40-8905

Quivira Mining Company

December 16, 1992

Certified Mail
Return Receipt Requested P 323 276 460

Mr. Gary Konwinski
Uranium Recovery Field Office
U. S. Nuclear Regulatory Commission
Box 25325
Denver, Colorado 80225-0325

Re: Raffinate Cell Information

Dear Mr. Konwinski:

Please find enclosed as requested during our telephone conversation yesterday, copies of correspondence from EPA and Quivira Mining Company in regards to the permitting of the raffinate cells at the Ambrosia Lake facility. Please call me at (405) 842-1773 if their are any questions regarding this information.

Sincerely,

Bill Ferdinand

Bill Ferdinand, Manager
Radiation Safety, Licensing &
Regulatory Compliance

xc: M. Freeman
file

170048

DW8

93-0130

6305 Waterford Boulevard, Suite 325, Oklahoma City, Oklahoma 73118 • (405) 848-1190 • FAX (405) 848-1208

Quivira Mining Company

November 16, 1990

Certified Mail
Return Receipt Requested P 568 963 620

Mr. Hank May
Radiation Representative
U.S. Environmental Protection Agency, Region VI
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Application For Approval of Construction
Phased Disposal Tailings Cell

Dear Mr. May:

Quivira Mining Company submits the following *"Application For Approval of Construction"* as required by EPA regulation 40 CFR 61.07. This application request approval to construct a new synthetic, double lined, phased disposal tailings cell at Quivira's uranium mill processing facility at Ambrosia Lake, New Mexico.

The proposed cell will be used to dispose of low specific activity byproduct material resulting from the extraction of uranium using the phased disposal processing method in accordance with 40 CFR 61.252(b)(1).

If you need further information or have questions please call me at (405) 842-1773.

Sincerely,

Bill Ferdinand

Bill Ferdinand, Manager
Radiation Safety, Licensing
& Regulatory Compliance

Attachments: (2)

xc: R. Calegari
M. Freeman
R. Luke
P. Luthiger
H. Whitacre
file

6305 Waterford Boulevard, Suite 325, Oklahoma City, Oklahoma 73118 • (405) 848-1190 • FAX (405) 848-1208

APPLICATION FOR APPROVAL OF CONSTRUCTION

For A Phased Tailings Disposal Cell

At

Quivira Mining Company's

Uranium Processing Facility

Ambrosia Lake, New Mexico

Presented To The

U. S. Environmental Protection Agency

November 1990

Application For Approval of Construction

Name of Applicant:

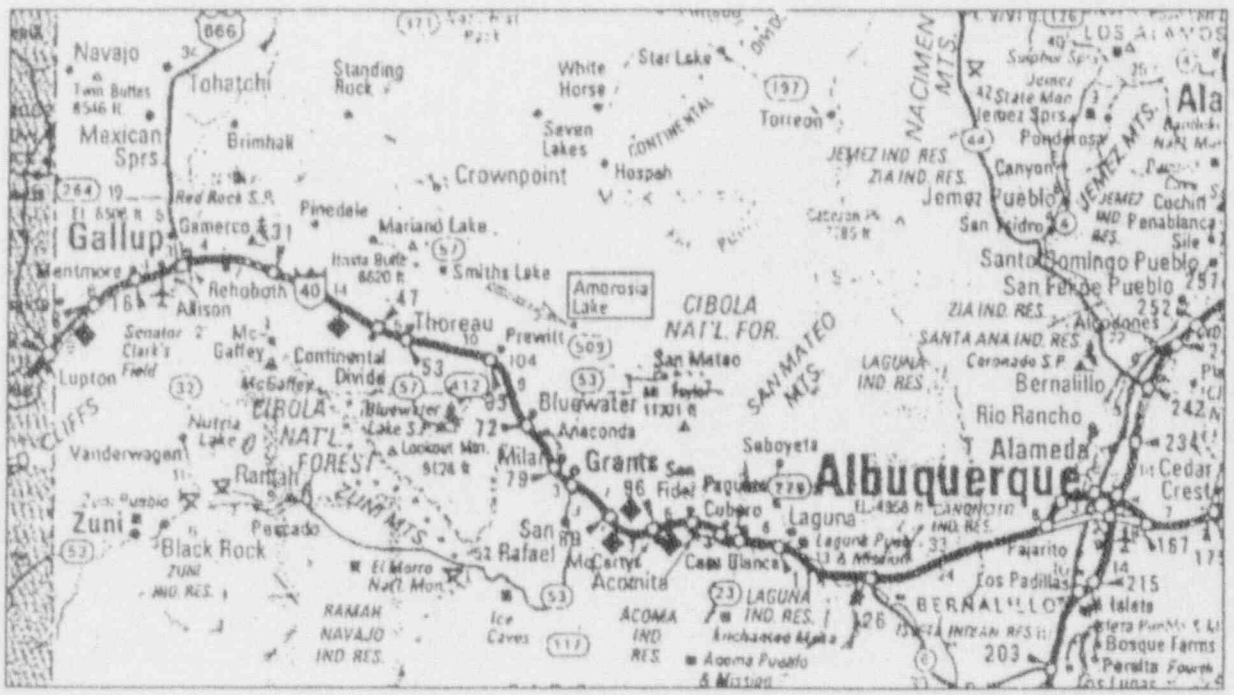
Quivira Mining Company

Address:

P.O. Box 218
Grants, New Mexico 87020

Location of Proposed Construction:

The construction of the proposed phased disposal cell is at Quivira Mining Company's Ambrosia Lake uranium processing mill. The mill is located approximately 20 miles due north of Grants, New Mexico. The Ambrosia Lake mill site is shown on the map below.



Technical Information

A. Purpose

The proposed phased disposal cell will be used in the disposal of low specific activity (LSA) byproduct material resulting from Quivira Mining Company's processing of mill feed material (source material) for the extraction of uranium.

The mill feed material being processed at Quivira's uranium processing mill includes raffinate and calcium fluoride. These alternative feed materials for Quivira are generated by Sequoyah Fuels Uranium Hexafluoride (UF_6) conversion facility at Gore, Oklahoma. These material are generated as LSA byproduct material during Sequoyah Fuels' natural uranium conversation to UF_6. The LSA radioactive byproduct material generated at Sequoyah Fuels contains extractable quantities of uranium-238.

All material being processed at the Ambrosia Lake facility is classified as source material in accordance with its Nuclear Regulatory Commission (NRC) source material license, SUA-1473, license condition 31. None of the material being processing is mixed waste.

B. Construction Location and Size

The proposed tailings impoundment cell is located within the NRC restricted area boundary at Quivira's Ambrosia Lake uranium processing mill. The proposed cell will be constructed below grade within the existing tailings impoundment #2. The location of cell construction is in accordance with NRC's 10 CFR 40, Appendix A, Criteria 2, which requires the avoidance of proliferation of small waste disposal sites.

Another important factor in the selection of this site for cell construction was prior approval by both the NRC and New Mexico State Engineer Office for continued tailings deposition in this area. Both agencies have approved the continued deposition of tailings in this area after review of site specific considerations including seismic activity, hydrological and radiological impacts.

Attached in Appendix A of this submittal, is Drawing #1 which shows Quivira's uranium processing facility and the proposed location of the phased disposal cell.

The proposed phased disposal cell measures 156' by 793' excluding bermed areas or 2.8 acres in size. The cell will be a total of 11' deep. The cell is designed to hold approximately 2,700 dry tons of LSA byproduct material.

C. Design and Construction

The proposed phased disposal cell will be constructed as a double lined impoundment with a secondary leachate collection-leak detection system between the liners. The synthetic liners each will be 90 mil thick and made from Deery membrane #6 or an equivalent liner material.

The Deery membrane #6 liner is a seamless thermoplastic geomembrane liner composed of a mixture of asphalts, oils, resins, antioxidants, and synthetic polymers. The geomembrane is highly elastic with a coefficient of permeability of 2.13×10^{-11} cm/second. Listed below are the other characteristics of the geomembrane.

Item	Characteristic
Resilience @77°F (20 seconds recovery Percent)	20-100 %
Softening Point (Temperature)	120-270 °F
Percent Elongation Before Breaking	up to 2300 %
Pliability	passes down to -40 °F
Service Temperature	-40 to 200 °F
Coefficient of Permeability (cm/sec)	2.13×10^{-11}

Tests performed on the geomembrane indicate superior resistance to strong acids

and bases including sulfuric acid and sodium carbonate. These chemicals are used in Quivira's uranium extraction processes. The resistance tests indicated that neither of these chemicals had a negative affect on Deery membrane #6. Because of these characteristics, the liner is compatible with Quivira's uranium extraction processes and provides ample environmental protection against ultraviolet, hydrostatic pressure (wind-wave actions), soil conditions and ambient temperatures.

