

October 31, 1996

Mr. Bill Ferdinand, Manager  
Radiation Safety, Licensing and  
Regulatory Compliance  
Quivira Mining Company  
6305 Waterford Bldg., Suite 325  
Oklahoma City, Oklahoma 73118

SUBJECT: GROUNDWATER ALTERNATE CONCENTRATION LIMITS FOR AMBROSIA LAKE

Dear Mr. Ferdinand:

The U.S. Nuclear Regulatory Commission staff has completed the initial processing, which is an administrative review, of your June 18, 1991, application for groundwater alternate concentration limits (ACLs) at Quivira Mining Company's (QMC's) Ambrosia Lake, New Mexico, uranium mill and tailings site. During this review, the NRC staff identified omissions and deficiencies which make the application unacceptable for the purpose of conducting a detailed technical review to further evaluate the proposed licensing action. These deficiencies are discussed in the enclosed acceptance review (Enclosure 1).

Please provide the additional information requested to address the deficiencies identified in the enclosure. In addition, QMC should consider revising its ACL application to meet the format and other guidelines in the Staff Technical Position "Alternate Concentration Limits for Title II Uranium Mills" January 1996, a copy of which is enclosed for your information and use (Enclosure 2). ACL applications which adhere to the STP will reduce the NRC staff time and effort required for review and limit the staff requests for additional information.

If you have any questions concerning this letter or the enclosures, please contact Kenneth Hooks, the NRC Project Manager for the Ambrosia Lake site at (301) 415-7777.

Sincerely,  
Joseph J. Holonich, Chief (Daniel Gillen For Holonich)  
Uranium Recovery Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

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Acceptance Review  
Application for Alternate Concentration Limits  
Quivira Mining Company's Uranium Recovery and Tailings Disposal Facility  
Ambrosia, New Mexico  
(Material License SUA-1473)

The U.S. Nuclear Regulatory Commission's staff has completed an Acceptance Review of an application submitted by Quivira Mining Company (Quivira) to apply alternate concentration limits (ACL) for groundwater protection at its uranium recovery and tailings disposal facility located in the Ambrosia Lake valley, north of Grants, New Mexico (Quivira Mining Company, 1991). The review covers Quivira's ACL application dated June 18, 1991; and is based on the guidance and criteria provided in the staff technical position on ACLs for Title II uranium mills, dated January, 1996 (STP) (U.S. NRC, 1996).

According to the STP, ACL applications will be accepted for detailed review if it is determined that the application is justified based on site-specific conditions, and if they include the minimum documentation and information needed for a detailed staff review. At a minimum, the application must provide a hazard assessment and a corrective action assessment. The acceptance review of Quivira's ACL application was conducted based on the applicable regulations and with respect to the STP guidance.

The ACL application indicates that a substantial effort has been undertaken to extract the contaminated groundwater (i.e., by installation and operation of extraction wells and an interception trench), and applying the ACL standards at the Ambrosia Lake facility may well be justified on the basis of the corrective action measures implemented to date. However, the application does not provide sufficient documentation or data to conduct detailed reviews of the hazardous and corrective action assessments as required by the regulations. The hazard assessment provided in the ACL application has several deficiencies, and the corrective action assessment is virtually missing.

Therefore, the acceptance review resulted in determining that the ACL application does not provide sufficient information and documentation to warrant a detailed review at this time. Specifically, the acceptance review has identified the following information and documentation that will need to be incorporated in the ACL application, before a detailed review can be undertaken. When this information and documentation are incorporated in the application, the staff can schedule and proceed with a detailed review.

**Issue 1:** The hazard assessment does not adequately characterize the extent of existing contamination and contaminant transport, particularly in aquifers other than the alluvial unit.

*1.1 Discussion of Issue*

As indicated in the STP, the ACL application should characterize the contamination source-term, extent of existing contamination, and contaminant transport in the groundwater. This information is needed to assess present human and environmental population exposure to elevated concentrations of

hazardous constituents, calibrate contaminant transport models, and evaluate projected future exposures.

