State of Utah
GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF RADIATION CONTROL
Rusty Lundberg
Director

June 23, 2011

CERTIFIED MAIL
(Return Receipt Requested)

David C. Frydenlund, Vice President, Regulatory Affairs and Counsel
Denison Mines (USA) Corp.
1050 17th Street, Suite 950
Denver, CO 80265

Subject: Nitrate Investigation Revised Phase 2 to 5 Work Plan dated June 3, 2011: **DRC Review Comments**

Dear Mr. Frydenlund:

DRC review comments regarding the June 3, 2011 Denison Mines (USA) Corporation (DUSA) "Nitrate Investigation Revised Phases 2 through 5 Work Plan" are enclosed (via URS Memorandum). Please ensure that all comments are address and resolved in the revised version of the Phase 2 through 5 Work Plan (Rev. 1.0).

If you have questions or concerns regarding the comments, or would like to arrange a meeting or teleconference to discuss the comments, please contact me at (801) 536-0080. Thank you.

Sincerely,

Thomas Rushing, P.G.
Geotechnical Services Section

Enclosure: URS Memorandum (5 pp)

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URS

MEMORANDUM

To: Tom Rushing (DRC), Loren Morton (DRC), Phil Goble (DRC)

From: Paul Bitter (URS), Jeremy Cox (URS)

cc: Robert Baird (URS)

Date: 23 June 2011

Re: Comments on the Nitrate Investigation Revised Phase 2 to 5 Work Plan for White Mesa Mill Site dated June 3, 2011

This memorandum contains the URS and DRC comments on the Revised Phase 2 to 5 Work Plan for White Mesa Mill Site (Work Plan) dated June 3, 2011, which was prepared for Denison Mines USA (DUSA) by Intera Corporation. This review has been performed as a deliverable for Contract No. 116259 issued through the Utah Department of Environmental Quality, Division of Radiation Control (DRC). This review also is in accordance with the amended Memorandum of Understanding (MOU) between the DRC and DUSA dated April 28, 2011. For purposes of expediency, the URS and DRC comments are edited for conciseness and combined into one memo. Note that format, grammar, and punctuation were not reviewed for accuracy and consistency.

The comments regarding the Work Plan are presented below.

1. General Comment: The Work Plan is well-organized. The initial conceptual site model incorporates good information that will benefit the evaluation of potential sources of the nitrate and chloride in groundwater at the site.
2. Global comment: The Decision Process Logic implies that if the vadose zone concentrations (mass) are less than background concentrations (mass), then the possible source under consideration is removed from the source candidate list and groundwater will not be analyzed. DRC disagrees with this implication. Groundwater must be analyzed throughout the site in order to dismiss potential sources. We presume based on the fate and transport discussions in the work plan, and underscore herein, that groundwater hydraulically downgradient of potential sources and within a distance comparable to the travel time of a release from a potential source is linked to the potential source. This forces consideration of increasing trends (if any) in groundwater that can be linked to an upgradient source. The vadose zone characterization indicates what will be transported to the groundwater in the future. Historical sources of nitrate and chloride may have resulted in groundwater contamination downgradient of the historical source that may still be present even if the nitrate is no longer present in the vadose zone at the former source area. The lack of nitrate concentrations or mass in the vadose zone at a potential source area, alone, is insufficient

evidence to dismiss a source area. Thus, evaluation of potential sources has to include the concentrations in groundwater up to the travel distance equivalent to the time frame of a potential release from each potential source. This factor appears to be addressed in the "necessary conditions" sections for the hypotheses in Section 2.3.3.1. Concentrations and mass of nitrate and chloride in the vadose zone should be one component of the weight of evidence approach to identify or dismiss potential sources of nitrate contamination in the groundwater. Please revise the decision logic diagrams and text accordingly.

