UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 16, 1997

Mr. Marvin Freeman, Vice President
Quivira Mining Company
6305 Waterford Bldg., Suite 325
Oklahoma City, Oklahoma 73118

SUBJECT: ACCEPTANCE OF BYPRODUCT MATERIALS AT QUIVIRA'S AMBROSIA LAKE SITE AMENDMENT NO. 37 TO LICENSE SUA-1473

Dear Mr. Freeman:

Quivira Mining Company (QMC) requested by letter dated November 20, 1995, an amendment to Source Material License SUA-1473 to allow disposal of 11e.(2) byproduct material in Tailings Impoundment #2 at its Ambrosia Lake Uranium Mill and Tailings site near Grants, New Mexico. The U. S. Nuclear Regulatory Commission staff has evaluated QMC's request, as modified by subsequent correspondence, and approves the amendment as described in the enclosed Technical Evaluation Report (Enclosure 1).

The action requested by QMC will result in no significant change in the types or significant increase in the amounts of any radiological effluent that may be released offsite, as documented in the enclosed Environmental Assessment (Enclosure 2). The NRC issued a Finding of No Significant Impact for the disposal of 11e.(2) byproduct material in the Federal Register, Volume 62, Number 82, Pages 23282-23284 (April 29, 1997).

The staff determined that in situ material should be included in the limits on material received. This change to QMC's amendment request was discussed and agreed to between yourself and Ken Hooks of the NRC on April 7, 1997. The staff also determined that QMC would be required to provide a surety analysis to the NRC based on disposal of the maximum amount of byproduct material, 5.3 million tons, prior to receipt of any material under this amendment. This condition was discussed and agreed to between yourself and Ken Hooks on May 14, 1997.

The license is being reissued to incorporate the new license condition #41 (Enclosure 3). All other conditions of the license shall remain the same. If you have any questions concerning the enclosures, please contact Kenneth Hooks, the NRC Project Manager for the Ambrosia Lake site at (301) 415-7777.

Sincerely,

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 40-8905
Enclosures: As stated

cc: JVirgona, DOEGJPO
ROhrbom, NMED

19929

TECHNICAL EVALUATION REPORT

DOCKET NO. 40-8905

LICENSE NO. SUA-1473

LICENSEE: Quivira Mining Company

FACILITY: Ambrosia Lake Facility

PROJECT MANAGER: Kenneth R. Hooks

TECHNICAL REVIEWER: Christepher McKenney

11e.(2) BYPRODUCT MATERIAL DISPOSAL AMENDMENT APPLICATION

SUMMARY AND CONCLUSIONS:

On November 20, 1995, Quivira Mining Company (Quivira) requested a license amendment to annually receive and dispose of up to 10,000 yd^3 (7,650 m^3) per generator of 11e.(2) byproduct material in tailings impoundment #2. Additional information (May 9, 1996, January 24, 1997, and February 13, 1997) has also included proposal for an annual total limit of 100,000 yd^3 (76,500 m^3) from all generators. Quivira requested that material from in situ facilities be excluded from the limits.

Quivira has either programs in place or proposed programs to support the request. The staff concurs that the radiation protection program and operations plans are sufficient to meet 10 CFR Part 20 and stabilization concerns. Ambrosia Lake's tailings impoundment #2 has sufficient excess capacity to allow the annual disposal of 100,000 yd^3 (76,500 m^3) of 11e.(2) byproduct material for many years. The licensee has proposed a program that would provide reasonable assurance that only 11e.(2) byproduct material similar to current tailings and other material in the impoundments would be received. The staff does not agree with an unlimited exclusion for in situ facility 11e.(2) byproduct material. The license condition should be as follows:

"41. In accordance with the licensee's submittals dated November 20, 1995, May 9, 1996, January 24, 1997, and February 13, 1997, the licensee is hereby authorized to dispose of 11e.(2) byproduct materials that are similar in physical, chemical, and radiological characteristics to the 11e.(2) byproduct material and associated wastes already within the impoundment subject to the following:

A. Prior to receipt of any material under this license condition, the licensee shall provide an analysis of the costs of reclamation based on disposal of the maximum amount of byproduct authorized by this condition (5.3 million tons), and if necessary, provide a revision to the surety.

B. The facility is authorized to dispose of up to 10,000 cubic yards (7,650 m^3) of 11e.(2) byproduct material per year from each generator.

C. Total annual receipt and disposal of 11e.(2) byproduct material shall not exceed 100,000 cubic yards (76,500 m^3) from all generators.

D. The total 11e.(2) byproduct material to be disposed of from all generators is limited to 5.3 million tons (3.8 million cubic yards).

E. Average annual Ra-226 concentrations of disposed material shall not exceed 1100 pCi/g (41 Bq/g) from any generator.

F. All contaminated equipment shall be dismantled, crushed, perforated or placed to minimize void spaces. Barrels shall be verified to be full prior to disposal. Barrels not completely full shall be filled or emptied and crushed prior to final disposal.

G. Byproduct material shall be free of standing liquids.

H. All disposal activities shall be documented. The documentation shall include a description of the byproduct material, the disposal locations, and the results of pre-acceptance testing. The licensee shall maintain documentation until license termination.