The source-term characterization should provide reliable estimates of the release rates of hazardous constituents as well as constituent distributions, including information on future releases of hazardous constituents into the groundwater. At sites with well-defined contaminant plumes, the spatial distribution of the various hazardous constituents needs to be defined and delineated.

The ACL application indicated that the solution sources and the extent of contamination has been extensively studied, defined and documented in previously submitted reports. However, the application seems to address contaminant distribution and transport in only the alluvial unit. The application did not address or raise concern about existing or future contamination, contaminant transport, or exposure to contamination in any aquifers other than the alluvial unit. The implication is that there are no other contaminated aquifers, and/or that the users of water from such aquifers are not at risk of exposure to contaminated groundwater. But the application does not address, provide documentation, or make specific reference to other documentation in support of this position.

#### *1.2 Required Action by Licensee to Resolve Issue*

The application should be revised to characterize the site hydrogeology and contaminant distribution and transport in aquifers other than the alluvial unit, or provide documentation that no other aquifers have been contaminated.

#### *1.3 Pertinent Reference in STP*

Section 2.1 (Application Content); Section 3.2.3.1.1 (Source-Term and Contaminant Characterization); Section 3.2.3.1.2 (Hydrogeologic and Contaminant Transport Assessment); Section 3.3.3.1.1 (Source-Term Characterization Review); and Section 3.3.3.1.2 (Site Hydrogeology and Contaminant Transport Review).

**Issue 2: The ACL application does not specify point of compliance (POC) or point of exposure (POE) locations.**

#### *2.1 Discussion of Issue*

The ACL application does not seem to identify specific POC or POE locations. The POC designates the location(s) in the uppermost aquifer where the ACL standards will be satisfied; the POE designates the location(s) where exposure of humans and environmental species to groundwater contamination can occur. In addition, this information is also needed to assess the level of contaminant attenuation that can be expected to take place between the POC and the POE locations, in support of the proposed ACL values.

## *2.2 Required Action by Licensee to Resolve Issue*

The ACL application should specify the POC and POE locations. The POC should be located in the uppermost aquifer at the downgradient edge of the tailings disposal site(s); the POE location(s) should be selected considering all possible exposure points in the uppermost aquifer, and other hydraulically connected aquifers and surface waters. The POC and POE locations should be depicted on a site map.

## *2.3 Pertinent Reference in STP*

Section 1.3 (Applicable Regulations; Sections 1.4 (Implementation Guidelines); Section 3.2.3.1.2 (Hydrogeologic and Contaminant Transport Assessment); Section 3.2.3.1.3 (Exposure Assessment); Section 3.3.3.1.2 (Site Hydrogeology and Contaminant Transport Review); Section 3.3.3.1.3 (Exposure-Assessment Review).

Issue 3: The ACL application specifies neither the attenuation rates nor procedure followed to determine proposed ACL values for constituents.

## *3.1 Discussion of Issue*

Establishing site-specific ACLs that are protective of human health and the environment requires a demonstration that the proposed ACLs (at the POC), will attenuate to background levels, Maximum Concentration Limits or MCLs, or some site-specific health-based concentrations that are protective of human health and the environment (at the POE). The presumed concentrations at the POE are used to deduce appropriate ACL values, using site-specific attenuation rates.

Although the ACL application discusses some of the factors that affect attenuation at the site, it is not clear what rates were used or what procedures were followed to determine such rates, and whether or not these rates were ultimately used to determine appropriate ACL values for different constituents in the site area.

## *3.2 Required Action by Licensee to Resolve Issue*

The ACL application should provide the attenuation rates that were used to determine appropriate ACL values for individual constituents, based on their protective health values at the POE, and should explain how these rates were determined. If the applicant does not want to claim any credit for attenuation of a particular constituent between the POC and the POE, the application should so clearly state; however, the proposed ACL values must in this case be protective of human health and the environment at the POC.

## *3.3 Pertinent Reference in STP*

Sections 1.4 (Implementation Guidelines); Section 3.2.3.1.2 (Hydrogeologic and Contaminant Transport Assessment); Section 3.3.3.1.2 (Site Hydrogeology and Contaminant Transport Review).

