STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM

DATE: May 8, 1981

TO: Bill Fleming
Uranium Licensing Section

FROM: Jere Millard
Surveillance and Field Operations Section

SUBJECT: Kerr-McGee Adequancy Review

This completes Mac Ennis' and my comments concerning the Kerr-McGee Adequancy Review. In addition, we had a few comments on your prepared comments that may be helpful. In general, we viewed this application to be deficient in a number of areas particularily the Radiological Impacts and monitoring sections. Maps were not provided and methods not documented, and no water pathway was considered in the radiological assessment. We hope these comments will detail specific deficiencies requiring additional work on the part of the applicant.

JM/dm
Enclosure

COMMENTS ON BILL FLEMING'S ADEQUANCY REVIEW

KERR-McGEE APPLICATION

Jere Millard - Mac Ennis

May 8, 1981

ok p.2,A-3 1. Are they talking about having a limit figure for a surety bond set well before decommissioning? Anyway, why not project the estimate to the end of the projected mill lifetime?

~~p.3~~, A-6 2. line 6: "radon daughters" should be inserted after "radon gas".

~~p.3,~~B-1 3. Monitoring data can be submitted in table format as shown in NRC Reg. Guide 4.14. Graphs of radionuclide concentrations vs. time are not required. Isopleth maps would be of limited value for air particulates and radon due to complex meterological interactions and the necessity for a sampling grid system to be implemented.

~~p.6,~~B-1 4. It is stated on p.12-24 that "the proper respirator protection factor is used in determining yellowcake exposures." Kerr-McGee does not have an approved respirator program, therefore, they shouldn't be taking any credit for exposure reduction.

p.5-1 2. The MILDOS run assumed an 18 year mill life time, but fails to include the time necessary for the tailings pile to dry out and undergo reclamation.

p.5-1 3. The met data set was not supplied by NMEID. We supplied impact with the raw data who then interpreted it for Kerr-McGee. It should be stated that the tables of met data did not result from our work, but from the work of Kerr-McGee consultants.

~~p.5-2 4. What is the average moisture content of the ore they mill?~~ ok ~~acceptable~~ in application.

p.5-2 5. Details for the calculation of dust emission rates for each mill cycle step should be submitted and the "established references" for each calculation included. especially for control of emissions.

~~p.5-2~~ 6. How were the stack release rates measured? Whose method was used? Under what conditions were the measurements made ie, were current process rates used?

p.5-4 7. I don't believe the ore is so far from equilibrium as indicated in Table 5-2. The Th-230 value is only 17% of the U-238 value. What does the footnote to the "Tailings" entry mean?

p.5-6 8. How was an exit velocity of 17.2 mps computed?

p.5-7 9. How was the value of 55% control for the dam and roads obtained? They should detail how the two dust control factors of 85% and 90% were arrived at as well as a map of the tailings areas in question and their respective control factors.

p.5-7 10. The entire set of MILDOS input parameters should be presented in section 5 in some appropriate format.

p.5-8 11. Documentation of the cited beef cattle density value of 4 animal units per square mile should be given.

p.5-8 12. What portion of the diet of the area population was assumed to come from locally grown meat, milk and vegetables?

p.5-8 13. If the "mill operator is currently performing environmental and other monitoring programs to provide detection of any seepage that occurs," and if no radiation dose estimates through water pathways have been calculated, then how can one assume that "no significant contribution to dose through liquid pathways is expected?

p.5-8 14. It is usually the case that "radionuclide concentrations in aquatic and terrestrial organisms" are used to predict radiation dose through the water pathways.

5.2 p.5-10 15. What is the location of the nearest downwind resident? What is the population center that is 7.5 km southeast of the mill? ~~More receptors need to be looked at for both dose and nuclide concentrations in air and soil.~~

5.4.2 p.5-19 16. Isn't it true that uranium mills are primarily designed, built and operated to process yellowcake?

5.4 p.5-20 17. More detail is needed of Kerr-McGee's radiation protection/health physics program used to protect its workers - see NRC's Task OH-710-4 and NRC's Reg. Guide 8-22.

Ambrosia Lake Mill
License Renewal 1981

3.0 MINING AND MILLING OPERATIONS

3.1 MINING ACTIVITIES

Mines owned by Kerr-McGee supplying ore to the mill at Ambrosia Lake are located in a northwest to southeast trending zone of the Westwater Canyon formation commencing with Section 22, T14N, R10W, and terminating with Section 36, T14N, R9W. An additional mine known as Church Rock I located in the Navajo Reservation in Section 35, T17N, R16W, also supplies ore to the mill on an intermittent basis. Additional mines are in some stage of development in the area.

Of the nine mine shafts located in the Ambrosia Lake valley, in one, Section 22, physical mining has been terminated and the future development will depend upon chemical removal of the residual ore values. Sections 17, 24, and 33, are currently in a standby state due to the depressed condition of the uranium market.

