NEW MEXICO
ENVIRONMENTAL LAW CENTER

April 4, 2016

Doug Haywood, Project Lead
BLM Las Cruces District Office
1800 Marquess Street
Las Cruces, NM 88005

RE: Comments of Turner Ranch Properties, L.P. on the Draft Environmental Impact Statement for the Copper Flat Copper Mine

Dear Mr. Haywood:

Please accept these comments on the Draft Environmental Impact Statement ("DEIS") for New Mexico Copper Corporation's ("NMCC") proposed Copper Flat Copper Mine ("Mine" or "Project"). These comments have been prepared by the New Mexico Environmental Law Center ("NMELC") on behalf of Turner Ranch Properties, L.P. ("TRP"), owner of the Ladder Ranch ("Ladder" or "Ranch"), located adjacent to the Mine.

Ladder is an historic livestock ranch which originated in the 1890s. Throughout its existence, cattle, horses and sheep were the main economic drivers of the Ranch. Since 1992, Ladder has been owned and operated by TRP. The primary sources of income are bison production and sales, and commercial hunting, with eco-tourism emerging as a very important economic component of the Ranch's operation. Recently, TRP's ownership has launched "Ted Turner Expeditions," an affiliated enterprise focusing on eco-tourism on Ladder and affiliated ranches. In addition to these commercial activities, great emphasis has also been placed on the restoration of native wildlife species and the protection and management of State and Federally listed species (threatened, endangered and experimental populations), and to protect the area's night sky.

The Ranch is also an important contributor to the local economy. Ninety-five (95) percent of Ladder's employees are from Sierra County, New Mexico. This includes full-time, part-time, and seasonal employment. The Ranch and its employees contribute to the local economy by buying goods and services that sustain those families and Ranch functions. Groceries, fuel, electricity, building and maintenance materials, and independent contractors from Sierra County are all critical for efficient operation of the Ranch.

Ladder is deeply concerned about the Mine's adverse impacts to the environment (air quality, water quantity and quality, wildlife, and threatened and endangered species), the night sky and recreation. This concern is based on the Mine's proximity to the Ranch boundaries and the Mine's potentially damaging impacts on surrounding land. To the north, northwest and northeast the Ranch is the closest landowner to the Mine.

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Ladder contains four tributaries of the Rio Grande River – the Las Animas, Seco, Palomas and Cuchillo streams. These streams support abundant flora, including ancient sycamores and cottonwoods, and fauna such as threatened Chiricahua leopard frogs and threatened Yellow-Billed Cuckoos, and sensitive Rio Grande cutthroat trout, which it is hoped will be soon restored to the streams. Undoubtedly, Ladder's most distinguishing characteristics are its incredibly diverse wildlife (bison, elk, deer, antelope, mountain lions, bears, a captive population of endangered Mexican Grey Wolves) and its breathtaking mix of ecosystems, ranging from desert grasslands to pine forests in the foothills of the Black Range (Gila Mountains).

The DEIS is grossly defective in a number of ways. It inadequately analyzes the potential impacts of the Mine to Ladder and the surrounding area. Important alternatives have been improperly excluded from detailed analysis and many critical assumptions – especially relating to water quality and quantity – are based on insufficient data. BLM has also failed to adequately address whether NMCC's Mine Plan of Operation ("MPO"), including the reclamation scheme, will prevent unnecessary or undue degradation of federal land. BLM, under its own regulations, has a legal duty to affirmatively answer this question or require substantial revisions to the MPO.

Because of these reasons, we urge BLM to prepare and submit for public review a revised Draft EIS and not simply proceed to issue a Final EIS. At a minimum, a supplemental DEIS must be published for public comment to meet the National Environmental Policy Act's legal requirements. As mandated by the regulations governing environmental impact statements, "The draft statement [EIS] must fulfill and satisfy to the fullest extent possible the requirements established for final statements." 40 C.F.R. § 1502.9(a).

Thank you for your consideration of these comments.

Sincerely,

Jaimie Park,
NMELC Attorney

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COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE COPPER FLAT COPPER MINE

PREPARED BY THE NEW MEXICO ENVIRONMENTAL LAW CENTER ("NMELC") ON BEHALF OF TURNER RANCH PROPERTIES, L.P. ("TRP")

APRIL 4, 2016

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The proposed Copper Flat Copper Mine ("Mine" or "Project") will have to comply with a number of state and federal environmental statutes and regulations that regulate air quality, water quality, solid wastes, wildlife and vegetation habitat, cultural and archaeological resources, transportation and noise. First and foremost, the Draft Environmental Impact Statement ("DEIS") for the Mine violates the National Environmental the National Environmental Policy Act ("NEPA") because it:

- Fails to fully ascertain baseline conditions;
- Relies upon a flawed, biased model for groundwater flow that yields significantly erroneous conclusions;
- Fails to adequately analyze all reasonable action alternatives and the No Action alternative;
- Fails to adequately analyze the Mine's direct and indirect impacts to air quality, climate change, water quantity and quality, wildlife and Federally-listed species, recreation, transportation, and economy in Sierra County and at the Ladder Ranch ("Ladder" or "Ranch");
- Failure to adequately analyze Environmental Justice issues in Sierra County;
- Fails to adequately analyze cumulative, subsequent and related impacts on Sierra County and the Ladder Ranch;
- Fails to adequately analyze the Mine's mitigation measures and their effectiveness;
- Fails to adequately analyze New Mexico Copper Company's ("NMCC") financial resources and assurance – and therefore fails to adequately address bonding requirements; and
- Fails to disclose all DEIS preparers and to properly reference all supporting documents.

Second, the DEIS makes incorrect and unsupportable assumptions regarding the 1872 Mining Act. Third, the stated action alternatives in the DEIS would violate federal and state water quality standards. Finally, the DEIS violates the Federal Lands Policy Management Act and Bureau of Land Management ("BLM") §3809 regulations because all action alternatives will result in unnecessary or undue degradation of federal lands.

These violations of NEPA and Council on Environmental Quality ("CEQ") standards and state and federal law must be corrected either through a revised draft EIS or a supplementation of the DEIS. However, Ladder contends that even when these issues have been fully addressed the

BLM must conclude that the Mine cannot be conducted without unnecessary and undue degradation to the environment and, therefore, cannot be approved.

DETAILED COMMENTS

The following are detailed comments on how the DEIS violates several federal and state laws. First, the DEIS violates NEPA. Second, the DEIS is based upon incorrect and unsupportable assumptions regarding NMCC's alleged "entitlement" to have the Mine approved under the 1872 Mining Law. Third, all action alternatives violate federal and state water quality standards. Fourth, all action alternatives violate the Federal Lands Policy Management Act ("FLPMA") and BLM §3809 regulations because each will result in unnecessary or undue degradation of federal lands. For these reasons BLM must either revise or supplement the DEIS, and ultimately cannot approve the Mine.

I. The DEIS Violates the National Environmental Policy Act.

A. The DEIS Fails to Fully Ascertain Baseline Conditions.

Under NEPA, an agency must "describe the environment of the areas to be affected or created by the alternatives under consideration." 40 C.F.R. §1502.15. "Without establishing the baseline conditions...there is simply no way to determine what effect the [action] will have on the environment, and, consequently, no way to comply with NEPA." *Half Moon Bay Fisherman's Mktg. Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988). "In analyzing the affected environment, NEPA requires the agency to set forth the baseline conditions." *Western Watersheds Project v. BLM*, 552 F. Supp. 2d 1113, 1126 (D. Nev. 2008).

The lack of an adequate baseline analysis fatally undermines an EIS. "[O]nce a project begins, the pre-project environment becomes a thing of the past and evaluation of the project's effect becomes simply impossible." *Northern Plains v. Surf. Transp. Brd.*, 668 F.3d 1067, 1083 (9th Cir. 2011). "[W]ithout [baseline] data an agency cannot carefully consider information about significant environment impacts. Thus, the agency fail[s] to consider an important aspect of the problem, resulting in an arbitrary and capricious decision." *Id.* at 1085.

Baseline data that provides the basis for BLM's environmental analysis must be provided before a proposed action is approved, not afterward. *Id.* at 1083 (internal citations omitted) (concluding that an agency's "plans to conduct surveys and studies as part of its post-approval mitigation measures," in the absence of baseline data, indicate failure to take the requisite "hard look" at environmental impacts). NEPA also requires agencies to disclose that information is incomplete or unavailable. 40 C.F.R. 1502.22(b). Agencies must obtain incomplete or unavailable information "if the overall costs of doing so are not exorbitant." *Id.*

Throughout the DEIS it fails to contain the required detailed analysis of all baseline conditions, and also fails to disclose that information is incomplete or unavailable. The following are two examples of how the DEIS relies upon inadequate data.

1. Water Quality & Quantity

Baseline hydrologic data is used to develop a conceptual flow model and to calibrate a numerical groundwater flow model. It includes surface water flow rates and chemistry, groundwater levels and chemistry, and aquifer property tests. The DEIS fails to contain complete hydrologic baseline data. According to hydrologist Tom Myers this is troubling because all DEIS action alternatives will cause a substantial drawdown of groundwater and significant depletions in flow to the Rio Grande and tributaries within the Mine area.[1]

The DEIS refers to the study INTERA (2012) for baseline hydrology information pertaining to groundwater monitoring wells (DEIS 3-21), pit lake water levels and inflow (*Id.* at 3-52), environmental characteristics of waste rock (*Id.* at 3-37), spring flow *(Id.* at 3-52), and the existing sulphate plume downgradient of the Mine's tailings (*Id.* at 3-30). However, the DEIS fails entirely to include:

- Data pertaining to fractures and other hydrogeologic characteristics of andesite rock in the Mine pit area deeper than 400 feet, although the pit will be at least 900 feet deep;
- Data for predicted rates of seepage and future contaminant plumes from waste rock;
- Data fully characterizing the existing sulphate plume;
- Information regarding the location for land application disposal ("LAD") of excess water from tailings, and soil sampling data;
- Groundwater level observations on the Ladder;
- Adequate stream flow measurements for Las Animas Creek; and
- Data pertaining to impairment of existing wells from the Mine.

BLM may not circumvent NEPA's requirement that this data be provided in a DEIS by stating that cooperating agencies, such as the New Mexico Office of the State Engineer, will provide such information at a later time. 42 U.S.C. § 4332(D); 40 C.F.R. Part 1501.6(b)(1) ("The lead agency shall request the participation of each cooperating agency in the NEPA process at the earliest possible time."). Furthermore, it is evident that there are not enough monitoring wells, especially at depth, to allow an estimation of parameters for the model around the Mine pit or to support conceptual flow modeling around the Mine's production wells. The

[1] Comments pertaining to the groundwater models relied upon in the DEIS and to the Mine's impacts on water quantity and quality were prepared by hydrologist Tom Myers, on behalf of TRP and NMELC. *See* attached Exhibit A.

surface water sampling is also insufficient because it was completed too infrequently and for too short a time period.

The following actions are necessary for completing hydrologic baseline data:

- Surface water flow data should be collected, at a minimum, monthly for two years. The measurements should be correlated to a nearby gage station for record extension purposes.

- Additional flow data should be collected to supplement the Greenhorn Arroyo water quality data. A seepage study should be performed to determine the source of any surface water.

- Near-pit monitoring wells should be placed at least to the maximum depth of the pit.

- Complete a water balance of the Santa Fe aquifer, including flow to the wells and flow to the river, to estimate the recharge. If the estimated recharge is unrealistically high, INTERA should identify areas further upstream that would be necessary to provide the recharge.

- Complete a groundwater balance for the Palomas graben[2] ("graben") and Animas uplift areas to assess whether springs are a significant part of the water balance.

- Consider geochemistry and isotopes in the springs in Las Animas Creek to determine whether flow actually diverts in a west-to-east gradient.

- Estimate hydrologic properties for a regional-scale; small-scale estimates yield conductivity values that are much too low for regional flow analysis.

- Fully characterize the existing sulphate plume at the Mine's tailings to determine whether the plume extends beyond a fault.

Additionally, though the DEIS states that all action alternatives will "reduce groundwater discharge to Caballo Reservoir and the Rio Grande, decreasing surface water quantities there," (DEIS 4-8), baseline data has not been gathered and an analysis has not been conducted. The DEIS provides that the "cumulative magnitude of the effect can only be determined through a comprehensive mid-basin study of Caballo Reservoir and the Rio Grande." *Id.*

Finally, we agree with the New Mexico Interstate Stream Commission ("ISC") comment that the DEIS fails to account for startup water necessary for the Mine's operations under all action alternatives. ISC Comments on Copper Flat DEIS, p. 5 (February 26, 2016). The

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[2] Graben: A geologic formation which has been lowered relative to the surrounding formation, and is usually bounded by normal faults.

Proposed Action anticipates using 13,370 acre feet of water per year ("af/y"), recycling 9,096 af/y and obtaining from freshwater sources 3,802 af/y. DEIS Figure 2-6. Alternative 1 uses 18,674 af/y, recycling 12,845 af/y and obtaining from freshwater sources 5,290 af/y. DEIS Figure 2-10. Alternative 2 uses 22,210 af/y, recycling 15,504 af/y and obtaining from freshwater sources 6,105 af/y. DEIS Figure 2-14. The recycling is reuse of water from the Mine's tailings; the DEIS figures refer to it as "water reclaimed from TSF." For each action alternative, the recycling water is about 2.5 times the freshwater source. It is unclear if the current tailings facility contains water from previous operations sufficient for the Mine's startup water needs.

At the commencement of mining there are no tailings, so there is no tailings reclaim water; initial water must be obtained from freshwater sources. The DEIS water accounting in Figures 2-6, -10, and -14 does not account for the initial water. This represents a major error in the water accounting for the Mine. We agree with the ISC that "it will take the mine about 5 years to reach a recycling capacity of 9,096 acre-feet at a 75 percent recycling efficiency." ISC Comments on Copper Flat DEIS, p. 5 (February 26, 2016). Therefore, BLM must either revise or supplement the DEIS with an adequate accounting of startup water necessary for mining operations.

2. Wildlife and Federally-Listed Species

The DEIS also relies upon incomplete or no baseline data for biological resources at and near the Mine site. For example, the DEIS fails to include recent data provided by NMCC to the New Mexico Mining and Minerals Division ("MMD") regarding the Mine's wildlife and vegetation impacts. In July 2015, NMCC submitted to MMD a "Baseline Data Addendum, Biological and Paleontology Resource Surveys on Nine Mill Sites and Two Substation Alternatives, Copper Flat Mine, Sierra County, New Mexico, Permit Tracking No. S1027RN ("BDR Addendum").[3] MMD and the New Mexico Department of Game and Fish ("NMDG&F"), both cooperating state agencies in the preparation of the DEIS, have determined that the BDR Addendum is incomplete.[4]

We also agree with EPA's comment that the "DEIS does not contain a final determination on the environmental consequences of the alternatives" to wildlife and Federally-listed species, and that the "U.S. Fish and Wildlife Service (USFWS) and New Mexico Department of Game and Fish (NMDGF) were contacted for consultation, but there is no concurrence from USFWS and NMDGF on any conclusion reached in the DEIS." EPA Comments on the Copper Flat DEIS, p. 3 (March 4, 2016). Additionally, the DEIS also fails to

[3] http://www.emnrd.state.nm.us/mmd/MARP/documents/2015-07-28_BDRAddendum-BioandPaleoReportofMillSiteClaims_CopperFlatMine_SI027RN.pdf. Last visited on February 26, 2016.

[4] http://www.emnrd.state.nm.us/mmd/MARP/documents/2016-01-05BaselineDataRptAddendum3-BiologicalandPaleontologyResourceSurveysonMillSiteClaims_.pdf. Last visited on February 26, 2016.

identify the Mine's impacts to Ladder's bison herd and captive endangered Mexican Grey Wolves.

In summary, the DEIS relies upon incomplete or no baseline data throughout, and fails to disclose that data is incomplete or unavailable. Inadequate baseline data leads to erroneous impacts and mitigation analyses. BLM must either revise or supplement the DEIS with complete baseline data.

B. The DEIS Relies Upon Inadequate and Biased Groundwater Models.

As discussed above, the hydrologic baseline data report (INTERA 2012) presents insufficient data to develop the modeling used for assessing the Mine's impacts. The DEIS's impacts analysis for surface and groundwater resources relies upon two models: the conceptual flow model ("CFM") and the numerical flow model ("NFM"). There are significant errors in the conceptual flow model and biases in the numerical flow model. These lead to erroneous impacts and mitigation analyses.

1. Conceptual Flow Model Errors

A conceptual flow model ("CFM") is a qualitative description of groundwater flow sources and sinks, and the flow paths through aquifers. A CFM describes geology, material properties, and geologic structures that affect groundwater flow. A CFM also estimates groundwater recharge and discharge, to the extent possible. The CFM relies upon testing conducted by INTERA (2012) for the estimation of material properties. According to hydrologist Tom Myers, there are six significant errors in the CFM which cause the numerical flow model to underestimate the amount of water the Mine will consume and how that consumption will affect water resources on and near the Ranch:[5]

- The CFM does not consider the source of water drawn to the pumping wells from the north. This water is probably an additional loss to the Rio Grande.
- The CFM describes the graben incorrectly, with inappropriate values for transmissivity[6], vertical anisotropy[7], and fault conductance[8]. The values used in the modeling are not supported by data. In fact, the anisotropy and transmissivity are not supported by the

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[5] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 5 (March 30, 2016).

[6] "Transmissivity" is the product of conductivity and the saturated thickness of the aquifer. It is an expression of the ease with which groundwater can flow through the entire aquifer.

[7] "Vertical anisotropy" is the ratio of vertical conductivity to horizontal conductivity, since vertical conductivity is usually much less than horizontal conductivity.

[8] "Fault conductance" is the ease with which groundwater flows perpendicularly through a fault. It is a function of the conductivity and thickness of the fault.

lithology[9] of the pumping wells. These errors cause the model to underestimate drawdown in Las Animas Creek, particularly near and on Ladder.

- The recharge rates and location for distributed recharge are not well supported. The CFM ignores distributed recharge into the Santa Fe formation east of the Mine.

- The CFM does not include an estimate for discharge to the Rio Grande, to Las Animas Creek or Percha Creek, to the flowing wells, or to evapotranspiration[10] ("ET") along the streams.

- The transmissivity of the andesite near the pit is not justified to be as low as calibrated. This inappropriately prevents the pit dewatering drawdown from extending northward to Ladder.

These errors result in an inaccurate water balance estimate, i.e., water that is consumed for mining versus water provided by natural processes such as precipitation and runoff. Rather than estimate recharge with an inaccurate method, the CFM should include an estimate of steady state discharge to the streams, to the Rio Grande, and to evapotranspiration. The CFM should then set recharge equal to discharge. Using estimated parameters of the geology and soils in the Mine's watersheds, the CFM should establish in general the locations for distributed recharge in the watershed. If the geology is too impervious for all of the recharge, there will be runoff to stream bottoms and the CFM should estimate recharge through the stream bottoms. These estimates must be supplemented with streamflow measurements to identify recharging reaches.

There are also serious conceptual errors in the description of the graben from which the Mine's production wells withdraw water. There can be no confidence in the CFM without data describing the conductance of the faults, the transmissivity of the aquifer within the graben, or the source of water in the graben. There is also no data to support the CFM's suggestion that clay layers prevent the pumping from drawing water from Las Animas Creek. Because the CFM has significant basic conceptual problems, there can be no confidence in the predictions resulting from the numerical flow model.

2. Numerical Flow Model Errors and Biases

The Mine site and its production wells site are numerically modeled using a version of the USGS code MODFLOW by Jones et al. (2014, 2013). It is a "version" of MODFLOW because it consists of proprietary alterations to the code. The numerical model leads to erroneous impacts predictions for the following reasons: 1) it implements the substantially

[9] "Lithology" is a description of characteristics of the geologic formations, rock or fill, through a vertical section of the ground.

[10] "Evapotranspiration" is the combination of evaporation and transpiration, or evaporation through plant leaves.

flawed CFM; 2) it utilizes methods which decrease the accuracy of simulations; 3) its inaccurate model structure minimizes the Mine's impacts; and 4) its calibration relies on baseline data insufficient to accurately calibrate the model in a steady state mode.[11]

There are many biases in the numerical model which minimize the Mine's impacts:

- The failure to adequately identify the regional hydrogeologic properties of the andesite, where the Mine pit is located. This causes the model to underestimate the drawdown effects in the area, particularly on Ladder.

- The production wells are located in the Palomas graben, a north-south trending feature between two faults, for which the model assumes the transmissivity as being unjustifiably high and the western fault conductivity unjustifiably low.

- The use of an inappropriate boundary condition which adds water to the north end of the graben in a way that will provide much of the production pumping water.[12]

- The failure to consider vertical gradients over large aquifer thicknesses due to inadequate vertical discretization of the model, especially in layer 2, the uppermost layer. This results in failing to consider flow losses to evapotranspiration or to the streams (Las Animas Creek, Percha Creek).

- Vertical discretization[13] near the pit is nonexistent, with a 1000-foot layer of thickness. This renders the calculations of dewatering inaccurate and makes it impossible to estimate the source of groundwater flowing into the pit. Any pit lake modeling based on this would be inaccurate and would also most likely underestimate the toxicity of the pit lake.

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[11] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 31-53 (March 30, 2016).

[12] We agree with the New Mexico Interstate Stream Commission's ("ISC") comment that:

> The model also assumes that there is Paleo-channel that results in an additional source of water to the model area from north to south. However, the predominant groundwater flow direction is from west to east toward the Rio Grande and Caballo Reservoir. This assumed boundary in the model adds additional water to the system that may not exist. A sensitivity analysis was done on this boundary and concluded that inclusion of this boundary does impact the measured surface flow of the Rio Grande. See Draft EIS page 3-71. However, despite this finding, the BLM decided to keep this boundary in the model that was used in the evaluation of the proposed action. The ISC suggests examining this sensitivity analysis again to determine how to better handle this assumption in the model."

ISC Comments on Copper Flat DEIS, p. 5-6 (February 26, 2016).

[13] "Vertical discretization" is the vertical thickness of groundwater model layers.

- The vertical anisotropy (the ratio of vertical to horizontal conductivity) as specified by Jones et al. (2014, Table 6.1) is highly suspect and likely biases model results.

- The model sets vertical conductivity[14] in the Santa Fe Group much too high, minimizing the effects of pumping on nearby artesian wells.

- The simulation of faults as flow barriers when there is no data to support they are barriers. This minimizes the Mine's impacts to Las Animas Creek and other surface waters.

- The failure to consider recharge in the Santa Fe Group. This skews the model calibration toward estimating higher conductivity values because water would have further to flow from the recharge source to a discharge point. This also causes the model to minimize the Mine's impacts Las Animas Creek and other surface waters.

The result of these biases is that the model erroneously predicts that most of the production pumping drawdown would extend eastward toward the Rio Grande, hence the Mine's predicted impacts are in that direction. However, if one removes these biases from the model, the Mine's impacts would actually extend in a different direction. For example, without the extra water entering the graben from the north (due to the model's inappropriate boundary condition and inaccurate characterization of the fault just west of the graben being highly impervious), production pumping drawdown would actually extend to the west and north of the Mine, affecting Las Animas Creek far further upstream than currently predicted.

For the reasons discussed above, BLM must either revise or supplement the DEIS with complete hydrologic baseline data and remove errors and biases in the groundwater models so that adequate impacts and mitigation analyses can be conducted. The following are necessary changes to the numerical model that would lead to adequate impacts and mitigation analyses:[15]

- Layer 2 should be split into at least three layers. Except in the streams, layer 2 is the uppermost layer and simulates the Santa Fe aquifer. Additional layers would allow better simulation of vertical flow and gradient, changing conductivity with depth, and provide a better match to screened intervals for the monitoring wells. Unfortunately, the new layers 3 and 4 would have no wells for calibration in the graben and near the pit, hence additional monitoring wells are needed in conjunction with this.

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[14] "Vertical conductivity" is conductivity in a vertical direction.

[15] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 52-53 (March 30, 2016).

- Horizontal discretization[16] should be improved around the production wells to improve the calculation of well drawdown. Discretization at the wells should be the same as at the pit.

- If justified in the CFM, the general head boundary[17] allowing flow north to south through the model domain[18] should be widened to include all of the northern and southern boundaries of the model. The current location, which is only in the graben, biases the model results by providing water to the portion of the model from which pumping occurs.

- The boundary for the Rio Grande River should be in all layers that intersect the depth of the reservoir, rather than in only layer 1 (which forces water upward into the river).

- Stream recharge should be simulated in a transient, not a steady state mode, because recharge will occur as slugs, not as a long-term steady state flow.

- The recommended data collection for parameterizing the faults and transmissivity of the graben must be collected and implemented to obtain improved modeling of the pumping from the graben.

- Vertical anisotropy should be better simulated with values of 0.01 to 0.001 rather than the values used in the model, including in the graben (which based on well logs should be 0.1 to 0.01).

- Existing tailings seepage should be better estimated by calibrating with the wells near the impoundment. The seepage includes both meteoric water draining through the facility and draindown.

In sum, the groundwater models upon which the DEIS relies to evaluate water impacts make every assumption designed to minimize impacts from the Mine, and exclude any assumption that would more realistically reflect the Mine's actual water impacts. NEPA specifically prohibits an agency from disclosing and considering only the impacts from a project that favor the project's applicant. 40 C.F.R. Part § 1502.2(f)(g).

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16 "Horizontal discretization" is the size of groundwater model cells.

17 "General head boundary" is a head-controlled flow boundary in a groundwater model. This means that the groundwater head is specified for the boundary, and flow into or from the model domain is controlled by the hydraulic gradient between the head in the boundary and in the surrounding model domain and the conductance of the boundary.

18 "Model domain" is the portion of an aquifer that is considered in a groundwater model.

C. The DEIS Fails to Adequately Review Reasonable Alternatives.

The DEIS also fails to fully review reasonable alternatives to the activities at the Mine, and related milling and transportation activities. NEPA requires the agency to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. §4332(E); 40 C.F.R. §1502.14. BLM must "rigorously explore and objectively evaluate all reasonable alternatives to a proposed action, in order to compare the environmental impacts of all available courses of action. For those alternatives eliminated from detailed study, the EIS must briefly discuss the reasons for their elimination." *N.M. ex rel. Richardson v. BLM*, 565 F.3d 683, 703 (10th Cir. 2009); 40 C.F.R. §§1502.14. *See also*, *City of Tenakee Springs v. Clough*, 915 F.2d 1308, 110 (9th Cir. 1990).

Indeed, NEPA's implementing regulations recognize that the consideration of alternatives is "the heart of the environmental impact statement." 40 C.F.R. §1502.14; *Greater Yellowstone Coal. v. Flowers*, 359 F.3d 1257, 1277 (10th Cir. 2004); *Utah Envtl. Cong. v. Bosworth*, 439 F.3d 1184, 1195 (10th Cir. 2006); *Alaska Wilderness Recreation and Tourism Ass'n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995). *Dine Citizens Against Ruining Our Environment v. Klein*, 747 F. Supp. 2d 1234, 1254 (D. Colo. 2010).

The DEIS analyzes three action alternatives, the first being NMCC's Proposed Action. The Proposed Action would have a throughput of 17,500 tons per day ("tpd"),[19] whereas Alternative 1 would have a 25,000 tpd throughput, and Alternative 2 would have a 30,000 tpd throughput. BLM has selected Alternative 2 as the "Preferred Alternative." According to Mining Engineer Jim Kuipers,[20] all three action alternatives are clearly economic driven alternatives intended to be "more efficient."[21] The DEIS fails to analyze additional reasonable alternatives that avoid unnecessary and undue degradation of federal land. DEIS 2-71.

Furthermore, the DEIS inadequately represents NMCC's Proposed Action. In 2013, NMCC conducted a Definitive Feasibility Study ("DFS") based upon a 30,000 tpd production rate.[22] NMCC failed to amend its mining plan of operations ("MPO") to reflect this new

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[19] The Proposed Action's throughput would be an increase from the previous 15,000 tpd throughput of the Quintana operation.

[20] Jim Kuipers is a mining engineer with more than 30 years of experience in mining and environmental process engineering design, management of mining operations, compliance with mining regulatory requirements, remediation of mining waste, reclamation and closure of mining operations, and financial assurances for mining operations. Mr. Kuipers has worked as a technical expert on mining and environmental issues for industry, public interest groups, and tribal, local, state and federal governmental entities. Mr. Kuipers has worked on several projects governed by the New Mexico Mining Act.

[21] *See* Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 2 (March 31, 2016), attached as Exhibit B.

[22] NMCC, "Definitive Feasibility Study," p. 23 (November 21, 2013).

increased throughput, and the DEIS fails to present a Proposed Action consistent with NMCC's DFS and permit applications submitted to the New Mexico Environment Department ("NMED") and the New Mexico Mining and Minerals Division ("MMD").[23]

NMCC's Proposed Action also relies on economic data that is unreasonable and unjustified.[24] NMCC's DFS is based upon a "long-term" copper price of $3.00 per pound and a daily production rate of 30,000 tpd, with an expected 20 percent internal rate of return.[25] At current copper prices of $2.01 - $2.28 per pound[26] it is likely that the NMCC's Proposed Action will result in a very low or negative rate of return. Given the nature of metals prices, an internal rate of return of 40 percent might be considered as the required rate of return to attract knowledgeable investors.[27] The copper price trend overall has continued a significant downtrend from almost $4.50 per pound in 2011 to current prices of approximately 50 percent that value. The economic analysis relied upon in the DEIS fails to take into consideration such information, therefore the analysis is unreasonable.

Additionally, the DEIS fails to consider an action alternative with increased waste rock storage and zero processing of low-grade ore.[28] According to expert Jim Kuipers, the DEIS description of the Mine's ore and waste production (DEIS 3-37) indicates that the DEIS fails to address alternatives involving a lower than expected copper price and a higher than expected waste to ore ratio. The DEIS states that "Low-grade copper ore would likely be processed at the end of the mine life," (DEIS 2-6), yet provides no supporting documentation for this statement.

Significantly lower copper prices (such as the current price of copper) results in an increase in waste rock storage area requirements and no processing of low-grade ore. Based on the history of copper mines in New Mexico and elsewhere, it is more likely that low-grade copper ore will not be processed except during times of exceptionally high copper prices or as an adjunct process to other processing operations. There is no assurance that the low-grade ore will be processed at any time during or at the end of the Mine's life. For the DEIS to consider it

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[23] NMCC also recently submitted a revised discharge permit application with NMED on December 8, 2015, stating its daily production rate will be 30,000 tpd. NMCC has also submitted an application with MMD stating its daily production rate will be 25,000 tpd. NMCC's representations to NMED and MMD regarding its daily production rate and NMCC's Proposed Action submitted to BLM for the DEIS are significantly different.

[24] *See* Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 3 (March 31, 2016).

[25] NMCC, "Definitive Feasibility Study," p. 23, p. 34 (November 21, 2013).

[26] *See* Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 3 (March 31, 2016).

[27] *Id.*

[28] *Id.* at 5.

"likely" is unreasonable and unwarranted. Therefore, BLM must either revise or supplement the DEIS with an adequate ore and waste production alternatives analysis.

Lastly, the DEIS fails to consider a reasonable action alternative that utilizes the following mitigation measures:[29]

- The use of a pit sump pump to prevent a pit lake;
- Partial or complete pit backfilling of the pit to prevent long-term pit lake water quality issues;
- Alternative tailings facility locations and methods, such as dry stack tailings (also known as filtered tailings) disposal and the depyritization method to reduce tailings acid generation;
- Alternative waste rock dump locations and configurations, and waste rock liners to collect any seepage; and
- Alternative reclamation and closure measures that utilize more advanced designs to address acid generation potential and metals leaching, such as engineered covers for waste rock and tailings.

According to hydrologist Tom Myers, backfilling the pit is the only mitigation measure that would prevent long-term pit lake water quality problems and will lessen the impacts of developing a pit lake on the groundwater balance in the area.[30] It also allows the drawdown cone, i.e., depleted groundwater levels, around the pit to recover. However, the DEIS does not disclose the obvious advantages of doing this. DEIS Chapter 2 mentions twice there is no plan to backfill the pit without considering it as an alternative. Backfilling would cost more, but the environmental benefits would outweigh those costs. BLM must either revise or supplement the DEIS to consider the following with regard to pit backfill:[31]

- The open pit lake will likely evaporate water in perpetuity, creating a long-term groundwater deficit and causing a drawdown cone that extends to the Ladder and to Hillsboro. Backfilling the pit would eliminate that evaporation.
- Water that flows to the pit from surrounding groundwater and surface water intercepted by the pit will likely be lost simply to fill the pit lake. Backfill would eliminate this loss.

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[29] *See* Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 4 (March 31, 2016).

[30] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 18-19 (March 30, 2016).

[31] *Id.*

- Backfilling the pit would lessen pit lake water quality problems. Though oxidation of the rock eventually backfilled into the pit could cause groundwater problems, this would be mitigated by mixing neutralizing material into the backfill.

- To mitigate the Mine's water quality and quantity impacts, the open pit should be backfilled with waste rock pulled from the pit, to at least the level to which groundwater would recover. Reclamation bonding should include the cost of backfill.

D. The DEIS Fails to Adequately Analyze the "No Action" Alternative.

NEPA requires that BLM include the alternative of "No Action." 40 C.F.R. Part § 1502.14(d). The DEIS "No Action" alternative analysis is woefully inadequate. The analysis is predicated on the premise that the "No Action" alternative requires no real analysis, and consists of repeated statements that "nothing will happen" were the "No Action" alternative to be selected. The requirement for the "No Action" alternative exists as a mechanism for comparing the environmental and related social and economic effects of the action alternatives. "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," Federal Register Vol. 46, No. 55, March 1981, Question 3, "No Action Alternative." Just as the impacts of the three action alternatives are analyzed over a range of 11 to 16 years of the Mine's operations, so too must the "No Action" alternative be analyzed. Furthermore, the period after Mine closure needs to be carefully and fully analyzed, particularly because the Mine represents an irreversible commitment of resources.

The DEIS fails to recognize that substantial change will continue to occur on other public lands and private lands surrounding the Mine. Changes in land use patterns will occur, including but not limited to residential uses, commercial uses, ranching, recreation, and conservation. Moreover, patterns in resource use will also change, most notably the use of increasingly scarce water resources.

The "No Action" alternative does not consist of a baseline suspending all change in Sierra County and Southwestern New Mexico for the duration of the Mine. To realistically project conditions in the affected area under the "No Action" alternative requires BLM to evaluate the aggregate of local government plans, policies, population projections, capital improvement programs, and conservation programs, along with other plans for other relevant federal, state and local agencies.

An especially troubling aspect of the "No Action" alternative analysis is its assertion that:

> Current regulations for environmental protection during mining, reclamation of disturbed areas, and post-closure site management are more stringent than the regulations that applied in the 1980s during the Quintana mining operations at the site. The beneficial effects that would occur under the Proposed Action and action alternatives would not occur under the No Action Alternative.

DEIS 3-49.

The DEIS also incorrectly states, "No additional mining, mitigation of existing water quality issues, or reclamation of the mine would occur." *Id.* In fact, NMCC has submitted to the New Mexico Environment Department ("NMED") a Stage 1 Abatement Plan ("Plan"), under the New Mexico Water Quality Act ("WQA"), to address current water contamination at the Mine. The Plan went into effect early 2012. Significant cleanup of the sulphate plumes under and adjacent to the tailings storage facility has occurred under this Plan.[32] Therefore, the DEIS errs in asserting that the only way reclamation of the Mine's current contamination will occur is to permit the Mine to resume operations. This assertion is another example of how BLM is making unreasonable and unfounded assumptions that favor NMCC and the Preferred Alternative, in violation of NEPA. 40 C.F.R. Part § 1502.2(f)(g).

Lastly, NMCC, as the owner and operator of the Mine, currently has reclamation obligations under the WQA. These obligations do not disappear if the Mine is not approved by BLM. BLM must either revise or supplement the DEIS with an analysis which acknowledges that reclamation must occur at the Mine in any event, and to describe what that reclamation would be.

E. The DEIS Fails to Analyze Different Management Scenarios For Each Action Alternative.

BLM fails to identify the regulatory environment under different management scenarios as an issue for analysis, in violation of NEPA. 40 CFR Part § 1501.7. The environmental effects of unplanned occurrences, such as acid mine drainage, accidental leaks and spills, and failure of design features, can be greatly reduced if there is a monitoring program in place to detect and respond to these situations earlier rather than later. As such, the DEIS should compare the following factors under different management scenarios: number of agency inspections, the thoroughness of these inspections, the ability to review the adequacy of the reclamation bond and adjust it as needed, the frequency of bonding review, bonding amounts, the past history of bonding increases, the past history of calculating the correct bond, the amount of potential fines for violations, and the ability to require and manage a fund for long term water treatment.

The frequency and duration of monitoring and number of annual agency inspections have real impacts on detection and response. Ladder recommends that the level of monitoring and inspection increase for all action alternatives. Ladder also strongly recommends that unannounced site visits be offered to the public upon request. Such site visits are extremely helpful in informing the public about actual conditions on site. BLM must either revise or supplement the DEIS with an adequate analysis of management scenarios for each action alternative.

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[32] The NMCC Stage 1 Abatement Plan is not referenced in the DEIS. However, a 2013 Status Update Report on the Stage 1 Abatement Plan is listed in the "References" section, yet is not cited to in the DEIS. *See also*, Tom Myers, PhD, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 7 (March 30, 2016).

F. The DEIS Fails to Identify Care and Maintenance Procedures for Each Action Alternative.

In the event of a temporary, short-term halt to mining or suspension of production, "care and maintenance" procedures need to be detailed for each action alternative. Under the New Mexico Mining Act ("NMMA"), mines may apply for a standby permit for a period of five years at a time, with an overall 20 year limit. 19.10.7.701.J NMAC. This temporary suspension does not fit the category of daily operations or the category of reclamation and closure. Major pieces of infrastructure need to be retained and maintained for future start up, but daily procedures such as water use for milling and dust control may be discontinued.

As such, the DEIS needs to describe how water balance will be affected; how capture, treatment and disposal of water will be affected; how the formation of a pit lake will be mitigated; and what level of work force is needed to assist in site management. This "Twilight Zone" of mine management leaves many uncertainties that are best addressed in advance of the actual event. Because different alternatives may have different ways of managing water balance or treatment, care and maintenance procedures should be detailed for each alternative.

The DEIS discusses NMCC's "interim management plan" for its Proposed Action at 2-42, stating that, "NMCC has prepared the following interim management plan to manage the mine area during periods of temporary closure (including periods of seasonal closure, if necessary) to prevent unnecessary or undue degradation." This plan includes:

> "[M]easures to stabilize excavations and workings; measures to isolate and control toxic or deleterious materials; provisions for the storage or removal of equipment, supplies, and structures; measures to maintain the mine area in a safe and clean condition; and plans for monitoring site conditions during periods of non-operation."

DEIS 2-42. However, the DEIS fails to reasonably discuss these measures and to evaluate their effectiveness. The DEIS also fails to adequately analyze other reasonable measures. For these reasons, BLM must either revise or supplement the DEIS with an adequate analysis of NMCC's interim management plan under all three action alternatives.

G. The DEIS Fails to Fully Analyze the Mine's Direct and Indirect Impacts.

An EIS must consider "any adverse environmental effects." 42 U.S.C. § 4332(2)(C)(iii); 40 C.F.R. Part § 1502.16. This review cannot be superficial—agencies must "take a 'hard look' at the environmental consequences of proposed actions utilizing public comment and the best available scientific information." *Biodiversity Conservation Alliance v. Jiron*, 762 F.3d 1036, 1051 (10th Cir. 2014). The "hard look" standard ensures the "agency did a careful job at fact gathering and otherwise supporting its position." *Id.*; *New Mexico ex rel. Richardson, 565 F.3d at 704* (quotations omitted).

"Any adverse environmental effects" are all direct, indirect, and cumulative environmental impacts of the proposed action. 40 C.F.R. §§1502.16; 1508.8; 1508.25(c). Impacts that must be analyzed include "effects on natural resources and on the components, structures, and functioning of affected ecosystems," as well as "aesthetic, historic, cultural, economic, social or health [effects]." Direct effects are caused by the action and occur at the same time and place as the proposed project. 40 C.F.R. §1508.8(a). Indirect effects are caused by the action and are later in time or father removed in distance, but are still reasonably foreseeable. 40 C.F.R. §1508.8(b).

As demonstrated above on pages 2-6 of these comments, the DEIS relies upon incomplete baseline data and biased models, which in turn preclude BLM from adequately analyzing the Mine's direct and indirect impacts on air quality, climate change, groundwater and surface water resources, wildlife and threatened and endangered species, recreation and tourism, transportation, and socioeconomic conditions.

1. <u>The DEIS Fails to Take a Hard Look at the Mine's Impacts to Air Quality.</u>

Ladder is located three miles downwind from the Mine,[33] and is very concerned about the Mine's air quality impacts on its wildlife, bison herd, staff and ecotourism guests. The Mine will produce significant amounts of fugitive dust emissions; heavy vehicle emissions; particulate emissions from soil stripping, blasting, construction, use of haul roads, crushing activities, materials storage and handling; and wind erosion from stockpiles. DEIS 3-6.

The DEIS fails to adequately analyze these impacts. General statements such as, "The overall air quality in the vicinity of the mine is good," and, "A review of the results of recent NATA [National Air Toxics Assessment] documents show that cancer, neurological, and respiratory risks in the mine area are well below national levels," are made without citation to any supporting documents. Furthermore, on December 17, 2015, EPA released the most recent update to the National Air Toxics Assessment (NATA).[34] The DEIS was released to the public on November 23, 2015. It clearly did not review "the results of recent NATA documents."

For example, the DEIS states that NMCC "operated an ambient particulate monitoring program…at the mine." DEIS 3-3. Two particulate samplers were used at the Mine, and "collected 58 samples between October 1, 2010 and September 30, 2011." *Id.* The DEIS fails to cite with particularity information in this study. Also, this study is not included in the appendices of the DEIS, nor is it listed under the "References" section; therefore, the data relied upon is not readily available to the public, in violation of NEPA. 40 C.F.R. Parts §§§ 1502.18, -.21 and -.24.

The DEIS also states that, "A detailed breakdown of mine operational emissions is in Appendix B." DEIS 3-6. Appendix B consists of the following documents:

- "Table B-1. Uncontrolled Emissions for 25,000 tpd Operating Scenario" (Source: NMED 2014);

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[33] Prevailing winds are from the southwest.

[34] http://www.epa.gov/national-air-toxics-assessment. Last accessed on March 1, 2016.

- "Table B-2. Controlled Emissions for 25,000 tpd Operating Scenario" (Source: NMED 2014);

- "Dispersion Model Report For THEMAC RESOURCES NEW MEXICO COPPER CORPORATION'S COPPER FLAT COPPER MINE NSR PERMIT APPLICATION" (Prepared by Paul Wade, Class One Technical Services, Inc., dated February 22, 2013); and

- "New Mexico Environment Department New Source Review Permit" (June 25, 2013).

These documents pertain to emissions for mining operations with a 25,000 tpd production rate, which is Alternative 1. Tables B-1 and B-2 are templates prepared by NMED, which provide estimates of emissions for mining operations. These tables do not represent actual emissions of the Mine.

The DEIS also refers to a dispersion model report, stating that, "Modeling was completed using as many receptor locations to ensure that the maximum estimated impacts are identified." DEIS B-19. However, this report fails to identify the "many receptor locations." It is unclear whether the dispersion model identifies Ladder as a receptor location for the Mine's air quality impacts. *Id.*

The documents in the DEIS appendices do not provide a detailed breakdown of emissions rates for either the Proposed Action or the Preferred Alternative. The DEIS must provide a detailed breakdown of emissions rates for all alternatives under NEPA. BLM must therefore either revise or supplement the DEIS to provide this information and to adequately analyze the Mine's air quality impacts under all action alternatives.

2. <u>The DEIS Fails to Take a Hard Look at the Mine's Impacts to Climate Change and Sustainability.</u>

The U.S. Department of Interior's Bureau of Reclamation has recently warned that "Within New Mexico, and in the Rio Grande Basin generally, climate change is anticipated to have profound effects on flood risks, water supply, ecosystem health, land cover, and other areas of national concern."[35] Although the DEIS provides a brief discussion of climate change and states that the Mine's climate change impacts would be "short-term to medium-term minor adverse effects" (DEIS 3-15 through 3-17), it fails to provide any supporting documentation or to adequately analyze such impacts, in violation of NEPA. 40 C.F.R. Parts §§1502.16 and .23.

For example, the "Regulatory Requirements Related to Climate Change and Sustainability" section fails to identify and take into consideration the Executive Order issued by President Obama on March 19, 2015 (Executive Order Planning for Federal Sustainability in the Next Decade). DEIS 3-15. This Executive Order commits federal agencies to cutting

[35] U.S. Department of the Interior, Bureau of Reclamation, SECURE Water Act Report: Reclamation Climate Change and Water 2016, p. 7-19 (March 2016).

greenhouse gas (GHG) emissions forty (40) percent over the next decade from 2008 levels -- saving taxpayers up to $18 billion in avoided energy costs -- and increase the share of electricity the Federal Government consumes from renewable sources to thirty (30) percent. No analysis of the Mine's green house gas ("GHG") emissions has been completed. We agree with the EPA that BLM should estimate the Mine's GHG emissions under all alternatives with the tools provided by CEQ for estimating and quantifying GHG emissions. EPA Copper Flat DEIS Comments, p. 2 (March 4, 2016).[36]

Additionally, the DEIS fails to analyze emissions from off-site operations of the Mine. For example, under NMCC's Proposed Action:

> Copper concentrate would be hauled by 25-ton capacity highway trucks towing 10-ton trailers to I-25 and then to a nearby railhead in southern New Mexico, and then transported by rail to a smelter in North America or to port facilities for shipping to Asia or Europe. Molybdenum concentrate and any other mineral would be filtered, dried, and packaged on-site and then transported to an off-site refinery by truck.

DEIS 2-33. The DEIS fails to provide any information regarding off-site smelters in North America that the copper concentrate may be transported to, and regarding off-site refineries the molybdenum concentrate may be transported to. Without knowing these potential smelter and refinery locations it is impossible to adequately analyze the Mine's indirect emissions and climate change impacts.

The DEIS refers to Table 3-4 for the total direct and indirect emissions associated with each of the action alternatives. DEIS 3-17. However, Table 3-4 fails to separate out the Mine's "direct" and "indirect" emissions. Table 3-4 is titled "Estimated Operational Emissions." *Id.* It appears that Table 3-4 does not specifically identify the Mine's indirect emissions from copper and molybdenum concentrates being transported off-site by truck, rail, and ship to ports in Mexico and Europe.

The DEIS also fails to analyze environmental impacts of an off-site substation that will be constructed on a "30-acre State Trust land south of NM-152 and east of the production wells" to supply additional power needed under an accelerated production rate. DEIS 2-81. There is no analysis of the effects (direct, indirect and cumulative) from using energy generated off-site, in violation of NEPA. 40 C.F.R. Part § 1502.16. Under Alternative 2, the Project's total power demand will be 241.49 gigawatt hours a year ("GWh/year"). DEIS 2-82. Such a huge energy demand will tax and possibly exceed the current regional electrical generating capacity, resulting in the likely need to go farther afield to acquire operating energy.

The DEIS's inadequate climate change analysis is particularly disturbing given that recent warming in the Southwest is one of the most rapid in the Nation. The average temperature in the Rio Grande Basin is projected to increase by roughly 5 to 6 degrees Fahrenheit during the

[36] Example tools can be found on CEQ's NEPA.gov website at https:..ceq.doc.gov/current_developments/GHG_accounting_methods_7Jan2015.html.

21st century.[37] The U.S. Department of the Interior is well aware that the Rio Grande Basin and the Southwest has experienced periods of unusually severe drought (e.g. a five decade mega drought) and findings suggest that similar severe drought conditions should be anticipated in an even warmer and drier future.[38] The Bureau of Reclamation has asserted that "mean-annual precipitation is projected to decrease" during the 21st century and "low-flow periods in the Rio Grande are projected to become more frequent due to climate change."[39] Until the climate dynamics of such mega droughts are fully understood, plans involving water management should be designed to accommodate a fifty (50) year mega drought.

Climate change is a reasonably foreseeable issue that should be analyzed in an integral way and included in the DEIS when assessing potential impacts to soils, water quality and quantity, and biological resources. BLM guidance, CEQ guidance, and several Executive Orders require that a complete, adequate climate change analysis occur. BLM must therefore either revise or supplement the DEIS to address these impacts.

3. <u>The DEIS Fails to Take a Hard Look at the Mine's Impacts to Water Quantity & Quality.</u>

As discussed above on pages 4-6 of these comments, the DEIS is based upon incomplete hydrologic baseline data. This leads to errors in the conceptual flow model and to biases in the numerical flow model. The CFM and numerical model ultimately fail to adequately identify the Mine's impacts. However, even the flawed DEIS concludes that the Mine will have significant impacts to water resources.

a. The Mine's Impacts to Water Quantity.