**Issue 4:** The ACL application does not adequately document the water classifications and water uses for all affected or potentially affected groundwater sources.

#### *4.1 Discussion of Issue*

The ACL application addressed the yield and unlikely use of groundwater from the alluvial unit, but did not address or provide water quality data that can be used for classification of water or determining the current and/or potential uses of the groundwater in the alluvial unit or other aquifers that may be hydraulically-connected to the alluvial unit.

#### *4.2 Required Action by Licensee to Resolve Issue*

The ACL application should provide additional information and documentation concerning the classification and current and potential uses of water from the alluvial unit and other aquifers that may be hydraulically-connected to the alluvial unit. Alternately, the application should clearly indicate and provide supporting justification that contamination of the alluvial unit will not impact any other aquifers. All commonly known water uses should be considered, and the classification should consider the groundwater classification in the U.S. Environmental Protection Agency's "Groundwater Protection Strategy", and other guidance provided in the STP.

#### *4.3 Pertinent Reference in STP*

Sections 2.1 (Application Content), 3.2 (Acceptance and Review Criteria), and 3.3 (Review Procedures).

**Issue 5:** Procedures used to evaluate the health risk and proposed ACL values are not satisfactory

#### *5.1 Discussion of Issue*

The applicant determined and defended the proposed ACL values for molybdenum, selenium and gross alpha on the basis of one or more of the following factors: (1) Health risk assessments; (2) Constituent concentrations permitted by the EPA standards for effluent discharge in surface waters under the National Pollution Discharge Elimination System (NPDES) regulations in 40 CFR 440; (3) Constituent concentrations permitted by the New Mexico Water Quality Control Commission's (NMWQCC) regulations for groundwater and surface water.

The staff notes that the health-risk assessment is the only approach specified in the STP for determining acceptable health-based values for individual constituents at the POE (these values are then used to determine the corresponding ACL values that must be complied with at the POC using the contaminants attenuation rates). The staff does not consider the argument that the ACL values should be acceptable only because they are within the NPDES standards, or because they are within the NMWQCC's regulations. This is because the NPDES standards are applicable to wastewater discharge in surface water and are not applicable to groundwater protection at uranium mill sites



(Groundwater protection standards that are applicable at the mill sites are those specified in Appendix A to 10 CFR Part 40, including MCLs, background levels, or ACLs).

In addition, the staff notes that the NPDES standards that are applicable to existing mills do not specify standards for any of the constituents for which ACLs have been applied for at the Ambrosia Lake facility (i.e., uranium, molybdenum, selenium, and gross alpha). The standard for uranium (2 mg/l) in the NPDES standards is applicable to mine water discharge but not to wastewater solutions from existing mills.

The concentration limit for selenium permitted in the NMWQCC's regulations for groundwater and surface water (0.25), which was cited in the ACL application, is not satisfactory because it exceeds the MCL value in Table 5C of Appendix A (0.01 mg/l) and EPA's proposed drinking water standard for selenium (0.05 mg/l). Appendix A does not provide standards for molybdenum or uranium.

To summarize, the staff disagrees with the procedure followed in the application to determine health-based values for selenium, molybdenum, and gross alpha. In the absence of MCL or background levels, ACLs may be used as groundwater protection standards at mill sites. The ACLs are established based on levels that are protective of human health and the environment at the POE, and are often based on site-specific health hazard assessments; a mere reliance on the NPDES standards or the NMWQCC's regulations to determine acceptable health based values and establish ACL values is unacceptable in this case.

### *5.2 Required Action by Licensee to Resolve Issue*

The applicant is requested to provide a site-specific assessment for individual constituents to determine a health-based concentration that may be used to establish ACLs for the site.

### *5.3 Pertinent Reference in STP*

Section 3.2.3.1.3 Exposure-Assessment; Section 3.3.3.1.3 Exposure Assessment Review.