I. The licensee shall submit a final reclamation plan upon the end of receipt operations."

DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

Quivira is requesting a license amendment to accept 11e.(2) byproduct material from offsite generators for disposal in tailings impoundment two. Quivira has proposed that receipt be limited in volume to 10,000 yd^3 (7,650 m^3) per generator, other than from in-situ leaching facilities, with an annual total limit of 100,000 yd^3 (76,500 m^3) from all generators, other than from in-situ leaching facilities. There would be no limiting quantity from in-situ leaching facilities. Under the proposal, byproduct material that may be accepted for disposal would include, but not be limited to:

1. Tailings resulting from separation of uranium/thorium from the ore bodies;

2. Contaminated soils;

3. Contaminated plant equipment including structural steel, pipes, cement, etc.;

4. Evaporation pond liners and associated residues;

5. Groundwater restoration residues.

Quivira would obtain a sample of the proposed disposal material before acceptance. The sample would be tested to assure characteristics (chemical, radiological, and physical) are similar to the current tailings or are prior approved by NRC. All material accepted for disposal at the facility would be required to be free of all standing liquids. Radium-226 concentrations would be limited to 1100 pCi/g (41 Bq/g) average annually per generator.

Materials would arrive on site usually in sealed 55-gallon (0.21 m^3) drums and/or crates as part of Low Specific Activity (LSA) exclusive use shipments. Full drums would be directly placed in the disposal area. The disposal area would be a series of earthen cells on the east side of tailing impoundment #2 and abutting impoundment #1, constructed on top of the finished radon attenuation cover system. Partially full drums would be opened, and either filled with material or emptied into the disposal area and crushed. Types of material not contained within sealed drums or crates, such as pumps, process equipment, cement, and pipes, would be crushed, dismantled, and/or spread within the disposal area in a tight compact manner to minimize void space. When the crushed material layer reaches 2 to 3 feet (0.6 to 0.9 m) thick, clean fill would be utilized to fill any remaining void space.

Quivira would submit a final reclamation plan upon the end of receipt operations. This reclamation plan would contain the actual characteristics of the additional waste received. The final radon attenuation cover would be designed to assure the radon flux standard will be met.

TECHNICAL EVALUATION:

Currently, Quivira has two limited-scope license conditions that allow similar disposals to occur. License condition 30 allows the receipt and disposal of damaged yellow-cake drums from Sequoyah Fuels Corporation. License condition 36 allows the receipt and disposal of 125 yd^3 (96 m^3) per year of 11e.(2) byproduct material from the Rio Algom Smith Ranch facility. Material from Smith Ranch is transported to the site in 55-gallon (0.21 m^3) drums or crates as LSA exclusive use shipments, and disposed of in trenches in tailings impoundment #2. Therefore, Quivira is currently allowed to perform similar operations, but on a very limited scope.

Three different areas of review will be discussed: (1) available disposal volume under the approved reclamation plan; (2) material acceptance criteria, and (3) operations plan for receipt and disposal.

Disposal Volume

In the approved 1986 reclamation plan, the Ambrosia Lake facility's tailings capacity was based on an assumption of 18 more years of production at 7,000 tons (5,000 yd^3 [3,825 m^3]) of tailings per day which would yield an additional 43 million tons (31 million yd^3 [24 million m^3]) of tailings material. When added to the 31 million tons (22 million yd^3 [17 million m^3]) in the disposal impoundments in 1986, the total quantity the design accounted for was 74 million tons (53 million yd^3 [40 million m^3]). Ambrosia Lake halted operations far earlier than the planned 18 year run and currently has 33 million tons (24 million yd^3 [18 million m^3]) of tailings in impoundments #1 and #2. Therefore, the excess capacity under the 1986 reclamation plan is 41 million tons (29 million yd^3 [22 million m^3]) of tailings.

Quivira has not requested to fill the entire available space under the reclamation plan. Quivira is limiting the height of impoundment #2 to that of impoundment #1 to insure proper run-off controls during reclamation. Based on this assumption, there is approximately a 30 foot (9 m) elevation difference between the average elevation of impoundment #1 and #2. Multiplying by the current size of tailings impoundment #2, 78.3 acres (31.7 ha), the usable capacity is approximately 5.3 million tons (3.8 million yd^3 [2.9 million m^3]).

Quivira has requested separate disposal limits for 11e.(2) byproduct material from in situ facilities and non-in situ facilities. For in situ facilities, Quivira has requested approval to dispose of an unlimited annual volume of material. For non-in situ facilities, two limits are requested: (1) a per generator annual limit of 10,000 yd^3 (7,650 m^3); and (2) a total annual limit of 100,000 yd^3 (76,500 m^3). Quivira provides no justification for unlimited disposal of material from in situ facilities. In situ facilities annually produce low volumes of byproduct material, well below the annual limit requested for non-in situ facilities.

While staff concurs that tailings impoundment #2 has sufficient volume available for disposal of 100,000 yd^3 (76,500 m^3) per year of 11e.(2) byproduct material, the staff does not agree with the requested exclusion of in situ material from annual volume limits. Therefore, Quivira will be limited, by license condition, to annually receive up to 10,000 yd^3 (7,650 m^3) of 11e.(2) byproduct material per generator, including in situ facilities, and a total annual volume of 11e.(2) byproduct material from all generators, not to exceed 100,000 yd^3 (76,500 m^3).

