Q. Okay. So that's still five years ago.

Okay. Thank you.

I have no further questions.

MS. ORTH: All right.

Ms. Barncastle?

MS. BARNCASTLE: Just a -- yes.

MS. ORTH: All right.

MS. BARNCASTLE: I need a --

MS. ORTH: Would you send the microphone over.

MS. BARNCASTLE: I got two coming.

There we go.

1631

CROSS EXAMINATION

BY MS. BARNCASTLE:

Q. I'm on slide 9. Okay. You're there.

Looking at this contamination plume, I'd like to know how the limits of that plume were determined from one well.

A. It's not. There are wells that -- that's just the one well in the cross-section. There are other wells that are north and south to the cross-section. If you look at the full report, there is a plan view of the plume, and then there are cross-sectional views of the plume.

Q. Okay. So those are just not shown on this diagram.

A. That's correct.

MS. BARNCASTLE: Okay. No further questions.

MS. ORTH: All right. Thank you.

Does anyone else have a question of Mr. Finch based on his testimony?

No?

Mr. Butzier, do you have any follow-up?

MR. BUTZIER: I have no further questions of Mr. Finch.

MS. ORTH: All right. Great. Thank you.

Mr. Finch, you're excused again.

1632

MR. FINCH: Thank you.
MR. BUTZIER: I'd next like to call Dr. Ruth Griffiths.
Actually -- I'm sorry. I did forget one question, with your indulgence, Madam Hearing Officer.
MS. ORTH: All right.
MR. BUTZIER: Or did I ask it?
Did I ask you the -- I think I did ask you.
No -- I have no questions.
MS. ORTH: Okay.
MR. BUTZIER: Sorry.

RUTH GRIFFITHS

having been previously duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Good evening, Dr. Griffiths.
A. Good evening.
Q. Have you been at the hearing throughout the week?
A. I have.
Q. And have you listened to all of the testimony?
A. I have.
Q. And have you heard anything over the course of the week that causes you to change your opinions that

1633

you expressed as part of your direct testimony?
A. No. I haven't heard anything that would cause me to change my opinion.
Q. Okay.
Now, there were some questions -- or there was some testimony that we received from Dr. Carroll relating to static and kinetic testing.
Do you recall that?
A. I do.
Q. And there was also some testimony from Dr. Carroll that seemed to draw into question the use of mixed data, so to speak, in connection with some of the modeling parameters that were used in your modeling, correct?
A. Correct.
Q. Could you -- do you have any response that you would like to provide to either or both of those issues?
A. Sure. So firstly, if we go to the static versus kinetic testing data, I believe I kind of responded to this in my direct testimony, but, you know, static testing is commonly used as a screening level test. It's conducted on pulverized material, and it's just looking purely at the potential for ARD.
Whereas kinetic testing evaluates rates over time, it takes into account the mineralogy of the

1634

sample. So it's carried out on a -- on a crushed rather than a pulverized material. So it's much more representative of the weathering rates you would expect in the field.
Q. And what about the mixed parameters?
A. Sorry. If I could just add --
Q. Oh.
A. -- further.
Q. Okay. I'm sorry.
A. I think with the Copper Flat project we've also established that the mineralogy is very important. We recognize that there's encapsulation of sulfide minerals and slow-reacting silicate minerals, and for that reason, you know, we feel that the kinetic testing measure is a much more reliable indicator of acid generation.
Q. Okay.
And do you have anything you'd like to respond to in relation to the testimony from Dr. Carroll relating to mixed parameters?
A. Yes. In response to that, I would say there's perhaps no standard method for incorporating humidity cell data into models. And in my experience, I've seen all weeks of humidity cell data used. I've seen steady-state weeks used. I've seen first flush weeks

1635

used. I've even seen just one single week of humidity cell data used.
And the reason we used the approach we did for this project is, as Dr. Carroll recognized, for calibration purposes, and we found that when we used that approach we saw a much better calibration with the existing pit lake.
Q. And so by doing so, did that increase your confidence in the modeling results that you received?
A. Absolutely.
Q. Okay.
Now, I asked Mr. Finch a question about whether he was involved in some of the geochemistry aspects of the Copper Flat project, and I'll ask you similarly.
Have you coordinated, and have you been involved in and reviewed the work of other experts involved in this -- in this project, including the geohydrology as well as the reclamation and closure aspects of this site?
A. Yes. We've been working closely with the other consultants ever since -- well, certainly, I personally started working on this project since 2010. And there's been a constant review.
I think, you know, the first stage in terms of

1636

receiving data, hydrological data for a geochemical modeling is -- geochemical model is to review that. So, you know, there was extensive review of both the water balance data and the -- and the reports and for use in the geochemical model.