The Mine's greatest impact to water quantity will be the substantial reduction of groundwater levels, which will result in significant surface water depletions to the Rio Grande, Caballo Reservoir, Las Animas Creek, and Percha Creek.

The Mine's impacts to water resources under all action alternatives include the following:[40]

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[37] U.S. Department of the Interior, Bureau of Reclamation, SECURE Water Act Report: Reclamation Climate Change and Water 2016, p. 7-5 (March 2016). *See also* Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). 2009. Global Climate Change Impacts in the United States. Cambridge University Press.

[38] *Id.* at 7-5 through 7-6. *See also* Cody Routson. 2011. Second Century Southwest Megadrought. Accessed at http://www.southwestclimatechange.org/blog/13285. Last visited on February 19, 2016.

[39] *Id.* at 7-6.

[40] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 7 (March 30, 2016).

- The Mine's production pumping will cause drawdown in the Palomas Basin and decrease flows to the Rio Grande River, Las Animas Creek, and Percha Creek, as well as to springs in the area.

- The Mine's dewatering and pit lake will deplete groundwater resources and cause a drawdown ("pit lake cone of depression" or "drawdown cone"), thereby decreasing discharges to springs and streams, both in Percha Creek and Las Animas Creek. The drawdown would affect springs and wells on Ladder.

- Leaks from the Mine's waste rock and tailings would reach groundwater and flow eastward toward productive aquifers.

- The Mine's future pit lake would have significant water quality issues, based on the acid-producing properties of the rock surrounding the pit.

The Mine's impacts to water quantity can be divided between the impacts of the Mine's production wells and the Mine's dewatering wells and open pit.

i. The Mine's Production Wells.

In general, the Mine's production wells will pump a very substantial amount of water with potential for significant harm. The predicted impacts of this pumping have been minimized due to the errors and biases in the models relied upon in the DEIS.[41] Impacts of the Mine's production well pumping would likely extend to Las Animas Creek, Percha Creek, and Caballo Reservoir.

Impacts to Ladder Ranch.

The DEIS fails to adequately analyze the Mine's direct impacts to Ladder due to the Mine's production pumping wells. The Mine's impacts to water quantity on Ladder will be the following:[42]

- If biases in the DEIS model are removed, then simulated production pumping drawdown of at least one foot would extend west and north of the Mine, affecting Las Animas Creek further upstream (on Ladder property) than currently predicted. This would affect springs along the stream course and decrease the perennial flows. Drawdown would also reach Seco Creek on Ladder.

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[41] *See* pages 7-11 of these comments for a detailed discussion on how errors and biases in the groundwater models minimize the Mine's impacts to water quantity and quality.

[42] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 4 (March 30, 2016).

- If biases in the DEIS model are removed, simulated production pumping drawdown would exceed twenty (20) feet at Ladder's southern boundary.

Impacts to the Rio Grande and Caballo Reservoir.

The DEIS also fails to adequately analyze the Mine's direct impacts to the Rio Grande and Caballo Reservoir due to the Mine's production pumping wells. As discussed on page 5 of these comments, the DEIS admits that the "cumulative magnitude of the effect [from the Mine's production pumping wells] can only be determined through a comprehensive mid-basin study of Caballo Reservoir and the Rio Grande." DEIS 4-8. This study has not yet been conducted, therefore the public is unable to comment on the findings of such a study. However, the estimated depletions to the Rio Grande provided in the DEIS are considerable. Under NMCC's Proposed Action, 17% of the flow from the project area watersheds to the Rio Grande would be lost. Under Alternative 2, BLM's Preferred Alternative, that loss increases to 25%.[43] The impact from these losses to groundwater discharge would be alarmingly apparent during periods of drought. Surface water depletions to the Rio Grande would have serious consequences for Sierra County and New Mexico.[44]

ii. The Mine's Dewatering Wells and Open Pit.

Impacts to Ladder Ranch.

The Mine's direct impacts to Ladder, due to mine dewatering and pit lake formation, include the following:[45]

- At the end of Mining operations, according to the DEIS modeling, drawdown of up to one foot would reach the John Cross Well on Ladder, and drawdown of ten (10) feet would reach Ladder's property line just north of the Mine.

- At the end of Mining, if the DEIS model is properly simulated with more fractures and higher conductivity of the andesite at the Mine pit, the drawdown would extend further into Ladder (and possibly for at least another mile beyond Ladder). It is very likely that the drawdown would be up to fifty (50) feet at Ladder's southern boundary.

- At the end of Mining operations a pit lake will form. It will most likely take a century or more to reach its full size. Drawdown around the pit lake will continue to expand even longer, reaching Las Animas Creek on Ladder after a few decades. Drawdown from the

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[43] *Id.* at 4.

[44] Reductions in surface water flows and levels will have serious impacts on Sierra County's economy and on New Mexico's ability to satisfy its obligations under the Rio Grande Compact.

[45] *Id.* at 3.

pit would cause Las Animas Creek, Warm Spring, and Myers Animas Spring to lose much or all of their flow.

During Mining operations, to keep the Mine's pit dry, NMCC proposes to pump water from locations close to the pit to dewater the entire area. These dewatering wells and the pit itself would have serious long-term effects on water availability in the regional aquifer and in surface water. The DEIS fails to adequately address whether the Mine's production pumping will "impair existing wells." DEIS 3-76. It simply states that the New Mexico Office of the State Engineer ("OSE") will determine such impairment. This is a clear violation of NEPA. 40 C.F.R. Part § 1501.6. BLM must either revise or supplement the DEIS with the required impairment analysis.

Additionally, as stated above, after the Mine ceases to operate a small pit lake will form and evaporate water in perpetuity. This evaporation would cause the pit to hydraulically resemble a large diameter well, in perpetuity. Though the DEIS discloses the total evaporation of the pit lake under the Proposed Action, it fails to disclose the total evaporation under the Preferred Alternative. This is significant because pit lake evaporation is a permanent loss of flow to the Rio Grande. Pit lake evaporation will be a permanent loss of approximately 100 af/y from the water budget of the Mine-area watershed's drainage to the Rio Grande.[46]

BLM must either revise or supplement the DEIS to estimate the long-term pit lake evaporation loss for all action alternatives and estimate the time for these losses to reach the Rio Grande. This can be accomplished by running the numerical model in transient mode[47] into the future, until conditions approach steady state[48]. The model should also be run in a steady state mode with the pit lake to estimate the steady state evaporation.

The DEIS concludes that drawdown of groundwater levels at wells near the Mine pit would be over 200 feet after 100 years. Continued drawdown at the Mine pit would be much greater. Water levels would recover very slowly to a point where the evaporation from the pit lake equals the inflowing groundwater, precipitation and runoff and the drawdown cone would continue to expand. However, the DEIS fails to adequately analyze the ultimate extent of the pit's cone of depression. BLM must either revise or supplement the DEIS to adequately estimate this impact. This can be done by running the numerical model with the pit lake simulated in steady state, as recommended above for estimating the steady state pit lake evaporation rate.

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[46] *Id.*

[47] "Transient mode" is a model simulation in which conditions change with time, usually including a change in pumping or other stresses with time.

[48] "Steady state mode" is a model simulation in which all inflows and outflows are constant, with no changes in groundwater levels.

The DEIS also fails to disclose all affected springs within the predicted one foot drawdown (of groundwater levels) from the Mine pit. It avoids doing so by claiming that springs along the alluvial valley will not be affected, because they are "perched discharges."[49] DEIS 3-82. The DEIS offers no evidence to support this assertion.

Impacts to the Rio Grande and Caballo Reservoir.

As stated above, the most substantial impact on the Rio Grande and Caballo Reservoir would be the loss of water due to the Mine's production wells and to evaporation from the permanent pit lake. However, the zone of influence of the pit dewatering wells and the Mine pit after mining ceases can contribute to robbing groundwater flow from the Rio Grande and Caballo Reservoir.

In summary, the water quantity impacts of the Mine will likely be very substantial. In light of the errors and biases in the groundwater models relied upon in the DEIS (and the associated minimization and uncertainty of impacts), BLM must ensure that this analysis is expanded to address the potential range of impacts. A worst case scenario should be presented in detail in either a revised or supplemental DEIS. BLM must also assure itself that NMCC has sufficient water rights to operate this Mine, given the massive quantities of water involved for both operations and mitigation.

b. The Mine's Impacts to Water Quality.

The Mine would pose serious threats to water quality in the surrounding area. Several aspects of the Mine would affect water quality, such as the construction and reclamation of waste rock dumps, expansion of the pit and dewatering, expansion and reclamation of the tailings impoundment, non-point source pollution from disturbed area runoff, and spills of hazardous materials. DEIS 3-36, -37. The major threat would be the tailings impoundment, with the waste rock piles and the open pit also potentially contributing to water quality impairment.

Additionally, the "Copper Rule" (20.6.7 NMAC) promulgated by the New Mexico Environment Department ("NMED") currently exempts groundwater beneath existing and future copper mines from compliance with New Mexico's "3103" water quality standards.[50] The Copper Rule allows the open pits, waste rock piles, leach piles, tailings, and other mine units at copper mines to release hazardous contaminants directly into the environment and to pollute groundwater above 3103 Standards. The DEIS makes no mention of this rule and its application to this Mine.

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[49] "Perched discharge" is a charge from a spring associated with a perched aquifer. A perched aquifer is a (usually) small aquifer not connected to the deeper regional aquifer.

[50] The numeric water quality standards codified at 20.6.2.3101 NMAC are commonly referred to as "3103 standards."

Hundreds of millions of tons of broken, crushed and finely ground mineralized rock are present within the massive leach ore, waste rock, and tailings piles found at open pit copper mines in New Mexico. These piles are capable of generating and releasing acid rock drainage ("ARD") into the environment for hundreds of years. ARD, along with the acidic solution used to leach copper from ore, has already contaminated approximately 20,000 acres of groundwater pollution at Freeport-McMoran's three existing mines in Grant County, New Mexico. After active mining ceases, the ore, waste rock, and tailings piles continue to generate ARD and pollute groundwater, which continues to move and spread in response to pressure gradients. Accordingly, the pump-and-treat remedial systems (prescribed by the Copper Rule) at a given copper mine must be operated continuously, in perpetuity, in order to prevent the permitted pollution from spreading offsite.

The following paragraphs discuss water quality impacts by Mine feature. The DEIS claims there is very little difference in impacts among the action alternatives because Project features (such as pit lake, waste rock dumps, tailings impoundment) vary minimally in size. However, the pit lake will be larger under the Preferred Alternative than under NMCC's Proposed Action and Alternative 1. Therefore, the DEIS fails to adequately analyze the difference in pit lake water quality due to size differences among the action alternatives, as discussed below.

i. The Mine's Waste Rock Dumps.

Waste rock dumps are pollution sources due to precipitation or runoff leaching through them. Their capacity for pollution depends on the reactivity[51] of the rock and whether the rock is sufficiently covered. The DEIS describes the waste rock only in general terms, acknowledging that some will have the potential to generate acid mine drainage ("AMD"). DEIS Table 3-12. The DEIS states that both waste rock and low-grade ore have the potential to generate "deleterious leachate if sufficient percolation of water through the rock piles occurs." DEIS 3-41. However, it fails to disclose the amount of transitional or sulfide waste rock or ore. This is problematic because some ore could be temporarily stored on the ground surface prior to processing.[52] The DEIS also implies that the Mine will rely on the dry climate to prevent AMD from reaching ground or surface water, (DEIS 3-39), and fails to disclose how NMCC will accomplish cover requirements.

[51] "Reactivity" of rocks is the tendency for rock to undergo geochemical changes with time, due to changing conditions in the ground.

[52] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 15 (March 30, 2016).

BLM must either revise or supplement the DEIS to analyze the following: reactive rock amounts potentially causing pollution on the Mine site; substantial precipitation events beyond low-frequency high rainfall events occurring in the summer; seepage from the waste rock dumps; cover requirements; and mitigation measures addressing waste rock and potential leaching of contaminants.

ii. The Mine's Tailings Impoundment.

The existing tailings impoundment has impacted downgradient groundwater since it was constructed in the early 1980s.[53] The DEIS claims that constructing a new impoundment on top of the existing impoundment would improve existing water quality because it will have a geomembrane liner, which will prevent seepage of new tailings water and prevent future seepage from the existing tailings.[54] DEIS 3-45. For this reason, the DEIS claims that all action alternatives will "result in an improvement of water quality as compared to the No Action alternative." *Id.*

This ignores the fact that NMCC has been implementing an abatement plan since 2012, remediating existing groundwater. It also fails to acknowledge that if BLM does not permit the Mine, NMCC will be required to undertake reclamation activities under NMMA, including tailings remediation. It is extremely inappropriate for the DEIS to suggest that an action alternative is necessary to remediate an existing sulfate/TDS plume, and demonstrates BLM's bias for the Preferred Alternative in violation of NEPA. 40 C.F.R. Part § 1502.2(f),(g).

iii. The Mine's Pit Lake.

The DEIS indicates that the existing pit lake has exceedances of "applicable surface water quality standards for aluminum, *cadmium, copper*, lead, manganese, selenium, and zinc in at least one of the baseline water quality samples." DEIS 3-21 (emphases show constituents with exceedances in all samples). Exceedances are based on the "designated uses of warmwater aquatic life, livestock watering, or wildlife habitat." *Id.* Total dissolved solids ("TDS") and sulfate also have very high and increasing concentrations with time since the initial pit lake formed in the early 1980s. DEIS 3-22.

The DEIS also predicts that a pit lake will re-form after mining ceases under all action alternatives. Inflow to the pit lake will be groundwater, precipitation, and surface runoff. There is little difference among alternatives for inflow. Being terminal,[55] with a significant amount of

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[53] *Id.* at 16.

[54] Mining Engineer Jim Kuipers also notes that the DEIS fails to adequately analyze the high rate of rise for the Mine's tailings storage facility. This is significant because the "rate of rise" is often times cited as a potential adverse factor relative to failures in mine tailings facility design and operation. *See* Jim Kuipers, "Technical Review of Copper Flat DEIS," p. 6-7 (March 31, 2016).

[55] "Terminal" means groundwater flow enters as a liquid and can leave only as a gas by evaporation.

reactive rock surrounding the pit, the future water quality would be at least as bad as the existing pit lake, and with evapoconcentration[56] (due to being a terminal lake) some concentrations will be worse than existing concentrations.[57] DEIS 3-31.

The DEIS downplays the importance of detailed water quality predictions for the pit lake because of "pertinent uncertainties." DEIS 3-31. Thus, the DEIS relies on both a predictive model and the existing pit lake only to inform its discussion of future pit lake water quality. A "predictive geochemical model is useful to understand the general water quality that may be present decades or centuries in the future, but the model predictions are only estimates and the *level of uncertainty in the model predictions cannot be fully quantified*." DEIS 3-32 (emphasis added). The DEIS notes the modeling predicts future water quality would be near-neutral pH, high TDS, calcium sulfate water, with exceedances of the current water quality standards for copper, lead, manganese, selenium, and zinc. *Id.*

The DEIS also discusses that future water quality standards for the pit lake may be different than at present, either by changing the designated use through a "use attainability analysis" (DEIS 3-33), or by completing site-specific standards, which appears to simply set standards based on what can live in the future poor quality water. *Id.*

Lastly, the DEIS fails to present groundwater modeling results to determine what would happen if the pit lake is pumped full prior to groundwater recovery. BLM must either revise or supplement the DEIS to include a "use attainability analysis" and data regarding pit lake water migration.

In summary, BLM must either revise or supplement the DEIS with the following information to comply with NEPA:

- The DEIS must disclose the amount of transitional or sulfide waste rock or ore and how it will be stored during mining operations;

- The DEIS must disclose how NMCC will accomplish cover requirements for the waste rock and tailings impoundment;

- The DEIS must disclose that NMCC has been undertaking remediation measures for existing groundwater contamination at the Mine site and will continue to do so if BLM does not permit the Mine;

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56 "Evapoconcentration" is the concentration of salts or metals in a water body due to evaporation. This is primarily a problem in terminal pit lakes into which groundwater flows, but only exits by evaporation. Salts and metals remain in solution when evaporation occurs.

57 Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 17 (March 30, 2016).

- The DEIS must disclose what the water quality standards for the pit will be after Mining operations cease; and

- The DEIS must disclose an analysis of the Mine's pit stability and groundwater modeling results to estimate the potential for pit lake water to enter the groundwater.

4. <u>The DEIS Fails to Take a Hard Look at Impacts to Wildlife and Federally-Listed Species.</u>

The DEIS fails to adequately analyze the Mine's impacts to wildlife and federally-listed species for two reasons. First, the DEIS relies upon incomplete baseline data for biological resources at and near the Mine site.[58] Second, the DEIS fails to identify and analyze the Mine's impacts to Ladder's bison herd and captive endangered Mexican Grey Wolves, and other wildlife species found on the Ranch.

a. The Mine's Impacts to Wildlife.

Ladder's riparian areas contribute significantly to biological diversity within New Mexico. The most pronounced and unusual communities on the Ranch are those dominated by Arizona sycamore, along the broadest flood plains of Las Animas Creek. Arizona sycamores are not known to occur anywhere else in the Rio Grande watershed, or further east of the Continental Divide. These riparian communities have high priority for conservation since throughout most of the Southwest they are in decline, due to drastic changes in hydrological conditions (such as large flood-control dams and climate change). The continued diversity of the riparian vegetation communities on Ladder is dependent on management practices that favor natural flooding, reliable stream flows on or near the surface, and protection of the uplands from erosion. Many wildlife species are totally dependent on these riparian communities, which serve as wildlife sanctuaries within an arid landscape.

The DEIS admits that due to pumping of the Mine's production wells and dewatering of the Mine's pit significant impacts will occur to local streams, springs, and seeps. These impacts will result in significant degradation to, and maybe even elimination of, wildlife and riparian habitat dependent upon these and other waters.

b. The Mine's Impacts to Federally-Listed Species.

As previously discussed, Ladder is engaged in numerous wildlife and federally-listed species reintroduction and restoration projects. Ladder has also recently launched its ecotourism initiative through Ted Turner Expeditions, which educates the public about the importance of such species and restoration and reintroduction efforts. Ladder has the following concerns regarding the Mine's impacts to its reintroduction and restoration projects:

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[58] *See* pages 6-7 of these comments.

i. Ladder's Endangered Mexican Grey Wolf Reintroduction Project.

Located within 3.5 miles of the Mine is a United States Fish and Wildlife Service ("USFWS") holding facility for the Endangered Mexican Grey Wolf. Ladder has been a partner with USFWS in endangered Mexican grey wolf restoration efforts since 1997. Since then, over 100 wolves have been housed in the Ladder Ranch Wolf Management Facility ("LRWMF"). Turner Endangered Species Fund ("TESF") is the cooperating entity with USFWS. TESF currently holds a permit from USFWS and New Mexico Game and Fish ("NMGDF") through 2016. It is anticipated that the program will continue and that the LRWMF will continue to be an important transitioning facility for the recovery of this endangered species. Blasting from the Mine could adversely affect the behavior of the captive wolves being held prior to their release in the wild.[59]

ii. Ladder's Threatened Chiricahua Leopard Frog ("CLF") Recovery Project.

Ladder has worked in partnership with USFWS and the NMDGF to conserve the threatened CLFs on the Ranch since 2001. CLFs are listed as "threatened" under the federal Endangered Species Act ("ESA") and as a "species of greatest conservation concern" by NMDGF. The conservation value of the Ranch's 155,000+ acres of diverse habitat in New Mexico cannot be overstated. As home to the last large CLF population in New Mexico, the Ranch plays a crucial role in the survival of this species. CLF occur in four drainages on the Ranch: Las Animas, Seco, Las Palomas, and Cuchillo creeks. The Ladder also houses an outdoor breeding facility and several steel rim refugia tanks that serve as temporary holding facilities for small, putatively unique populations that are at high risk of extirpation in the wild and serve a crucial role in CLF recovery.[60]

<u>Dust-abatement</u>.

Dust-abatement (especially with any chemicals) caused by the Mine will likely have a major impact on water quality, in turn affecting Ladder's breeding facility and refugia tanks. Water is relatively stagnant at these sites and an increase in chemicals in the area will likely change the pH in the water. Water with pH less than 6.0 may inhibit reproduction, and acidic waters with a pH of less than 5.5 are likely fatal to most CLFs (USFWS 2007: 25); whereas pH above 10 is also likely detrimental. Copper has been found to be acutely toxic to CLFs.

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[59] *See* Turner Endangered Species Fund website at http://tesf.org/project/mexican-wolf-recovery/ for more information about Ladder's endangered Mexican grey wolf reintroduction project.

[60] Comments pertaining to the Mine's impacts to CLFs were prepared by Ladder Ranch Staff Biologist, Cassidi Cobos, on behalf of TRP and NMELC. *See also* Turner Endangered Species Fund website at http://tesf.org/project/chiricahua-leopard-frog/ for more information about Ladder's threatened CLF recovery project.

Groundwater pumping.

As stated above, the Mine's extraction of ground water may reduce the extent or permanence of nearby surface waters, thereby eliminating habitat for any frogs present, resulting in forced dispersal, increased exposure to predators, or desiccation. A reduction in permanency will also result in changes to other components, such as aquatic vegetation and invertebrates, leading to a reduction in food resources to larval and adult frogs.

Noise and Vibrations.

The Mine's noise may disrupt male vocalizations in some manner, and thus may affect aspects of mating and reproduction. Vocalizations by male frogs are species-specific and are assumed to serve as conspecific[61] mate attractants that permit females to reduce the likelihood of error in mate choice where other similar ranid species are present. Frost and Bagnara 1977. Anthropogenic noise, especially during the night or at dusk when CLFs primarily vocalize, may impact calling behavior. The vibrations may also disturb CLFs in Cave Creek, which could cause forced dispersal from the area or change breeding habitats.

Vegetation Removal.

The Mine's activities that degrade riparian zones are likely to have significant impacts to water permanency in lotic systems and their associated backwater pools. The removal of upland vegetative ground cover may also induce erosion and sedimentation reaching aquatic sites. Neary et al. (2005). The deposition of sediments, as previously discussed, may fill in Ladder's pools and tanks, thus reducing the permanence of those sites and their use for breeding. Parker 2006. Increased turbidity and accumulated fine particulates may reduce primary productivity of vegetated sites, resulting in altered availability of foods for larva and adults. Sedimentation may also alter aquatic or semi-aquatic vegetation in and around aquatic sites, thus reducing feeding and cover (e.g., egg-laying, escape) habitats for CLFs. Pilliod et al. 2003. Pulses of sediments may also smother eggs.

iii. Ladder's Endangered Bolson Tortoise Reintroduction Project.

Ladder's endangered bolson tortoise reintroduction project is located within 2.5 miles of the Mine. Bolson tortoises, the largest and rarest of the five North American tortoise species, is listed as endangered under the ESA and as "vulnerable" on the International Union for Conservation of Nature ("IUCN") Red List. The objective of this project is to release juvenile bolson tortoises on Ladder (as well as the Armendaris Ranch), which is the northern tip of the tortoise's prehistoric range, to establish wild populations. Effects of mining activity, particularly vibrations from blasting, are unknown, but could cause the collapse of burrows and alter behavior patterns.[62]

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[61] Conspecific: of the same species.

[62] *See* Turner Endangered Species Fund website at http://tesf.org/project/bolson-tortoise-recovery/ for more information on Ladder's endangered bolson tortoise reintroduction project.

iv. Ladder's Prairie Dog Reintroduction Project.

The black-tailed prairie dog has been a candidate species for listing under the ESA. Prairie dogs are a keystone species whose presence on the landscape has a profound positive effect on biodiversity. Ladder has been restoring black-tailed prairie dog colonies within two miles of the Mine. Effects on these colonies from blasting and other mining operations are unknown, but could cause the collapse of burrows and alter behavior patterns.[63]

For the reasons discussed above, the DEIS's analysis of the Mine's wildlife and threatened and endangered species impacts is woefully inadequate. BLM must either revise or supplement the DEIS with complete baseline data which address Ladder's concerns.

5. <u>The DEIS Fails to Take a Hard Look at the Mine's Impacts to Recreation.</u>

The Mine will have significant impacts to air quality, water quality and quantity, and visual resources - which in turn will negatively affect recreation at Ladder and in Sierra County. The DEIS fails to take a hard look at the Mine's recreation impacts for three reasons: 1) it fails to identify Ladder,[64] Caballo Lake State Park and Percha Dam State Park as key recreational sites in Sierra County (DEIS 3-194); 2) it fails to adequately analyze the Mine's impacts on water levels at Caballo Reservoir and Elephant Butte Lake; and 3) it fails to adequately analyze streamflow reduction impacts to Las Animas and Cave creeks.

a. Impacts to Ladder Ranch.

Of primary concern is the DEIS's failure to adequately analyze the Mine's impacts on water use and the subsequent impact to recreation at Ladder. Ladder offers the following recreational opportunities: hunting, guided hiking and mountain biking, bird watching, wildlife and bison viewing, and astronomy events. Anticipated future recreational activities on the Ranch include guided horseback riding and camping.[65]

The DEIS states that, "The Proposed Action...is predicted to slightly reduce streamflows in both Las Animas Creek and Percha Creek and reduce groundwater discharge to Caballo Reservoir and the Rio Grande. However, recreational impacts in Caballo Reservoir and the Rio Grande are expected to be minor and temporary to medium-term, where recreational use is concerned." DEIS 3-201. The DEIS then fails to cite to any supporting documents.

One of Ladder's greatest concerns is that a 700-900 foot deep pit, and associated pit dewatering, will cause a cone of depression that could devastate portions of these creeks forever.

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[63] *See* Turner Endangered Species Fund website at http://tesf.org/project/prairie-dogs/ for more information on Ladder's black-tailed prairie dog reintroduction project.

[64] *See* http://tedturnerexpeditions.com/properties/ladder-ranch/ for more information on Ladder's many recreational opportunities, which include hunting and ecotourism.

[65] *See* attached Exhibit G for more information on recreational tour offerings at Ladder Ranch.

Ladder is extremely concerned about the Mine's reduction in streamflows in Las Animas Creek and Cave Creek, and how this will impact Ladder's wildlife restoration projects and ecotourism programs.[66] It has been estimated that roughly eighty (80) percent of all the wildlife on Ladder depend on these creeks for survival. They are important migration routes for birds, as well as nesting grounds for rare species. Ladder will be conducting surveys this summer for endangered Willow Flycatchers and threatened Yellow-billed Cuckoos on Las Animas Creek.

Las Animas creek is one of the crown jewels for biodiversity in New Mexico and the Southwest. Any draw down of water from the Mine's production pumping, dewatering wells and pit lake will likely affect these creeks and riparian corridors, and the unique species that rely on them. A drop in ground water can also eliminate certain vegetation and trees, particularly ancient sycamores, upon which many species, particularly birds, depend.

Even a one-foot drop can be disastrous. Specifically, this can affect a suite of neoptropical birds that breed on Ladder, including tanagers, oriels, blackhawks, and zone tails. Until a few years ago, Ladder had bald eagles nesting along the Las Animas creek. Although now abandoned, the nest can still be reused. This can be seen at the Armendaris Ranch, a nearby ranch owned by a TRP affiliate, where bald eagles are again using a nest that had been abandoned for many years.

b. Impacts to Sierra County.

The Mine's reduction of groundwater discharge to Caballo reservoir and the Rio Grande pose serious threats to recreation in Sierra County. The New Mexico Tourism Department has stated:

> State park visits decreased by 20.5% from 2010 to 2013. State park visitation is highly sensitive to drought and water levels as most visits to New Mexico's state parks are associated with warm weather water recreation. Visitation has suffered over the last few years, almost entirely due to long term drought that has resulted in low water levels low enough to interfere with recreation activities (such as boating, camping, fishing and swimming), combined with occasional park closures due to wildlife hazards."

New Mexico Tourism Department 2014 Annual Report, p. 14.

The Mine will further lower water levels at Caballo Lake State Park, and thus potentially interfere with recreational activities at these sites. Any reduction of capacity at Caballo can in turn result in the forced release of water from Elephant Butte Lake upstream, which will result in further negative impacts on recreational activities conducted there. Taken together, this reduction of flow caused by the Mine will have more than a "minor" adverse impact on Sierra County. Though tourism levels decreased during 2010-2013, New Mexico began to see a significant increase in visitation and tourism spending in 2014. New Mexico Tourism Department 2015 Annual Report, p. 5-6. "Tourism employment has been one of the best

[66] *See* http://theladderranch.com/wp-content/themes/bones-ttx/library/docs/TTX-Ladder-sample-itinerary.pdf.

performing sectors in the New Mexico economy." *Id.* at 7. New Mexico is also currently benefitting from a substantial tourism-generated taxes increase. *Id.* at 9.

Elephant Butte and Caballo are two of the most visited state parks in New Mexico. New Mexico Tourism Department Fiscal Year 2011 3rd Quarter Report, p. 8. These parks are major economic drivers of Sierra County. The U.S. Department of Interior's Bureau of Reclamation recently stated that "...reservoir evaporation at Elephant Butte Reservoir, the reservoir with the highest evaporative losses in the Upper Rio Grande Basin, is projected to increase by up to 10 percent."[67] Additionally, the Upper Rio Grande Impact Assessment has identified a number of water-dependent recreational activities that are expected to be negatively affected by climatic changes that reduce water supply in the basin for recreational uses. These activities include fishing and flat-water boating and camping at Elephant Butte and Caballo Reservoirs.[68] The Mine's contribution to the lowering of water levels at these parks will substantially interfere with recreation activities, resulting in a significant reduction of income and tax revenue generated from these activities.[69]

The DEIS also fails to adequately analyze the benefits to recreation under the "No Action" alternative. The DEIS states that, "Local employment and economic revenue would not increase as a result of this [no action] alternative. Existing uses such as grazing and recreation would continue at current levels," (DEIS 2-87) without any citation to supporting documents. The DEIS must state what the current level for recreation is and acknowledge that New Mexico is currently experiencing substantial growth in recreation and tourism.[70]

Economic contributions from recreational fishing alone constitute a significant economic driver for Sierra County. The American Sportfishing Association released a report on the economic contributions of recreational fishing in 2015 stating that New Mexico's Congressional District #2 (which includes Sierra County) generated 1,599 jobs; $12,286,252 in state and local tax revenues; $129,423,004 in retail sales, with a total multiplier effect of $180,584,884.[71] Based

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[67] U.S. Department of the Interior, Bureau of Reclamation, SECURE Water Act Report: Reclamation Climate Change and Water 2016, p. 7-7 (March 2016).

[68] U.S. Department of the Interior, Bureau of Reclamation, SECURE Water Act Report: Reclamation Climate Change and Water 2016, p. 7-9 (March 2016).

[69] According to a study by Texas A&M University, the economic contribution from wildlife watchers in the Rio Grande Valley is estimated to be approximately $463 million per year. U.S. Department of the Interior, Bureau of Reclamation, SECURE Water Act Report: Reclamation Climate Change and Water 2016, p. 7-11 (March 2016). Though a similar study has not been conducted for the entire Rio Grande Basin, this study provides a reasonable estimate of income derived from recreational wildlife watchers in the Rio Grande Basin.

[70] *See* https://outdoorindustry.org/images/ore_reports/NM-newmexico-outdoorrecreationeconomy-oia.pdf. "Every year, Americans spend $646 billion on outdoor recreation."

[71] American Sportfishing Association, Economic Contributions of Recreational Fishing: U.S. Congressional Districts, p. 18 (October 2015).

on this report and forecasts of the New Mexico Tourism Department, local employment and revenue will continue to increase as a result of the No Action alternative.

For the above stated reasons, BLM must either revise or supplement the DEIS with documentation supporting its claim that no benefits to recreation (such as continued growth in visitation, employment, income and tax revenue for Sierra County) will occur, and to fully analyze the Mine's recreation impacts to Ladder and Sierra County.

6. The DEIS Fails to Take a Hard Look at the Mine's Impacts to Transportation.

The Mine will rely heavily on NM-152 and I-25 for mining operations. Thorough analysis of transportation impacts to NM-152 is vital because it is an important rural connector serving the Truth or Consequences, Caballo, Elephant Butte, Hillsboro, Kingston, and Silver City region. More important, NM-152 is a part of two scenic byways: the Lake Valley Backcountry Byway and the Geronimo Trail National Scenic Byway. Ladder is also located along NM-152, three miles from the entrance to the proposed Mine. Traffic congestion, increased travel time, and reduced safety caused by the Project would negatively impact the Ranch and these scenic byways.

The DEIS's transportation impacts analysis is inadequate for four reasons. First, the DEIS fails to evaluate the current capacity of NM-152 and I-25 to serve the Mine's traffic demand and volume. NM-152 is a chipseal route and is not designed for a specific load carrying capacity. An assessment of NM-152's current capacity for withstanding increased heavy truck traffic under all three action alternatives, along with a cost analysis for road improvements and maintenance, must be completed in the DEIS. Second, the analysis is erroneously based on assumptions and not actual baseline data. DEIS 3-218.

Third, the DEIS fails to identify and evaluate the following transportation impacts:

- Impacts to wildlife and Federally listed species existing within and nearby the minesite;
- Impacts to the scenic byways and other recreational and cultural resources; and
- Impacts to Ladder and other land uses along NM-152, such as reduced property values.

Finally, the DEIS fails to identify studies conducted and relied upon in support of its assertion that transportation impacts to recreation along the two scenic byways would be "minor" and "would occasionally reduce the standard pace of scenic driving along the overlap of the byways." This statement contradicts Table ES-3 "Summary of Impacts," in which the DEIS concludes that the Mine's impacts to transportation and traffic will be "significant" under all three action alternatives. DEIS ES-9. Therefore, BLM must either revise or supplement the DEIS with an adequate transportation impacts analysis.

7. The DEIS Fails to Take a Hard Look at the Mine's Impacts to Noise and Vibration Levels.

Noise impacts associated with the Mine can be divided into four distinct phases: 1) pre-mining, which consists primarily of enlarging the existing pit and constructing mining facilities; 2) active mining, which consists primarily of operation of the mine; 3) final reclamation and closure of the mine; and 4) post-closure activities. The analysis of the Mine's noise and vibration impacts is grossly inadequate for several reasons. First, it is based on misstatements of law and facts. Second, it fails to disclose and make readily available to the public the study relied upon in the DEIS. Third, it fails to identify and analyze several factors.

The DEIS only identifies the federal Noise Control Act of 1972 as governing law regarding noise and vibrations and claims that "Neither the State of New Mexico nor Sierra County have noise ordinances." DEIS 3-225. This is incorrect, and for this reason alone the BLM must either revise or supplement the DEIS with a noise and vibrations impacts analysis governed by all applicable federal and state laws and guidance policies.

The following are federal and state laws and guidance policies which the DEIS must include in its analysis:

- Office of Surface Mining blasting performance standards (30 C.F.R. §816.67);
- Federal Highway Administration regulations for noise evaluation (23 C.F.R. §772) and FHWA's Highway Traffic Noise: Analysis and Abatement Guidance (June 2010);
- New Mexico Department of Transportation's Infrastructure Design Directive IDD-2011-02: Procedures for Abatement of Highway Traffic Noise and Construction Noise (April 2011) (provides procedures for noise studies and noise abatement measures);
- 1980 Federal Interagency Committee on Urban Noise Report (U.S. Department of Housing and Urban Development, Federal Transit Administration and Federal Aviation Administration use the metric within this report to establish impacts; This metric serves as guidance for BLM); and
- U.S. Department of Housing and Urban Development noise guidelines (This serves as guidance for BLM).

New Mexico also has a number of noise-related statutes, though none specifically regulating copper mines. However, such statutes provide guidance and must be considered in the DEIS to render an adequate noise impacts analysis.[72]

[72] *See, e.g.*, NMSA 1978, §3-18-17 (Nuisances and offenses…noises); §66-3-843 (Horns and warning devices); §66-3-844 (Mufflers; prevention of noise); §66-3-1010.3 (Operation and equipment); §66-12-10 (Muffling devices); §73-25-2 ("The purpose of the Regional Transit District Act is to …reduce noise and air pollution produced by motor vehicles.").

The DEIS also claims that, "There are no nearby noise-sensitive receptors (churches, schools, hospitals, or residences) in the immediate vicinity of the proposed Copper Flat Copper project." DEIS 3-226. This is inaccurate. Ladder is within the immediate vicinity of the Mine. Ladder is not only a residence for the ownership representatives and staff of the Ranch, it is a commercial bison operation, ecotourism destination, and site of numerous endangered and threatened species restoration projects.

Additionally, Ladder Headquarters is comprised of historic buildings constructed in the early 1900s from rock and mortar. Several miles of water pipelines, five wells and four cement-base steel rimmed water storage units are also located within two to three miles of the Mine. All of these structures will be subjected to noise and continuous vibrations from blasting on a daily basis, suffering unknown damage to structural integrity.

Individuals living within two to four miles of the Tyrone Mine in Grant County have advised Ladder that they experience significant adverse impacts from the Tyrone Mine. These include noise from mining operations, truck and equipment traffic, and blasting. They also include vibrations from blasting, which have caused structural damage to buildings on residential property near the mine.[73]

Finally, it is unclear what factors are considered in the study relied upon by the DEIS and what the study's spatial and temporal parameters are.[74] It is necessary for BLM to include the following factors in its analysis:[75]

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[73] Richard Martin resides 3.5 miles from the Tyrone Mine. Adverse impacts from the Tyrone Mine experienced on Mr. Martin's property include noise from dumping, dozers filling trucks, clanking of trucks/equipment, and traffic; vibrations from blasting occurring during the day, during the lunch hour. Ed Spencer resides two miles from the Tyrone Mine. Adverse impacts experienced on Mr. Spencer's property include noise from constant mining activities, the use of fire cannons to scare away birds from settling into the pits and ponds at the mine; and vibrations from blasting have caused cracks in the walls of several buildings on his property.

[74] The DEIS states that "Existing noise levels (DNL and Leq) were estimated for the areas associated with the proposed Copper Flat project using the techniques specified in the *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term Measurements with an Observer Present* (ANSI 2013). DEIS at 3-226. Not only is ANSI not listed under the "References" section of the DEIS, it is not included in the DEIS appendices. Even more concerning, the study itself is not listed under "References" section or included in the DEIS appendices. These documents must be made readily available to the public under NEPA and CEQ guidelines. The BLM must either revise or supplement the DEIS with these documents so that the public may submit informed comments on the adequacy of the DEIS's noise and vibrations impacts analysis.

[75] Ladder recommends the DEIS include guidance from the New York State Department of Environmental Conservation Program Policy: *Assessing and Mitigating Noise Impacts* (October 6, 2000). http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf. Last visited March 1, 2016.

- Evaluation of Sound Characteristics:
    - Ambient noise level;
    - Future noise level;
    - Increase in Sound Pressure Level ("SPL");
    - Sharp and Startling Noise;
    - Frequency and Tone;
    - Percentile of Sound Levels; and
    - Expression of Overall Sound.

- Receptor Locations (Ladder Ranch, Scenic Byways); and

- Thresholds for Significant SPL Increase.

It is also necessary for BLM to conduct noise monitoring at a currently active open-pit copper mine to establish complete baseline data.[76] For the reasons stated above, BLM must either revise or supplement the DEIS with an adequate noise and vibrations impacts analysis.

8. <u>The DEIS Fails to Take a Hard Look at the Mine's Impacts to the Night Sky.</u>

The DEIS states that under all action alternatives the proposed Mine will operate 24 hours a day, 365 days a year. DEIS 2-6. This indicates that the Mine will utilize extensive artificial lighting. The Mine will have significant impacts on the night sky and astronomy interests at Ladder and in Sierra County, yet the DEIS fails to identify and adequately analyze this impact.

In 1999, New Mexico enacted the Night Sky Protection Act (NMSA 1978, §§74-12-1 through 74-12-10) ("Act"). The purpose of this Act is to "regulate outdoor night lighting fixtures to preserve and enhance the state's dark sky while promoting safety, conserving energy and preserving the environment for astronomy." *Id.* One of the first of its kind in the United States, the Night Sky Protection Act makes dark skies a priority in New Mexico for the health of its people, wildlife, and economy.

Sierra County recognizes the economic importance of protecting dark skies. "Thanks to New Mexico's efforts to minimize light pollution, the whole state offers great views of the night skies, and Sierra County's sparse population (just 3 people per square mile, largest town population = 6000) maximizes this advantage!"[77]

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[76] The noise and vibrations impacts analysis relied upon in the EIS for the proposed Rosemont Copper Mine in Arizona was based not only on noise monitoring studies conducted in the vicinity of the project area, but also on noise monitoring at a currently active open-pit copper mine with similar terrain for comparative analysis with the project area. http://www.rosemonteis.us/final-eis. Last visited March 1, 2016.

[77] Sierra County Recreation and Tourism, http://www.sierracountynewmexico.info/recreation/stargazing/.

An important component of the recreational experience at Ladder and in Sierra County is night sky viewing. The cloudless night skies, minimal atmospheric pollution, and low humidity of the Southwest provide ideal conditions for this activity. Dark skies are a prerequisite to any star gazing activities. These activities will be significantly impacted by light pollution from the Mine, adversely affecting Ladder's ecotourism programs. Specifically, increased light and air particulates from Mine-related facilities, equipment, vehicles, and processes may diminish dark skies. The increased sky glow will reduce the visibility of all celestial objects, particularly the faint ones.

The DEIS briefly discusses artificial night lighting in the context of environmental effects on wildlife (DEIS 3-137), however, it fails to discuss impacts on threatened and endangered species, people, and the night sky. This is problematic for three reasons: 1) New Mexico's Night Sky Protection Act has been governing law since 1999; 2) both the Federal Public Lands Management Act ("FPLMA") and BLM's §3809 standard ("undue, unnecessary degradation standard) require BLM to prevent such degradation to night skies; and 3) artificial night lighting impacts cannot be isolated to wildlife; it also impacts people and the night sky.

The recent EIS for the proposed Rosemont Copper Mine in Arizona contains a light impacts analysis and is instructive in this case.[78] Rosemont Copper, owner and operator of the proposed mine, prepared a "Lighting Plan," gathered baseline data for adequate analysis of light impacts,[79] and had a "Light Pollution Mitigation Recommendation Report" prepared by Monrad Engineering, Inc.[80] Each of these documents was relied upon in that EIS process. Therefore, BLM must either revise or supplement the DEIS to adequately analyze the Mine's light pollution impacts to threatened and endangered species, people and the night sky.

9. <u>The DEIS Fails to Take a Hard Look at the Mine's Impacts to Socioeconomic Issues.</u>

"NEPA requires an EIS to disclose the significant health, socioeconomic, and cumulative consequences of the environmental impact of a proposed action." *Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 106-107 (1983) (citing Metropolitan *Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766 (1983); *Kleppe v. Sierra Club*, 427 U.S. at 410; 40 C.F.R. §§1508.7, -.8. The DEIS fails to rely on a quantitative analysis of public costs to Sierra County and the State. Contrary to its assertions that the Mine will have a positive impact to Sierra County, the DEIS fails to take a hard look at the following:[81]

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[78] EIS materials can be accessed at http://www.rosemonteis.us/final-eis. Last visited March 1, 2016.

[79] "Sky Brightness and Light at Night: Santa Rita Mountains, Arizona, Airborne and Ground-based Reference Data Collection," prepared by STEM Laboratory, Inc. (December 2011) (Referenced as: STEM TechRep-11-1201).

[80] "Rosemont Copper Project Light Pollution Mitigation Recommendation Report," prepared by Monrad Engineering, Inc. (January 24, 2012).

[81] Comments pertaining to the Mine's socioeconomic impacts were prepared by Phil Musser, retired Economic Developer, on behalf of NMCC. For a detailed discussion of the DEIS's inadequate socioeconomic impacts analysis see Phil Musser, Economic Developer, "Comments on Socioeconomic Analysis Relied Upon By the DEIS of

- The instability of the Mine's production, employment and payroll;[82]
- The impact of ongoing labor-displacing technological change that constantly reduces the workforce required for any level of Mine production;
- The fact that Mine employees are very mobile, commuting long distance to work while maintaining their residences outside of the area immediately impacted by the mining and milling. This causes a significant amount of the Mine's payroll to "leak" out of the region immediately around the Mine;
- The fact that mines, ultimately, always deplete their economically viable ore deposits and shut down. The average life of a metal mine has declined significantly in recent decades. The Copper Flat Project is an example of this reduced mine life. The DEIS states the life of the project ranges from 11-16 years;
- The fact that mining is land intensive and as a result can have nearly permanent impacts on the natural environment. Environmental degradation can significantly reduce the attractiveness of a mining area as a place to live, work, and raise a family;
- The costs to state infrastructure and resources. The DEIS fails to analyze the costs of road, bridge and other infrastructure maintenance and repair associated with this increase in truck traffic;
- The costs associated with the damage to water resources.[83] In an arid state where water is likely to become even scarcer due to the effects of global climate change, the economic value of water will increase, both in terms of its value as a commodity and its value as an economic driver. The DEIS fails entirely to quantify and analyze the costs associated with the Mine's water use;

Copper Flat Copper Mine," (February 16, 2016), attached as Exhibit D. There is no Exhibit C attached to these comments.

[82] The Mine was formerly owned and operated by Quintana Minerals, Inc. (1977-1982) and only operated for 3.5 months. Gold Express Corporation then owned the Mine (1991-1993), but did not engage in mining operations. Alta Gold Company then became the Mine's owners (1994-1999) and attempted to renew mining operations, but filed for bankruptcy before BLM could issue a Final Environmental Impact Statement. Consider also that the Tyrone Mine in Grant County recently reduced its mining operations by 50%, resulting in a significant layoff of mine workers. http://www.grantcountybeat.com/news/news-articles/23804-freeport-mcmoran-to-implement-layoffs-at-tyrone-mine. Last visited February 26, 2016.

[83] *See* page 43 of these comments for a discussion on the Mine's impacts to New Mexico's obligations under the Rio Grande Compact. The State of Texas has sued New Mexico for alleged violation of the Compact, seeking upwards of $1 billion in damages.

- The economic impacts and legal implications of a new source of surface water depletion to the Rio Grande Project. The United States and Texas have initiated litigation against New Mexico in the U.S. Supreme Court, alleging that New Mexico is permitting illegal and excessive groundwater pumping that is affecting the water supply of the Rio Grande Project. Texas is claiming that New Mexico has been under-delivering surface water to Texas, in violation of the Rio Grande Compact. Texas is claiming damages in excess of $1 billion dollars; and

- The social impacts of increased crime, drug abuse, prostitution, infectious diseases, including sexually transmitted diseases, and domestic violence associated with boom and bust extractive economies.[84] These impacts will certainly impose increased costs on local law enforcement, jails, court systems and medical care facilities.

Additionally, the socioeconomic analysis relied upon in the DEIS is fundamentally biased toward the Mine due to the following:[85]

- It ignores the economic role that the landscape amenities of Sierra County and Southwestern New Mexico play in supporting local economic wellbeing and vitality;

- It treats landscape amenities and their degradation as primarily cultural, social or aesthetic problems with no significant economic implications;

- It relies uncritically on economic impact modeling funded by NMCC;

- It exaggerates economic impacts of the construction phase of the Mine;

- It exaggerates local economic impacts of the Mine by exaggerating indirect impacts for Sierra County by assuming that most of the supplies needed to operate the Mine will be produced by and purchased from local business firms;

- It states that closure of the Mine is not anticipated.[86] Current copper prices have been hovering around $2 a pound.[87] Throughout the history of copper mining in

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[84] *See*, e.g., Kuyek, Joan and Coumans, Catherine, "No Rock Unturned: Revitalizing the Economies of Mining Dependent Communities" (2003).

[85] *See, e.g.*, Power, Thomas Michael and Power, Donovan S., "The Economic Impacts of Renewed Copper Mining in the Western Upper Peninsula of Michigan" (2013); http://www.savethewatersedge.com/the-economic-impacts-of.html (last visited February 17, 2016).

[86] According to Mining Engineer Jim Kuipers, "It is very likely that the Copper Flat Mine is not economically viable for long-term production (11 to 16 years) or even short-term production given the current price of copper." Jim Kuipers, "Technical Review of Copper Flat DEIS," p. 3 (March 31, 2016).

[87] http://www.nasdaq.com/markets/copper.aspx. Last visited March 1, 2016.

New Mexico and the United States copper mine production and employment have fluctuated substantially over periods as short as ten years or less. The DEIS fails to consider one of the primary economic costs associated with metal mining - the instability and disruption it brings to local employment and payroll. The net result, again, is to exaggerate the local economic benefits by assuming they will be more stable than can reasonably be expected;

- The DEIS grossly understates the size of the visitor economy that can be negatively impacted by the Mine; and

- The DEIS confidently predicts the level of copper production and its impacts on employment and payroll 11-16 years into the future in its positive economic impacts analysis. Hence, the BLM is willing to speculate on the positive impacts of the Mine, but dismisses the potential negative impacts because they might be speculative or difficult to predict or quantify. This clearly represents a bias that emphasizes positive economic impacts while dismissing negative economic impacts.