Material Acceptance Criteria

Prior to contracting for disposal, Quivira has committed to requiring the material's owner to demonstrate that the material is 11e.(2) byproduct material. Additionally, Quivira will test pre-acceptance samples for radiological and chemical characteristics as described in the January 24, 1997 submittal. These tests would consist of both a basic set of 25 elements, isotopes and chemicals and any additional characteristics which may be identified as unique by the supplier or reasonably likely to be present given the origin of the materials. To insure availability of information at the time of final reclamation, Quivira will be required by license condition to maintain records of the acceptance testing until license termination.

A generator would be limited to an annual average radium-226 concentration of 1100 pCi/g (41 Bq/g), which is equivalent to the average activity level of the slimes. Quivira estimates that the average Ra-226 and Ra-228 concentrations would not exceed 400 pCi/g (15 Bq/g) over all generators. Single shipments would be limited to less than 2,000 pCi/g (74 Bq/g) for any radionuclide in the uranium series or 6,000 pCi/g (222 Bq/g) for any radionuclide in the thorium series in any shipment.

Additionally, to minimize groundwater concerns, all material would be required to be free of all standing water.

The staff concurs that the acceptance criteria will provide reasonable assurance that the material disposed of will be similar to current tailings and/or material currently in the impoundment.

Operations

License conditions 30 and 36 allow Quivira to currently perform operations, though on a smaller scale, similar to the activities included in this license amendment request. Quivira plans that most material that would arrive on site would be similar to material received from Rio Algom Smith Ranch and would use the standard operating procedure, Handling/Disposal of Byproduct Material and Contaminated Waste, which was developed for disposal of offsite material

packaged in 555-gallon (0.21-m^3) drums or crates (attachment to QMC letter dated November 20, 1995). Additionally, an operations plan addressing applicable operations has already been approved for reclamation work on the tailings pile. When a generator wishes to ship material in other than 55-gallon (0.21 m^3) drums and/or crates as LSA, a radiation work permit will be issued for the receipt of and disposal of the waste material until a standard operating procedure for that waste type can be established. Procedures are currently in place for the emplacement of material in the cells to minimize void space.

The staff concurs that Quivira's current radiation protection program is commensurate with the scope and extent of requested license activities and is sufficient to ensure compliance with the provisions of 10 CFR Part 20. The staff also concurs that proper procedures are in place for receipt of and disposal of the material to meet future stabilization concerns.

ENVIRONMENTAL ASSESSMENT

11e.(2) BYPRODUCT MATERIAL DISPOSAL AMENDMENT REQUEST FOR QUIVIRA MINING COMPANY'S AMBROSIA LAKE FACILITY

On November 20, 1995, Quivira Mining Company (Quivira) requested a license amendment for the Ambrosia Lake facility to annually receive and dispose of up to 10,000 yd^3 (7,650 m^3) per generator of 11e.(2) byproduct material in tailings impoundment #2. Additional information (May 9, 1996, January 24, 1997, and February 13, 1997) has also included an annual total limit of 100,000 yd^3 (76,500 m^3) from all generators. Quivira requested that material from in situ facilities be excluded from the limits. NRC staff will require by license condition that all generators, including in situ facilities be limited to the 10,000 yd^3 (7,650 m^3) per generator and the total annual limit of 100,000 yd^3 (76,500 m^3) be inclusive of all material received from generators, including in situ facilities.

The disposal of the requested material at the Ambrosia Lake facility will not result in any significant adverse environmental impacts. The potential impacts are less than any impacts that could have resulted due to the facility operating as licensed. Specifically, the total amount of material received each year is a small fraction of the allowed production rate of 11e.(2) byproduct material under operations. Unlike material created during the Ambrosia Lake's milling operations, the received material will be free of standing liquids and usually contained in sealed 55-gallon (0.21 m^3) drums or crates. At the end of receipt activities, a final radon attenuation and erosion protection cover will be designed and placed to assure compliance with the radon flux standard of 20 $pCi/m^2/s$ (0.7 $Bq/m^2/s$).

Materials would arrive on site usually in sealed 55-gallon (0.21 m^3) drums and/or crates as Low Specific Activity exclusive use shipments. Full drums will be directly disposed into the disposal area. The disposal area will be a series of earthen cells on the east side of tailing impoundment #2 and abutting impoundment #1, constructed on top of the finished radon attenuation cover system. Partially full drums will be opened and either filled with material or emptied into the disposal area and the drum crushed. Types of material not contained within sealed drums or crates, such as pumps, process equipment, cement, and pipes, will be crushed, dismantled, and/or spread within the disposal area in a tight compact manner to minimize void space. When the crushed material layer reaches 2 to 3 feet (0.6 to 0.9 m) thick, clean fill will be utilized to fill any remaining void space. Upon cessation of receipt and disposal operations, Quivira will submit a new reclamation plan based on the final characteristics of the impoundments, including a final radon attenuation cover system.

In the approved 1986 reclamation plan, the Ambrosia Lake facility's tailing capacity was based on an assumption of 18 more years of production at 7,000 tons (5,000 yd^3 [3,825 m^3]) of tailings per day which would yield an additional 43 million tons (31 million yd^3 [24 million m^3]) of tailings material. When added to the 31 million tons (22 million yd^3 [17 million m^3])

in the disposal impoundments in 1986, the total quantity the design accounted for was 74 million tons (53 million yd^3 [40 million m^3]). Ambrosia Lake halted operations far earlier than the planned 18 year run and currently has 33 million tons (24 million yd^3 [18 million m^3]) of tailings in impoundments #1 and #2. Therefore, the excess capacity under the 1986 reclamation plan is 41 million tons (29 million yd^3 [22 million m^3]) of tailings.

