

Docket File 40-8857  
 LFMB/PDR/DCS  
 DBangart, RIV  
 Tolsen  
 GKonwinski  
 WDEQ (2)  
 JHaes, RCPD, WY  
 LLW Branch, WMLU  
 URFO r/f

40-8857/TT0/87/07/01/0

- 1 -

JUL 01 1987

URFO:TT0  
 Docket No. 40-8857  
 SUA-1511  
 040088570100

Everest Minerals Corporation  
 P.O. Box 1210  
 Glenrock, Wyoming 82637

Gentlemen:

Our office received no comments in response to the Draft Finding of No Significant Impact published in the Federal Register on May 12, 1987. It is our conclusion that the staff's environmental assessment of the Highland Uranium Project addressed all appropriate environmental concerns. As you are aware, a Final Finding of No Significant Impact has been prepared and published in the Federal Register.

Therefore, pursuant to Title 10, Code of Federal Regulations, Part 40, and in accordance with the staff's review of your application as documented by the Environmental Assessment and the Safety Evaluation Report, Source Material License SUA-1511 is being issued.

Please also note that under Source Material License SUA-1139, Exxon Coal and Minerals Company will be actively decontaminating, decommissioning and reclaiming the Expanded Pilot R&D ISL. It is our understanding that your proposed uranium recovery activities will not interfere with Exxon's efforts.

FOR THE NUCLEAR REGULATORY COMMISSION

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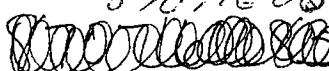
R. Dale Smith, Director  
 Uranium Recovery Field Office  
 Region IV

Enclosure: Source Material License SUA-1511

Case Closed: 040088570100

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FOR THE NUCLEAR REGULATORY COMMISSION

R. Dale Smith, Director  
Uranium Recovery Field Office  
Region IV

Enclosure: Source Material License SUA-1511

Case Closed: 040088570100

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DATE : 87/07/01	:	:	:	:	:	:

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*[Handwritten signature]*

## MATERIALS LICENSE

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

## Licensee

1. Everest Minerals Corporation

3. License number

SUA-1511

2. P.O. Box 1210  
Glenrock, Wyoming 82637

4. Expiration date July 1, 1993

5. Docket or  
Reference No. 40-88576. Byproduct, source, and/or  
special nuclear material7. Chemical and/or physical  
form8. Maximum amount that licensee  
may possess at any one time  
under this license

Uranium

Unspecified

Unlimited

9. The authorized place of use shall be the licensee's Highland project facilities in Converse County, Wyoming.

10. For use in accordance with statements, representations, and conditions contained in Sections 3 and 4 of the licensee renewal application dated December 1985, and the licensee's submittal dated June 12, 1987, except where superseded by license conditions below.

11. The licensee is hereby exempted from the requirements of Section 20.203(e)(2) of 10 CFR 20 for areas within the facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.203(e)(2) and with the words, "Any area within this facility may contain radioactive material."

12. Standard operating procedures (SOPs) shall be established for all operational process activities involving radioactive materials that are handled, processed, or stored. Standard operating procedures for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for nonoperational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An up-to-date copy of each written procedure shall be kept in the process area to which it applies.

13. All written procedures for both operational and nonoperational activities shall be reviewed and approved in writing by the RSO and the Corporate RSO before implementation and whenever a change in a procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the Corporate RSO shall perform a documented review of all existing operating procedures at least annually.

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14. The licensee shall be required to use a Radiation Work Permit (RWP) for all work or nonroutine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written operating procedure exists. All RWPs shall be accompanied by a breathing zone air sample or an applicable area air sample. The RWP shall be issued by the Highland Site RSO or his designate, qualified by way of specialized radiation protection training, and shall at least describe the following:
- A. The scope of the work to be performed
  - B. Any precautions necessary to reduce exposure to uranium and its daughters
  - C. The supplemental radiological monitoring and sampling necessary prior to, during, and following completion of the work
  - D. In addition, the RSO's review of all nonroutine activities shall be documented.
15. The licensee shall maintain effluent control systems as specified in Section 4.4.3 of the licensee's application with the following additions:
- A. Operations shall be immediately suspended in the dry/pack area of the facility if any of the emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.
  - B. The licensee shall, during all periods of yellowcake drying operations, assure that the scrubber is operating within the manufacturer's recommended ranges for water flow and air pressure differential necessary to achieve design performance. This shall be accomplished by either (1) performing and documenting checks of water flow and air pressure differential approximately every four (4) hours during operation, or (2) installing instrumentation which will signal an audible alarm if either water flow or air pressure differential fall below the manufacturer's recommended levels. If an audible alarm is used, its operation shall be checked and documented daily.
  - C. Air pressure differential gauges for other emission control equipment shall be read and the readings documented once per shift during operations.
16. Occupational exposure calculations shall be performed and documented within 1 week of the end of each regulatory compliance period as specified in 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2). Routine radon daughter and particulate samples shall be analyzed in a timely manner to allow exposure calculations to be performed in accordance with this condition. Nonroutine samples shall be analyzed and the results reviewed by the RSO within two (2) working days after sample collection.

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17. The licensee shall submit a detailed decommissioning plan to the USNRC at least twelve (12) months prior to planned final shutdown of mining operations.
18. The licensee shall perform and document a daily visual inspection of the waste solution disposal system. Should the inspection indicate that a discharge has taken place, the USNRC, Uranium Recovery Field Office, shall be notified by telephone within 48 hours.

A written report shall be filed with the USNRC, Uranium Recovery Field Office, within 30 days of first notifying the USNRC that a discharge occurred. This report shall include analytical data and describe the mitigative actions and the results of that action.

19. The licensee shall maintain an area within the restricted area boundary for storage of contaminated materials prior to their disposal. All contaminated wastes and evaporation pond residues shall be disposed at a licensed radioactive waste disposal site.
20. In addition to the inspection and audit program described in Section 4.7 of the application, the RSO or his designate shall document a daily walkthrough of the facility to determine if radiation control practices are being implemented.
21. The licensee shall submit to the USNRC, Uranium Recovery Field Office, a copy of the ALARA report as specified in Section 4.7 of the application within two (2) months of the end of the reporting period. The report shall also include a summary of the daily walkthrough inspections.
22. The licensee shall submit to the USNRC, Uranium Recovery Field Office, particulate and radon sampling locations as well as designated eating areas at least two (2) months prior to beginning uranium recovery. The locations, as a minimum, shall include the drying and packaging area and all worker occupied stations associated with the uranium recovery process. Radon daughters shall be sampled weekly, and particulates shall be sampled weekly in the dry/pack area and monthly in the process areas.
23. If any worker reaches or exceeds 25 percent of the maximum permissible exposure limits as specified in 10 CFR Part 20, based upon a calculated TWE for the week or the calendar quarter, dependent on the solubility of the material, the RSO shall initiate an investigation of the employee's work record and exposure history to identify the source of the exposure.

Necessary corrective measures shall be taken to ensure that future exposures are as low as is reasonably achievable. Records shall be maintained of these investigations and results furnished to the USNRC, Uranium Recovery Field Office, in the semiannual 10 CFR 40.65 report.

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24. In addition to the bioassay program discussed in Section 4.7.5 of the application, the licensee shall comply with the following:
- A. Anytime an action level of 15 ug/l uranium for urinalysis or 9 nCi of natural uranium for in vivo measurement is reached or exceeded, the licensee shall document the corrective actions which have been performed in accordance with Revision 1 of Regulatory Guide 8.22, dated January 1987. This documentation shall be submitted to the USNRC, Uranium Recovery Field Office, as part of the semiannual report required by 10 CFR 40.65.
  - B. Anytime an action level of 35 ug/l for two consecutive specimens or 130 ug/l uranium for one specimen for urinalysis or 16 nCi uranium for an in vivo measurement is reached or exceeded, the licensee shall document the corrective actions which have been performed in accordance with Revision 1 of Regulatory Guide 8.22. This documentation shall be submitted to the NRC, Uranium Recovery Field Office, within thirty (30) days of exceeding the action level.
  - C. All in vivo measurements shall be performed in accordance with the recommendations contained in Revision 1 of Regulatory Guide 8.22.
25. If employees do not shower prior to leaving the main process facility, they shall monitor themselves with an alpha survey instrument prior to exiting. Should the results of monitoring exceed an action level of 1000 dpm/100 cm<sup>2</sup>, employees shall decontaminate themselves to less than the action level. If decontamination cannot be accomplished, the employee shall report the incident to the RSO for investigation. Additionally, the RSO shall perform and document unannounced quarterly spot checks of employees leaving the process area.
26. All radiation monitoring, sampling, and detection equipment shall be recalibrated after each repair and as recommended by the manufacturer or at least semiannually. In addition, all radiation survey instruments shall be operationally checked with a radiation source before each use.
27. Any changes to the organizational chart as illustrated in Figure 4.1 of the application shall require approval by the USNRC in the form of a license amendment.
28. The licensee shall submit for USNRC review and approval, three (3) months prior to lixiviant injection, a written procedure for determining employee exposures.
29. The licensee shall, two (2) months prior to lixiviant injection, propose a surface contamination program which includes inspection frequency and utilizes and action level of 1000 dpm/100 cm<sup>2</sup> removable alpha. The licensee shall also prohibit eating in all but designated eating areas.

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30. The results of sampling, analyses, surveys and monitoring, and calibration of equipment and reports on audits and inspections, all meetings and training courses required by this license and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the USNRC regulations, all such documentation shall be maintained for a period of at least five (5) years.
31. Release of equipment or packages from the restricted area shall be in accordance with Attachment No. 1, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984.
32. The plant throughput shall not exceed a flow rate of 3200 gallons per minute.
33. Any significant changes in the process circuit as illustrated and described in Figure 3.2 of the renewal application shall require approval by the USNRC in the form of a license amendment.
34. The licensee shall sample irrigation fluid water quality monthly for pH, conductivity, TDS, Na, Ca, Mg, K, Cl, SO<sub>4</sub>, HCO<sub>3</sub>, As, B, Cr, Cu, Ni, Se, Zn, U<sub>3</sub>O<sub>8</sub>, and Ra-226. The results of this analysis shall be included with the semiannual environmental monitoring report.
35. The results of effluent and environmental monitoring as described in Section 7.3 of the Environmental Assessment shall be reported in accordance with 10 CFR 40, Section 40.65, with copies of the report sent to the USNRC, Uranium Recovery Field Office. The report shall also include injection rates, recovery rates, and injection manifold pressures.
36. Before engaging in any activity not previously assessed by the USNRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the USNRC in the form of a license amendment.
37. All liquid effluents from process buildings and other process waste streams, with the exception of sanitary wastes, shall be returned to the process circuit or discharged to the solution disposal system.
38. The licensee shall submit baseline water quality data for all mining areas two (2) months prior to lixiviant injection. The data shall at a minimum consist of
  - A. Two separate samples analyzed for the full suite of State of Wyoming, Department of Environmental Quality, Guideline 8, Appendix 1 parameters.

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B. Three separate samples analyzed for bicarbonate, chloride, electrical conductivity, radium, selenium, sulfate, total dissolved solids, uranium, iron, pH, arsenic and fluoride.

39. The licensee shall submit for review and approval, four (4) months prior to lixiviant injection, an aquifer testing proposal which will define the hydraulic characteristics of all areas to be mined.
40. The licensee shall submit for USNRC review and approval, one (1) month prior to lixiviant injection, Upper Control Limits (UCLs) for all monitor wells to be utilized for operational monitoring of an individual mining area. The UCLs will be defined as the baseline high established for the mine area plus 20 percent for sulfate, chloride, electrical conductivity, and bicarbonate.
41. The licensee shall utilize a carbon dioxide solution with an oxygen or hydrogen peroxide oxidant. Any variation from this combination shall require a license amendment.
42. Each radium settling pond shall have three (3) feet of freeboard required. The storage reservoir shall have four (4) feet of freeboard required.
43. The licensee shall perform and document a daily visual inspection of the radium settling ponds and the storage reservoir embankments, fences and liners, as well as measurements of pond freeboard and checks of the leak detection system. Should analyses indicate that the pond is leaking, the USNRC, Uranium Recovery Field Office, shall be notified by telephone within 48 hours of verification and the pond level shall be lowered by transferring its contents into the other cell. Water quality samples taken at the standpipe shall be analyzed for chloride and conductivity once every 7 days during the leak period for at least 2 weeks following repairs. Additionally, water samples collected at the settling basin standpipes shall be analyzed for the full suite of parameters as defined in WDEQ/LQD Guideline 8, Appendix 1, at least once per month during the leak period.

A written report shall be filed with the USNRC, Uranium Recovery Field Office, within 30 days of first notifying the USNRC that a leak exists. This report shall include analytical data and describe the mitigative actions and the results of that action.

44. The licensee shall notify the USNRC, Uranium Recovery Field Office, by telephone within 48 hours of any failure of a solution storage pond, any break or rupture of any pipeline or any similar failure of any other fluid or material conduit or storage facility which results in an uncontrolled release of radioactive materials, or of any unusual conditions which if not corrected could lead to such a failure. Such notification shall be followed, within 7 days, by submittal of a written report detailing the conditions leading to the failure or potential failure, corrective actions taken, and results achieved. This requirement is in addition to the requirements of 10 CFR Part 20.



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45. At least six (6) months prior to termination of uranium recovery in a mining area, the licensee shall submit to the USNRC, Uranium Recovery Field Office, in the form of a license amendment, a plan for ground-water restoration and post restoration monitoring. The goal of restoration shall be to return the ground-water quality, on a mining unit average, to baseline concentrations. Additionally, failure to restore ground-water quality to baseline concentrations shall require the licensee to submit a report describing the methodology actually implemented during the restoration attempt, predicted results of any subsequent restoration efforts to further lower ground-water concentrations and an evaluation of the impacts of the remaining ground-water contamination.
46. The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criterion 9, adequate to cover the estimated costs, if accomplished by a third party, for completion of the NRC-approved site closure plan including; above ground decommissioning and decontamination, the cost of offsite disposal of radioactive solid process or evaporation pond residues, and ground-water restoration as warranted. Within three (3) months of NRC approval of a revised closure plan and cost estimate, the licensee shall submit, for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved site closure plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within three (3) months of written NRC approval. Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criterion 9, shall be provided to the NRC at least three (3) months prior to the anniversary of the effective date of the existing surety instrument. If the NRC has not approved a proposed revision 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing arrangement, prior to expiration, for 1 year.

Along with each proposed revision or annual update, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency, changes in engineering plans, activities performed and any other conditions affecting estimated costs for site closure. The licensee shall also provide the NRC with copies of surety related correspondence submitted to the State, a copy of the State's surety review and the final approved surety arrangement. The licensee must also ensure that the surety, where authorized to be held by the State, expressly identifies the NRC related portion of the surety and covers the above ground decommissioning and decontamination, the cost of offsite disposal, soil and water sample analyses and ground-water restoration associated with the site. The basis for the cost estimate is the NRC approved site closure plan or the NRC approved revisions to the plan.

Prior to actual operation, Everest Minerals Corporation shall submit a surety instrument acceptable to the State of Wyoming and the NRC for an amount not less than \$2,233,000, in favor of the State of Wyoming, and shall be continuously maintained for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9,

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until a replacement is authorized by both the State and the NRC. The NRC's site closure estimate represents \$2,233,000 of this surety arrangement.

Attachment No. 3 "outlines the minimum considerations used by the NRC in the review of site closure estimates." Reclamation/decommissioning plans and annual updates should follow this outline.

47. The results of all effluent and environmental monitoring required by this license shall be reported in accordance with 10 CFR 40, Section 40.65 with copies of the report sent to the USNRC, Uranium Recovery Field Office. Monitoring data shall be reported in the format shown in the Attachment No. 2, "Sample Format for Reporting Monitoring Data."
48. The licensee shall implement the effluent and environmental monitoring program specified in Section No. 4 of the December 1985 renewal application, as well as Section No. 2 of the July 1986 Wastewater Land Disposal Application, and Section No. 7 of the April 1986, Wyoming Groundwater Pollution Control Permit for Subsurface Injection of Mineral Processing Waste. Additionally, the licensee shall implement an air particulate monitoring program external to the main processing facility in accordance with 10 CFR Part 20.

FOR THE NUCLEAR REGULATORY COMMISSION

Date:

JUL 01 1987

*R. Dale Smith*  
R. Dale Smith, Director  
Uranium Recovery Field Office  
Region IV

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FOR THE NUCLEAR REGULATORY COMMISSION

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Date: JUL 01 1987

R. Dale Smith, Director  
Uranium Recovery Field Office  
Region IV

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**GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT**

**PRIOR TO RELEASE FOR UNRESTRICTED USE**

**OR TERMINATION OF LICENSES FOR**

**BYPRODUCT OR SOURCE MATERIALS**

U. S. Nuclear Regulatory Commission  
Uranium Recovery Field Office  
Region IV  
Denver, Colorado 80225

SEPTEMBER 1984

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.

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 Uranium Recovery Field Office, Region IV, P.O. Box 25325, Denver, CO 80225. 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. The licensee shall not release the premises for unrestricted use without the written approval of the USNRC staff.

TABLE I

## ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES <sup>a</sup>	AVERAGE <sup>b c f</sup>	MAXIMUM <sup>b d f</sup>	REMOVABLE <sup>b e f</sup>
U-nat, U-235, U-238, and associated decay products	5,000 dpm /100 cm <sup>2</sup>	15,000 dpm /100 cm <sup>2</sup>	1,000 dpm /100 cm <sup>2</sup>
Transuranics, Ra-226, Ra-228, Th-230, Th-118, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm <sup>2</sup>	300 dpm/100 cm <sup>2</sup>	20 dpm/100 cm <sup>2</sup>
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm <sup>2</sup>	3,000 dpm/100 cm <sup>2</sup>	200 dpm/100 cm <sup>2</sup>
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm /100 cm <sup>2</sup>	15,000 dpm /100 cm <sup>2</sup>	1,000 dpm /100 cm <sup>2</sup>

<sup>a</sup>Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

<sup>b</sup>As 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.

<sup>c</sup>Measurements 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.

<sup>d</sup>The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

TABLE I

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<sup>e</sup>The amount of removable radioactive material per 100 cm<sup>2</sup> 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.

<sup>f</sup>The 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.



SAMPLE FORMAT FOR REPORTING

MONITORING DATA

REGULATORY GUIDE 4.14

TABLE 3<sup>(a)</sup>

## SAMPLE FORMAT FOR REPORTING MONITORING DATA

1. STACK SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Stack flow rate (m<sup>3</sup>/sec)

<u>Radionuclide</u>	<u>Concentration</u> <u>(<math>\mu</math>Ci/ml)</u>	<u>Error Estimate<sup>(b)</sup></u> <u>(<math>\mu</math>Ci/ml)</u>	<u>Release Rate</u> <u>(Ci/qr)</u>	<u>Error Estimate</u> <u>(Ci/qr)</u>	<u>LLD<sup>(c)</sup></u> <u>(<math>\mu</math>Ci/ml)</u>	<u>% MPC<sup>(c)</sup></u>
U-nat						
Th-230						
Ra-226						
Pb-210						

2. AIR SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection

<u>Radionuclide</u>	<u>Concentration</u> <u>(<math>\mu</math>Ci/ml)</u>	<u>Error Estimate</u> <u>(<math>\mu</math>Ci/ml)</u>	<u>LLD</u> <u>(<math>\mu</math>Ci/ml)</u>	<u>% MPC</u>
U-nat				
Th-230				
Ra-226				
Pb-210				
Rn-222				

<sup>(a)</sup> This table illustrates format only. It is not a complete list of data to be reported. (See text of guide and Tables 1 and 2.)

<sup>(b)</sup> Error estimate should be calculated at 95% uncertainty level, based on all sources of random error, not merely counting error. Significant systematic error should be reported separately. See Sections 6.1, 7.1.4, and 7.3.

<sup>(c)</sup> All calculations of lower limits of detection (LLD) and percentages of maximum permissible concentration (MPC) should be included as supplemental information.

TABLE 3 (Continued)

## SAMPLE FORMAT FOR REPORTING MONITORING DATA

3. LIQUID SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Type of sample (for example: surface, ground, drinking, stock, or irrigation)

<u>Radionuclide</u>	<u>Concentration (<math>\mu\text{Ci}/\text{ml}</math>)</u>	<u>Error Estimate (<math>\mu\text{Ci}/\text{ml}</math>)</u>	<u>LLD (<math>\mu\text{Ci}/\text{ml}</math>)</u>
U-nat (dissolved)			
U-nat (suspended) <sup>(d)</sup>			
Th-230 (dissolved)			
Th-230 (suspended) <sup>(d)</sup>			
Ra-226 (dissolved)			
Ra-226 (suspended) <sup>(d)</sup>			
Pb-210 (dissolved)			
Pb-210 (suspended) <sup>(d)</sup>			
Po-210 (dissolved)			
Po-210 (suspended) <sup>(d)</sup>			

4. VEGETATION, FOOD, AND FISH SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Type of sample and portion analyzed

<u>Radionuclide</u>	<u>Concentration (<math>\mu\text{Ci}/\text{kg wet}</math>)</u>	<u>Error Estimate (<math>\mu\text{Ci}/\text{kg}</math>)</u>	<u>LLD (<math>\mu\text{Ci}/\text{kg}</math>)</u>
U-nat			
Th-230			
Ra-226			
Pb-210			
Po-210			

<sup>(d)</sup> Not all samples must be analyzed for suspended radionuclides. See Sections 1.2 and 2.2 of this guide.

TABLE 3 (Continued)

## SAMPLE FORMAT FOR REPORTING MONITORING DATA

5. SOIL AND SEDIMENT SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Type of sample and portion analyzed

<u>Radionuclide</u>	<u>Concentration</u> ( $\mu\text{Ci/g}$ )	<u>Error Estimate</u> ( $\mu\text{Ci/g}$ )	<u>LLD</u> ( $\mu\text{Ci/g}$ )
U-nat			
Th-230			
Ra-226			
Pb-210			
Po-210			

6. DIRECT RADIATION MEASUREMENTS

For each measurement, report the dates covered by the measurement and the following information:

<u>Location</u>	<u>Exposure Rate</u> ( $\text{mR/hr}$ )	<u>Error Estimate</u> ( $\text{mR/hr}$ )
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7. RADON FLUX MEASUREMENTS

For each measurement, report the dates covered by the measurement and the following information:

<u>Location</u>	<u>Flux</u> ( $\text{pCi/m}^2\text{-sec}$ )	<u>Error Estimate</u> ( $\text{pCi/m}^2\text{-sec}$ )
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RECOMMENDED OUTLINE FOR SITE SPECIFIC RECLAMATION  
AND STABILIZATION COST ESTIMATES

As required under Criteria 9 and 10 of 10 CFR Part 40, Appendix A, the licensee shall supply sufficient information for NRC to verify that the amount of coverage provided by the financial assurance accounts for all necessary activities required under the license to allow the license to be terminated. Cost estimates for the following activities (where applicable) should be submitted to NRC with the initial license application or reclamation plan and updated annually as specified in the license. Cost estimates must be calculated on the basis of completion of all activities by a third party.

Detailed Cost Information Breakdown for Mills and In-Situ Facilities

The detailed cost information necessary to verify the cost estimates for the above categories of closure work are described in the following outline.

I. Facility Decommissioning

Mill Site Decommissioning. - Dismantling, decontamination and/or disposal of all structures and equipment. - Excavation and burial of contaminated earth (in vicinity of mill site, ore storage area, access roads around the perimeter of the tailings disposal site, evaporation pond residues, etc.) - Reclamation of disturbed areas from the above clean up activities.

In Situ Facility Decommissioning - This includes dismantling, decontamination and disposal of all structures and equipment. This may be accomplished in two phases. In the first phase, only the equipment not used for ground-water restoration is removed. The remaining equipment would be removed in a second phase, when ground-water restoration and well plugging is complete. The buildings used for the in-situ operations may be decontaminated and released for unrestricted use.

A. Salvageable building and equipment decontamination (list). For each building or pieces of equipment listed, the following data should be provided.

1. Labor for dismantling and decontamination

a. Person-hours

disposal site. The quantity of material to be removed and the distance to the disposal site are important considerations in determining the costs of disposal.

Reclamation - This entails recontouring the well fields and evaporation ponds and placing top soil or other materials acceptable to NRC. This may also include revegetation.

1. Removal

- a. Area, depth and quantity of material to be removed (area, feet and cubic yard--or size of liner if appropriate)
- b. Unit cost (include excavation, loading, transportation and deposition)
- c. Total cost

2. Revegetation

- a. Area to be revegetated (acre)
- b. Unit cost (include fill material replacing topsoil, and revegetation cost)
- c. Total cost

## II. Ground Water Restoration and Well Plugging

Mill Site Ground Water Restoration - A major concern in the termination of a mill license is the restoration of aquifers that have been contaminated by the operation of a tailings impoundment. As this concern is added to the site-specific reclamation plans, the licensee should include these costs in their surety until the licensee is released from further ground water restoration activities.

In Situ Site Ground Water Restoration - A major concern in closing an in situ facility is ground water restoration. In most cases, this consists of ground water sweeping and water treatment with partial reinjection. The water treatment equipment used during the uranium recovery phase of the operation is generally suitable for the restoration phase. The capital cost of this equipment is usually absorbed during the initial stages of the operation leaving only the costs of operation, maintenance and replacement filters for the restoration phase.

- A. Method of restoration
- B. Volume of aquifer required to be restored - area and thickness of aquifer -- number of required pumping cycles -- cycling time
- C. Equipment associated with aquifer restoration (e.g., RO unit)
- D. Verification sample analysis
  - 1. number of samples
  - 2. unit cost for sample collection and analysis (per sample)
  - 3. total cost for verification sample analysis
- E. Well plugging
  - 1. number of drill holes to be plugged
  - 2. depth and size of each drill hole
  - 3. material to be used for plugging--include acquisition, transportation, and plugging
  - 4. Total cost for well plugging
- F. Total cost for ground-water restoration

### III. Interim Stabilization of Tailings During The Drying Out Phase

Interim Stabilization of the Tailings During Drying - Placement of soil, chemical spraying or other control measures over dry tailings to minimize dusting or dispersal of particulates.

- A. Drying time
- B. Area of dry exposed tailings for each year during the drying period (acres for \_\_\_\_ years)
- C. Unit cost for placement of soil, chemical spraying or other methods (Price per acre) (Include material, labor, and equipment)
- D. Cost for an enhanced evaporation system, where included in the reclamation and stabilization plan. - Capital costs and operating costs

E. Total cost of interim tailings stabilization

IV. Tailings Impoundment Area Reclamation

Tailings Impoundment Area Reclamation - Earthwork necessary to recontour the tailings in order to prepare for cover placement. - Placement of cover materials - Revegetation and/or placement of riprap. - Construction of diversion channels or other measures required for long-term stability.

- A. Area and quantity of cover material (acres, cubic yards)
- B. Location and size of borrow area that serves as a source of cover material. (Include distance from borrow area to tailings impoundment and quantity of material from each borrow area)
- C. Unit cost for each type of material (include excavation, loading, transportation, depositing, spreading, and compacting)
- D. Estimated costs for revegetation of tailings pile, if applicable, and borrow areas
- E. Estimated costs for riprap/rock armor, if applicable.
- F. Estimated costs for special engineered features - diversion channels, spillways, etc. (in unit costs)
- G. Estimated costs for a quality assurance program including field and laboratory testing to assure that the "as built" system conforms to design specifications.
- H. Total cost

V. Radiological Survey

Radiological Survey - Gamma surveys and soil samples for radium in areas to be released for unrestricted use. Soils around the mill building, tailings piles, well field, evaporation ponds and process buildings should be analyzed for radium content. A gamma survey of all areas should be made prior to release for unrestricted use. All equipment released for unrestricted use should be surveyed and records maintained prior to release.

- A. Soil samples for radium
- B. Decommissioning equipment and building smear samples



The licensee should include a contingency amount to the total cost estimate for the final site closure. The staff currently considers a 15% contingency to be an acceptable minimum amount.

#### VIII. Adjustments To Surety Amounts

The licensee is required by 10 CFR 40, Appendix A, Criteria 9 and 10 to adjust their cost estimates annually to account for inflation and changes in reclamation plans.

##### ° Adjustments for Inflation

- a. The licensee should submit a revised surety incorporating adjustments to the cost estimates for inflation two (2) months prior to each anniversary of the date on which the first reclamation plan and cost estimate was approved. The adjustment should be made using the inflation rate indicated by the change in the Consumer Price Index published by the U.S. Department of Labor, Bureau of Labor Statistics.
- b. Proposed revisions to reclamation plans must be thoroughly documented and cost estimates and the basis for cost estimates detailed and presented to the NRC for consideration.

##### ° Changes in Plans

- a. Changes in the process such as size or method of operation.
- b. Licensee initiated changes in reclamation plans.
- c. Adjustments to reclamation plans required by the NRC.
- d. Proposed revisions to reclamation plans must be thoroughly documented and cost estimates and the basis for cost estimates detailed for NRC review and approval. Where a licensee is authorized by the NRC to secure a surety arrangement with the state, no reduction to the surety amount shall be initiated without prior NRC approval.