The ore in all of these mines is located in the Westwater Canyon units of the Morrison Formation which is an active aquifer. The ore mined is a grayish colored sandstone averaging approximately 0.15 percent U_3O_8 with occasional high values to 0.5 percent and low values to 0.05 percent. Varying amounts of contaminating substances are present in the ores as mined. Only molybdenum exists in sufficient quantity to make recovery a necessary activity as an additional step in the milling. The ore contains a significant amount (2 to 5 percent) of limestone.

Since the ore zone is an active aquifer, mining can only proceed after provision is made to remove the water. Water is drained from the mine

through a series of trenches down each haulage drift and is collected into a central sump near the bottom of the mine shaft. It is pumped to the surface, passed through a series of settling ponds to remove suspended solids and subsequently, pumped to the IX plant and then to the mill reservoir located near the Ambrosia Lake mill. Here the water is stored as a supply for the mill process. Mines located in Section 35-36 follow the same pattern except that the water produced is not pumped to the mill reservoir but is treated separately and discharged into an over land drainage canal where it infiltrates the surface and serves to irrigate the adjacent pasture in Sections 1 and 12. All the water discharged is absorbed by the surface within approximately 2½ miles of the point of discharge. Water pumped from the mines contains some uranium and radium in solution in addition to other minerals. The uranium values exceeding release standards are removed by an ion exchange facility which treats the entire stream. Subsequent to ion exchange for uranium values, the water is treated with barium chloride which precipitates barium sulfate, trapping radium sulfate as a co-precipitate. Table 3-1 provides additional data on all of the Kerr-McGee Nuclear Corporation mines located at Ambrosia Lake and Church Rock.

Ore is removed from the mine by a skip and dumped into a truck at the bottom of the discharge hopper. The ore is stockpiled in a storage yard and later trucked direc / to the mill depending upon production plans and current supplies. The ore mined contains 12 to 15 percent water but evaporation in these stock piles normally decreases the water content to the range of 8 to 10 percent.

Ion Exchange Facilities

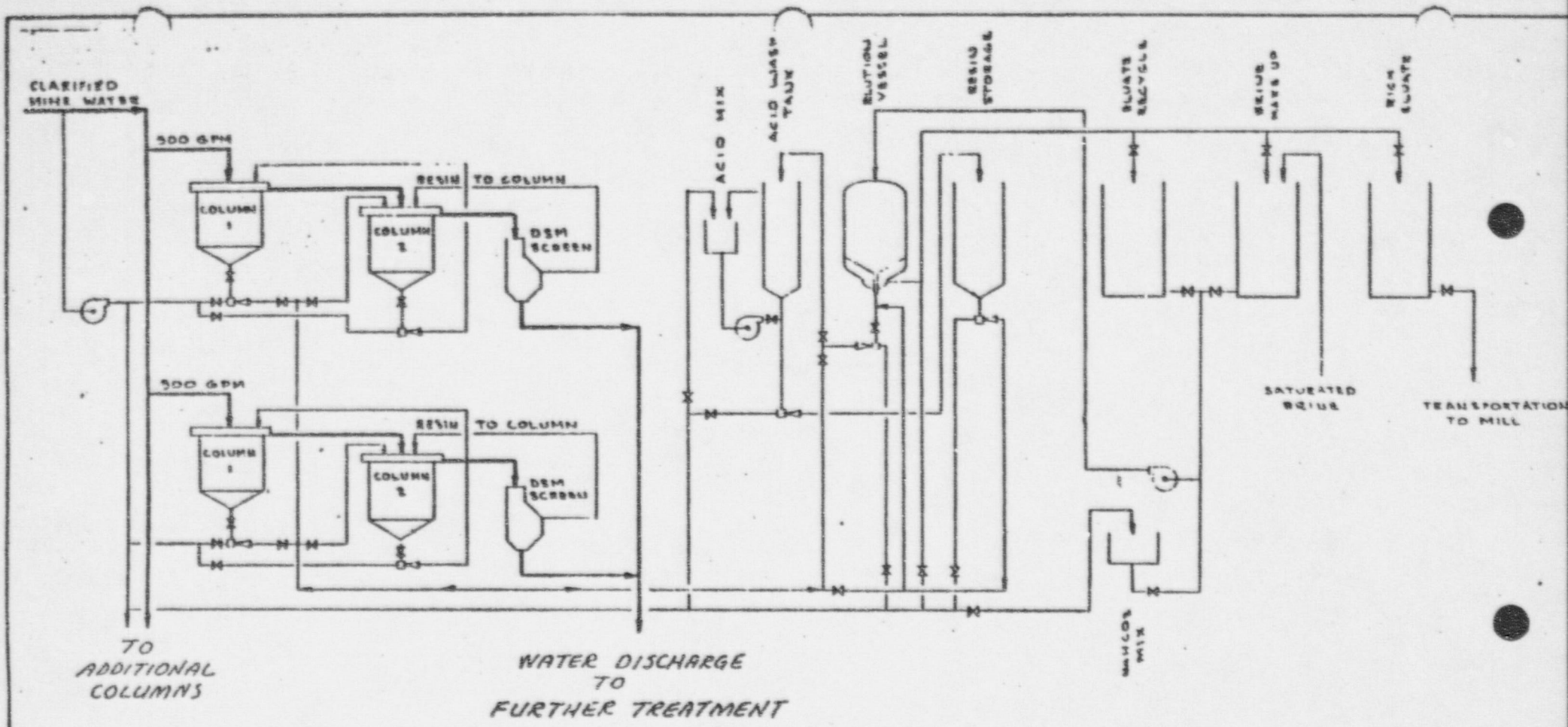
In addition to the ore milling process, an ion exchange (IX) process is utilized to remove uranium from mine water.