For the above listed reasons, BLM must either revise or supplement the DEIS with an adequate socioeconomic impacts analysis.

H. The DEIS Fails to Take a Hard Look at the Mine's Environmental Justice Impacts.

We agree with the EPA's comment that the DEIS fails to provide meaningful consideration of the Mine's environmental justice impacts on the people of Sierra County, a recognized environmental justice community. EPA Comments on Copper Flat DEIS, p. 1 (March 4, 2016). Though Table ES-3 "Summary of Impacts" identifies environmental justice impacts as significant under Alternatives 1 and 2, "it does not appear that BLM took the necessary measures to identify each EJ community nor identify the impact totality as required by Executive Order 12898." *Id.* The DEIS has failed to provide the public with any supporting documentation that adequately supports its environmental justice analysis.

Therefore, BLM must either revise or supplement the DEIS with an analysis that identifies each environmental justice community within, near and adjacent to the proposed Project boundaries, pursuant to Executive Order 12898.

I. The DEIS Fails to Take a Hard Look at the Mine's Cumulative Impacts.

NEPA requires that BLM fully consider all direct, indirect, and cumulative environmental impacts of the proposed action. 40 C.F.R. §§1502.16; 1508.8; 1508.25(c); *Utahns v. United States DOT*, 305 F.3d 1152, 1172 (10th Cir. 2002). Cumulative impacts are:

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of

what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. §1508.7. *Id.* at 1172-73.

In a cumulative impact analysis, an agency must take a "hard look" at all actions…[A]nalysis of cumulative impacts "must give a sufficiently detailed catalogue of past, present, and future projects, and provide adequate analysis about how these projects and differences between the projects, are thought to have impacted the environment." *Te-Moak Tribe v. U.S. Dep't of Interior*, 608 F.3d 592, 603 (9th Cir. 2010).

BLM fails to adequately analyze cumulative impacts (including related and consequentional actions) throughout the DEIS. First, the DEIS fails to identify all projects in the region and to reasonably discuss the actual impacts from these projects. The DEIS merely lists some nearby projects, notes that they will result in cumulative impacts along with the Mine to various resources (e.g. air, water, wildlife), and provides a cursory mention of impacts. Second, the DEIS fails to provide the "quantified assessment" of the impacts from these activities, as required by NEPA.

For example, the DEIS fails to identify the Mine's cumulative impacts to the administration of the Rio Grande Compact ("Compact") and to the Compact states of New Mexico, Colorado, and Texas.[88] The DEIS acknowledges that all action alternatives will impact water storage in Caballo Reservoir, therefore affecting the amount of "usable water in project storage."[89] We agree with the New Mexico Interstate Stream Commission's ("ISC") comment that "…if the impact on the Rio Grande and Caballo Reservoir is not offset on a real-time basis, there will be an impact on the amount of water in the Reservoir, thereby reducing Usable Water in Project Storage." ISC's Comments on Copper Flat DEIS, p. 2 (February 26, 2016).

In 2013 the State of Texas initiated a lawsuit against New Mexico for violation of the Compact. *See Texas v. New Mexico and Colorado*, Original No. 141. The U.S. Supreme Court cleared the way last year for Texas to proceed with its lawsuit. Texas is alleging that New Mexico has violated and continues to violate the Compact by allowing illegal and unauthorized diversions and use of water apportioned to Texas. Texas is charging that groundwater pumping in New Mexico is tapping the shallow aquifer, causing water tables to drop and preventing water from draining back into the river. The suit alleges river levels are now lower than normal due to

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[88] This issue also falls under the DEIS's socioeconomic impacts analysis, as discussed on page 40 of these comments.

[89] "Usable Water in Project Storage" is defined by the Rio Grande Compact as "all water, exclusive of credit water, which is in project storage and which is available for release in accordance with irrigation demands, including deliveries to Mexico." See Act of May 31, 1939, ch. 155, 53 Stat. 785. The water stored in Caballo Reservoir is Usable Water in Rio Grande Project Storage.

such action, preventing Texas from receiving its full share of water as required by the Compact.[90]

The U.S. Department of Interior's Bureau of Reclamation recently warned that "The project water supply imbalances will greatly reduce the reliability of deliveries to all users who depend on Rio Grande water. In the Upper Rio Grande, supplies over the course of the 21st century are projected to decrease by about one-fourth in the Colorado portion of the basin, and by about one-third in the New Mexico portion."[91] The Mine's impacts to groundwater and surface water must be analyzed in the context of the Rio Grande Compact. Therefore, BLM must either revise or supplement the DEIS with an analysis addressing the Mine's cumulative impacts to the administration of the Compact.

Other striking examples of the DEIS's failure to adequately analyze the Mine's cumulative, related and consequential impacts include, but are not limited to: (1) the Mine's need for new high voltage lines to be brought up from Caballo dam to meet its energy needs; and (2) the Mine's immediate and long-term impacts upon existing public road infrastructure (secondary roads, primary roads and interstate highways) already in need of repairs, maintenance and upgrading. BLM must either revise or supplement the DEIS with an adequate analysis of these cumulative, related and consequential impacts.

J. The DEIS Fails to Fully Evaluate Mitigation Measures.

BLM is required to "discuss possible mitigation measures in defining the scope of the EIS, 40 CFR §1508.25(b) (1987), in discussing alternatives to the proposed action, §1502.14(f), and consequences of that action, § 1502.16(h), and in explaining its ultimate decision, §1505.2(c). It is not enough to merely list possible mitigation measures." *San Juan Citizens Alliance v. Stiles*, 654 F.3d 1038, 1053-54 (10th cir. 2011) (citing to *Colorado Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1173_(10th Cir. 1999)). "Detailed quantitative assessments of possible mitigation measures are generally necessary when a federal agency prepares an EIS to assess the impacts of a relatively contained, site-specific proposal." *Id.*

NEPA regulations define "mitigation" as a way to avoid, minimize, rectify, or compensate for the impact of a potentially harmful action. 40 C.F.R. §§1508.20(a)-(e). The omission of a reasonably complete discussion of possible mitigation measures will undermine the 'action-forcing' function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects.

An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective. The Supreme Court has

[90] http://southwestfarmpress.com/water-shortage/new-mexico-attorney-general-wants-money-fight-texas-suit. Last accessed on February 28, 2016.

[91] U.S. Department of the Interior, Bureau of Reclamation, SECURE Water Act Report: Reclamation Climate Change and Water 2016, p. 7-8 (March 2016).

> required a mitigation discussion precisely for the purpose of evaluating whether anticipated environmental impacts can be avoided. A mitigation discussion without at least some evaluation of effectiveness is useless in making that determination.

South Fork Band Council v. Dept. of Interior, 588 F.3d 718, 727 (9th Cir. 2009) (rejecting EIS for failure to conduct adequate review of mitigation and mitigation effectiveness) (internal citations omitted). *See also*, *Wyoming Outdoor Council v. U.S. Army Corps of Eng'rs*, 351 F. Supp. 2d 1232, 1238 (D. Wyo. 2005).

As just one example of the DEIS's failure to adequately evaluate mitigation measures, the DEIS admits that "…the likelihood and severity of possible effects to Federally-listed species are being evaluated, and any measures necessary to mitigate adverse effects are being determined, through consultation with the USFWS in compliance with Section 7 requirements of the Endangered Species Act." DEIS 3-160.[92] This admits that the analysis has not yet been conducted – despite NEPA's requirement that all mitigation analysis must be included in the Draft EIS.

The following are additional examples of the DEIS's failure to adequately analyze mitigation measures for the Mine's impacts to air quality, climate change, water quantity and quality, wildlife and federally-listed species, recreation, transportation, the night sky, and socioeconomic matters.

1. Mitigation Measures for the Mine's Impacts to Air Quality.

The DEIS fails to adequately analyze mitigation measures for the Mine's impacts to air quality on Ladder and surrounding areas. Again, Ladder is three miles from the Mine, downwind and with prevailing winds from the southwest. For an adequate analysis to occur, Ladder must be identified as a receptor location for a dispersion model relied upon by the DEIS. Therefore, BLM must either revise or supplement the DEIS to include an adequate analysis of mitigation measures and their effectiveness for impacts to air quality on Ladder Ranch.

2. Mitigation Measures for the Mine's Impacts to Climate Change.

The DEIS fails to identify and analyze the effectiveness of mitigation measures for the Mine's climate change impacts. Page 2-25 of the DEIS states, "NMCC is analyzing the viability of solar power generation to partially offset the mine's energy demand along with other energy and water conservation measures," indicating that this study has yet to be completed. The BLM must either revise or supplement the DEIS with this analysis.

[92] *See also* pages 6-7 of these comments for a discussion of how the DEIS relies upon incomplete baseline data for biological resources.

We also agree with the EPA's recommendation of the following mitigation measures for BLM's consideration:

- Use conveyors rather than haul trucks where possible, e.g., for transporting ore to processing areas and the heap leach facility;
- Incorporate alternative energy components into the project such as on-site distributed generation systems, solar thermal hot water heating, etc.;
- Incorporate recovery and reuse, leak detection, pollution control devices, maintenance of equipment, product substitution and reduction in quantity used or generated;
- Include use of alternative transportation fuels, electric vehicles, etc., during construction and operation if applicable; and
- Commit to using high efficiency diesel particulate filters on new and existing diesel engines to provide nearly 99.9% reductions of black carbon emissions.

EPA Comments on Copper Flat DEIS, p. 2-3 (March 4, 2016). Additionally, we also recommend that BLM utilize the National Climate Assessment ("NCA") to identify and analyze climate change mitigation measures based on how future climate scenarios may impact the Mine.[93]

3. <u>Mitigation Measures for the Mine's Impacts to Water Quantity & Quality.</u>

As previously discussed on pages 21-29 of these comments, the Mine's impacts to water quantity and quality will be substantial. Ladder is in close proximity to the Mine and will directly experience such impacts. The DEIS fails to provide any mitigation measures for the Mine's drawdown of groundwater levels and reduction of surface water discharges to the Rio Grande and its tributaries. The mitigation analysis for the Mine's impacts to water quality is also woefully inadequate.

As previously mentioned, New Mexico's Copper Rule currently allows pollution above water quality standards within: (1) the "area of open pit hydrologic containment," within which liners and monitoring of tailings, waste rock and impoundment are not required; and (2) outside the area of open pit hydrologic containment if the operator installs interceptor systems downgradient from waste rock and tailings piles. Because of the permanent nature of ARD, once the pollution is allowed it may persist and have to be contained hydraulically for 100s of years, or in perpetuity. This means that the pit dewatering could extend much longer than the time

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[93] The NCA was released by the U.S. Global Change Resource Program (http://nca2014.globalchange.gov/) and "contains scenarios for regions and sectors, including energy and transportation. Using NCA or other peer reviewed climate scenarios to inform alternatives analysis and possible changes to the proposal can improve resilience and preparedness for climate change." EPA Comments on Copper Flat DEIS, p. 3 (March 4, 2016).

necessary to extract the ore, and that pump-and-treat remediation measures could extend into perpetuity.

The following comments on mitigation measures for specific Mine features were prepared by hydrologist Tom Myers, and mining engineer Jim Kuipers on behalf of TRP and NMELC.[94]

a. The Mine's Waste Rock Dumps.

The Mine's waste rock dumps are pollution sources due to precipitation or runoff leaching through them.[95] The DEIS fails to adequately analyze mitigation measures for the impacts of waste rock dumps. It merely states that the dry climate would prevent acid mine drainage from reaching ground or surface water. DEIS 3-39. Therefore, BLM must either revise or supplement the DEIS with an analysis of cover requirements and mitigation measures, and to address the following:

- Why alternative cover designs, such as an engineered cover with geomembrane and capillary break resulting in zero infiltration, were not chosen as a mitigation for acid rock drainage;

- The extent to which the proposed design will limit infiltration of water and oxygen based on results at other similar mine sites in New Mexico, such as the Chino and Tyrone Mines; and

- Why a geomembrane liner or similar system to college and manage seepage under the waste rock was not considered as the best practice to protect groundwater and long-term public liability.[96]

b. The Mine's Tailings Impoundment.

Though the DEIS recognizes there will be years of water management at the new tailings upon closure (DEIS 3-45), it fails to discuss how the tailings impoundment would be closed. However, it does specify that the tailings water would be disposed of by land application disposal ("LAD"). The DEIS errs by not discussing the plans for LAD. The DEIS neither discloses where the LAD site would be, nor presents data regarding the ability of the soils to accept the excess tailings water. Rather, the DEIS states that NMCC "would provide detailed chemical analyses of the water and an assessment of potential effects to vegetation or soils to the

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[94] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 15-19 (March 30, 2016) and Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 7-20 (March 31, 2016).

[95] *Id.* at 15.

[96] Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 8-9 (March 31, 2016).

BLM. If the seepage water has the potential to adversely affect vegetation or soils, the proponent would propose an alternative management approach to the BLM for approval." *Id.*

BLM is allowing NMCC to create a potential pollution hazard, the tailings impoundment, without a plan for closing that hazard.[97] BLM must either revise or supplement the DEIS with plans for constructing an LAD site, including soils and vegetation analyses appropriate to the plan.

We also agree with the EPA in that "an analysis of the proposed [TSF] liner's long-term effectiveness and long-term compatibility with the tailings material be provided" by BLM. EPA Comments on the DEIS for Copper Flat, p. 5 (March 4, 2016). Additionally, a revised or supplemental DEIS should include information on how the proposed liner design will conform with New Mexico law (20.6.7.22(4) NMAC) and address why the proposed liner was chosen over a less leak-prone design, such as a double liner with a leak collection and recovery system.[98]

Lastly, the DEIS fails to discuss the most current standards relative to reduction of catastrophic risks from TSF dam collapse, which have been summarized in the findings of the Mt. Polley Mine Expert Panel.[99] Therefore, BLM must either revise or supplement the DEIS with the following:

- A probabilistic and deterministic seismic evaluation for the area.
- A dam breach analysis, a failure modes and effects analysis or other appropriate detailed risk assessment, and an observational method plan addressing residual risk.
- A description of the chemical and physical properties of the materials and process solutions to be stored in the TSF.
- A list of the assumptions used during the analysis and design of the facility and a description justifying the validity of each assumption.
- A description of proposed risk management measures for each facility life-cycle stage, including construction, operation and closure.
- A detailed description of how water, seepage, and process solutions are to be routed or managed during construction, operation and closure.

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[97] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 16 (March 30, 2016).

[98] Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 8 (March 31, 2016).

[99] The full report, appendices and background material are available at https://www.mountpolleyreviewpanel.ca/

- A detailed description of storm water controls, including diversions, storage, freeboard, and how extreme storm events will be managed.

- A flood event design criterion less than the probable maximum flood but greater than the 1-in-500 year, 24-hour event.

- Utilization of an Independent Review Panel to ensure the TSF design plans satisfy best available technology ("BAT").[100]

c. *The Mine's Pit Lake Water.*

The DEIS also states that future water quality standards for the pit lake may be different than at present, either by changing the designated use through a "use attainability analysis" (DEIS 3-33), or by completing site-specific standards, which appear to simply set standards based on what can live in the future poor quality water. *Id.* Additionally, the DEIS suggests that there is uncertainty regarding federal jurisdiction over pit lake water quality because the Clean Water Act does not specifically address pit lakes. This perceived uncertainty does not allow BLM to avoid a mitigation measures analysis. The DEIS merely recommends that:

- NMCC plans to meet requirements in the future by creating a preliminary pit lake water quality management plan as part of the mine plan of operations (MPO) that would meet applicable standards for 30 years after completion of reclamation. The DEIS states this while also acknowledging that it does not know what those standards would be.

- NMCC update the pit lake water quality management plan at least 1 year prior to Mine closure, to outline reclamation, water quality management, and monitoring that would "facilitate compliance with applicable water quality standards during the post-mining monitoring period." DEIS 3-34.

- NMCC provide a cost estimate for implementation of the plan for BLM review and approval. The DEIS does not specify when this is to occur, but the implication is it would be part of the updated MPO.

- NMCC "provide a trust fund or other long-term funding mechanism" to implement the water quality management plan for 30 years.

BLM is essentially allowing NMCC to develop mitigation measures for pit lake water quality just one year before closure (avoiding public review). Regardless of the uncertainties inherent with pit lake water quality predictions, BLM must require plans and bonding for mitigation *before* approving any mining at the site.

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[100] Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 8-9 (March 31, 2016).

Additionally, the DEIS is incorrect in stating that rapidly pumping the pit lake full would create a steady state hydraulic sink.[101] DEIS 3-34. The lake will initially be higher than surrounding groundwater, which will cause pit lake water to flow from the pit into the surrounding groundwater. Seepage discharge from the rapidly formed pit lake can degrade the surrounding groundwater. The DEIS fails to present groundwater modeling results to estimate the potential for pit lake water to enter the groundwater.

The groundwater model assumes a 1000-ft thick model layer near the pit, which does not allow predictions of inflow from areas with different reactivity. BLM must acknowledge that any such prediction is highly dependent on near-pit conductivity and recharge estimates, and can be quite inaccurate. Therefore, BLM must either revise or supplement the DEIS with groundwater modeling results addressing this issue.

Backfilling the pit is the only mitigation that will prevent long-term pit lake water quality problems and allow the drawdown cone around the pit to recover. However, the DEIS fails to disclose backfilling's obvious advantages. DEIS Chapter 2 mentions twice there is no plan to backfill the pit, and fails to consider it under any of the action alternatives. Backfilling would cost more, but the environmental benefits could make the plan worthwhile. BLM must either revise or supplement the DEIS to analyze this mitigation measure.[102]

Lastly, we are in agreement with EPA's assessment that the 30-year time period for post-mining compliance with water quality standards for the pit lake and for the funding mechanism for implementation of the pit lake water quality management plan is inadequate. See EPA's Comments on DEIS for Copper Flat, p. 7 (March 4, 2016). As EPA has stated, "The 30-year time period is inadequate because (1) it may take decades or even centuries for some environmental impacts (acid rock drainage from sulphate rock) to occur to the surface water and ground water resources at this site, and (2) mitigation efforts to maintain compliance with New Mexico surface water quality standards for the designated future uses of the pit lake will likely be needed for similar time frames and possibly in perpetuity." *Id.* We also recommend that "BLM require the MPO to include post-mining monitoring and implementation of the pit lake water quality management plan for a minimum of 100 years." *Id.*

4. <u>Mitigation Measures for the Mine's Impacts to Wildlife and Federally-Listed Species.</u>

The DEIS's mitigation measures analysis for the Mine's impacts to wildlife, Ladder's captive endangered Mexican Grey Wolf population, and federally-listed species is woefully inadequate for the following reasons.

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[101] Tom Myers, Hydrologic Consultant, "Technical Memorandum: Review of the Draft Environmental Impact Statement, Copper Flat," p. 17-18 (March 30, 2016).

[102] *See also* pages 14-15 of these comments.

a. Migratory Birds, Wildlife and Livestock.

i. Migratory Birds.

As previously discussed, the Mine's pit lake and process ponds will exceed water quality standards and most likely be toxic to birds and wildlife. In addressing the Mine's impacts to migratory birds, the DEIS merely provides that "NMCC would investigate and utilize other mitigation actions, such as exclusionary devices. These devices include, but are not necessarily limited to, bird balls and netting to minimize the potential for avian wildlife contacting process pond waters that contain elevated chemical constituents in excess of ecological risk levels." DEIS 3-139. There is no discussion of the Migratory Bird Treaty Act ("MBTA"), or how these mitigation measures will be implemented and how effective these measures will be.

The MBTA declares it a misdemeanor to pursue, hunt, *take*, capture, or kill birds protected by several international treaties. 16 U.S.C.S. § 703 (emphasis added). Violations of the MBTA are strict liability crimes. *United States v. Apollo Energies, Inc.*, 611 F.3d 679 (10th Cir. 2010). However, defendants must "proximately cause" the MBTA violation to be found guilty. *Id.* at 689 (internal citations omitted). Liability attaches under the MBTA where the injury to migratory birds "might be reasonably anticipated or foreseen as a natural consequence of the wrongful act." *Id.*

NMCC has admitted that it anticipates or foresees migratory birds contacting "process pond waters that contain elevated chemical constituents in excess of ecological risk levels" (DEIS 3-139), which is likely to result in a "taking" under the MBTA if adequate mitigation measures are not conducted by NMCC. Lastly, the DEIS also fails to identify mitigation measures for the Mine's impacts on the night sky, particularly measures pertaining to migratory birds relying on dark skies for navigation.

ii. Wildlife and Livestock.

In addressing the Mine's impacts to livestock, the DEIS simply states that, "NMCC would construct BLM-approved wire fencing to prevent livestock from entering the pit, WRDFs, and TSF. Fences of appropriate height would be constructed around water and solution ponds to keep out *larger wildlife such as deer and antelope*." DEIS 2-32 (emphasis added). This fails to address preventing bison from entering the pit, WRDFs, and TSF. As previously stated, Ladder is engaged in bison production and sales, which is the Ranch's primary source of income.

b. Federally-Listed Species

The DEIS admits that a mitigation measures analysis for impacts to federally-listed (threatened or endangered) species has not yet been completed. DEIS 3-160. This is a clear violation of NEPA's requirements. 40 C.F.R. Part § 1502.25. BLM may not complete this analysis after the issuance of a DEIS. Therefore, BLM must either revise or supplement the DEIS with this required analysis.

5. Mitigation Measures for the Mine's Impacts to Recreation.

The DEIS fails to analyze water use, noise and vibrations, transportation and night sky impacts to recreational users and wildlife – all of which impact recreation.[103] Without an adequate analysis of the Mine's direct and indirect recreation impacts there cannot be an adequate mitigation measures analysis. BLM must therefore either revise or supplement the DEIS with this required analysis.

6. Mitigation Measures for the Mine's Impacts to Transportation.

We agree with EPA's conclusion that "it is unclear how the transportation and traffic impacts will be addressed." EPA Comments on Copper Flat DEIS, p. 3 (March 4, 2016). The DEIS clearly fails to adequately identify and analyze mitigation measures for the Mine's transportation impacts. It merely states, "No mitigation measures for transportation and traffic beyond regulatory requirements described in the Proposed Action have been identified for any alternative." DEIS 3-224.

Additionally, under Section 2.1.13, the transportation of hazardous materials is identified:

> Hazardous materials required for operation of the Copper Flat project include gasoline, diesel fuel, propane, other petroleum products, explosives, solvents for degreasing of machinery and equipment, and laboratory chemicals. These materials would be purchased from various vendors and brought to the site by truck. NMCC would ensure that the Hillsboro volunteer fire department and the Sierra County fire district are aware of the nature of the materials routinely being transported to the site, and that they have appropriate response training in the event of a spill or other accident involving hazardous materials.

DEIS 2-34.

The DEIS fails to discuss NMCC's obligations or ability to finance such mitigation. NMCC should be required to pay for all transportation mitigation measures required by NMDOT in connection with NM-152, as well as mitigation measures for other Sierra County and New Mexico state roads.[104] We agree with EPA that clarification is needed for "how the transportation and traffic impacts will be addressed" and to "identify any committed mitigation." EPA Comments on Copper Flat DEIS, p. 3 (March 4, 2016). BLM must therefore either revise or supplement the DEIS with this information.

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[103] *See also* pages 32-35 of these comments.

[104] The DEIS also fails to identify the transportation routes to be used by the Mine in transporting hazardous materials.

7. Mitigation Measures for the Mine's Impacts to Noise and Vibrations Levels.

Both New Mexico and Federal policy make clear that when traffic noise impacts occur, noise abatement must be considered and implemented if found to be feasible and reasonable. The DEIS states, "Due to the remote location and the overall minor impacts, no mitigation would be required. Although the overall effects would be less than significant, the following BMPs [best management practices] are proposed to minimize the potential for blasting noise and vibration impacts." DEIS 3-234. This fails to identify mitigation measures for noise from vehicles and mining equipment and operations not involving explosive devices. BLM must therefore either revise or supplement the DEIS.

BLM should analyze the following necessary mitigation measures:[105]

- Reduce noise frequency and impulse noise at the source of generation by:
    - Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;
    - Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;
    - Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;
    - Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces;
- Reduce noise duration by:
    - Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts;
    - Limiting noisier operations to normal work day hours may reduce or eliminate complains, though it does not reduce the sound pressure level;
- Reduce noise sound pressure levels by:
    - Increasing the setback distance of the Mine's ancillary facilities from

[105] Ladder recommends the DEIS consider guidance from the New York State Department of Environmental Conservation Program Policy: *Assessing and Mitigating Noise Impacts* (October 6, 2000). http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf. Last visited March 1, 2016.

noise and vibrations receptors;

- o Moving processing equipment during operation further from receptors (particularly the Ladder Ranch);

- o Substituting quieter equipment (example – replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level);

- o Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment;
- o Ensuring that equipment is regularly maintained;

- o Enclosing processing equipment in buildings (example – enclosing noisy equipment could result in an 8-10 decibel ("dB") noise level reduction, a 9 inch brick wall can reduce sound pressure level by 45-50 dB);

- o Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception;

- o Phasing operations to preserve natural barriers as long as possible;
- o Altering the direction, size, proximity of expanding operations particularly in relation to the Ladder Ranch); and

- o Designing enclosed facilities to prevent or minimize sound pressure level increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

8. Mitigation Measures for the Mine's Impacts to the Night Sky.

The DEIS fails to identify and analyze mitigation measures for the Mine's impacts to the night sky. BLM must therefore either revise or supplement the DEIS. BLM should include in its analysis the following necessary mitigation measures: [106]

- Employ 21st century light sources (light emitting diodes or LED, induction, organic LED, and plasma) and on-demand lighting and adaptive lighting;

- Employ very well shielded and aimed light sources;

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[106] These mitigation measures recommendations are derived from Rosemont Copper's "Light Pollution Mitigation Recommendation Report." This report has been viewed as a "good compromise" between industry and individuals and groups concerned with dark sky preservation. See footnote 47. "Scott Kardel, managing director of the International Dark-Sky Association, said the plan Monrad proposed appeared to be a good compromise." http://www.insidetucsonbusiness.com/news/rosemont-mine-lighting-plan-seeks-to-minimize-impact-on-night/article_176d6d8e-81ce-11e2-9282-001a4bcf887a.html. Last visited on March 1, 2016.

- Employ spectral control eliminating aqua, blue and violet emissions to preserve conditions that are more favorable to astronomical observations;

- Use the smallest necessary light source ("lumen package");

- Address the environmental concerns of native flora and fauna; and

- Use solid-state lighting for vehicular-mounted task lighting.

9. Mitigation Measures for the Mine's Impacts to Socioeconomic Issues.

The DEIS fails to adequately analyze mitigation measures for the Mine's socioeconomic impacts. Of primary concern, the DEIS fails to address the economic impacts from the Mine's reduction of the overall surface water supply available to Ladder and Sierra County residents and recreationists. It also fails to address the Mine's economic impacts to nearby irrigated lands. Such lands will dry up as the Mine attempts to provide replacement water to offset its impacts to area water resources, resulting in substantial economic losses. Lastly, the DEIS also fails to address the economic impacts to New Mexico and its obligations under the Rio Grande Compact with Texas.[107] BLM must therefore either revise or supplement the DEIS with mitigation measures for these impacts.

K. The DEIS Fails to Adequately Analyze the Mine's Post-Closure Operations, Maintenance and Monitoring Plans.

The DEIS fails to adequately analyze the Mine's post-closure operations, maintenance and monitoring plans for two reasons. First, the DEIS fails to include information required under BLM's § 3809 regulations. Second, the DEIS claims that the Mine, post-closure, will not require perpetual care.

In addressing the Mine's post-closure monitoring, the DEIS states that "The BLM and State agencies would set post-closure monitoring requirements at mine closure," and, "Sampling of the water in the pit after mine closure would continue for a period that is established by consultation with the NMED to determine any changes in pit water quality." DEIS 2-38. Such statements do not satisfy the requirements of NEPA. Additionally, the DEIS fails to provide the following information required under BLM § 3809 regulations:[108]

- The reclamation plan must include all reclamation, closure, and post-reclamation requirements needed to meet the performance standards described at 43 CFR 3809.420. (BLM § 3809 Handbook, p. 3-7)

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[107] *See also* pages 40 and 43 of these comments.

[108] *See* Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 17-18 (March 31, 2016).

- Detailed plans for water treatment that will be conducted during mine operations, or will continue post-reclamation, must be provided. This includes information on treatment methods, system design, outfalls, rates, treatment threshold, and the expected duration of treatment. Other Federal or state permits that may be needed for the operation of the treatment system must be identified. (*Id.* at 4-16)

- Post-Closure Management Plans…Sometimes reclamation-related activities must continue long after the majority of reclamation work has been completed. Fencing may need to be maintained, signs replaced, water treatment systems operated or maintained, reclaimed slopes repaired, etc. The duration of such activity may be months, years, decades, or in the case of water treatment, the end date may be indefinite. The reclamation plan must clearly identify these post-closure activities and the operator's commitment to performing the required work over the necessary time period. (*Id.* at 4-24)

- Evaluate the Plan of Operations and any alternatives on their inherent merits assuming full implementation, including all operation, mitigation, monitoring, reclamation, closure, and post-reclamation actions. (*Id.* at 4-40)

- Post-reclamation runoff or run-on control structures must be incorporated by the operator into the overall reclamation plan and built to accommodate flows from the design storm event. Inadequate consideration of the runoff area(s), control designs, or improper runoff management procedures, can cause cascading downgradient reclamation failures that may seriously affect the overall reclamation success. (*Id.* at 5-11)

- Reclamation Plan. Any post-reclamation obligations covered by the long-term funding mechanism must be described in the approved Plan of Operations. If the District/Field Manager determines the operator is responsible for post-reclamation obligations not described in the original reclamation plan, the manager will direct the operator to submit a modification to the Plan of Operations covering those obligations. The manager must review and approve the Plan of Operations to ensure all reclamation and closure obligations and corrective actions are adequately addressed. (*Id.* at 6-33)

BLM must therefore either revise or supplement the DEIS to include the above referenced information required under § 3809 regulations. Additionally, the post-closure monitoring period of 12 years (for all three action alternatives; *See* DEIS 2-5, 2-59, and 2-73) should be lengthened. Twelve years may be appropriate for revegetation activities, but it is not appropriate or consistent with either BLM or New Mexico's Copper Rule for post-closure monitoring.[109] As stated on page 50 of these comments, we agree with the EPA that "BLM require [NMCC's] MPO to include post-mining monitoring and implementation of the pit lake

[109] Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 18-19 (March 31, 2016).

water quality management plan for a minimum of 100 years." EPA's Comments on DEIS for Copper Flat, p. 7 (March 4, 2016).

Second, the DEIS states, "The project is designed to meet, without perpetual care, all applicable Federal and State environmental requirements following closure." DEIS 2-34. This statement contradicts not only the experience at other major mines in New Mexico and elsewhere, but also contradicts BLM's experience and subsequent guidance developed in geographic areas such as Nevada (where modern mining is more common and the effects more well established).[110] For example, management of mine-influenced water associated with the existing Chino, Tyrone, Cobre, and Little Rock copper mines in New Mexico is predicted to require perpetual care.[111]

As noted by BLM's § 3809 Handbook:

> The reclamation plan may be the most important component of the Plan of Operations for the long-term mitigation of impacts and achievement of sustainable development levels or objectives. The reclamation plan serves as the basic construction plan for calculating the reclamation cost and financial guarantee amount, so detail is important."

(4-19).

Therefore, the DEIS should be revised or supplemented to provide additional discussion of how the site-specific characteristics of this Mine contradict both BLM guidance and management experience at similar projects in New Mexico where perpetual care is assumed to be required, such as at the Chino and Tyrone Mines. The DEIS should not contain or be based upon unjustified speculation as to the success of the Mine, particularly where it is in direct contradiction to the overwhelming evidence that suggests long-term monitoring, maintenance and operations are required to assure protection of the land and water resources. Not one mine in New Mexico has been successfully closed and reclaimed.[112]

Lastly, though the DEIS states that NMCC will utilize liners for tailings seepages instead of using seepage containment wells, there is currently no legal requirement for NMCC to do so. New Mexico's Copper Rule does not require the use of liners for tailings within the Mine's boundaries. In the event that NMCC revises its MPO, stating it will not utilize liners for tailings seepages but will use seepage containment wells, then BLM must supplement the DEIS with this new closure plan.

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110 *Id.* at 11.

111 *See* Chino, Tyrone and Cobre Closure Closeout Plans submitted to MMD and NMED.

112 Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 11 (March 31, 2016).

L. The DEIS Fails to Adequately Identify and Analyze NMCC's Financial Resources and Assurance.

Under 43 C.F.R. §3809.500, BLM requires mine operators to provide a financial guarantee before beginning operations under an approved Notice or Plan. The bond amount must cover the estimated cost to contract a third party to reclaim the mine's operations. The NMMA also requires the provision of a financial guarantee. 19.10.12 NMAC. If the operator of a mine provides evidence of an acceptable state approved financial guarantee under the New Mexico Mining Act that covers the same operations, the mining operator will not be required to provide a separate financial guarantee.

In exercising its authority under 43 C.F.R. §3809.500, BLM must also comply with its NEPA mandate by disclosing and analyzing the amount, scope and form of financial assurance to make certain that such a critical issue is subjected to public review and comment. Such disclosure is consistent with CEQ guidance, which states that all relevant, reasonable mitigation measures that could improve the project are to be identified in an EIS; and, to ensure that environmental effects of a proposed action are fairly assessed, the probability of the mitigation measures being implemented should also be discussed.[113] More recent CEQ guidance concerning mitigation views a discussion of funding as critical to ensuring informed decision making, and suggests that agencies should not commit to mitigation measures if it is not reasonable to foresee the availability of sufficient resources to ensure the performance of the mitigation.[114]

The DEIS is grossly inadequate because it does not disclose any detail about how BLM will ensure that funds will be available as long as they are needed to implement NMCC's closure and post-closure obligations.[115] We are in agreement with the EPA's comment that, "The availability of adequate resources to ensure effective reclamation, closure and post-closure management is a critical factor in determining the significance of [the Mine's] potential impacts." EPA's Comments on Copper Flat DEIS, p. 2 (March 4, 2016).

We recommend that BLM determine the appropriate level of funding for the reclamation/closure bond and the proposed long-term funding mechanism for the Mine, and analyze the adequacy of the funding amount and mechanism, including associated uncertainties to ensure that sufficient funds would be available for as long as needed. This information should be made available to the public for review in either a revised DEIS or a supplemental DEIS, in accordance with NEPA and CEQ's NEPA Implementation Regulations.

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[113] CEQ, "Memorandum for Federal NEPA Liaisons, Federal, State and Local Officials and Other Persons Involved in the NEPA Process," Question 19b, March 16, 1981.

[114] CEQ, "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact," 76 Fed. Reg. 3843, 3848-3849 (Jan. 21, 2011).

[115] Jim Kuipers, Mining Engineer, "Technical Review of Copper Flat DEIS," p. 19 (March 31, 2016).

M. BLM Fails to Disclose All Preparers of the DEIS and to Require Disclosure Statements.

40 C.F.R. §1506.5 permits the BLM to prepare directly, or indirectly through a contractor selected by the lead agency, an environmental impact statement. Additionally, "Contractors shall execute a disclosure statement prepared by the lead agency, or where appropriate the cooperating agency, specifying that they have no financial or other interest in the outcome of the project." *Id.* The DEIS also "shall list the names, together with their qualifications (expertise, experience, professional disciplines), of the persons who were primarily responsible for preparing the environmental impact statement or significant background papers." 40 C.F.R. Part § 1502.17. Though Table 5-1 on page 5-6 of the DEIS shows a "List of Preparers" it fails to provide their qualifications.

On February 3, 2016, an NMELC attorney requested information from Doug Haywood, Project Lead for the Mine, regarding preparation of the DEIS. Mr. Haywood stated, "The original company that was hired to assist us with the EIS was Mangi, which is now Solv. I have attached their disclosure statement for you." *See* attached Exhibit E . The disclosure statement is dated November 16, 2011, and states that:

> Mangi Environmental Group, Inc. is to be engaged, via a third party contract arrangement with New Mexico Copper Corporation (NMCC), to assist the Bureau of Land Management and the State of New Mexico in the preparation of an Environmental Impact Statement and an Environmental Evaluation concerning the proposed Copper Flat Mine.

See attached Exhibit F. The disclosure statement is signed by James I. Mangi, PhD, President.

It is unclear exactly how and when Mangi Environmental Group, Inc. became Solv. Mr. Haywood provided no such explanation, and Solv's website fails to convey it originated as Mangi Environmental Group, Inc. Solv's founders are Tom Grome and Purvagna Amin. Their biographies on Solv's website do not mention any employment at Mangi Environmental Group, Inc.[116] Solv's website also does not disclose the company's past and current contracts. Thus, there is no way for the public to ascertain whether a conflict of interest exists between Solv and NMCC.

BLM has failed to publically disclose that Mangi Environmental Group, Inc. were preparers of the DEIS.[117] BLM also failed to procure the required disclosure statement from Solv. The public is therefore unable to determine whether there exists a conflict of interest between Solv and NMCC. BLM must either revise or supplement the DEIS with this information and identify which work product of Mangi Environmental Group, Inc. was incorporated into the DEIS.

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[116] http://www.solvllc.com/about-us.php. Last visited February 19, 2016.

[117] BLM, through Project Lead Doug Haywood, failed to clarify how long Mangi Environmental Group, Inc. worked on the DEIS and which of its work product was included in the DEIS.

N. The DEIS Fails to Adequately Incorporate by Reference Supporting Documents and to Accurately List Supporting Documents in the References Section.

Throughout the body of the DEIS there are various reports and papers referenced as supporting documents, but the DEIS fails to provide citations to specific text or information. There is also a "References" section, consisting of documents not cited to in the body of the DEIS. It is unclear what information in these documents is relied upon. The DEIS must explain to the public precisely what information is being "incorporated by reference," 40 C.F.R. §1502.21, and must accurately list supporting documents relied upon in the references section. *Id.* at -.18. This deficiencies need to be addressed in a revised or supplemental DEIS.

II. The DEIS is Based on Incorrect and Unsupportable Assumptions Regarding NMCC's Alleged "Entitlement" to Have the Mine Approved Under the Mining Law.

"The need for the BLM to authorize this project is established under the General Mining Law of 1872…persons are entitled to reasonable access to explore for and develop mineral deposits on public domain land." DEIS ES-3. The DEIS is therefore based on BLM's belief that, due to NMCC's filing of mining claims (26 patented mining claims and 231 unpatented mining claims [202 lode claims and 29 placer claims], 9 unpatented mill sites), BLM cannot prohibit mining or deny mineral operations under the Mining Law. The DEIS fails to provide verification that all of NMCC's mining claims are valid claims. It is unclear what evidence BLM is relying upon and whether BLM conducted such an inquiry.

Under NMCC's Proposed Action, the Mine would disturb "approximately 745 acres of unpatented mining claims on public land and 841 acres of private land controlled by NMCC." DEIS 2-2. Additionally, "Portions of the waste rock disposal areas, as well as the crushing facility and the mill facility, would be located on public land subject to unpatented mining claims controlled by NMCC. Approximately 28 percent of the TSF [tailings storage facility] and 10 percent of the open pit would be located on public land subject to mining claims controlled by NMCC." *Id.*

The filing of NMCC's lode claims does not preclude BLM from choosing the "No-Action" alternative, nor does it restrict its approval and review authority over the Mine. The DEIS's review, and the BLM's selection of Alternative 2 as its "Preferred Alternative," are based on the overriding assumption that NMCC has statutory rights to use all of the public lands at the Mine site under the 1872 Mining Law. However, where Project lands have not been verified to contain, or do not contain, such rights, BLM's more discretionary multiple-use authorities apply. *See Mineral Policy Center v. Norton*, 292 F.Supp.2d 30, 46-51 (D.D.C. 2003). BLM's Preferred Alternative violates provisions of FLPMA and the Multiple Use Sustained Yield Act, laws mandating that agencies manage, or at least consider managing, these lands for non-mineral uses – something which the BLM fails to do or consider.

Under the Mining Law, in order to be valid, mining claims must contain the "discovery of a valuable mineral deposit." 30 U.S.C. §22.[118] Based on the record in this matter, the lands to be covered by the large ancillary waste and processing facilities do not contain the requisite valuable and locatable mineral deposits. It defies common sense for BLM to assume that NMCC would permanently bury "valuable mineral deposits" with 100.8 million tons of contaminated tailings and 38.4 million tons of waste rock over 16 years. *Id.* at 2-5. Indeed, it is very likely that these lands do not contain sufficient mineralization to qualify as "valuable mineral deposits" and are in fact simple "common varieties" of rock and sand covering the non-mineralized portions of the Mine site.

At a minimum, BLM should inquire as to whether the vast majority of the Mine lands contain "common varieties" or "valuable mineral deposits." BLM regulations contemplate an investigation into whether the lands covered by proposed plans of operation contain the requisite locatable minerals instead of common varieties. Under 43 C.F.R. §3809.101(a), except for casual use operations, claimants "must not initiate operations for minerals that may be 'common variety' minerals…until BLM has prepared a mineral examination report." The DEIS fails to cite to such a report.

The evidence in the record shows that the lands proposed for the waste dumping, tailings, and other non-extractive uses do not contain the requisite valuable minerals, and may indeed be "common variety" minerals, therefore BLM's assumptions of "rights" or an "entitlement" under the Mining Law are erroneous. BLM's assumption regarding such "rights" and "entitlement" should be investigated and supported by detailed factual evidence (such as the inclusion of a mineral examination report) in a revised or supplemental DEIS.

III. The DEIS Action Alternatives Violate Other State and Federal Laws.

A. The DEIS Action Alternatives Violate the Federal Lands Policy Management Act and BLM § 3809 Regulations.

FLPMA requires BLM to "take any action necessary to prevent unnecessary or undue degradation of the lands." 43 U.S.C. § 1732(b). This is known as the "prevent UUD" standard. This duty to "prevent undue degradation" is the "heart of FLPMA [that] amends and supercedes the Mining Law." *Mineral Policy Center v. Norton*, 292 F.Supp. 2d 30, 42 (U.S. Dist. D.C. 2003). BLM cannot approve a mining project that will cause UUD. 43 C.F.R. § 3809.411(d)(3)(iii). "FLPMA's requirement that the Secretary prevent UUD supplements

[118] The Supreme Court has endorsed at least two tests for determining whether a claim qualifies as a "valuable mineral deposit." Under the "marketability" test, it must be shown that the mineral can be "extracted, removed and marketed at a profit." *United States v. Coleman*, 390 U.S. 599, 600 (1968). According to the "prudent-person" test, "the discovered deposits must be of such a character that a person of ordinary prudence would be justified in the further expenditure of his labors and means, with a reasonable prospect of success, in developing a valuable mine." *Id.* at 602. The Court has held that profitability is "an important consideration in applying the prudent-man test and the marketability test," and notes that "…the prudent-man test and the marketability test are not distinct standards, but are complementary in that the latter is a refinement of the former." *Id.* at 602-603.

requirements imposed by other federal laws and by state law." *Center for Biological Diversity v. Dept. of Interior*, 623 F.3d 633, 644 (9th Cir. 2010).

In addition, BLM must ensure that all operations comply with the Performance Standards found at §3809.420. *See* 43 C.F.R. §3809.5 (definition of UUD, specifying that failing to comply with the Performance Standards set forth at §3809.420 constitutes UUD). One of the most important Performance Standards requires BLM to ensure that all operations comply with all environmental protection standards, including air and water quality standards. *See, e.g.*, 43 C.F.R. §3809.5 (definition of UUD includes "fail[ure] to comply with one or more of the following:...Federal and state laws related to environmental protection."); §3809.420(b)(5) (listing Performance Standards that must be met, including the requirement that "All operators shall comply with Federal and state water quality standards..."); §3809.420(b)(4) ("All operators shall comply with applicable Federal and state air quality standards, including the Clean Air Act.").

As detailed in pages 25-29 of these comments, the Mine pit lake is predicted to violate federal and state water quality standards (with no mitigation proposed or required). According to BLM policy, failure to avoid significant impacts and failure to require mitigation that would reduce adverse Project impacts constitute UUD. "Mitigation measures fall squarely within the actions the Secretary can direct to prevent unnecessary or undue degradation of the public lands. *An impact that can be mitigated, but is not, is clearly unnecessary.*" 65 Fed. Reg. 69998, 70052 (Nov. 21, 2000) (preamble to BLM's 43 C.F.R. Part § 3809 mining regulations) (emphasis added). Additionally, as discussed on pages 46-50 of these comments, the DEIS's mitigation analysis fails to include the required analysis of the effectiveness of each measure, thus failing to meet BLM's duties under NEPA as well as FLPMA.

B. The DEIS Action Alternatives Violate State and Federal Water Quality Laws.

The DEIS fails to ensure that all requirements of the federal Clean Water Act have been met. Under the Clean Water Act ("CWA") Section 313, agencies cannot approve any activity that may result in a violation of a federal[119] or state water quality standards or water quality protection requirements, including a state's antidegradation policy. 33 U.S.C. §1323(a). Judicial review of this requirement is available under the federal Administrative Procedure Act. *Oregon Natural Resources Council v. United States Forest Service*, 834 F.2d 852 (9th Cir. 1987).

"A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses." 40 C.F.R. §131.2. The minimal designated use for a water body is the "fishable/swimmable" designation which "provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." 33 U.S.C. §1251(a)(2).

> The text [of the CWA] makes it plain that water quality standards contain two components. We think the language of §303 is most naturally read to require that a

[119] Water quality standards include the protection of beneficial uses under both the CWA and EPA regulations.

> project be consistent with both components, namely, the designated uses *and* the water quality criteria. Accordingly, under the literal terms of the statute, a project that does not comply with a designated use of the water does not comply with the applicable water quality standards.

PUD No. 1 of Jefferson County v. Washington Department of Ecology, 511 U.S. 700, 714-15 (1994) (italics emphasis in original). Thus, the CWA prohibits any activity that will not fully protect all of the designated uses for that water body.

Again, as detailed in pages 25-29 of these comments, the Mine's pit lake is predicted to violate federal and state water quality standards (with no mitigation proposed or required). The DEIS fails to adequately analyze the Mine's impacts to water resources at the Mine site and surrounding areas. It also fails to adequately analyze mitigation measures for such impacts (*See* pages 46-50 of these comments). The DEIS merely states that there is uncertainty regarding federal jurisdiction over pit lake water quality. DEIS 3-33. Under NEPA, jurisdiction is irrelevant to identifying reasonable action alternatives and considering impacts. 40 C.F.R. Part 1502.14(c). BLM must either revise or supplement the DEIS with the required analyses and a determination whether pit lake water quality will violate the CWA.

CONCLUSION

In summary, the Copper Flat Copper Mine DEIS violates numerous state and federal laws. First, it violates NEPA for the overwhelmingly persuasive reasons discussed at pages 3-59 of these comments. Second, the DEIS makes incorrect and unsupportable assumptions regarding the 1872 Mining Act. Third, the stated action alternatives in the DEIS violate federal and state water quality standards. Finally (and ultimately), the DEIS violates the Federal Lands Policy Management Act and BLM §3809 regulations because all action alternatives will result in unnecessary or undue degradation of federal lands.

BLM, therefore, must either revise or supplement the DEIS to correct these violations of NEPA and CEQ standards, and state and federal law. However, Ladder contends that when these issues have been fully addressed BLM must conclude that the proposed Mine cannot be conducted without unnecessary and undue degradation to the environment and, therefore, cannot be approved.

TECHNICAL MEMORANDUM:

REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT, COPPER FLAT

Sierra County NM

March 30, 2016

Prepared for: Turner Ranch Properties, L.P. ("TRP"), owner of the Ladder Ranch, and the New Mexico Environmental Law Center ("NMELC")

Prepared by: Tom Myers, PhD, Hydrologic Consultant, Reno NV

Table of Contents

Table of Figures

Table of Tables

1.0 INTRODUCTION

New Mexico Copper Corporation ("NMCC") has proposed to construct the Copper Flat Copper Mine ("Mine") by submitting a mine plan of operations ("MPO") to the Bureau of Land Management ("BLM"). The BLM has prepared a draft environmental impact statement ("DEIS") to assess the impacts of constructing and operating the Mine. This technical memorandum reviews the DEIS with an emphasis on hydrogeology, including the effects of obtaining water for Mine production, pit dewatering, pit lake development, and potential contamination downgradient from waste facilities (such as waste rock and tailings impoundments) due to seepage. Throughout this review, a general reference to the DEIS includes the supporting documents.

My background includes a PhD and MS in hydrology/hydrogeology from the University of Nevada, Reno and a BS in civil engineering from the University of Colorado. I have 35 years of employment experience in consulting, academics and government, with about 20 years specific to mining and energy development hydrogeology. My specialties include numerical modeling and contaminant transport. I have published 17 peer-reviewed journal articles, with five articles since 2009 concerning groundwater modeling, contaminant transport, and aquifer water balance. My CV is attached to this review.

