



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

February 10, 2000

Mr. Harold R. Roberts, Executive Vice President  
International Uranium (IUSA) Corporation  
Independence Plaza, Suite 950  
1050 Seventeenth Street  
Denver, CO 80265

**SUBJECT: AMENDMENT 13 TO MATERIALS LICENSE SUA-1358 -- RECLAMATION PLAN  
AT THE WHITE MESA URANIUM MILL IN BLANDING, UTAH**

Dear Mr. Roberts:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the amendment request regarding the Reclamation Plan at your White Mesa uranium mill site in Blanding, Utah, by your letter dated February 28, 1997, and amended by your letters of December 16, 1997, September 11, 1998, October 23, 1998, May 26, 1999, and June 22, 1999. The staff has determined that the reclamation plan described in the submittals is acceptable. A modification of License Condition 12.2 has been made to require inclusion of a detailed Quality Assurance Plan with the Decommissioning Plan that must be submitted to the NRC at least 12 months prior to planned final shutdown of mill operations. This modification was discussed with you on December 30, 1999. Details of the amendment request review for the Reclamation Plan are discussed in the staff's Technical Evaluation Report (TER) (Enclosure 1).

An Environmental Assessment (Enclosure 2) of the reclamation plan was performed by the NRC as required by 10 CFR Part 51. A Finding of No Significant Impact was issued by Federal Register Notice on January 4, 2000 (Volume 65, Number 2). Also, an environmental report by the licensee was not required pursuant to 10 CFR Part 51.60(b)(2).

We have also completed our review of your request to modify the current surety from \$11,469,859 to \$9,682,467 as requested in your letter dated May 26, 1999. These revised estimates reflect your current approved reclamation plan. We provided comments to your original request in our letter dated October 21, 1999. In your November 9, 1999, letter, you adequately addressed our concerns. Therefore, the requested surety amount of \$9,682,467 is approved. Details of the surety review are discussed in the staff's TER (Enclosure 3). The enclosed license (Enclosure 4) is being reissued to incorporate the above modifications. All other conditions of this license shall remain in effect and are unchanged. Please provide the revised bond.

1000 02 10 10:00 AM

DFO3

H. Roberts

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If you have any questions regarding this letter or the enclosures, please contact William von Till, the NRC Project Manager for the White Mesa mill, at (301) 415-6251.

Sincerely,

Original Signed By

Thomas H. Essig, Chief  
Uranium Recovery and  
Low-Level Waste Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 40-8681  
SUA-1358, Amendment No. 13

Enclosures:

1. Technical Evaluation Report -  
Reclamation Plan
2. Environmental Assessment
3. Technical Evaluation Report -  
Surety Review
4. Amended Source Material License  
SUA-1358

cc: W. Sinclair, UT  
C. Crist, Ute Mountain Ute Tribe EPA  
Terry Brown, US EPA Region VIII

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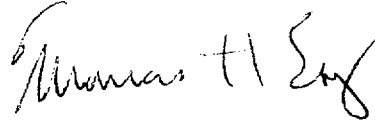
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(Date)

H. Roberts

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If you have any questions regarding this letter or the enclosures, please contact William von Till, the NRC Project Manager for the White Mesa mill, at (301) 415-6251.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas H. Essig". The signature is fluid and cursive, with the first name "Thomas" being more prominent.

Thomas H. Essig, Chief  
Uranium Recovery and  
Low-Level Waste Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 40-8681  
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cc: W. Sinclair, UT  
C. Crist, Ute Mountain Ute Tribe EPA  
Terry Brown, U.S. EPA Region VIII

ENCLOSURE 1

**TECHNICAL EVALUATION REPORT  
RECLAMATION PLAN FOR THE WHITE MESA URANIUM MILL AND TAILINGS SITE  
BLANDING, UTAH**

**DATE:** January 5, 2000

**DOCKET NO.** 40-8681

**LICENSE NO.** SUA-1358

**LICENSEE:** International Uranium (IUSA) Corporation

**FACILITY:** White Mesa

**PROJECT MANAGER:** William von Till

**TECHNICAL REVIEWERS:** Daniel Rom, Ted Johnson, and John Lusher (NRC)  
Center for Nuclear Waste Regulatory Analyses

**SUMMARY AND CONCLUSIONS:**

On February 28, 1997, International Uranium Corporation (IUC) submitted a site reclamation plan (RP) for the White Mesa Uranium Mill. On August 19, 1997, and on December 5, 1997, NRC issued responses to IUC's RP which identified some omissions or deficiencies. On December 16, 1997, IUC issued responses to NRC's comments. On July 17, 1998, NRC submitted a Request for Additional Information on the RP. A Rock Sampling Plan was submitted on September 11, 1998, and on October 23, 1998, IUC advised NRC that alternate rock source sites were under investigation.

On March 24, 1999, Daniel Rom (NMSS) met with IUC at the White Mesa Mill in Blanding, Utah, at which time discussion was held regarding appropriate responses to remaining RP open issues. On May 26, 1999, IUC submitted Revision 2.0 to the RP, and on June 22, 1999, IUC submitted Attachment A to Revision 2.0, addressing the remaining construction and engineering open issues. Based on review of these submittals, the staff has found the RP to be acceptable in accordance with 10 CFR Part 40 Appendix A.

**BACKGROUND:**

The mill is currently in operation and reclamation will occur at some time in the future. The objective of the RP will be to stabilize the tailings for at least 1,000 years and ensure that the radon emanation from the tailings will not exceed 20 pCi/M<sup>2</sup>/s. The licensee proposes to reclaim Cells 1, 2, 3, and 4A; the mill buildings and equipment; on-site contaminated areas; and off-site contaminated areas. The reclamation will be accomplished by placing mill decommissioning debris and other contaminated materials within Cells 2 and 3. Cells 2 and 3 will be covered, and runoff will be diverted from the vicinity. Finally, the borrow sources will be reclaimed.

In order to reclaim the site in accordance with requirements, the licensee has submitted a plan that outlines specific measures that will be used. In particular, aspects of geotechnical

engineering, earth construction, surface water management, and health physics are addressed. The RP, Rev 2.0, describes the methods the licensee proposes in order to:

- Attenuate radon flux to an acceptable level.
- Minimize infiltration into the reclaimed tailings cells.
- Maintain a design life of up to 1000 years to the extent reasonably achievable, and in any case, for at least 200 years; and
- Provide long-term slope stability and geomorphic durability to withstand erosional forces of wind, the probable maximum flood event, and a horizontal ground acceleration of 0.1g due to seismic events.

The facilities to be reclaimed include the following:

- Cell 1 (evaporative), Cells 2 and 3 (tailings), and Cell 4A (not currently used).
- Mill buildings and equipment.
- On-site contaminated areas.
- Off-site contaminated areas (i.e., potential areas affected by windblown tailings).

The reclamation of the above facilities will include the following:

- Placement of materials and debris from the mill decommissioning in tailings Cells 2 and 3.
- Placement of contaminated soils, crystals, and synthetic liner material from Cell 1 in tailings Cells 2 and 3.
- Placement of contaminated soils, crystals, and synthetic liner material from Cell 4A in tailings Cells 2 and 3.
- Placement of an engineered multi-layer cover on Cells 2 and 3.
- Construction of runoff control and diversion channels as necessary.
- Reconditioning of mill and ancillary areas.
- Reclamation of borrow sources.

## **TECHNICAL EVALUATION:**

### **1.0 INTRODUCTION:**

International Uranium (USA) Corporation's (IUC) uranium mill site is located in San Juan County, Utah, approximately 8 kilometers (km) (5 miles) south of Blanding, Utah. The area surrounding the facility is in an arid climate with an annual precipitation of 30 centimeters (cm) (12 inches) and a mean temperature of 9 degrees centigrade (50 degrees Fahrenheit). Runoff in the project area is directed by the general surface topography, either westward into Westwater Creek, eastward into Corral Creek, or to the south into an unnamed branch of Cottonwood Wash. The San Juan River, a major tributary to the Colorado River, is located approximately 29 km (18 miles) south of the site.