Approval has been granted for operation of three IX plants in conjunction with the mill license. The first IX plant is located at the mill site and removes uranium from all of the Kerr-McGee Ambrosia Lake mine waters except the Section 35 and Section 36 mines.

The IX plants are constructed with two-column circuits of 600 gpm capacity. The mill site IX plant contains five circuits (10 resin columns) and is capable of processing 3000 gpm of mine water. It is currently operating at 2500 gpm. A second IX plant is operating at Section 35 and has three circuits capable of 1800 gpm and is operating at 1500 gpm. A third IX plant has been licensed for construction at the Kerr-McGee Church Rock operations to process 4000 gpm of mine water from the Church Rock mine.

In a typical ion exchange plant, the mine water enters the plant and passes through a split circuit of upflow cascade resin columns which reduce the uranium concentration to approximately 1.0 mg/l. An anion exchange resin (e.g., Rohm and Haas IRA 430) selectively extracts the uranium leaving all other constituent concentrations essentially the same. (See Figure 3-3 for typical flow sheet.)

The uranium is eluted from the resin with 1.5 normal sodium chloride solution which then joins the mill process at the solution clarification step. Loaded resin from the Section 35 IX plant is hauled by truck to the mill IX plant for stripping and return for reuse. Uranium bearing sodium chloride solution from the Church Rock IX plant will be trucked to the mill.



KERR-McGEE NUCLEAR CORPORATION
KERR-McGEE CENTER ■ OKLAHOMA CITY, OKLAHOMA 73116

TYPICAL
SCHEMATIC FLOW DIAGRAM
MINE WATER IX PLANT

DRAWN BY	DATE: 1-26-81	SCALE:
APPROVED		DRAWING NUMBER: FIG. 3-3

ITEMS REQUESTED BY EID TO COMPLETE KM LICENSE RENEWAL APPLICATION

		Date to EID
Chapter 1:	Title report evidencing land ownership	12/15/81
Chapter 2:	1. Morning mixing height data	12/15/81
	2. Area map showing upstream catchment area	12/15/81
	3. Calculations for diversion to carry 100 yr storm	3/1/82
	4. Update seismology report	1/1/82
Chapter 4:	Copy of results of sand backfilling program	2/1/82
Chapter 5:	1. Radiological monitoring data for mill and tailings to meet 4-200	12/15/81
	2. Analyses of groundwater and mill reservoir discharge for Th-230, Pb-210, and Po-210	2/1/82
	3. Data for air particulates, radon, vegetation, livestock, fish, soil, sediment and gamma	2/1/82
	4. Map showing all source term locations	12/15/81
	5. Description of stacks with emission controls	12/15/81
	6. Engineering plans and costs for stabilizing waste retention systems	1/15/82
	7. Sample calculations for stack emission rates	12/15/81
	8. Explanation for the non-equilibrium levels of Th-230	12/15/81
	9. Exit velocity calculations and measurement details	1/15/82
	10. Emission control justification for tailings and map of levels of control	1/15/82
	11. Documentation for the assumed beef cattle density	12/15/81
Chapter 7:	Sufficient monitoring for compliance (Th-230, Pb-210, Po-210) for water	2/1/82
Chapter 8:	1. Contingency plan	---
	2. Soil cleanup criteria for Ra-226, Th-230, Pb-210, plus background values for soil concentration sof U, Th, Ra, and Pb	2/1/82
	3. Procedures to deal with pipeline rupture between mill and tailing sand section 4 ponds	12/15/81