2.0 SUMMARY OF MAJOR IMPACTS OF THE PROPOSED PROJECT AND ERRORS WITH THE DEIS ANALYSIS

2.1 Effects of Proposed Action on Ladder Ranch

The Ladder Ranch ("Ladder" or the "Ranch") borders the Mine site on the north; however, the DEIS presents almost no analysis of impacts to the Ladder. The DEIS mentions Ladder only twice in hydrology-related sections. It notes that Ladder uses water from the Las Animas Creek for irrigation (DEIS 3-53) and that the Ranch has domestic wells along Las Animas Creek (DEIS 3-67).

Figure 1 shows the southern property boundaries of Ladder. The Mine would lie about one mile south of the Ranch. Ladder is mostly in the Animas Graben[1] and also in the Animas Uplift area (Jones et al. 2014, INTERA 2012). There are three primary hydrogeologic impacts the Mine will have on Ladder: 1) drawdown from the Mine pit due to dewatering; 2) pit lake formation; and 3) groundwater drawdown from production pumping. Drawdown is the lowering of the groundwater table in an unconfined aquifer or the lowering of the pressure in a confined aquifer due to a stress.

[1] A graben is a geologic formation which has been lowered relative to the surrounding formation, and is usually bounded by normal faults.

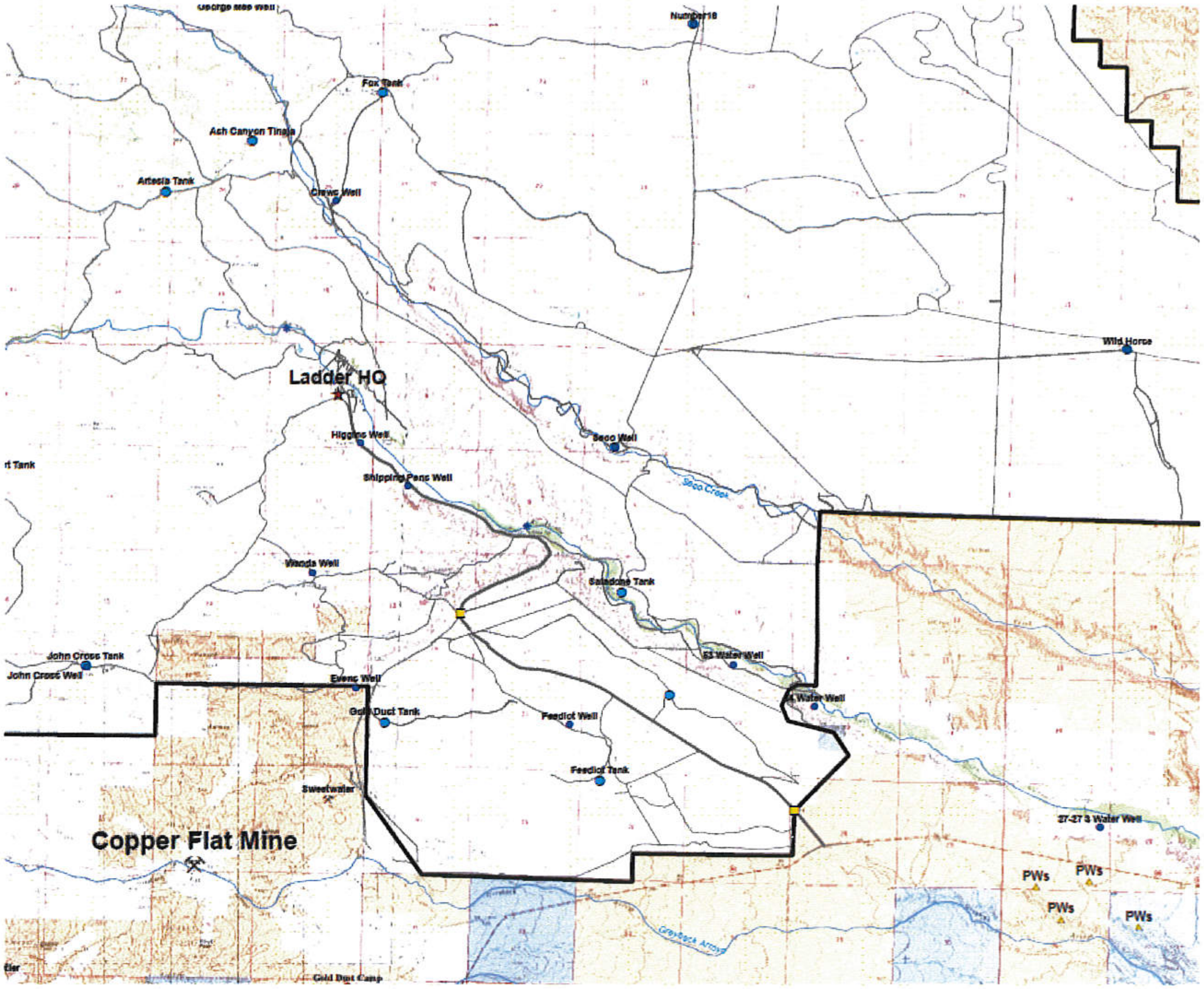


Figure 1: Outline of Ladder Ranch property lines with the Copper Flat Mine and production wells (PWs). Turn Ranch Properties, L.P. developed the base map for this figure.

The information and analyses available to the BLM indicates that the Mine could have significant impacts on Ladder, which BLM fails entirely to consider. The open pit would be constructed less than two miles south of the Ranch. The DEIS basic conceptual model is that the pit will be constructed in low permeability andesite[2]. This conceptual flow model ("CFM"), upon which BLM based its hydrological impacts analysis, has substantial recharge occurring west of the Mine and flowing east to the Rio Grande. However, the andesite actually causes most of it to flow north toward Las Animas Creek or south toward Percha Creek.

Between the Mine and Ladder, the geology shows carbonate rock, which is theorized to be high conductivity rock, but there are no data to support this claim. There are also no data in the DEIS pertaining to rock in the pit area deeper than 400 feet, although the pit will be much deeper than this. The data in the DEIS also do not characterize the fractures or other hydrogeologic characteristics of the

[2] Andesite is a high density rock of volcanic origin. If unfractured, it has very low permeability.

andesite. A few fractures would preferentially increase the flow through the andesite, increasing the permeability of rock around the pit.

The DEIS also fails to characterize dewatering fractures in andesite. These fractures are likely to divert flow from the carbonate which otherwise would discharge to Las Animas Creek within Ladder. The failure to accurately identify the regional hydrogeologic properties of the andesite would also cause the conceptual flow model to underestimate the drawdown effects on the Ranch. This is due to the failure to understand fractures and also due to the use of very short-term tests to estimate permeability. As described in detail below, tests that are representative of only a small portion of the aquifer are typically too small scale to estimate the regional characteristics of the aquifer. On a regional scale, an aquifer is usually more conductive than when considered on a small, local scale. Dewatering is a regional phenomenon, but because conductivity is underestimated in the conceptual flow model, the extent of drawdown is also underestimated in the numerical model used for predictions in the DEIS.

The direct impacts to Ladder due to mine dewatering and pit lake formation are the following:

According to the DEIS modeling, by the end of mining, drawdown of up to one foot would reach the John Cross Well and would be ten feet at the property line just north of the Mine.

If the model is properly simulated with more fractures and higher conductivity in the andesite at the Mine pit, the drawdown by the end of mining would extend further into the Ladder property (than currently predicted). Drawdown would probably extend at least another mile past Ladder and would be at least 50 feet at the Ranch's southern boundary. The model would have to be run with proper parameters to make actual predictions.

The Mine pit lake would require a long time, probably a century or more, to reach its full size. Drawdown around it would expand for even longer. At some point, probably decades into the future, the drawdown would reach Las Animas Creek on Ladder (which could possibly stop its extension to the north). This happens because the creek would be drawn into the groundwater to make up the dewatering deficit. Las Animas Creek, Warm Spring, and Myers Animas Spring would likely lose much or all of their flow due to drawdown caused by the Mine pit.

Production pumping is the second aspect of the Mine which will affect Ladder. However, several factors combine in the conceptual flow model to limit the extent that the drawdown, caused by production pumping, extends westward. While discussed in detail below in the modeling section, these factors function as biases in the model due to the production wells being located in the Palomas graben, a north-south trending feature between two faults. The transmissivity in the graben is unjustifiably high and the western fault conductivity is unjustifiably low in the DEIS conceptual flow model. The DEIS numerical model also uses a boundary condition that adds water to the north end of the graben in a way that will provide much of the production pumping water, minimizing the Mine's actual impacts.

The result of these biases is that the model relied upon in the DEIS predicts most drawdown from production pumping going eastward toward the Rio Grande, and the predicted effects, critiqued below, are in that direction.

The DEIS model predicts that the one-foot drawdown under Las Animas Creek would extend about three miles beyond Ladder's southern boundary to about the Saladone Tank area (Figure 1). Drawdown under Las Animas Creek would be about 10 feet at Ladder's southern property boundary. This is an intermittent stream reach and the drawdown caused by the Mine's production pumping could dewater the alluvium and cause the stream to have flow less often, although the DEIS model does not simulate this.

Drawdown from the Mine's production pumping will also extend north of Las Animas Creek (than currently predicted in the DEIS model), reaching Seco Creek. Drawdown would be several feet at Ladder's southern boundary. The DEIS fails to disclose impacts on Seco Creek.

If these biases of the model are removed, production pumping drawdown would then extend west and north of the Mine, affecting Las Animas Creek far further upstream than currently predicted by the numerical model. This could affect springs along the stream course and decrease the perennial flows. The one-foot drawdown would probably extend up to three miles further into Ladder, and at the Ranch's southern boundary drawdown could exceed twenty feet if the model is properly simulated.

2.2 Impacts to Water Resources in Project Area

In addition to potentially impacting Ladder, all action alternatives analyzed in the DEIS will cause substantial depletions in flow to the Rio Grande River and tributaries within the Mine area. The proposed action will reduce flow from the Mine area watersheds by seventeen (17) percent, and the preferred alternative will increase that loss to twenty-five (25) percent. Additional losses to the river, not accounted for in the DEIS, could result from diverting groundwater from upriver (above Caballo Reservoir) by decreasing flow from the wells in the lower parts of the Mine watershed near the river, and by diverting flow of the alluvial aquifer along Las Animas Creek. Additionally, drawdown from production pumping extends under Las Animas Creek where it will draw water from the alluvium. It also extends to the flowing wells, which reduces their discharge.

Evaporation from the Mine pit lake will be a permanent loss of approximately 100 af/y from the water budget of the Mine-area watershed's drainage to the Rio Grande. The DEIS fails to disclose this loss and to estimate the time it will take to impact the river. Groundwater levels around the pit lake will recover very little and the extent of the drawdown cone will grow for a long time into the future. The DEIS does not estimate the full extent of the aquifer that will be affected by drawdown, which includes an extension into the Ladder.

The future pit lake will be terminal, with the only outflow being through evaporation. The DEIS acknowledges that water quality will be poor, at least as bad as the existing pit lake and exceeding current standards for at least five parameters. The DEIS suggests the standards will change to meet the resultant water quality. The only proposed mitigation is to rapidly fill the pit lake with water. This will force poor quality water from the pit into the surrounding groundwater, causing a violation of groundwater standards.

The DEIS also acknowledges that seepage through waste rock will impact water quality, but fails to disclose predicted rates of seepage or future contaminant plumes. Regarding closure of the tailings impoundment, the DEIS indicates that land application disposal ("LAD") will be used to dispose of excess water, but it fails to disclose where the LAD site will be. The DEIS also fails to provide soils data to show whether there is even an acceptable site. Of concern is the DEIS's failure to disclose the advantages of considering pit backfill as an alternative to LAD of contaminated pit water.

2.3 Errors Causing the DEIS to Render Erroneous Predictions

The BLM also lacks fundamental and accurate baseline data to adequately analyze the Mine's environmental impacts.

2.3.1. The DEIS Lacks Basic Information about Water Quality and Availability.

First, the DEIS fails to consider the initial water needed to commence Mining operations. Second, the DEIS does not have sufficient data to support its analyses or predictions. There are not enough monitoring wells, especially at depth, to parameterize a model around the Mine pit or to support conceptual flow modeling around the Mine's production wells. The surface water sampling was completed too infrequently and for too short of a time period. The DEIS's characterization of the existing sulfate plume also does not utilize all available data. Third, the DEIS fails to analyze recent groundwater level observations on Ladder and streamflow measurements on Las Animas Creek.

2.3.2. The DEIS Groundwater Models Are Deeply Flawed.

The conceptual flow model ("CFM") has six significant errors which cause the numerical model to underestimate the Mine's impacts:

- The CFM does not consider the source of water drawn to the Mine's pumping wells from the north. This water is probably an additional loss to the Rio Grande.
- The CFM describes the Palomas Graben incorrectly, with inappropriate values for transmissivity, vertical anisotropy, and fault conductance. The values used in the modeling are not supported by data. In fact, the anisotropy and transmissivity are not supported by the lithology of the pumping wells.
- The errors in the CFM for the Palomas graben cause the model to underestimate drawdown in the Las Animas Creek near the Ladder Ranch.
- The recharge rates and location for distributed recharge is not well supported. The CFM ignores distributed recharge into the Santa Fe formation east of the Mine.
- The CFM does not include an estimate for discharge to the Rio Grande, to Las Animas or Percha Creek, to the flowing wells, or to evapotranspiration ("ET") along the streams.
- The transmissivity of the andesite near the Mine pit is not justified to be as low as calibrated. This inappropriately prevents the drawdown caused by pit dewatering from extending north to the Ladder Ranch.

The numerical groundwater model also has several errors, which are outlined later in these comments. I have provided a list of necessary changes to the DEIS model that would improve its predictive accuracy. Without collecting additional baseline data for calibration as recommended herein, the model accuracy will be limited. Because the DEIS is based on insufficient data and contains many errors in its analysis, rendering the impacts analysis inadequate, BLM must either revise or supplement the DEIS.

3. DETAILED DISCUSSION OF DEIS

The following section examines the DEIS's alternatives and impacts analyses. The DEIS fails to adequately analyze reasonable alternatives to NMCC's Proposed Action and the Mine's impacts due to incomplete baseline data and biases in the conceptual flow model and numerical model. Water production estimates identified for each action alternative fail to account for startup water necessary for mining operations. The DEIS also fails to analyze NMCC's on-going remediation efforts for the sulphate plume below the existing tailings impoundment and in the groundwater under Greyback Wash. The Mine's impacts discussed in the DEIS are either erroneous or significantly minimized.

3.1 Analysis of DEIS Alternatives

3.1.1 Proposed Action and Action Alternatives

The BLM underestimates the amount of water needed for mining operations. The DEIS analyzes three alternatives, with the production rate being the primary difference among them. The Proposed Action calls for a 17,500 tons per day ("tpd") mining rate, while Alternatives 1 and 2 call for 25,000 and 30,000 tpd, respectively. Alternative 2 would have a higher rate of water use for a shorter period of time. The BLM has identified Alternative 2 as the Preferred Alternative.

The Proposed Action and Alternative 1 propose a pit, with a diameter of 2,800 feet and a depth of 780 feet, measured at the middle of the Copper Flat basin, and 900 feet below the pit wall high point. DEIS 2-6. Alternative 2 proposes to mine an additional 25,000 million tons of ore, which would require a larger pit, one with a diameter of 2,800 feet and 1,000 feet of depth. DEIS 2-74.

The Proposed Action anticipates using 13,370 af/y ("acre feet per year"), recycling 9,096 af/y and obtaining 3,802 af/y from freshwater sources. DEIS Figure 2-6. Alternative 1 uses 18,674 af/y, recycling 12,845 af/y and obtaining from freshwater sources 5,290 af/y. DEIS Figure 2-10. Alternative 2 uses 22,210 af/y, recycling 15,504 af/y and obtaining from freshwater sources 6,105 af/y. DEIS Figure 2-14. The recycling is alleged reuse of water from the tails; the DEIS figures refer to it as "water reclaimed from TSF." For each action alternative, the recycling water is about 2.5 times the freshwater source. At the commencement of mining, there are no tailings, so there is no tailings reclaim water; initial water must be obtained from freshwater sources. The DEIS water accounting in Figures 2-6, -10, and -14 does not account for the initial water. This represents a major error in the water accounting for the Mine.

- The DEIS should change its estimate of production water to account for the Mine's startup water. All analyses that depend on a proper estimate of water production should be redone, including simulations of production pumping on groundwater. This could also affect required water rights.

3.1.2 No Action Alternative

The proposed mine site has been mined previously, so the No Action alternative considers an existing pit and pit lake, waste rock dump, and tailings impoundment. The pit lake covers 5.2 acres and holds about 60 acre-feet ("af") of water. DEIS 3-52. Stormwater and runoff, groundwater inflow, and evaporation from the pit lake surface control the current water balance. The pit lake elevation is "as much as 100 feet below the regional groundwater table." DEIS 3-62. The DEIS indicates that the previous pumping rates "were no more than 50 gpm for the Quintana pit" (Id.), or about 81 af/y.

The existing mine caused three significant areas of pollution. There is a sulfate plume below the tailings impoundment and in the groundwater under Greyback Wash. Groundwater near to and within the existing pit lake has very low quality as well. There are ongoing remediation plans to remediate these plumes, which should be acknowledged as part of the No Action alternative.

3.2 DEIS-Predicted Impacts to Water Quantity

All action alternatives will impact both groundwater and surface water quantity and potentially degrade groundwater and surface water quality in the area. The DEIS acknowledges many impacts, but fails to propose adequate mitigation to prevent the degradation. There are, however, many issues that the DEIS fails to properly analyze. With respect to water resources, the impacts to water resources from all of the action alternatives will include the following:

- The Mine's production pumping will cause drawdown in the Palomas Basin and decrease flows to the Rio Grande River, Las Animas Creek, and Percha Creek, as well as springs in the area.
- Mine dewatering will deplete groundwater resources by causing drawdown and decreasing discharge to springs and streams, both in Percha Creek and Las Animas Creek. The drawdown will affect springs and wells on the Ladder Ranch.
- Leaks from waste rock and tails will reach groundwater and flow eastward toward productive aquifers.
- The future Mine pit lake will cause significant water quality issues, based on the acid-producing properties of the rock surrounding the pit. The DEIS fails to disclose how poor the water quality will be.

The differences among the action alternatives are a matter of degree based on different pumping rates, time period for pumping (based on the life of the Mine), and the size of the pit. The following paragraphs discuss the impacts of, and differences among, the action alternatives.

The DEIS assesses the Mine's impacts to both surface and groundwater flow primarily based on a numerical groundwater model (Jones 2015). I review reports regarding the conceptual flow model of the area and the numerical model implementing the CFM in sections 4.2 and 4.3 of these comments (starting on page 29). While the CFM and numerical model are fundamentally flawed, and therefore do not provide an accurate basis for considering the Mine's impacts, if one assumes for the sake of argument that the models are reasonable, the DEIS still concludes the Mine will have significant impacts on water resources.

Changes to groundwater flows from the Mine cause most of the surface water impacts by changing the groundwater discharge rates to surface water. The DEIS shows depletions to surface water flow rates in DEIS Table 3-15 and cumulatively in Table 3-16, and shows changes in discharge rates to groundwater model reaches in DEIS Tables 3-21a, 3-22a, and 3-23a and cumulatively in DEIS Table 3-21b, 3-22b, and 3-23b, respectively, for each of the action alternatives. The respective river reaches are Caballo Reservoir, Rio Grande (downstream of dam), Las Animas Creek, and Percha Creek. Depletions are based on simulated flows to these river reaches and are not calibrated to actual flow measurement data. I review the water balance data below in the section concerning the CFM (in these comments).

Table 1 of these comments assembles the predicted depletions by alternative for comparison. The estimated depletions to the Rio Grande are substantial, but the depletions to Las Animas and Percha Creeks are only a small percent of the predicted flows (simulated no action flows) to those creeks.

Alternative 2, the Preferred Alternative, will cause the highest loss rate to the Rio Grande and to the flowing wells (Table 1). Overall, the loss to the Rio Grande from the Proposed Action is about 17% of the flow from the Mine area watersheds. Alternative 2 would increase the loss by up to 25% of the

Proposed Action decrease (Table 1). This will be due to additional pumping for the higher production rate. The lost discharge from flowing wells and other losses (Table 1) may also be lost to the Rio Grande. DEIS 3-81. The DEIS does not consider how or whether NMCC may mitigate these losses. *Id.*

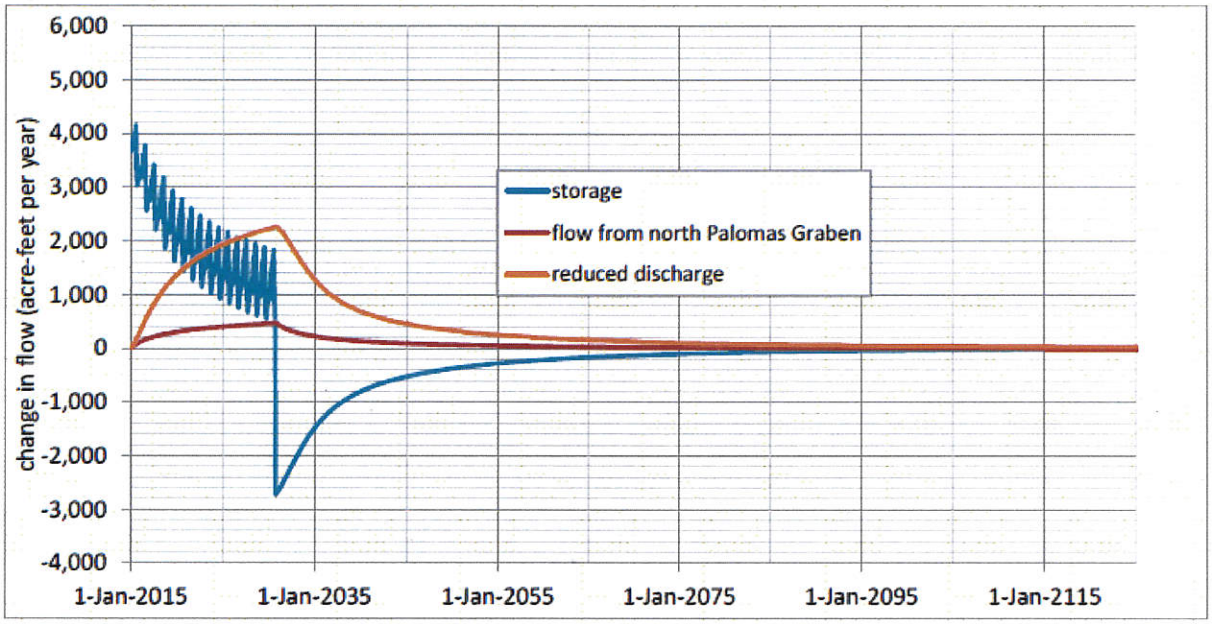
Table 1: Summary of DEIS Table 3-20, 3-21, and 3-22. The decrease is for three months after cessation of mining, assuming the Mine operates as proposed.

		Proposed action		Alternative 1		Alternative 2	
Parameter	Flow Rate, no mine	Max Decrease (af/y)	Cum Vol lost (af)	Max Decrease (af/y)	Cum Vol lost (af)	Max Decrease (af/y)	Cum Vol lost (af)
GW Q to RG ab Caballo	10,561	807	8,845	939	6,934	1,093	8,353
GW Q to RG bl Caballo	1,234	657	7,106	803	5,533	932	6,730
Q from flowing wells	2,030	765	8,680	930	6,954	1,054	8,338
Animas Creek	4,848	12	140	14	113	17	136
Percha Creek	2,630	18	178	20	134	24	165
Inflow from graben north	2,184	459	5,438	566	4,510	665	5,493

Long-term losses to the Rio Grande are best measured as cumulative volume lost, and the Proposed Action would experience a higher cumulative decrease in flow. The DEIS cumulative volume lost value is extremely misleading, however, because it accounts only for lost flow through the end of mining. DEIS 3-74. As drawdown near the production wells recovers, water will continue to be lost to the Rio Grande and the flowing wells. DEIS Figure 3-15a (reproduced as Figure 2 in these comments) shows clearly for the Proposed Action that "reduced discharge" continues after the cessation of mining. During mining, the pumping will remove water from storage (the blue line in Figure 2) and cause "reduced discharge" (the orange line).

Additionally, the drawdown caused by the Mine's production pumping will cause additional groundwater to be drawn from the north into the Palomas graben to the production wells, as shown on the red line in Figure 2. This groundwater flow would most likely discharge into the Rio Grande if not diverted south to the Mine's pumping wells, although the DEIS does not discuss this nor does the CFM (critiqued below) address the source of this water.

Figure 3-15a. Impacts of Proposed Action on Water Budget



Source: JSAI 2015.

Figure 2: DEIS Figure 3-15a showing a hydrograph of flow loss rates for the proposed action. Similar hydrographs to Figure 2 are shown in the DEIS for all alternatives.

There is a gage station on the Rio Grande below Caballo Reservoir. Based on the US Geological Survey National Water Information System (NWIS) site (http://waterdata.usgs.gov/nwis/inventory/?site_no=08362500), the contributing area is 27,760 square miles with a drainage area of 30,700 square miles. The gage has operated since 1938, the year Caballo Reservoir was constructed. The average flow since 1961 has been 869 cfs, or 628,900 af/y. The capacity of Caballo Reservoir is 326,700 af and the total reservoir storage capacity above the outlet from Caballo is 4,991,100 af. (Bureau of Reclamation 2013).

The maximum loss for all action alternatives rates (Figure 2) are about 0.2 to 0.3% of the total average flow from Caballo Reservoir. During drought, groundwater discharges to the river are the most consistent source of inflows to the reach because the valley aquifers are essentially additional storage for the river (Bureau of Reclamation 2013). For this reason losses to groundwater discharge will be much more important during drought periods. There have been years during which the average flow from the reservoir was about a quarter of the long-term average, so the reductions due to lost groundwater inflow can be as much as 1% of the total river flow at the Caballo Reservoir.

The drawdown cone caused by the Mine's production well pumping (Figures 3 and 4 show DEIS Figure 3-13b and 3-15b for the Proposed Action and Alternative 2, the Preferred Alternative, respectively) shows minimal drawdown at Caballo Reservoir; the dashed contour intersects the reservoir. The reservoir prevents the groundwater from drawing down at the reservoir because the reservoir adds water to the groundwater model domain. The groundwater model uses a boundary for the reservoir which, in the modeling, sets the water level. Drawdown affects the reservoir by diverting groundwater flow from reaching the reservoir, rather than lowering the water table beneath the reservoir. This drawdown actually lowers the gradient for groundwater flow to the reservoir.

Figures 3 and 4 show that drawdown contours are elongated north-south parallel to the reservoir. This is due to biases coded into the modeling, as discussed in detail in the conceptual model and numerical modeling sections below. The biases are due to how the models establish the properties of the Palomas Graben, the geologic feature in which the Mine's production wells are located. The models assume the Palomas Graben is a north-south trending feature with transmissivity much higher than the surrounding aquifer, a conceptualization not supported by data. The models also assume that faults bound the graben on the east and the west, with the fault on the west being almost impervious.

The modeling also allows groundwater to enter from the north into the graben (Figure 2). For example, up to 665 af/y was induced to enter the graben for Alternative 2 (Table 1). However, as discussed above, the DEIS does not disclose the source of this water from the north; the groundwater model simply models it as a boundary with unlimited available water without explaining its source (Jones et al. 2014). This additional flow to the graben prevents additional groundwater from being removed from groundwater storage, which would cause additional drawdown. This unreasonable assumption also fails to account for groundwater that would not be discharged to surface water, which would in turn prevent accounting for further decrease in flows to the Rio Grande.

Additionally, the DEIS fails to disclose that inducing water to enter the graben likely diverts flow from the river north of the Caballo Reservoir because that source of flow presently discharges to the river from watersheds north of the Mine watersheds. This Mine would divert more water from the river than the DEIS discloses.

Figure 3-13b. Map of Water Level Declines in Layer 2 at End of Mining - Proposed Action

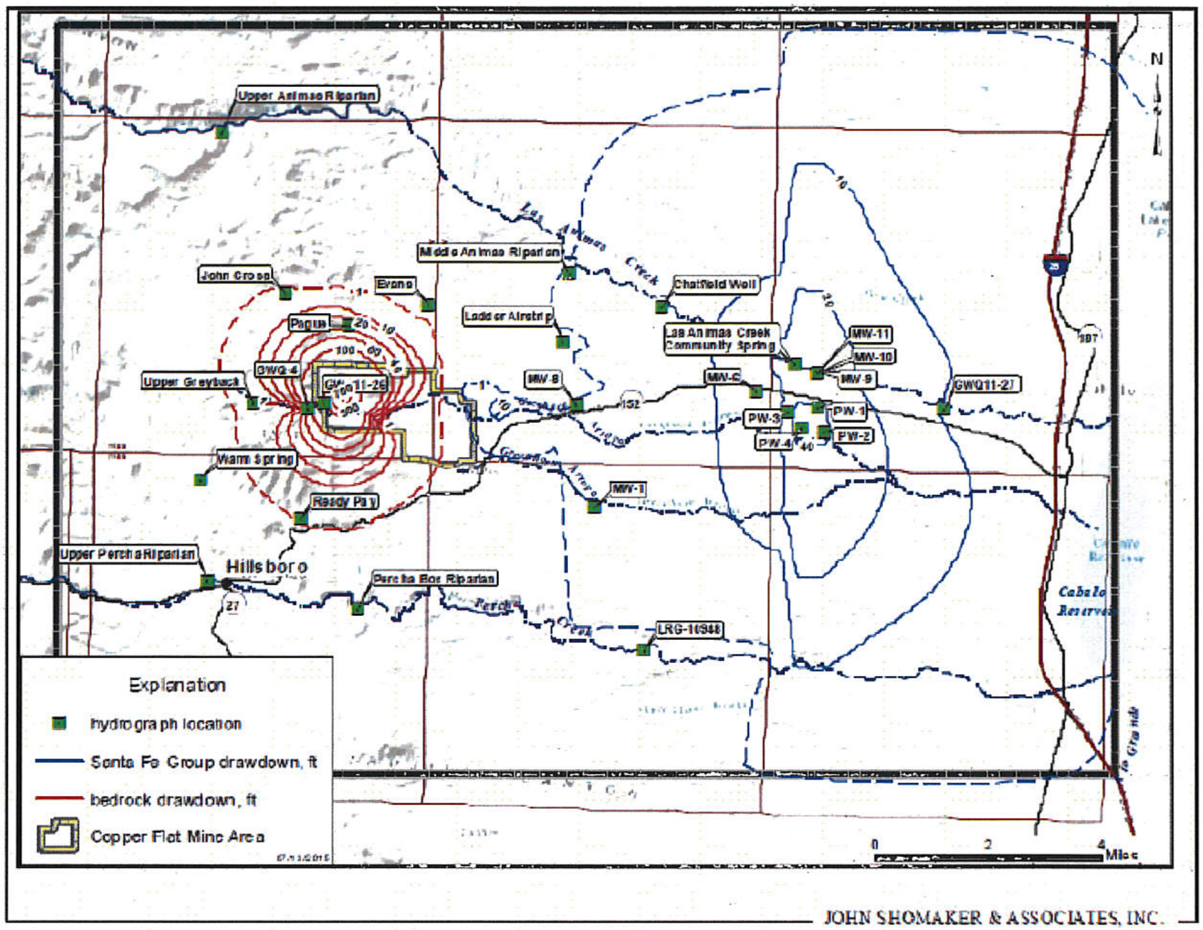


Figure 3: DEIS Figure 3-13b showing drawdown in model layer 2 at the end of mining for the Proposed Action.

Figure 3-19b. Map of Water Level Declines in Layer 2 at End of Mining – Alternative 2

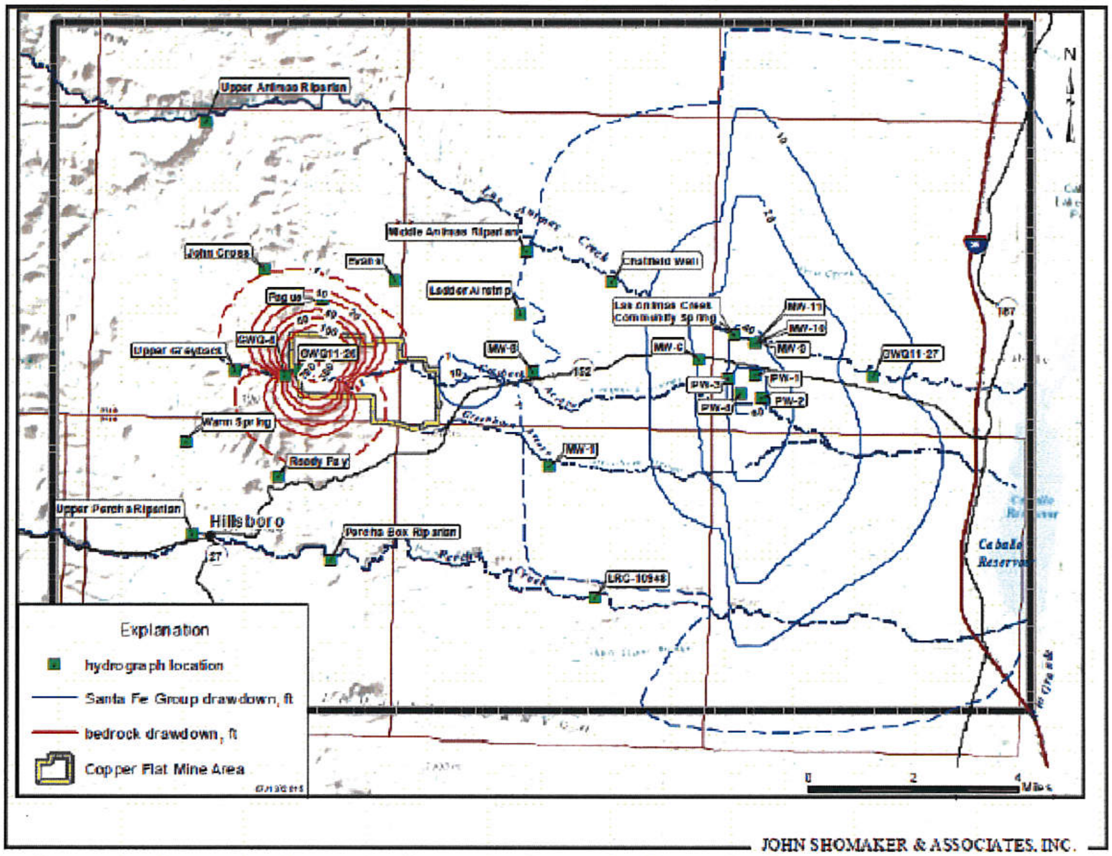


Figure 4: DEIS Figure 3-15b showing drawdown in model layer 2 at the end of mining for alternative 2, the preferred alternative.

The drawdown cone at the Mine pit (Figure 3) is much deeper than that at the production wells for all action alternatives (Figures 3 and 4), but represents much less water removed from storage due to the much lower porosity in the bedrock around the pit. After mining, a small pit lake will form and evaporate water in perpetuity. This evaporation will cause the pit to hydraulically resemble a large diameter well in perpetuity. The DEIS discloses the evaporation rate for the Proposed Action will be about 100 af/y (DEIS p 3-76), but does not disclose the evaporation rate for Alternative 2, which will be larger because the pit is larger. Pit lake evaporation is a permanent loss of flow to the Rio Grande, although it will not manifest at the river for a very long time due to travel time between the pit and river.

- The DEIS should estimate the long-term pit lake evaporation loss for all alternatives and should estimate the time for these losses to reach the Rio Grande. This can be accomplished by running the numerical model in transient mode into the future until conditions approach steady state. The model should also be run in steady state mode with the pit lake to estimate the steady state evaporation. This should likewise be done for all alternatives.

Water levels at and near the pit recover very little, regardless of the action alternative, as shown in DEIS Figure 3-14a, which shows the well level hydrograph for a nearby well; the drawdown is over 200 feet after 100 years. The model predicts the levels will recover very slowly, which reflects the continued expansion of the drawdown cone. Groundwater hydraulics with the Mine pit indicate the water table near the pit will approach, but never reach, equilibrium in the future, although the drawdown cone will have expanded beyond that shown in Figure 3. A major flaw of the DEIS is that it does not disclose the ultimate extent of the drawdown at the Mine pit.

- The DEIS should estimate the ultimate extent of drawdown by running the model with the pit lake also simulated in steady state, as recommended above for estimating the steady state pit lake evaporation rate.

The DEIS claims that drawdown will not affect springs along the alluvial valley because those springs are considered to be perched discharges. DEIS 3-82. The DEIS offers no evidence for them being perched other than supposition about clay layering.

- The DEIS should disclose all springs within the predicted 1-foot drawdown as potentially being affected by the Mine production pumping.

The DEIS also does not address whether the pumping will "impair existing wells," allowing that to be determined by the New Mexico Office of the State Engineer. DEIS 3-76.

In summary, the DEIS predicts that the Proposed Action and both Alternatives will have unacceptable impacts to water quantity in the Rio Grande River. Due to errors in the CFM and numerical modeling, reviewed below, the DEIS underestimates impacts to Las Animas Creek and to water resources on the Ladder. Improved modeling will show the more accurate estimates of drawdown from Mine dewatering, which will reveal that the long-term pit lake formation will cause drawdown across the southern boundary of the Ladder and the production pumping drawdown will extend northwest toward Las Animas Creek on the Ranch.

3.3 DEIS-Predicted Impacts to Water Quality

Several aspects of the Mine's operations can affect water quality, including the construction and reclamation of waste rock dumps, expansion of the pit and dewatering, expansion and reclamation of the tailings impoundment, non-point source pollution from runoff from disturbed areas, and spills of hazardous materials. DEIS 3-36, -37. The following paragraphs discuss water quality impacts by project feature. There is very little difference among the action alternatives because the size of the features vary minimally, except that the pit lake would be a little larger under Alternative 2, the Preferred Alternative. The DEIS fails to discuss the difference in pit lake quality due to size differences among the action alternatives.

Waste Rock Dumps: Waste rock dumps are pollution sources due to precipitation or runoff leaching through them. Their capacity for pollution depends on the reactivity of the rock and whether the rock is covered and runoff prevented from reaching the dumps.

The DEIS describes the waste rock only in general terms, acknowledging that some will have the potential to generate acid mine drainage ("AMD"). DEIS Table 3-12. The DEIS states that both waste rock and low-grade ore has the potential to generate "deleterious leachate if sufficient percolation of water through the rock piles occurs." DEIS 3-41. This applies to both transition and sulfide rock, with the difference being that sulfide rock may require more time for leachate to develop. *Id.* The DEIS fails to disclose the amount of transitional or sulfide waste rock or ore. Some ore could be temporarily stored on the ground surface prior to processing.

- The DEIS does not meet NEPA's requirement that it disclose the amount of reactive rock potentially causing pollution on the site.

The DEIS implies that the Mine would rely on the dry climate to prevent AMD from reaching ground or surface water. DEIS 3-39. The DEIS claims that ET exceeds annual precipitation by five times, but the precipitation that will cause leaching will be low-frequency high rainfall events. *Id.* However, even if most precipitation occurs during summer, substantial events will cause percolation to enter the waste rock and potentially leach contaminants. This is especially true while the dump is constructed prior to any cover being added.

- BLM must either revise or supplement the DEIS with the required information regarding the amount of reactive rock potentially causing pollution on the Mine site, analyze substantial precipitation events beyond low-frequency high rainfall events occurring in the summer, and identify and analyze the effectiveness of mitigation measures addressing waste rock and potential leaching of contaminants.

The DEIS also does not present any detailed analysis of closure. Rather, the DEIS simply states that the operator must place growth media over the cover materials according to State requirements. DEIS 3-40. Specifically, the DEIS suggests that requirements are that "up to 36 inches of earthen materials" be placed as a cover system. DEIS 3-41. NMCC must assure the "materials have the water holding capacity to store at least 95 percent of the long-term average winter ... precipitation or at least 35 percent of the long-term average summer precipitation, whichever is greatest." *Id.* There are no specifications for seeds or plantings that will be used with the cover.

- The DEIS fails to disclose how NMMC will accomplish the cover requirements for all alternatives.

The DEIS does not provide a detailed analysis of percolation through the dumps, but it does imply that percolation would be relatively uniform and ignores preferential flow. AMD problems occur when significant percolation finds pathways through reactive rock. This can lead to significant amounts of seepage reaching the base of the dump, where it will either flow laterally across the ground surface or enter the soils and groundwater.

- BLM must either revise or supplement the DEIS with a detailed seepage analysis through the proposed waste rock cover.

Tailings Impoundment: The existing tailings impoundment has impacted downgradient groundwater since it was constructed in the early 1980s. The DEIS claims that the water that discharged from the impoundment over the last 30 years "originated from dewatering of the initial tailings slurry." DEIS 3-44. This may not be correct, as discussed below in the modeling section, because the groundwater mound created by the tailings leakage has remained higher than simulated by the modeling which assumed the seepage ceased after the fluid drained.

The DEIS basically claims that constructing the new impoundment on top of the existing impoundment will improve existing water quality because it will have a geomembrane liner that will prevent seepage of new tailings water and also prevent future seepage from the existing tailings. DEIS 3-45. For this reason, the DEIS claims the Proposed Action (and other action alternatives) will "result in an improvement of water quality as compared to the No Action alternative." *Id*. This ignores the fact that an abatement plan is ongoing with the objective of remediating existing contaminated groundwater.

- It is entirely inappropriate for the DEIS to suggest that an action alternative is necessary to remediate an existing sulfate/TDS plume (Id.).

The DEIS recognizes there will be years of water management at the new tailings upon closure. DEIS 3-45. The DEIS does not disclose how the tailings impoundment will be closed. However, it does specify that the tailings water will be disposed by land application disposal (LAD). The DEIS errs by not discussing the plans for LAD. The DEIS does not describe where the LAD site will be, nor presents data regarding the ability of the soils to accept the excess tailings water. Rather, the DEIS states that NMCC "would provide detailed chemical analyses of the water and an assessment of potential effects to vegetation or soils to the BLM. If the seepage water has the potential to adversely affect vegetation or soils, the proponent would propose an alternative management approach to the BLM for approval." *Id*. BLM is therefore allowing NMMC to create a potential pollution hazard, the tailings impoundment, without a plan for closing that hazard. This is a failure of the DEIS to disclose potential impacts.

- BLM must either revise or supplement the DEIS with plans for constructing an LAD site, including soils and vegetation analyses appropriate to the plan.

Expansion of the Pit: The DEIS acknowledges that dewatering water from the pit may exceed water quality standards for various constituents. This is based on the baseline data for several groundwater monitoring wells. The dewatering water will be disposed of primarily for dust suppression activities, therefore the DEIS claims it will not be present long enough to cause a hazard. DEIS 3-43. The DEIS fails to consider whether hazardous constituents could build up on surfaces where the water will be applied for dust control and create a long-term water quality hazard.

- BLM must either revise or supplement the DEIS with an adequate analysis of water quality issues with the pit wall.

Pit Lake: The existing mine pit has a pit lake with dimensions as described above. The DEIS indicates that the pit lake has exceedances of "applicable surface water quality standards for aluminum, **cadmium, copper**, lead, manganese, selenium, and zinc in at least one of the baseline water quality samples." DEIS 3-21 (emphases show constituents with exceedances in all samples). Exceedances are based on the "designated uses of warmwater aquatic life, livestock watering, or wildlife habitat." *Id*. Total dissolved solids ("TDS") and sulfate also have very high and increasing concentrations with time since the initial pit lake formed in the early 1980s. DEIS 3-22.

The DEIS predicts that a pit lake will re-form after mining ceases under all action alternatives. Inflow to the pit lake will be groundwater, precipitation, and surface runoff with little difference among alternatives. Being terminal[3], with a significant amount of reactive rock surrounding the pit, the future water quality will be at least as bad as the existing pit lake, and with evapoconcentration (due to being a terminal lake) some concentrations will be even worse than existing concentrations. DEIS 3-31.

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[3] A terminal pit lake is one from which the only outflow is through evaporation. Pit lake water does not flow out of the pit into surrounding groundwater because evaporation from the pit lake prevents the pit lake from rising to the aquifer groundwater levels.

The DEIS downplays the importance of detailed water quality predictions for the pit lake because of "pertinent uncertainties." DEIS 3-31. Thus, the DEIS relies on both a predictive model and the existing pit lake only to inform its discussion of future pit lake water quality. A "predictive geochemical model is useful to understand the general water quality that may be present decades or centuries in the future, but the model predictions are only estimates and the **level of uncertainty in the model predictions cannot be fully quantified.**" DEIS 3-32 (emphasis added). The DEIS notes that the modeling predicts that future water quality will be near-neutral pH, high TDS, calcium sulfate water, with exceedances of the current water quality standards for copper, lead, manganese, selenium, and zinc. *Id.*

The DEIS also discusses that future water quality standards for the pit lake may be different than at present, either by changing the designated use through a "use attainability analysis" (DEIS 3-33), or by completing site-specific standards, which appears to simply set standards based on what can live in the future poor quality water. *Id.* Additionally, the DEIS suggests that there is uncertainty regarding Federal jurisdiction over pit lake water quality because the Clean Water Act does not specifically address pit lakes. This perceived uncertainty does not allow BLM to avoid a mitigation measures analysis. The DEIS merely recommends that:

- NMCC plans to meet requirements in the future by creating a preliminary pit lake water quality management plan as part of the Mine plan of operations ("MPO") that will meet applicable standards for 30 years after completion of reclamation. The DEIS states this while also acknowledging that it does not know what those standards may be.
- NMCC is to update the pit lake water quality management plan at least 1 year prior to Mine closure, to outline reclamation, water quality management, and monitoring that would "facilitate compliance with applicable water quality standards during the post-mining monitoring period." DEIS 3-34.
- NMCC is to provide a cost estimate for implementation of the plan for BLM review and approval. The DEIS does not specify when this is to occur, but the implication is it would be part of the updated MPO.
- NMCC is to "provide a trust fund or other long-term funding mechanism" to implement the water quality management plan for 30 years.

In summary, the DEIS essentially allows NMCC to develop mitigation measures for pit lake water quality at least one year before closure, avoiding public review, and that NMCC provide a long-term bond to implement the pit lake plan.

- Regardless of the uncertainties inherent with pit lake water quality predictions, BLM must require plans and bonding for mitigation **before** approving any mining at the site. I recommend BLM complete a "reasonable worst case" scenario which takes into consideration that the amount of PAG ("potential acid generating") rock be near its upper limit and that the neutralizing rock does not counter the reactivity. This must be based on the current understanding of conditions, but it could be acceptable to lessen the trust fund as the uncertainty is reduced in future. This should be presented as part of a revised or supplemental DEIS.

As part of mitigation, or to counter the potentially bad water quality in the pit lake, the DEIS suggests the pit lake could be pumped full for water quality reasons, to "introduce good quality water, dilute solutes derived from water-rock interaction, submerge walls and benches to limit oxidation of sulfide minerals, stabilize pit water quality, and create a steady state hydraulic sink in the near term." DEIS 3-34. The DEIS discusses various additives that could counter acidity and various reasons that water pumping measures minimize the amount of poor water quality in the pit lake. DEIS 3-35, -36. A key point is that there is a great deal of uncertainty around any of the proposed methods. The long-term trust fund should be based on a high-end estimate of the costs of implementing these procedures.

The DEIS is wrong in stating that rapidly pumping the pit lake full will create a steady state hydraulic sink. DEIS 3-34. The lake would initially be higher than surrounding groundwater, which would cause pit lake water to flow from the pit into the surrounding groundwater. Seepage discharge from the rapidly formed pit lake could degrade the surrounding groundwater. The DEIS does not present groundwater modeling results to estimate the potential for pit lake water to enter the groundwater. As noted, the groundwater model assumes a 1000-ft thick model layer near the pit, which does not allow predictions of inflow from areas with different reactivity. It must therefore be recognized that any such prediction would be highly dependent on near-pit conductivity and recharge estimates, and could be quite inaccurate.

- The DEIS should disclose the groundwater quality impacts of pumping water into the pit to create a pit lake rather than allowing it to form naturally. The DEIS should also disclose how the additional pumping of the production wells will affect drawdown and flows to surface water.

Backfilling the pit is the only mitigation that will prevent long-term pit lake water quality problems and will allow the drawdown cone around the pit to recover. However, the DEIS does not disclose the obvious advantages of doing this. DEIS Chapter 2 mentions twice there is no plan to backfill the pit without considering it as an alternative. Backfilling would cost more, but the environmental benefits could make the plan worthwhile.