Q. And based upon that involvement that you had on this project, if DP-1840 is granted, in your view, would it pose a hazard to public health or an undue risk to property?

A. In my opinion, it would not.

MR. BUTZIER: That's all the questions I have.

MS. ORTH: All right. Thank you.

Mr. Knight?

MR. KNIGHT: I have no questions for this witness.

MS. ORTH: Mr. de Saillan?

MR. DE SAILLAN: No questions. Thank you, Madam Hearing Officer.

MS. ORTH: Ms. Barncastle?

MS. BARNCASTLE: I have no questions of this witness. Thanks.

MS. ORTH: Anyone else?

No?

All right. Thank you very much, Dr. Griffiths.

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Mr. Butzier.

MR. BUTZIER: I'll next call Mr. David Kidd.

DAVID KIDD

having been previously duly sworn or affirmed, was examined and testified further as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Good evening, Mr. Kidd.

A. Good evening.

Q. Have you been present throughout the week and listening to all of the testimony in this proceeding?

A. I have.

Q. And have you heard anything this week from any of the witnesses that gives you reason to want to change any of the opinions expressed in your direct testimony or that gives you a lesser confidence in the conclusions you reported?

A. No changes in my opinions, and no changes in my testimony.

Q. Thank you.

Have you also been involved as part of a coordinated effort to conduct consulting services to New Mexico Copper in connection with the Copper Flat project?

A. Yes.

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Q. And in that context, have you interacted with, for example, the other Golder witness here, Mr. Todd Stein, in connection with closure and reclamation issues?

A. To a lesser extent, but yes.

Q. Okay.

But you've had some involvement with basically all of the consultants over the course of --

A. Yes.

Q. -- the work that you've done on this project?

A. Yes.

Q. Given all that involvement, if DP-1840 were to be issued by the New Mexico Environment Department, in your professional opinion, would it pose a hazard to public health or undue risk to property?

A. I don't feel that it would.

MR. BUTZIER: Thank you.

That's all I have, Madam Hearing Officer.

MS. ORTH: Okay.

Questions?

Mr. Knight?

MR. KNIGHT: No questions.

MS. ORTH: Mr. de Saillan?

MR. DE SAILLAN: No questions.

MS. ORTH: Ms. Barncastle?

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MS. BARNCASTLE: No ma'am. Thank you.

MS. ORTH: Anyone else?

MR. KIDD: Thank you.

MS. ORTH: Thank you.

MR. BUTZIER: One more witness, Madam Hearing Officer, Mr. Todd Stein.

TODD STEIN

having been first duly sworn or affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUTZIER:

Q. Good evening, Mr. Stein.

A. Good evening.

Q. Have you been present throughout the week and listening to all of the testimony in this proceeding?

A. Yes, I have.

Q. Have you heard anything that causes you to want to change any of your opinions expressed in your direct testimony or that gives you some lesser confidence level in the opinions you expressed?

A. No, I have not.

Q. Okay.

And have you likewise been part of a coordinated team of consultants on this project such that you've been involved with reviewing hydrological

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information, for example, as well as geochemical information?
A. Yes, I have.
Q. And as a result of that or given that involvement in this project, if DP-1840 were to be granted, do you in your professional opinion believe that it would pose a hazard to public health or undue risk to property?
A. I do not.
MR. BUTZIER: That's all I have, Madam Hearing Officer.
MS. ORTH: Thank you.
Questions?
MR. KNIGHT: No questions.
MR. DE SAILLAN: No questions.
MS. BARNCASTLE: We have nothing either.
MS. ORTH: All right.
Anyone else?
No?
Thank you very much, Mr. Stein.
Mr. Butzier, are you going to offer 107?
I noticed that each page had a different exhibit sticker.
MR. BUTZIER: Yes. I would. Thank you, Madam Hearing Officer.