The initial construction consists of building a base foundation for the bottom liner. The construction site will be smoothed, graded, and compacted to a minimum of 90% of standard proctor. This will stabilize the ground and provide a stable base foundation for the liner.

The Deery membrane will be installed over a preplaced polyester fabric. This fabric stabilizes and adds support during the initial placement of the #6 membrane liner. The polyester fabric will be overlapped 1 foot along all seams.

Upon completion of the installation of the bottom liner, the area will be inspected to assure proper geomembrane liner placement. All areas deemed to be unsatisfactory, will be relined.

The leachate\leak detection system will be placed between the two geomembranes within a clean, coarse sand blanket. The interstitial blanket will be 6 inches thick. The leachate collection\leak detection system will be located in the middle of the

cell at the base of the juncture of the cell side wall slopes and the cell floor.

The leachate collection\leak detection system will be made from 4 inch, schedule 40, perforated PVC pipe. The leachate collection\leak detection system will extend the entire length of the cell and collect all fluids by gravitational flow. The two (2) leak detection monitoring stations are located in the middle of the cell on the west and east embankments. Gravitation flow is provided by the 0.3% grade from the north and south cell side walls towards the middle of the cell.

The design of the cell is such that the southern side wall will be a 10:1 slope. This slope will be the entrance for all construction equipment. All other side slopes are 3:1.

Upon completion and inspection of the interstitial sand blanket and leachate collection\leak detection system, the upper geomembrane will be constructed in the same manner as the lower liner and inspected for proper installation. All areas deemed unsatisfactory, will be relined.

D. Operation

The impoundment cell will be used as part of the phased disposal method as required by 40 CFR 61.252 (b)(1). The cell will be filled with LSA byproduct material resulting from the batch campaign processing of the mill feed material. Upon completion o filling the cell, the cell will be dried and covered to meet the

radon flux standard as required by 40 CFR 61.252 (a).

The batch campaigning of material involves the processing of material during several intermittent cycles per year. These cycles are dependant upon receipt of feed material and weather considerations. As such, it is anticipated that most batch processing of the feed material will occur during the summer months.

After processing of the mill feed material, residue slurry product from the feed material will be pumped to the impoundment cell via a HDPE pipeline. The slurry will consist of approximately 12% solids. The slurry material will be spigoted along the east and/or west side walls. The spigot will be moved as needed, to permit an even distribution of solids within the cell. In any case, the cell will maintain a minimum 3 foot freeboard. The cell and spigoting system will be inspected daily for structural integrity in accordance with NRC's Regulatory Guide 3.11.1, "Operational Inspection and Surveillance of Embankment Retention Systems For Uranium Mill Tailings". The leak detection system will be monitored weekly with the findings documented and filed for inspection.

E. Emission Control

Radon flux emissions from the cell will be controlled in accordance with 40 CFR 61.253, Appendix B, Method 115, Section 2.1.3 (a). As such, during the operating life of the cell, all solid materials contained within the cell will be covered with a minimum of 2 inches of water. This will result in a zero emanation

of radon flux. After drying for final closure, the cell will be covered to meet the 20 pCi/meter^2/second radon flux standard as described by Appendix B, Method 115.

APPENDIX A

CONSTRUCTION DETAILS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

JAN 18 1991

CERTIFIED MAIL RETURN RECEIPT REQUESTED P 106 973 141

Mr. Bill Ferdinand, Manager
Radiation Safety, Licensing
and Regulatory Compliance
Rio Algom Mining Corp.
6305 Waterford Blvd.
Suite 325
Oklahoma City, OK 73118

Re: National Emission Standards for Hazardous Air Pollutants (NESHAPs), Standards for Radon Emissions from Operating Mill Tailings, 40 CFR Part 61, Subparts A and W.

Dear Mr. Ferdinand:

This is in response to your application of November 16, 1990, which was submitted pursuant to 40 CFR §61.07 (NESHAPs) for approval to construct a new synthetic, double lined, phased disposal cell at Quivira's uranium mill processing facility at Ambrosia Lake, New Mexico. We have completed our initial review of the application.

