The NM OSE Hydrology Bureau has reviewed the April 2009 Sampling and Analysis Plan (SAP) for the proposed Roca Honda mine, located in Sections 9, 10 and 16 of Township 13 North and Range 8 West in McKinley County. Amongst other permits, the proposal indentifies two required state permits from NM OSE for mine dewatering and appropriation of underground water permits (Section D.11-permits required, page 10 of the SAP Phase 1 Permit application for MK025RN dated 4-20-09). The SAP will, in part, collect information in support of these permit applications. Overall, the surface and ground water sections of the SAP are adequate. An implementation schedule for the SAP may be useful to the State Agencies. Several specific details should be clarified related to the number, duration of aquifer tests within Westwater Canyon member of the Morrison formation. Also, the timing and number of additional wells relative to these aquifer tests needs clarification. A licensed New Mexico driller must drill and install wells in accordance with 19.27.4 NMAC.

Specific Comments

1. Section 9.5, page 9-33. The SAP indicates that in geologic formations other than Morrison wells will be installed and developed in accordance to standing operating procedures. No standard operation procedures were provided. NM OSE requires that a licensed driller follow 19.27.4 NMAC Regulations to drill and complete wells. Since artesian conditions exist in the area for some aquifers, an artesian well plan of operation may be a required for submittal, review and approval in accordance with 19.27.4.31.A NMAC.

2. Section 9.5 and Table 9-14, pages 9-33 and 9-34. Please clarify whether the shallower wells will be installed prior to the aquifer tests at wells S1, S3 and S4 in the Westwater Canyon member of the Morrison formation. In Section 9.5 it appears that the wells will be installed prior to the aquifer testing. However, Table 9-14 and the Appendix on aquifer testing procedures indicates more uncertainty about the timing of the well installation for the alluvial, Menefee formation, and Point Lookout sandstone.

3. Section 9.5 and Table 9-14, pages 9-33 and 9-34. The SAP does not indicate the Gallup Sandstone and Dakota sandstone units would be monitored while pumping the Westwater Canyon member of the Morrison formation and whether wells would be installed in these units. Please clarify whether there will be any monitoring of existing or new wells screened across the Gallup and Dakota sandstones during the aquifer tests.

4. Section 9.5, page 9-34. The SAP states that the data collected will be used to estimate the quantity of water that will be discharged during dewatering activities. The Roca Honda Project likely will need water quantity evaluations on regional and local scales to assess impacts. Please clarify the methodologies that will be used to make such estimates.

5. Section 9.5, Table 9-13 and Appendix A. Please clarify the specific length of the aquifer tests, which may be 24, 72, or undetermined according to the SAP.

6. Section 9.5, page 9-33. The SAP mentions a well inventory and some field check of wells in comparison to the NM OSE WATERS database. Please include the Water Rights file number, point of diversion (POD) number and well diversion in the tabulated well information.

7. Table 9-10. Please add Storativity to Table 9-10 or create a separate table with such information. In the event Storativity values are not available for the Westwater Canyon member of the Morrison Formation, one consideration may be that the aquifer test duration should be long enough, if possible, to generate a drawdown response in an observation well.

8. Section 9.1, page 9-1. Please note that around 2005 the Rio Algom Mining Company in the Ambrosia Lake area evaluated the USGS model (Kernodle, 1996) using more recent water level data since underground mining and leaching have ceased. The information may be useful in preparing a potentiometric map of the area.

9. Section 9.9, page 9-38. The SAP mentions that a ground water model will be used to assess impacts. Please clarify the type of model(s) and whether the evaluation can address both local and regional scale impacts.

10. Section 8.1.4, page 8-12. The springs mentioned are dismissed as having any connection to the proposed mine dewatering. In the final report for the SAP results, please provide a more detailed explanation which formations the spring are emanating from and why that excludes any connection to the mine dewatering.

11. Section 8.1.4, page 8-12. In the final report for the SAP results, please provide details on surface water rights associated with the springs in the vicinity of San Mateo Creek and the proposed Roca Honda Mine.

12. Tables 9-1 and 9-2, page 9-13. Please check metals values for lead, manganese, aluminum, zinc and copper. These tables appear to have inadvertently left off the less than sign for below the detection limit.

13. Tables 9-1 and 9-2, page 9-13. Note that there are other US DOE wells that were sampled in this area along with a US NRC Homestake Mill evaluation for an alluvial aquifer study along San Mateo Creek. Uranium and Selenium have been detected in the alluvial aquifer at some locations along San Mateo Creek.

14. Section 9.1.3.1, page 9-12. Note that the text refers to a wide range of water quality for the alluvium while the corresponding Table 9-1 and 9-2 shows one sample. Also, the well's location and number 131 in Table 9-1 does not seem to

correspond with any alluvial well in Section 25 of the Plate 1. It may correspond to well 121 in Section 24.

15. Section 9.1.3.7, pages 9-22 to 9-23. Please clarify in subsequent documents that 1950s-1980s surface discharges of mine water (and residual salts) likely contributed to the poor water quality recharge through the alluvium and into the Morrison formation. As presented, water quality of recharge from the uncontaminated alluvial aquifer would not explain the higher TDS values in the Morrison along San Mateo Creek at the confluence with Arroyo del Puerto.

16. Table 9-15, pages 9-35 and 9-36. Table 9-15 repeats itself without including a complete list of metals for analysis.

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17. Appendix A., Pre-Test Activities No. 3 & 4. Please clarify the time interval of water level measurements for wells prior to the aquifer tests and during the recovery phase. There is mention of hourly barometric readings without a corresponding frequency for water level measurements. For background transducer measurements a more frequent measurement interval (e.g., every 15 minutes) would better assess the barometric effect on the water levels.

18. Appendix A, Constant Rate Test - Introduction; Constant Rate Test No. 13; General Test Guidelines No. 5; Pre-Test No. 9; General Test No. 2 & 8; Constant Rate Test No. 9 & last paragraph; Constant Rate Test, Tables A-1 & A-2; Pre-Test No. 5; and Constant Rate Test No. 8. NM OSE concurs and in some instances expands upon for greater emphasis on the following aquifer testing procedures: allow full recovery of water levels to background after the step test and before the constant rate test; continue measurements during recovery phase for possibly weeks unit full recovery of water levels is reached; refuel and maintain the generator without shutting down pump during the test; record in the field log all adjustments to valve position and flow rate even when flow checks result in no changes; append field log to data tables; and collect more frequent transducer data for early and late time recording because the data may be useful in identifying regional background trends and indicating equipment malfunctions

19. Appendix A, General Test No. 3; and Pre-Test No. 7. Check manufacturer specifications for totalizing flow meter placement relative to discharge plumbing such as the proximity to elbows, valves, diameter changes and the gate valve for proper function.

20. Appendix A, General Test No. 3; and Constant Rate No. 9. Check manufacturer specifications for correct use of orifice meter and manometer (or orifice plate and manometer) regarding proximity to plumbing transition and limitation for diameters selected.

21. Appendix A, Pre-Test No. 5. Check the ratings of the transducers, particularly in the pumped well, to avoid exceeding the tolerance of the device. This would most likely be an issue with setting the transducer near maximum submergence, then having pumping shut off in a transmissive aquifer, where recovery bounce occurs, possibly exceeding original static water level vigorously. It might also occur subtly if there is a regional rise in water level over the duration of data collection, and again the transducers were set at extreme submergence. Transducers provide most accurate data when operated in the middle of their pressure range.