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I would like to offer into evidence New Mexico Copper Corporation's Exhibit 107 through 115.
MS. ORTH: All right.
Objections?
MS. BARNCASTLE: No objection.
MR. DE SAILLAN: No objections.
MR. KNIGHT: No objection.
MS. ORTH: All right. NMCC 107 through 115 are admitted.
(Exhibits NMCC 107 through 115 admitted into evidence.)
MS. ORTH: Is that all, Mr. Butzier?
MR. BUTZIER: That's all, Madam Hearing Officer.
MS. ORTH: All right.
Mr. Knight, will the department have rebuttal?
MR. KNIGHT: We will not.
MS. ORTH: Okay.
Mr. de Saillan?
MR. DE SAILLAN: We've already presented our rebuttal, Madam Hearing Officer. So we are also finished.
MS. ORTH: All right.
And Ms. Barncastle.
MS. BARNCASTLE: We are completely done, as

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well.
MS. ORTH: Okay. Thank you, all.
Is there anyone left to offer public comment?
This is really truly your last chance.
No?
And by the way, for the parties' information, Mr. Baca and I have consistently informed people that for the purposes of this hearing, unlike the EMNRD hearing, public comment has to come in by today as opposed to subsequent to today.
So is there anything else we need to do except talk about the posthearing process briefly?
I assume we'll get the transcript. When the transcript is received by the hearing clerk, the hearing clerk will send a notice of transcript filing so that all parties know what day that is. And that's important, because that's the day from which we will count 30 days for posthearing submittals.
Mr. --
MR. BUTZIER: Madam Hearing Officer, I would request, given how many delays have already occurred in this proceeding, that we go three weeks rather than a full month from the receipt of the transcript to the submission of posthearing findings of facts and conclusions of law.

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MS. ORTH: How do the other counsel feel about that?
MR. DE SAILLAN: Madam Hearing Officer, we were actually going to suggest 60 days for submitting proposed findings of fact and conclusions of law and closing arguments as we have done in previous mine Discharge Permit hearings.
We would also like to have the opportunity to file responses to the other parties' proposed findings of fact, conclusions of law and closing arguments as we have also done in other mining Discharge Permit hearings.
MS. ORTH: I take it you're referring to the last set of hearings we did a long time ago, Chino and Tyrone.
MR. DE SAILLAN: Chino and Tyrone and Molycorp. Yes, Madam Hearing Officer, those are the ones.
MS. ORTH: Those are the ones.
Any other opinions about this?
MS. BARNCASTLE: I certainly would prefer more time rather than less, especially given that this was five full days of hearing, this is not going to be a short transcript.
And when Mr. Butzier refers to all of the

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delays so far, I can't venture to imagine what he's talking about given that my request for an extension was denied. So that's one -- at least one delay that did not happen. So the only possible delay that he could be referring to is the extension on the public comment period.

MS. ORTH: Okay.

MR. DE SAILLAN: Madam Hearing Officer.

MS. ORTH: Mr. de Saillan.

MR. DE SAILLAN: If I may, I would also point out, as you well know, that we have a Mining Act hearing -- permit hearing coming up in October which is going to occupy a lot of our time and a lot of your time, as well, as I understand.

MS. ORTH: Right. I don't know that we'll have the transcript by then, but thank you for that point.

Mr. Knight, any opinion?

MR. KNIGHT: Yes. Thank you.

Madam Hearing Officer, I certainly see no reason to deviate from the rules in terms of the times for posthearing submittals. Personally, I would be in favor of a three-week time period from the time the transcript is received. I know -- I know that I will personally be working on my posthearing submittal

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starting on Monday, and I will not be waiting for the transcript, and personally I see no reason to do that.

But, you know, certainly the transcript will be necessary to fill in the citations to such, but I -- my opinion is that three weeks from the time the transcript is filed is what I would prefer, but in no case would I -- would I be in favor of going beyond the time frames that are laid out in the -- in the rules.

MS. ORTH: 20.1.4.

MR. KNIGHT: That's right.

MS. ORTH: Right.

MS. BARNCASTLE: Madam Hearing Officer, if I might add, EBID has consistently leveled a complaint with the lack of time we have had to prepare for this hearing and to prepare for the public comment phase. So, you know, I would -- I would suggest to you that I am further aligning myself with Mr. de Saillan's position moving forward.