The DEIS should consider the following with regard to pit backfill:

- The open pit lake will evaporate water in perpetuity, creating a long-term deficit in the groundwater and causing a drawdown cone that extends to the Ladder Ranch and to Hillsboro. Backfilling the pit will eliminate that evaporation.
- Backfill will also eliminate the groundwater lost to simply fill the pit lake. That is water that flows to the pit from surrounding groundwater and surface water intercepted by the pit.
- Backfilling the pit will lessen pit lake water quality problems. Oxidation of the rock eventually backfilled into the pit could cause groundwater problems, but that could be mitigated by mixing neutralizing material into the backfill.
- To mitigate both water quality and water quantity impacts due to the Mine, the open pit should be backfilled with waste rock pulled from the pit, to at least the level to which groundwater will recover. Reclamation bonding should include the cost of backfill.

3.4 Water Quality Factors Not Considered

Nitrates from Blasting: The DEIS fails to consider that nitrate resulting from blasting can build up on the pit wall or waste rock and be a source of pollution, even though it considers ammonium nitrate as a hazardous substance for storage. The DEIS should add an analysis estimating how much nitrate will be created and estimate the water quality impacts of that nitrate.

4.0 REVIEW OF SUPPORTING DOCUMENTS INCLUDING BASELINE DATA, CONCEPTUAL FLOW MODEL, AND NUMERICAL GROUNDWATER MODEL

4.1 Baseline Hydrologic Data Report (INTERA 2012)

The DEIS refers to INTERA (2012) for baseline hydrology information regarding numerous issues, including a sulfate plume downgradient of the tailings plume (DEIS 3-30), groundwater monitoring wells (DEIS 3-21), pit lake water levels and inflow (Id. and 3-52), meteorology data, environmental characteristics of waste rock (DEIS 3-37), spring flow (DEIS 3-52), etc. The baseline data report assembles the monitoring and test data collected and assembled to develop the CFM and numerical groundwater model. This section reviews aspects of that report to analyze whether the data is ultimately sufficient to develop a DEIS. The conclusion is that the data is woefully insufficient.

Baseline hydrologic data are the data used to develop the conceptual flow model and to calibrate the numerical groundwater flow model. It includes surface water flow rates and chemistry, groundwater levels and chemistry, and aquifer property tests. The surface water baseline data is grossly insufficient because data were collected quarterly for just one year. This is insufficient because it is representative only of the conditions occurring during that year, and because quarterly sampling does not capture adequate seasonal variability.

Groundwater monitoring wells date from 1981 and have collected data intermittently since that time. However, there is no data for describing conditions deeper than about 400 feet near the pit, which will be at least 900 feet deep. The production wells are screened over a thickness near 1000 feet, which makes them useless as monitoring wells or for pump tests. Pump tests provide parameter estimates that represent only a local aquifer scale, whereas flow predictions need parameter values that apply on a regional scale. The report provides no evidence to support the contention that faults are flow barriers. The report also does not provide a water balance for the aquifers. Finally, the existing sulfate plume under the existing tailings is poorly defined, both horizontally and vertically. No evidence supports the idea that it does not extend beyond the fault, and there is little characterization at depth as to whether it has dispersed vertically. For these reasons, the baseline hydraulic data should be revised.

4.1.1 Surface Water Flow and Quality

Las Animas Creek flow rates at a location downstream of the Ladder Ranch boundaries were measured quarterly only from August 2010 to April 2011. INTERA 2012, p 8-3. Quarterly flow measurements are insufficient for characterizing flows in the creek because it is not possible to know on which part of the hydrograph the data comes from. Baseflow is not simply an annual low flow, and estimation requires the separation of runoff from the hydrograph to estimate baseflow. Quarterly data for Percha Creek shows secondary flow peaks in January at some of the stations, but the report fails to explain why that is. It could either be from winter storm runoff, decreased ET from riparian vegetation, or increased groundwater discharge due to seasonal changes. The report does not provide such potentially useful analyses. Additionally, one year of data is grossly insufficient because it does not reflect conditions for wet, dry, and average years.

- Surface water flow data should be collected, at a minimum, on a monthly basis for two years to have a basic understanding of surface flow in the area. The measurements should be correlated to a nearby gaging station for record extension purposes.

The Mine's largest impacts result from changes in surface/groundwater interactions, and spot flow measurements provide little useful data to understand these interactions. It is essential to have piezometers installed in the streambank to assess how the near-stream groundwater responds to changes in flow.

The INTERA report also presents a seepage study in appendix 8-B (Sigda and Tinklenberg 2011) for Las Animas and Percha Creeks (Figure 5). The quarterly measurements on Las Animas Creek noted above, were taken at sites LAC-A (upstream end) to LAC-E (downstream end); on Percha Creek, the quarterly measurements were taken at PC-A through PC-E. Additional detailed seepage studies were completed for sections on each creek denoted by yellow symbols. Detailed seepage studies were not completed west of the red dashed line, including on the stream on Ladder. The studies occurred during a baseflow period when groundwater would have dominated the flow. The Las Animas reach shows two short gaining reaches with longer losing reaches and one dry section. The Percha Creek reach has more stations and more flow variability, which include a couple of significant springs that add flow to the reach.

The seepage study presents depth to water data for five wells near the studied reach on Las Animas Creek, but presents no analysis. The DEIS should show how the well water levels compare to surface water elevations or the elevation of the streambed in dry reaches.

The field parameters in the Las Animas Creek sections follow predictable patterns. Temperature increases from upstream to downstream, with the most increase occurring in losing reaches. The specific conductivity increases from the upstream four to downstream two sections, reflecting evapoconcentration and the fact that the downstream sections included flow through the alluvium beneath the creek. In Percha Creek, the parameters exhibit a substantial temperature change between PC-10 and PC-11, which is a dry reach. Water that reemerges into the creek at PC-11 is much cooler, but then it warms quickly as it flows to PC-12, probably reflecting the solar insulation occurring the day of the study.

The observed flow along both stream reaches is common for reaches in alluvium with gaining and losing reaches often controlled by constrictions in the underlying bedrock geology. It is not very useful for long-term predictions if the DEIS is correct that the water in the alluvium is primarily not connected to the regional groundwater that would be affected by mining. It is also not very useful because it does not provide data for reaches further west which are more likely to be affected by the Mine.

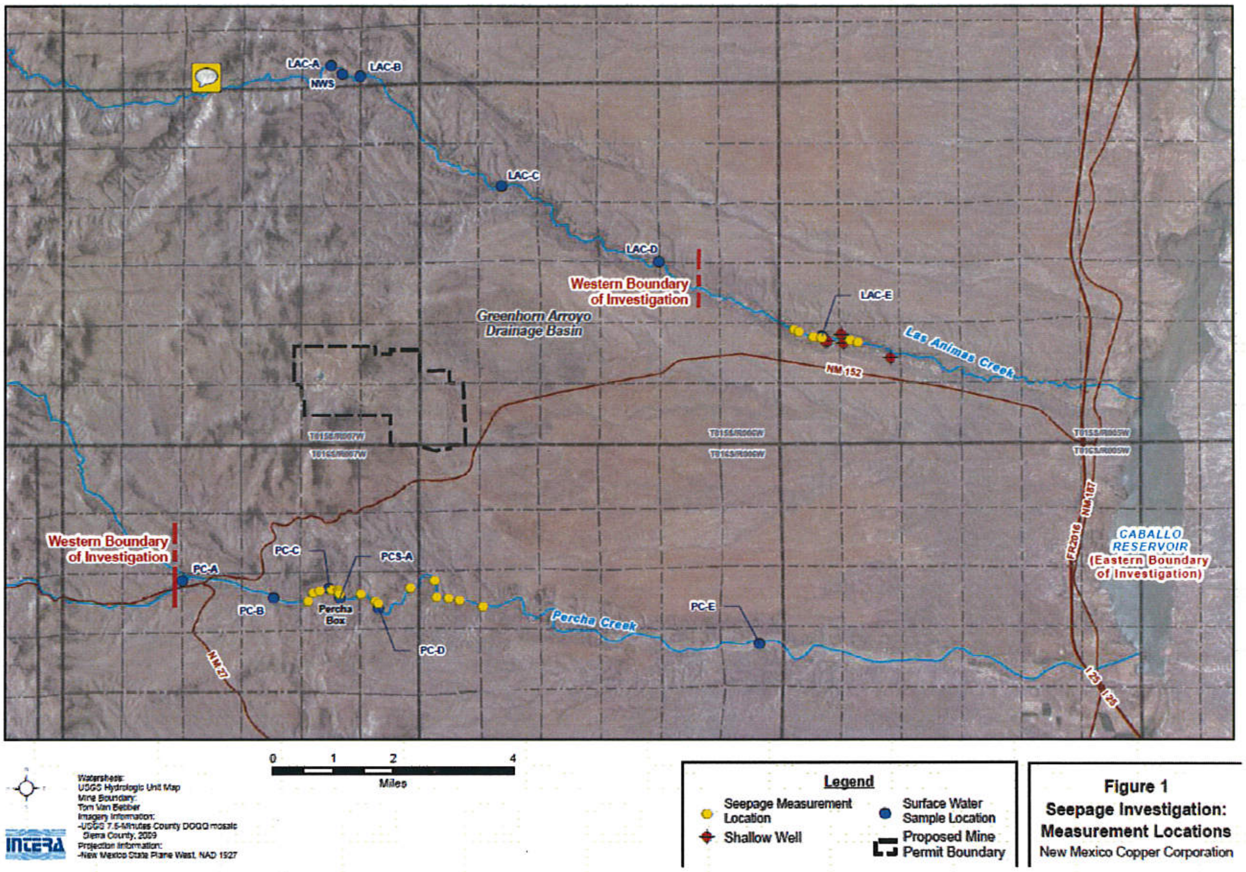

Figure 5: Figure 1 from Sigda and Tinklenberg (2011) showing seepage study reaches along Las Animas and Percha Creek. The quotation bubble in the upper reach of Las Animas Creek is where spring flow enters the creek.

There is more water quality data for three surface sites in Greenhorn Arroyo basin than in the others. This is because BLM and others collected data at up to three sites commencing in the early 1980s when the site was first mined. Site SWQ-1 is a little above the Mine, and SWQ-2 and -3 are short distances below the Mine. There are very substantial increases in TDS and sulfate with time. In general, there are increases in the values between the 1985 and 1991 data; for SWQ-3 there is a significant increase between 1997 and 2010. INTERA 2012, Appendix 8-C. INTERA notes these increases. *Id.* at 8-12. There is no information about the flow rates or why the sample days were chosen. The report simply fails to explain increases in concentration. The Mine is obviously the cause, but there must be leaks or seeps that are causing it.

- Additional flow data should be collected to supplement the Greenhorn Arroyo water quality data. A seepage study should be performed to determine the source of any surface water.

4.1.2 Groundwater Levels and Quality

There are groundwater monitoring wells dating from as early as 1981 at the Mine. INTERA refers to wells with data prior to 2010 as "historic or regional wells" (INTERA 2012, Figure 8-21) and wells with data in 2010/11 as "baseline." *Id.* However, many historic wells are also baseline wells.

There is insufficient data to characterize the deep aquifer properties, groundwater quality and pressure near the Mine pit because none of the wells are nearly as deep as the proposed pit. The lack of information about hydrogeology at depth is especially important because the numerical modeling uses a 1,000-foot thick layer at the pit. This assumes that all properties are constant from the surface down to 1,000 feet bgs. Without wells at that depth, there is simply no data supporting the assumption that 1,000 feet can be considered as one layer.

Of the shallow/deep paired wells, GWQ96-22B has the deepest screen, ranging from 340 to 380 feet bgs. Paired wells GWQ11-24 and 11-25 both show a downward gradient with a difference of 5 to 10 feet between the shallow and deeper screen. The screens on these two pairs are shorter and separated more than for the other paired wells GWQ96-22 or -23, which show essentially no differences between shallow and deep water levels. The four paired wells are all near the pit and the differences can not explain the gradient in just two of the pairs. The best explanation is that the wells without a demonstrable gradient are simply screened over too long of an interval, and that water levels tend to overlap and differences become washed out. All four well pairs near the pit are too shallow to provide adequate information about the deep bedrock, and are screened over too large a thickness to provide adequate detail about vertical gradients, which were observed in two pairs.

- Near-pit monitoring wells are substantially shallower than the maximum depth of the pit and therefore the DEIS has been completed without data for the bottom half of the pit.

Wells MW-2, -4, -6, and -8 in the Santa Fe Formation extend to 1,000 to 1,500 feet bgs, but the upper portion of the screen is shallow, less than 366 ft (at MW-8). These wells, constructed in 1975, monitor water levels and quality east of the tailings in the Santa Fe formation. The length of the screen indicates these wells sample a huge thickness of aquifer, therefore their data is likely useless. Both chemistry and observed water levels are a mix of conditions over a very large aquifer thickness. Water levels are an average of pressures all along the well bore, although the most transmissive layer may manifest the water level. This is similar to the reasons regarding why there are no good gradient differences among the paired wells, as discussed in the previous paragraph.

INTERA compares baseline and historic groundwater quality data to see if it changes the data set and concludes "that the addition of baseline data to the historical data set does not significantly change the data set." INTERA 2012, 8-25. The report does not describe how the statistical comparison was made, but presents Tables 8-12, -13, and -14, which show descriptive statistics of historical, baseline (2010-11), and combined data sets, respectively. These tables are provided in these comments as Figures 6, 7 and 8 for comparison.

Crystalline bedrock wells GWQ96-22A and -23A have substantially higher observations of chloride, sulfate and TDS in the 1990s than in the baseline period. In fact, Figures 7 and 8 show there is a substantial decrease in the values with time. There are only three or four observations during each period, therefore statistical comparison of the periods is not possible. Wells IW-2 and MW-6 show values that have not changed much between the time periods, therefore treating these as the same population is probably acceptable. Wells NP-1 and NP-3 have from 26 to 66 samples in the historic record (Figure 6), but just three in the baseline record (Figure 7). The baseline data tends to be higher than the historic data, although the statistics in Figure 8 are difficult to interpret. Considering that NP-1 and NP-3 are near the downgradient edge of the historic tailings, the increases may be revealing an upward trend resulting from leaks from the tailings.

Table 8-12
Descriptive Statistics of Historical Data

Sample ID	Chemical	Number of Samples	Number of Detections	Arithmetic Mean	Geometric Mean	Standard Deviation	Mean + 2 Standard Deviations	Minimum	Maximum	Upper Confidence Level (95%)	Method of Determining UCL	Distribution
Crystalline Bedrock Aquifer Wells												
GWQ96-22A	Chloride	3	3	66	54	40	146	20	89	NA	NA	NA
GWQ96-22A	Copper	3	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
GWQ96-22A	Sulfate	3	3	210	205	53	316	150	250	NA	NA	NA
GWQ96-22A	TDS	3	3	723	723	40	804	700	770	NA	NA	NA
GWQ96-23A	Chloride	3	3	19	19	3	25	16	22	NA	NA	NA
GWQ96-23A	Copper	3	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
GWQ96-23A	Sulfate	3	3	240	214	148	536	140	410	NA	NA	NA
GWQ96-23A	TDS	3	3	673	652	216	1105	520	920	NA	NA	NA
Santa Fe Group Aquifer System Wells												
IW-2	Chloride	3	3	376	375	35	446	340	409	NA	NA	NA
IW-2	Copper	2	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
IW-2	Sulfate	3	3	1431	1328	712	2854	1000	2252	NA	NA	NA
IW-2	TDS	3	3	2933	2844	932	4798	2390	4010	NA	NA	NA
MW-6	Chloride	2	2	71	70	6	83	66	75	NA	NA	NA
MW-6	Copper	1	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6	Sulfate	2	2	42	41	5	51	38	45	NA	NA	NA
MW-6	TDS	2	2	348	337	124	597	260	436	NA	NA	NA
NP-1	Chloride	53	53	23	23	4	32	15	40	24	Student's-t	NonParametric
NP-1	Copper	26	2	0.043	0.027	0.090	0.223	0.005	0.480	NA	NA	NA
NP-1	Sulfate	53	53	136	135	17	171	86	163	140	Student's-t	Normal
NP-1	TDS	53	53	486	472	153	791	277	1484	522	Student's-t	NonParametric
NP-3	Chloride	64	64	178	122	122	422	26	566	250	Chebyshev	NonParametric
NP-3	Copper	32	3	0.023	0.020	0.008	0.039	0.001	0.050	NA	NA	NA
NP-3	Sulfate	66	66	505	390	296	1096	95	971	375	Chebyshev	NonParametric
NP-3	TDS	64	64	1186	1015	565	2316	360	2460	1519	Chebyshev	NonParametric

Notes:
Historic data were collected 1981 through 1997
NA= not applicable due to entire data set being non-detected values, or not enough data to calculate meaningful statistics

Figure 6: Table 8-12 from INTERA (2012).

Table 8-13
Descriptive Statistics of Baseline Data

Sample ID	Chemical	Number of Samples	Number of Detections	Arithmetic Mean	Geometric Mean	Standard Deviation	Mean + 2 Standard Deviations	Minimum	Maximum	Upper Confidence Level (95%)	Method of Determining UCL	Distribution
Crystalline Bedrock Aquifer Wells												
GWQ96-22A	Chloride	3	3	75	75	6	86	70	81	NA	NA	NA
GWQ96-22A	Copper	3	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
GWQ96-22A	Sulfate	3	3	43	43	9	61	34	52	NA	NA	NA
GWQ96-22A	TDS	3	3	565	565	8	581	557	573	NA	NA	NA
GWQ96-23A	Chloride	4	4	13	13	1	15	12	14	NA	NA	NA
GWQ96-23A	Copper	4	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
GWQ96-23A	Sulfate	4	4	80	49	56	192	6	140	NA	NA	NA
GWQ96-23A	TDS	4	4	754	752	48	850	689	804	NA	NA	NA
Santa Fe Group Aquifer System Wells												
IW-2	Chloride	4	4	550	548	48	645	500	600	NA	NA	NA
IW-2	Copper	4	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
IW-2	Sulfate	4	4	1100	1098	82	1263	1000	1200	NA	NA	NA
IW-2	TDS	4	4	2528	2519	243	3014	2280	2770	NA	NA	NA
MW-6	Chloride	2	2	74	74	1	77	73	75	NA	NA	NA
MW-6	Copper	2	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6	Sulfate	2	2	49	49	0	49	49	49	NA	NA	NA
MW-6	TDS	2	2	462	462	8	479	456	468	NA	NA	NA
NP-1	Chloride	3	3	37	37	2	40	35	38	NA	NA	NA
NP-1	Copper	3	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
NP-1	Sulfate	3	3	143	143	6	155	140	150	NA	NA	NA
NP-1	TDS	3	3	533	533	17	566	514	548	NA	NA	NA
NP-3	Chloride	3	3	277	277	12	300	270	290	NA	NA	NA
NP-3	Copper	3	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
NP-3	Sulfate	3	3	803	803	23	850	790	830	NA	NA	NA
NP-3	TDS	3	3	1680	1679	53	1786	1640	1740	NA	NA	NA

Notes:
Baseline data were collected January 2010 through May 2011
NA= not applicable due to entire data set being non-detected values, or not enough data to calculate meaningful statistics

Figure 7: Table 8-13 from INTERA (2012).

Table 8-14
Descriptive Statistics of All Historic and Baseline Data Combined

Sample ID	Chemical	Number of Samples	Number of Detections	Arithmatic Mean	Geometric Mean	Standard Deviation	Mean + 2 Standard Deviations	Minimum	Maximum	Upper Confidence Level (95%)	Method of Determining UCL	Distribution
Crystalline Bedrock Aquifer Wells												
GWQ96-22A	Chloride	6	6	71	64	26	123	20	89	117	Chebyshev*	NonParametric
GWQ96-22A	Copper	6	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
GWQ96-22A	Sulfate	6	6	127	94	97	321	34	250	207	Student's-t*	Normal
GWQ96-22A	TDS	6	6	644	639	91	825	557	770	719	Student's-t*	Normal
GWQ96-23A	Chloride	7	7	15	15	4	23	12	22	18	Student's-t*	Normal
GWQ96-23A	Copper	7	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
GWQ96-23A	Sulfate	7	7	148	92	127	403	6	410	242	Student's-t*	Normal
GWQ96-23A	TDS	7	7	719	708	136	991	520	920	819	Student's-t*	Normal
Santa Fe Group Aquifer System Wells												
IW-2	Chloride	7	7	476	466	101	677	340	600	574	Student's-t*	Normal
IW-2	Copper	6	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
IW-2	Sulfate	7	7	1242	1191	451	2144	1000	2252	1136	Student's-t*	Normal
IW-2	TDS	7	7	2701	2653	605	3912	2280	4010	2648	Student's-t*	Normal
MW-6	Chloride	4	4	72	72	4	81	66	75	NA	NA	NA
MW-6	Copper	3	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6	Sulfate	4	4	45	45	5	56	38	49	NA	NA	NA
MW-6	TDS	4	4	405	394	98	600	260	468	NA	NA	NA
NP-1	Chloride	56	56	24	23	5	34	15	40	25	Student's-t	NonParametric
NP-1	Copper	29	2	0.039	0.021	0.086	0.211	0.003	0.480	NA	NA	NA
NP-1	Sulfate	56	56	136	135	17	170	86	163	140	Student's-t	Normal
NP-1	TDS	56	56	488	475	149	786	277	1484	523	Student's-t	NonParametric
NP-3	Chloride	67	67	182	126	121	424	26	566	252	Chebyshev	NonParametric
NP-3	Copper	35	3	0.021	0.017	0.010	0.040	0.001	0.050	NA	NA	NA
NP-3	Sulfate	69	69	518	403	295	1109	95	971	684	Chebyshev	NonParametric
NP-3	TDS	67	67	1208	1038	562	2331	360	2460	1531	Chebyshev	NonParametric

Notes:

NA= not applicable due to entire data set being non-detected values

* indicates less than 8 data points, which may not be adequate to compute meaningful statistics and estimates.

Figure 8: Table 8-14 from INTERA (2012).

INTERA discusses artesian wells in section 8.2.4.4. There are many of these wells in the lower Las Animas Creek, as shown on Figure 8-32. Although the flow rate appears to be decreasing with time, probably due to the wells being allowed to discharge continuously (INTERA 2012, 8-32), the flow rate discharging from a few artesian wells (Figure 8-36), magnified by a total of 61 such wells, indicates a substantial flow through the aquifer. INTERA suggests that hydrogeologic zone 2 is a recharge zone "where Las Animas Creek and alluvium can readily recharge the regional aquifer." INTERA 2012, 8-31. Figure 8-33 shows this to be a relatively short reach, labeled as "potential recharge zone for artesian wells." If correct, this zone will not only recharge the artesian wells, but it will also support flow into the Rio Grande. There is no justification that sufficient water could recharge the aquifer through this small zone to support most of the flow in the artesian wells. INTERA presents no data to support this conceptual model. Supporting data or analyses should include an estimate of how much recharge would be needed to support the estimated discharge. If recharge, as postulated by INTERA, is insufficient to support the discharge, major parts of the conceptual model for the Mine is flawed.

- INTERA should do a water balance of the Santa Fe aquifer, which includes flow to the wells and flow to the river, to estimate the recharge. If the estimated recharge is unrealistically high, INTERA should identify areas further upstream that would be necessary to provide the recharge. If it is unlikely that recharge in this area supports the discharges, then flow from upstream would be necessary (but this would counter the conceptual model that the faults are a barrier).

4.1.3 Hydrogeology

INTERA divides the study area into three hydrogeologic regions: the Palomas graben, the Animas uplift, and the Palomas basin, in a west to east direction. This basic subdivision of regions holds through the conceptual flow model and the numerical model, with additional subdivisions for the Palomas graben and alluvial aquifers.

Groundwater Contours: The groundwater contour map, INTERA Figure 8-14 (reproduced as Figure 9 herein) shows a west to east gradient through the study area, with contours affected by topography, aquifer permeability, and the elevation of discharge points (such as the river and creeks). Low permeability in the Animas uplift generally, and the andesite around the Mine, diverts groundwater flow from the west around the pit area north and south to Las Animas Creek and Percha Creek, as indicated by the mounding (Figure 9). INTERA suggests that the groundwater mound shows how the andesite diverts groundwater into the creeks. There are springs in the upper part of Las Animas Creek that could result from flow diverted northward, but the springs could also result from local recharge in the graben (the area of which INTERA Figure 8-12 indicates is much larger in the Las Animas watershed). Understanding these flow paths is essential to modeling and predicting the effects of the Mine, but INTERA falls far short of supporting its hypothesis.

- INTERA should support its suggestion by completing a groundwater balance for the graben area and the Animas uplift to assess whether springs are a significant part of the water balance.
- INTERA should also consider geochemistry and isotopes in the springs in Las Animas Creek to determine whether flow actually does divert in that direction.

The groundwater contour map (Figure 9) shows a substantial west to east gradient through the andesite and Mine area that could reflect more groundwater flow than accounted for by INTERA (and the DEIS). If the analysis is wrong, there can be substantially more dewatering for the pit than estimated. Its effects on the drawdown cone will depend on aquifer properties. The DEIS simply does not have adequate hydrogeologic data to support its conclusions regarding the effects of dewatering. The wells are not deep enough to provide sufficient data concerning the properties at depth.

The groundwater contour map (Figure 9) also does not support other ideas presented by INTERA and assumed in the CFM:

- There is no evidence that faults are flow barriers. A flow barrier would cause a steplike shape in the contours, which is not present in Figure 9.
- The contours do not indicate flow from the north enters the study area domain, as INTERA (and Jones et al. 2012) suggest occurs.

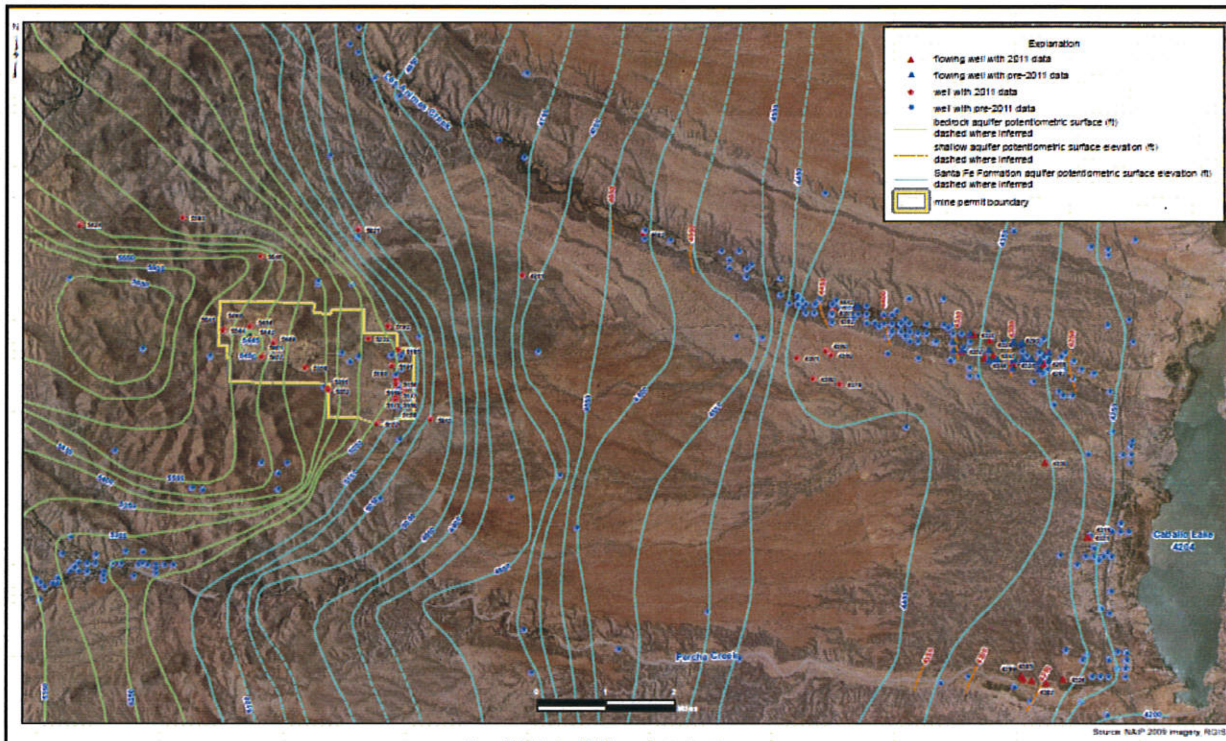

Figure 8-14. Regional 2011 groundwater elevation contours.

Figure 9: Figure 8-14 from INTERA (2012) showing actual 2011 groundwater contours.

Faults: INTERA suggests that there is "a north-to-south-trending fault … [that] acts as a barrier to groundwater flow east of the tailing impoundment dam." INTERA 2012, 8-21. The contour map does not support the presence of this fault. In fact, INTERA presents data that contradicts the idea of a fault as a barrier. The water surface profile in section TA-TA' (INTERA Figure 8-17) does not show a step or any kind of discontinuity as expected if the fault were a barrier. There are no springs identified with the fault which would indicate a barrier, because if flow cannot cross a fault it must flow somewhere to a discharge point. Often that is vertically to a spring or laterally to the point where the fault intersects a canyon and groundwater discharges. Therefore, INTERA presents no evidence that the faults are flow barriers.

Conductivity: Varying lithology and flow barriers (INTERA 2012, p 8-20) indicate there is preferential flow through the Santa Fe Group sediments. The variability in reported conductivity shown by INTERA supports the idea of highly transmissive areas. The modeled parameter zones do not reflect such preferential flow, as discussed in the modeling section of these comments.

INTERA estimates conductivity for the crystalline rock aquifer near the pit/waste rock dumps, and the Santa Fe Group aquifer from the tailings impoundment east to the river. The estimates represent very small sections of their respective aquifers, but the authors ignore important scale factors. In general, the representative volume is the amount of water pumped, divided by the effective porosity (Schulz-Makuch et al. 1999); this effectively means a sample volume, including all pore spaces affected by the pumping. Short-term tests represent properties only over a very small volume. Figure 10 shows an example from the literature of variability for a fracture-flow media, the type of media that controls the flow near the pit. Hydraulic conductivity varies over seven orders of magnitude in the example, depending upon the volume of the aquifer represented in a given test.

Schulz-Mackuch et al. (1999) present data from other fracture flow examples. Single-well tests with water removed over only a few minutes presented in App B would have volumes similar to those presented for packer tests in Appendix B Figure 2. The conductivity represented in that figure for those tests is about four orders of magnitude less than that observed at the point where the relation becomes stable. Becoming stable means that conductivity is relatively constant, even as volume is added to the sample for which K is being estimated. This is tantamount to the relative elemental volume concept, which is the volume at which the effective porosity no longer changes as volume is added to the sample (Bear 1979). However, if sufficient additional volume is added to the sample, the conductivity will again vary with volume because it will begin to include an influence from surrounding formations.

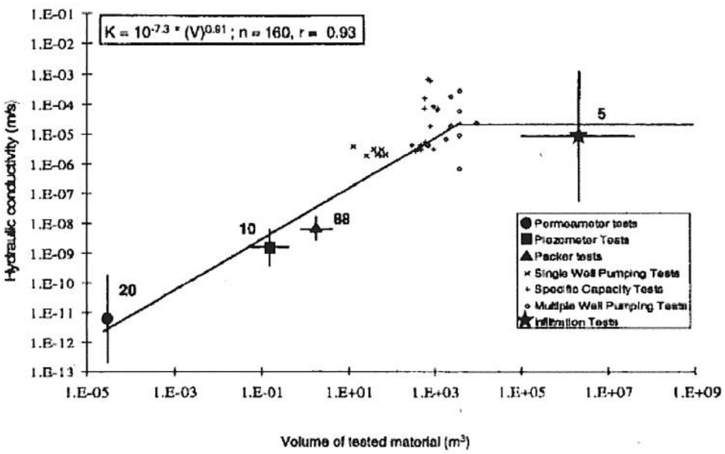

Figure 6. Relationship of hydraulic conductivity to scale of measurement in the Racine Formation of the carbonate aquifer of southeastern Wisconsin. Permeameter, piezometer, packer, and passive infiltration tests were plotted as geometric means with 95% confidence intervals; pumping tests and specific capacity data as single values. Number of observations are given adjacent to means. Passive infiltration tests are derived from the infiltration of Lake Michigan water into the Racine Formation due to the construction of a sewage tunnel. The regression line is derived from all individual values (n = 160) below the infiltration scale. The 95% confidence interval about the slope is 0.91 ± 0.06, and r is the correlation coefficient.

Figure 10: Figure 6 from Schulz-Makuch et al. (1999) showing the variation of hydraulic conductivity with volume of material used for testing. The Racine Formation is a fracture-flow formation and is used here only as an example of the variability.

From the perspective of flow and transport prediction (as needed near the pit and waste rock dumps), small-scale properties control local flow while the larger-scale measurements control regional flow, which can be estimated without understanding localized details. A mine that intersects and excavates significant portions of a formation affects flow at a regional level, and therefore the modeling requires property measurements at that scale. The short-term tests in the crystalline bedrock presented by INTERA are not relevant at a regional scale.

- Most of the hydrogeologic properties estimated for the DEIS are for a small-scale and yield conductivity values that are much too low for regional flow analysis. This causes the DEIS to predict impacts limited to the areas closer to the Mine.

The existing pit presents a natural long-term, large-scale pump test that could provide transmissivity estimates relevant to regional flow. Evaporation from a pit lake, combined with groundwater flow into the pit lake, creates a hydrologic situation similar to a large-diameter well; and data from it and surrounding groundwater could be used to estimate conductivity. The pit lake covers approximately 5.2 acres and contains about 60 af of water. INTERA 2012, 8-14. The volume is variable, as demonstrated by the depth variation from about 35.8 feet in January 2011 to 28.9 feet in July 2011. *Id.* INTERA reports that average annual precipitation is about 13 in/y, and estimates average lake evaporation to be from 58 to 65 in/y. INTERA 2012, 2-1. Assuming that half of the precipitation becomes runoff and that an area equal to the area of the pit lake drains to the lake, the average runoff to the pit is 2.8 af/y. Direct precipitation would contribute 5.6 af/y, while evaporation at 61 in/y would remove 26.7 af/y. A steady state water balance would require 18.2 af/y of groundwater inflow. The volume and area result in an average depth of 11.5 feet and radius of 268 feet. This yields a circumference of 1,688 feet and cross-sectional area of 19,500 ft^2. The conductivity for flow through this area would be 0.11 ft/day, which is about 1.5 to 2.0 times greater than the estimates in INTERA (2012) Table 8-20, with one exception. This is an example of the scale issues discussed above in these comments.

4.1.4 Existing Sulfate Plumes

The existing Mine created a tailings dam during the 1980s, just downhill from the pit. The impoundment was not lined and it "created a groundwater mound and discharges of increased sulfate and TDS to groundwater." INTERA 2012, 8-34. Figure 11, herein, shows a section through the impoundment with a plume under the tails but stopping at a fault. The text suggests that clay layers "act as vertical barriers to groundwater flow," that the "plume appears to be stable," and that "downward migration is limited by a barrier boundary fault." *Id.* There is no data to support these statements because, as shown in Figure 11, there are no wells downgradient of the fault that could show either water quality or hydrologic data in support of the fault as a barrier claim. Some of the wells show slightly higher concentrations in 2010 than during the 1990s, suggesting the concentrations are not really "stable."

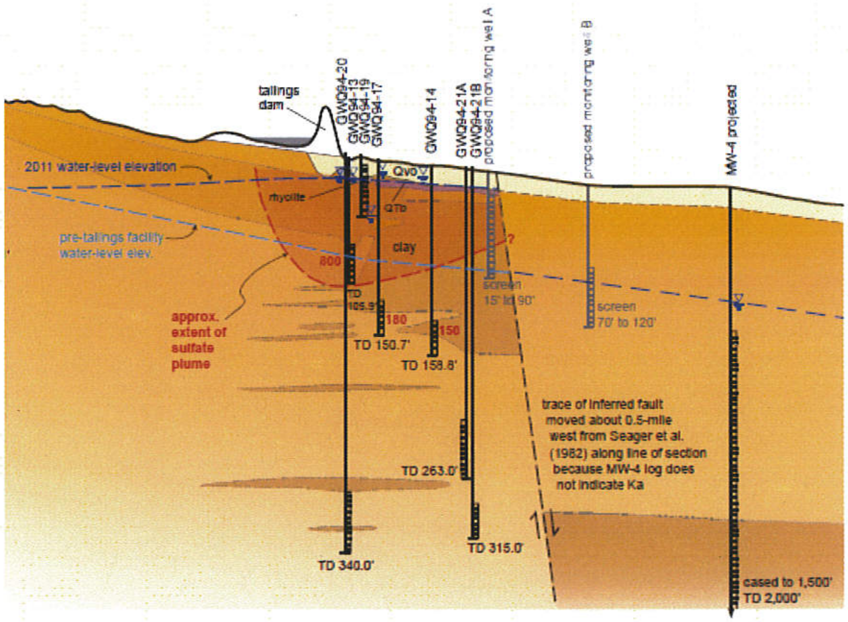

Figure 11: Snapshot of a section of a portion of Figure 8-17 (INTERA 2012). The figure shows a section west-east through the existing tailings impoundment, including a sulfate plume emanating from the tails.

The cross-section figure also misrepresents the vertical extent of the plume. Wells GWQ94-21A and -21B are beneath the plume, but have sulfate concentrations at 120 mg/l. Even the deeper well GWQ94-20 has concentrations as high as 56 mg/l, although the last observation was in 1996. It should have been sampled during the baseline sampling period to estimate whether its concentration has increased. If the fault prevents or limits eastward flow and there is a mound under the tails, it is likely there is a downward gradient beneath the tails and west of the fault. A downward gradient would drive downward vertical flow so that contaminant advection and vertical dispersion could cause sulfate concentrations to increase at depth.

- In summary, the sulfate plume under the existing tails is poorly defined, both horizontally and vertically. No evidence supports the idea that it does not extend beyond the fault and there is little characterization at depth as to whether it has dispersed vertically. There is not sufficient information to make predictions regarding the future of the plume, with or without an action alternative.

JSAI (2013) also addresses the flow and transport conditions around waste rock/millsite and the tails. It presents monitoring results from two quarters in 2013. "The fault mapped by Beaumont (2012) is a barrier boundary to groundwater flow and is supported by hydraulic response in monitoring wells east of the TSF and groundwater flow model calibration." THEMAC (2013); JSAI (2013), 10. This statement is false because the monitoring wells are all west of the fault, which makes it impossible to compare responses and conclude the fault is a barrier. JSAI also suggests "the groundwater elevation in the andesite is slightly higher than the bottom elevation of the alluvium in Grayback Arroyo, and the alluvium is gaining groundwater from the andesite." *Id.* JSAI, however, presents no well data to support the contention of higher groundwater elevations.

The contours in JSAI Figure 5 show crenulations that would exist if the groundwater elevation was higher and groundwater actually discharged into the alluvium, but there is no well data to support the placement of these crenulations. The alluvium of Grayback Arroyo could act as a hydraulic drain, but the referenced Figure 6 does not provide evidence in support of that. JSAI states that downgradient of GWQ-1 (east of it) the "hydraulic gradient steepens as a result of the barrier boundary effect of the East Animas Fault Trend." *Id.* Figure 12 contained herein, is a snapshot of a portion of JSAI (2013) Figure 5, and shows the steepened contours between GWQ-1 and the fault, but fails to show monitoring wells to support the location of the contours. In fact, if the fault is a barrier, the groundwater table west of it will be flat due to a backwater effect, just as water ponds upstream of a dam. The steep gradient will occur as a change across the fault, not on one side of it.

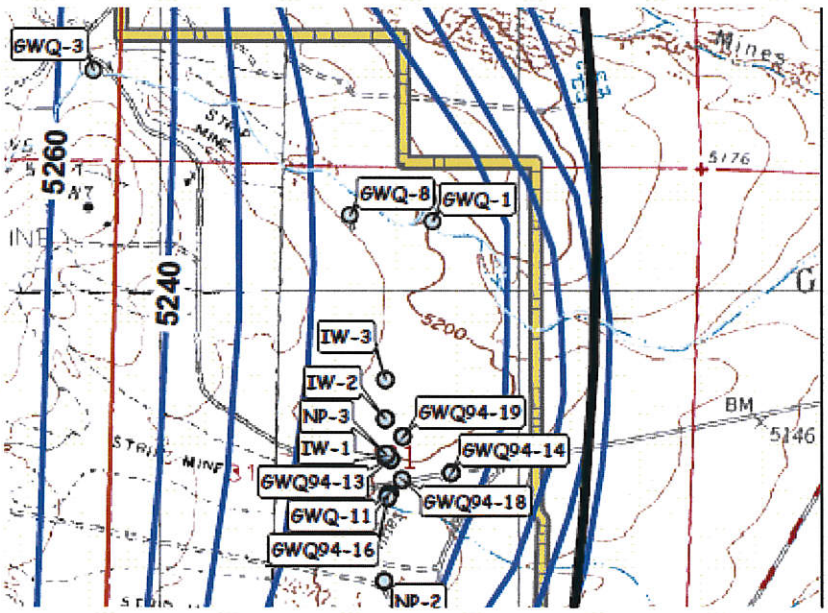

Figure 12: Portion of Figure 5, JSAI (2013), showing groundwater contour details near the existing tailings impoundment.

Incidentally, the various reports have different locations for the East Animas Fault. JSAI (2013) shows the fault east of the east property boundary, whereas Jones et al. (2013) show the fault as much as half a mile further west, albeit as inferred (Figure 4.3, Jones et al. 2013); the same figure shows another fault just east of the property line in roughly the same location as the East Animas Fault in JSAI (2013). Discussion on JSAI (2013) page 18 suggests there is a difference of opinion regarding the exact location.

Monitoring wells in the pit area show very high concentrations of some constituents, with many values far exceeding groundwater standards (JSAI 2013, Table 5). Sulfate concentrations were as high as 23,800 mg/l at GWQ11-25A. The shallow well, of paired wells GWQ11-24 and -25, has much higher concentrations of most constituents; although the deeper well also has numerous exceedances of standards. Also, concentrations at wells GWQ96-22 and -23, although geographically mixed with the GWQ11-24 and -25 wells, are much lower, which probably reflects the high level of mixing which would occur with their longer well screens.

4.1.5 Baseline Report Specific Comments

INTERA states that the Percha Shale "likely prevents groundwater movement up into the creek and eastward ... Most of the water in the western, upstream portion of Las Animas Creek likely discharge to the surface west of the Animas Uplift." INTERA 2012, 8-2. The document describes the location of the Percha Shale in comparison to a township boundary (Id.) rather than showing it on a map. The regional geology map (Figure 7-1) also does not show the shale. Without data and without showing the location of the shale, INTERA's claim regarding groundwater movement is not supported.

4.1.6 Summary of Baseline Data Report Review

The baseline data report INTERA (2012) presents insufficient data to develop the modeling used for assessing the Mine's impacts. There simply are not enough monitoring wells, especially at depth, to parameterize a model around the pit or to support conceptual flow modeling around the production wells. The surface water sampling was completed too infrequently and for too short of a time period. Additionally, the characterization of the existing sulfate plume does not utilize all available data. There also are no groundwater level observations on the Ladder, nor streamflow measurements on Las Animas Creek (at least since 1967).

The lack of sufficient baseline data for the analyses in the DEIS is a strong reason for BLM to either revise or supplement the DEIS with data.

4.2 Conceptual Flow Model

A conceptual flow model ("CFM") is a qualitative description (but quantitative where possible) of groundwater flow sources and sinks, and the paths the flow takes through the aquifers. A CFM describes the geology, material properties, and geologic structures that affect the flow. The CFM relies on testing done in INTERA (2012) for the estimation of material properties.

The DEIS also relies on Jones et al. (2012) for a major part of its CFM description, but it refers to the CFM report as two separate references: "JSAI 2012" and "Jones et al. 2012." The same problem occurs for the first numerical model report, referred to interchangeably as "JSAI 2013b" or "Jones et al. 2013"; see also the DEIS reference list and the various references throughout the DEIS.

This section of my comments discusses a key aspect of the CFM, which is an estimate of the water balance for the aquifer. Though the CFM estimates recharge, it uses methods that are inappropriate for the area. Furthermore, the report does not attempt to balance the recharge with a discharge estimate. This section also reviews the parameter estimates for the formations in the model domain, including the pump tests.

4.2.1 Water Balance

A key aspect of a CFM is the water balance. To model groundwater flow, it is necessary to estimate the water balance for the aquifer(s), including recharge, inflow/outflow through aquifer boundaries, and groundwater discharge to streams and ET. A transient water balance will include a change in groundwater storage.

Potential ET is the total ET that will occur if water is not limiting, and Jones et al. (2012) note that Penman-Monteith equations are usually used for the estimate (Jones et al. 2012, p 4). The report indicates that actual ET is less than potential ET "depending on sun and wind exposure, ground conditions, and availability of water." *Id*. The report incorrectly equates actual ET to "actual evaporation from an open water surface" (Id.); this is improper because, by definition, an open water surface is not water-limiting.

Section 3.2 (Jones et al. 2012) discusses "runoff and recharge" estimates based on three recharge estimation methods: Bennet and Finch (2002), Maxey and Eakin (1949), and BLM (2000). Presumably, the inclusion of runoff with the recharge estimates implicitly assumes that runoff becomes recharge at some point within the watershed.

These methods have many problems as applied to the Mine:

- The Bennet and Finch (2002) study was never published, much less peer-reviewed, which means there can be no confidence in its estimates. It is simply an abstract for a presentation at a Geological Society of America Conference.
- The Maxey-Eakin method ("M-E method") was developed based on closed basins in eastern and central Nevada, not dry basins in southern Nevada as claimed by Jones et al. Jones et al. 2012, 8.
- The M-E method has been used extensively throughout Nevada and Great Basin/Basin and Range portions of surrounding states. The Mine is far from the area for which it was developed.
- The M-E method depends on use of a 1936 precipitation map for estimating basin-wide precipitation. The method was developed by relating estimated discharge, generally ET from playa wetlands and springs, to precipitation amounts estimated by precipitation depth bands. The bands resulted in 0.03, 0.07, 0.15, and 0.25 estimates of the proportion of rainfall that becomes recharge for the annual precipitation zones 8 to 12, 12 to 15, 15 to 20, and greater than 20 in/y (inches per year), respectively. It is critical that the precipitation estimate result from original mapping because precipitation estimates from any other method, including direct measurement, will change the base population of data and is not appropriate.
- The BLM (2000) method is based on the M-E method, therefore it has similar limitations with respect to being used with a different set of precipitation data. Having been developed for an EIS over 15 years ago, the document itself is not available for review.
- All methods that relate recharge simply to precipitation ignore a basin's geology and other characteristics that affect the amount of precipitation that actually becomes recharge.

The CFM does not discuss how these recharge methods are used for the CFM. The numerical model shows recharge zones in inches per year. This will be discussed below.

The limestone north and south of the andesite near the Mine likely receives more recharge than the andesite, but the report indicates that the recharge includes "infiltration of runoff from Las Animas and Percha Creeks that was generated at higher elevations" and indicates that from the limestone, "groundwater discharges as spring flow and base flow to Percha and Las Animas Creeks." Jones et al. 2013, 17. It is not possible for the creeks to be both source and sink across the short distance they flow across the uplift.

The CFM hydrogeologic boundary conditions (Figure 4.6, Jones et al. 2012) show a zone of direct recharge, and implies stream channel recharge only in the upper reaches of Las Animas Creek. It suggests there is no recharge in the lower portions of either creek. The direct recharge zone appears to include only the bedrock outcrop portions of the Animas uplift and all of the mountains west of the uplift. All of the recharge appears to be west of the faults, which may act as flow barriers.

The key to estimating recharge in the area is to estimate discharge from the area. In a steady state, with storage changes assumed to equal zero, it is possible to estimate average recharge if there are other estimates of discharge (Cherkauer 2004). The discharge estimates available for these watersheds limit estimates to "runoff and recharge" (Table 3.6, Jones et al. 2012) because the estimate for discharge from the basins depends on the water balance for Caballo Reservoir; after accounting for precipitation onto the lake and Rio Grande River flow, the remainder is flow from the basins west of the reservoir, but it is not possible to separate out groundwater and surface water flow.

- The key to estimating recharge from the area is to improve the estimate of discharge. Methods of Myers (2013) would be useful for this. Myers (2013) estimated bank storage in Lake Powell using estimates and measurements of all other sources of inflow and outflow to the reservoir. Similar methods would yield unmeasured inflow (the groundwater discharge to the reservoir) to the Caballo Reservoir.

4.2.2 Pump Tests

The CFM report provides more detail about the pump tests which had been reported in the baseline report. The CFM report also has essentially been added to the numerical model report Jones et al. (2013).

During previous mine pumping in the early 1980s, Jones et al. (2013) indicate that water levels at well MW-5 drew down about 20 feet due to project pumping (or from 2,000 to 3,000 gallons per minute, or "gpm"). Figure 5.8, however, shows just two well level observations during the period. The first one appears to be early during the mine pumping, therefore it may not capture the full drawdown to eventually result from the pumping. The second one appears near the end of a period of much reduced pumping (at 40 gpm). It has recovered from the drawdown of the earlier observation by about seven feet. This 40 gpm of pumping is significantly less than the project pumping and that almost full recovery could have been possible. The 20-foot drawdown used for calibration at this well is not representative of a full response to production pumping.