**Issue 6:** The ACL application provides no proper corrective action assessment and does not demonstrate that the proposed ACLs are "as low as reasonably achievable".

### *6.1 Discussion of Issue*

As provided in Criterion 5B(6) of Appendix A, site-specific ACLs will be established for hazardous constituents if the proposed ACL values are as low as is reasonably achievable (ALARA), after considering practicable corrective actions. This is in addition to a finding that the constituents will not pose a substantial present nor potential hazard to human health or the environment as long as the ACLs are not exceeded.

The corrective action assessment provided in the ACL application does not provide a proper corrective action assessment that demonstrates that the proposed ACLs are ALARA. Although the staff recognizes that significant groundwater extractions have been undertaken, from extraction wells and an interceptor trench, it is not clear that the corrective action measures to date represent all of the corrective action that can be implemented, or why these measures should be terminated at this time. Getting the concentration levels below the NPDES standards or the concentration levels in the NMWQCC's regulations does not represent an automatic compliance with the ALARA requirement in the regulations.

#### *6.2 Required Action by Licensee to Resolve Issue*

The ACL application should be revised to provide a detailed analysis of corrective action and demonstrate and document that the proposed ACLs meet the ALARA provision in the regulations.

#### *6.3 Pertinent Reference in STP*

Section 1.3 (Applicable Regulations); Section 2.1 (Application Content); Section 3.2.3.2 (Review Element 2: Corrective Action Assessment); Section 3.3.3.2 (Review Element 2: Corrective Action Assessment).

**Issue 7:** The ACL application provides no explicit commitment to transfer land to the Federal or State Government or to provide necessary documentation and supporting information to secure commitment by government agency to accept such land.

#### *7.1 Discussion of Issue*

The regulations (Criterion 11 of 10 CFR Part 40) require that the title to the land that is used for the tailings disposal be transferred to the Federal Government or the State, for long-term custody when the specific license is terminated. The ACL application did not make a specific commitment to do so.

#### *7.2 Required Action by Licensee to Resolve Issue*

As described in detail in the STP (Section 1.4: Implementation Guidelines), NRC requires that when a distant POE is involved, the land between the POC and POE be transferred along with the disposal site, and the licensee should provide necessary documentation that can be used to secure a commitment to take the land from long-term site custodian of the site.

Therefore, the ACL application should include an explicit and clear commitment by the licensee to transfer the stabilized tailings (including protective diversions), and the area required for contaminant attenuation to the U.S. Department of Energy, or the State of New Mexico at the time the specific license is terminated. If a distant POE is involved, the ACL application should also include language that the licensee will coordinate and work with NRC to provide necessary documentation that can be used to secure a commitment from the long-term custodian to take custody of the site after the termination

of the specific NRC license.

### *7.3 Pertinent Reference in STP*

Section 1.4 Implementation Guidelines.

## **Issue 8: Application update**

### *8.1 Discussion of Issue*

The ACL application was prepared in 1991, based on the 1988 draft staff technical position on ACLs. The application uses pre-1991 data and predates the final STP presently in effect. There is clearly a need to update much of the analysis to take advantage of the data collected since the ACL application was submitted, and to make use of the guidance in the STP. It is also noted that some of the figures provided in the application are on a small scale and are not legible.

### *8.2 Required Action by Licensee to Resolve Issue*

The ACL application should be revised to update the data and analysis, using the guidance provided in the STP. Legible figures should also be either provided in the revised application or referenced.

### *8.3 Pertinent Reference in STP*

Section 1: Regulatory Position and Implementation Guidelines; Section 2: Application Content and Format; Section 3.4: Documentation of Review Findings.

## **References**

Quivira Mining Company, 1991. Proposed Alternate Concentration Limits for the Alluvial Unit, Ambrosia Lake Facility, Ambrosia Lake, New Mexico, June 1991.

U.S. Nuclear Regulatory Commission, 1996. Final Staff Technical Position, Alternate Concentration Limits for Title II Uranium Mills, Standard Format and Content Guide, and Standard Review Plan for Alternate Concentration Limit Applications, January 1996.