Quivira has not requested to fill the entire available space under the reclamation plan. Quivira is limiting the height of impoundment #2 to that of impoundment #1 to insure proper run-off controls during reclamation. Based on this assumption, there is approximately a 30 foot (9 m) elevation difference between the average elevation of impoundment #1 and #2. Multiplying by the current size of tailings impoundment two, 78.3 acres (31.7 ha), the usable capacity is approximately 5.3 million tons (3.8 million yd^3 [2.9 million m^3]).

NRC believes this request will not result in significant impacts because the impacts will be a small fraction of those that could result due to currently approved activities for the following reasons:

1) The total annual volume is a small fraction of the total volume allowed to be produced under the current license. Based on an approved production rate of 7,000 tons (5,000 yd^3 [3,825 m^3]) per day, the requested annual limit would be reached in only 20 days of production.

2) Groundwater impacts are minimized because the received material will be free of standing liquids and the disposal cells will have a 3 foot (1 m) thick minimum clay liner. In comparison, material produced by milling operations would result in solid and liquid phases that would need to be dried. Additionally, the licensee will be required to only accept material similar in physical, chemical and radiological characteristics to material already disposed in the impoundments.

3) Air releases will be minimized because most of the material received will be packaged in drums or crates. Under full production activities, produced 11e.(2) byproduct material is not confined but must be wetted to reduce fugitive dust emissions.

4) Exposure to workers is expected to be similar or lower than exposures expected to personnel working with 11e.(2) byproduct material due to currently licensed operations. In addition to being licensed for full operations, Quivira is currently licensed to accept small volumes of 11e.(2) byproduct material from a couple of specific sources: In-situ byproduct material from Rio Algom Smith Ranch and damaged yellow-cake drums from Sequoyah Fuels Corporation. Material received under the disposal request would be packaged similarly and would be handled under the pre-existing radiation protection program. The radiological characteristics of the waste from each generator will be similar to those already present in the tailings impoundments and most material will be packaged which will minimize exposures due to inhalation.

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Quivira Mining Company	3. License number SUA-1473, Amend. No. 37
2. 6305 Waterford Blvd., Suite 325 Oklahoma City, Oklahoma 73118 [Applicable Amendments: 12]	4. Expiration date Until terminated [Applicable amends: 29]
	5. Docket or Reference No. 40-8905

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
Uranium	Any	Unlimited

9. Authorized Place of Use: The Licensee's Ambrosia Lake facility located in McKinley, County, New Mexico.

10. This license authorizes uranium recovery in accordance with statements, representations, and conditions contained in submittals dated August 30, 1990, and January 31, 1991, with the exception that processing of conventional uranium ores shall not be performed without specific authorization from the NRC in the form of a license amendment. Anywhere the word "will" is used in the documents referenced above, it shall denote a requirement.

Any changes to the mill circuit as described in Section 6.2 of the August 30, 1990, submittal or as authorized by subsequent license conditions shall require approval by the NRC in the form of a license amendment. [Applicable Amendments: 4, 10, 11, 21, 28]

11. The licensee shall designate a Radiation Safety Officer (RSO) who will be responsible for the establishment and maintenance of a facility radiation protection program including personnel and environmental monitoring programs. The RSO shall possess minimum qualifications as specified in Section 2.4.1 of Regulatory Guide 8.31.

12. The licensee is authorized to possess byproduct material in the form of uranium process tailings and other byproduct wastes generated by the licensee's uranium processing operations. Mill tailings, other than small samples for purposes such as research or analysis, shall not be transferred from the restricted area without prior approval of the NRC in the form of a license amendment.

13. The licensee is authorized to operate mine water uranium recovery treatment facilities at Ambrosia Lake, New Mexico. These facilities include treatment plants at the main facility, Section 35-36, and individual ion exchange units located above or underground at the

Quivira Mining Company mine sites. The radiological effluent monitoring and radiological safety program in effect at the licensee's mill shall include these water treatment facilities. All U.S. DOT requirements shall be followed in the transport of the ion exchange resin. A listing of the individual ion exchange units currently in operation shall be provided by January 1, 1987, and shall be updated at least annually thereafter.

14. Written standard operating procedures (SOPs) shall be established for all operational process activities involving radioactive materials that are handled, processed or stored. These procedures shall specify radiation safety practices to be followed. An up-to-date copy of each written procedure shall be kept in the mill area to which it applies for employee reference. All SOPs shall be reviewed annually to update procedures and be approved by the RSO to ensure that proper radiation protection principles are being applied.

15. The licensee shall be required to use a Radiation Work Permit (RWP) for all work where the potential for significant exposure to radioactive material exists and for which no SOPs exist. All RWPs shall be approved by the Radiation Safety Officer (RSO), or his designee qualified by way of specialized radiation protection training. The RWP shall describe the following:

    A. The scope of the work to be performed.

    B. Any precautions necessary to reduce exposures to radioactive materials.

    C. Supplemental monitoring required prior to, during, and after the completion of the work.

16. The licensee shall establish written procedures for all surveillance activities including in-plant and environmental monitoring bioassay analysis and radiation monitoring instrument calibration. These procedures shall be reviewed and approved by the RSO annually to ensure that proper and current radiation protection principles are being applied.