The authors also suggest there is no response to pumping at well MW-6, which lies west of the well field, although there has been a slow rise of 170 feet over 30 years. The authors quote a source "the anomalous highs to which the water level recovered indicated that the well was being recharged by an unknown source of water (either perched water or possibly slow seepage up the well bore from the sand stringers underlying the clay layer) and that the aquifer materials were too plugged with drilling mud to allow this water to move freely into the formation." Jones et al. 2013, 31. This may be a reasonable explanation and may counter any drawdown effects of the production well pumping. However, "As MW-6 was pumped, the well slowly developed and became hydraulically connected to sodium-chloride groundwater locally upwelling along an extensional fault zone." *Id*. This sentence is not clear because there is no information about when or how much MW-6 was pumped. Therefore it is not reasonable to claim the pumping had no effect at this well because of these influences. This well level data provides no useful information for calibration and should not be used.

4.2.3 Production Wells

Production pumping for the Mine will cause the largest change to the natural water balance. The production wells are about 8 miles east of the proposed mine in a segmented aquifer bounded by faults both east and west. DEIS Figure 3-10. This segmented aquifer is the Palomas Graben and has a large impact on how the production pumping affects groundwater resources. The drawdown cone is "elongated north-south due to the effect of faults to the west of the supply wells and clays in the aquifer to the east." DEIS 3-76.

Five factors contribute to the DEIS disclosing minimized impacts due to pumping:

- Faults bounding the aquifer;
- High transmissivity in the aquifer within the graben;
- Very low vertical anisotropy in the graben, allowing easy vertical movement of groundwater to meet the production pumping demand;
- Modeled flow allowing water to enter the Palomas basin only into the graben; and
- Clay layers in the alluvium preventing the propagation of drawdown from depth to affect the streamflow.

The DEIS notes that "static water levels in … project well field were 25 to 50 feet lower than the water table in the Las Animas alluvium." DEIS 3-65. The DEIS suggests that the alluvial water is perched and "has quite limited hydraulic connection to the main aquifer." *Id.* Therefore, the effects of production pumping on the creek will be limited. DEIS Figure 3-9 shows the production wells are about a mile from the creek, hence the difference in water levels is not that substantial and do not prove the alluvium is perched.

The DEIS claims a clay layer "serves as a perching horizon that would isolate flows in Las Animas Creek from effects of pumping of the mine supply wells." DEIS 3-63. The DEIS claims the clay "is demonstrated in well logs and in aquifer test results," (Id.), and that the clay "is responsible for the artesian conditions found in many wells between the supply well field and the Rio Grande." *Id.* The DEIS also attributes the very limited simulated effects to Animas Creek to the clays. *Id.* at 3-75.

4.2.4 Summary

The CFM is inaccurate because it fails to complete an accurate water balance estimate. Rather than estimate recharge with an inaccurate method, the CFM should include an estimate of steady state discharge to the streams, to the Rio Grande, and to ET. The CFM should then set recharge equal to discharge. Using estimated parameters of the geology and soils in the project watersheds, the CFM should establish in general the locations for distributed recharge in the watershed. If the geology is too impervious for all of the recharge, the CFM should estimate recharge through the stream bottoms. These estimates must be supplemented with streamflow measurements to identify recharging reaches.

There are also serious conceptual errors in the description of the graben from which the production wells withdraw water. There can be no confidence in the CFM without data describing the conductance of the faults, the transmissivity of the aquifer within the graben, or the source of water in the graben.

There is also no data to support the CFM's suggestion that clay layers prevent the pumping from drawing water from Las Animas Creek.

The next section of these comments describes the numerical flow model, which is based on the CFM. Because the CFM has basic conceptual problems there can be no confidence in the predictions that result from the numerical model. For this reason, BLM should either revise or supplement the DEIS to present an updated and more accurate CFM for use in revising the numerical model.

4.3 Numerical Flow Model

The Mine site and production well site are numerically modeled using a version of the USGS code MODFLOW by Jones et al. (2014, 2013). It is a "version" of MODFLOW because it has some proprietary alterations to the code, which I review below.[4] BLM provided MODFLOW files for the model (through a FOIA request; such files were not made available when the DEIS was released to the public), which allowed me to examine the structure of the model within graphical unit interface (GUI) GWVistas. I did this by importing the MODFLOW files as provided. This was very useful in interpreting the model structure because Jones et al. (2014, 2013) is a poor description of the model structure. However, because of the proprietary packages, GWVistas had difficulty interpreting the river and lake files. I was also unable to run the model without having the proprietary routines. Additionally, although BLM provided output files, they are in standard MODFLOW text format which was difficult to review.

The numerical model implements the CFM, therefore errors in the CFM (described above) become errors in the numerical model. Also, there are appropriate methods for describing the model domain and simulating aspects of the CFM. This section discusses how the numerical model uses methods that are far less than optimal. It also describes the basic model structure and calibration.

Model structure includes the size and discretization of the model domain, which are inadequate for simulating pit drawdown or production pumping. Model structure also describes how the geology of the area is included in the model, including the different geologic formations and faults. These factors are included in a very coarse way, thereby decreasing the accuracy of the simulations. This section also describes the model boundary conditions, including discharge to rivers and to ET and recharge, and how they are inappropriate for the DEIS model. Overall, this section points out the inaccuracies with the model structure which lead to underestimated impacts of the Mine.

Additionally, the model calibration relies on data collected in the baseline report, which is insufficient to accurately calibrate the model in a steady state mode. The transient calibration is based on short-term pumping in the 1980s (when the Mine had previously operated), and on pump tests that are representative of only a small portion of the model domain. The transient stresses used for calibration are far too small to calibrate a model intended to simulate the stresses expected from the Mine development. There is effectively no transient data used to calibrate the model near the pit.

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[4] MODFLOW is a package of routines that solve the various equations of groundwater flow. Special packages have been written to simulate aspects of flow, such as the interactions of groundwater and surface water. The code is public and written in Fortran, and it is generally acceptable for a user to add packages or routines. However, packages not written by the USGS have not undergone the same peer review as the USGS packages.

4.3.1 Model Discretization

MODFLOW solves the equations of groundwater flow based on three-dimensional rectangular cells. The model calculates a water balance among all model cells simultaneously, with changes in groundwater storage being changes in the water table or potentiometric surface. Model discretization refers to the size of the cell, which can vary through the model domain; calculations are more precise for smaller cells, but require more memory and time. The cells are rectangular, defined by a grid specified for the entire model domain area. Figure 13, herein, shows Jones et al.'s model grid. The detailed grid centers on the Mine site where the spacing is just 200 feet in both direction. *Id.* The grid increases to 1320 foot spacing away from the Mine. The model grid does not intentionally have a detailed grid for the production well field, meaning calculations near the production wells are less precise than near the pit. The well field intersects the finer grid east of the Mine site (Figure 13), resulting in cells near the production wells being 200 by 1,320 feet.

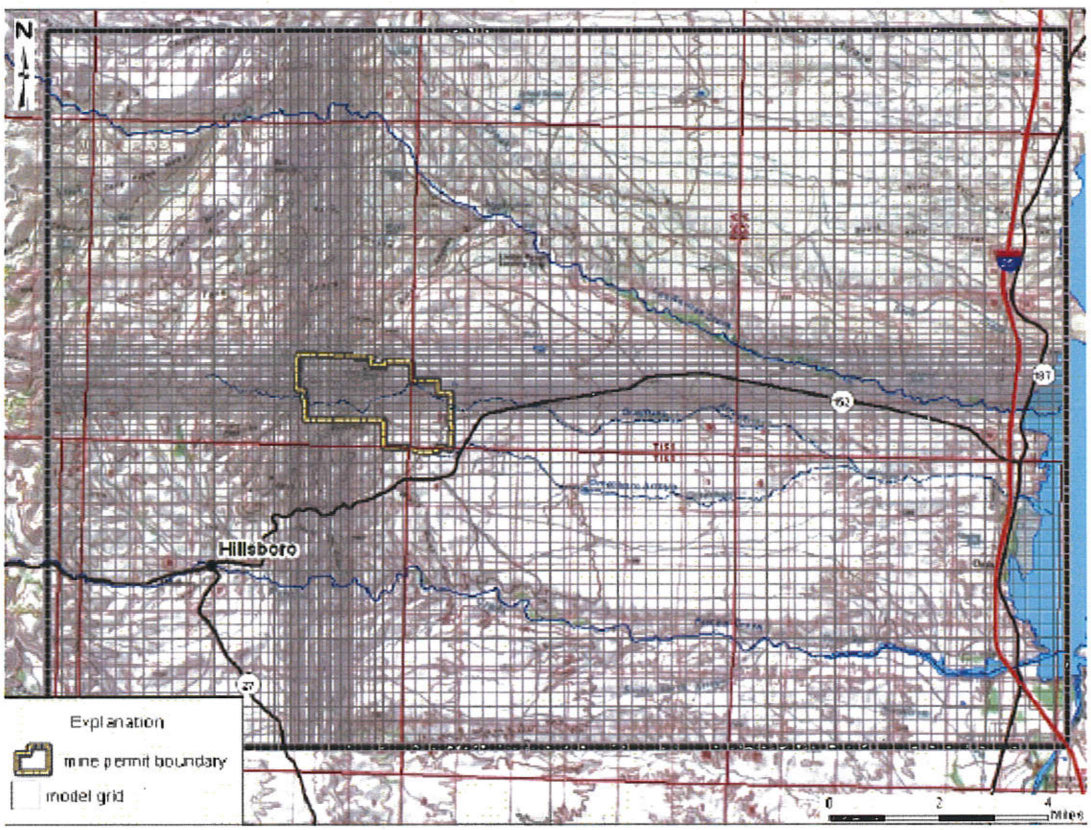

Figure 6.1. Model domain and grid.

Figure 13: Figure 6.1 from Jones et al. (2013) showing the horizontal discretization for the Copper Flat model.

Vertical discretization refers to the thickness of layers. Jones et al. (2013) is not clear on layer thickness. Jones et al. (2013) Table 6.1 provides modeled aquifer properties that include a column for saturated thickness by layer. This is not the same as layer thickness for unconfined aquifers for which the saturated thickness will vary. Jones et al. Table 6.1 specifies widely varying thicknesses by hydrogeologic unit; either 200, 500 or 1,000 feet for layer 2. Layers 3 and 4 have thicknesses by unit equaling either 1,000, 2,000, or 3,000 feet. Layer thickness can vary spatially, but the thicknesses as specified in Table 6.1 imply discrete values which will lead to changes in thickness by block. Viewing the model structure using GWVistas facilitated visualizing the model in three dimensions, as shown in Figure 15 below.

The head calculated for each cell can be assumed to apply through the entire layer thickness. No vertical gradient can be estimated through a given model layer. Vertical gradient is the difference in head between adjacent layers. When layers represent different units, the model simulates flow only among units, but not variably within units. If there is a reason to expect variation in vertical flow within a unit, a unit may be divided into two or more layers, but this is not done here, even though paired wells (discussed above) indicate the presence of vertical gradients within formations.

- The DEIS model fails to consider vertical gradients over large aquifer thicknesses. This can result in failing to consider flow losses to ET or to the stream.

Model layer 2 is 1,000 feet thick, and is "where pumping impacts will be concentrated." DEIS 3-67. It is the uppermost layer in most of the model domain, which means the specific yield ("Sy") is applicable over the entire 1,000 feet. Modeled Sy in most materials is 10% or a little less. If the layer thickness includes the entire formation no vertical gradient is simulated within the formation.

- Thick units only have horizontal flow under natural or steady state conditions, but significant stresses may impose vertical gradients within a formation.

Mine dewatering is a significant stress because it lowers the water table by hundreds of feet. Mine production pumping also imposes a significant stress because it significantly changes the water budget of an aquifer unit. The model layers are likely too thick to accurately simulate significant drawdown near the Mine pit.

- At the least, model calculations of groundwater level using just one model layer are fraught with water balance inaccuracies.

Layer 2 in the andesite near the pit is 1,000 feet thick. This means the model does not consider variable transmissivity near the pit, nor can the model estimate different dewatering rates for different formation layers. When the pit lake is forming the model cannot determine different flow rates into the pit lake from different levels. Having groundwater enter the pit lake from a 1,000-foot vertical section is a gross and unreasonable assumption of homogeneity near the pit. For example, it will not allow an estimate of flow levels with different geochemistry. The data developed from this model does not provide accurate estimates of the source of flow to the pit lake.

- Vertical discretization near the pit is nonexistent with a 1,000-foot layer thickness. This renders the calculations of dewatering inaccurate and makes it impossible to estimate the source of groundwater flowing into the pit. Any pit lake modeling based on this will be inaccurate and probably underestimate the toxicity of the pit lake because areas with more-reactive rock will be ignored.

4.3.2 Model Parameters

Jones et al. (2013) specify model properties by zone, with different zones for different hydrogeologic formations. Figure 14, herein, shows the zones for layer 2; layers 3 and 4 are similar. Figure 15, herein, shows a screen capture from GWVistas of the steady state input file. Specific property values are initially estimated based on previous information, such as aquifer tests, and by calibrating the model, as critiqued below. Specified horizontal conductivity values (in Table 6.1, Jones et al. 2014) are reasonable based on the previous information given in the baseline report; however, a groundwater model usually has conductivity a couple orders of magnitude higher than the values determined from pump tests.

The ability of a model layer to transmit groundwater depends on transmissivity, which is the product of conductivity and layer thickness. Table 6.1 shows that transmissivity varies more than conductivity. Figure 15, herein, shows in cross section the varying thicknesses.

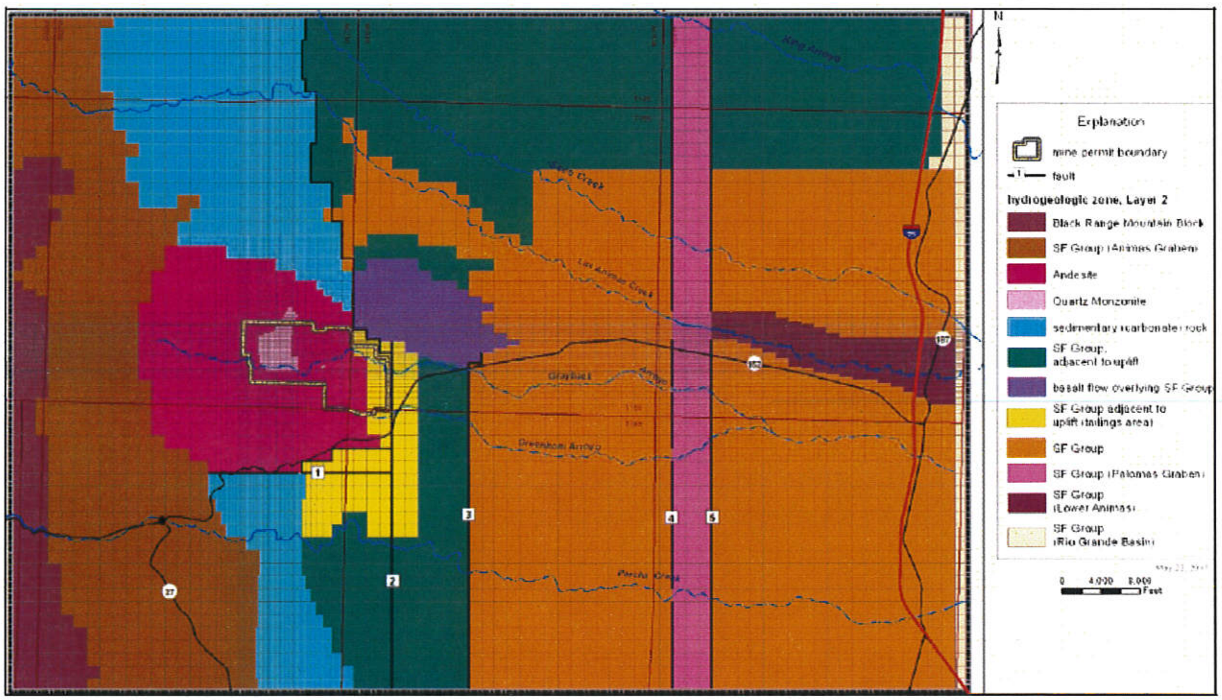

Figure 6.3. Layer 2 hydrogeologic zones.

Figure 14: Figure 6.3 (Jones et al. 2014) showing layer 2 hydrogeologic zones.

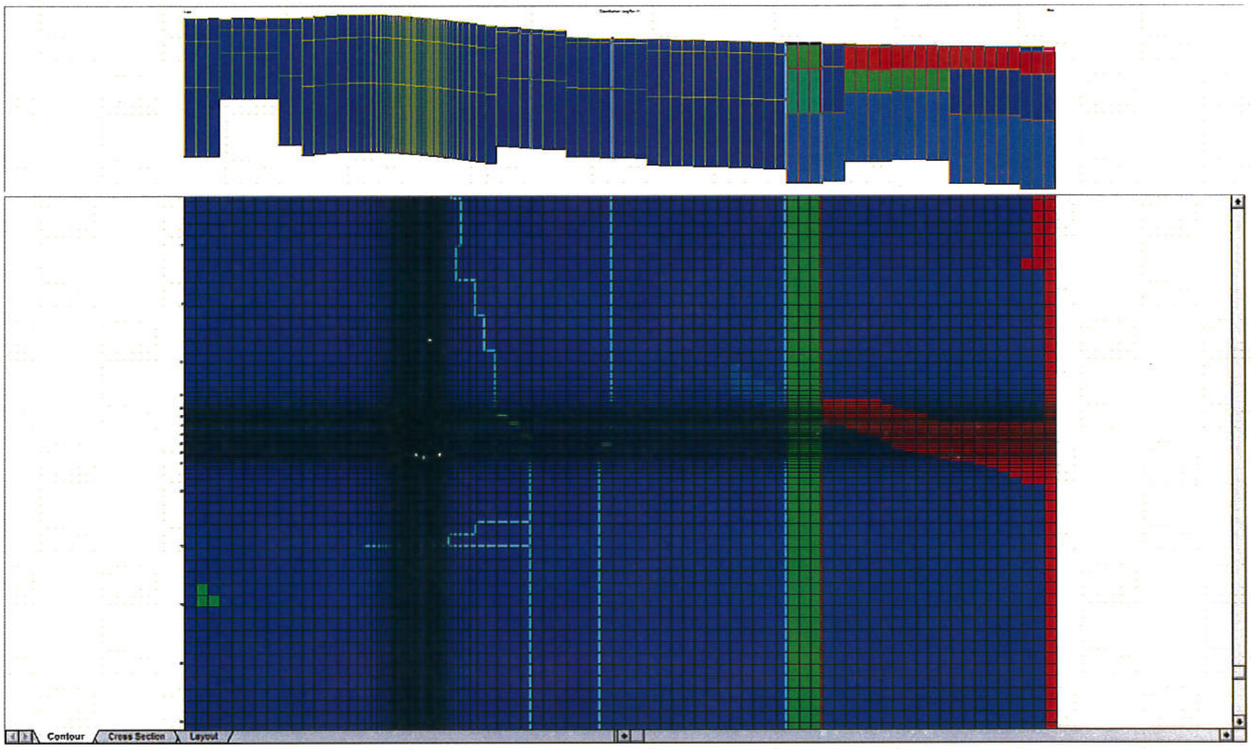

Figure 15: Screen capture of layer 2 from the Jones et al. model showing the plan view (below)) and cross-section above. The figure is from the steady state model files.

The variable thickness for layer 2 near the Palomas Graben is the most significant. At 10 ft/d (feet per day), the graben has one of the higher conductivity values for the Santa Fe group. Layer 2 thickness increases from 500 to 1,000 feet from west to east across the transition into the Palomas Graben (Figure 14). This causes the transmissivity to increase from 900 to 10,000 ft^2/d[5] from west to east across the transition. Production pumping occurs from the graben.

Also, the vertical anisotropy, as specified by Jones et al. (2014, Table 6.1), is very suspect and likely biases the model results. Vertical anisotropy is a ratio of vertical to horizontal conductivity.[6] In unconsolidated formations, vertical conductivity ("Kv") is usually less than horizontal conductivity ("Kh") because sedimentation causes sediments to settle with the longer particle dimension closer to horizontal. Most formations also have layers with finer grained layers interbedded with coarser-grained layers. Horizontal flow occurs mostly through the coarser grained layers, while the finer-grained layers prevent vertical flow;[7] this leads to an even higher lower anisotropy for the formation.

Vertical conductivity may be determined by multiplying the horizontal conductivity by the anisotropy. In layer 2, Kh and Kv is 0.9 and 0.009 ft/d for the SF Group and 10.0 and 10.0 ft/d for the SF Group, Palomas Graben and Rio Grande Basin, respectively. The respective anisotropy values are 0.01 and 1.0.

[5] Table 6.1 (Jones et al. 2014) incorrectly shows the transmissivity to equal 1000 ft2/d, but the GUI shows the transmissivity is 10,000 ft2/d.

[6] The ratio can be expressed either as Kh/Kv or Kv/Kh.

[7] It is rarely possible to model each layer individually so a model layer is an agglomeration of fine and coarse-grained layers.

The baseline report and CFM describe the SF Group, especially in the Rio Grande Basin, as having increasing layers of clay and causing the artesian wells.

> The Santa Fe Group is composed chiefly of coalescing alluvial fan deposits that are discontinuous and locally heterogeneous with inter-bedded sandstones, silts, and clays of varying percentages. The Upper Santa Fe Group Palomas Formation (Lozinsky and Hawley, 1986) represents the USF. This formation grades eastward from the Animas Uplift from coarse alluvial fan material to braided stream and deltaic sands and silts to clays near the Rio Grande. **The inter-fingering with clays begins approximately 3 to 5 miles west of the current position of the Rio Grande and is responsible for the flowing wells common in this part of the Baseline Study Area.**
>
> INTERA 2012, 8-24; emphasis added.

Clay layering will cause Kv to be much lower than Kh. In fact, it is likely that the anisotropy will be much lower than 0.01. As modeled with a ratio of 1.0, Jones et al. applies no resistance to vertical flow beyond that applied to horizontal flow. Considering the clay that exists in the formation, the numerical model has not accurately applied the CFM of the formation. By allowing easier vertical flow, it may have allowed more flow to discharge through the DRAIN boundaries used to simulate the artesian wells, therefore underestimating the effects of the Mine's pumping.

- The model minimizes the effects of pumping on the artesian wells by setting vertical conductivity in the Santa Fe formation much too high.

Vertical anisotropy of the Santa Fe Group in the Palomas Graben is also 1.0. This is the formation in layer 2 from which the production wells pump process water. INTERA does not describe this group, but Jones et al. (2013) provides well logs in their Appendix B for many wells, including the production wells. The lithology descriptions are mostly "sand, gravel" or some variation, including even cobbles down to about 900 feet, at which point the descriptions may include silt or clay. Vertical conductivity will be less than horizontal due simply to layering of the gravel and the tendency for sand to fill the pores around gravel, but will not be as low as in the Santa Fe groups near the Rio Grande. Vertical anisotropy of 1.0, as used herein, is inappropriate and should be 0.1 or 0.01.

- Using an inappropriately high vertical conductivity for modeling the formations in the Palomas graben allows the production wells to more easily pump water from the entire formation within the graben, which limits the drawdown caused by production pumping.

4.3.3 Horizontal Flow Barriers

Figure 14, herein, also shows the location of faults simulated in the DEIS model; and Jones et al. Table 6.2 shows the conductivity values used to determine the conductance for the horizontal flow barrier ("HFB") model, which is used to simulate the faults. The groundwater contour maps suggest very strongly that the groundwater model simulates the faults as being far more effective as flow barriers than the data actually justifies.

Figure 16, herein, shows the simulated steady state contours from Jones et al. (2013) Figure 6.11 (the figure is labeled "simulated 2012 groundwater levels" contrary to how the text in Jones et al. refers to it). Due to 30 years of inactivity there will not be a significant difference. Figure 9 (shown above) is the 2011 groundwater contour map from INTERA (2012) Figure 8-14. There are many differences between these two groundwater contour maps, but the most glaring difference is the lack of significant contour drops that could be assigned to faults (Figure 14) that is at all similar to the simulated effect (Figure 16). The actual groundwater contours do not suggest the faults are barriers as conceptualized by Jones et al. (2013, 2012).

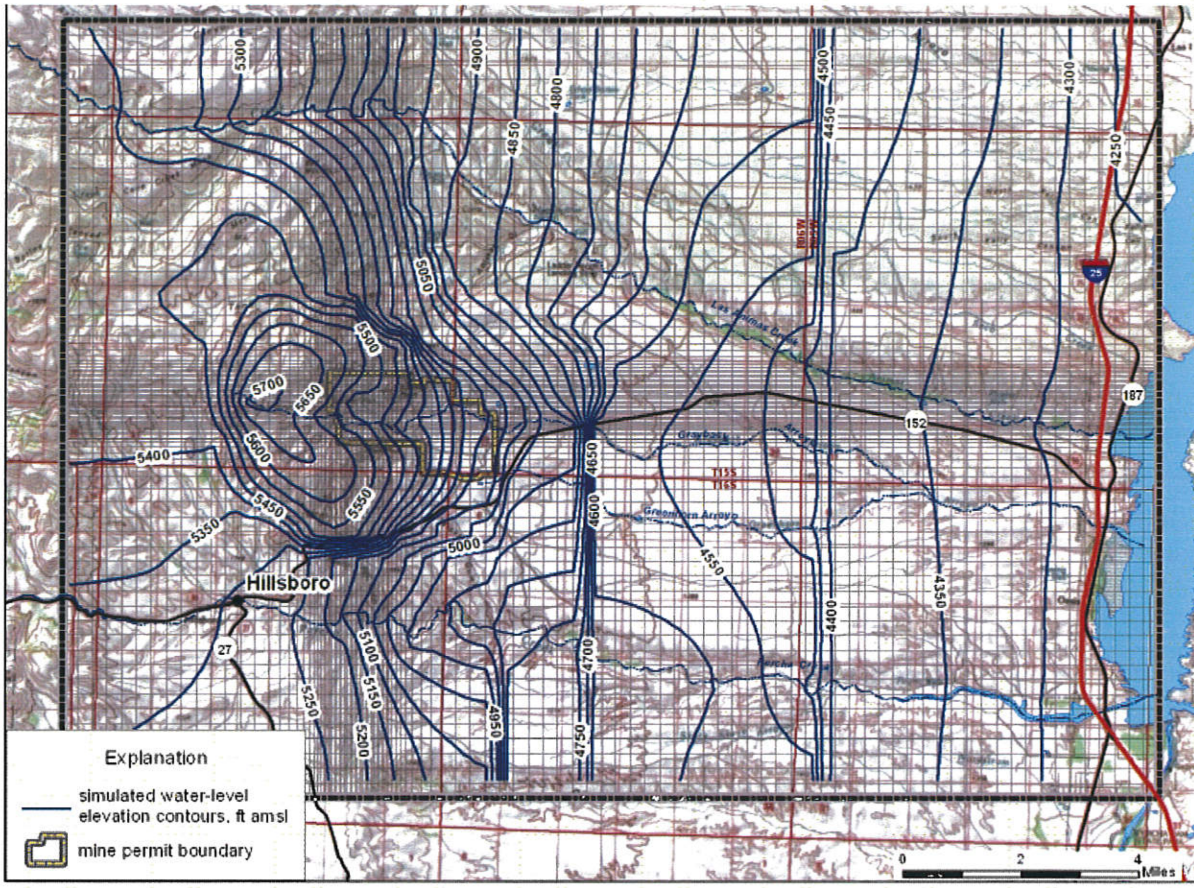

Figure 6.11. Contours of simulated 2012 groundwater levels.

Figure 16: Figure 6.11 from Jones et al. (2013) showing simulated steady state groundwater contours. The red line approximately midway north/south through the map is Hwy 152. The label "simulated 2012 groundwater levels appears to be incorrect in the original document.

Conductance for the fault on the west side of the Palomas graben is $1x10^{-8}$ ft/d, while on the east side is 1, an order-of-magnitude difference of 8. The amount of water crossing the fault on the west will be miniscule and therefore the fault effectively isolates the model on the west from the model on the east. The simulated steady state contour map (Figure 16) shows two locations with significant head drops, as expected due to low conductance faults. The easternmost drop of from 150 to 200 feet coincides with fault 4 (Figure 16, see fault numbers in Figure 14), the west side of the Palomas graben. Faults 4 and 5 both have a gap at Las Animas Creek, which does not seem justified by the geology because the fault is not in the alluvial formation in layer 1. This gap will concentrate flow from west of the fault into the formation beneath the creek, where it will be available to replenish the creek or prevent drawdown.

Further west, a larger drop coincides with fault 3. Just south of Hwy 152, the groundwater table drops at least 300 feet (Figure 17). However, only in layer 2 does the fault end at Hwy 152. The substantial head drop spreads out north of the highway because groundwater can flow eastward without horizontal flow barrier ("HFB") impedance in layer 2. Therefore, the fault effectively controls the head and helps to match observed water levels south of Hwy 152 and allows flow around to the north where it can replenish Las Animas Creek.

Using faults as flow barriers inappropriately biases the DEIS model results in several ways:

- Faults can help to control water levels, thereby falsely improving the calibration of heads. This occurs specifically where there are no wells near the faults.
- Faults control where water can flow, as discussed above. The faults divert groundwater to the production wells and to Las Animas Creek, thereby minimizing the predicted impacts.
- Faults can prevent drawdown impacts from propagating across them, if they are simulated with a sufficiently low conductance. The steps in drawdown west of the production wells demonstrate how the fault has prevented simulated drawdown from propagating to the west. Figure 17.

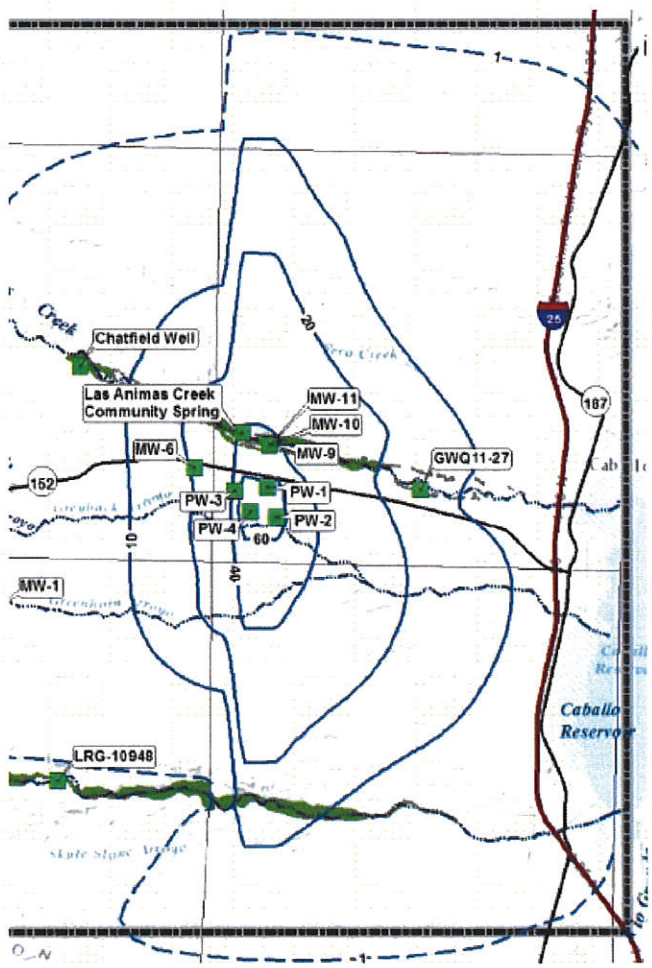

Figure 17: Snapshot of a portion of Figure 13 in Jones (2015) showing drawdown for the 30,000 tpd scenario, end of mining.

4.3.4 Boundary Conditions

Boundary conditions in a numerical model are the conditions that constrain the equations of flow, in that they represent a location in the domain where the head or flux is known or where the flux is a known function of hydraulic gradient. Jones et al. (2013) divide boundary conditions between natural and anthropogenic boundaries, with anthropogenic boundaries being those caused by the Mine, such as production pumping or the need to dewater the deepening pit. Figure 18, herein, shows generally the boundary conditions as coded by Jones et al. (2015).

Recharge boundaries are specified flux boundaries for which a constant depth of water over a specific area enters the model domain for a specified time period; in steady state, as shown in Figure 18 herein, the rate is a constant value per year, which implies it represents average conditions. Jones et al. (2013) do not specify how the actual rates in Figure 18 are determined, so they are difficult to review. The rates are relatively low and distributed so that more enters through the carbonate rock north of the Mine and that very little enters the andesite near the Mine. Jones et al. do not specify any distributed recharge into the Santa Fe Group east of the Mine, even though the relatively high conductivity will support there being some distributed recharge into the area.

- Failure to consider recharge in the Santa Fe Group biases the model calibration toward estimating higher conductivity values because water will have further to flow from the recharge source to a discharge. This will cause the model to under-predict impact due to Mine stresses.

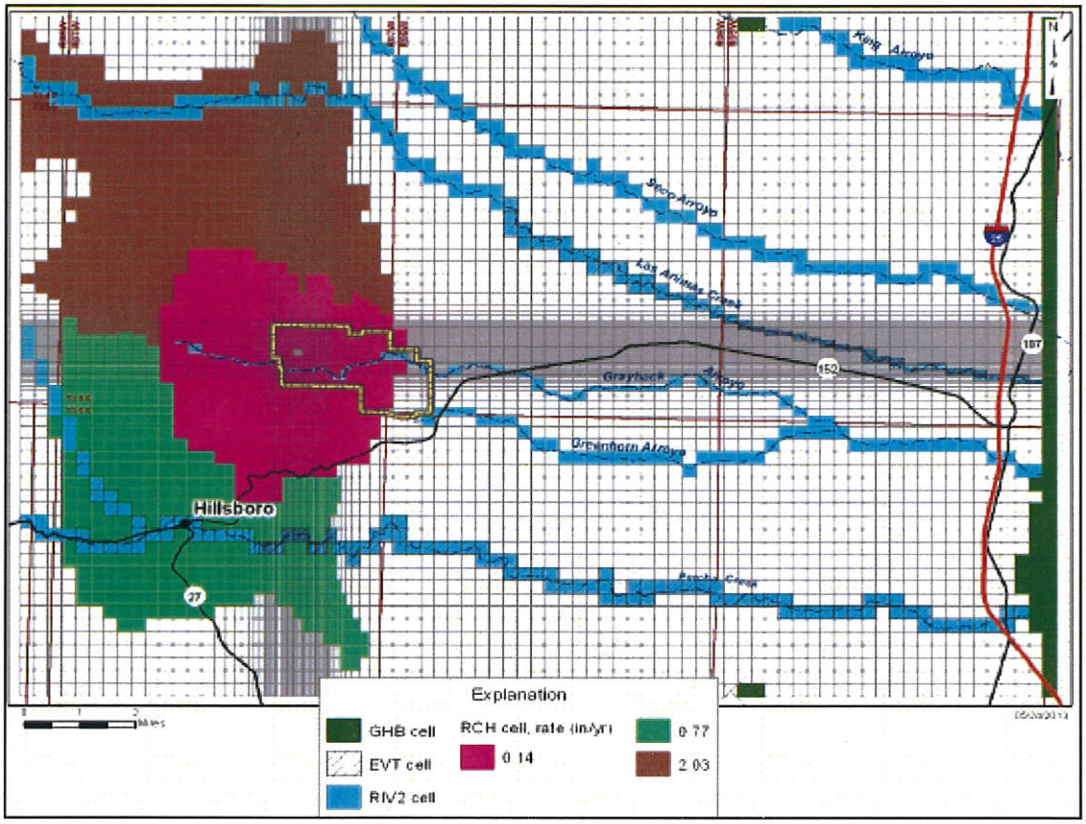

Figure 6.6. Natural boundary conditions.

Figure 18: Figure 6.6 from Jones et al. (2013) showing the natural boundary conditions specified for the model simulation.

Stream channel infiltration, or more properly groundwater/surface water relations, is simulated using a RIV2 package (which apparently simulates infiltration to the groundwater and discharge back to surface water), and accounts for the stream water balance so that the net recharge cannot exceed the amount of available water (the amount that enters the reach from runoff and from groundwater discharge). Flow to or from a cell is a head-controlled flux, meaning it equals the product of conductance and gradient, limited by the flow available in the stream if the direction of flow is into the aquifer. Flow is input to the stream reach at its upstream end; and the amount that does not infiltrate moves to subsequent downstream model reach cells. Jones et al. 2013, 51.

Apparently the modelers add 5,249 and 7,898 af/y to the upstream end of Upper Percha and Las Animas Creek, respectively. Jones et al. 2014, 2013, Table 6.3. This is apparently for steady state conditions with no amendments specified for transient conditions. The model water balance does not show the same value for each stream. Table 6.5 in each document (Jones et al. 2014, 2013) is the "Simulated steady state water balance" presumably for the entire model domain. The 2014 table shows that 21,455 af/y flows through the model domain, whereas the 2013 table shows 18,864 af/y. The difference is due to a difference in inflow values for Las Animas and Percha Creek, which the 2014 steady state water balance table shows as 8,720 and 7,052 af/y, respectively. Jones et al. (2014) does not discuss the source of the higher value since Table 6.3 (Jones et al. 2014) specifies the same runoff as does Jones et al. (2013).

- The steady state model water balance for the 2014 version of the steady state model relied upon in the DEIS is more than 10% higher due strictly to additional runoff in the streams. This minimizes the impacts of production pumping due to there being more available water.

As described, this method of simulating streamflow is inappropriate because it does not account for the realities of streambed recharge. Streambed recharge usually occurs during runoff and snowmelt events, but simulating a constant rate entering the stream at the upstream end does not capture that variability. It is unlikely that the simulated streambed recharge resembles the actual streambed recharge. A river boundary can allow whatever water is necessary to discharge into the model domain to maintain the user-specified head. This can bias the model conductivity values to be less sensitive because the head is matched by river discharge, not conductivity adjustments.

Jones et al. (2013, p 52) claim the "model reproduces the observed pattern of stream flow in the region" with "runoff generated in the mountain watersheds, flows downstream until it crosses the mountain front, where it recharges the Santa Fe Group aquifer." *Id.*

- Jones et al. should provide a graph of river flux with distance along the stream to support this claim.
- These boundaries should also be subject to various sensitivity analyses, including a variation of the upstream inflow to test the effect of differing limitations that would manifest due to natural runoff variability.

The model simulates flow entering the domain east of the Mine in the Palomas Basin through groundwater from the north and exiting through the south, but only in the Palomas Graben. The flow enters and leaves through a general head boundary ("GHB") at the north and south end of the Palomas Graben (Figure 18). A GHB is a head-controlled flux boundary similar to the river boundary. Water effectively enters the model domain in a narrow section of aquifer with high transmissivity bounded by faults. The graben effectively provides a conduit in the model for flow to enter the model domain from the north and flow directly to the production wells, which lie within the Palomas Graben conductivity zones. Therefore, drawdown caused by pumping within the graben will pull water from the GHBs.

- By limiting GHB flow to the graben, the modelers have biased the model to under-predict drawdown due to production pumping by providing a high conductivity pathway (high conductivity formation bounded by low conductance horizontal flow barriers) and a source of water to draw from (the GHBs on either end).

It appears reasonable that groundwater flows north-south along the Palomas Basin, although the groundwater contours do not show a gradient from the north. However, it is not reasonable to confine it to the graben.

- The model should be re-conceptualized with the GHB over much more of the north and south boundary so as not to control the flow as much as it does.
- Inflow to the basin should be estimated and used to calibrate the GHB, rather than allowing it to provide water as needed to the wells.

A GHB is also used to simulate the Rio Grande River and reservoir, as seen in the green cells on the east side of Figure 18, herein. The report does not specify this, but the MODFLOW input files show that this boundary occurs only in layer 1. This has the effect of driving flow from the lower to the uppermost layer, which is just 100 feet thick in this location. It also creates a backwater and higher gradient in layer 2 than would occur if the groundwater could discharge directly from layer 2 into the reservoir.

- This poor conceptualization of the reservoir will artificially maintain pressure in layer 2 and decrease the effects of pumping on the artesian well.
- The GHB for flow to the Rio Grande should also be calibrated based on flow to the Rio Grande as estimated above.

Anthropogenic boundaries include the artesian wells, production wells, tailings seepage and the open pit. Figure 16. Jones et al. (2014) simulates the artesian wells using drain boundaries, which allows water to leave the model zone only based on head and conductance. There are no flow measurements for these wells, so the calibration of conductance is completely uncertain. As noted above, the failure to consider clay layers in the formation may cause the impacts of production well pumping to be underestimated at the artesian wells.

Tailings seepage is simulated as a specified flux using a well boundary to inject water, apparently on four model cells (Figure 19). Because the model layer is 1,000 feet thick, this effectively spreads the seepage evenly through the thickness of the model layer, in contrast to the reality of the flow being spread evenly across the surface of the layer. This is less problematic if the layer is thinner, hence the seepage is spread over a thinner layer. The seepage has much less of an effect on a thicker aquifer. Calibration is discussed below, but accurately simulating the water levels in a thick aquifer has much less effect on the transmissivity than in a thinner, but more appropriate, layer.

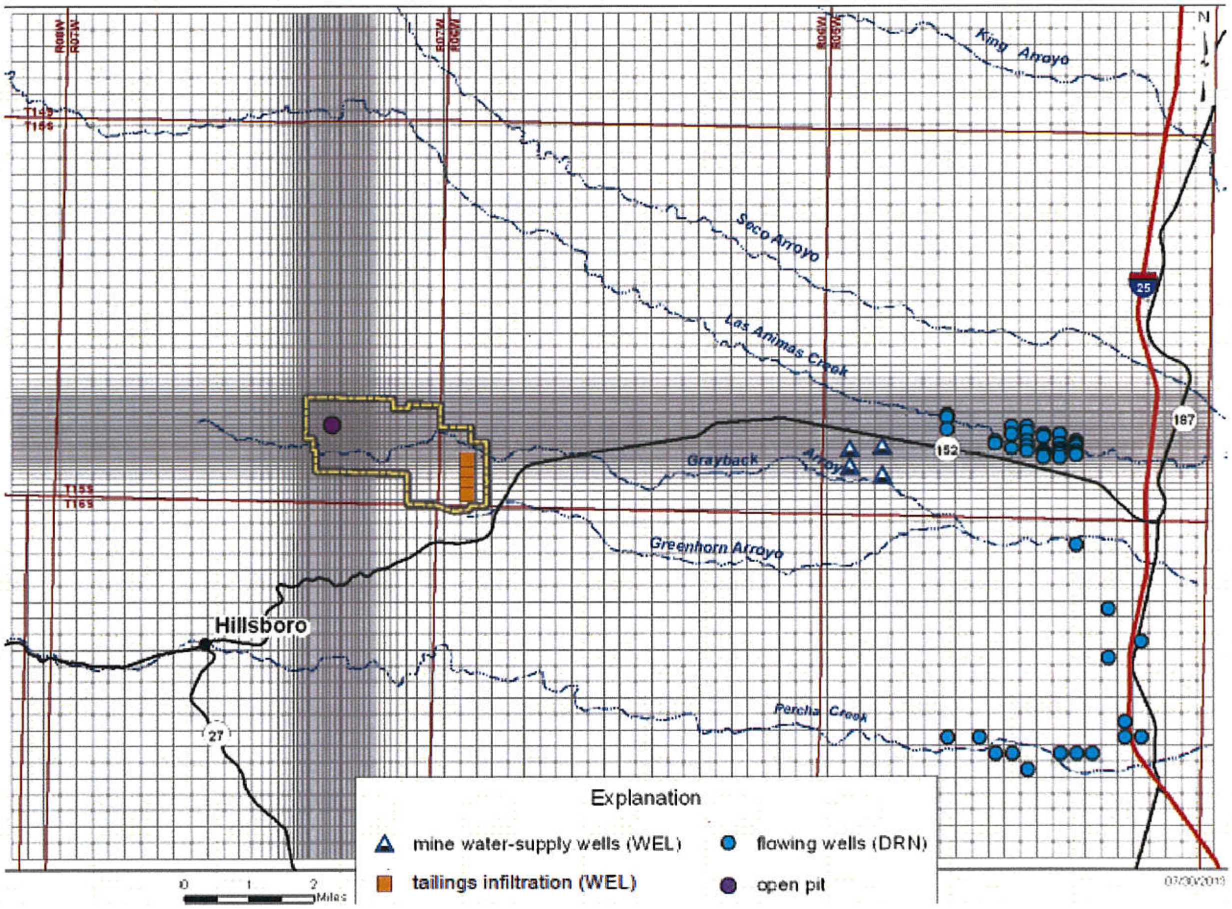

Figure 6.7. Anthropogenic boundary conditions.

Figure 19: Figure 6.7 from Jones et al. (2013) showing the anthropogenic boundary conditions specified for the model simulation.

4.3.5 Calibration

The statistics and scatter plot for the steady state calibration (Jones et al. 2013, Figure 6.10) look reasonable, however, the residuals range to almost 50 feet. This is an issue for the transient calibration, as discussed below. The transient calibration is based on simulating conditions from about 1980 through 2011, or from the beginning of mining in 1980 through its shutdown and the initial testing for the current proposal. Figure 6.13 through 6.27 (Jones et al. 2013) compare simulated and observed well level hydrographs for the transient period. The figures show many problems with the calibration.

Initial head for some of the wells differs substantially from the observed values. Because the initial heads are the simulated steady state heads, this reflects errors in the steady state simulation. Many of the monitoring wells are near streams and thus control the discharge to the streams, therefore substantial errors in the level cause errors in the gradient controlling the flow to the stream. This can cause errors in the calibrated conductance, which in turn can cause the stream to respond differently to stresses than it would if appropriately calibrated.

Many wells respond significantly differently in the model than as observed. Well MW-5, which lies near the production wells, recovers from pumping stress very quickly under the DEIS model, whereas the observed levels took years to recover (Jones et al. 2013, Figure 6.13). The well field continued to pump at low rates after mining ceased. However, the rapid recovery of the modeled well levels indicates that the model simulations show recovery much faster than will occur in reality. It appears that the simulated recovery responds more like a confined aquifer than may actually occur.

Well MW-6 hardly responds to simulated pumping, but the observed water level has risen 170 feet over a period of about 30 years. Figure 6.14. Jones et al. (2013, 30) explains how high sodium chloride ("NaCl") content led them to conclude the rise was anomalous, except that chloride concentrations presented in INTERA (2012) do not show the chloride concentration is that high. MW-6 is screened between 310 and 1,000 feet below ground surface ("bgs") just northwest of the production wells. It is west of the faults that prevent pumping stresses from propagating west, and the lack of simulated response in the well demonstrates that the faults perform as intended.

- The observed increases at well MW-6 indicate the specified conceptual model fails to explain all of the factors responsible for well level responses to pumping stresses.

Wells MW-9, -10, and -11 are located near Las Animas Creek, with MW-11 being shallow alluvium and the others being in the Santa Fe Group, and show the observed upward gradient and almost no effect from the simulated pumping. Figure 6.15. Figure 6.16 shows that well USGS #325804107205501 did not respond to changes under the DEIS model, whereas the observed data shows a general decrease in water level over time. This well is closer to the river and could reflect changes in the reservoir water level. Other USGS wells near the river show similar effects (Figure 6.18 and 6.19), although USGS# 325817107221201 shows a very modest response to pumping. Wells MW-2 and -8 trend with few changes under the model, whereas the observed changes are various with time (Figures 6.20 and .21). These wells lie between the tailings impoundment and the production wells, so the observed changes are likely due to natural variations not captured by the steady state modeling of recharge.

Wells NP-1 through -5 and GWQ-12 show rising water levels in response to the existing tailings seepage and the prevention of eastward flow by faults (Figures 6.22 to 6.27). All simulated responses show a steep rise during the early 1980s, when the tails were initially created, followed by a decrease in water level to at least half of the initial rise. The observed water level data decreases much less than smooth curves for the simulated water levels. This suggests that the simulated tails seepage is less than what actually occurs.

- By underestimating seepage, the model will underestimate the long-term effect of continuing seepage.

Jones et al. (2013) simulates tailings seepage using a specified flux boundary, which is a well boundary that injects a specified amount of seepage. The rate apparently is determined by calibration with a constraint being the amount of water added to the impoundment. Figure 20 herein shows the estimated infiltration rate exceeded 250 gpm briefly in 1982, and dropped close to zero by 1986, when the cumulative infiltration reached 150,000,000 gallons, or about 460 af.