MS. ORTH: All right.

So, Mr. Butzier, any response?

MR. BUTZIER: Yes. I want to just draw attention to 20.1.4.500B, part of the hearing procedures applicable here. It does mention 30 days, which the Hearing Officer initially proposed.

I share Mr. Knight's preference for three

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weeks. If the Hearing Officer is inclined to hear the pleas for additional time, I would certainly not want to see it go beyond 30 days.

And I don't find anything in the procedural rules that contemplate the process that Mr. de Saillan proposed of responding to each other's. That -- there's a whole series, there's an opportunity for the parties after 15 days from receipt of the Hearing Officer's report to -- to respond and ask for a hearing at that point.

And so I don't think we need to elongate the whole process unnecessarily.

MS. ORTH: Yeah. We do have a lengthy process as it is set out in 20.1.4. So in consideration of the upcoming hearing for the other agency that we're doing, I won't shorten it from 30 days, but I don't feel as though it should be necessary to go to the 60 days you've proposed.

The last set of hearings we did, we spent at least two weeks in Questa on the Molycorp hearing, two weeks on Chino, two weeks on Tyrone. Those were at least twice as long as this hearing.

So for now, let's stick with 20.1.4, and I want you to assume that we're going to stick with 20.1.4 and the deadlines there for the -- for the time being

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going -- going forward to the end of the process.

The only other thing I can ask you to consider, Mr. Butzier, because I know you're paying for the agency's transcript, is an expedited process there. That's the only other thing I can think of.

MR. BUTZIER: Thank you. I will take that under consideration.

MS. ORTH: Okay.

Is there anything else we need to talk about?

Again the posthearing submittals will look like proposed findings of fact, proposed conclusions of law and any written closing argument you would like to make. It's not required, but it's often very helpful to have the perspective of the evidence that actually came in during this week and to argue from that evidence.

MR. KNIGHT: Madam Hearing Officer, may the parties advocating for the same position combine their posthearing submittals and -- to reduce the number of documents that you will -- the number of undoubtedly lengthy documents you will need to review?

MS. ORTH: You know what, I have an iron bottom. So I'm not going to ask them to do that. However, if that's something that occurs to them, certainly not objectionable to me, if you want to combine your proposed findings and conclusions, or even

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some of them, if you know what I mean, some of the more fundamental things you would find.

Another thing that I've seen, and again I don't find it objectionable, is because the applicant bears a lot of the burden here of proving that the permit should be issued and the department bears the burden of proving that the permit conditions they've suggested and the nature of their review that has to be proved by them -- I have seen cases in which those who either oppose a permit fundamentally and/or have conditions above and beyond what the department would like to impose focus their findings and conclusions on those.

It's a way of narrowing perhaps what you might have otherwise had in mind for the document.

MS. BARNCASTLE: I might just state for the record, though, in response to Mr. Knight's comment, that Mr. de Saillan and I were admonished to make sure we did not duplicate our testimony and cases.

MS. ORTH: Yes.

MS. BARNCASTLE: So suggesting that we file something together would be a little difficult given that we've presented two very different cases.

MS. ORTH: Right. And so I'm definitely not suggesting that to you. I think he was -- Mr. Knight

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was trying to be helpful, and I don't know that I can offer any other suggestion besides what I just offered.

Anything else?

Mr. Butzier?

MR. BUTZIER: Just a thank you to the court reporter --

MS. ORTH: Yes.

MR. BUTZIER: -- Cheryl Arreguin.

MS. ORTH: Yes. Thank you.

THE REPORTER: Thank you.

MR. BUTZIER: I know everybody shares in that.

THE REPORTER: Thank you very much.

MR. DE SAILLAN: And I will second that.

MR. KNIGHT: Here, here.

MS. ORTH: Great. Thank you so much.

Safe travels home.

And we're adjourned.

(Proceedings adjourned at 6:13 p.m.)

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STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, CHERYL ARREGUIN, the officer before whom the foregoing proceeding was taken, do hereby certify that the witnesses whose testimony appears in the foregoing transcript were duly sworn or affirmed; that I personally recorded the testimony by machine shorthand; that said transcript is a true record of the testimony given by said witnesses; that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this proceeding is taken, and that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in the action.

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