

September 5, 2008

Ms. Georgia Cleverley, Coordinator
Environmental Impact Review
New Mexico Environment Department
1190 St. Francis Drive
Santa Fe, NM 87505

SUBJECT: REPONSE TO REQUEST FOR WRITTEN RESPONSES TO NMED
COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT OF RIO
ALGOM MINING LLC'S ARROYO DEL PUERTO CHANNEL RE-DESIGN;
URANIUM MILL FACILITY AT AMBROSIA LAKE, NM

Dear Ms. Cleverley:

I am responding to your request of August, 6, 2008, for written responses to the New Mexico Environment Department (NMED) comments on the Draft Environmental Assessment (EA) of Rio Algom Mining LLC's (Rio Algom) Arroyo Del Puerto channel re-design, uranium mill facility at Ambrosia Lake, NM.

On April 1, 2008, the U.S. Nuclear Regulatory Commission (NRC) staff sent a Draft EA for Rio Algom's Ambrosia Lake uranium mill facility near Grants, New Mexico, to NMED with a request to provide comments. On April 11, 2008, Mr. Kevin Myers of the NMED Ground Water Quality Bureau sent an e-mail to NRC with three comments on the Draft EA. On April 30, 2008, Mr. Myers provided additional comments on the Draft EA to NRC. On May 1, 2008, Mr. Neal Schaeffer of the NMED Surface Water Quality Bureau provided comments on the Draft EA to NRC. On May 6, 2008, a teleconference was conducted between NRC staff and NMED staff to discuss the comments on the Draft EA. NMED comments were incorporated into the EA and the EA was made final in our ADAMS system on August 5, 2008. A copy of the EA was sent to Ms. Deanna Cummings of the U.S. Army Corps of Engineers, on August 5, 2008, to facilitate the completion of the Licensee's application for a Section 404 permit. Ms. Cummings forwarded the EA to Mr. Schaeffer on the same date.

On August 6, 2008, you sent an e-mail to NRC enclosing a letter you had sent to NRC on May 9, 2008, requesting that NRC provide written responses to NMED's comments on the Draft EA. Unfortunately, NRC did not receive this letter. In response to your August 6, 2008 letter, enclosed are our responses to NMED comments on the Draft EA.

We are also providing a copy of this letter to Mr. Myers and Mr. Schaeffer. If you require additional information, please contact Tom McLaughlin at 301-415-5869 or by email at Thomas.mclaughlin@nrc.gov.

G. Cleverley

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

/RA/ by T. Carter for

Rebecca Tadesse, Branch Chief
Materials Decommissioning Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-8905
License No.: SUA-1473

Enclosure:
Response to comments

cc: Art Kleinrath, DOE-GJ
Kevin Myers, NMED
Neal Schaeffer, NMED
Mary Ann Menetrey, NMED

G. Cleverley

- 2 -

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Sincerely,

Rebecca Tadesse, Branch Chief
Materials Decommissioning Branch
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cc: Art Kleinrath, DOE-GJ
Kevin Myers, NMED
Neal Schaeffer, NMED
Mary Ann Menetrey, NMED

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RESPONSES TO NMED QUESTIONS AND COMMENTS

Comments from the Ground Water Quality Bureau

The Department has some questions on the draft Environmental Assessment (EA) that was sent on April 1, 2008, for the Rio Algom Ambrosia Lake facility.

1. Will several wells have to be abandoned and replaced because of construction of Diversion Channel and Interior Drainage Channel?

No wells are going to be abandoned or replaced as the result of construction of the diversion embankment/channel.

2. Was there any evaluation of the infiltration along the interior drainage channel, which goes over the worse part of the alluvial contaminant plume? The depth to water in this area is about 10 to 15 feet and the low gradient of the channel may favor infiltration.