17. Occupational exposure calculations shall be performed and documented within one (1) week of the end of each regulatory compliance period as specified in 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2). Routine airborne ore dust and yellowcake samples shall be analyzed in a timely manner to allow exposure calculations to be performed in accordance with this condition. RWP ore dust and yellowcake samples shall be analyzed and the results reviewed by the RSO or his designee within two (2) working days after sample collection.

18. DELETED by Amendment No. 4.

19. The results of all effluent and environmental monitoring required by this license shall be reported semiannually and in accordance with 10 CFR 40, Section 40.65, with copies of the report sent to the NRC.

Monitoring data shall be reported in the format shown in the attachment to SUA-1473 entitled, "Sample Format for Reporting Monitoring Data." [Applicable Amendments: 25]

20. The results of sample analyses, monitoring surveys, equipment calibration, reports of audits and inspections, meetings, and training sessions required by applicable regulations or this license and any subsequent reviews, investigations, and corrective actions shall be documented. Unless otherwise specified in this license or in NRC regulations, all documentation shall be maintained for a period of five (5) years.

21. The licensee shall operate the tailings retention systems in accordance with the "Tailings Stabilization Report" submitted October 1, 1986, as approved by the NRC and in compliance with 10 CFR 40, Appendix A. Any changes in the tailings retention system that would significantly deviate from the above shall require the licensee to provide a written evaluation of the changes and obtain approval from the NRC in the form of an amendment to the license.

In addition, the licensee shall implement a tailings dam inspection program as specified in Section A3 of the submittal dated, November 12, 1986, with the exceptions that annual technical evaluations of embankment performance need to be performed, and daily inspections of the tailings embankments need only be performed on regularly scheduled work days. [Applicable Amendments: 4, 21, 26]

22. The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criteria 9 and 10, adequate to cover the estimated costs, if accomplished by a third party, for decommissioning and decontamination of the mill and mill site, reclamation of any tailings or waste disposal areas, ground water restoration as warranted, and the long-term surveillance fee.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criteria 9 and 10, shall be submitted to the NRC by June 30 of each year. Along with each proposed revision or annual update, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency fee, changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure. The basis for the cost estimate is the NRC approved reclamation/decommissioning plan as supplemented by the NRC assumptions identified in License Condition No. 37, or NRC approved revisions to the plan. The attachment to this license, entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates" outlines the minimum considerations used by the NRC in the review of site closure estimates. Reclamation/decommissioning plans and annual updates should follow this outline.

The licensee's currently approved surety, a parent Company Guarantee issued by Rio Algom Limited, shall be continuously maintained in an

amount no less than $11,749,000 for the purpose of complying with 10 CFR 40, Appendix A, Criteria 9 and 10, until a replacement is authorized by the NRC. The use of a parent company guarantee necessitates a complete evaluation of the corporate parent by the NRC as part of the annual surety update. In addition to the cost information required above, the annual submittal must include updated documentation of the (1) letter from the chief financial officer of the parent company, (2) auditor's special report confirmation of chief financial officer's letter, (3) schedule reconciling amounts in chief financial officer's letter to amounts in financial statements, and (4) parent company guarantee document if changes are required. [Applicable Amendments: 18, 19, 22, 24, 30, 32, 36]

23. Prior to termination of this license, the licensee shall provide for transfer of title to byproduct material and land, including any interests therein (other than land owned by the United States or the State of New Mexico), which is used for the disposal of such byproduct material or is essential to ensure the long-term stability of such disposal site to the United States or the State of New Mexico, at the State's option.

24. The licensee shall have a contingency plan for responding to unexpected releases of liquids or tailings from the mill facility, tailings impoundments, and lined evaporation ponds and for the accidental release of uranium concentrates during shipment and transport.

25. Release of equipment or packages from the restricted areas for unrestricted release or disposal shall be in accordance with the attachment to SUA-1473 entitled, "Guidelines for Decontamination for Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated, September, 1984.

26. Before engaging in an activity not previously authorized by the license, the licensee shall prepare and record an environmental evaluation of such activity. Should the evaluation indicate that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of the activity and obtain prior approval of the NRC in the form of a license amendment.

27. The licensee shall implement an interim stabilization program for tailings areas as specified in the "Tailings Stabilization Report" submitted October 1, 1986, as modified by Section 4.6 submitted by letter dated, March 20, 1987. This program shall include written operating procedures and shall prevent or minimize dispersal of blowing tailings to the extent reasonably achievable and in accordance with Criterion 8 of 10 CFR 40, Appendix A. The effectiveness of the control methods used shall be evaluated in accordance with the procedure submitted by letter dated June 17, 1987. Corrective actions taken shall be documented in response to inspection findings.

The licensee shall adhere to the interim stabilization schedule for

cleanup of contaminated areas as addressed in the submittal dated October 15, 1987. [Applicable Amendments: 4, 7]

28. The licensee is hereby exempted from the posting requirements of 10 CFR 20.203(e)(2) for areas within the mill provided that all entrances to the mill are conspicuously posted in accordance with Section 20.203(e)(2) and with the words, "Any area within this mill may contain radioactive material."

29. The licensee shall submit a detailed decommissioning plan to the NRC at least six (6) months prior to the planned start of decommissioning activities.

