

June 5, 2000

Mr. William Paul Goranson, Manager
Radiation Safety, Licensing and
Regulatory Compliance
Quivira Mining Company
6305 Waterford Blvd., Suite 325
Oklahoma City, OK 73118

SUBJECT: DISAPPROVAL OF RELEASE OF QUIVIRA MINING COMPANY- AMBROSIA
LAKE FACILITY'S POND 8 FOR UNRESTRICTED USE

Dear Mr. Goranson:

The purpose of this letter is to confirm statements made by my staff concerning Pond 8, at the Quivira Mining Corporation's (QMC) Ambrosia Lake facility, during the confirmatory survey meeting with you on November 9, 1999, and by follow-up letter on the survey dated March 8, 2000. The staff of the Nuclear Regulatory Commission (NRC) has evaluated the information related to the remediation of Pond 8. Based on the review of the data provided to us, we are unable to support the approval of the unrestricted release of Pond 8.

By letter dated December 28, 1988, the NRC staff approved release of Pond 8 at the Quivira's Ambrosia Lake uranium mill site for unrestricted use. This decision was based primarily on data provided by the licensee dated October 18, 1988, indicating that the soil met the subsurface radium (Ra-226) criterion in 10 CFR 40, Appendix A, Criterion 6(6). The former evaporation pond for tailings solution was to be cleaned to the 15 pCi/g Ra-226 standard and covered with a minimum of 15 cm (6 inches) of clean soil. However, our recent review of the proposed methodology presented in the submittal of December 7, 1987, the data provided May 2 and October 18, 1988, and particularly Pond 8 soil data from samples obtained in November 1999, requires NRC to rescind that approval.

Pond 8 cannot be released for unrestricted use because of the potential hazard to human health. Also, Pond 8 cannot be transferred to the long-term custodian until it is demonstrated that residual radionuclides in the soil meet applicable criteria. These determinations are based on the following:

1. QMC made an incorrect conclusion concerning the gamma-radium correlation submitted December 7, 1987. In Appendix B of that submittal, QMC states that the correlation graph illustrates that a 1 to 1 ratio of soil radium content and gamma intensity exists. In fact, the gamma values are not reliable indications of the soil Ra-226

level. The data show that Ra-226 values of 1.7, 2.8, 6.3, 16.0, and 18.0 pCi/g are associated with gamma readings of 14 μ R/hr. Samples in the range of Ra-226 background, 1.6 to 3.8 pCi/g, have associated gamma values ranging from 12 to 40 μ R/hr while samples containing 8 to 18 pCi/g have gamma values of 13 to 32 μ R/hr. The gamma data, as collected by QMC, does not reflect the soil Ra-226 level as determined by QMC.

2. The gamma meter and gamma scan path of 25 feet used on the pond area would not allow an accurate determination of the average gamma level in each 100 sq. meter area as needed to demonstrate compliance with the radium standard. If more complete surveys were performed to assess the uniformity of the gamma field, this was not reported.

3. QMC stated that 10.2 acres within the pond area were remediated. This area is equivalent to 413 100-square-meter grids but only eight soil samples were analyzed for Ra-226. Commonly at that time, soil samples from 10 percent of the grids was recommended. One of several soil samples also analyzed by NRC staff in 1988 failed to meet the Ra-226 criterion (26 pCi/g instead of 18, assuming background of 3 pCi/g), contrary to the QMC results of 14 pCi/g.

4. QMC data (May 2, 1988) indicated levels of thorium (Th-230) as high as 2200 pCi/g in Pond 8 but cleanup of Th-230 was not addressed. While cleanup criteria for residual radionuclides (byproduct material) other than radium did not exist in Part 40, Appendix A at that time, §40.42k(2) indicates that before license termination, reasonable effort should be made to eliminate residual radionuclides. This effort would also apply to any areas to be released for unrestricted use. There also was the Branch Technical Position on Disposal or Storage of Thorium and Uranium Wastes dated October 1981 that recommends soil levels for natural thorium (5 pCi/g surface, 15 pCi/g subsurface) that could have been considered by QMC.

5. Two soil samples (each a composite of five samples per grid) collected on Pond 8 during the November 1999, confirmatory survey and analyzed by staff from the Oak Ridge Institute for Science and Education, demonstrated Ra-226 at 44 and 21 pCi/g and Th-230 at 2197 and 1237 pCi/g in the upper 15 cm and 15 to 30 cm interval, respectively.

Because of reliance on an inadequate gamma-radium correlation and gamma survey, there are no reliable data for 405 grids in the remediated area and the adjoining areas may be contaminated. Also, there was no assessment and remediation of the excess Th-230 in the pond. Therefore, Pond 8 does not meet the radium requirements of Part 40, Appendix A, criterion 6(6), and the thorium levels do not meet the requirements of §40.42k(2) and could present a public health hazard if the pond were to be released for unrestricted use. Quivira Mining Company is hereby notified that Pond 8 at the Ambrosia Lake facility is to be remediated to meet applicable standards in a timely manner.

W. Goranson

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Should you have any questions regarding this matter, please contact Jill Caverly, the NRC project manager, at 301-415-6699.

Sincerely,
/RA/

Philip Ting, Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No.: 40-8905
SUA-1743

cc: R. Edge, DOE GJ

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