We have determined that the application is not complete. Specifically, §61.07 (b)(3) requires that each application for approval of construction shall include, "... technical information describing the proposed nature ... of the source ...". In particular, the isotopic contents of uranium and radium, and that of any other radionuclide that is present in significant concentration, were not presented in the application. Also, the statement is made in the application that none of the material being processing [sic] is mixed waste. This statement should be supported by providing a listing of all the significant chemical and other constituents that are present in the materials to be used as feed.

In the course of our review scoping calculations were performed, using estimates of the uranium content of raffinate from the Sequoyah Fuels Uranium Hexafluoride conversion facility. These calculations are imprecise because of several uncertainties, but they suggest that the quantity of uranium in the amount of feed material needed to fill the proposed disposal cell with tailings

is not enough to offset the expense of its milling. If this is indeed the case, then it is not clear that the waste materials from the milling process would be uranium tailings within the meaning of §60.251 (g), i.e., "waste produced ... from any ore processed primarily for its source material content."

Another significant omission in the application is a description of the status of the existing tailings impoundment #2 with respect to the Radionuclide NESHAPs, Subparts T and W. If the impoundment is considered to be in standby status for operation to accept additional tailings, and if it lacks a liner which meets the requirements set forth at §61.252 (c), then the impoundment has been in noncompliance with §61.05 (c) since March 15, 1990. If the impoundment has ceased to be operational (§61.221 (b)), then it must be disposed of and brought into compliance with Subpart T, §61.222(a) by December 15, 1991.

Since the new phased tailings disposal cell is proposed to be constructed below grade within the existing tailings impoundment #2, we are concerned that operation of the disposal cell might interfere with, or delay the schedule for, disposal of the tailings in impoundment #2 as required by §61.222 (b). An additional concern is the possible impact on the NESHAPs compliance of impoundment #2 if future additional disposal cells are planned to be constructed.

In order for us to expedite and complete our evaluation of your application for approval of construction for NESHAPs compliance, you should submit the necessary additional information which has been described in this letter, to satisfy your application's deficiencies. Specifically, the necessary additional information is:

1. Concentrations of uranium, radium and all other radioactive, chemical and other constituents of the feed material described in the application.

2. A statement as to whether existing tailings impoundment #2 is subject to 40 CFR 61 Subpart T, or to 40 CFR 61 Subpart W. If subject to Subpart W, an additional statement is required as to whether or not a liner is present which meets the requirements specified at 40 CFR 61.252 (c).

3. A description of construction and operational activities related to the proposed new tailings disposal cell, as they may affect the disposal of existing tailings impoundment #2.

4. A description of construction and operational activities related to any future new disposal cells, which may be proposed, as they may affect the disposal of existing tailings impoundment #2.

The additional information should be submitted to this office to the attention of Mr. Hank May. Evaluation of your application for NESHAPs compliance will be resumed upon receipt of sufficient information to constitute a complete application.

I will be pleased to answer any questions you may have about this determination. Please refer any informal technical questions to Mr. Hank May of my staff at (214) 655-7223, and any informal legal questions to Mr. Richard Bartley, Esq. at (214) 655-2125.

Sincerely yours,

John R. Hepola

for A. Stanley Meiburg
Acting Director
Air, Pesticides & Toxics Division (6T)

cc: Richard Mitzelfeldt, New Mexico,
Environmental Improvement Division

Roman E. Hall, Nuclear Regulatory Commission
Uranium Recovery Field Office

Quivira Mining Company

February 1, 1991

Federal Express
Overnight Mail
Tracking No. 9411003184

Mr. Hank May
Radiation Representative
U.S. Environmental Protection Agency, Region VI
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Application For Approval of Construction
Phased Disposal Tailings Cell

Dear Mr. May:

Quivira Mining Company is in receipt of EPA's letter dated January 18, 1991, requesting additional information pertaining to the "Application For Approval of Construction" at the Ambrosia Lake, New Mexico mill facility.

Quivira has reviewed the letter and submits the attached information needed to facilitate the review and approval to construct the phased disposal tailings cell. For convenience, the attached additional information is indexed to each of the specific items as addressed in EPA's January 18, 1991 letter.

To facilitate the review and approval, we would be willing to meet with you on short notice to discuss the application. Please contact me at (405) 842-1773 for further information or to arrange a meeting.