3. Global comment: Cryptosporidium is a marker of cattle contribution to groundwater contamination; however, the presence of cryptosporidium does not mean that all nitrate in the groundwater near a specific potential source is due to cattle management activities. Cryptosporidium should be one component of the weight of evidence approach to identify or dismiss potential sources of nitrate contamination in the groundwater. Please revise the decision logic diagrams and text accordingly.
4. Global comment: Although the decision logic process may imply that an isotopic fingerprint may uniquely identify a specific source, the isotopic fingerprint may not conclusively link nitrate in a source area to the nitrate in the groundwater. Instead, isotopic analysis should be one component of the weight of evidence approach to identify or dismiss potential sources of nitrate contamination in the groundwater. Please revise the decision logic diagrams and text accordingly.
5. Section 1.1.1.1: Although procedures for the Phase 2 sampling may be presented in the Phase 2 QAP, sampling locations can be selected at this time based on the groundwater data. Groundwater sampling locations were presented in the first iteration of the nitrate investigation work plan, and DRC recommended several additional groundwater sampling locations in subsequent meetings. Due to the anticipated schedule for delivery of the Phase 2 QAP and Revision 1.0 of the Phase 2-5 Work Plan versus the schedule for the Phase 2 sampling, the locations previously agreed upon in these meetings should be shown on a figure in the Phase 2 QAP and Revision 1.0 of this Work Plan, and discussed in this section of the text or elsewhere in these documents, as appropriate. The Phase 2 sample locations should be listed in a sampling table in the Phase 2 QAP and Revision 1.0 of this Phase 2 through 5 Work Plan.
6. Section 1.1.1.2: Although specific locations for Phase 3 sampling cannot be specified until receipt of data from the Phase 1 investigation, the Phase 1 data should be available before the anticipated delivery of Revision 1.0 of the Phase 2–5 Work Plan. Phase 1 sampling activities were completed on approximately June 12. Typical laboratory turn-around times are on the order of three weeks for conventional analyses such as the ones being performed for Phase 1. Therefore, the laboratory likely would be able to deliver the analytical data to DUSA by mid-July at the latest. DRC requests that the draft report for Phase 1 sample results be submitted to DRC prior to, or concurrent with, Revision 1.0 of the Phase 2-5 Work Plan so that the Phase 1 data can be used to justify the Phase 3 sampling locations.
7. Section 1.1.1.3: Refer to the DRC comment on Section 1.1.1.1. Locations of monitoring wells at which isotope sampling would be conducted were also previously submitted with the

first iteration of the nitrate investigation work plan, and were subsequently modified during meetings between DRC and DUSA earlier this year. DRC does not see any reason why the locations for the isotope analyses would require modification from the previously agreed-upon locations. The locations previously agreed upon in these meetings should be shown on a figure in Revision 1.0 of this Work Plan, and discussed in this section of the text or elsewhere, as appropriate. The Phase 4 sample locations should be listed in a sampling table in Revision 1.0 of this Phase 2 through 5 Work Plan, with the columns left blank if the details need to be presented later in the Phase 4 QAP.

8. Section 1.1.3, last paragraph, fourth and fifth sentences: Please remove the quotations marks at the beginning and end of these sentences.
9. Section 1.2.2 and Section 1.5: DRC prefers that a standard USGS or other national publication be used to guide descriptions of rock cores instead of the New York Department of Transportation.
10. Section 2.2.4, third paragraph: The units for the estimated hydraulic conductivities should be centimeters per second (cm/s), not cubic meters per second.
11. Section 2.2.4, fourth paragraph: The discussion of groundwater travel time between monitoring wells TWN-2 and MW-31 is helpful. However, the estimated travel time presented in this paragraph is based on two assumptions that must be listed in this text: (1) the nitrate and chloride in the groundwater at MW-31 originated from a single source in the vicinity of TWN-2, and (2) the dissolved nitrate and chloride travel directly downward through the vadose zone from the point of discharge at the surface to the groundwater, with no lateral spreading due to the Mancos Shale or Dakota Sandstone/Burro Canyon Formation. As discussed in Section 2.3, the latter assumption is unlikely.
12. Section 2.3: The discussion of the migration pathways is detailed and appropriate. Several inferences are made regarding the effect of the Dakota Sandstone/Burro Canyon Formation, the Mancos Shale, and the interface between the Mancos Shale and the alluvial material on migration of contaminants. DRC requests that DUSA further explain in this Work Plan these lithologies' effects on the chloroform plume relative to the presumed sources of the chloroform contamination.
13. Figure 4: There is no figure in this Work Plan showing the locations of the potential source areas that are listed in the text. These areas are relevant to Phase 3 and the conceptual site model. Figure 4 would be an ideal location where the potential source areas could be displayed relative to the groundwater plumes. Please remove the wells from Figure 4 and add the potential source areas to this figure.
14. Figures 6 through 10: These figures do an excellent job of illustrating the conceptual site model. However, the hatching for the groundwater plumes obscures some of the cross section. Please use a less dense pattern for the groundwater plumes so that the soil types can be seen more clearly.
15. Figures 13 and 14: Please revise these figures to show groundwater mounding below the surface pond and include the interpretation as related to differences in groundwater flow paths and velocities (increased hydraulic gradient).