ITEMS REQUESTED BY EID TO COMPLETE KM LICENSE RENEWAL APPLICATION

		Date to EID
apter 9:	1. Quarterly reporting of monitoring results (including Th-230, Pb-210, Po-210)	---
	2. Update Map 1 to show sampling methods and frequency from Table 9-1	12/15/81
	3. Analytical procedures for U, Ra, Th, and Pb plus lower limits of detection and standard error	12/15/81
	4. Stack flow measurement and process rate specified	12/15/81
	5. Clarify particulate sampling duration	12/15/81
	6. Groundwater and surface water analysis for Unat, Th-230, Ra-226, Pb-210, Po-210	2/1/82
	7. Vegetation, food (cattle), and fish analysis for Pb-210	2/1/82
	8. Sediment samples analyzed for Unat, Th-230, ra-226, Pb-210	2/1/82
	9. Collect soil samples at air sample site and analyze for Unat,Th-230, Ra-226, Pb-210	2/1/82
apter 10:	1. Analysis of tailings management alternative sites and methods	~~3/1/82~~ 4/21
	2. Timing commitment for liquid recycle program and repair of liners in ponds 9 & 10	12/15/81
	3. Details on tailings management program required	1/15/82
	4. Analysis of tailings methodology alternatives	2/15/82
	5. Quantitative details on size and impact of slurry trench	1/15/82
	6. Technical and economic information on regulatory impact	---
	7. Engineering details for adequacy of spigotting distance	12/15/82 ?
hapt 11:	1. Technical basis for assumption of 55% control for dam and roads	12/15/81
	2. Proposed engineering plans and costs for stabilizing waste retention system	1/15/82
hapter 12:	1. Provide documentation for the periodic review sessions of the Rad Safety Training	2/15/82
	2. Detailed description of respirator program	2/15/82
	3. Formulate a response to the ALARA objective	2/15/82
	4. Supply LLD for each mill survey and method of calculating U, Th, Ra, and Pb from gross alpha	2/15/82
	5. Describe time studies for rad safety program	2/15/82
	6. Detailed description of bioassay program	2/15/82
	7. Details for surface contamination surveys	2/15/82
	8. Provide documentation for chosen beta gamms/survey levels	2/15/82

3/26

review by Bruce Gerber May 15, 1981

ADEQUANCY EVALUATION OF KERR-MCGEE URANIUM MILL RENEWAL APPLICATION

CHAPTER 1: INTRODUCTION

Section 3-300J of the New Mexico Radiation Protection Regulations states that "An appropriate title report or other documents evidencing land ownership, or properly drawn purchase option, shall be attached to the application."[1]

These documents are necessary for the present disposal site as well as for the State land on Section 36 which must be purchased for the proposed tailings disposal plan.

CHAPTER 2: THE ENVIRONMENTAL SETTING

2.1 Geography and Demography

The table on p.2-8 of the renewal report on population distribution needs to be accompanied by a map showing the location of the nearest resident. Please indicate this on map 3 (land use).

2.2 Socioeconomic Profiles

Adequate

2.3 Meteorology

1. Please state that New Mexico Environmental Improvement Division meteorological data was analyzed and interpreted by Kerr-McGee's consultant.

2. Please calculate the average morning mixing height, in addition to the afternoon mixing height given on p.2-61.

3. Please indicate whether Kerr-McGee intends to install a meteorological station on company property. Please locate the station used on map 3.

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[1] The New Mexico Court of Appeals recently decided that Section 3-300J is invalid. To this date, and pending completion of court proceedings, the New Mexico Environmental Improvement Board has not taken "steps...necessary to remove 3-300J from the Radiation Protection Regulations."

2.4 Hydrology

1. Please supply a map showing the catchment area upstream of the mill and tailings area.

2. Please supply an analysis to indicate that the tailings area is protected from flooding with adequate diversion structures.

2.5 Geology and Seismology

Please update Sanford's seismic study (1975) with recent data.

CHAPTER 3: MINING AND MILLING OPERATIONS

3.1 Mining Activities

Adequate

3.2 Mill Process and Controls

Adequate

3.3 Sources of Mill Wastes and Effluents

1. Please modify "NM REC-0041 NRC" on p. 3-27 to read "NRC NUREG-0041".

2. Please provide radiological analysis of solid waste (p. 3-28).

CHAPTER 4: EXISTING TAILINGS MANAGEMENT SYSTEMS

4.1 Description

Adequate

4.2 Operation History

Adequate

4.3 Tailings Dam Stability

Adequate when considered in conjunction with consulting reports not included in this application and State Engineer Office evaluations.

~~Please submit~~? ok will be part of the hearing record

4.4 Evaporation Ponds

Adequate

4.5 Backfill

The description of backfilling operations is inadequate in terms of monitoring data and environmental impacts (p. 4-11 to 4-15).

Please follow the outline enclosed for the submission of information required (attachment 2).

CHAPTER 5: RADIOLOGICAL IMPACTS

Section 4-200 of the New Mexico Radiation Protection Regulations requires that "each licensee or registrant shall make or cause to be made such surveys as may be necessary for him to establish compliance with these regulations". With the exception of selected water quality parameters (radium and uranium) in Appendix A, radiological monitoring data for the mill and tailings disposal do not appear in the renewal report. Because of these omissions, it is impossible to establish compliance with Part 4 standards.

Please submit all relevant data for the past five years. For stations where a number of data points exist over time, please graph the points (with standard error brackets) with concentration on the y-axis. Several sampling stations may be presented on the same graph if the results are clear. Maximum permissible concentrations should be indicated on each graph.