Sincerely,

Bill Ferdinand

Bill Ferdinand, Manager
Radiation Safety, Licensing
& Regulatory Compliance

Attachments: (2)

xc: R. Calegari
M. Freeman
R. Luke
P. Luthiger
H. Whitacre
File

6305 Waterford Boulevard, Suite 325, Oklahoma City, Oklahoma 73118 • (405) 848-1190 • FAX (405) 848-1208

SUPPLEMENTAL SUBMITTAL

APPLICATION FOR APPROVAL OF CONSTRUCTION

For A Phased Tailings Disposal Cell

At

Quivira Mining Company's

Uranium Processing Facility

Ambrosia Lake, New Mexico

Presented To The

U. S. Environmental Protection Agency

January 1991

SUPPLEMENTAL SUBMITTAL

The following information is presented and indexed to correspond to those issues requested within EPA's letter dated January 18, 1991.

Item #1

Concentrations of uranium, radium and all other radioactive, chemical and other constituents of the feed material described in the application.

Response #1

The uranium content of the raffinate and calcium fluoride source material averages 0.61 and 0.13 percent respectively. The average grade of conventionally mined ore processed through the Ambrosia Lake mill was 0.18 percent. Both source materials are amenable for uranium recovery at Quivira's Ambrosia Lake mill facility

The raffinate and calcium fluoride source material is produced at Sequoyah Fuel's uranium hexafluoride (UF_6) conversion facility located in Gore, Oklahoma. The conversion facility purifies uranium concentrates (yellowcake) received from uranium mills and converts the purified uranium to UF_6 as feed material for the Department of Energy (DOE) isotopic separation plants. The raffinate source material is produced in the yellowcake purification step during the solvent extraction phase to recover uranium. The calcium fluoride source material is generated in the fluorination process in the uranium conversion due to lime neutralization of the process gas. The chemical constituents for

each of these source materials are shown on Tables 1 and 2.

Both materials have been officially designated by the Nuclear Regulatory Commission (NRC) as being source material. These determinations were made in accordance with 10 CFR 40.4(h), on April 10, 1987 and September 21, 1987. A copy of these NRC transmittals are attached in Appendix A.

Thus, we reiterate our statement made in our November 16, 1990 application for construction of the phased disposal cell that, "None of the material being processed is mixed waste". This is based on the fact that Section 1004 (27) of the Resource Conservation and Recovery Act (RCRA) excludes source, special nuclear, and byproduct material from the definition of "solid waste". RCRA defines solid waste as:

> "any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agriculture operations, or from community activities, <u>but does not</u> include solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended, or <u>source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended</u>." [emphasis added]

The Atomic Energy Act (AEA) has defined radioactive materials as outlined in Section 11 as being:

> Source material means (1) uranium, thorium, or any other material which is determined by the Atomic Energy Commission (AEC) pursuant to the provisions of section 61 of the AEA to be source material, or (2) ores containing one or more of the foregoing materials, in such concentration as the AEC may by regulation determine from time to time.

Therefore, since hazardous waste (i.e. mixed waste) is a subset of solid waste and by the fact that source material is excluded from RCRA regulations, "None of the material being processed is mixed waste".

TABLE I

Typical Chemical Constituents - Raffinate Feed Material

(Dry Basis, Percent)

Constituent	
Uranium	0.03 - 1.0*
Aluminum (Al)	10
Calcium (Ca)	9
Iron (Fe)	8
Silicon (Si)	7
Fluorine (F)	9
Arsenic (As)	< 1
Boron (B)	< 1
Chlorine (Cl -- including Bromine, Br, and Iodine, I)	< 1
Potassium (K)	< 1
Magnesium (Mg)	< 1
Molybdenum (Mo)	1
Sodium (Na)	4
Phosphorus (P)	1
Sulfur (S)	5
Vanadium (V)	< 1
Zirconium (Zr)	< 1
Manganese (Mn)	< 1
Lead (Pb)	< 1
Nickel (Ni)	< 1

* Average U_3O_8 content is 0.61 percent

Radionuclide	uCi/gm
Uranium-238	0.002
Uranium-234	0.002
Thorium-230	0.089
Radium-226	0.002
Lead-210	0.003

For comparison, the activities of the raffinate material, yellowcake and uranium ore are provided:

Material	uCi/gm
Raffinate Feed Material	0.098
Yellowcake	0.550
Uranium Ore	0.003

On an activity basis, one ton of the raffinate feed material is equivalent to approximately 33 tons of ore versus 7,000 tons of ore processed per day during normal operation.