16. Figures General: DRC requests that an additional figure be included in the work plan consisting of an isopach map (2 dimensional) to depict extent and thickness of the Mancos Shale paleoridge and including location plots of all boring locations completed for Phase 1, as well as the locations of potential sources of nitrate contamination in the study area (as listed in the Work Plan Section 2.3.3.1).
17. Section 2.3.3.1: Several of the discussions regarding potential sources and their fate and transport are nearly identical and could be consolidated into one discussion pertaining to groups of sites. DRC suggests that any nearly identical sections be consolidated.
18. Section 2.3.3.1, Main Leach Field, Decision Process: DRC requests multiple edits to the logic detailed here and elsewhere in the report for other potential source areas. (1) The weight of evidence approach should be used to determine whether potential source areas can be ruled out. By definition, this approach incorporates multiple lines of evidence. A single line of evidence, such as a hydrogeological evaluation, will not be sufficient to rule out most of the potential source areas. (2) DRC reserves the right to determine whether a potential source is ruled out. (3) The lack of nitrate or chloride in alluvial soil or bedrock below a potential source area is not sufficient evidence to rule out that site as a contributing source. It is possible that the nitrate and chloride in the groundwater are the result of a historical release. If the release ceased but a source of uncontaminated water continued through the soil column over time, most or all of the nitrate and chloride could have been removed from the vadose zone. An example would be a leach field in which process chemicals containing ammonium and chloride were historically discharged. After the discharge ceased, the continued operation of the leach field could have contributed water free of nitrate and chloride that removed the nitrate and chloride from the soil column over time and deposited them into the groundwater. For this reason, the soil data alone should not be used to rule out a potential source, nor should soil data alone be sufficient reason to rule out groundwater sampling. (4) The soil isotopic analyses for Phase 5 were intended to be for alluvial soil, not bedrock as stated here. Please revise this text and the text for all of the subsequent potential sources accordingly.
19. Section 2.3.3.1, Historic Pond, Hypothesis 16-2: DRC notes that the analysis of aluminum in soil to test this hypothesis will be unreliable. Aluminum from rocket motor testing is unlikely to behave in the same manner as ammonium or chloride, and site-specific background concentrations of aluminum in soil likely are not currently available and could have a wide variation. Instead, DRC reinforces analyzing for nitrate, chloride, and perchlorate as discussed in the Phase 2 through 5 Work Plan.
20. Section 2.3.3.1, multiple sections: The presence of oxygen in the pore space in subsurface soil is likely to provide sufficient oxygen to convert ammonium to nitrate. A source of oxygenated water may not be the sole source of oxygen needed for the nitrification, although the water would be necessary for the transport of the nitrate to groundwater.
21. Section 2.3.3.1, multiple sections: for all text regarding "nitrates and chloride associated with sewage" please modify the text to discuss "nitrates and chloride originating from sewage or process chemicals".

22. Sections 2.3.3.1, multiple sections: the concentrations of all groundwater analytes must be compared against a background level for the site or region. This includes perchlorate, cryptosporidium, or any agriculturally-used chemicals. If reliable literature values for these analytes are not available, DRC requests that DUSA sample a statistically-significant number of monitoring wells that do not contain elevated concentrations of nitrate or chloride to determine a background level. The details regarding determination of background levels may be deferred to the Phase 2 QAP, but the comparison against background levels must be mentioned in Revision 1.0 of this Work Plan.
23. Section 3.7.3.5: During the review of the QAP, DRC may require third-party data validation for groundwater analytes not included in the original QAP.
24. Figures 15-18: Refer to global comments and comment on Section 2.3.3.1, Main Leach Field, Decision Process. The conclusions on the flow diagrams should be modified accordingly.
25. Table 1: Per communication between DRC and DUSA on 6/8/11, the Phase 2 and Phase 4 QAP are to be stand alone documents and are not to be Addenda to the QAP currently approved for the White Mesa Ground Water Permit, Permit No. UGW370004. This is based on this sampling and analysis being a one time event and specific to the Nitrate Investigation Project. Please ensure that all language referring to either of the Phase 2 and Phase 4 QAP's as an "Addendum" is removed and that Revision 1.0 of the Phase 2-5 Work Plan clarifies that these QAP's will be stand alone documents.
26. Table 1: The long time for isotopic analyses by the laboratory (5-6 months) appears to be unreasonably long. Please justify why this time would be required for the laboratory analyses.

[End of comments]