30. Damaged yellowcake drums may be returned for disposal in Tailings Pond No. 2 as described in the licensee's submittal dated January 2, and March 5, 1987, October 6, 1989 and November 16, 1995. All such disposal shall be documented. In addition, no drums shall be disposed within 150 feet of the dam crest. [Applicable Amendments: 2, 14, 34]

31. The licensee is authorized to process alternate feed materials (raffinate and calcium fluoride sludges) from Sequoyah Fuels Corporation's Gore, Oklahoma, facility in accordance with the submittals dated March 31, July 15, and August 6, 1987, and May 15, 1990, with the exception that the yellowcake product shall be maintained in slurry form or dried in accordance with Condition No. 38 of this license. [Applicable Amendments: 3, 5, 7, 28]

32. The licensee is authorized to dispose of and bury contaminated waste materials resulting from past milling operations into the disposal areas in accordance with the submittals dated July 20, 1995. The licensee may also dispose of and bury within these areas, byproduct materials as authorized by license conditions 30, 36, and 41. In addition, the licensee shall adhere to the following requirements. The licensee shall maintain detailed disposal records indicating quantities and locations of all waste material disposed in the disposal areas and prior to the disposal of any wastes, the licensee shall establish a detailed procedure to describe the handling, preparation, placement and covering of wastes in the specified disposal areas. The final design of the disposal areas, including drawings, calculations, analyses, and a list of materials included in the disposal areas, will be submitted to the NRC for approval prior to placement of the final cover. [Applicable Amendments: 6, 33, 37]

33. The licensee is hereby authorized to inject chemically fortified mine waters in accordance with their July 14, 1987 submittal. The following upper control limits shall be observed: calcium = 35 mg/1, sodium = 253 mg/1, sulfate = 450 mg/1, carbonate/bicarbonate = 303 mg/1, pH = 10.0 standard units. Should any of these limits be exceeded, based upon monthly sampling, the licensee shall immediately suspend injection of chemically fortified waters, notify the NRC, in writing within 5 days sample for the above parameters on a weekly frequency, and within an additional 25 days, submit a plan to remediate the situation. [Applicable Amendments: 8]

34. The licensee shall implement a groundwater compliance monitoring program containing the following:

A. Sample Dakota Sandstone wells 17-01, 30-02, 30-48, 32-45, and 36-06 for antimony, arsenic, beryllium, cadmium, cyanide, lead, molybdenum, nickel, selenium, combined radium-226 and -228, natural uranium, thorium-230, lead-210, gross alpha, chloride, sulfate, nitrate, pH, and electrical conductivity.

Sample Tres Hermanos A wells 31-01 and 33-01 for cyanide, molybdenum, nickel, selenium, radium-226 and -228, natural uranium, thorium-230, lead-210, gross alpha, chloride, sulfate, nitrate, pH, and electrical conductivity.

Sample Tres Hermanos B wells VH19-2, 31-66, 31-67, 36-01 and 36-02 for cyanide, molybdenum, nickel, selenium, combined radium-226 and -228, natural uranium, thorium-230, lead-210, gross alpha, chloride, sulfate, nitrate, pH, and electrical conductivity.

Sample alluvium wells 5-03, 32-59, 31-61, and MW-24, for molybdenum, nickel, selenium, combined radium-226 and -228, thorium-230, natural uranium, lead-210, gross alpha, chloride sulfate, nitrate, pH, and electrical conductivity.

B. Comply with the following groundwater protection standards at Dakota Sandstone point of compliance well 30-02, 30-48, 32-45, and 35-06, with background being recognized at well 17-01: antimony = 0.05 mg/1; arsenic = 0.1 mg/1, beryllium = 0.01 mg/1; cadmium = 0.01 mg/1; cyanide = 0.04 mg/1; lead = 0.14 mg/1; molybdenum = 0.06 mg/1; nickel = 0.03 mg/1, selenium = 0.04 mg/1; gross alpha = 56 pCi/1; combined radium-226 and -228 = 5.0 pCI/1 natural uranium - 0.02 mg/1; thorium-230 = 2.3 pCi/1; lead-210 - 1.9 pCi/1.

Comply with the following groundwater protection standards at Tres Hermanos A point of compliance well 31-01, with background being recognized at well 33-01: cyanide = 0.01 mg/1; molybdenum - 0.03 mg/1; nickel = 0.05 mg/1; selenium - 0.03 mg/1; gross alpha = 18.0 pCi/1; combined radium-226 and -228 = 5.0 pCi/1; natural uranium - 0.01 mg/1; thorium-230 = 4.3 pCi/1; lead-210 = 4.14 pCi/1.

Comply with the following groundwater protection standards at Tres Hermanos B point of compliance wells 31-66, 31-67, 36-01, and 36-02, with background being recognized at well VH19-12: cyanide = 0.01 mg/1; molybdenum = 0.08 mg/1; nickel = 0.06 mg/1; selenium = 0.04 mg/1; gross alpha = 21.0 pCi/1; combined radium-226 and -228 = 7.4 pCi/1; natural uranium = 0.02 mg/1; thorium-230 =2.2 pCi/1; lead-210 = 0.9 pCi/1.

Comply with the following groundwater protection standards at alluvium point of compliance wells 32-59, 31-61, and MW-24, with background being recognized at well 5-03: molybdenum = 0.06 mg/1; nickel = 0.06 mg/1; selenium = 0.05 mg/1; gross alpha - 57 pCi/1; combined radium-226 and -228 = 5.0 pCi/1; thorium-230 = 3.1 pCi/1;

natural uranium = 0.06 mg/1; lead-210 = 4.9 pCi/1.

