

# Quivira Mining Company

Marvin D. Freeman  
Vice President

January 24, 1997

Mr. Joe Holonich  
Nuclear Regulatory Commission  
Uranium Recovery Branch  
Division of Low Level Waste Management & Decommissioning  
Mail Stop T7J9  
11555 Rockville Pike  
Rockville, MD 20850

Re: Ambrosia Lake Facility  
License SUA-1473  
Docket # 40-8905  
Byproducts Material

Dear Mr. Holonich:

This letter is in response to Mr. Ken Hooks' most recent request for additional information to supplement our November 20, 1995 request for NRC to amend the Ambrosia Lake Facility license to provide for the acceptance and disposal of de-minimis quantities of Section 11e.(2) byproduct materials. Specifically, Mr. Hooks requested that Quivira provide further assurances that the chemical and radiological characteristics of the proposed materials are within the bounds of Quivira's previously submitted environmental reports and the materials will be properly processed and disposed without additional impacts upon the environment or exposures to the workers or to the public.

## Chemical Characteristics

The weighted averages of various chemicals contained in the slurry to the Ambrosia Lake Tailings Facility are shown below:

	<u>Grams/Liter</u>
U <sub>3</sub> O <sub>8</sub>	0.0112
Mo	0.014
Cl	1.54
SO <sub>4</sub>	30.60
F.A.	12.60
NH <sub>3</sub>	0.18
Fe	2.99
TDS	40.60
Na	0.86
Ca	0.58
Mg	0.64
V	0.09
Se (mg/)	6.80
Ra-226 (pCi/l)	336.00

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1405 1/0

Source: Table 3-3, Quivira Mining Company's Supplemental Environmental Report for Reclamation, Ambrosia Lake New Mexico Facility, February 12, 1993

Because of different host rock compositions, processing technologies and treatment systems at other uranium and thorium ore processing centers, it is not possible to provide a direct comparison of the chemistry of tailings or wastes generated from other uranium and thorium processing centers to the tailings generated at the Ambrosia Lake Facility. However, to insure incoming byproduct materials are consistent with the tailings currently impounded on-site, are not more active than the current materials disposed on-site, and are not detrimental to the long-term operation and management of the disposal cell, Quivira will obtain a sample of the proposed byproduct materials prior to authorizing shipment and will test the samples for those constituents identified below and other constituents which may be identified as unique to the specific supplier or reasonably likely to be contained because of the origin of the materials.

Base sample analysis for chemical characteristics:

Arsenic	Mercury	Diethyl Phthalate
Barium	Molybdenum	Methylene Chloride
Beryllium	Nickel	Acetone
Cadmium	Radium	Chloroform
Chromium	Selenium	Carbon Disulfide
Cyanide	Thorium	2-Butanone
Fluorine	Uranium	Naphthalene
Lead		2-Methylnaphthalene
		1, 2-Dichloroethane

Source: December 15, 1987, Ed Hawkins, Nuclear Regulatory Commission to Quivira Mining Company.

Additionally, Quivira will sample all incoming byproduct materials as described in Bill Ferdinand's May 9, 1996 clarification of previous discussion items (i.e. NRC Staff Discussion Question #3) for disposal documentation and groundwater reference purposes.

Chemically and physically the byproduct materials to be brought on-site will be similar to the various forms of byproduct materials already disposed on-site. For example, expected materials to be received are uranium and thorium ores and their processing residues, including:

- tailings resulting from the separation of the uranium/thorium from the ore bodies;
- contaminated solids;
- contaminated plant equipment, including structural steel, pipes, cement, etc.;
- evaporation pond liners and associated clean-up residues; and,
- residues generated during groundwater restoration activities.

### **Radiological Characteristics**

Quivira has requested that only tailings or wastes produced by the extraction and concentration of uranium and thorium ores, including wastes from in-situ leaching operations, be approved for disposal. Accordingly, the radioactive materials to be received will consist of only natural uranium/thorium and their normal decay products and would be no more radioactive than the tailings currently impounded on-site. Basically, the materials to be received would be in secular equilibrium absent the uranium or thorium separated during the processing activities.

Typical Ra-226 concentrations of various materials already disposed on-site due to the Ambrosia Lake Facility activities follows:

	Range <u>pCi/gm</u>	Average <u>pCi/gm</u>
Tailings Sands	150 to 330	237
Tailings Slimes	600 to 1,920	1,086
Pond Clean-up	7 to 57	19
Windblown Clean-up	2 to 16	7

Source: Ambrosia Lake Tailings Reclamation Plan, September 28, 1990, Enclosure 1, Radon Attenuation Cover Calculations

It is anticipated that byproduct materials to be received will contain an average concentration of radium-226 of approximately 400 pCi/gram which is consistent with normal processing of uranium ores, is similar to the tailings currently impounded on-site and is in general conformance with the model mill radium-226 value of 280 pCi/gram used in the Final Generic Environmental Impact Statement on Uranium Milling<sup>1</sup>. It is not unusual to accumulate higher concentrations of radium-226 in the tailings fines, or "slimes", which result from impounding the tailings. For example, slime areas within the current Ambrosia Lake Facility impoundments have measured concentrations which exceed 1,900 pCi/gram radium-226. Although the radon flux standard of 20 pCi/m<sup>2</sup>/second has been achieved during closure even with these higher levels and to ensure the new materials will not be more radioactive than materials already impounded on-site, Quivira will not accept byproduct from a source which would cause the materials received to exceed 1,100 pCi/gram radium-226 averaged over the disposal area without securing NRC's approval prior to disposing of the materials.

As presented in previous documents, the addition of 10,000 yd<sup>3</sup> of byproduct materials averaging 400 pCi/g radium-226 would represent less than 0.03% of the total radium-226 activity of approximately 16,000 Ci already disposed on-site and would use less than 0.06% of the remaining designed disposal capacity of the facilities.

### **Receiving and Handling**

It is contemplated that some of the byproduct materials to be received will be packaged in 55-gallon drums, crates or bags and transported to the facility in exclusive use transport vehicles. However, materials may also be shipped by other methods such as tankers, closed bulk trailers, etc., which are unique to the type of materials to be shipped and/or the shipper. As provided in Bill Ferdinand's November 20, 1995, amendment request, Appendix B, Quivira Mining Company's Standard Operating Procedure (SOP), Handling/Disposal of Byproduct Material and Contaminated Wastes, the facility currently has a standard operating procedure for receiving, monitoring, and handling highway motor vehicles and certain containers to be off-loaded and disposed on-site. Should a shipper wish to deliver byproduct materials which are not in accordance with the above SOP,

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<sup>1</sup>NUREG-0706, Vol. 1, Final Generic Environmental Impact Statement on Uranium Milling, Project M-25, September 1980, Table 5.3, Chemical and Radiological Properties of Tailings Wastes Generated by the Model Mill

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Quivira will, in accordance with License Condition #15, initially issue a Radiation Work Permit (RWP) to provide for the safe unloading, storage and disposal of the shipment until such time as a Standard Operating Procedure can be developed and approved in accordance with License Condition #14.

I believe the above supplemental data completes the additional information requested to date from your office. If you have any questions regarding this response, please contact me at 405-848-1187.

Sincerely,



Marvin D. Freeman

MDF:RA:kb

cc: R. Adkisson (QMC-OKC)  
T. Fletcher (QMC-Ambrosia Lake)  
P. Luthiger (QMC-Ambrosia Lake)  
NRC - (Div. Of Radiation Safety and Safeguards) Arlington, TX  
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