The IUC site is licensed by the U.S. Nuclear Regulatory Commission (NRC) under Materials License SUA-1358 to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the licensee's milling operations, as well as other source material from multiple locations. Some of these locations include material from Formerly Utilized Sites Remedial Action Program (FUSRAP) sites managed by the U.S. Army Corps of Engineers (USACE). These materials generally have similar chemical, physical, and radiological composition to conventional mill tailings.

The White Mesa uranium mill was developed in the late 1970's by Energy Fuels Nuclear, Inc. (EFN) as an outlet for the many small mines that are located in the Colorado Plateau. After about 2½ years, the mill ceased ore processing and entered a total shutdown phase. In 1984, a majority ownership interest was acquired by Union Carbide Corporation's (UCC) Metals Division, which later became Umetco Minerals Corporation (Umetco), a wholly owned subsidiary of UCC. In May of 1997, IUC purchased the assets of EFN and is the current owner and operator of the facility. The mill has gone through operation and shutdown periods throughout the 1980s and 1990s. The current license specifies a maximum production rate of 4380 tons of yellowcake per year. The facility is currently in operation, and since early 1997, the mill has processed 58,403 tons of ore from several additional alternate feed stocks. Alternate feed materials consist of uranium-bearing residues from uranium-processing facilities or other metal-processing facilities, as well as environmental media (soils) contaminated with natural uranium (e.g. FUSRAP materials). From inception through April of 1999, the mill has processed a total of 3,815,577 tons of ore.

The tailings facilities currently consist of four lined cells with leak detection systems (LDS) and a groundwater detection monitoring program consisting of six monitoring wells. These wells are sampled quarterly for chloride, potassium, nickel, and uranium. These constituents are good indicator parameters to detect potential groundwater impact. Currently, there is no indication of groundwater impact from the tailing cells based on the groundwater sampling. Environmental monitoring consists of groundwater and surface water sampling, gamma radiation measurements, soil, and vegetation sampling.

Staff review focused in the areas of radiological, geotechnical, and surface water hydrology and erosion protection. The following sections contain detailed evaluations by discipline.

## **2.0 RADIOLOGICAL EVALUATION:**

### **2.1 Introduction**

The staff has completed its review of the processing site cleanup plan for soil and structures, and radiation safety controls and monitoring, as part of the reclamation plan review for the IUC-White Mesa uranium milling facility. This review included an evaluation using the review procedures in the Draft Standard Review Plan (SRP) for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act (NUREG-1620) Sections 5.2.2, 5.3.3, and the acceptance criteria outlined in SRP Sections 5.2.3 and 5.3.4.

Based on the information provided in the RP and the detailed review conducted of the processing site cleanup plan for the IUC White Mesa uranium milling facility, the staff has concluded that the plan is acceptable and is in compliance with 10 CFR 40, Appendix A, Criterion 6(6). This criterion requires that the longevity and control of radon release apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters, which, as a result of byproduct material does not exceed the background levels by more than (1) 5 picocuries per gram (pCi/g) of Ra-226 averaged over the first 15 centimeters (cm) below the surface; and (2) 15 pCi/g of Ra-226 averaged over 15 cm thick layers more than 15 cm below the surface. Also, the cleanup of other radionuclides in soil and the surface activity on structures equipment would meet NRC guidance levels.

Additionally, the RP indicates that the current radiation protection program that is in place for monitoring of exposures to employees, will remain in effect throughout the time period during which tailings cell reclamation, mill decontamination, and cleanup of windblown contamination are conducted. This radiation protection program meets the NRC requirements of 10 CFR Part 20 and implements requirements that achieve occupational and public doses that are as low as reasonably achievable (ALARA).

### **2.2 Processing Site Cleanup**

The licensee has provided an acceptable processing site cleanup plan, including: (1) appropriately substantiated site characterization data or plans in order to determine contaminated areas; (2) plans to cleanup and place within the disposal cell all materials that are in excess of the standards and guidelines; (3) plans for post reclamation survey and sampling for verification that reclaimed areas meet radium concentration limits; (4) plans to clean surface contamination of equipment and structures that are to be released for unrestricted use to acceptable levels; (5) plans to cleanup residual uranium or thorium; and (6) plans to measure gamma levels in habitable buildings onsite to satisfy NRC guidelines.

### **2.3 Radiation Safety Controls and Monitoring**

The licensee indicated in the RP that it would use the current NRC-approved radiation protection and environmental monitoring programs for worker and public protection to maintain ALARA during the tailings cell reclamation, mill decontamination and cleanup of windblown contamination.



The licensee did not provide a Quality Assurance (QA) program for the radiological survey and sampling program. IUC did indicate in the RP submittal that 6 months prior to the beginning of decommissioning activities that it would submit a detailed QA plan for NRC approval. A requirement to submit the QA plan will be inserted into a license condition.

### **3.0 GEOTECHNICAL STABILITY**

#### **3.1 Introduction**

This section presents the results of the NRC staff review of the geotechnical engineering aspects of the reclamation action proposed at the White Mesa, Utah, Title II Project site. This review included an evaluation using the review procedures in the Draft Standard Review Plan (SRP) for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act (NUREG-1620). The action consists of the reclamation of Cells 1, 2, 3, and 4A; the mill buildings and equipment; on-site contaminated areas; and off-site contaminated areas. The reclamation will include placement of mill decommissioning debris and other contaminated materials within Cells 2 and 3. Cells 2 and 3 will be covered, and runoff diverted from the vicinity. Finally, the borrow sources will be reclaimed.

The geotechnical engineering aspects reviewed included: (1) information related to the disposal and borrow sites; (2) materials associated with the reclamation action, including the excavated materials, tailings, and other contaminated materials; and (3) design and construction details related to the disposal cells and covers.

#### **3.2 Site and Material Characterization**

##### **3.2.1 Site Description**

The White Mesa Uranium Mill site is situated on White Mesa, a flat area bounded on the east by Corral Canyon, to the west by Westwater Creek, and to the south by Cottonwood Canyon. The site includes the uranium processing mill and four engineered, lined tailings disposal cells.

The tailings facilities at White Mesa consist of four cells:

Cell 1, constructed with a 30-millimeter PVC earthen-covered liner, is used for the evaporation of process solution.

Cell 2, constructed with a 30-millimeter PVC earthen-covered liner, is used for the storage of barren tailings sand.

Cell 3, constructed with a 30-millimeter PVC earthen-covered liner, is used for the storage of barren tailings sands and solutions.

Cell 4A, constructed with a 40-millimeter HDPE liner, is currently not used.

The estimated design capacity of Cells 2, 3, and 4A is approximately six million cubic yards. The tailings typically contain 30 percent moisture by weight, have an in-place dry density of 86.3

pounds per cubic foot (Cell 2), have a size distribution with a predominant-325 mesh size fraction, and have a high acid and flocculant content.

### 3.2.2 Geotechnical Investigations

#### 3.2.2.1 Disposal Cell Areas

Several subsurface investigations have been performed at the White Mesa processing site in order to characterize the tailings and contaminated materials for geotechnical engineering and radiological aspects of the closure. Chen & Associates, Dames & Moore, D'Appolonia Consulting Engineers, Inc., Titan Environmental Corporation, and Woodward-Clyde Consultants have performed geotechnical engineering services for the licensee and its predecessors dating to 1978. In 1999, additional material characterization was performed by the licensee.

Exploration to depth within portions of the ponds was not previously performed due to inaccessibility. To further characterize the tailings, and to evaluate the cells with respect to stability and potential settlement, the licensee has performed analyses based on other direct and indirect methods. To confirm the validity and conservativeness of the assumptions, settlement will be monitored and evaluated with respect to the time-rate of tailings consolidation.

#### 3.2.2.2 Borrow Areas

Proposed cover soils from on-site stockpiles and from nearby Section 16 (on-site) were evaluated by the licensee and its consultants. The Section 16 borrow area is located about three miles south of the existing cells. Numerous classification, gradation, and moisture-density relation tests were conducted to ascertain the suitability of the proposed cover soils.