TABLE 2

Typical Chemical Constituents
Calcium Fluoride Feed Material
(Dry Basis Percent)

Constituent	Wt. %
CaF_2	84.9
$Ca(OH)_2$	5.0
$CaCO_3$	2.24
SiO_2	0.90
$CaSO_4$	0.57
U(Nat)	0.18
Fe	0.14

Radionuclide	uCi/gm
U(nat)	0.002*
Th-230	< 0.001
Ra-226	< 0.001

* The calcium fluoride material averages 0.18 percent uranium.

Item #2

A statement as to whether existing tailings impoundment #2 is subject to 40 CFR 61 Subpart T, or to 40 CFR 61 Subpart W. If subject to Subpart W, an additional statement is required as to whether or not a liner is present which meets the requirements specified at 40 CFR 61.252 (c).

Response #2

With the promulgation of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclides by EPA on December 15, 1989, it is Quivira's understanding that tailings impoundment #2 became subject to Subpart T, "National Emission Standards for Radon Emissions From the Disposal of Uranium Mill Tailings".

However, serious questions remain if a portion of a tailings impoundment can be considered subject to Subpart W while another area of the impoundment is subject to Subpart T. Within Subpart T, at regulation 61.220 (b), it states the definition of operational to mean "a uranium mill tailings pile that is licensed to accept additional tailings, and those tailings can be added without violating subpart W or any other Federal, state or local rule or law." Currently, tailings impoundment #2 is licensed by NRC to accept additional tailings, and with the approval to construct the proposed phased disposal cell, it will comply with the requirements of Subpart W as outlined in regulation 61.252, including the liner provision in (c). It is Quivira's belief that nothing within Subparts T and W prevents an operational tailings impoundment within an

non-operational impoundment as long as the non-operational portions of the impoundment are being "disposed of" through an approved reclamation plan.

It should be noted that Quivira sought to confirm this understanding and to discuss other NESHAP items, by meeting with EPA officials at EPA's Region VI offices in Dallas, Texas, on August 21, 1990. Subsequent to that meeting, on September 13, 1990, Quivira submitted a written follow up letter to EPA outlining various NESHAP questions including this issue. Please refer to question #1 within the September 13, 1990 letter, of which, a copy is attached in Appendix B. To date, this specific question has not been clarified by EPA.

As such, Quivira has proceeded with its reclamation plan and to date, none of the raffinate nor calcium fluoride material has been placed on tailings impoundment #2.

Item #3

A description of construction and operational activities related to the proposed new tailings disposal cell, as they may affect the disposal of existing tailings impoundment #2.

Response #3

As noted within the original November 16, 1990 construction application, Quivira proposed that the phased disposal tailings cell be built below grade in the northern portion

of tailings impoundment #2. The site for the proposed phased disposal cell was selected after careful consideration of many geotechnical and regulatory factors.

The first of these considerations included compliance with 10 CFR 40, Appendix A, Criteria 2 and 3, which requires the avoidance of proliferation of small byproduct disposal sites and below grade byproduct disposal.

Other important factors considered in the selection of this site included prior approval by NRC, New Mexico State Engineer Office (NMSEO) and New Mexico Environmental Improvement Division (NMEID) for continued deposition of tailings within this area after their careful consideration of stability, hydrological and radiological impacts.

In addition, the tailing impoundment area has in place and operating, a NRC and NMEID approved ground water monitoring and restoration program. The NRC approved ground water program is based on NRC regulations which incorporate the ground water protection regulations published by EPA for uranium mill tailings. NRC's ground water monitoring and restoration plan for the tailings impoundment consists of 16 wells while the NMEID plan consists of 78 wells. Further, the proposed phased disposal cell will have an interstitial leak detection system. Thus, in the unlikely event that a leak should develop within the cell, it can be quickly identified and corrected thereby mitigating and preventing any potential ground water impact.

Finally, the proposed cell construction site was selected so as to maintain reclamation integrity with the September 24, 1990, NRC approved reclamation plan. In the course of stabilizing and consolidating the slime tailings material within impoundment #2, several areas including the northern half of impoundment #2, must be reworked and reshaped into the necessary base isopleth contours. The base isopleths represent the initial contour elevations upon which the appropriate final radon attenuation cover thicknesses will be applied for tailings impoundment #2 to meet the radon flux standard of 20 pCi/m^2/second.

