

MEMORANDUM
OFFICE OF THE STATE ENGINEER
Hydrology Bureau

DATE: April 18, 2023

TO: Carmen Rose, Permit Lead, Mining Act Reclamation Program

THROUGH: Katie Zemlick, Ph.D., Hydrology Bureau Chief *KZ*

FROM: Christopher E. Angel, PG, Senior Hydrologist, Hydrology Bureau *CEA*

SUBJECT: Additional Comments on Permit Revision 20-1 to Update Closure/Close Out Plan and Financial Assurance, Permit No. SF0002RE, Cunningham Hill Mine

I. Introduction

The New Mexico Office of the State Engineer (NMOSE) Hydrology Bureau received the Mining and Minerals Division's (MMD's) March 9, 2023, request for additional comments on the subject Cunningham Hill Mine (CHM) Closure Plan and Financial Assurance. The application materials were downloaded from <https://www.emnrd.nm.gov/mmd/mining-act-reclamation-program/pending-and-approved-mine-applications/mining-applications-regular-existing/sf002re-lac-minerals-cunningham-hill-revision-20-1/>.

This request for additional comments includes a review of LAC's responses to NMOSE Hydrology Bureau's comments dated June 27, 2022. The NMOSE comments were as follows:

- 1) *On Page 4 of JSAI (2022), it is stated that the "Observed water levels have closely followed the "no diversion" simulation." This is supported by Figure 3 – a graph showing open pit water levels and how they follow the simulated – no diversion curve. There are many water level perturbations on this graph. Several of these perturbations are from a former reverse osmosis treatment system, pumping from the Guest House Well, Residue Pile plume recovery system, surface water diversion from Cunningham Gulch runoff, etc. On page 11 of JSAI (2022), it is stated that the Nano Filtration was started in 2021 and that the Guest house well and Residue Pile plume recovery system are added to the open pit (no volumes are supplied).*

With the above context, the following information is requested:

- 1) *A summary table of all the inflows and outflows from the time mining ceased (1987) to the current time period. This table should include but is not limited to any water that was removed from the open pit for remediation, the amount of post treatment water returned to the pit, surface water diverted into the pit, and groundwater that is pumped into the pit. This information can then be used to explain the perturbations in Figure 3 on page 7 of JSAI (2022) and determine how the pit reacts to different stressors.*

Additionally, the NMOSE Hydrology Bureau reviewed the comments and reports from the public hearing and other agency responses. This review was performed to identify any potential hydrologic concerns.

II. Open Pit Water Levels

LACs responses do not adequately address the inflows and outflows from the open pit lake. Their response directs the NMOSE Hydrology Bureau to look up the information in historical reports including JSAI (2011) updated groundwater flow model for the diversions from 1987 to 2011 and the associated analysis and then utilize Table 3 from the Updated CCP Appendix E report and DP-55 annual reports. The NMOSE Hydrology Bureau has attempted to put some of the information about potential water outflows and inflows onto the attached open pit water levels and model simulated graphs (Figure 1).