The Licensee prepared a technical memorandum to respond to the question of surface water infiltration and the potential for ground water recharge to the alluvial system beneath the channel from surface water flow. After reviewing the Licensee's response in their technical memorandum, U.S. Nuclear Regulatory Commission (NRC) staff concluded that Rio Algom Mining LLC (RAMC) adequately explained that the infiltration potential within the Ambrosia Lake Mill site would be small. The following are the most significant points stated by the Licensee that supports its conclusion that infiltration (recharge to the water table) is small:

- The drainage area for the Interior Drainage Channel is limited (less than a square mile-440 acres), thus, the surface runoff amounts would be small.
- The soils in the vicinity of the Arroyo del Puerto (ADP) at the Ambrosia Mill site are greater than 30 feet deep, and are composed of fine sandy silt to silty fine sand. Because of their fine texture and low permeability, they would retain more soil moisture than coarser textured soils. As a result, the evapotranspiration process would remove much of the soil moisture before it reaches the water table.

The evaporation rate for this site (54 inches/year) is greater (more than 6 times) than the annual precipitation (8.83 inches/year).

3. Was a synthetic liner considered for segments of the channels that go directly over waste piles (i.e., NE corner of Pond 4 and SW corner of Pond 6)? Otherwise, the low gradient may tend to infiltrate storm water and saturate the cover, which would leach contaminants from waste materials into the vadose zone or shallow alluvial aquifer.

None of the channels will go directly over waste piles. The interior channel will be constructed adjacent to the southwest sides of Ponds 4, 5, and 6 and will not be excavated into potentially impounded areas of the former ponds. The side rock apron of the channel will tie to the erosion protection rock to be placed over the entire conservatively estimated footprints of Ponds 4, 5, and 6. The alignment of the original ADP will be straightened by construction of the interior channel and the channel will be lined with erosion protection rock.

4. Given the challenges of constructing a channel with low gradients (0.1 to 0.5%), NMED noted that erosion monitoring and maintenance were not mentioned. Are these activities to be part of the current license or only for a long term surveillance plan?

Monitoring and maintenance of the channel are not part of the current license. In accordance with the requirements of 10 CFR Part 40 Appendix A, credit is not given for active maintenance in the design of the channel and erosion protection features. In the future, when NRC has approved the construction and has reviewed the licensee's completion report, the license will be terminated and a long-term surveillance and maintenance plan (LTSP) will be developed by the designated site custodian, usually DOE. In a typical LTSP, DOE performs routine monitoring and maintenance; such routine monitoring and maintenance would be expected to occur at this site, despite the fact that no credit has been given for it.

5. What is the relevance of the erosion lateral migration study cited in the January 2008 report? The comparison of natural to engineered channel features through aerial photography, especially when the naturally features may not have had significant flows, may have limited use.

This study was part of a previous reclamation plan that was submitted some time ago. For the design of the interior channel and the diversion channel, the NRC staff did not rely on the referenced lateral migration study. Instead, the staff assumed that lateral migration of the main channel of ADP would occur if an engineered design was not provided to prevent and/or limit the lateral migration. When this was discussed with the licensee, the licensee decided to provide the current design to prevent lateral migration into any of the areas where contaminated material is present.

6. Please provide clarification about the Quality Control requirements for the rip rap based on the January 2008 text references to "the opinion of the contractor...adjusted by a crowbar... approved by a qualified and certified rip rap inspector." Is this the extent of information available on the Quality Control and Quality Assurance program for rip rap?

In January 2008, the staff reviewed the initial QA/QC requirements and concluded that they needed to be enhanced and improved. These concerns were communicated to RAMC, and revised procedures were submitted and approved by the staff. These procedures included better QA/QC controls for rock production, rock durability testing, thickness testing, and uniformity checks.

7. In the March 2008 report on Sheet 13, the interior drainage channel has a drop of 4% along the channel. Has this been considered a possible nick point for erosion and are adequate measures taken to project this reach?

The portion of the channel that has a 4% slope is treated similarly to other portions of the channel. Although this could be considered a relatively steep slope from a hydraulic standpoint, rock riprap was provided to resist the velocities from a Probable Maximum Flood (PMF) event and to prevent nick point erosion on such a steep slope. The staff has approved riprap for slopes steeper than 4% at numerous sites throughout the United States.

8. In the March 2008 report on Sheet 16, there is a note that says, "Begin Daylighting." NMED requests clarification about the meaning of daylighting and whether it refers to buried rip rap along a portion of the channel in order to achieve the desired slope.