#### 3.2.2.3 Geotechnical Investigation Conclusions

NRC staff has reviewed the subsurface exploration data presented by the licensee. The staff concludes that the geotechnical investigations conducted at the disposal and borrow sites satisfactorily establish the stratigraphy to the extent possible, that the explorations are in general conformance with applicable provisions of Chapter 2 of the NRC SRP, and that they are adequate to support the assessment of the geotechnical stability of the stabilized tailings and contaminated material in the disposal cells. In cases where the stratigraphy could not be determined directly, appropriate estimates were obtained by reviewing survey and other available records.

### 3.2.3 Testing Program

Geotechnical engineering characteristics and strength parameters for the tailings, contaminated soil, and natural soils, have been determined by the licensee, through laboratory analysis of samples from the investigations. Laboratory testing by Titan Environmental and the licensee included moisture-density (Proctor) determinations, gradation analyses, specific gravity, and Atterberg Limits. The staff has reviewed the geotechnical engineering testing program for the White Mesa site. Staff concludes that the tests identified above were conducted on representative materials.

The licensee's laboratory testing of the Section 16 borrow material included gradation, Atterberg Limits, moisture-density determination, and specific gravity. The licensee stated that additional tests will be made on the borrow soils during construction to confirm continued conformance with the project specifications.

Proposed cover materials were evaluated for durability. Testing included Los Angeles Abrasion, sodium sulfate soundness, absorption, and specific gravity tests. Further discussion regarding the tests on proposed cover materials is presented in Section 4.

On the basis of the field exploration and laboratory testing programs, the Licensee concluded that the proposed borrow sites contain suitable quantities of material acceptable for the proposed radon barrier.

Based on the review, NRC staff finds that the number and type of tests conducted in the testing program were appropriate for the support of the engineering analyses performed and that the scope of the testing program and the utilization of the test results to define the material properties are in general agreement with the applicable provisions of the SRP (NRC, 1999).

### 3.3 Geotechnical Engineering Evaluation

#### 3.3.1 Slope Stability

The evaluation of the geotechnical stability of the slopes of the disposal cells containing stabilized tailings and other contaminated materials is presented in this section. The staff has reviewed the exploration data, test results, slope characteristics, and methods of analyses pertinent to the slope stability aspects of the reclamation plan. The analyzed cross-sections with 5 horizontal to 3 vertical side slopes have been compared with the exploratory records and design details. The staff finds that the characteristics of the slopes have been satisfactorily represented and that the most critical slope sections have been considered for stability analyses.

Soil parameters for the various materials in the disposal cell slope have been adequately established by appropriate testing of representative materials. Soil parameter values have been assigned to other layers (riprap, gravel bedding, bedrock, etc.) by the licensee, on the basis of data obtained from geotechnical explorations at the site and data published in the literature. The staff finds that the determinations of these parameters for slope stability evaluation follow conventional geotechnical engineering practice, and are also in compliance with the applicable provisions of Chapter 2 of the SRP. The staff also finds that an appropriate method of stability analysis (Bishop method) has been employed by the licensee to address the likely extreme adverse conditions to which the slope might be subjected, for the static case.

Factors of safety against failure of the slope for static and seismic loading conditions have been determined by the licensee. A factor of safety for the static loading conditions was calculated by the licensee to be 2.91, which is in excess of the minimum required value of 1.5.

The seismic stability of the slope was investigated by the licensee using the pseudo-static method of analysis, with a horizontal seismic coefficient of 0.10g. The value of the seismic coefficient was selected by considering the boundary value discussed in a report to the NRC by

Lawrence Livermore National Laboratory in 1994. The horizontal seismic coefficient value of 0.10g used in the pseudo-static evaluation is conservative for this case. A factor of safety for the pseudo-static loading conditions was calculated by the licensee to be 1.778, which is in excess of minimum required value of unity.

Based on review of these analyses and the results, NRC staff concludes that the slopes of the disposal cell are designed to endure the effects of the geologic processes and events, including resistance to earthquake and settlement, to which they may reasonably be subjected during the design life and that the analyses have been made in a manner consistent with Chapter 2 of the NRC SRP.

### 3.3.2 Settlement and Cover Cracking

Long-term settlement of materials in the disposal cell, which could result in either local depressions or cracks on top of the cover, was addressed by the Licensee in Titan Environmental's report of October, 1996. A proposed settlement monitoring program has also been provided by the Licensee. Conventional settlement monuments will be installed. Also, empirical data from other Title II sites will be considered in the analysis. Visual observations made in partially reclaimed areas indicate that excessive differential settlement has not occurred.

Settlement monuments will be located in areas where consolidation is expected to be the greatest, including areas believed to have maximum thicknesses of fine tailings; however, it is acknowledged that the character of tailings will vary considerably. Additionally, the final soil cover will be spread and compacted in a uniform manner to minimize the effects of settlement due to the weight of the final soil cover materials.

The monuments will be surveyed for vertical displacement on a regular basis. When the Licensee has concluded that 90 percent of the consolidation settlement is complete, and with NRC's concurrence, final soil cover placement operations may begin.

The proposed settlement monitoring program is considered sufficient to satisfy applicable portions of Criteria 1, 6, and 12, of 10 CFR 40, Appendix A, regarding reclamation design to control radiological hazards for the design life without active maintenance after reclamation is complete.

### 3.3.3 Liquefaction Potential

The liquefaction potential for the White Mesa site was evaluated by the licensee and Knight Piesold Consulting Engineers in Rev 2 of the Reclamation Plan dated May, 1999. The licensee evaluated the liquefaction potential based on: 1) the Stress Ratio Method of Takimatsu and Seed, 1987; and 2) the method proposed by the Committee on Earthquake Engineering, 1985. Although there were some differences in the predicted results of settlement due to liquefaction, both methods indicated that disruptive effects on the embankments would be minimal, with cover cracking under worst-case conditions about two inches or less. Based on a review of the analyses submitted, staff concludes that there is adequate assurance of safety with respect to liquefaction damage.

### 3.3.4 Cover Design

The Licensee has proposed an embankment cover section as follows:

- 1) Three feet (minimum) of random fill soil (platform fill) from on-site stockpiles.
- 2) One-foot of compacted clay soil from Section 16.
- 3) Two feet of compacted random fill (frost barrier) from on-site stockpiles.
4. Three to eight inches (top and slopes, respectively) of riprap for erosion resistance.

The system has been designed to limit the infiltration of precipitation, to protect the pile from erosion, and to control the release of radon from the contaminated materials below. Details of the staff's review of the cover's performance related to limiting infiltration and the review of the cover's erosion protection features is presented in Section 4, and the review of the radon attenuation aspects of the cover is presented in Section 2. Certain other design aspects of the proposed cover are discussed herein.

The physical shape and surface grading of the reclaimed tailings embankment will effectively remove surface water resulting from precipitation which falls on the area. The relatively low permeability of the cover materials and the low annual rainfall with high evaporation rate will serve to prevent significant tailings recharge.

The Licensee has evaluated the potential for frost penetration using the BERGGREN.BAS computer code developed at the U.S. Army Corps of Engineers (COE, 1968). The code has been used on several other uranium mill tailings reclamation projects. In order to evaluate the potential for frost penetration, temperature data including the freezing index, mean annual air temperature, length of freezing season, and geotechnical parameters are considered. The model calculates the heat capacity, thermal conductivity, and latent heat of fusion for the soil layers unless these data are entered manually.

The staff has reviewed the input data used in determining the total frost penetration depth and these values are a reasonable representation of the extreme site conditions to be expected. Therefore, the Licensee's evaluation of the frost penetration depth is acceptable to the staff. In the worst-case scenario, the Licensee determined that the depth of frost penetration would be less than 6.8 inches. Therefore, the two-foot layer of random fill will provide adequate protection to the underlying clay layer.

## 3.4 Geotechnical Construction Details

### 3.4.1 Construction Methods and Features

The staff has reviewed and evaluated the geotechnical construction criteria provided in the Reclamation Plan. Based on this review, the staff concludes that the plans and drawings clearly convey the proposed closure action design features. In addition, the excavation and placement methods and specifications are consistent with accepted standard practice.