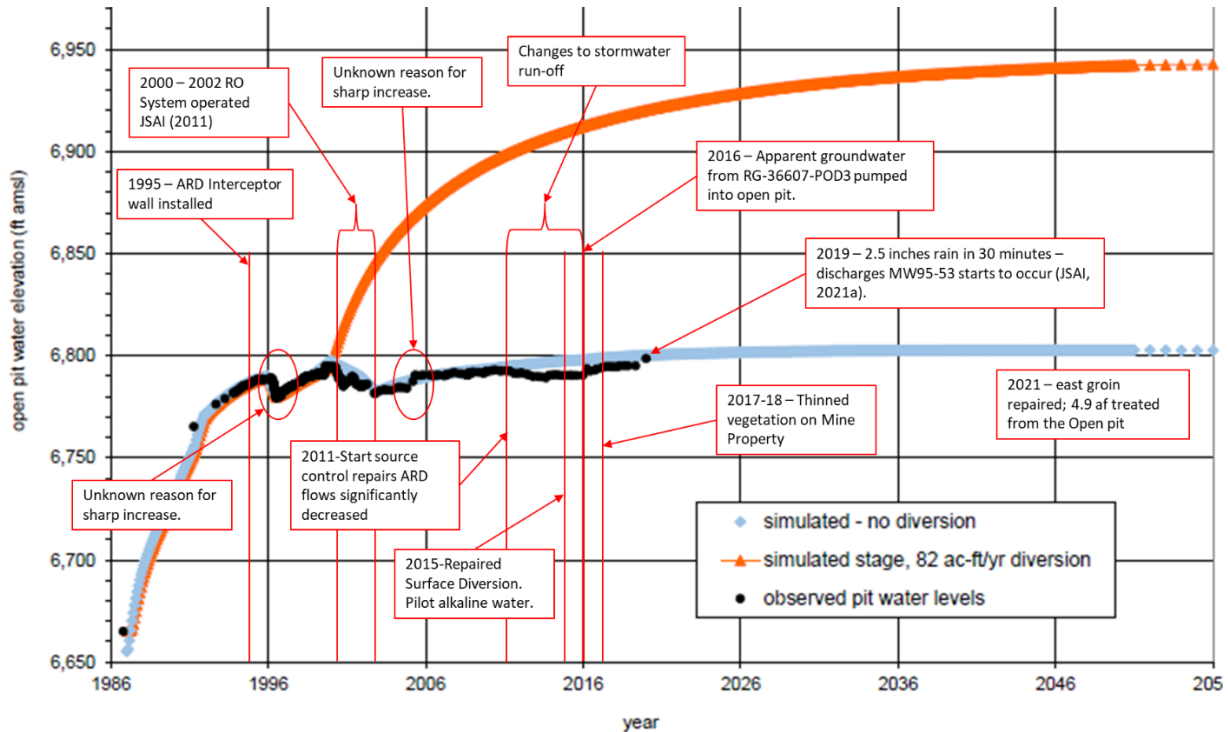


Figure 1: Open Pit Lake and modeled water level elevations along with events that may affect the open water level (modified Figure 3 from JSAI, 2022).

Figure 1 (modified Figure 3 from JSAI, 2022) documents the actual open pit lake water levels and the model results. There are many variations in the open pit water levels. These variations and the changes that may have created are listed below:

- 1) A sharp increase in the pit water level occurs in 2005. No documentation has been supplied for this increase in open pit water level has been supplied.
- 2) There is a decrease in water levels between 2011 and approximately 2013 that does not follow the "No diversion" simulation.
- 3) Between approximately 2013 and 2016 the water levels are relatively flat below the no diversion line.
- 4) In 2016 there was a sharp increase of approximately 5-feet in the open pit water level. This gain in open pit lake water level is not explained by the weir data and may be from

supplemental water being input into the open pit. This input of water would make the water levels appear to follow the no diversion line.

- 5) In 2019, the open pit lake water levels increase to nearly 6,800 ft msl. This nearly 5-foot increase in water level is partly due to a large rain event.
 - a. Surface water diverted into the pit was 20.91 ac-ft.
 - b. RG-36607-POD3 and the residue pile recovery system also pumped 13.61 ac-ft.
 - c. If no evaporative losses were suffered and no other water flowed in to or out of the open pit, then the estimated increase in the open pit water levels would be approximately 22 feet.

Several other groups or individuals have raised concerns about the open pit water levels. Public Comment 22 and 25 (LAC, 2023) raises the concern about the open pit lake being a sink due to evaporative losses and if the current open pit water level is sustainable. As was mentioned by the NMOSE Hydrology Bureau's comments, the open pit lake may follow the "no diversion" line due to water permits supplying water to the open pit lake and thereby maintaining the water level and the water quality. However, without knowing the amounts of water being supplied or removed from the open pit lake, the NMOSE Hydrology Bureau cannot determine if the open pit lake follows to "no-diversion line" or if this is sustainable.