In this case, “Begin Daylighting” refers to the area where the interior channel bottom slope will begin a smooth transition into the exterior drainage channel.

Comments from the Surface Water Quality Bureau

1. The SWQB finds that the engineering plan lacks any concept of natural channel design. Although the report addresses historic flow, this concept was not extended to historic channel geometry. The shape of the proposed channels is significantly different from pre-existing landforms, even though those natural channels are acknowledged to be stable. Specifically, the SWQB is concerned that the proposed channels will be inherently unstable (the SWQB notes that the NRC expects stability for 1000 years).

For this specific channel design, it is expected that some erosion and sedimentation will occur over a 1000-yr period. However, the configuration of the channel is such that a 1.5% channel bottom cross-slope is used to provide a low point on the left side of the channel that directs flows away from the diversion berm. If erosion occurs, it is likely to initially occur along the left side of the channel, where the flows are deeper and the velocities are higher, thus providing further protection from gully migration. The major protection from gully migration is provided by the riprap that is placed along the right side of the channel and on the diversion berm. This riprap is designed to resist flow velocities and channel scour produced by the PMF. The staff concludes that this design is very conservative and meets the stability requirements of 10 CFR Part 40 Appendix A. Similar channel designs have been approved by the staff for reclamation at many uranium mills in the western United States.

It should be noted that RAMC was faced with a relatively difficult design problem at this site. The presence of contaminated material in Ponds 4, 5, and 6 necessitated a design that would prevent erosion of this material. Unfortunately, the ponds were constructed several years ago in an extremely large area of the floodplain of ADP, and the actual main channel of ADP had the potential to encroach on the ponds. Because of the nature of the alluvial floodplain of ADP, RAMC and the NRC staff recognized the difficulties associated with predicting exact locations of sediment deposition or the exact position of the ADP channel if it changed during a large flood event. Therefore, the staff requested RAMC to provide a design that would accommodate potential channel avulsion, erosion, sediment deposition, and other phenomena. RAMC chose a design that included channels and large berms to divert flood flows and to minimize sediment problems.

2. The SWQB believes that the engineering would be much improved with consideration of local reference-reach geometry, including a review of bank-full channel dimensions. We further believe that those natural channels offer greater stability than the proposed ones.

The staff considers that the current design is more stable than any natural design that could be provided and meets the requirements of 10 CFR Part 40. The channel and diversion berm provide protection for an occurrence of the PMF, and the riprap that is added will minimize the potential for gully and channel migration into contaminated areas. Without the berm and riprap, any natural channel may be subject to rapid avulsion and erosion into the waste areas. The engineered features are specifically designed to prevent such erosion.

3. The report notes that “the Arroyo del Puerto has been a relatively narrow channel in a broad alluvial flood plain” (i.e., very different from the proposed channel); and it concludes that “migration of the channel of Arroyo del Puerto has been minimal, if any, since 1935.” The

SWQB believes that this finding cannot be extrapolated to the proposed channel due to the significantly changed channel shape. Thus, the SWQB disputes the NRC findings that “historic information does provide a level of assurance that migration of Arroyo del Puerto will not be significant.”

As stated above, the staff considers that the current design is more stable than any natural design that could be provided and meets the requirements of 10 CFR Part 40. Further, the staff considers that the engineered features will enhance the overall performance of the natural channel system and will provide more stability to a system that was already relatively stable. This is especially important during the occurrence of very high flows, such as those that would occur during a PMF. The “level of assurance” that is provided by historic information was intended to apply from a qualitative standpoint. Although rapid channel migration is not considered likely, it cannot be ruled out. The proposed design will assure that such an unlikely event is acceptably accommodated.

4. The Bureau also notes that the design of the diversion channel already appears to reproduce a “broad flood plain”, at least during very high flows. However, despite “evaluation” of historic aerial photos, the meander pattern of those pre-existing stable channels is not reproduced in the proposed channels. Such meander patterns are essential to stable channel geometry.

There was no intent to reproduce meander patterns, which the staff considers may not be stable during large floods. The relatively straight diversion channel is about 250 feet wide and is not considered to reproduce floodplain flows. As discussed in response to Comment 2, above, the staff expects any new areas of erosion to form on the left side of the channel. Only very large flows will impact the diversion berm and the riprap on the berm. Also, there is a large over-bank area on the left side of the channel to convey channel overflows.

5. The SWQB is concerned that both the interior drainage channel and the diversion channel are oversized (the report describes the later as “very large”) and too straight. More specifically, we suspect that these channels will accumulate sediments as point bars, and that the resulting flow patterns, specifically secondary-cell or helical flow patterns, will exert significant lateral erosional stress on the engineered banks. The NRC staff expressed a similar concern.

NRC staff concerns were satisfied with the channel design, as currently proposed. The large channel is provided to reduce channel velocities to manageable levels, but to also provide sufficient velocities to “flush” sediments through the channel. By providing a deeper area on the left side of the channel, the sediments will be directed to an area where velocities are highest, thus resulting in minimal accumulations of sediments as point bars.

6. The report (page 51) describes calculating “trap efficiency” and “sediment transport capacity” in the diversion channel, referring to Table E-1. The Bureau was unable to find Table E-1, but the narrative implies that these calculations considered only very high flows (greater than 200-year return interval). The SWQB is concerned about aggradation during more common channel-forming events. Thus, the Bureau disputes the design summary conclusion that “the system is not subject to sedimentation problems”; and we believe that such problems are likely to result in channel instability.

Sediment accumulations can pose a problem in the design of diversion channels. In many instances, diversion channels are constructed to convey flood flows where the slope of the channel is radically lessened. In this specific case, the channel slope is not dramatically altered,

and the channel configuration could more properly be considered as a channel re-alignment, rather than a channel diversion. In any case, the slope of the re-aligned channel is not significantly different than the natural channel slope.

As discussed in our response to the above comments, the staff concludes that the channel with its cross-slope configuration will minimize the accumulation of sediment in the channel. Further, the staff relied on information provided in Appendix E.1 of the licensee's January 2008 submittal. This report was prepared by Gerry Lindsey, an expert geomorphologist with considerable experience in the southwest United States and in the design of diversion channels for DOE at numerous sites in the Title I program. Mr. Lindsey indicates in his report "Geomorphic Analysis of Arroyo Del Puerto Drainage, Ambrosia Lake Area" that there is a high infiltration rate associated with the thick alluvial deposits that significantly reduces the potential for gullying and sediment production and that there is a notable lack of gullying in the lower Ambrosia Lake valley. Mr. Lindsey also indicates that most tributary channels are poorly defined as a result of a lack of flow concentration, caused by infiltration and dissipation of runoff.

RAMC also provided analyses in Appendix E.2 to show that most of the fine-grained sediment that is produced in the drainage basin will be conveyed past the site at a relatively high velocity during flood flows. The slope of the channel is such that the higher velocities will flush sediment from the channel, and sediment will not be deposited in any significant quantities.

Of considerable importance is the fact that RAMC also provided HEC-RAS analyses to show that overtopping of the diversion berm would not occur, even if significant sediment accumulation occurred in the exterior diversion channel. The analyses showed that the increase in water levels in the channel would be insignificant, primarily because flood flows would spread further into the left over bank.

7. This report also does not provide the basis for the upstream diversion structure design, other than (presumably) to build it like the rest of the levee. The SWQB notes that this small part of the structure (the upstream end) blocks flow from the historic channel. We are concerned that this will experience significant erosional stress and that it will have a short lifespan.

As discussed in Comment 6 above, RAMC provided Corps of Engineers HEC-RAS analyses to show that overtopping of the diversion berm would not occur during a PMF event, even if unexpected and significant sediment accumulation occurred in the exterior diversion channel. The analyses showed that the increase in water levels in the channel would be insignificant, primarily because flood flows would spread further into the over-bank areas. In addition, RAMC's analyses indicate that the riprap provided is capable of resisting velocities produced by a PMF in this area of the channel.

8. Finally, the SWQB is concerned about the apparent lack of consideration for monitoring and maintenance of these structures.

See response to Comment 4 above.