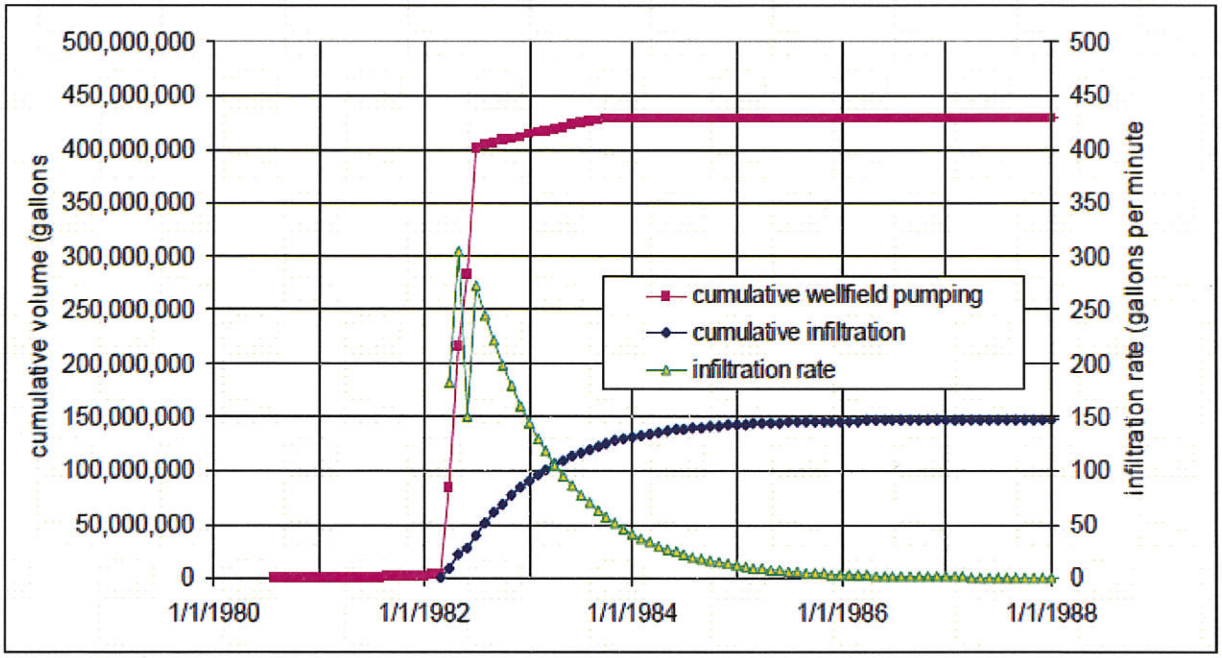

Figure 6.8. Modeled historical tailings infiltration.

Figure 20: Figure 6.8 from Jones et al. (2013) showing modeled tailings infiltration.

Jones et al. (2014, 2013) rely on the December 2012 pump test for transient model calibration. Their section 5.0 describes the test and attempts to estimate parameters, and section 6.4.3 discusses the use of the test for model calibration. The pumping began and occurred in an irregular fashion, appearing to almost be unplanned (Figure 21); whereas to have interpretable data, a pump test should occur with a constant pumping rate for a given time period. It is good to have pumped the production wells for 30 days, however the irregular pumping and results can influence the interpretation. Rather than treating the initial attempts and longer term pumping as part of the test (November through January in Figure 21), it is better to test the pumps and wells and then allow them to recover prior to starting the constant rate pumping. Each well should be tested independently with full recovery prior to the start of a pump test for each well.

The production wells lie within the Palomas Graben, which consists of the high conductivity Santa Fe Group and is bounded by low-conductivity faults on both the east and west. Jones et al. (2014, 37) notes that:

> "[w]ells within the Palomas Graben did not respond to pumping as they would in an extensive aquifer; initial drawdown was rapid and followed a semi-linear trend with time. Initial post-pumping water-level recovery was also rapid. These drawdown and recovery responses to pumping are characteristic of a high-transmissivity, semi-isolated hydrologic unit of finite size (the Palomas Graben)."

These factors make the use of standard pump test analyses difficult, therefore Jones et al. analyzed the results using the numerical model. Modelers adjusted a "combination of (1) leaky fault barriers bounding the Palomas Graben, (2) high permeability within the graben and (3) lower permeability units adjacent to the graben" (Jones et al. 2014, p 78) to match the measured and simulated aquifer test responses.

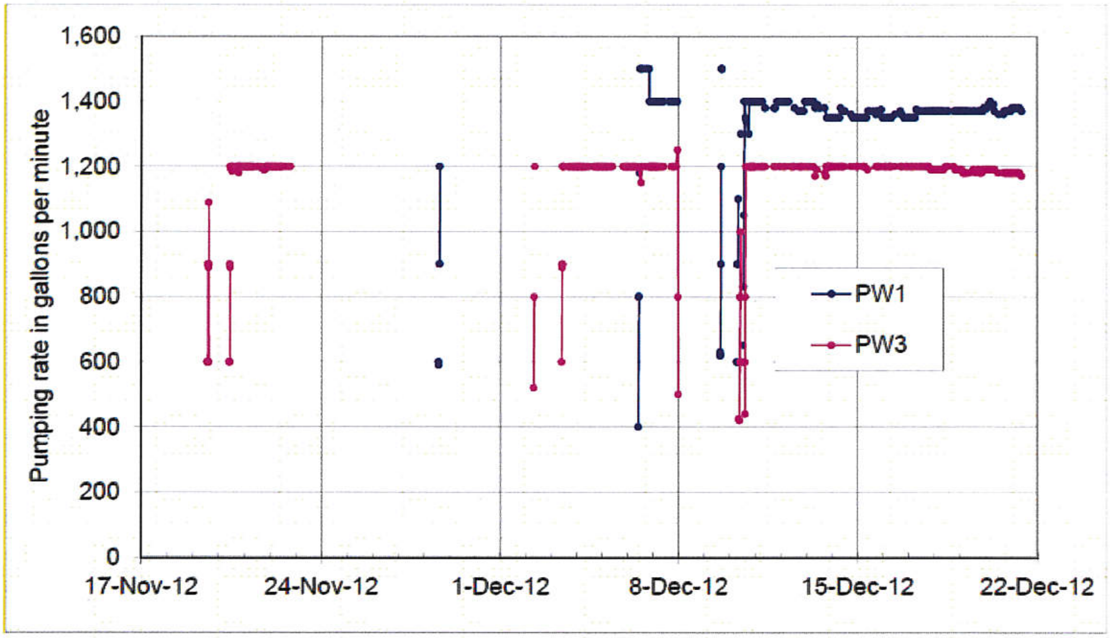

Figure 5.14. Measured aquifer test pumping rates.

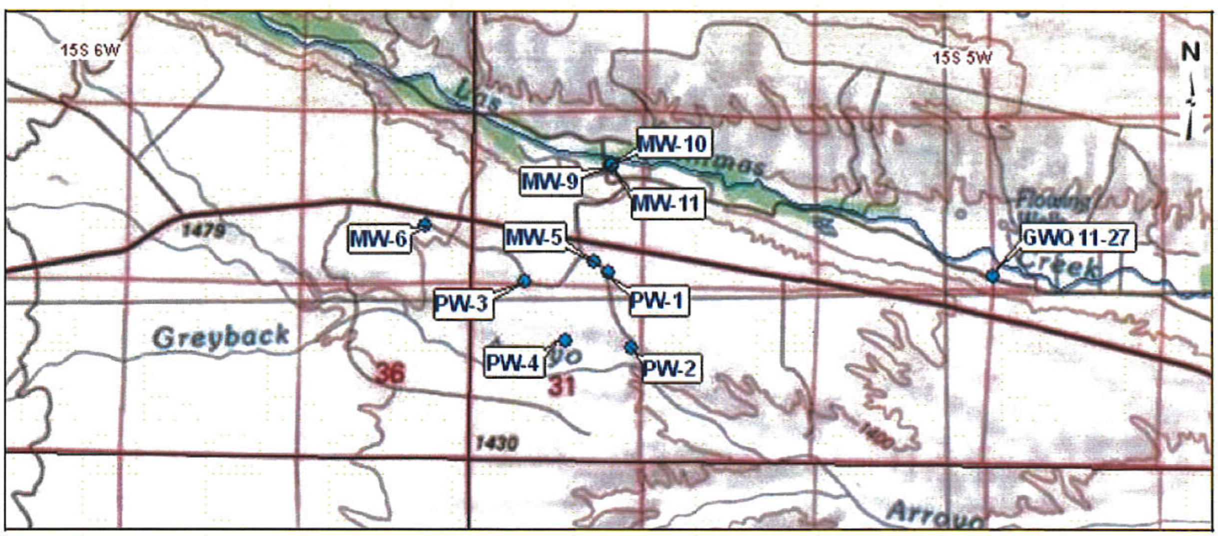

Figure 5.15. Aquifer test pumping and observation wells.

Figure 21: Figures 5.14 and 5.15 from Jones et al. (2014) showing the long-term pump test results for pumping production wells PW1 and PW3.

For the pumping wells, the report compares the measured, simulated, and bore simulated water level hydrograph. The bore simulated hydrograph includes estimated well bore loss, using a proprietary MODFLOW package LAK2, to estimate the free water surface within the well accounting for well bore losses. This can partially account for the differences in measured well levels because the simulated well levels are an average over the model cell rather than the actual value in the well bore. Figures 6.31 and 6.32 show substantial differences between simulated and bore simulated, and for PW-1 the bore simulated closely matches the simulated water level hydrograph, with the simulated water level hydrograph having almost 100 feet less drawdown (Figure 6.31). The observed water level hydrograph shows almost 40 feet more drawdown than the bore simulated for well PW-3 by the end of pumping. PW-3 is pumped successfully for longer periods than is PW-1 (Figure 21), and because observed matches bore simulated initially (Figure 6.32), the model may provide more water more easily to PW-3 than the aquifer will during production pumping. The calibrated parameters may underestimate the drawdown at PW-3.

Figures 6.33 and 6.35 suggest the model simulates pumping effects reasonably accurately at PW-2 and MW-5, but Figure 6.34 shows that simulated drawdown exceeds observed effects at PW-4[8], as noted by Jones et al. (2014, 77). The authors, however, fail to point out that the simulation levels under the model recover faster than actually observed, which suggests that impacts could extend further from the pumping (at least in the direction of PW-4).

The DEIS model significantly underestimates drawdown at MW-9, a well in the Las Animas Creek monitoring well cluster (MW-9, MW-10, and MW-11), but not at MW-10 or MW-11. Screened from 200 to 250 feet bgs, MW-9 monitors the response substantially deeper in the aquifer. Because the pumping wells remove water from deeper levels, it is reasonable that the effects propagate further at depth. The observed data does not show drawdown at shallower depths; it is possible it just takes longer to propagate upward to shallow depths, and for the brief period simulated other effects could be more important.

One problem with matching water levels in the monitoring wells results from the model layer thickness. Layer 2, the layer from which most pumping and pit dewatering occurs, is 1,000 feet thick at the production wells, which means that the model simulation pumps water from a very thick simulated aquifer; whereas the monitoring wells are screened over much thinner sections of the aquifer. It is unlikely that all productive layers at a monitoring well are monitored because the screens were likely chosen based on yield. The monitoring wells simply do not monitor all of the aquifer simulated in the model. Put another way, the model simulation spreads out the pumping over a much thicker aquifer than occurs in reality, so that the model underestimates drawdown in many locations.

- The model simulation underestimates actual drawdown because it pulls water evenly from all levels in a 1,000-foot thick aquifer.

The report also does not include a meaningful sensitivity analysis. Jones et al. 2014, 80-83. The presented discussion primarily concerns various steps that were completed to establish parameters within the Palomas graben. Each figure compares the simulated and observed drawdown at MW-5 for the 2012 pump test. For example, Figure 7.1 shows that the simulation matches observed drawdown at

[8] The text on page 77 mistakenly refers to PW-2 in Figure 6.34, thus statements regarding water levels apply to PW-2.

MW-5 best for anisotropy equal to 1.0, with ratios of 0.1, 0.01, and 0.001 yielding much more simulated drawdown. The figure does not specify the horizontal conductivity used for the test, although drawdown could also have been adjusted by changing the conductivity ("K") or the storage coefficient. Figure 7.2 shows the best match occurs for conductivity equal to 10 ft/d. Figure 7.3 shows that removing the GHB boundary on the north and south end of the graben yields poorer results, and discussion (Id. at 82) indicates that setting the fault conductance high on the east and low on the west side of the graben yields better results. There is no indication whether other combinations of these factors can yield equally valid results.

4.3.6 Model Predictions

Jones (2015) prepared and presented model predictions for the three action alternatives. Figures 5 and 6 in Jones (2015) show that water leaves the model and enters storage very rapidly at the end of pumping, representing a very rapid drawdown recovery. The high reduction in change in "surface flow and ET" seems to be the primary source; however, this is a long distance from the river discharge where much of the surface flow occurs. Drawdown cones in the Santa Fe Group (Jones Figure 3) show that the 10-foot drawdown extends more than two miles toward the river, and as much as five miles to the south and north (Figure 16). The rapid substantial changes in groundwater storage and discharge to the river suggest that the model recovers water levels very quickly at a distance from the pumping wells. This finding is very unusual, in that drawdown cones usually recover quickly near the pumping wells but expand at their limits as water draws toward the pumping wells, or at least toward areas of deeper drawdown. Similar findings can be drawn from the figures for the other alternatives. Jones (2015) should provide drawdown maps at representative periods after dewatering ceases to show where the water is drawn from. He should also show cumulative storage volume removed/returned to the aquifer.

The drawdown maps show contours to the one-foot drawdown; however, the DEIS fails to present the information in a meaningful way. For example, springs may go dry with a one-foot drawdown, and all springs within the one-foot drawdown should be identified as at risk. Such springs should be monitored frequently and there should plans to mitigate lost flows.

Water can be drawn from a stream even if the predictions show no drawdown occurring at the creek. As the water table lowers, streams lose water. It is the gradient for the connection between the groundwater and the stream that increases and causes additional flow loses from the stream.

4.3.7 Summary and Recommended Changes to Numerical Model to Improve Predictions and Remove Biases

The foregoing sections describe various factors of the numerical model that lead to inaccurate or biased predictions for the DEIS. These include problems with the model structure (the discretization of the model domain, both horizontally and vertically), and with the parameter zones. The model uses an inappropriate boundary on the north and south boundary of the domain. The model does not accurately distribute recharge among the formations west of the proposed Mine site or consider distributed recharge east of the Mine site.

The following bullet points are necessary changes to the Jones et al. (2013) study that will improve the predictions made for the DEIS. These changes should be made as part of a revised or supplemental DEIS:

- Layer 2 should be split into at least three layers. Except in the streams, layer 2 is the uppermost layer and simulates the Santa Fe aquifer. Additional layers will allow better simulation of vertical flow and gradient, changing conductivity with depth, and will provide a better match to screened intervals for the monitoring wells. Unfortunately, the new layers 3 and 4 will have no wells for calibration in the graben and near the pit, hence additional monitoring wells are needed in conjunction with this.
- Horizontal discretization should be improved around the production wells to improve the calculation of well drawdown. Discretization at the wells should be the same as at the pit.
- If justified in the CFM, the general head boundary allowing flow north to south through the model domain should be widened to include all of the northern and southern boundaries of the model. The current location, only in the graben, biases the model results by providing water to the portion of the model from which pumping occurs.
- The boundary for the Rio Grande River should be in all layers that intersect the depth of the reservoir, rather than in only layer 1 (which forces water upward into the river).
- Stream recharge should be simulated in transient, not steady state mode, because recharge will occur as slugs, not on a long-term steady state basis.
- The recommended data collection for parameterizing the faults and transmissivity of the graben must be collected and implemented to obtain improved modeling of the pumping from the graben.
- Vertical anisotropy should be better simulated with values of 0.01 to 0.001 rather than the values used in the model, including in the graben which, based on well logs, should be 0.1 to 0.01.
- Existing tailings seepage should be better estimated by calibrating with the wells near the impoundment. The seepage includes both meteoric water draining through the facility and draindown.

5. References

Bear J (1979) Hydraulics of Groundwater. Academic Press.

Bureau of Reclamation (2013) Appendix E: The Upper Rio Grande Simulation Model (URGSiM). Albuquerque NM

Freeze RA, Cherry JA (1979) Groundwater. Prentice-Hall.

INTERA (2012) Baseline Data Characterization Report for Copper Flat Mine, Sierra County, New Mexico. Prepared for New Mexico Copper Corporation. February 2012.

John Shomaker & Assoc, Inc (JSAI) (2013) Status Report for Stage 1 Abatement at the Copper Flat Mine Site near Hillsboro New Mexico.

Jones M (2015) Technical Memorandum: Model Projections – Operating Scenarios Considered for Copper Flat EIS. John Shomaker & Assoc, Albuquerque NM

Jones MA, Shomaker JW, Finch Jr. ST (2012) Conceptual Model of Groundwater Flow in the Animas Uplift and Palomas Basin, Copper Flat Project, Sierra County, New Mexico. John Shomaker & Assoc., Albuquerque N>

Myers T (2013) Reservoir loss rates from Lake Powell and their impact on management of the Colorado River. *Journal of the American Water Resources Association*. DOI: 10.1111/jawr.12081

Schulze-Makuch D, Carlson DA, Cherkauer DS, Malik P (1999) Scale dependency of hydraulic conductivity in heterogeneous media. *Ground Water* 37(6):904-920.

Sigda J, Tinklenberg A (2011) Letter Report to S Raugust, THEMAC Resources, Seepage Investigation Report for Portions of Las Animas and Percha Creeks, Sierra County, New Mexico. Albuquerque NM.

March 31, 2016

From: Jim Kuipers P.E., Kuipers & Associates

To: Jaimie Park, NMELC

Re: **Technical Review of Copper Flat DEIS**

INTRODUCTION

The following comments are provided for the Copper Flat Copper Mine ("Mine") Draft Environmental Impact Statement ("DEIS"), November 2015, prepared by the United States Department of the Interior, Bureau of Land Management ("BLM"). The comments are based on more than 35 years of professional experience and prior review and analysis of more than 200 mining- associated environmental assessments conducted for mines on BLM, U.S. Forest Service, state, Native American trust lands, and private lands on behalf of state, federal and tribal regulatory agencies and public interest organizations.

EXECUTIVE SUMMARY

As noted in the introductory section of the DEIS, New Mexico Copper Corporation's ("NMCC") Proposed Action includes an open pit mine, flotation mill, tailing storage facility ("TSF"), waste rock disposal areas, a low-grade ore stockpile, and ancillary facilities. As part of the DEIS process, BLM must review NMCC's proposed mining plan of operations ("MPO") and determine if it can be implemented in a manner that will prevent unnecessary or undue degradation of public land. BLM may disapprove an MPO when it: 1) does not meet content requirements as described in 43 CFR §3809.401; 2) proposes operations in an area withdrawn from the mining laws; or 3) proposes operations that will result in unnecessary or undue degradation of public land.

In summary, and as supported by the comments herein, it is my professional opinion that:

1) The DEIS fails to adequately analyze whether all action alternatives will meet the requirements of BLM policy and guidance, 43 CFR §3809.401, and will not result in unnecessary or undue degradation of public land.

2) The DEIS fails to take a "hard look" at a full range of reasonable alternatives, as required by the National Environmental Policy Act ("NEPA").

3) The DEIS fails to adequately analyze the Mine's environmental and socioeconomic impacts.

4) The DEIS fails to adequately analyze a viable reclamation and closure plan or other mitigation.

EXHIBIT
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Because NMCC has not provided a complete MPO in support of this environmental review, the DEIS cannot meet the requirements of NEPA. BLM must either revise or supplement the DEIS with the MPO and its analysis thereof.

COMMENTS

1) THE DEIS FAILS TO ADEQUATELY ANALYZE WHETHER ALL ACTION ALTERNATIVES WILL MEET THE REQUIREMENTS OF BLM POLICY AND GUIDANCE, 43 CFR § 3809.401, AND WILL NOT RESULT IN UNNECESSARY OR UNDUE DEGRADATION OF PUBLIC LAND.

As demonstrated in Figure 4.2-2 Plan of Operations – Completeness Review of the BLM Handbook[1] (p. 4-6), BLM must ensure that NMCC's MPO is complete prior to proceeding with the environmental review process. This completeness review ensures that the MPO includes required information regarding water management plans, rock characterization and handling plans, reclamation plans, and provisions for post-closure management and monitoring. The comments provided herein suggest a lack of consistency with BLM practice and policies regarding completeness reviews and requirements for MPOs. BLM has also failed to adequately analyze whether all action alternatives will not result in unnecessary or undue degradation of public land. These violations of BLM policy and guidance ultimately result in a violation of NEPA.

2) THE DEIS FAILS TO TAKE A "HARD LOOK" AT A FULL RANGE OF REASONABLE ALTERNATIVES, AS REQUIRED BY NEPA.

A. Alternatives Considered.

The DEIS states that, "40 CFR 1500-1508 specifies the requirements for an EIS." DEIS 2-71. These regulations state: "§1502.14 Alternatives including the proposed action. *This section is the heart of the environmental impact statement.*" (Emphasis added). Furthermore, "NEPA provides guidance on the development of alternatives. Reasonable alternatives include those "that are practical or feasible from technical and economic standpoints and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 2007)." DEIS 2-87.

The DEIS purports to analyze three action alternatives, the first being NMCC's Proposed Action. According to the DEIS, in comparing the previous short-lived operation permitted for 15,000 tpd ("tons per day"), "...the Proposed Action proposes to increase that throughput to 17,500 tpd to increase efficiency." DEIS 2-4. Additionally, Alternative 1: Accelerated Operations – 25,000 tpd (DEIS 2-56), and Alternative 2: Accelerated Operations – 30,000 tpd (DEIS 2-71), are clearly economic driven alternatives intended to "be more efficient." *Id.*

In 2013, NMCC conducted a Definitive Feasibility Study[2] ("DFS") based upon a 30,000 tpd production rate (DFS p. 250, 2013). NMCC failed to amend its MPO to reflect this new

[1] H – 3809-1 – Surface Management, Release 3-336, 09/17/2012.
[2] Copper Flat Project Form 43-101F1 Technical Report Feasibility Study, M3 Engineering & Technology Corporation for THEMAC Resources, November 21, 2013.

increased throughput, and the DEIS fails to present a Proposed Action reflecting NMCC's DFS 30,000 TPD. Therefore, the DEIS inadequately represents NMCC's Proposed Action based on its DFS (as well as its recent December 8, 2015 discharge permit application submitted to the New Mexico Environment Department ("NMED") and its mine permit application submitted to the New Mexico Mining and Minerals Division ("MMD")).[3]

Additionally, the validity of the economic data used by NMCC in support of the Proposed Action is unreasonable and unjustified. The 2013 DFS[4] economic analysis is based upon a design basis for the process plant of 30,000 tpd (2013 DFS p. 250) and upon a "long-term" copper price of $3.00 per pound. The Project is expected to have a 20.0% internal rate of return. 2013 DFS p. 259. The 2013 DFS also evaluated a copper price of $2.75 per pound, which resulted in a decrease to 15.8% internal rate of return, and a -20% case ($2.40/lb), which resulted in a 5.8% internal rate of return. *Id.* At current copper prices of $2.01 - $2.28 per pound[5] it is likely the "proposed project" will result in a very low or negative rate of return. Given the nature of metals prices, an internal rate of return of 40% might be considered as the required rate of return to attract knowledgeable investors. The copper price trend overall has continued a significant downtrend from almost $4.50 per pound[6] in 2011 to current prices of approximately 50% that value. The economic analysis relied upon in the DEIS fails to take into consideration such information, therefore the analysis is unreasonable.

It is very likely that the Copper Flat Project is not economically viable for long-term production (11 to 16 years) or even short-term production given the current price of copper. Based on the history and nature of the Copper Flat project[7] the DEIS should consider a "premature closure and abandonment" alternative that will address this high-likelihood scenario. The realization of fluctuating metals prices and their incidental risks particular to the Copper Flat Project present a seriously different picture of the likely environmental and economic consequences of the Proposed Action than that discussed in the DEIS.

It is clear that the DEIS includes a Proposed Action which is inconsistent with NMCC's own feasibility analysis and two action alternatives intended to address economic aspects of the Project. Such an "analysis" fails to satisfy the requirements for the "heart of the environmental impact statement." The failure of the DEIS to provide a substantive, meaningful alternatives analysis to identify the Project's environmental impacts and mitigation measures requires BLM to either revise or supplement the DEIS in accordance with 40 CFR 1500-1508.

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[3] NMCC submitted a revised discharge permit application with the New Mexico Environment Department on December 8, 2015, stating its daily production rate will be 30,000 TPD. NMCC has also submitted an application with the New Mexico Mining and Minerals Division stating its daily production rate will be 25,000 TPD.
[4] Copper Flat Project Form 43-101F1 Technical Report Feasibility Study, M3 Engineering & Technology Corporation for THEMAC Resources, November 21, 2013.
[5] Kitco Metals 30 Day Copper Spot 04 Feb – 03 Mar, 2016
[6] Kitco Metals 5 Year Copper Spot March 2011 – February 2016
[7] There have already been two failed attempts at long-term production at Copper Flat. Quintana operated for a mere 3.5 months and Alta Gold went bankrupt and failed to initiate operations at Copper Flat.

The alternatives analysis should consider the following:

- The 1977 Environmental Assessment Record conducted by BLM for Quintana Minerals Corporation's Copper Flat Project. This environmental assessment considered alternative routes for the power line, water pipeline, and access road, as well as power generation and water development on site.

- The 1996 Draft Environmental Impact Statement conducted by BLM for the Alta Gold Copper Flat Project. This DEIS considered a reduced stripping ratio alternative and a consolidated waste rock disposal alternative. Notably, it also considered, but eliminated from detailed analysis, a tailings impoundment lining alternative (now the Proposed Action in the November 2015 DEIS).

We also recommend that the following alternatives, at a minimum, be considered for their potential to reduce impacts from the Proposed Action:

- Pit sump pump to prevent a pit lake, partial pit backfilling to prevent formation of a pit lake, and complete pit backfilling;

- Alternative waste rock dump locations and configurations and waste rock liners to collect any seepage;

- Alternative tailings facility locations and method, in particular, filtered or paste tailings; and

- Alternative reclamation and closure measures that utilize more advanced designs to address acid generation potential and metals leaching, such as engineered covers for waste rock and tailings.

All of these measures potentially have a greater likelihood of resulting in fewer requirements for perpetual care.

B. *Alternatives Considered but Eliminated.*

The DEIS states that it considered, but eliminated, the alternative of dry stack tailings disposal. This alternative measure, also referred more correctly as filtered tailings, is utilized by other hard rock mines to eliminate the risk of catastrophic failure of a tailings dam and the attendant significant economic and environmental costs, as well as the potential loss of human life. Of note, the dry stack option was recently included in the preferred alternative action of the Rosemont Copper Mine DEIS.[8] The Rosemont mine proposed dry stack tailings and the rationale for same in that mine's DEIS is in contradiction to the assumptions relied upon in the Copper Flat DEIS that dry stack tailings is not considered reasonable. DEIS 2-89.

[8] The Rosemont Copper Mine is located in Arizona and is currently undergoing a comparable permitting process.

BLM must either revise or supplement the DEIS with an analysis of dry stack tailings as a mitigation measure for the action alternatives. We also recommend that the alternative of paste (thickened) tailings be considered due to the energy savings and comparable stability and other environmental advantages to filtered tailings.

C. Alternatives Not Considered.

1. The DEIS Fails to Consider Depyritization Method to Reduce Tailings Acid Generation.

The DEIS fails to consider the alternative measure of depyritization (e.g. removal of the pyrite) in any of the action alternatives. Depyritization is used to reduce the acid generation potential of the tailings prior to deposition in the TSF. The DEIS merely states, "Following the flotation process, the remaining slurry consisting primarily of non-valuable minerals, pyrite, miscellaneous un-floated minerals, and water would flow into a tailings thickener." DEIS 2-18.

Under the Proposed Action's process, the pyrite is already liberated, and by using flotation or other means the pyrite could be recovered, segregated and isolated in a repository minimizing exposure to oxygen and infiltration. Alternatively, the pyrite could be inundated under water, such as below the water table in the bottom of the pit, so as to minimize acid generation potential, or the pyrite concentrate could be used as an agricultural amendment if it did not contain undesirable contaminants. Even if it is necessary for NMCC to subsidize the cost of shipping to enable usage of the pyrite, the overall benefit in terms of optimizing use of the resource and minimizing future potential for acid generation is significant enough to offset the economic cost.

2. The DEIS Fails to Consider an Alternative with Increased Waste Rock Storage and Zero Processing of Low-Grade Ore.

The DEIS states, "Both ore and waste rock would be produced from the open pit in varying proportions throughout the mine life depending on factors such as the design of the open pit (e.g., the required slope of the high walls and the areal extent of the pit at various depths); the three-dimensional form of the ore body; and economic factors (e.g., metal prices, fuel prices, and other variable costs of production)." DEIS 3-37. This description of the ore and waste production indicates that the DEIS fails to address alternatives involving a lower than expected copper price and a higher than expected waste to ore ratio. Significantly lower copper prices (such as the current price of copper) results in an increase in waste rock storage area requirements and no processing of low-grade ore. BLM must either revise or supplement the DEIS with an adequate ore and waste production alternatives analysis.

As described in the DEIS, the waste rock will be acid generating:

"In general, the geochemical test work shows that near-surface transitional waste rock and low-grade ore is likely to generate ARD or other deleterious leachates if sufficient percolation occurs through the piles." (DEIS 3-38)

The DEIS goes on to state that:

"The proposed reclamation approach would decrease the amount of percolation that occurs through the waste rock dumps (and the low-grade stockpile if reclaimed in place) because the growth media would store water that percolates into the ground during precipitation events and hold that water until it is either evaporated or transpired by plants in a process termed evapotranspiration (ET). This would decrease the volume of water that would enter the waste rock or low-grade ore, and reduce the potential for leachate generation." (DEIS p. 3-41)

Elsewhere the DEIS asserts that infiltration and therefore acid generation and metals leaching can be alleviated. However, as the information cited suggests, in fact the proposed measures would decrease, but not eliminate, infiltration, and subsequent poor quality acid rock drainage seepage from the waste rock and low-grade ore under the proposed plan of reclamation. There is no reason to assume it will not regardless of any modeling or suppositions. This has already been demonstrated at the Chino and Tyrone mines and at numerous other mines in the United States and elsewhere in similar climates. For that reason, and in accordance with the NM Copper Rules, the waste rock should be placed on a lined area.

3) THE DEIS FAILS TO ADEQUATELY ANALYZE THE MINE'S ENVIRONMENTAL AND SOCIOECONOMIC IMPACTS, AS REQUIRED BY NEPA.

A. The DEIS Fails to Adequately Analyze Impacts of the Mine's Operation Phase.

1. The DEIS fails to address the processing reality of low-grade ore.

The DEIS states that "Low-grade copper ore would likely be processed at the end of the mine life," (DEIS p. 2-6), yet provides no supporting documentation for this statement. Based on the history of copper mines in New Mexico and elsewhere, it is more likely that low-grade copper ore will not be processed except during times of exceptionally high copper prices or as an adjunct process to other processing operations. There is no assurance that the low-grade ore will be processed at any time during or at the end of the mine life. For the DEIS to consider it "likely" is unreasonable and unwarranted. BLM must either revise or supplement the DEIS with an alternatives analysis that includes an alternative in which low-grade ore remains unprocessed.

2. The DEIS fails to address the stability of the Mine's open pit.

The DEIS glaringly omits an analysis of the Mine's open pit stability from a post-mining, long-term standpoint. This is necessary to address public safety, post-mining land use, and any maintenance or operation activities associated with the open pit. BLM must either revise or supplement the DEIS to address stability of the Mine's open pit in both impacts and mitigation measures analyses.

3. *The DEIS Fails to Adequately Analyze the Mine's Tailings Storage Facility ("TSF").*

A. *The DEIS fails to adequately analyze the high rate of rise for the Mine's TSF.*

The DEIS provides that, "The proposed method of construction for the new TSF is by centerline raises, using cycloned tailings sand that is compacted to form a stable embankment. The centerline construction method was selected because the tailings deposition rate of rise is expected to be greater than 10 feet per year in the first 5 years *and up to 80 feet per year in the initial 2 years of TSF operation* (NMCC 2014a)." DEIS 2-18 (emphasis added). This is significant because the "rate of rise" is often cited as a potential adverse factor relative to failures in mine tailings facility design and operation.

As noted by the Arizona Mining BADCT ("Best Available Demonstrated Control Technology") Guidance Manual, "Large shear strains can potentially be created by differential settlements within the dam slopes and foundation, rapid rise or lowering of the water table within the slopes, earthquakes or a combination of two or more of these factors."[10] One way of controlling the failure potential is "limiting the rate [of] rise to prevent the triggering of undrained behavior of tailings by internal shear strains." AZ BADCT, p. 3-66. Although this is more common to upstream construction methods, it is also important to centerline methods as noted by Obermeyer (2011) in a centerline construction project involving 20 meters a year (approximately 65 ft/year) rise rate. According to Obermeyer, "The rapid rate of rise in the early years of TSF operation required careful planning, identification of very efficient construction methods, and incorporating design specifications and components that could meet the significant challenges posed by the high rate of rise."

BLM must either revise or supplement the DEIS with additional information addressing the relatively high rate of rise ("up to 80 feet per year in the initial 2 years of TSF operation") and the potential for internal shear strains to develop, triggering undrained behavior of tailings. The DEIS must specifically address what measures, in terms of design specifications and components, will be used to address the very high rate of rise being proposed for the TSF.

[10] Arizona Mining Guidance Manual, BADCT (Best Available Demonstrated Control Technology), Arizona Department of Environmental Quality, Aquifer Protection Program, p. E-2.

4) THE DEIS FAILS TO ADEQUATELY ANALYZE MITIGATION MEASURES AND RECLAMATION AND CLOSURE PLANS, AS REQUIRED BY NEPA AND BLM § 3809 REGULATIONS.

A. Mitigation.

1. The DEIS Fails to Adequately Analyze Mitigation Measures for the Mine's TSF.

i. TSF Liner Seepage.

The DEIS errs in providing a more detailed description of the TSF liner to be used under action Alternative 2, instead of under the Proposed Action. We agree with the U.S. Environmental Protection Agency's ("EPA") comment that "an analysis of the proposed liner's long-term effectiveness and long-term compatibility with the tailings material be provided" by the BLM. EPA Comments on the DEIS for Copper Flat, p. 5 (March 4, 2016). Additionally, a revised or supplemental DEIS should include information on how the proposed liner design will conform with New Mexico Administrative Code ("NMAC") regulation 20.6.7.22(4), which contains requirements for new tailings impoundment units.

The EPA has long since determined that all liners leak,[11] and in its recent comments submitted to BLM on the DEIS for Copper Flat, it calls on BLM to include "a discussion on compatibility to acidic tailing seepage if the tailing material becomes acidic and the type of collection system [that will be utilized] if at some point there is seepage after cessation of mining." EPA Comments on DEIS of Copper Flat, p. 5 (March 4, 2016). The DEIS should also be revised or supplemented to address why the proposed liner design was chosen over a less leak-prone design, such as a double liner with a leak collection and recovery system. The DEIS should also discuss and identify viable and implementable mitigation measures to address leakage that will most likely be needed if the proposed design is actually implemented.

ii. TSF Dam Collapse.

The DEIS fails to discuss the most current standards relative to reduction of catastrophic risks from mine tailings, which have been summarized in the findings of the Mt. Polley Mine Expert Panel.[12] While no mine can ever be entirely free of failures, the risk of catastrophic failure can be minimized by using best available technology ("BAT"). The Panel stated, "BAT should be actively encouraged for new tailings facilities at existing and proposed mines. Safety attributes should be evaluated separately from economic considerations, and costs should not be the determining factor."

BAT consists of three main components: 1) eliminate surface water from the impoundment; 2) promote unsaturated conditions in the tailings with drainage provisions; 3) and achieve

[11] U.S. Environmental Protection Agency, 1988, Federal Register, v. 53, no. 168, August 30, 1988, p. 33345.
[12] The full report, appendices and background material are available at https://www.mountpolleyreviewpanel.ca/

"dilatant"[13] conditions throughout the tailings deposit by compaction. (Mt Polley Expert Panel Report Section 9.3.1 BAT Principles) "The overarching goal of BAT is to reduce the number of tailings dam subject to failure. This can be achieved most directly by storing the majority of the tailings below ground – in mined-out pits for surface mining operations or as backfill for underground mines." (Mt Polley Expert Panel Report Section 9.3.2 BAT Methods)

Recent legislation passed in Montana, with bipartisan support, contains these BAT recommendations.[14] This legislation, which the Mt Polley Expert Panel as well as the author of these comments helped draft, contains requirements, which should be addressed in a revised or supplemental DEIS for the Copper Flat Project. For example, a revised or supplemental DEIS should provide the following:

- A probabilistic and deterministic seismic evaluation for the area.
- A dam breach analysis, a failure modes and effects analysis or other appropriate detailed risk assessment, and an observational method plan addressing residual risk.
- A description of the chemical and physical properties of the materials and process solutions to be stored in the TSF.
- A list of the assumptions used during the analysis and design of the facility and a description justifying the validity of each assumption.
- A description of proposed risk management measures for each facility life-cycle stage, including construction, operation and closure.
- A detailed description of how water, seepage, and process solutions are to be routed or managed during construction, operation and closure.
- A detailed description of storm water controls, including diversions, storage, freeboard, and how extreme storm events will be managed.
- A flood event design criterion less than the probable maximum flood but greater than the 1-in-500 year, 24-hour event.
- Utilization of an Independent Review Panel to ensure the TSF design plans satisfy BAT.

[13] A dilatant is a non-Newtonian fluid where the shear viscosity increases with applied shear stress. This behavior is only one type of deviation from Newton's Law, and it is controlled by such factors as particle size, shape, and distribution

[14] http://leg.mt.gov/bills/2015/BillPdf/SB0409.pdf

2. *The DEIS Fails to Adequately Analyze Mitigation Measures for the Mine's Waste Rock Disposal Facility.*

The DEIS states the following mitigation measures will be utilized to mitigate AMD, "These diversion ditches and berms would also be used to control water inflow onto waste rock disposal piles containing partially oxidized and unoxidized material," and, "To limit oxidation potential post closure, the reclaimed waste rock and any remaining stockpiles would be covered with a consolidated layer of reclamation cover to limit infiltration of water and oxygen and then covered with growth media and vegetated." DEIS 2-22. However, the DEIS fails to address the following:

- Why alternative cover designs, such as an engineered cover with geomembrane and capillary break resulting in zero infiltration, were not chosen as a mitigation for acid rock drainage.
- The extent to which the proposed design will limit infiltration of water and oxygen based on results at other similar mine sites in New Mexico, such as the Chino and Tyrone mines.
- Why a geomembrane liner or similar system to collect and manage seepage under the waste rock was not considered as the best practice to protect groundwater and long-term public liability.

The DEIS must either be revised or supplemented to address these issues and adequately analyze mitigation measures for the Mine's waste rock disposal facility.

3. *The DEIS Fails to Adequately Analyze Mitigation Measures for the Mine's Pit Lake.*

The DEIS states the following:

> NMAC 20.6.7.33(D) requires that pit lakes in which evaporation from the surface of the open pit water body is expected to exceed the water inflow shall be considered hydrologic evaporative sinks and water quality in these pit lakes is not subject to New Mexico groundwater quality standards at 20.6.2.3103 NMAC. If water is predicted to flow from a pit lake into groundwater, the groundwater quality standards at 20.6.2.3103 would apply to the pit lake. Based on the current conceptual understanding of the groundwater flow system at the pit lake, it is thought that the groundwater quality standards at 20.6.2.3103 NMAC do not apply to the existing pit lake.

DEIS 3-32. However, the DEIS goes on to say that, "SRK (2013a) predicts that the water quality in 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." *Id.* The DEIS must identify what water quality standards (e.g. surface water or other) will apply to the pit lake if groundwater quality standards are not applicable.

The DEIS further provides that, "Because both the future pit lake water quality and the water quality standards that will apply to the pit lake decades or centuries in the future are uncertain, it is recommended that mitigations be developed to provide for post-mining compliance with water quality standards." DEIS 3-33. Therefore, the DEIS instructs, "The proponent shall modify the MPO to include appropriate mitigations to protect pit lake water quality. The proponent shall provide a preliminary pit lake water quality management plan, which describes reclamation, water quality management, and monitoring activities that would be conducted to facilitate compliance with applicable water quality standards during the post-mining monitoring period." *Id.* The DEIS does not provide NMCC's preliminary pit lake water quality management plan, as NMCC has yet to modify its MPO to include such a plan.

BLM should require NMCC to develop a conceptual pit lake water quality management plan on a conservative basis to ensure that mitigations are identified and available to provide for post-mining water quality standards. Furthermore, BLM should require a cost estimate for implementation of the plan and that a trust fund or other long-term mechanisms be established for implementation *prior* to any permit for the project being issued. The suggestion by the DEIS that a plan be developed as little as one year prior to closure (and only then will a cost estimate be performed and a trust fund be established) (DEIS 3-34), is not only inconsistent with BLM financial assurance policy, but essentially will constitute failure to adequately regulate a predictable adverse impact.

We are in agreement with EPA's assessment that the 30-year time period for post-mining compliance with water quality standards for the pit lake and for the funding mechanism for implementation of the pit lake water quality management plan is inadequate. See EPA's Comments on DEIS for Copper Flat, p. 7 (March 4, 2016). As EPA has stated, "The 30-year time period is inadequate because (1) it may take decades or even centuries for some environmental impacts (acid rock drainage from sulphate rock) to occur to the surface water and ground water resources at this site, and (2) mitigation efforts to maintain compliance with New Mexico surface water quality standards for the designated future uses of the pit lake will likely be needed for similar time frames and possibly in perpetuity." *Id.* We also recommend that "BLM require the MPO to include post-mining monitoring and implementation of the pit lake water quality management plan for a minimum of 100 years." *Id.*

B. Reclamation and Closure.

The DEIS states, "The project is designed to meet, without perpetual care, all applicable Federal and State environmental requirements following closure." DEIS 2-34. This statement contradicts not only the experience at other major mines in New Mexico and elsewhere, but also contradicts BLM's experience and subsequent guidance developed in geographic areas such as Nevada where modern mining is more common and the effects more well established. Management of mine-influenced water associated with the existing Chino, Tyrone, Cobre, and Little Rock copper mines in New Mexico is predicted to require perpetual care (see Chino, Tyrone and Cobre Closure Closeout Plans submitted to the New Mexico Mining and Minerals Division and New Mexico Environment Department).

As noted by the BLM Handbook, "The reclamation plan may be the most important component of the Plan of Operations for the long-term mitigation of impacts and achievement of sustainable development levels or objectives. The reclamation plan serves as the basic construction plan for calculating the reclamation cost and financial guarantee amount, so detail is important." (p. 4-19). To meet this requirement Nevada BLM, for example, has developed guidance for long-term closure costs.[15] The guidance includes examples for when a reclamation plan is required and the necessary long-term tasks to be included if the project involves a tailings facility, has acid rock drainage, or involves groundwater contamination. The Copper Flat Mine involves a tailings facility, acid rock drainage, and groundwater contamination.

Therefore, the DEIS should be revised or supplemented to provide additional discussion of how the site-specific characteristics of this project contradict both BLM guidance and management experience at similar projects in New Mexico where perpetual care is assumed to be required, such as at the Chino and Tyrone Mines. The DEIS should not contain or be based upon unjustified speculation as to the success of the Project, particularly where it is in direct contradiction to the overwhelming evidence that suggests long-term monitoring, maintenance and operations are required to assure protection of the land and water resources.

1. The DEIS Fails to Adequately Analyze Environmental Considerations for Reclamation.

i. The Mine's Growth Media.

"Although the proposed MPO (NMCC 2012c) indicates that there is a potential shortage of available topsoil to stockpile during construction of the mine, a supplemental soils investigation has determined that cover materials sufficient to meet cover requirements of up to 36 inches will be obtained from within the Copper Flat mine area (THEMAC, 2015)." DEIS 3-41. The DEIS should provide additional information on the available topsoil (e.g. how much is available and what are the characteristics) and identify the supplemental materials that will be used as growth medium to meet cover requirements of 36 inches.

The DEIS provides the following regarding the Mine's growth media:

> Available growth media would be salvaged and stored in stockpiles for reclamation. Growth media would consist of soils stripped prior to surface disturbance activities and containing some organic matter. Growth media remaining in a stockpile for one or more planting seasons would be shaped for erosion control and seeded with an interim seed mix to stabilize the material, reduce establishment of undesirable weeds and noxious weeds, and assist with control of blowing dust.

DEIS 2-32. In order to evaluate the adequacy of the reclamation plan and its potential for reclamation success, the DEIS should be revised or supplemented with additional information on growth media quantity, volume, depth for reclamation, quality for revegetation, and other similar variables. According to the BLM Handbook, "The Notice must describe how the operator will complete reclamation to the standards described at 43 CFR 3809.420. The operator must provide

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[15] See Attachment 1 to these comments.

sufficient information for the BLM to assess the adequacy of the proposed reclamation plan." Additionally, "…the plan must propose the criteria for what would constitute successful revegetation and describe any additional measures, such as temporary fencing or noxious weed control, which might be used on the reclaimed area." (p. 3-6,3-7.) The DEIS simply fails to provide any of this information.

Given the particularly challenging environment and ecosystem in the Project area, in addition to the revegetation requirements specific to the New Mexico Mining Act Regulations, the DEIS should be revised or supplemented to provide extensive information and analysis in this regard. It should discuss examples where successful mine reclamation and closure, meeting both existing New Mexico Mining Act and BLM 3809 requirements, have been accomplished at mine sites in New Mexico. In doing so, the DEIS should recognize that the ability to achieve successful revegetation and water protection is unproven and has been the subject of significant ongoing scientific debate among the mining industry, regulators and various experts on the subject matters of recontouring, stormwater design, growth media type, depth and amendment, seed mixes, and other aspects. As no major mine has been reclaimed and successfully closed meeting the requirements of the New Mexico Mining Act to the best of our knowledge, the DEIS should recognize that the success of these measures in general presents significant risk to the environment that can result in the need for ongoing long-term monitoring and maintenance, including periodic replacement of some features such as stormwater catchments and conveyances following storm events which exceed design specifications.

In addition, the DEIS should address the financial assurance implications related to ensuring long-term viability of the post-closure plan. The DEIS should ensure the necessary tasks can be accomplished in perpetuity if necessary, without liability or expense to the government and public taxpayers.

2. ***The DEIS Fails to Adequately Analyze Environmental Protection Measures for Reclamation.***

   i. ***The Mine's Acid Rock Drainage.***

The DEIS states the following regarding reclamation of the Mine's acid rock drainage:

> Acid Rock Drainage (ARD): Partially oxidized transitional waste rock would be managed and reclaimed to alleviate potential ARD. The transitional waste rock may be segregated and placed in the west and north waste rock disposal areas. The exact method of disposal and possible segregation would be determined though the current geochemical testing program and the development of a material handling plan. To minimize oxidation post-closure, waste rock would be placed in an engineered WRDF (NMCC 2014a).

DEIS 2-37.

"Waste rock with the potential to generate acid or mobilize deleterious constituents would be determined through the current geochemical testing program and the development and execution of a NMED-approved waste management plan." DEIS p. 2-48.

As noted by these sections of the DEIS, the management of waste rock is important, however the method of management is being deferred to an as yet to be developed waste management plan. This is in contradiction to BLM requirements. According to the BLM Handbook:

> Rock characterization and handling plans describe how the operator will manage rock that may require special handling, e.g., due to its potential to generate acid or deleterious leachate, is to be managed.62 The plans must include the analytical protocols and criteria that will be used to identify potential acidic or reactive rock. The plan must include how such material is to be (1) identified by testing prior to and during mining, (2) selectively handled, (3) processed or treated, and (4) reclaimed. These plans are integral to the "source control" of acid-forming, toxic, or other deleterious material as described in the performance standards (Section 5.3.11.1, Source Control Requirements).

Id. Pp. 4-17 (Section 4.3.3.2.4 Rock Characterization and Handling Plans).

The DEIS should be supplemented to include the waste rock management plan developed for NMED. In general, the DEIS should be supplemented to include all information provided to NMED and NM MMD as part of their permit requirements, including draft permits. The supplemental EIS should be delayed until the state permit processes have proceeded to a point where their requirements can be incorporated into the EIS. Without this information, a meaningful environmental analysis cannot be performed on this project.

ii. The Mine's Waste Rock.

The DEIS provides that waste rock "may" be segregated (DEIS p. 2-37) using a method that "would be determined" and result "…in the development of a material handling plan." (DEIS p. 2-48). According to the BLM Handbook (p. 4-17), NMCC's MPO "must include" a rock characterization and handling plan. The MPO should contain a rock characterization and handling plan and it should be summarized and included as an appendix as part of DEIS. BLM and other evaluators are not able to determine whether the waste rock will or will not result in unnecessary or undue degradation of public land based on the information provided.

Additionally, "The WRDFs [waste rock disposal facility] would be contoured to enhance runoff; covered to reduce infiltration; and reclaimed by regrading. This would be done with a dozer compacting the surface and covering this surface with up to 36 inches of growth media or topsoil (or as may be allowable under State statutes)." DEIS 2-37.