5.1 SOURCES AND EXPOSURE PATHWAYS

1. Groundwater: It is stated that although "there is a possibility of some seepage of radioactive liquids from the tailings...into the...groundwater system...no significant contribution to dose through liquid pathways is expected" (p.5-8). It is further stated that "the mill operator is currently performing environmental and other monitoring programs to provide detection of any seepage that occurs".

   According to data presented in Appendix A (Hydrologic Assessment), Ra-226 concentrations for four ground water wells in unrestriced areas greatly exceed Part 4 standards of the Radiation Protection Regulations. The following values indicate seepage from the tailings area:

Well Number	Depth(ft)	Ra-226 Concentrations (pCi/l)
36-02 Trb	240 (Tres Hermanos)	75.66
32-52 Kd	272 (Dakota)	874.72
32-41	61 (alluvium)	174.99
32-42	38 (alluvium)	121.24

[Lower Dakota?]

The areal extent of this seepage plume must be accurately defined on an isoline map by Kerr-McGee.

In addition, analyses for Th-230, Pb-210 and Po-210 should be included, [illegible]

2. Surface Water: Data for Th-230, Pb-210 and Po-210 should be submitted for the liquid released from the mill reservoir, in addition to data supplied for U and Ra on p. 38 of the hydrological assessment.

3. Air Particulates and Radon: Data for U_{nat}, Ra-226 Th-230, Pb-210 and Rn-222 must be submitted from at least three stations at or near property boundaries, one at the nearest residence, and one at a control location. Continuous sampling is necessary and specific locations of these monitors must be noted on map 1 (environmental monitoring map). A large number of air sampling stations are located on map 1, but these are not specified in terms of sampling frequency, duration of sampling program or constituents sampled. Please specify the location of the nearest resident.

4. Vegetation, Livestock and Fish: Data for U_{nat}, Ra-226, Th-230, Pb-210 and Po-210 should be submitted. Vegetation samples should be from three grazing areas near the site in different sections which would have the highest predicted air particulate concentrations during milling operations. Sampling should be made from the most commonly grazed grasses two to three times annually. Please note locations on the monitoring map. Data from livestock for U_{nat}, Th-230, Ra-226, Pb-210 and Po-210, collected once, should be submitted for animals grazing within 3km of the site. Please supply similiar data collected for "minnow and planted catfish samples" (p.9-5).

Do they keep to kill a Cow?

5. Soil and Sediment: Data on soil samples, collected from the same sites as air particulate samples, should be submitted for U_{nat}, Th-230, Ra-226 and Pb-210. Data from Kerr-McGee's yearly sediment survey (p.9-5) should be submitted for U_{nat}, Th-230, Ra-226 and Pb-210. Please note the soil sampling locations on map 1, as has been done for the sediment locations.

6. Gamma Radiation: Please submit data from the 23 TLD locations mentioned on p.9-5 and identified on map 1.

7. A map showing all source term locations including stacks, vents, ore storage pads, and tailings areas should be submitted. Please indicate which stacks have emission controls and which are vents.

8. Please include in the MILDOS anlaysis the time necessary for the tailings pile to dry out and undergo reclamation, in addition to the assumed 18 year mill life.

9. Please state on p.5-1 that meteorological data provided by the State of New Mexico was used and interpreted by Kerr-McGee consultants.

10. Please supply sample calculations for stack emission rates for each mill cycle step as well as "established references" for assumed controls (p. 5-2 and 5-3).

    Please supply details of measurement techniques, including the process rate at the time of measurement.

11. Please explain why the value for Th-230 is so far from equilibrium (17% of the U-238 value; p. 5-4).

12. Please explain the size ranges stated for tailings ("75m, 10-75m, -10m"; p. 5-4).

13. Please explain how a "exit velocity of 17.2 mps" was measured and calculated (p. 5-6).

14. Please provide technical justification for the assumptions of 55% control for roads and the dam, and tailings activity control levels of 85% and 90% (p. 5-7). Please provide a map of the tailings area with control factors for various sectors.

15. Please summarize the entire set of MILDOS input parameters in a single table.

16. Please document the assumed beef cattle density of four animal units/mi^2 (p. 5-8).

17. Please indicate the values used for the portion of the area population diet assumed to come from locally grown meat, milk and vegetables (p. 5-8).

5.2 Dose Commitments to Individuals and Populations

1. Because of high radium 226 values in ground water in unrestricted areas (previous discussion), dose commitments must be calculated for the ground water pathway. This is particularly important because alluvial and Dakota wells are used for domestic and stock water.

2. Please locate the nearest downwind resident and the nearest population center on map 1 (p. 5-10).

5.3 Evaluation of Radiological Impacts

Included in this evaluation (Table 5-10) must be impacts for liquid pathways, particularly ground water, as discussed previously in this section. A specific evaluation of the seepage plume is necessary, as well as

5.4 Occupational Dose

The annual limit on intake for uranium as published in ICRP 30 is not binding on the NMEID (p. 5-20). Current NMEID Radiation Protection Regulations limit the intake per quarter to 6.3 x 10^{-2} μCi. This is 0.252 μCi/yr. The intake formula from NRC's Draft Regulatory Guide OH-710-4 should be:

$$I = b\sum_{i=1}^{n} x_i t_i$$

where,

I = uranium intake, μg or μCi

t_i = time of exposure to average concentration x_i, hrs

x_i = average concentration of uranium in breathing zone air during the time t_i, μg/m^3 or μCi/m^3

b = breathing rate, 1.2 m^3/hr

n = number of exposure periods during the week or quarter

CHAPTER 6: NON-RADIOLOGICAL IMPACTS OF OPERATIONS

6.1 Physical and Biological System

1. Please supply a reference for Table 6-2 on p. 6-7 (Animal Species Expected to Occur-Ambrosia Lake Area).

2. Please supply a reference for the statement that "annual herbage production is estimated at between 500-1000 air dry pounds/acre/yr".

6.2 Economic and Social Effects

1. Please explain why the assumption of a "phased closure" of the mill after 1996 is ~~assumed~~ (p. 6-18).

2. Please document the assumption of an 87% "capture rate" for indirect employment in McKinely and Valencia counties resulting from the Ambrosia Lake operations (p. 6-18). Please document the information which would allow such a precise estimate.

CHAPTER 7: IMPACTS OF OPERATIONS ON WATERWAYS AND GROUNDWATER

7.1 Surface Water

Please supply data on Thorium 230 and Lead 210 in addition uranium and radium for "reservoir water and that released to the creek" (p. 38 of Appendix A). Table 7 indicates that standards for SO_4, TSD and Se are exceeded in this discharge for average 1980 analyses.

7.2 Groundwater

1. As discussed in the comments on Chapter 5, it is necessary to accurately define on isoline maps the areal extent of the seepage contamination. This should include U, Ra, Th and Pb concentrations.

2. Please supply evidence for the statement that "leakage from ponds 2, 7 and 8 is considered to be small and of inconsequential impact to anyone" (Appendix A, p. 41). Please submit radionuclide water quality results from well 36-05.

3. Several faults and fracture zones with a northerly trend are present in the tailings disposal area, as well as in the proposed new tailings area (Appendix A, p. 3, 21 and Figure 8). Please comment on the impacts of these structural features, particularly the younger fractures in the Mancos and Tres Hermanos formations, on ground water movement.

CHAPTER 8: EFFECTS OF ACCIDENTS

8.1 Mill and Tailings System Accidents Involving Radioacticity and 8.4 Contingency Plan

1. Section 3-300L states that "Mill applicants shall analyze realistic tailings release scenarios and provide systems to contain potential releases to company controlled property".[1] Measures for dealing with a failure of the tailings dam at mixiмum capacity are not addressed. The "Contingency Plan for Accidental Release of Radioactive Material to Unrestricted Areas" (Appendix F of the renewal report) is adequate in terms of organizational and administrative guidance, but inadequate in describing the technical/engineering details of a dam failure specific to the Amborsia Lake facility. Failure scenarios of overtopping resulting from a large runoff event and physical impoundment failure from liquefaction should be addressed. The statement on p. 8-3 that "For the expected rainfall and low seismic activity in the area, no dam failure should result" is inadequate.

   The EID is not requiring a detailed analysis of the likelihood of the above-mentioned event occuring, but rather a contingency plan predicting the volume, chemistry and ultimate location of spilled radioactive material.

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[1] The New Mexico Court of Appeals recently decided that Section 3-300L is invalid. To this date, and pending the completion of court proceedings, the New Mexico Environmental Improvement Board has not taken "steps...necessary to remove 3-300L...from the Radiation Protection Regulations".

As part of the contingency plan required by amendment number 31 of Kerr-McGee's present license, this information is required for the evaporation ponds as well as the tailings impoundment. The analysis should include engineering information, including topographic determinations, on methods for containing potential releases to company controlled property.

2. Clean-up criteria for contaminated soil are incomplete. The concentration for uranium of 30 pCi/g above background is acceptable, but values for radium, thorium and lead are necessary. The value for radium must not be greater than 10 pCi/g. In addition, Kerr-McGee needs to establish a background value for soil concentrations of uranium, thorium, radium and lead.

3. Please supply engineering details for procedures to deal with a pipeline rupture between the plan and the tailings pond (p. 8-3), as well as plans to improve or replace the wooden pipeline, which develops constant leaks. Please also detail procedures for dealing with a pipeline failure between the tailings impoundment and the Section 4 evaporation ponds.

8.2 Non-Radiological Accidents

Adequate

8.3 Transportation Accidents (including Appendix C)

Adequate

CHAPTER 9: MONITORING PROGRAMS

For all of the environmental monitoring program, the EID requires that Kerr-McGee commits to submitting a quarterly report based on the suggested format of Attachment III.

9.1 Air Quality Monitoring

1. Map 1 should indicate which air sampling stations monitor continuously for particulates (U, Ra, Th, Pb) and which stations monitor continuously for radon.

2. Please discuss the details of analytical methods of measurement ~~of~~ U, Ra, Th and Pb, as well as lower limits of detection and standard error terms.

3. Stack flows should be measured semi-annually and the process rate should be specified at the time of measurement.

4. Please confirm that air particulate sampling is continuous, rather than 24-hour sampling.

9.2 Water Quality Monitoring

Groundwater and surface water samples must be analyzed for U_{nat}, Th-230, Ra-226, Pb-210 and Po-210.

9.3 Vegetation, Food, Fish, Soil and Sediment

1. Vegetation, food (cattle) and fish ~~must also~~ should be analyzed for Pb-210.

2. Sediment samples ~~must~~ should be analyzed for U_{nat}, Th-230, Ra-226 and Pb-210.

3. Soil samples ~~must~~ should be collected at the same sites as the air particulate samples and should be analyzed for U_{nat}, Ra-226 and Pb-210.

9.4 Gamma Radiation

Adequate

CHAPTER 10: ALTERNATIVE TAILINGS MANAGEMENT SYSTEMS

10.1 Alternative Sites and 10.2 Below Grade Disposal

Kerr-McGee proposed to convert a present and temporary evaporation pond area (ponds 2, 7 and 8) to a permanent solid tailings disposal site. In addition, Kerr-McGee must purchase a portion of Section 36, now State land, as part of the proposed disposal plan.

Section 3-300K of the New Mexico Radiation Protection Regulations requires that applicants for a uranium mill license "shall perform an analysis of viable tailings management alternatives including below-grade disposal and alternative sites". According to the Environmental Improvement Board's interpretation and ruling on April 11, 1980, the EID considers the area upon which you propose to dispose of solids and slimes (p. 10-3 of the renewal report) to constitute a new site for tailings disposal.

The EID is consistent in its position that evaporation ponds are transitory, not permanent, disposal features. The EID is not requiring Kerr-McGee to address the question of moving existing tailings to a new site or to below-grade trenches. The EID is requiring an analysis of alternatives, including other sites and below-grade disposal, for the new, permanent disposal site. Specific guidance for the preparation of an alternative site analysis is attached (Attachment 1).

10.3 Other Alternatives

1. Please supply a timing commitment for the liquid recycle program and pond liner repair for ponds 9 and 10 (p. 10-3). Engineering details on pond liners are necessary. Please specify when and how ponds 2, 3s, 3n, 7 and 8 will be lined. Geotechnical and stability analyses for all ponds will be necessary.

2. The tailings management program described in outline terms for the next 17 years on p. 10-3 and map 4 is inadequate. Details on timing, volumes of solids and liquids, interim stabilization, final reclamation, the need for more evaporation ponds, engineering details on impoundment stability for the proposed system, and flood hazard analysis are necessary.

3. Section 3-300H of NM Radiation Protection Regulations states that each application, including the first renewal, must address the "short-term and long-term environmental, radiological and public and safety aspects of the application and alternatives to the proposed action". The potential radiological hazard from ~~potential~~ seepage and accidental release associated with Kerr-McGee's 21 evaporation ponds is a source of continuing concern. Under the category of alternative methodology, the EID requires that Kerr-McGee investigate the economic feasibility of neutralizing the tailings material before deposition in the tailings impoundment or backfilling.

The investigation should quantify both costs and benefits of neutralization. Costs should be quantified for at least the following: 1) annual cost of necessary amounts of lime and other materials; ~~limestone~~ 2) capital cost of lime handling and mixing equipment. Benefits should be quantified for at least the following: 1) savings from evaporation pond construction, maintenance and instrumentation; 2) savings in reclamation costs; 3) savings in tailings impoundment stability analyses and instrumentation; 4) savings in operational aspects of tailings management; 5) reduction in risk of a tailings impoundment failure; 6) savings from reduced groundwater monitoring requirements. The resulting difference between costs and benefits should be expressed in terms of additional production cost per pound of yellowcake produced.

4. The Radiation Protection Bureau requires details of the "planned grout curtain" and its effect on intercepting radionuclide seepage (p. 10-4). Please submit your plans for improving and lining the ditch around the tailings pile used to carry decant liquid from pond 1 to evaporation ponds.

5. There is a detailed quantitative discussion, including dollar figures, of the cost of mining, milling and severence taxes to the uranium industry (p. 10-5 to 10-15). It is stated that "contemplated regulatory actions...would require such an expenditure that continued operation would be questionable", but no dollar figures are cited. The previous statement would have credibility if accompanied by competent economic analysis which quantifies the cost to the uranium industry of present and proposed environmental regulations.

6. Please prepare a set of operational procedures for spigotting which will increase the distance of the spigot from the crest of the tailings pile to reduce the risk of spills.

CHAPTER 11: LONG TERM IMPACTS

11.1 Interim Stabilization and Reclamation

Measures to deal with interim stabilization have not been adequately addressed in the renewal report.

The statement of p. 5-7 of the renewal report that "Dale Gillette of NOAA indicates that wind velocities in excess of 100 mph would be necessary for significant dusting of...crusts" in the south half of the impoundment is insufficient. Documentation is insufficient to make the assumption that half of the tailings is "heavily crusted with gypsum" and therefore, not susceptible to wind dispersion (MILDOS assessement). Also necessary is a commitment from Kerr-McGee for weekly documented inspections to determine the effectiveness of the interim stabilization program, as well as monthly reporting to the EID.

11.2-11.4 Decommissing, Decontamination, Reclamation

Section 12-300H of the NM Radiation Protection Regulations states that "Licensees processing active and inactive waste-retention systems on the effective date of these regulations shall develop proposed or projected engineering plans and costs for stabilizing the licensee's waste-retention system". According to the definition in Part 12 of the Regulations, "stabilization means all measures necessary to minimize the transport of radioactive gases and particulates into the atmosphere and the erosion or long-term leaching to ground or subsurface waters of milling so as not to exceed the applicable standards found in Part 4".

The EID requires a detailed discussion of operating procedures to prevent the dispersion of tailings particulates by wind and water outside the tailings area prior to cessation of operations and final reclamation (interim stabilization). Engineering details and cost projections of Kerr-McGee's plan to accomplish this objective are necessary.

Decommissioning and reclamation details, both technical and economic, are inadequate (p. 11-2 and 11-3). The following details are necessary: Please

1. A technical and financial feasibility assessment on methods and costs of stabilizing tailings retention system(s). Prepare a scheme for covering the tailings to prevent sheet erosion and arroyo headcutting, and to reduce radon emanation and gamma radiation to applicable standards.

2. Provision for assuring control of the property on which the tailings will be stored and assuring ownership of the tailings.

3. Cost estimates should be provided for decommissioning of the mill site. Costs figures supplied in the renewal report ($12 million) are too general for adequate evaluation, and must be detailed into component costs.

Post-operation groundwater reclamation and monitoring should be included. Plans and associated costs should be provided for any necessary post-stabilization ground water measures including the following: 1) restoration of the quality of the water bearing zone to acceptable levels as dictated by applicable groundwater regulations; 2) runoff diversion contouring at the perimeter of the stabilized tailings piles; 3) a groundwater monitoring program of sufficient scope to demonstrate the success of items 1) and 2).

CHAPTER 12: ADMINISTRATION

12.1 Corporate Organization

Adequate

12.2 Qualifications of Key Personnel

Adequate

12.3 Training

Please document dates for the past five years when "periodic review sessions" (p. 12-8) of the Radiation Safety Training Program took place.

12.4 Security

Adequate

12.5 Radiation Safety Program

1. It is stated on p. 12-15 that "All employees working in the yellowcake areas shall endeavor to prevent yellowcake from entering the body or contaminating adjacent areas". Based on recent inspections of your facility and the observation of improper face mask use by the yellowcake packaging operator, the EID requires specifics of procedures for operators in the yellowcake areas.

   A more detailed description of the respirator program is needed. It is stated in Part D on p. 12-24 that "the proper respirator factor is used in determining yellowcake expsoures". Kerr-McGee can take no credit for reduction of exposure unless it has an approved respirator program. See NRC Reg. Guides 8.22, 8.15 and NUREG-0041.

2. Please specify "administrative action levels" for exposure to airborne radioactivity in accordance with the ALARA objective (P. 12-20). The action levels should be some fraction of allowable intakes and should be established for time-weighted exposures averaged over a week and for the concentration of airborne radioactivity in any air sample. If certain action levels are reached, an investigation should be performed by the RSO to ensure that levels are kept as low as reasonably achievable.

3. Please specify the LLD for each mill survey and the method of calculating U, Th, Ra, and Pb concentrations from gross alpha analyses (yellowcake and ore dust surveys, p. 12-20).

4. Please specify which samples are from area samples and which are from ~~personal air~~ samples (p. 12-21).

5. Please describe the "time studies", both in terms of purpose and methodology (p. 12-22).

6. A more detailed description of the bioassy program is needed. Refer to NRC Reg. Guide 8.22. An in vivo radiation measurement program should be established as outlined in the guide.

7. Please detail the Surface Contamination Survey described on p. 12-24.

8. The value specified by NRC in Draft Reg. Guide OH 710-4 specifies that the maximum total surface contamination level should not exceed 15,000 dpm alpha per 100 cm^2. Please document the choice of 25,000 dmp as well as the level chosen for beta/gamma survey levels (p. 12-25).

Attachments:

I Alternative Site Analysis Guidance
II Outline for Environmental Report on Backfilling
III Sample Format for Reporting Monitoring Data

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