C. Implement a corrective action program as described in the September 25, 1989, submittal with the objective of returning the concentrations of hazardous constituents to the concentration limits specified in Subsection (B). The program shall, at a minimum, consist of mine dewatering and maintenance and operation of the interceptor trench.

D. Submit, by August 1 of each year, a review of the corrective action program and its effect on the aquifers.

E. The licensee is authorized pursuant to the letter dated November 21, 1995, to construct a replacement well in the Tres Hermanos B formation for background well VH19-2. The licensee will submit final construction records of the monitor well to NRC upon completion. This well will be used as a replacement for VH19-2.

[Applicable Amendments: 9, 11, 13, 15, 25, 35]

35. The licensee shall submit to the NRC, copies of all correspondence with the New Mexico Environmental Improvement Division. [Applicable Amendments: 11]

36. The licensee is authorized to dispose of byproduct material waste from the Rio algom Mining Corp. Smith Ranch in-situ leach facility in accordance with the submittals dated, February 19, 1990, and September 26, 1991, with the following modifications or additions:

A. The written procedures, included in the February 19, 1990, submittal shall be reviewed and revised in accordance with License Condition No. 14.

B. Prior to disposal of drums containing sludge material, the licensee shall obtain written confirmation from Rio Algom Mining Company that the drums have been verified to be full or the verification shall be performed by Ambrosia Lake personnel.

C. Drums containing wastes other than sludges shall be opened and the wastes disposed directly into excavated trenches.

D. All disposal activities shall be documented. [Applicable Amendments: 16, 23]

37. The licensee shall reclaim the disposal area as stated in the September 24, 1990, and January 7, 1994, submittals as supplemented by the following conditions. Though recognized as conservative, these conditions were assumed when evaluating the acceptability of the reclamation plan as submitted, and are identified pending submittal of acceptable design alternatives. Justification for any design alternatives must be submitted for NRC review and approval prior to implementation.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
SUA-1473, Amend No. 37

Docket or Reference Number
40-8905

A. The radon barrier shall be constructed as specified in the licensee's September 28, 1990, submittal, as amended by the February 7, August 2, September 2, and November 4, 1994, submittals. Prior to placement of any material onto the interim cover, the procedure defined in the licensee's October 4, 1990, submittal for establishing the integrity of the in-place material must be performed.

B. DELETED by Amendment No. 19.

C. The relocated contaminated material shall be placed in lifts not to exceed 12 inches and compacted to at least 90 percent of the maximum standard dry density after a stable work base has been established.

D. In place density and moisture laboratory compaction, soil classification, and rock quality testing shall be performed in accordance with the licensee's September 23, 1990, submittal. If test procedures other than the sand cone test or oven dry moisture are used in the construction quality control, procedures that will be used to establish correlation between the tests must be submitted for NRC review and approval prior to implementation.

E. A detailed cover design for Ponds 11-21 must be submitted for NRC review and approval. All contaminated materials in Pond 3 that are not covered by the reclaimed Pond 1 outslope shall be relocated to Pond 2 unless an erosion protection plan is submitted for NRC review and approval.

F. The settlement survey data shall be submitted for NRC review and approval prior to placement of the radon barrier on the interim cover.

G. The fresh water dam mill reservoir must be breached during final reclamation activities.

H. Settlement monuments shall consist of a steel bar welded to a 1-foot square steel plate, or equivalent, placed at least 3 feet below the surface.

I. The fill associated with the Pond 1 spillway shall be constructed to the same specifications and quality control program as the radon barrier material.

J. If a rock source other than the Homestake Quarry is selected, the licensee shall submit the results of durability tests as outlined in the Final Staff Technical Position on Design of Erosion Protection, August 1990, for NRC review and approval prior to placement of any of the material.

K. All rip rap shall be placed in a manner that prevents segregation of the material. The material placed shall be reasonably well graded and shall be within the following gradation specifications.

D_{50} = 1.0"

Sieve Size	Percent Passing (by weight)
3 inch	100
2 inch	70-100
1 inch	25- 55
¾ inch	15- 40
½ inch	0- 25

D_{50} = 3.2"

Sieve Size	Percent Passing (by weight)
6 inch	100
5 inch	78-100
4 inch	35-100
3 inch	12- 45
2 inch	0- 20

D_{50} = 7.7"

Sieve Size	Percent Passing (by weight)
13 inch	100
12 inch	80-100
10 inch	49-100
8 inch	26- 54
6 inch	7- 32
4 inch	0- 13

L. A minimum 6-inch bedding layer with a D_{50} of 1 inch shall be placed under all riprap on the disposal area having a D_{50} of 2 inches or larger.

The bedding material shall be reasonably well graded to prevent migration of the base material into the riprap. The quality of the bedding material shall be equivalent to that of the riprap.

M. A riprap filled toe trench shall be placed on the West side of Pond 2 where the existing steep slopes transition onto the flatter surface of Pond 2.

The licensee shall submit a proposed design of the trench for NRC review and approval prior to construction.

N. The spillway riprap shall be extended 45 feet onto the top of Pond 1 to prevent erosion.

O. Riprap with a D_{50} of 1 inch shall be placed in all areas of the South Diversion Ditch which are not excavated in rock.