Hearing Officer Report

In the Hearing Officer Report submitted by Felicia L. Orth, Steve Finch states that "the open pit water body has elevated total dissolved solids (TDS) and sulfate that's currently being treated". Based on this information the amounts of water being removed from the open pit and returned to the open pit need to be well documented and published to determine if the model follows the "no diversion" line. The stability of the open pit lake may be dependent on the inflows and outflows as can be seen on Figure 1 of this report.

Several other individuals offered public comment both orally and written on the open pit lake. Several of the comments contained concerns about climate change and increased evaporation. This increased evaporation may allow for the open pit levels to change. Therefore, it is necessary to demonstrate if the open pit lake water levels are stable by engineered methods or stable in a natural state.

The San Marcos Association

The San Marcos Association asks the question "is there any assurance that the current pit water level is sustainable?" As presented earlier in this report the NMOSE Hydrology Bureau needs the applicant to document all the inflows and outflows from the open pit lake. This will allow the NMOSE to evaluate the pit water levels as being "stable" and under what conditions they may be stable. In addition, the NMOSE Hydrology Bureau is requesting the MODFLOW Model files to

continue the evaluation of the open pit lake water level stability and the stability of the water levels for any engineered controls for the open pit lake water levels.

Jim Kuipers, P.E. Kuipers & Associates LLC Report (2022)

Kuipers (2022) discusses water levels in the open pit lake. He recommends that the CCP should be updated to address the amount of discharge to the surrounding groundwater at various open pit lake levels. This report also stated that "The CCP should define and identify the bounds of steady-state that is expected to be achieved as "near steady-state level" is not meaningful without further context." As such the NMOSE Hydrology Bureau has previously requested the inflows and outflows from the open pit lake in order to evaluate the open pit lake as being steady-state or near steady-state and what parameters are needed to meet the steady state criteria.

III. Conclusions

In conclusion, LAC Minerals (USA) LLC Responses to Comments do not satisfy the NMOSE Hydrology Bureau requests for additional information on the inflows and outflows from the open pit lake at the Cunningham Hill Mine. In addition, several others have raised issues with the open pit lake. Therefore, the NMOSE Hydrology Bureau requests:

- 1) A summary table of all the inflows and outflows from the time mining ceased (1987) to the current time period. This table should include but is not limited to any water that was removed from the open pit lake for remediation, the amount of post treatment water returned to the pit, surface water diverted into the open pit lake, and groundwater that is pumped into the open pit lake.
- 2) A copy of all the current MODFLOW model files for the Cunningham Hill Mine.

IV. References

JSAI, 2011, Update and Recalibration of Groundwater-Flow and Solute Transport Model for Predicting Potential Effects from the Cunningham Hill Mine Open Pit, Santa Fe County, New Mexico, John Shoemaker and associates, Inc., June 27, 2011.

Hearing Officer Report, State of New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division, In the matter of Revision 20-1 for the Cunningham Hill Mine Reclamation Project, Santa Fe County, New Mexico, Permit No. SF002RE

JSAI, 2022, (Finch, S.T., and Mandybur, A.) Cunningham Hill Mine Open Pit Waiver Justification, Permit No. SF002RE, Santa Fe County, New Mexico. Appendix H in Cunningham Hill Mine Reclamation Project Closure/Closeout Plan Update, John Shoemaker and associates, Inc., October 2021; Revised May 27, 2022.

Kuipers, J., 2022, Re: Comments on Revised October 2021 CCP update for MMD Permit No. SF002RE, LAC Minerals (USA) LLC Cunningham Hill Mine, From Jim Kuipers P.E., Kuipers & Associates LLC; To Ross Lockridge, Friends of Santa Fe County, November 17, 2022.

LAC, 2023, LAC Minerals (USA) LLC Responses to Comments on the Closure/Closeout Plan Update Amendment to application for Revision 20-1 Cunningham Hill Mine Permits No. SF002RE, February 23, 2023.

The San Marcos Association (undated), letter to Jerry Schoeppner, Director, Mining and Minerals Division, Cerrillos, NM.