NMCC's MPO and the DEIS should provide for an actual proposed depth (e.g. "with 36 inches") rather than be non-committal (e.g. "with up to 36 inches"). The DEIS should also discuss and evaluate the incorporation of geomorphic landform design concepts. Landform design[16]

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[16] See B. Ayres, B. Dobchuk, D. Christensen, M. O'Kane and M. Fawcett. 2006. INCORPORATION OF NATURAL SLOPE FEATURES INTO THE DESIGN OF FINAL LANDFORMS FOR WASTE ROCK STOCKPILES, Paper presented at the 7th International Conference on Acid Rock Drainage (ICARD), March 26-30, 2006, St. Louis MO and Schor, Horst J., Gray, Donald H. 2007. Landforming: An Environmental Approach to Hillside Development, Mine Reclamation and Watershed Restoration, John Wiley & Sons.

represents an opportunity to use state-of-the-art geomorphological reclamation approaches to achieve both better revegetation and reduced erosion by mimicking the natural environment. Under conventional agricultural-based approaches to reclamation, uniform evenly graded engineered slopes are typical. It has been shown, however, that the replication of mature and relatively stable natural geomorphic land forms, with all their variability and irregularity, can reduce the risk of erosion while increasing the likelihood of both successful initial propagation of plants and sustained revegetation success over the long term. The principles of landform reclamation are compatible with standard engineering approaches, as well as stakeholder approaches.

iii. The Mine's TSF.

The DEIS states, "Diversions and Overland Flow: The surface drainage of the mine area was designed to contain or control the 100-year/24-hour storm event," (DEIS p. 2-37), and, "TSFs: The TSF would be designed, constructed, and maintained to prevent adverse impacts to the hydrologic balance and adjoining property, and to assure the safety of the public and wildlife." DEIS p. 2-38. However, as noted by Logsdon and the National Academy of Science[17], it is entirely reasonable, if not prudent, to utilize a performance criteria of 200 years for engineered systems at modern mines. This suggests that not only should stormwater and other systems be designed for a 200-yr storm event return interval, but also that post-closure monitoring and maintenance, together with operations required to maintain regulatory compliance, be planned and financially assured for a similar 200-year period.

The current best practice is to use a 200-yr/24-hr storm event as standard design performance criteria for diversion and overland flow, as well as internal stormwater conveyance and catchment designs. Given the recognized potential for climate change to result in greater frequency and/or intensity of storm events, it is strongly recommended that the design, NMCC's MPO and the DEIS be revised to incorporate the 200-yr/24-hr storm event as the minimum level of performance. It is also recommended that the design, NMCC's MPO and the DEIS incorporate other features, such as tailings spillways designed for the PMF ("probable maximum flood"), as a conservative measure to *minimize* impacts, as this still would not entirely "prevent" storm event impacts to the hydrologic balance and adjoining property, public safety and wildlife.

3. The DEIS Fails to Adequately Analyze Facility-Specific Reclamation.

i. The Mine Pit.

The DEIS provides the following regarding reclamation of the Mine's pit:

> Mine Pit: NMCC does not propose to backfill the pit. Groundwater inflow formed a lake in the former pit. The current water level is at about 5,439 feet; therefore, pit dewatering would be necessary during operations. Following cessation of dewatering activities, a lake would again form in the pit. The post-closure pit water elevation is estimated to be approximately 4,900 feet. The depth of the lake would fluctuate a few feet depending on precipitation and the evaporation rate. If natural refilling were to be selected, this would

[17] https://www.imwa.info/docs/imwa_2013/IMWA2013_Logsdon_564.pdf

> proceed over a number of years. Rapid filling, proposed as mitigation, would occur much more quickly. This would occur under conditions of water right approval to quickly submerge mineralized wallrock and limit mineral oxidation and formation of soluble mineral residue. Reclamation of the pit during operations would be limited to erosion control and maintaining slope stability.

DEIS 2-43.

Although it is not required under BLM 3809 regulations, as noted by the California Department of Natural Resources, which has passed requirements for pit backfilling, "In summary, leaving large, open pits in the surface surrounded by millions of cubic yards of waste rock does not leave the site in a useful condition, and clearly leaves the site in a less useful and beneficial condition than before it was mined...To date, no large, open pit metallic mines in California have been returned to the conditions contemplated by SMARA[18], and these sites remain demonstrably dangerous to both human and animal health and safety."[19] Final Statement of Reasons for 14 CCR Section 3704.1, p. 1-2. Similarly, because the New Mexico Mining Act requires that ongoing care and maintenance not be required, complete backfilling or at the very least partial backfilling to prevent formation of a pit lake is necessary to meet this requirement. The DEIS should be supplemented to include partial backfilling to prevent formation of a pit lake, and complete backfilling to original contours, as fully analyzed alternatives to the proposal to not backfill the pit; requiring no backfilling would allow for the creation of a pit lake with significant potential to exceed New Mexico groundwater standards as well as present a hazard to wildlife.

ii. The Mine's Waste Rock Disposal Areas and Low-Grade Stockpile.

The DEIS states, "Waste Rock Disposal Areas and Low-Grade Stockpile: "All the WRDFs and any low-grade ore remaining in the low-grade ore stockpile would be reclaimed in a manner that has been determined to reduce infiltration and to alleviate the long-term risk of acid generation and metals leaching." DEIS 2-45. This statement is inconsistent with reclamation experience at other New Mexico mines and mines elsewhere in the U.S.

While revegetated covers can be utilized to reduce infiltration, as suggested by the DEIS, reduction is not equivalent to "elimination" of infiltration as would be required to alleviate, or entirely eliminate, the long-term risk of acid generation and metals leaching. In fact, despite similar covers (e.g. 3 ft growth medium) used at the Chino and Tyrone Mines (see CCPs) intended to reduce infiltration to the greatest extent reasonable, acid generation and metals leaching is still expected to be present and require long-term mitigation including water treatment. Similarly, store and release or evapotranspiration ("ET") covers are widely utilized, but are not expected by themselves to eliminate long-term seepage and subsequent potential seepage requirements.

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[18] California Surface Mining and Reclamation Act.

[19] See http://www.conservation.ca.gov/smgb/reports/Documents/smgb%20ir%202007-02.pdf.

iii. The Mine's TSF.

TSF: "When processing and tailings deposition ends, the free water pond remaining at the top of the TSF would be evaporated to eliminate the largest source of draindown solution, and solution flow through the TSF underdrain system would reduce to approximately 800 gpm approximately 9 months after processing shutdown. After that time, draindown from the TSF would continue to decline at a steady rate. Draindown solution would be collected in the TSF underdrain collection pond, from which it would be pumped to the top of the TSF to be evaporated or used as reclamation cover irrigation if the water is of suitable quality. If the draindown solution is not suitable for reclamation cover, a portion of the TSF would be left un-reclaimed and uncovered for evaporation operations. When the draindown flow rate reached a very low level, estimated to require 3 to 5 years following process shutdown, and with the approval of the appropriate New Mexico regulatory agencies, a passive evapotranspiration system would be installed at the bottom of the TSF to eliminate final draindown flows. At this point, the seepage collection pond would be decommissioned and reclamation of the TSF completed." (DEIS p. 2-46)

The suggestion of achieving a very low level in 3-5 years to allow for passive evapotranspiration to accomplish draindown solution elimination is not consistent with BLM experience at other mine sites and is not consistent with BLM guidance. As described by the Nevada Department of Environmental Protection[20] as part of an interagency memorandum of understanding with BLM[21], Phase I and II process fluid stabilization for tailings facilities includes active evaporation for a period of approximately 30 years followed by Phase III which involves a ten year period of draindown treatment leading to Phase IV described as a passive system in approximately 40 years. The BLM should require NMCC to conduct draindown calculations using methodologies similar to those developed by BLM in Nevada[22] and revise the MPO as well as supplement the DEIS based on the information provided.

4. The DEIS Fails to Adequately Analyze the Mine's Post-Closure Operations, Maintenance and Monitoring.

i. The Mine's Post-Closure Operations, Maintenance and Monitoring.

The DEIS provides the following information to describe and evaluate post-closure operations, maintenance and monitoring:

- Proposed Action. "Post-closure monitoring - 12 years." DEIS 2-5.
- Alternative 1: Accelerated Options – 25,000 TPD. "Post-closure monitoring, care, and maintenance - 12 years." DEIS 2-59.
- Alternative 2: Accelerated Options – 30,000 TPD. "Post-closure monitoring, care, and maintenance - 12 years." DEIS 2-73.

When discussing post-closure monitoring, the DEIS states, "Following the completion of reclamation and closure activities, revegetation would be monitored for at least two growing

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[20] See http://ndep.nv.gov/bmrr/file/ifm_pfs_definitions.pdf
[21] See http://www.blm.gov/nv/st/en/prog/minerals/mining.print.html
[22] See http://www.blm.gov/style/medialib/blm/nv/minerals/mining.Par.81105.File.dat/HLDE_1_2.xls

seasons and would meet Part 6 requirements under the New Mexico Mining Act. Groundwater would be monitored according to conditions set forth in the groundwater DP, which was prepared by NMCC for submission to NMED and is currently undergoing technical review." DEIS 2-36. NMCC's December 8, 2015 discharge permit application submitted to NMED has not been listed in the "references" section of the DEIS, nor has it been included in the DEIS appendices.

Additionally, such vague statements as "The BLM and State agencies would set post-closure monitoring requirements at mine closure," and, "Sampling of the water in the pit after mine closure would continue for a period that is established by consultation with the NMED to determine any changes in pit water quality" do not satisfy the requirements of NEPA. DEIS 2-38. Therefore, the DEIS's post-closure information is inadequate. The DEIS fails to present a substantive analysis of on- site operations and maintenance, or post-closure monitoring. This prevents the adequate evaluation of impacts and minimizes the Mine's potential for long-term care and maintenance.

According to BLM's 3809 Handbook, the following information is required to implement the BLM's surface management program:

- "The reclamation plan must include all reclamation, closure, and post-reclamation requirements needed to meet the performance standards described at 43 CFR 3809.420." (p. 3-7)

- "Detailed plans for water treatment that will be conducted during mine operations, or will continue post-reclamation, must be provided. This includes information on treatment methods, system design, outfalls, rates, treatment threshold, and the expected duration of treatment. Other Federal or state permits that may be needed for the operation of the treatment system must be identified." (p. 4-16)

- "Post-Closure Management Plans…Sometimes reclamation-related activities must continue long after the majority of reclamation work has been completed. Fencing may need to be maintained, signs replaced, water treatment systems operated or maintained, reclaimed slopes repaired, etc. The duration of such activity may be months, years, decades, or in the case of water treatment, the end date may be indefinite. The reclamation plan must clearly identify these post-closure activities and the operator's commitment to performing the required work over the necessary time period." (p. 4-24)

- "Evaluate the Plan of Operations and any alternatives on their inherent merits assuming full implementation, including all operation, mitigation, monitoring, reclamation, closure, and post-reclamation actions." (p. 4-40)

- "Post-reclamation runoff or run-on control structures must be incorporated by the operator into the overall reclamation plan and built to accommodate flows from the design storm event. Inadequate consideration of the runoff area(s), control designs, or improper runoff management procedures, can cause cascading downgradient reclamation failures that may seriously affect the overall reclamation success." (p. 5-11)

- "Reclamation Plan. Any post-reclamation obligations covered by the long-term funding mechanism must be described in the approved Plan of Operations. If the District/Field Manager determines the operator is responsible for post-reclamation obligations not described in the original reclamation plan, the manager will direct the operator to submit a modification to the Plan of Operations covering those obligations. The manager must review and approve the Plan of Operations to ensure all reclamation and closure obligations and corrective actions are adequately addressed." (p. 6-33)

BLM's 3809 Handbook also describes various post-reclamation structures or features that will have to be relied upon long-term and therefore may require routine maintenance and/or periodic replacement:

- "...monitoring wells, ponds for stormwater management, or powerlines for treatment facilities." (p. 4-23)
- "...construction and maintenance of a permanent safety fence to limit public access to a highwall after mine closure." (p. 6-33)
- "...monitoring, construction, operation, maintenance, replacement, or other activities for those required facilities, treatment, or other post-reclamation needs documented in the Plan of Operations." (p. 6-34)

The DEIS should either be revised or supplemented to include the above-referenced information. It should be clear what the purpose of post-closure monitoring will be. Finally, the post-closure monitoring period should be significantly lengthened. Twelve years may be appropriate for revegetation, but it is not appropriate or consistent with either BLM or NMED Copper Rules for post-closure monitoring.

ii. NMCC's Financial Assurance for Post-Closure Operations, Maintenance and Monitoring.

The DEIS fails to disclose NMCC's financial assurance information. We agree with EPA's comment that, "The availability of adequate resources to ensure effective reclamation, closure, and post-closure management is a critical factor in determining the significance of the proposed project's potential impacts." EPA Comments on Copper Flat DEIS, p. 2 (March 4, 2016). This information "is likely to be required" (Id.) and a revised or supplemental DEIS should incorporate a discussion of NMCC's financial assurance. Additionally, BLM's 3809 Handbook provides the following:

> 6.2.1.6 Operating and Maintenance Costs. Reclamation operating and maintenance costs reflect the direct current costs of reclamation based on the filed Notice or approved Plan of Operations. Where applicable, reclamation costs should be estimated for the following closure tasks: interim operation and maintenance, hazardous materials treatment, water treatment, demolition, removal and disposal, earthwork, drill hole plugging, revegetation, mitigation, and post-reclamation operation, maintenance, and monitoring requirements.

BLM 3809 Handbook, p. 6-6.

iii. NMCC's Long-Term Funding Mechanism(s) for Post-Closure Operations, Maintenance and Monitoring.

The DEIS fails to identify or discuss what long-term funding mechanisms NMCC will implement for the Mine's post-closure operations, maintenance and monitoring. Again, the availability of adequate financial resources to ensure effective reclamation, closure and post-closure management is a critical factor in determining the significance of the Mine's potential impacts. Failure to include and analyze such information violates NEPA.

Additionally, BLM's 3809 Handbook provides that:

> The purpose of a trust fund or other long-term funding mechanism is to guarantee the continuation of post-mining treatment to achieve water quality objectives and for other long-term, post-mining maintenance requirements. The District/Field Manager decides whether a trust fund is needed on a case-by-case basis. In determining whether a trust fund or other funding mechanism will be required, the manager should consider the following factors:
>
> - The anticipated post-reclamation obligations as identified in an environmental document and/or plan approval for the operation.
> - The reasonable degree of certainty that the obligations will occur based on accepted scientific evidence and/or models.

BLM 3809 Handbook, p. 6-32.

Based on the long history of mine bankruptcies in New Mexico and throughout the United States, many state and federal agencies have developed financial assurance requirements for mines to ensure that adequate funds will be available when they are needed, and for as long as may be needed. These funds are used to satisfy reclamation, closure, and post-closure management obligations, such as the prevention of undue and unnecessary degradation. Information and an analysis regarding long-term funding mechanisms to be utilized by NMCC are essential for an adequate overarching evaluation of the Mine's impacts, because it could make the difference between a project that is sufficiently managed over the long-term by the site operator and an unfunded or under-funded contaminated site that becomes a liability for New Mexican or Federal regulators. BLM must therefore revise or supplement the DEIS with estimated reclamation and post-reclamation costs, supported by a detailed reclamation and closure plan, and a financial assurance cost estimate with long-term funding mechanisms submitted by NMCC as part of its MPO.

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MEMORANDUM

To: Jaimie Park, NMELC

FROM: Phil Musser

RE: Comments on Socioeconomic Analysis Relied Upon By the DEIS of Copper Flat Copper Mine

DATE: February 16, 2016

My Background

Back in 1985 I was hired as the regional economic developer in the Western Upper Peninsula of Michigan, a geographically isolated region with a population of 47,000. This region experienced the closure of a copper mine in 1969 that laid off hundreds of workers. The copper mine had been the lifeblood of the community, being the major employer, the primary purchaser of local goods and services, and a contributor to many community organizations. By 1985, the regional economy had suffered a long downturn. Many manufacturing and service businesses that once served the mine had closed, and many retail businesses either closed or were in a difficult economic condition. The only industries left in the region were logging and tourism.

My task was to rebuild the region's economy. Because of few resources and little possibility of attracting outside employers, I developed what later became known as an "economic gardening strategy." This strategy was later popularized by an economic development group in Littleton, Colorado, and championed by the Edward Lowe Foundation and many states and communities throughout the U.S. An economic gardening strategy involves providing customized business assistance to local entrepreneurs with potential for starting new businesses, that is, growing your own businesses. These businesses have roots in the community, can be started by low and moderate income residents, and are often smaller businesses which provide economic diversification.

Over a period of 20 years, this strategy revitalized the local economy through the start up of many manufacturing, high tech and service companies in the community. Tourism continued to also be a mainstay of the regional economy, as did logging (though to a lesser extent). The rebuilding was made easier by the fact that "boom and bust" copper mining did not resume in the community; thus allowing the region to focus on building a diversified economy based on many small and medium-sized businesses which have continued to grow.

Critique of the DEIS's Socioeconomic Study

The socioeconomic study for Sierra County has a number of deficiencies. Specifically, it erroneously assumes that:

- **Copper mining will continue uninterrupted, albeit at different levels, over the 11-16 year life of the mine.**

However, mining is contingent upon copper prices and, in reviewing copper prices over the past decades, it is difficult to find an 11-year period when copper prices stayed above what is commonly considered to be break-even prices.[1] The current situation with the nearby Tyrone Mine that has recently laid off over 200 employees due to low copper prices is just such an example. This downsizing will likely continue to haunt that regional economy for many years to come.

- **The majority of wages and benefits paid to mining employees will stay in Sierra County.**

While the study correctly observes that there will be leakage of miners' incomes as wages are sent back to family members not living in Sierra County, it fails to mention that a significant share of income for mine employees with both locally relocated and distant families is spent purchasing goods and services on the internet. A report by Forrester Research Inc. states that e-retail spending will increase by 62% from 2011 to 2016, and that each customer is projected to spend $1,738 in 2016 since many consumers prefer e-commerce to shopping at local bricks-and-mortar stores. Further, most small town businesses do not advertise on the internet nor are set up to allow on-line purchases. Small town goods and services businesses often cannot compete with either larger bricks-and-mortar stores in their community, which send their profits out of the area, or with on-line stores. These dynamics severely constrain wage spending and growth of Sierra County's economy.[2]

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[1] 3.22.1.4.3: Royalties – the first paragraph of page 3-2444 indicates royalty payments above and below $2 per pound of copper. However, it fails to mention what price of copper is necessary for the mine to even operate. That is, there is no real sensitivity analysis offered based on a break-even price for copper.

[2] 3.22.1.3 Earnings: the discussion of leakage, while correctly observing that workers who do not live where the work occurs will spend elsewhere, forgets to mention that in addition a significant share of worker wages gets spent on internet purchases. Together, this is significant leakage that diminishes the wage figures claimed to benefit Sierra County.

- **A significant number of jobs for miners and other employees will be held by Sierra County residents.**[3]

To the contrary, current mining technology requires education and skills that most Sierra County residents do not possess.[4] The study observes that Sierra County has an older population, with double the number of persons 65 and older than the state as a whole. A story *Undermining the West*, an article about a proposed Arizona copper mine in an area called Oak Flat, appeared in the February 8, 2016 issue of *High Country News*. The article included a quote from a former mayor of Superior, Arizona who is also a former miner:

> *Former mayor (Roy) Chavez has spent a good deal of energy and time since the old mines closed trying to build a new economy for Superior, one based on tourism, amenities and the like, and he worries that an enormous mine would scuttle those plans. Besides, he predicts that the nature of modern mining means that few locals will be hired. 'Without a college degree,' Chavez says, 'you don't stand a chance.'*

As the study observes, "About 78.1 percent of the total population in the Hillsboro CDP has less than a ninth-grade education," and, "Additionally, 30.6 percent of Sierra County's population is over the age of 65, an above-average concentration."[5]

- **New mining jobs in Sierra County will be a positive economic development.**

However, the study ignores the following:

- When mining operations are first announced and then commence, many local businesses take out bank or government guaranteed loans (SBA 7a loans) in order to expand or update their businesses in anticipation of increased customers and revenues. Local governments also expend funds for new and updated infrastructure.[6] Real Estate developers build new

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[3] 3.22.1.2.3: Unemployment rates: Sierra County's unemployment rate is significantly lower than the state as a whole. This means two things, first that fewer qualified workers are available for the proposed mine and, secondly, that Sierra County's economy has begun to rebound without mining jobs.

[4] 3.22.1.5.3.2 Continuing Education: The fact that 78.1 percent of Hillsboro CDP have less than a ninth-grade education would suggest that, even with continuing education, few Hillsboro residents would be eligible for mining jobs, particularly during the operating phase.

[5] Table 3-54: Cites a lower population of people between the ages of 19 and 44 than the state as a whole, and a significantly higher percentage of older adults than the state as a whole. This is a recipe for very few local hires in the copper mining industry which is constantly increasingly the level of technology and, correspondingly, the level of education and skills required of its workforce.

[6] 3.22.1.5 Community Services: this section fails to mention that an increase of both firefighters and police would be necessary during mine operations. Further, many communities are having difficulty recruiting volunteer firefighters, and hiring/retaining of law enforcement personnel depends on continued mine operations during the mine period. Given the volatility of copper prices, this would cause hiring/retention issues.

homes. A layoff or cessation of mining operations leaves these businesses with unpayable debt, and wreaks a heavy financial toll on local government and school budgets.

- Mine closures happen quickly with little notice to employees who have financial obligations they suddenly cannot meet if laid off or if working hours are reduced.[7]

- A mining operation tends to dominate the local economy. Businesses start to focus their products and services to the mining operation and to mine employees; local governments become dependent upon increased tax revenues and larger budgets; and local organizations and non-profits become dependent upon contributions from the mining company. This tends to preempt other community economic development initiatives that otherwise would have happened, preventing growth and diversification of the local economy. When a mine closes or downsizes, this produces a negative financial domino effect throughout the community. This causes businesses to "pull in," and for now-unemployed workers to move elsewhere. Financial institutions also become less willing to finance local business and entrepreneurs. In Michigan, it took us many years to convince local lenders to begin providing business loans to local businesses and entrepreneurs again, a dynamic that severely constrained economic development.

- Mining and tourism are incompatible economic drivers. The study observes that one of Sierra County's main economic drivers is tourism. Specifically, it states "Over the past few decades, the social environment of the surrounding communities has been in transition from traditional extractive associations with natural resources...to more recreation- and tourism-based economies and lifestyles." Mining facilities increase truck traffic, dust and particulates, and decrease water quantity and quality, as well as visual resources.[8] Tourists in Sierra County are most interested in beautiful vistas and outdoor recreation, and communities like Sierra County promote an image of offering these amenities. Mining activity can actually decrease tourism activity while it is operating, and long after mining operations have ceased. During the period 2001-2010, the study observes that no compensation of employees in Sierra County came from mining.[9] Given that Sierra County's

[7] DEIS 3-260, first and second paragraphs: The assumption of 127 employees on average per year neglects the likelihood that the mine will have vastly different employment levels over the life of the mine, resulting in economic "boom and bust" for Sierra County. It also neglects the possibility of the mine shutting down in the event of low copper prices. Further, it bases its assumptions on 70 percent local employment which, as previously stated, is likely unrealistic.

[8] 3.22.2 Environmental Effects: The study promotes the positive economic impacts of the mine, but fails to discuss the longer-term negative impacts to the economy from mine closure, that is, the "boom-and-bust" nature of mining operations and the fact that most mining communities are worse off economically than communities with no mining history. Again, only positive "ripple" effects are considered.

[9] 3.22.1.3.1 Per Capita Personal Income (PCPI): The fact that Sierra County's PCPI grew so rapidly from 2001-2010 again likely shows its economy is gathering strength based upon other than mining employment (Table 3-62 shows no mining employment from 2001-2010) as evidenced by "the ongoing revival of downtown Truth and Consequences." The reference to this being caused in part by an aging resident population neglects to mention the increase in transfer payments to an **increasing** aging population including pension and social security payments adding to income. Transfer payments are an important component of local spendable income and a boost to local retail and other establishments.

Per Capita Personal Income increased 63.2% in this 10 year period, the County is certainly doing something right economically.[10] It would be disappointing if relatively short-term mining disrupted the sectors that are doing well, particularly the tourism sector.[11]

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[10] 3.22.1.2.2 Employment: Since employment increased during the period 2000-2010, this indicates that Sierra County has had positive results in rebuilding their economy based on other than mining employment.

[11] It takes many years, even decades, for a community to establish itself as a recreation and tourism destination and as a place for retirees to relocate to. That is, a community must take a long-term view when executing an economic development strategy. The proposed mining project is a short-term economic event that is not in conformity with Sierra County's longer-term and recently successful recreation and tourism strategy as indicated by PCPI and other statistics. It is unfortunate that lower income communities feel it necessary to welcome short-term economic impacts that are not in its longer-term interest.

Jaimie Park

From:	Haywood, Doug [dhaywood@blm.gov]
Sent:	Thursday, February 04, 2016 8:26 AM
To:	Jaimie Park
Subject:	Re: Question Regarding Contractor Who Prepared DEIS for Copper Flat
Attachments:	Mangi Environmental Group disclosure for Copper Flat 11-16-11.pdf

Jaimie,

The original company that was hired to assist up with the EIS was Mangi, which in now Solv. I have attached their disclosure statement for you. Let me know if you need anything else. On another note we are getting close to having all of your other FOIA done.

Thanks,

On Wed, Feb 3, 2016 at 11:26 AM, Jaimie Park <jpark@nmelc.org> wrote:

Good afternoon, Doug. I wanted to confirm that the contractor who prepared the DEIS is Solv, correct? Do you happen to have on hand the contractor's disclosure statement indicating that Solv has no financial or other interest in the project? I will submit a FOIA for that shortly, but wanted to ask you first. Take care.

Kind Regards,

Jaimie Park

Staff Attorney

New Mexico Environmental Law Center

1405 Luisa Street, Suite 5

Santa Fe, NM 87505

(505) 989-9022

jpark@nmelc.org

www.nmelc.org

EXHIBIT

tabbies

E

--
Douglas Haywood
Lands/Minerals Supervisor
575-525-4498

MANGI
ENVIRONMENTAL
GROUP

THE MANGI ENVIRONMENTAL GROUP, INC.
7927 Jones Branch Dr. McLean VA 22102
703 760 4801 Fax 703 760 4899
www.mangi.com

Viet Nam Veteran Owned

16 Nov 2011

Mangi Environmental Group, Inc. is to be engaged, via a third party contract arrangement with New Mexico Copper Corporation (NMCC), to assist the Bureau of Land Management and the State of New Mexico in the preparation of an Environmental Impact Statement and an Environmental Evaluation concerning the proposed Copper Flat Mine.

This is to certify that Mangi Environmental Group, Inc. has no financial interest in the mine, or the outcome of the EIS/EE decision process. Our only business relationship with NMCC is in regard to the preparation of the EIS/EE and associated documentation. Moreover, Mangi Environmental has no interests in any other project or effort that would create a conflict of interest, impairing our ability to conduct the EIS/EE effort in a thoroughly objective manner.

J. I. Mangi

JAMES I. MANGI, PhD
President

EXHIBIT
F

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TED TURNER
EXPEDITIONS™

TOUR OFFERINGS

ABOUT TED TURNER EXPEDITIONS

Ted Turner Expeditions is rooted in two million acres of wild, private North American landscape acquired by Ted Turner as a pioneering investment in balancing conservation and economic sustainability. The restoration of habitats, conservation of threatened and imperiled species, and increase of biodiversity are the cornerstones of Ted's vision. His vast, pristine, working landscapes and their ground-breaking conservation practices give voice to the visionary in all of us.

ABOUT OUR TOURS

Ted Turner Expeditions' eco-conscious journeys are individually crafted and tailored to their specific locales; these unique adventures are intended to deliver an insightful and restorative experience, while also providing extraordinary guest service. Each well-appointed property reflects its surrounding geography and its area's rich history. Ted Turner Expeditions is committed to making a difference by inspiring individual action to preserve the wonder of nature.

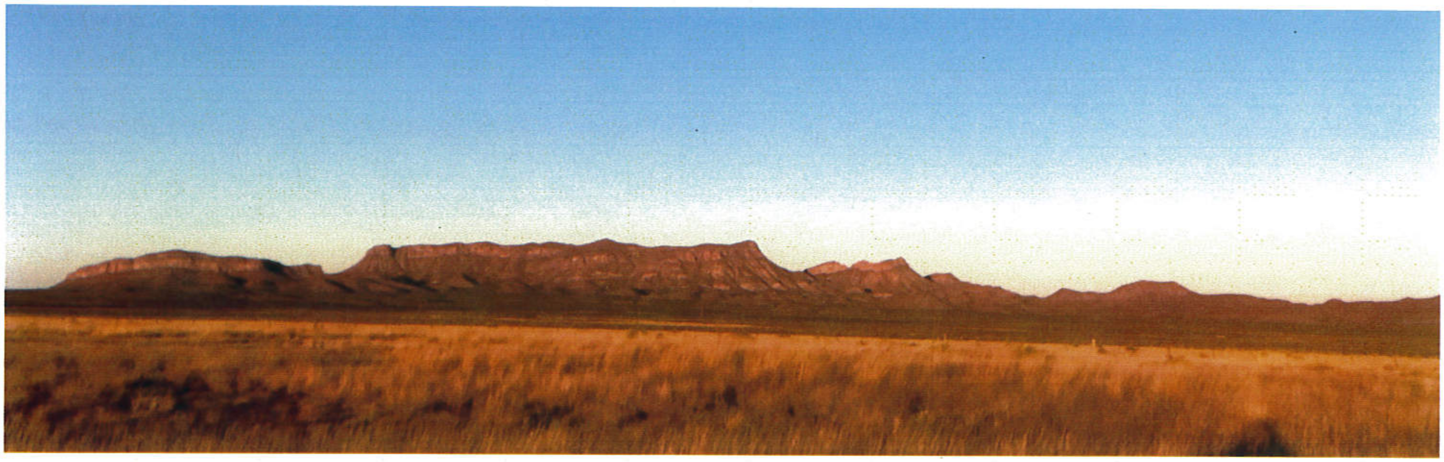
All tours begin and end at Sierra Grande Lodge and Spa, where a Ted Turner Expeditions guide will escort you to and from the properties and be your host on the tours.

We offer private and group (max 4 guests) touring opportunities! Pricing for private and group tours vary. Please contact the front desk of Sierra Grande Lodge & Spa for more information, or to inquire about booking.

We look forward to hosting you on the ranches!

Front Desk: 575-894-6976
TTX Representative: 1-877-288-7637
www.tedturnerexpeditions.com

ARMENDARIS RANCH



FRA CRISTOBAL SUMMIT OVERLOOK MOTOR TOUR | FROM $150 PER GUEST*

Easy fitness level

Experience dramatic, panoramic views of Ted Turner's 362,885-acre Armendaris Ranch on a compelling, guided driving tour to the summit overlook of the picturesque Fra Cristobal Range. Your excursion on the Armendaris provides you with a highly unique experience complete with stunning, desert landscapes and abundant animal and plant species.

At the summit, lofty views of Elephant Butte Reservoir and the Rio Grande corridor await - the prized pinnacle of this exceptional five-hour tour.

Your guide will be your escort to the top of the range.

FRA CRISTOBAL SUMMIT TREK & GEOCACHE | FROM $200 PER GUEST*

Moderate fitness level

Summit your own private mountain range, the Fra Cristobals, and experience dramatic, panoramic views of the 360,000-acre Armendaris Ranch on an all-day adventure guided by a TTX team member.

The cross country passage covers just over three miles of ridge crest terrain with commanding views across the Chihuahuan Desert to the Continental Divide. At the summit, a bird's eye view encompassing over sixty miles in every direction awaits. Stretching out before you will be the Rio Grande Valley, White Sands Missile Range, the Trinity Site, El Camino Real, Elephant Butte Reservoir, the Black Range, Ladder Ranch and the towns of Truth or Consequences and Elephant Butte.

Be among the few to sign the summit register and take part in a unique geocache experience- bring a small trinket for the geocache and plan on taking a small souvenir home left by others who have summited.

This eight-hour tour is a great way to enjoy off-trail hiking and visit the highest point on the Armendaris Ranch, as well as experience the abundant animal and plant species.

PALEONTOLOGY PROSPECTING TOUR | FROM $200 PER GUEST*

Easy fitness level

The Armendaris Ranch is home to an impressive cache of Late-Cretaceous Period dinosaur bones, including specimens that are currently on display at the New Mexico Museum of Natural History. There are active paleontology digs underway on the ranch, resulting in the recent excavation of a Sauropod femur.

On this guided fossil "prospecting" tour you will travel on an easy 1.5-mile cross-country hike (requires climbing a gentle hill) in search of undisturbed dinosaur bone fields, learning to differentiate bone fragments from the surrounding rock and possibly help identify the next promising site for further investigation and research. This half day tour is a wonderful way to get out on the Armendaris and share in its rich paleontological legacy.

7TX BUBBLING SPRING MOUNTAIN BIKE TOUR | FROM $200 PER GUEST*

Easy fitness level

Ted Turner Expeditions' 7TX Mountain Biking Area offers experienced and beginner riders an opportunity to peddle for the first time on the Armendaris Ranch. Our Bubbling Spring ride is a gentle 6-mile out-and-back route, with a host of intriguing areas to explore – including Bubbling Spring, a historic well used by the Spanish as they passed through the area and Canon Del Muerto (Canyon of Death) a reference to the frequent attacks by Native Americans in this tight passage. This half day excursion is fun for the novice rider and can be extended into a full day for those looking for more of a challenge. On a one to five scale (five being most difficult), this half day tour is rated "2" for fitness level and ability.

ARMENDARIS HERITAGE & PHOTOGRAPHY TOUR | FROM $200 PER GUEST*

Easy fitness level

Spend the day exploring the undisturbed beauty of the vast Armendaris Ranch grasslands and desert mountain range, in pursuit of the perfect compositions and light on our Heritage and Photography Tour. This majestic landscape has seen the passage of countless Spanish pioneers along the Jornado Del Muerto section of the historic El Camino Real.

Your exclusive photo tour unfolds at your own pace to allow for the study of large scale landscapes and textural desert details. The unmatched long shadows and dramatic light of the southwest winter sunrises or sunsets are the ideal subjects for a photographer's dream. Picturesque stops such as Lava Station, Lava Camp, Casa Grande and the Fra Cristobal Canyons are always guest favorites.

This southwestern safari crossing of open grasslands on the Armendaris Ranch provides extremely unique opportunities to photograph bison and unparalleled wildlife. We look forward to developing an itinerary which best achieves your photographic goals and connects you with the remarkable history of the Armendaris Ranch.

SPELLMEYER CANYON TOUR | FROM $150 PER GUEST*

Moderate Fitness Level

Ted Turner Expeditions leads you back in time on a 5-hour hike in Spellmeyer Canyon.
The pristine nature of Spellmeyer Canyon exemplifies undisturbed beauty – a hallmark of Ted Turner's ranches.
Your guide will help you locate marine fossils from an ancient seabed and navigate the rock scrambles you will encounter on this hike.

This five-hour tour provides a platform to contemplate the ever-changing environment of our home planet.
As with all tours to Ted Turner's ranches, wildlife and Bison encounters are a very real possibility.

CAVE CANYON SCRAMBLE | FROM $200 PER GUEST*

Moderate to Strenuous Fitness Level

Cave Canyon begins with a steep climb through limestone terraces that ascend a picturesque canyon overlooking the eastern grasslands of Ted Turner's Armendaris Ranch. A fortified entrance to a large alcove at the top of the canyon shows evidence of use as an ancient shelter by the region's indigenous people. This tour is perfect for the experienced hiker who is adept at using their hands and feet to climb stair-step ledges, with a modest amount of exposure. A half-day tour, Cave Canyon can be combined with Spellmeyer Canyon to create a full-day adventure with two remarkably diverse and untouched canyon hikes.

TWO HOUR HIDDEN CANYON HIKE | $200 (for up to four guests)

Moderate to Strenuous Fitness Level

A perfect way to sample Ted Turner's Armendaris Ranch, the Hidden Canyon Hike is a brief, 15 minute drive from Sierra Grande Lodge & Spa. On this superb, guided two-hour loop, experience the diversity of terrain and natural beauty that sets the Armendaris apart, including several rock scrambles into pristine canyons and dramatic views of the Chihuahuan desert and the town of Truth or Consequences.

SPACEPORT AMERICA AND ARMENDARIS EXPEDITION | FROM $900 PER GUEST*

Experience a full day of adventure, gazing into the future and discovering the past, while exploring two of New Mexico's inspirational landmarks: Spaceport America and Ted Turner's historic, 363,000-acre Armendaris Ranch.

Our exclusive Spaceport America Immersion Excursion is a behind-the-scenes look at the world's first purpose-built commercial spaceport. Ted Turner Expeditions (TTX) guests receive access to the inner workings of this futuristic facility, including the Spaceport Command Center (SCC), home to Mission Control. Guests have the opportunity to interact with Spaceport America crewmembers while touring the 18,000-acre campus.

TTX guests are then escorted a short distance by vehicle to Ted's Armendaris Ranch for a customized tour. There, guest will have opportunities to encounter 300-million-year-old marine fossils, Cretaceous period dinosaur bone fields, exciting wildlife, commanding views from the summit of the Fra Cristobal Mountains, and other points of interest.

For an additional landing fee, guests with private aircraft can opt to land on Spaceport America's two-mile-long Spaceway.

**Rates: $900 for first guest. $475 each additional guest.*

LADDER RANCH

ANIMAS CREEK / RANCH HERITAGE TOUR | FROM $150 PER GUEST*

Easy Fitness Level

Take a step back in time onto the 156,439-acre Ladder Ranch with our Animas Creek and Ranch Heritage Tour. Experience the beauty of Animas Creek, historic Native American artifacts, ancient petroglyphs, and the photogenic ruins of a turn-of-the-century adobe home.

The pristine nature of the ranch also provides a unique opportunity to photograph the incredible and diverse wildlife from birds to bison that call Ladder Ranch home.

Choose from a three hour, or half-day (five hour) tour. Prices vary depending on length of tour.

LADDER RANCH NATIVE AMERICAN ROCK ART TOUR | FROM $150 PER GUEST*

Easy Fitness Level

The lush and diverse environment of the Ladder Ranch once provided a home to several indigenous cultures. Most prominent, are the ancient remnants of the Mimbres and Apache tribes that can be found throughout the ranch in the form of pictographs and petroglyphs. The tranquil settings of the Native American Rock Art sites on the Ladder Ranch provide an unrivaled opportunity to step back in time and reflect on the former inhabitants of this magnificent landscape on this full day tour.

Both novice and seasoned rock art enthusiasts will enjoy the diversity of the petroglyphs and the unique locations including canyon walls, loose boulders and small outcroppings of rock that provided perfect canvases for the rock art. Your archeological tour will also include a brief stop at Ladder Ranch Headquarters.

LADDER RANCH BIRDING TOUR | FROM $200 PER GUEST*

Easy Fitness Level

Ted Turner's 156,000 acre Ladder Ranch is considered one of the finest birdwatching sanctuaries in North America. The Ladder offers exquisite and diverse habitats, from lush riparian zones to arid, rocky slopes and cliffs; which host a large number of species who migrate through the region and many species who call the ranch home year-round. Its location is a magnet for spring and fall migrations.

One of our seasoned birding guides will be your host for this private tour. Your experience may also include viewing of bison, black bear and coyote; as well as stops at petroglyphs (Rock Art) created by ancient indigenous people. Whether you are a beginner or advanced birder we can create a half or full day tour which will surely add new species to your Life List. Our birding tours are limited to four guests, offering an intimate and low impact birding experience.

LAS PALOMAS NORTH AND SOUTH LOOP TOUR | FROM $200 PER GUEST*

Moderate Fitness Level

Join us for a 5-hour tour of the pristine riparian habitat of Palomas Creek on Ladder Ranch, and experience why we at Ted Turner Expeditions feel that this is the perfect picture of the ecological conservancy that is the foundation of the Turner Ranches.

You'll have the opportunity to hike through scenic rugged back-country that's in a completely unaltered and natural state. The stunning scenery alone is a photographer's dream, and you may even encounter fascinating wildlife along the way including Bison, Elk, Deer, Peccary (Javelina), and a host of other animals that call Ladder Ranch home.

Please note that the hike includes some off-trail sections and requires a moderate fitness level for this five-hour tour. Transportation to the Palomas Creek trailhead is provided.

TED'S VISION QUEST HIKE | FROM $200 PER GUEST*

Moderate Fitness Level

A personal favorite of owner Ted Turner, this 3-hour guided hike leads you along a unique path once used by ancient Native Americans cultures for their sacred vison quest ceremonies. The hike begins close to the Ladder Ranch Headquarters and Ted's private residence, ascending to the top of a bluff overlooking breathtaking views of the riparian area of Animas Creek, Ladder Ranch HQ and the surrounding Chihuahuan desert (an entertaining anecdote about this path is recounted by Ladder Ranch Manager Steve Dobrott, in Ted Turner's 2013 biography, *Last Stand: Ted Turner's Quest to Save a Troubled Planet*; pgs. 35-36). Along the way, your guide will provide you with fascinating information on the desert vegetation, the animals who call Ladder Ranch home and Ted's vision for the Ladder Ranch. *Please note that this hike includes some exposure along ledges and steeper terrain.*

CREST TO CREEK MOUNTAIN BIKE RIDE | FROM $385 PER COUPLE*

Moderate Fitness and Riding Level

This guided, moderately difficult mountain bike ride covers 6.5 miles (10.46 km) of backroads and historic old wagon trails. For this 3-hour tour, you depart from Sierra Grande Lodge & Spa and be transported to the staging area atop a ridge near the Ladder Ranch Headquarters. The first leg of the ride traverses the ridgecrest with incredible 360-degree views of the Chihuahuan desert, Ladder Ranch, Armendaris Ranch, the Black Range of the Gila National Forest, the Caballo Mountains, and much more. After taking in these expansive, stunning views, you then descend off of the ridge into the lush Animas Creek drainage.

Riders will be provided with start-of-the-art, full suspension Santa Cruz "Tall Boy" bikes, helmets and riding gloves. *Please note that as this ride has been classified "moderate" in difficulty, riders should be prepared to utilize some technical skills to negotiate uneven terrain.*

CUSTOM ITINERARY LADDER RANCH DAY TOUR | FROM $150 PER GUEST*

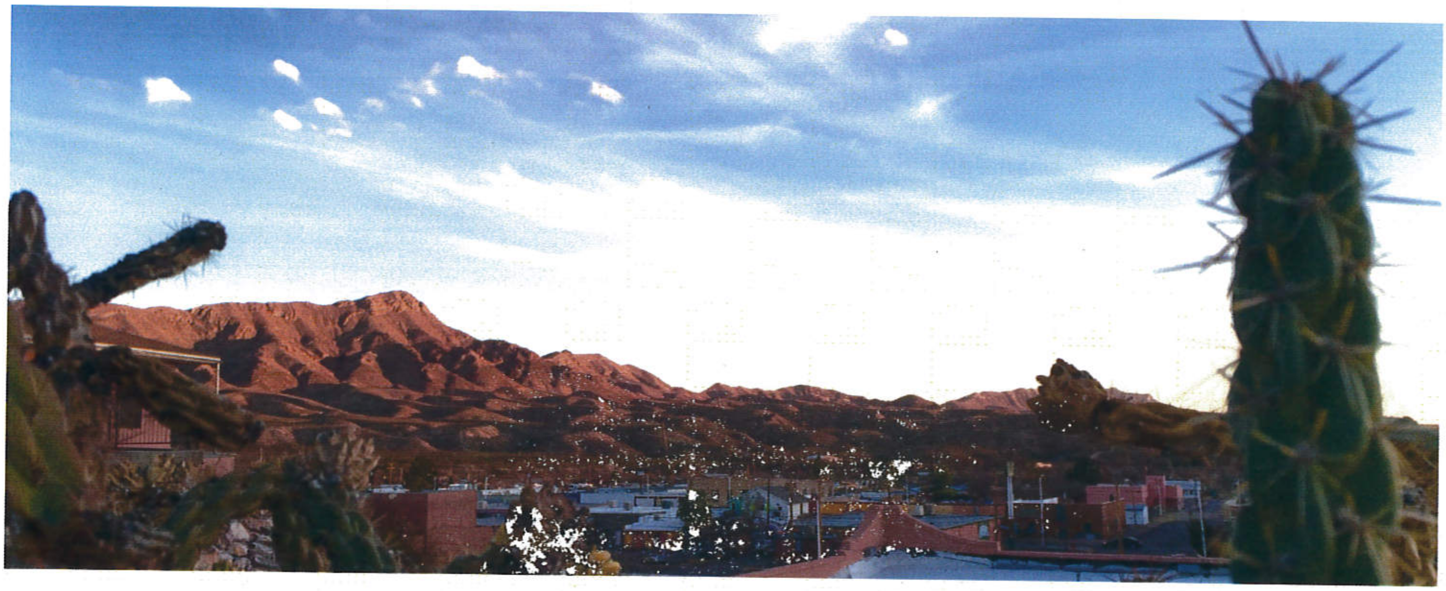
Easy to Moderate Fitness Level

The 156,000-acres of the Ladder Ranch provide endless opportunity to explore and photograph its exquisite wildlife, as well as hike its unbelievably vast terrain while experiencing the Ladder's fascinating history. The Ladder Ranch is a private working bison ranch focusing on habitat conservation and wildlife management. With a diversity of formations and ecosystems including the Chihuahuan Desert, riparian habitats, open grasslands, volcanic cones, Rocky Mountain vegetation, adobe ruins, Apache battle sites and other ancient points of interest; there are endless opportunities for private guided expeditions for a wide range of interests, ability levels and ages.

Your tour can be custom tailored to fit your ultimate Ted Turner Expeditions experience. From searching for bison or the incredibly diverse wildlife on the Ladder (elk, deer, antelope, mountain lions, bears, etc.) to customized motor tours, mountain biking or hiking with your choice to focus on areas of interest such as photography, botany, biodiversity or archeology. The Custom Ladder Ranch Day Tour is the perfect way to relax and allow maximum flexibility in your itinerary to experience all this majestic property has to offer.

Half and full-day touring options are available.

TRUTH OR CONSEQUENCES



HISTORIC DISTRICT WALK | COMPLIMENTARY

Easy Fitness Level

Sierra Grande Lodge & Spa and Ted Turner Expeditions invite you on a complimentary, guided 1.25 mile walk through historical downtown Truth or Consequences.

This enlightening tour lasts approximately 45 minutes and includes several educational stops through Truth or Consequence's vibrant and varied history. Your guide will discuss a range of topics from "how the city got its name," to the history of the hot springs, introduction to the local artist community, Spaceport America and plans for the city's new downtown.

Guests are encouraged to stop and explore the Geronimo Museum along the walk, but please note there is an additional entrance fee.

Check with the front desk at Sierra Grande Lodge & Spa for a tour schedule and departure times.

Sites of interest, particularly for photography and nature enthusiasts, are the desert pathway and the portion of the trail that passes the beautiful Rio Grande. During the tour, your guide will educate you on local botany, geography, geology and human history of the region.

SIERRA GRANDE LODGE & SPA

IN-ROOM BOOKING

BOOKING DETAILS

All tours depart from the Sierra Grande Lodge. Ground transportation, specialized equipment, and professional guide included. Lunch and snacks can be arranged through the Restaurant at Sierra Grande. Trips may be cancelled by TTX due to weather with full refund. Cancellation within 24 hours of departure forfeits full-payment. 48 hour advanced reservations recommended.

- **Private Tours** - Rates are based on a two guest minimum, flexible departure times.
- **Scheduled Group Tours** - Availability and tour departure times are based upon pre-set itineraries. Please contact Front Desk (575-894-6976) or a TTX Representative (1-877-288-7637), for upcoming Group Tour opportunities. Limited capacity, so advanced reservations are recommended.
- **Customized Group Itineraries** - TTX invites groups to experience our private ecotourism venues with themes and activities designed to achieve your retreat objectives. Please contact the Sierra Grande Lodge & Spa to custom your itinerary.
- **Packages** - Check out our special packages for lodging, spa and activities savings.

TOUR RATES

PRIVATE TOURS

	1-2 Guests	Each Additional
Two Hour Tours	$200.00 (1 to 4 guests)	$100.00
Three Hour Tours	$350.00	$100.00
Half Day Tours (Approx. 5 Hours)	$450.00	$125.00
Full Day Tours (Approx. 8 Hours)	$600.00	$150.00
Crest to Creek Mountain Bike Ride	$385.00	$175.00

SCHEDULED GROUP TOURS

	Per Person
Two Hour Tours	$200.00 (1 to 4 guests)

Three Hour Tours	$150.00
Half Day Tours (Approx. 5 Hours)	$200.00
Full Day Tours (Approx. 8 Hours)	$250.00