P. As an alternative to the erosion protection design of the top surfaces of Ponds 1 and 2, which was approved in Amendment No. 18, the licensee may use a 3-inch layer of riprap having a minimum median stone diameter (D_{50}) of 1-inch.

[Applicable Amendments: 18, 19, 29, 31]

38. The licensee is authorized to perform yellowcake drying in accordance

with the submittal dated, October 22, 1990. In addition to commitments contained in the October 22 submittal, the licensee shall comply with the following:

A. Air sampling used to determine the exposure of yellowcake operators to airborne uranium shall include breathing zone sampling at the yellowcake barrelling station.

B. Water flow rates for the wet scrubber servicing the yellowcake dryer shall be checked and recorded hourly during operation and a range of flow rates established which assure optimum performance of the scrubber.

C. Detailed inspection, cleaning, and needed preventive maintenance shall be performed and documented at least annually on all yellowcake area emission control equipment.

D. Written procedures shall be reviewed and approved in accordance with License Condition No. 14. [Applicable Amendments: 20]

39. The licensee shall conduct an annual survey of land use (grazing, residences, water supply wells, etc.) in the area within two miles of the mill and submit a report of this survey annually to the NRC. This report shall indicate any differences in land use from that described in the licensee's previous annual report, and shall specifically address occupancy of the Berryhill Ranch. The report shall be submitted by July 1 of each year. [Applicable Amendments: 21]

40. The licensee shall complete site reclamation in accordance with an approved reclamation plan and groundwater corrective plan, as authorized by License Condition Nos. 37 and 34, respectively, in accordance with the following schedules.

A. To ensure timely compliance with target completion dates established in the Memorandum of Understanding with the Environmental Protection Agency (56 FR 55432, October 25, 1991), the licensee shall complete reclamation to control radon emissions as expeditiously as practicable, considering technological feasibility, in accordance with the following schedule:

(1) Windblown tailings retrieval and placement of the pile - July 31, 1997.

(2) Placement of the interim cover to decrease the potential for tailings dispersal and erosion -

For impoundment No. 1 - December 31, 1993
For impoundment No. 2, excluding portions used for approved byproduct material disposal - December 31, 1993.

(3) Placement of a final radon barrier designed and constructed to limit radon emissions to an average flux of no more than 20 $pCi/m^2/s$ above background -

For impoundment No. 1 - December 31, 1997.
For impoundment No. 2, excluding portions used for approved byproduct material disposal - December 31, 1997.

B. Reclamation, to ensure required longevity of the covered tailings and groundwater protection, shall be completed as expeditiously as is reasonably achievable, in accordance with the following target dates for completion:

(1) Placement of erosion protection as part of reclamation to comply with Criterion 6 of Appendix A of 10 CFR Part 40 -

For impoundment No. 1 - December 31, 1999.
For impoundment No. 2, excluding portions used for approved byproduct material disposal - December 31, 1999.

(2) Projected completion of groundwater corrective actions to meet performance objectives specified in the groundwater corrective action plan - December 31, 2043.

C. Any license amendment request to revise the completion dates specified in Section A must demonstrate that compliance was not technologically feasible including inclement weather, (litigation which compels delay to reclamation, or other factors beyond the control of the licensee).

D. Any license amendment request to change the target dates in Section B above, must address added risk to the public health and safety and the environment, with due consideration to the economic costs involved and other factors justifying the request such as delays caused by inclement weather, regulatory delays, litigation, and other factors beyond the control of the licensee.

41. In accordance with the licensee's submittals dated November 20, 1995, May 9, 1996, January 24, 1997, and February 13, 1997, the licensee is hereby authorized to dispose of 11e.(2) byproduct materials that are similar in physical, chemical, and radiological characteristics to the 11e.(2) byproduct material and associated wastes already within the impoundment subject to the following:

A. Prior to receipt of any material under this license condition, the licensee shall provide an analysis of the costs of reclamation based on disposal of the maximum amount of byproduct authorized by this condition (5.3 million tons), and if necessary, provide a revision to the surety.

License Number
SUA-1473, Amend No. 37

Docket or Reference Number
40-8905

MATERIALS LICENSE
SUPPLEMENTARY SHEET

B. The facility is authorized to dispose of up to 10,000 cubic yards (7,650 m^3) of 11e.(2) byproduct material per year from each generator.

C. Total annual receipt and disposal of 11e.(2) byproduct material shall not exceed 100,000 cubic yards (76,500 m^3) from all generators.

D. The total 11e(2) byproduct material to be disposed of from all generators is limited to 5.3 million tons (3.8 million yds^3).

E. Average annual Ra-226 concentrations of disposed material shall not exceed 1100 pCi/g (41 Bq/g) from any generator.

F. All contaminated equipment shall be dismantled, crushed, perforated or placed to minimize void spaces. Barrels shall be verified to be full prior to disposal. Barrels not completely full shall be filled or emptied and crushed prior to final disposal.

G. Byproduct material shall be free of standing liquids.

H. All disposal activities shall be documented. The documentation shall include a description of the byproduct material, the disposal locations, and the results of pre-acceptance testing. The licensee shall maintain documentation until license termination.

I. The licensee shall submit a final reclamation plan upon the end of receipt operations.

FOR THE NUCLEAR REGULATORY COMMISSION

Dated: May 16, 1997

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards