



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

JUL 09 1980

DOCKET NO.: 40-8348

LICENSE NO.: SUA-1223

LICENSEE: Minerals Exploration Company (MEC)

FACILITY: Sweetwater County, Wyoming

SUBJECT: REVIEW OF ADDENDUM TO SYNOPSIS OF RESEARCH IN-SITU
URANIUM LEACHING PROJECT IN SUPPORT OF THE LICENSE
RENEWAL REQUEST OF JANUARY 25, 1980

REVIEWER: G. G. Eadie

Background

Minerals Exploration Company (MEC) was issued Source Material License No. SUA-1223 as revised in its entirety on July 14, 1977, to reflect their updated application, dated May 23, 1977. The leach mining was operated in the injection production mode for approximately 575 days, with a circulation rate ranging from 60 to 75 gpm. Operations were initiated in August 1976 and were terminated on March 23, 1978.

By letter dated March 23, 1978, MEC informed the NRC of their plans to commence the groundwater quality restoration phase of the leach testing project. Production (pump out) of the groundwater to effect the "sweep" phase was started on March 24, 1978. After 104 operating days in this mode, about 12 million gallons (36.83 acre-feet) of water was produced. All of the water was contained in a natural depression and created a wet area of about 500 feet long by 50 feet wide (0.57 acres). This restoration phase of the program was terminated about September 1978 when all of the pumps were pulled from the wells and the well field was not disturbed until the spring of 1979.

Restoration status of the wells was monitored by sampling in April, May, and July 1979, and the results of this testing were submitted to the NRC on October 26, 1979, in a report entitled, "Addendum to Synopsis of Research In-Situ Uranium Leaching Project, Minerals Exploration Company, Sweetwater County, Wyoming." This report also discussed the remaining decommissioning work to be completed at the project. On January 25, 1980, MEC submitted an application for timely renewal of Source Material License No. SUA-1223 to permit implementation of a decommissioning program culminating in the termination of the facility's Source Material License.

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Discussion

The following comments are provided concerning MEC's proposed reclamation plans as outlined in the original decommissioning report of October 26, 1979 which was summarized in the subject Addendum Report of January 15, 1980.

A. Water Quality

The MEC report indicated some baseline values established per well based on sampling results obtained from August 1976 through June 1977, a period prior to the initiation of the actual in-situ leaching tests. Some of the reported baseline values were then in excess of the Federal Drinking Water Standards (DWS) (e.g., L20-6A and L20-8A which had radium-226 concentrations of 290 and 36 pCi/l, respectively). However, the majority of the remaining wells (18 out of 21 wells) had no reported baseline radium values. Only three wells (L20-7A, LS-1, and LS-2) had baseline radium data and these wells showed values of 2.3, 3.1, and 3.1 pCi/l, respectively.

Restoration verification samples taken in July 1979 indicated that wells L20-2A, L20-3A, L20-5A, L20-6A, L20-7A, L20-8A, L29-1B, L29-2B, L29-5B, LS-1 were equal to or exceeded the 5 pCi/l radium-226 Drinking Water Standard. No sample was reported for LS-2. Therefore, based on the July 1979 sampling results, it appears that at least ten wells exhibited radium-226 concentrations in excess of the DWS. Also, as indicated in a letter from the Wyoming Department of Environmental Quality (DEQ) to T. Larson, dated April 22, 1980 (copy attached), wells L20-2A, L20-6A, LS-1, and L20-7A exceeded 15 pCi/l radium-226 levels. In addition, several wells (e.g., L20-2A, L29-2B and L20-5A) exceeded the proposed federal drinking water and agricultural standard of five mg/l for uranium. No sample result was reported for uranium for well LS-2.

Based on the number of wells which exceeded the DWS for either radium or uranium, it is concluded that further efforts should be initiated at this time by the licensee to resample the affected wells. A restoration plan should then be submitted for approval based on the more recent determinations. This conclusion is consistent with DEQ's requirement (see attached DEQ letter) that each well shall not exceed the Federal Drinking Water Standards; however, if baseline data indicates excessive concentrations, restoration should at least return the well to its original or premining baseline level.

B. Soil Sampling

Soil sampling was conducted over the "natural depression" area used to contain the water produced during the sweep phase of the groundwater restoration program. Soil sampling was performed by digging a small pit with a backhoe and then sampling the sidewalls over the top one-half foot, and then over intervals down to a total depth of

ten feet. Soil sampling locations A, B, and C appeared to be background locations; and only samples D, E, and F were within the "inundated area" of the natural depression area where the discharged water was allowed to evaporate/percolate. Only the surface sample (i.e., the top one-half foot) at sampling location D showed elevated radium-226 and uranium levels. All other samples appeared to be at background or baseline levels. (The slightly higher uranium levels from the 2.5 to 10 foot depth at sampling location A appeared to be a natural phenomenon since this particular location was not affected by the in-situ mining operations.)

Since the licensee has proposed to remove the top six inches of soil downstream from the outfall of the discharge pipe (as discussed in item 2, page 4 of Addendum Report), and also since sample D-1 in the inundated area had an elevated radium concentration, it is concluded that the licensee should complete a soil resampling program designed to evaluate the surface contamination levels (i.e., to a depth of 5 cm) within, and immediately surrounding, the inundated area after the top six inches of soil has been removed.

This resampling program should be conducted using a consistent surface soil sampling technique of known surface area and to a depth of 5 cm (e.g., a metal scoop of volume 10 cm wide by 10 cm long by 5 cm deep). Also, such a surface soil sampling program should be conducted over the entire affected area; therefore, it is recommended that at least ten samples should be collected. The suggested sampling locations should be within 150 cm of locations identified on Map A of the October 26, 1979 Addendum Report as: A2, C3, C4, C5, E5, D6, E8, F8, F9, and soil pit D. Soil sample analysis should be for radium-226 and uranium concentrations. As guidance on acceptable levels of residual radioactivity, it is noted that recent regulations promulgated by the U. S. Environmental Protection Agency for the cleanup of open lands contaminated with material from inactive uranium processing sites limit the radium-226 activity to less than 5 pCi/g in any 5 cm thickness of soils within one foot of the surface, or in any 15 cm thickness below one foot (40 CFR 192; Federal Register Notice, Vol. 45, No. 79, April 22, 1980).

C. Gamma Radiation Survey

The gamma radiation survey was performed in December 1978 and January 1979 on a grid of 45 points within the retention area. These results indicated no distinguishable gamma exposure rates above normal background fluctuations.

D. Proposed Reclamation Plan

The following specific comments are based on statements made in the January 15, 1980, Addendum Report as therein enumerated:

- (1) All facilities and equipment to be removed from the site shall be decontaminated per guidelines provided in the attached document, "Annex C - Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated November 1976.
- (2) After removal of the top six inches of soil downstream from the outfall of the discharge pipe, a soil sampling program, as discussed in B above, shall be completed within such area to verify effective decontamination of the area to acceptable level^c. i.e., less than 5 pCi/g of radium-226 in the top 5 cm.
- (3) If the two 10' x 30' metal buildings and the quonset type building are left at the site for storage facilities, appropriate radiological surveys shall be conducted as specified in the attached "Annex C."

Also, the results of the radiological surveys (performed in accordance with Annex C) completed on the lab and office trailers, fuel tanks, generators, and the generator buildings, which have already been removed, shall be provided for NRC review.

- (4) Prior to abandoning the freshwater well, a water sample shall be taken and analyzed for uranium, radium-226, TDS, pH, NH_4^+ and NO_3^- . All associated facilities shall be decontaminated per "Annex C" and results provided to the NRC for review. The proposed final status of this freshwater well, e.g., will the well be plugged?, shall be subject to Wyoming DEQ approval.
- (5) So long as the contents of the lined sump are left as is (i.e., covered and fenced in), an active source material license shall be maintained. Upon removal of the contents of the sump, and appropriate landfill and revegetation of the area, either a soil sampling or gamma radiation survey shall be conducted to verify cleanup. License termination shall be effected only after verification that the entire site has been restored to acceptable radiological conditions and subject to Wyoming DEQ's concurrence.

- (6) The disposal of all contaminated soils, material, or equipment in the Sweetwater mill tailings area is acceptable. However, any item to be released for unrestricted use must be surveyed in accordance with "Annex C" and all records provided to the NRC for review.

E. Recommended Actions

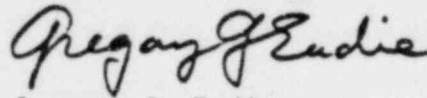
The NRC staff has concluded that the following actions must be satisfactorily completed by the licensee prior to termination of Source Material License SUA-1223:

1. The licensee shall conduct a water quality resampling and reevaluation program on at least five wells to be chosen from the following wells: L20-2A, L20-3A, L20-5A, L20-6A, L20-7A, L20-8A, L29-1B, L29-2B, L29-5B, LS-1 or LS-2. Every effort shall be made to sample wells located both upstream and downstream of the original production well and shall also include at least one injection well. Analysis shall include radium-226, uranium, pH, TDS, NH_4^+ and NO_3^- .
2. Prior to abandoning the freshwater well, a water sample shall be taken and analyzed for radium-226, uranium, TDS, pH, NH_4^+ , and NO_3^- . The proposed final status of this freshwater well shall be subject to NRC and Wyoming DEQ approval.
3. The licensee shall conduct a groundwater restoration program based on the results of the groundwater resampling program with the proposed restoration plan subject to the review and approval of the NRC and the Wyoming DEQ.
4. The licensee shall conduct a surface soil resampling program in the affected area after the removal of the top six inches of soil downstream of the outfall of the discharge pipe to the "inundated area." At least ten surface soil samples shall be collected from within 150 cm of locations identified on Map A of the January 15, 1980 Addendum Report as: A2, C3, C4, C5, E5, D6, E8, F8, F9, and soil pit D. Analysis shall be for radium-226 and uranium contents.
5. The licensee shall ensure that all facilities, equipment or materials to remain at, or to be removed from, the site shall be decontaminated as provided for in "Annex C - Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source, or Special Nuclear Material," dated November 1976.

Upon completion of site decommissioning activities, the licensee must report the results of these activities for approval by the NRC and WY DEQ and must submit an application for a major license amendment (with appropriate fee) requesting termination of license No. SUA-1223. The licensee is expected to keep WYDEQ informed of all programs and activities related to decommissioning of the site and termination of the Source Material License.

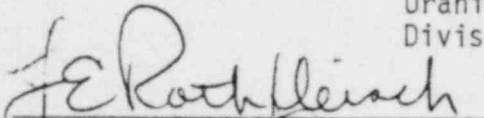

Based upon the above considerations and recommendations, it is recommended that Source Material License SUA-1223 be renewed in order to permit initiation of the final site restoration program. Since operations were terminated on March 23, 1978, Conditions 11 thru 19 of the original license, issued July 14, 1977, are not applicable during the period of site restoration and reclamation, and these conditions should be eliminated from the renewed license.

The proposed issuance of this license renewal and the recommended actions for ultimate license termination are not deemed to be major federal actions significantly affecting the quality of the human environment. Thus, pursuant to 10 CFR Parts 40 and 51, Section 51.5(d)(4), an environmental impact statement, negative declaration, or an environmental impact appraisal need not be prepared.



Gregory G. Eadie
Uranium Recovery Licensing Branch
Division of Waste Management

Approval:


J. E. Rothfleisch
for H. J. Miller, Section Leader

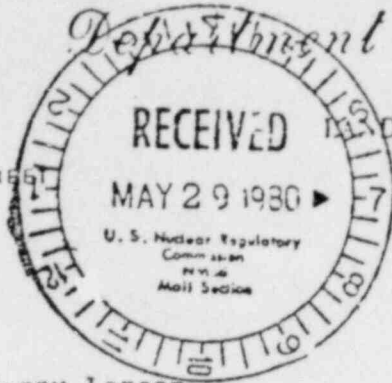
Enclosures:

1. Letter from DEQ to T. Larson dated 4/22/80
2. Annex C

cc: W. C. Ackermann, WY DEQ
R. Engelmann, WY DEQ

Department of Environmental Quality

933 MAIN STREET

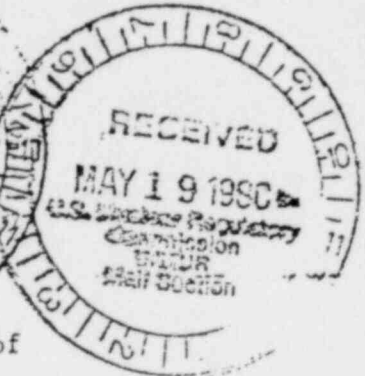
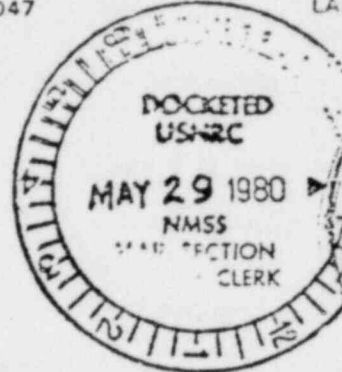


DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION - DISTRICT II

TELEPHONE 307-332-3047

LANDER, WYOMING 82520

April 22, 1980



Mr. Terry Larson
Minerals Exploration Co.,
1846 W. Grant Road
Tucson, Arizona 85705

RE: License to Explore No. 17, Aquifer Restoration; Demonstration of Compliance with new Chapter XIV Regulations ("In Situ Mining")

Dear Terry:

It is the opinion of the Division that Minerals Exploration is close to achieving restoration of the aquifer at the in situ site in Sections 20 and 29, T.24N., R. 93W. However, the latest analyses (summer of 1979) still show high U and Ra²²⁶ values for some of the wells. Wells 2A and 5/ exceeded the proposed federal drinking water and agricultural water standard of 5 mg/l for U and Wells 2A, 6A and 7A exceeded the federal standard of 15 pCi/l for Ra²²⁶. The aquifer must be restored to the point where these wells fall under these limits.

From our understanding of the processes used for the experimental work, time should return the aquifer to a reducing condition, in which case it is possible for the aquifer to clean itself up. This can be verified when NRC samples the wells again this spring or summer. At this time, DEQ would like to split samples for our own analysis. If the analyses are not favorable, additional restoration work may be required.

In addition to the above, I would like to remind you that we will need information regarding Minerals' compliance with the new Chapter XIV Regulations by no later than May 25, 1980. This information can be submitted to us in the form of a letter.

Sincerely,

800619005 / *[Signature]*

Rick Engelmenn
District Engineer

FEE EXEMPT

RE: mm

cc: R. Shaffer - Cheyenne DEQ-LQD
Margery Hulbert - Cheyenne DEQ-LQD

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add info

ANNEX C

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT
PRIOR TO RELEASE FOR UNRESTRICTED USE
OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE,
OR SPECIAL NUCLEAR MATERIAL

U. S. Nuclear Regulatory Commission
Division of Waste Management
Uranium Recovery Licensing Branch
Washington, D.C. 20555

NOVEMBER 1976

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The instructions in this guide in conjunction with Table I specify the radioactivity and radiation exposure rate limits which should be used in accomplishing the decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table I do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control will be considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.
2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table I prior to applying the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.
3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.
4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:
 - a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.
 - b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table I. A copy of the survey report shall be filed with the Division of Fuel Cycle and Material Safety, USNRC, Washington, D.C. 20555, and also the Director of the Regional Office of the Office of Inspection and Enforcement, USNRC, having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:
 - a. Identify the premises.
 - b. Show that reasonable effort has been made to eliminate residual contamination.
 - c. Describe the scope of the survey and general procedures followed.
 - d. State the findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

TABLE I
ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES ^a	AVERAGE ^{b c f}	MAXIMUM ^{b d f}	REMOVABLE ^{b e f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α /100 cm ²	15,000 dpm α /100 cm ²	1,000 dpm α /100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm ²	3,000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm $\beta\gamma$ /100 cm ²	15,000 dpm $\beta\gamma$ /100 cm ²	1,000 dpm $\beta\gamma$ /100 cm ²

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cMeasurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^dThe maximum contamination level applies to an area of not more than 100 cm².

TABLE I

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^eThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped. .

^fThe average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.