As such, the northern portion of the tailings impoundment #2 will be contoured and compacted to allow the phased disposal cells to be built below grade while also complying with NRC geotechnical requirements, including final grade design, tailings stability, radon attenuation cover thickness and construction quality control. The construction of the disposal cell would not detract from the ongoing reclamation schedule but rather is an integral part of the reshaping and recontouring phase of the plan itself.

Although the phased disposal cell will be built in the course of stabilizing and consolidating the tailings material within tailings impoundment #2, Quivira has been and is continuing since the NRC approval of its reclamation plan on September 24, 1990, to diligently work toward reclamation of tailings impoundment #2. However, as we discussed during our August 21, 1990 meeting, and as submitted in question #4 of our September 13, 1990 letter, it is physically impossible to complete "long term disposal"

within the mandated two year limit. EPA itself has acknowledged that long term disposal within the two year time frame is physically impossible for most, if not all, mill tailings sites.

Additionally, regulatory compliance is impossible within the two year final closure time frame as NRC requires that it must approve the timing of the application of the *final* radon attenuation cover due to settlement and consolidation considerations. NRC typically requires 95% consolidation before it will approve the placement of the *final* radon attenuation cover. As such, the operator cannot arbitrarily place a *final* radon attenuation cover upon the impoundment without prior NRC approval. In some cases that settlement, based on site specific conditions including dewatering of the tailings material and tailings mesh size, may exceed two years.

However, in keeping with the intent of the Subpart T regulations, that is, to control radon emanation from tailings material, Quivira has undertaken actions to comply with this intent by proceeding with the placement of an *interim* radon attenuation cover. The purpose of the *interim* cover is to attenuate the radon flux, stabilize the tailings impoundment, and to prevent windblown tailings material. The *interim* radon attenuation cover being placed consists of alluvial material which will be compacted to at least 95% of standard Proctor. This attenuation cover is projected to be applied over all of impoundment #2 in 1991. As to the proposed cell disposal area, the impermeable liner will reduce the radon emissions from the underlying tailings well below the 20 pCi/m^2/second standard.

Since the northern area of impoundment #2 will be at base elevation and initial grade due to the required base contouring, the currently proposed phased disposal cell site will be prepared in conjunction with and just prior to the application of the interim radon attenuation cover. The side slopes of the cell will be constructed such that, upon final closure, and placement of the *final* radon attenuation cover, the contours will be at the final elevations as approved by NRC.

Item #4

A description of construction and operational activities related to any future new disposal cell, which may be proposed, as they may affect the disposal of existing tailings impoundment #2.

Response #4

As noted in our response in item #3, the construction and operation of the currently proposed phased disposal cell and all future disposal cells would be built to base elevation and initial grade during the stabilizing and consolidating phase of the reclamation plan. As discussed during our August 21, 1990 meeting, Quivira currently plans to build an additional 3, two (2) acre cells in the northern portion of tailings impoundment #2. The locations of these cells are shown in Appendix C. It is estimated that each cell would have a 18-24 month processing capacity.

The tailings material within impoundment #2, including the northern half of impoundment #2, will be reworked and reshaped into the necessary base isopleth contours. The initial contouring will allow the future phased disposal cells to be built below grade in accordance with NRC's "prime option" byproduct disposal as outlined in 10 CFR 40, Appendix A, Criteria 3. It would also allow Quivira to maintain compliance with NRC geotechnical requirements, including final grade design, tailings stability, final radon attenuation cover thicknesses and construction quality control.

In order to limit radon flux emanation, Quivira is proposing to prepare the additional future cell sites in conjunction with and just prior to the application of the *interim* radon attenuation cover. The *interim* radon attenuation cover being placed consists of alluvial material compacted to at least 95% of standard Proctor. Prior to actual construction of the disposal cells, Quivira would apply for the construction permit on each of these cells as required by 40 CFR 61.07 as processing capacity dictated. Upon actual construction, the phased disposal cells (liners) will be built upon the interim radon attenuation cover. The height of the cell will be such that upon final closure, and with the application of the final radon attenuation cover, the ultimate contour elevations will be those approved by NRC.

Again, as previously mentioned, the area has NRC and NMEID approved ground water monitoring and restoration programs in place and operating. The phased disposal cells

will be constructed with interstitial leak detection systems to provide a timely indication of any leakage so corrective actions can begin promptly. This will prevent any potential ground water impact to the area.

APPENDIX A

NRC SOURCE MATERIAL DETERMINATIONS