### 3.4.2 Testing and Inspection

The staff has reviewed and evaluated the testing and inspection quality control requirements provided in the Technical Specifications. The plan is found to provide a program for testing and inspection that is generally consistent with the Staff Technical Position on Testing and Inspection (NRC, 1990).

### 3.5 Conclusions

Based on the review of the geotechnical engineering aspects of the design of the White Mesa reclamation as presented in the Remedial Action Plan, the NRC staff concludes that the cells and proposed borrow soils have been adequately characterized. Furthermore, the cover system appears to be adequately designed to resist the effects of freezing conditions that can reasonably be expected. Overall, the staff concludes that IUC has provided sufficient information to demonstrate compliance with the geotechnical engineering aspects of 10 CFR Part 40, Appendix A.

## 4.0 SURFACE WATER HYDROLOGY AND EROSION PROTECTION

This review included an evaluation using the review procedures in the Draft Standard Review Plan (SRP) for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act (NUREG-1620).

### 4.1 Hydrologic Description and Site Conceptual Design

To comply with NRC regulations, which require stability of the contaminated material for 1,000 years to the extent reasonably achievable and, in any case, for at least 200 years, IUC proposes to stabilize the contaminated materials in engineered embankments to protect them from flooding and erosion. The design basis events for design of the erosion protection included the Probable Maximum Precipitation (PMP) and the Probable Maximum Flood (PMF), both of which are considered to have low probabilities of occurrence during the 1000-year stabilization period.

As proposed by IUC, the contaminated materials will be contained behind tailings dams that currently impound water and will be stabilized and protected by rock covers. The covers will have very flat slopes on the top, and the side slopes will be 1 Vertical (V) on 5 Horizontal (H). The toe of the side slopes will be protected by a riprap apron that will prevent gully intrusion. In addition, a drainage channel will be constructed to convey offsite flood flows away from the site.

### 4.2 Flooding Determinations

The computation of peak flood discharges for various design features at the site was performed by IUC in several steps. These steps included: (1) selection of a design rainfall event; (2) determination of infiltration losses; (3) determination of times of concentration; and (4) determination of appropriate rainfall distributions, corresponding to the computed times of concentration. Input parameters were derived from each of these steps and were then used to

determine the peak flood discharges to be used in water surface profile modeling and in the final determination of rock sizes for erosion protection.

#### 4.2.1 Selection of Design Rainfall Event

One of the most disruptive phenomena affecting long-term stability is surface water erosion. To account for extreme rainfall and flood events, IUC utilized the PMP, which is computed by deterministic methods (rather than statistical methods), and is based on site-specific hydrometeorological characteristics. The PMP has been defined as the most severe, reasonably possible rainfall event that could occur as a result of a combination of the most severe meteorological conditions occurring over a watershed. Therefore, the PMP is considered by the NRC staff to provide an acceptable design basis.

A PMP rainfall depth of approximately 7.8 inches in one hour was used by IUC to estimate the PMFs for the small drainage areas at the disposal site. Using Hydrometeorological Report (HMR) 49 (Department of Commerce, 1977), the staff performed an independent check of the PMP value, based on the procedures given in HMR 49. Based on this check of the rainfall computations, the staff concludes that the PMP was acceptably derived for this site.

#### 4.2.2 Infiltration Losses

Determination of the peak runoff rate is dependent on the amount of precipitation that infiltrates into the ground during the occurrence of the rainfall. If the ground is saturated from previous rains, very little of the rainfall will infiltrate and most of it will become surface runoff. The loss rate is highly variable, depending on the vegetation and soil characteristics of the watershed. Typically, all runoff models incorporate a variable runoff coefficient or variable runoff rates. Commonly-used models such as the Rational Formula (USBR, 1977) incorporate a runoff coefficient (C); a C value of 1 represents 100% runoff and no infiltration. Other models such as the U.S. Army Corps of Engineers Flood Hydrograph Package HEC-1 (COE) separately compute infiltration losses within a certain period of time to arrive at a runoff amount during that time period.

In computing the peak flow rate for the design of the rock riprap erosion protection at the proposed disposal site, IUC used the Rational Formula. In this formula, the runoff coefficient was assumed by IUC to be 0.8; that is, IUC assumed that 80% of the rainfall would run off and that only 20% of the rainfall would infiltrate. Based on a review of the computations, the staff concludes that this is an acceptable assumption, because of the high rock cover porosity and the very gentle slopes (0.002 ft/ft) of the covers.

#### 4.2.3 Times of Concentration

The time of concentration ( $t_c$ ) is the amount of time required for runoff to reach the outlet of a drainage basin from the most remote point in that basin. The peak runoff for a given drainage basin is inversely proportional to the time of concentration. If the time of concentration is computed to be small, the peak discharge will be conservatively large. Times of concentration and/or lag times are typically computed using empirical relationships such as those developed by Federal agencies (USBR, 1977). Velocity-based approaches are also used when accurate estimates are needed. Such approaches rely on estimates of actual flow

Following the determination of the peak flood discharge, it is necessary to determine the resulting water levels, velocities, and shear stresses associated with that discharge. These parameters then provide the basis for the determination of the required riprap size and layer thickness needed to assure stability during the occurrence of the design event.

#### 4.3.1 Top Slopes

To determine the riprap size for the relatively flat top slopes, IUC used methods discussed in NUREG/CR-4620 (Nelson, et al, 1986). The staff checked the computations using the Safety Factors Method (Stevens, et al., 1976) and recently developed empirical methods (Abt and Johnson, 1991). Based on a review of the calculations provided by IUC and the independent checks, the staff concludes that the calculations are acceptable.

#### 4.3.2 Side Slopes

Riprap requirements for the side slopes were determined by IUC using the Stephenson Method (Stephenson, 1979), as recommended NUREG/CR-4620 and NRC staff guidance (NRC, 1990). The calculations were checked by the staff using recently-developed empirical methods (Abt and Johnson, 1991). Based on these independent evaluations, the staff concludes that the design is acceptable.

#### 4.3.3 Aprons/Toes

The designs of the aprons along the toe of the side slopes are generally based on the following considerations:

1. provide riprap of adequate size to be stable against the design storm (PMP),
2. provide uniform and/or gentle grades along the apron and the adjacent ground surface such that runoff from the cell is distributed uniformly at a relatively low velocity, minimizing the potential for flow concentration and erosion, and
3. provide an adequate apron thickness to prevent undercutting of the disposal cell by (a) local scour that could result from the PMP, or (b) potential gully encroachment that could occur due to gradual headcutting over a long period of time.

Additional discussion of the aprons can be found in Section 4.4.1.2, below.

#### 4.3.4 Drainage Channels

Normal depth, computed using Manning's Equation (Chow, 1959), was used by IUC to estimate depths and velocities for the estimated discharge conditions in the channel. The maximum flow depths and velocities in the various segments of the channel were estimated, based on PMF discharge and the applicable slopes. Staff review indicates that the computations are acceptable.



#### 4.4 Erosion Protection

##### 4.4.1 Sizing of Erosion Protection

Riprap layers of various sizes and thicknesses are proposed for use at the site. The design of each layer is dependent on its location and purpose.

###### 4.4.1.1 Top Slopes and Side Slopes

The rock on the top slopes and side slopes has been sized to withstand the erosive velocities resulting from a PMP, as discussed above. For the top slopes, IUC proposes to use a layer of rock with a thickness of 3 inches and minimum  $D_{50}$  of about 0.3 inches. For the side slopes, IUC proposes an 8-inch layer with a  $D_{50}$  of about 3.5 inches. Methods recommended by the NRC staff (NRC, 1990) were used to determine the required rock sizes. Based on staff review of the IUC analyses and independent analyses, the staff concludes that the proposed rock sizes are adequate.

###### 4.4.1.2 Apron/Toe

IUC evaluated the design of the apron/toe along the dam face and determined the extent and depth of the toe. The actual apron area will extend out from the side slope for a distance of about 9 feet and will be placed to a depth of 2 feet below grade. Riprap with an average  $D_{50}$  of about 8 inches will be provided in the apron. Based on independent staff analyses using NRC-recommended methods (NRC, 1990), the rock size is acceptable.

###### 4.4.1.3 Drainage Channel

Based on information provided by IUC, the drainage channel will be constructed and cut through competent rock. Therefore, no riprap is required.

###### 4.4.1.4 Sediment Considerations

In general, sediment deposition can be a problem when incoming flow velocities in gullies and channels are high, and there is insufficient slope or velocities in the flatter areas to flush the sediment away. In particular, enhanced design features may be necessary in areas where natural gullies or channels are intercepted by the upstream aprons. Concentrated flows and high velocities could transport large quantities of sediment, and the size of the particles transported by the natural gully may be larger than the man-made design features can effectively flush out.

For this site, the area draining toward the cell is relatively flat and un-gullied and can be expected to provide a minimal amount of sediment. Any sediments that are produced will be flushed through the discharge channel, because the velocities in the channel are sufficient to prevent sediment deposition.

#### 4.4.2 Rock Durability

NRC regulations require that control of residual radioactive materials be effective for up to 1000 years, to the extent reasonably achievable, and, in any case, for at least 200 years. The previous sections of this report examined the ability of the erosion protection to withstand flooding events reasonably expected to occur in 1000 years. In this section, rock durability is considered to determine if there is reasonable assurance that the rock itself will survive and remain effective for 1000 years.

Rock durability is defined as the ability of a material to withstand the forces of weathering. Factors that affect rock durability are: (1) chemical reactions with water; (2) saturation time; (3) temperature of the water; (4) scour by sediments; (5) windblown scour; (6) wetting and drying; and (7) freezing and thawing.

IUC has identified several potential sources of rock in the immediate site vicinity. IUC has committed to use NRC recommendations (NRC, 1990) to determine the suitability of the rock using laboratory tests. IUC will conduct several durability tests and will use the results of these tests to classify the rock's quality and to assess the expected long-term performance of the rock. The tests recommended by the NRC staff include:

1. Bulk Specific Gravity (ASTM C127). The specific gravity of a rock is an indicator of its strength or durability; in general, the higher the specific gravity, the better the quality of the rock.
2. Absorption (ASTM C127). A low absorption is a desirable property and indicates slow disintegration of the rock by salt action and mineral hydration.
3. Sulfate Soundness (ASTM C88). In locations subject to freezing or exposure to salt water, a low percentage is desirable.
4. Los Angeles Abrasion (ASTM C131 or C535). This test is a measure of a rock's resistance to abrasion.

IUC will then use a step-by-step procedure for evaluating durability of the rock, in accordance with procedures recommended by the NRC staff (NRC, 1990), as follows:

- Step 1. Test results from representative samples are scored on a scale of 0 to 10. Results of 8 to 10 are considered "good"; results of 5 to 8 are considered "fair"; and results of 0 to 5 are considered "poor".
- Step 2. The score is multiplied by a weighting factor. The effect of the weighting factor is to focus the scoring on those tests that are the most applicable for the particular rock type being tested.
- Step 3. The weighted scores are totaled, divided by the maximum possible score, and multiplied by 100 to determine the rating.

Step 4. The rock quality scores are then compared to the criteria which determines its acceptability, as defined in the NRC scoring procedures.

For rock selection and production, IUC proposes to follow the procedures suggested in the NRC Staff Technical Position (NRC, 1990), IUC will conduct durability tests, and rock quality scores will be determined. IUC indicates that the rock will be oversized, as necessary, using suggested NRC criteria (NRC, 1990). The staff concludes that the licensee's commitment to meet NRC-suggested criteria is acceptable.

#### 4.4.3 Testing and Inspection of Erosion Protection

The staff has reviewed and evaluated the testing and inspection quality control requirements for the erosion protection materials. IUC has proposed a program to test and inspect the rock at various times and has proposed a plan to assure that adequate placement, gradation, and thicknesses are achieved. The program is similar to programs previously approved by the staff. Based on a review of the information provided by IUC, the staff concludes that the proposed testing program is acceptable.

#### 4.5 Upstream Dam Failures

There are no impoundments near the site whose failure could potentially cause site flooding.

#### 4.6 Conclusions

Based on review of the information submitted by IUC, the NRC staff concludes that the site design meets NRC regulations as stated in 10 CFR Part 40 Appendix A with regard to flood design measures and erosion protection. The staff concludes that an adequate hydraulic design has been provided to reasonably assure stability of the contaminated material at the disposal site for a period of 1,000 years, or in any case, at least 200 years.

#### **REFERENCES:**

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U.S. Bureau of Reclamation (USBR), Design of Small Dams, 1977.

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U.S. Nuclear Regulatory Commission (NRC), Staff Technical Position on Testing and Inspection Plans During Construction of DOE's Remedial Action at Inactive Uranium Mill Tailing Sites, Revision 2.0, January, 1989.

NRC, "Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites," 1990.

NRC, Draft Standard Review Plan (SRP) for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act (NUREG-1620), January, 1999.

#### **RECOMMENDED LICENSE CHANGE:**

The license should be modified to incorporate the following language:

9.11 The final reclamation shall be in accordance with the May, 1999, Reclamation Plan Revision 2.0 and Attachment A submitted on June 22, 1999.

12.1 Deleted in Amendment 13.

12.2 The licensee shall submit a detailed decommissioning plan to the NRC at least twelve (12) months prior to planned final shutdown of mill operations that includes a detailed Quality Assurance Plan. The plan will be in accordance with Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs," and NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), or equivalent most current guidance.

#### **ENVIRONMENTAL IMPACT EVALUATION:**

During its review of the amendment request, the NRC staff performed an evaluation to determine if the reclamation activities meet any criterion stated in 10 CFR 51.22 (c) for

categorical exclusion from the requirement for the staff to perform an environmental assessment (EA). In accordance with paragraph (c)(11) of 10 CFR 51.22, a categorical exclusion cannot be given. Therefore, in accordance with the requirements of 10 CFR 51.25, the staff prepared an EA. The conclusion of the EA is a Finding of No Significant Impact (FONSI) for the proposed licensing action. The staff issued the FONSI in accordance with 10 CFR 51.32 and published that finding in the *Federal Register* on January 4, 2000 (Volume 65, Number 2, Pages 308-309). The *Federal Register* notice stated the NRC's intent to issue the license amendment, the availability of the EA, and the opportunity for a hearing of affected individuals.

ENCLOSURE 2

ENVIRONMENTAL ASSESSMENT  
FOR  
INTERNATIONAL URANIUM CORPORATION'S URANIUM MILL SITE  
WHITE MESA, SAN JUAN COUNTY, UTAH

IN CONSIDERATION OF AN AMENDMENT TO  
SOURCE MATERIAL LICENSE SUA-1358 FOR THE APPROVAL OF THE  
PROPOSED RECLAMATION PLAN

PREPARED BY

THE U.S. NUCLEAR REGULATORY COMMISSION  
DIVISION OF WASTE MANAGEMENT  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

**ENVIRONMENTAL ASSESSMENT  
FOR THE PROPOSED RECLAMATION PLAN  
INTERNATIONAL URANIUM CORPORATION'S URANIUM MILL SITE  
WHITE MESA, SAN JUAN COUNTY**

**1.0 INTRODUCTION**

**1.1 Background**

This action is to evaluate the environmental impacts of the proposed reclamation plan at the International Uranium (USA) Corporation's (IUC) uranium mill site located in San Juan County, Utah, approximately 8 kilometers (km) (5 miles) south of Blanding, Utah (Figure 1). The proposed action is to reclaim the site at sometime in the future, since the mill is presently operational.

The IUC site is licensed by the U.S. Nuclear Regulatory Commission (NRC) under Materials License SUA-1358 to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the licensee's milling operations, as well as other source material from multiple locations. Some of these locations include material from Formerly Utilized Sites Remedial Action Program (FUSRAP) sites managed by the U.S. Army Corps of Engineers (USACE). These materials generally have similar chemical, physical, and radiological composition to conventional mill tailings.

On February 28, 1997, IUC submitted a site reclamation plan (RP) for the White Mesa Uranium Mill. On August 19 and on December 5, 1997, NRC issued responses to IUC's RP that identified some omissions or deficiencies. On December 16, 1997, IUC issued responses to NRC's comments. Finally, on July 17, 1998, the NRC submitted a Request for Additional Information on the RP. A Rock Sampling Plan was provided by IUC to NRC on September 11, 1998, and on October 23, 1998, IUC advised NRC that alternate rock source sites were under investigation. On March 24, 1999, Daniel Rom (NRC) met with IUC at the White Mesa Mill in Blanding, Utah, at which time discussion was held regarding appropriate responses to remaining RP open issues. On May 26, 1999, IUC submitted Revision 2.0 to the RP, and addressed remaining construction and engineering open issues. Some open issues still remained after staff reviewed revision 2.0, and by letter dated June 22, 1999, IUC addressed the remaining issues in Attachment A to Revision 2.0 of the RP.

A Final Environmental Statement (FES) was prepared for the license application in May 1979, an Environmental Assessment (EA) was prepared by NRC in September 1985, for license renewal, and an EA was prepared by NRC in February 1997, for license renewal.

**1.2 Proposed Action**

The proposed action is needed to minimize exposure of contaminated materials, once the mill operations have ceased, by reclaiming contaminated areas and stabilizing wastes. The goal of the reclamation plan is to permanently isolate and stabilize the tailings and associated contamination by minimizing disturbances by natural forces, and to do so without ongoing maintenance. The design objective is to be effective for up to 1000 years, to the extent reasonable, and in any case, for at least 200 years; to provide reasonable assurance that releases of radon-222 from the residual radioactive material will be minimized, and to provide reasonable assurances to protect groundwater resources.





The facilities to be reclaimed include the following:

- Cell 1 (evaporative), Cells 2 and 3 (tailings), and Cell 4A (not currently used).
- Mill buildings and equipment.
- On-site contaminated areas.
- Off-site contaminated areas (i.e., potential areas affected by windblown tailings).

The reclamation of the above facilities will include the following:

- Placement of materials and debris from the mill decommissioning in tailings Cells 2 and 3.
- Placement of contaminated soils, crystals, and synthetic liner material from Cell 1 in tailings Cells 2 and 3.
- Placement of contaminated soils, crystals, and synthetic liner material from Cell 4A in tailings Cells 2 and 3.
- Placement of an engineered multi-layer cover on Cells 2 and 3.
- Construction of runoff control and diversion channels as necessary.
- Reconditioning of mill and ancillary areas.
- Reclamation of borrow sources.

### 1.3 Review Scope

In accordance with 10 CFR Part 51, this EA serves to: (1) present information and analysis for determining whether to issue a Finding of No Significant Impact (FONSI) or to prepare an Environmental Impact Statement (EIS); (2) fulfill the NRC's compliance with the National Environmental Policy Act when no EIS is necessary; and (3) facilitate preparation of an EIS when one is necessary. Should the NRC issue a finding of no significant impact, no EIS would be prepared and the technical evaluation of the license amendment would be completed.

## 2.0 **SITE CHARACTERISTICS**

The area surrounding the facility is in an arid climate with an annual precipitation of 30 centimeters (cm) (12 inches) and a mean temperature of 9 degrees centigrade (50 degrees Fahrenheit). Runoff in the project area is directed by the general surface topography, either westward into Westward Creek, eastward into Corral Creek, or to the south into an unnamed branch of Cottonwood Wash. The San Juan River, a major tributary to the Colorado River, is located approximately 29 km (18 miles) south of the site.

The population density of San Juan County is approximately 0.6 persons per square kilometer (1.6 persons per square mile). The town of Blanding is the largest population center near the facility with a population of 3162. Approximately 5.6 km (3.5 miles) southeast of the site is the White Mesa Reservation, a community of approximately 320 Ute Mountain Indians. The nearest resident to the mill is located approximately 5 km (3 miles) to the northeast of the mill, which is in the prevailing wind direction.

Approximately 60 percent of San Juan County is federally-owned land administered by the U.S. Bureau of Land Management (BLM), the U.S. National Park Service (NPS), and the U.S. Forest Service. Primary land uses include livestock grazing, wildlife range, recreation, and exploration for minerals, oil, and gas. A quarter of the county is Indian land owned by either the Navajo Nation or the Ute Tribe. The land within 8 km (5 miles) of the site is predominantly owned by residents of Blanding. The White Mesa mill site encompasses approximately 202 hectares (ha) (500 acres).

Groundwater beneath the site mainly occurs in three strata: the Dakota Sandstone, the Burro Canyon formation, and the Entrada/Navajo Sandstone. The Burro Canyon formation hosts perched groundwater over the Brushy Basin Member of the Morrison formation. The Entrada/Navajo Sandstones form one of the most permeable aquifers in the region. The aquifer is separated from the Burro Canyon formation by the Morrison formation and Summerville formation. Two water wells are completed in the Entrada/Navajo sandstone located 4.5 miles (7.25 km) southeast of the site on the Ute Mountain Ute Reservation. These wells are used as domestic water supply wells and are completed approximately 1200 feet (365 meters) below the ground surface. Water in this aquifer is under artesian pressure and is used at the mill for industrial needs and showering. Recharge to the aquifers occurs by infiltration along the flanks of the Abajo, Henry, and La Sal Mountains, and along the flanks of the structural folds. Groundwater in the perched aquifer (Burro Canyon Formation) is monitored by the mill in the groundwater detection monitoring program. Water in this zone flows south to southwest. Seventy-six groundwater applications, within an 8 kilometer (5 mile) radius of the site, are on file with the Utah State Engineer's office. The majority of applications are by private individuals and for wells drawing small, intermittent quantities of water, less than eight gallons per minute (gpm) (0.02 cubic feet per second), from the Burro Canyon formation. For the most part, these wells are located upgradient (north) of the facility. Stock watering and irrigation are listed as the primary uses. No wells are completed within the perched groundwater of the Burro Canyon formation within five miles downgradient of the site.

### **3.0 OPERATIONS**

The White Mesa uranium mill was developed in the late 1970's by Energy Fuels Nuclear, Inc. (EFN) as an outlet for the many small mines that are located in the Colorado Plateau. After about two and one-half years, the mill ceased ore processing and entered a total shutdown phase. In 1984, a majority ownership interest was acquired by Union Carbide Corporation's (UCC) Metals Division, which later became Umetco Minerals Corporation (Umetco), a wholly owned subsidiary of UCC. In May of 1997, IUC purchased the assets of EFN and is the current owner and operator of the facility. The mill has gone through operation and shutdown periods throughout the 1980s and 1990s. The current license specifies a maximum production rate of 4380 tons of yellowcake per year. The facility is currently in operation, and since early 1997, the mill has processed 58,403 tons of ore from several additional alternate feed stocks. From

inception through April of 1999, the mill has processed a total of 3,815,577 tons of ore. Alternate feed materials consist of uranium-bearing residues from uranium-processing facilities or other metal-processing facilities, as well as environmental media (soils) contaminated with natural uranium (e.g. FUSRAP materials).

The tailings facilities currently consist of four lined cells with leak detection systems (LDS) and a groundwater detection monitoring program consisting of six monitoring wells. These wells are sampled quarterly for chloride, potassium, nickel, and uranium. These constituents are good indicator parameters to detect potential groundwater impact. Currently, there is no indication of groundwater impact from the tailing cells based on the groundwater sampling. Environmental monitoring consists of groundwater and surface water sampling, gamma radiation measurements, soil, and vegetation sampling.

#### **4.0 ENVIRONMENTAL EFFECTS**

Environmental monitoring will continue during the time period in which reclamation and decommissioning is conducted. This includes monitoring of surface and groundwater, airborne particulates, radon, soils, and vegetation, according to the existing License Conditions. No changes to the existing programs are expected and reclamation activities are not expected to increase exposure potential beyond the current levels.

A historical review of the site was conducted as part of the initial license application, and six historical sites were identified, none of which is in an area affected by the mill operations. The license contains a condition that before engaging in any activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), and the Archaeological Resources Act and its implementing regulations (43 CFR 7). The NRC sent a letter to the State of Utah Historic Preservation Officer on September 3, 1999, to comment on the proposed action. The NRC sent a letter to the White Mesa Ute Tribal Historic Preservation Officer on September 9, 1999, to comment on the proposed action.

Based on the groundwater detection monitoring program, no groundwater contamination from the tailings cells has occurred. Therefore, no groundwater corrective action measures are considered in the reclamation plan. If groundwater contamination occurs at some time in the future from site activities, it will be addressed by the NRC under 10 CFR Part 40, Appendix A. Groundwater beneath the site is not expected to be adversely impacted by reclamation. Further, reclamation would protect the groundwater resources due to the decrease in infiltration into the tailings cell by the addition of a cover.

In the vicinity of the site, the presence of six animal species and one plant species classified as either endangered or threatened could occur. These include: (1) the bald eagle (*Haliaeetus leucocephalus*); (2) the American peregrine falcon (*Falco peregrinus anatum*); (3) the black-footed ferret (*Mustela nigripes*); (4) the Southwestern willow flycatcher (*Empidonax traillii extimus*); (5) California Condor (*Gymnogyps californianus*); (6) the Mexican Spotted Owl (*Strix occidentalis lucida*), and (7) the Navajo Sedge (*Carex specuicola*) (plant species). While the ranges of the bald eagle, peregrine falcon, and willow flycatcher encompass the project area, their likelihood of utilizing the site is extremely low. The black-footed ferret has not been seen

in Utah since 1952, and is not expected to occur any longer in the area. The California Condor, Mexican Spotted Owl, and Navajo Sedge have been added to the list since the 1997 EA. NRC staff contacted wildlife biologists from the BLM and the Utah Wildlife Service to gather local information on the occurrences of these additional species surrounding the mill. The California Condor has only rarely been spotted in the area of Moab, Utah, (70 miles north) and around Lake Powell (approximately 50 miles south). The Mexican Spotted Owl is only found in the mountains in Utah, and is not expected to be on the Mesa. The Navajo Sedge has not been observed in the area surrounding Blanding, and is typically found in areas of moisture.

No populations of fish are present on the project site, nor are any known to exist in the immediate area of the site. Four species of fish designated as endangered or threatened occur in the San Juan River 29 km (18 miles) south of the site. There are no discharges of mill effluents to surface waters; therefore, no impacts are expected for the San Juan River due to operations at the mill.

Construction materials for reclamation will be obtained from on-site locations. Fill material will be available from stockpiles that were generated from excavation of the cells for the tailings facility. If required, additional materials are available to the west of the site. A clay material source, identified at the southern end of the site, will be used to construct the one foot compacted clay layer. Rip rap material will be produced from off-site sources located to the north of Blanding. Three potential sources of rock were identified; Cow Canyon pit located approximately 15 mi (24 km) from the site north of Bluff, Utah, Brown Canyon pit located on the west side of Recapture Canyon approximately 4 mi (6 km) northeast of the site, and North Pit located one mile northeast of Blanding. IUC stated that the North Pit would be the most reasonable choice and it is located on land administered by the BLM. The BLM would have to evaluate potential environmental impacts of rock removed from this area.

The single largest off-site activity related to reclamation of the White Mesa Mill is the acquisition of rip rap rock for the tailings cells. The estimate for the total amount of material needed off-site is 146,00 cubic yards (111,544 cubic meters) from a borrow site 7 miles (11.2 km) north of the mill along State Highway 191. Approximately 6,636 truck loads would be required over a 6.5 month period. Assuming a five-day work week, this would result in an average of 48 truckloads (peak of 65 truckloads) per day during the 6.5 month period. The 1979 FES projected, from an operational standpoint, that 68 truckloads of ore would be delivered daily to the mill with 8-10 additional truckloads of reagents. For comparison purposes, the Utah Department of Transportation conducted a truck census in 1998 (most current) along State Highway 191, and counted an average of 373 trucks per day passing a point six miles south of the mill entrance. The same census also counted 473 trucks per day through the city of Monticello, Utah, and 886 per day through Moab, Utah. Therefore, the reclamation activities for the White Mesa mill site are not expected to adversely affect the current truck traffic along State Highway 191.

The RP is considered to be a beneficial action which will take measures to protect human health and the environment from the tailings and contaminated material from the mill operations.

## **5.0 ALTERNATIVES**

The action that the NRC is considering is approval of an amendment request to a source material license issued pursuant to 10 CFR Part 40. The alternatives available to the NRC are:

1. Approve the license amendment request as submitted; or
2. Amend the license with such additional conditions as are considered necessary or appropriate to protect public health and safety and the environment; or
3. Deny the request.

The NRC staff has concluded that there are no significant environmental impacts associated with the proposed action. Therefore, alternatives with equal or greater impacts need not be evaluated. The staff considers that Alternative 1 is the appropriate alternative for selection. A technical evaluation report will be completed with respect to the criteria for reclamation, specified in 10 CFR Part 40, Appendix A.

## **6.0 SUMMARY AND CONCLUSIONS**

Based on an evaluation of the environmental impacts of the IUC amendment request, the NRC has determined that the proper action is to issue a FONSI in the Federal Register. The following statements support the FONSI and summarize the conclusions resulting from the EA.

1. An acceptable environmental and effluent monitoring program is in place to monitor effluent releases and to detect whether applicable regulatory limits are exceeded. Radiological effluents from site operations have been and are expected to continue to remain below the regulatory limits.
2. Present and potential risks were assessed. Given the remote location, limited activities requested, the small area of impact, the commitments by the licensee, and the past activities on the site, the staff has determined that the risk factors for health and environmental hazards are insignificant.

## **7.0 CONSULTATION WITH OTHER AGENCIES**

The NRC sent a draft EA to the Utah Department of Environmental Quality (UDEQ) Divisions of Water Quality and Radiation Control, with cover letter dated November 11, 1999. UDEQ voiced concerns regarding potential groundwater contamination from site activities and potential future remediation of any groundwater contamination. To address concerns voiced by UDEQ regarding groundwater, IUC submitted a Groundwater Information Report on May 28, 1999 (IUC, 1999). This report is similar to a Groundwater Discharge Permit (GWDP) Application, as outlined in Part 6 of the UDEQ's Ground Water Quality Protection requirements (UDEQ Regulation R317-6-6). At this time, IUC is working with the UDEQ towards a potential GWDP. As mentioned in section 4 of this report, the NRC has concluded that based on the groundwater detection monitoring program, no groundwater contamination from the tailings cells has occurred. Therefore, no groundwater corrective action measures are considered in the reclamation plan. If groundwater contamination occurs at some time in the future from site

activities, it will be addressed by the NRC under 10 CFR Part 40, Appendix A. Groundwater beneath the site is not expected to be adversely impacted by reclamation.

IUC is currently investigating an occurrence of Chloroform in one of its monitoring wells (MW-4) and is working with the UDEQ to characterize the source of this contamination. Information submitted to date, on the occurrence of the Chloroform, indicates that it is not from a leak in the tailings cells. The UDEQ is the primary regulatory authority investigating the Chloroform occurrence through a Groundwater Corrective Action Order issued to IUC by letter dated August 23, 1999. As the investigation progresses, the NRC will evaluate whether the source is from site activities and will take appropriate action if necessary at that time.

The UDEQ also commented on the indicator parameters used in the groundwater detection monitoring program and suggested adding parameters such as ammonia, nitrate, nitrite, and molybdenum. The NRC has concluded that the current indicator parameters; chloride, potassium, nickel, and uranium are adequate to detect groundwater contamination from the tailings cells. If additional information is received at a later date that suggests additional parameters are justified, the NRC will re-evaluate the groundwater detection program at that time.

The NRC requested comments from the State and Tribal Historic Preservation Officers by letters dated September 3, 1999, and September 9, 1999, respectively. A letter dated October 5, 1999, from the Ute Mountain Ute Tribe was received by NRC which stated that the language in the license was satisfactory to protect the Cultural and Historical Resources associated with the mill relating to activities including reclamation. A letter dated September 17, 1999, from the Division of State History, Utah State Historical Society, was received by the NRC which concurred with the conditions outlined to proceed with reclamation.

The U.S. Fish and Wildlife, BLM, and Utah Division of Wildlife Services were contacted by phone regarding occurrences of endangered species in the area surrounding the mill.

## **8.0 REFERENCES:**

International Uranium Corporation's (IUC), "Reclamation Plan, White Mesa Mill, Blanding, Utah, Revision 2.0", May 1999.

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Consideration of the Renewal of Source Material License No. SUA-1358, for the Umetco Minerals Corporation, White Mesa Uranium Mill," September 26, 1985.

NRC, Phone conversation with William von Till of NRC and Tammy Fletcher of BLM, Regarding the occurrence of endangered species in the Blanding, Utah, area, August 5, 1999.

NRC, Phone conversation with William von Till of NRC and Guy Wallace of the Utah Wildlife Service, Regarding the occurrence of endangered species in the Blanding, Utah, area, August 5, 1999.

Utah State Historical Society, Response to NRC Request for Comments on Cultural and Historical Resources for the Proposed Reclamation Plan, September 17, 1999

Ute Mountain Ute Tribe, Response to NRC Request for Comments on Cultural and Historical Resources for the Proposed Reclamation Plan, October 5, 1999



ENCLOSURE 3

## TECHNICAL EVALUATION REPORT

**DATE:** January 4, 2000

**DOCKET NO.:** 40-8681 License No. SUA-1358

**LICENSEE:** International Uranium (USA) Corporation

**FACILITY:** White Mesa Mill

**PROJECT  
MANAGER:** William von Till

**TECHNICAL  
REVIEWER:** Daniel Rom

### EVALUATION:

In response to a May, 1999, submittal from International Uranium (USA) Corporation (IUC), staff has reviewed the Licensee's detailed cost estimates for reclamation of the White Mesa facilities near Blanding, Utah. The NRC staff approval of the reclamation plan is documented in a separate technical evaluation report accompanying this licensing action. IUC submitted detailed 1999 cost estimates for 1) Mill Decommissioning; 2) Cell 1; 3) Cell 2; 4) Cell 3; 5) Cell 4A; 6) Miscellaneous items; 7) Rock production; 8) Equipment; 9) Labor; and 10) Long-term costs. The cost basis supports a revised bond amount of \$9,682,467. The Licensee's surety figure was based on production estimates, equipment costs, and labor costs from reputable sources. The quantities were based on takeoffs by IUC and were supported with calculations. Adjustments to the Long-term Care figure were made to reflect an increase in the Consumer Price Index between December, 1978, and January, 1999. Reasonable profit (10%), contingency (15%), and licensing/bonding allowances (2%) are included in the total.

The IUC cost estimates were presented in a logical manner and appeared to be thorough. The licensee took advantage of favorable equipment and blasting contract rates due to economy of scale. Based on its review, the NRC requested, in a letter dated October 21, 1999, that the licensee confirm that similar unit rates would apply should a trustee be required to complete reclamation operations. On November 9, 1999, the licensee provided written backup confirming the conservatism of the unit rates used for blasting and equipment rental, per our request. The licensee's submittal of November 9, 1999, satisfactorily addresses the questions raised in our letter of October 21, 1999.

### RECOMMENDED LICENSE CHANGE:

The license should be modified to incorporate the following language:

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

reclamation/decommissioning plan, the licensee shall submit, for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within 3 months of written NRC approval.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criteria 9 and 10, shall be submitted to the NRC at least 3 months prior to the anniversary date, which is designated as June 4 of each year. If the NRC has not approved a proposed revision to the surety coverage 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing surety arrangement 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 fee, changes in engineering plans, activities performed and any other conditions affecting estimated costs for site closure. The basis for the cost estimate is the NRC- approved reclamation/decommissioning plan or NRC-approved revisions to the plan. The previously provided guidance entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates" outlines the minimum considerations used by the NRC in the review of site closure estimates. Reclamation/decommissioning plans and annual updates should follow this outline.

The currently approved surety instrument, a Performance Bond issued by National Union Fire Insurance Company in favor of the NRC, and the associated Standby Trust Agreement, dated April 29, 1997, shall be continuously maintained in an amount not less than \$9,682,467 for the purpose of complying with 10 CFR 40, Appendix A, Criteria 9 and 10, until a replacement is authorized by the NRC.

[Applicable Amendments: 2, 3, 5,13]

ENCLOSURE 4

## 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, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

|                                                          |                                                                                           |                                                                                      |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Licensee                                                 |                                                                                           | 3. License Number                                                                    |
| 1.                                                       | International Uranium (USA) Corporation<br>[Applicable Amendments: 2]                     | SUA-1358, Amendment No. 13                                                           |
| 2.                                                       | 6425 S. Highway 191<br>P.O. Box 809<br>Blanding, Utah 84511<br>[Applicable Amendments: 2] | 4. Expiration Date<br>March 31, 2007                                                 |
|                                                          |                                                                                           | 5. Docket or<br>Reference No. 40-8681                                                |
| 6. Byproduct, Source, and/or<br>Special Nuclear Material | 7. Chemical and/or Physical<br>Form                                                       | 8. Maximum Amount that Licensee<br>May Possess at Any One Time<br>Under This License |
| Natural Uranium                                          | Any                                                                                       | Unlimited                                                                            |

SECTION 9: **Administrative Conditions**

- 9.1 The authorized place of use shall be the licensee's White Mesa uranium milling facility, located in San Juan County, Utah.
- 9.2 All written notices and reports to the NRC required under this license, with the exception of incident and event notifications under 10 CFR 20.2202 and 10 CFR 40.60 requiring telephone notification, shall be addressed to the Chief, Uranium Recovery and Low-Level Waste Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards.
- Incident and event notifications that require telephone notification shall be made to the NRC Operations Center at (301) 816-5100.
- 9.3 The licensee shall conduct operations in accordance with statements, representations, and conditions contained in the license renewal application submitted by letter dated August 23, 1991, as revised by submittals dated January 13, and April 7, 1992, November 22, 1994, July 27, 1995, December 13, and December 31, 1996, and January 30, 1997, which are hereby incorporated by reference, and for the Standby Trust Agreement, dated April 29, 1997, except where superseded by license conditions below.
- Whenever the word "will" is used in the above referenced documents, it shall denote a requirement. [Applicable Amendment: 2]
- 9.4 A. The licensee may, without prior NRC approval, and subject to the conditions specified in Part B of this condition:
- (1) Make changes in the facility or process, as presented in the application.

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

2

OF

9

PAGES

~~SUA-1358~~ Amendment No. 13

Docket or Reference Number

40-8681

- (2) Make changes in the procedures presented in the application.
  - (3) Conduct tests or experiments not presented in the application.
- B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied.
- (1) The change, test, or experiment does not conflict with any requirement specifically stated in this license, or impair the licensee's ability to meet all applicable NRC regulations.
  - (2) There is no degradation in the essential safety or environmental commitments in the license application, or provided by the approved reclamation plan.
  - (3) The change, test, or experiment is consistent with the conclusions of actions analyzed and selected in the EA dated February 1997.
- C. The licensee's determinations concerning Part B of this condition, shall be made by a "Safety and Environmental Review Panel (SERP)." The SERP shall consist of a minimum of three individuals. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the corporate radiation safety officer (CRSO) or equivalent, with the responsibility of assuring changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, specific earth sciences, and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants.
- D. The licensee shall maintain records of any changes made pursuant to this condition until license termination. These records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining changes are in compliance with the requirements referred to in Part B of this condition. The licensee shall furnish, in an annual report to NRC, a description of such changes, tests, or experiments, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit to the NRC changed pages to the Operations Plan and Reclamation Plan of the approved license application to reflect changes made under this condition.

The licensee's SERP shall function in accordance with the standard operating procedures submitted by letter dated June 10, 1997.

[Applicable Amendments: 3]

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

**SUA-1358, Amendment No. 13**

Docket or Reference Number

**40-8681**

- 9.5 The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criteria 9 and 10, adequate to cover the estimated costs, if accomplished by a third party, for decommissioning and decontamination of the mill and mill site, for reclamation of any tailings or waste disposal areas, ground-water restoration as warranted and for the long-term surveillance fee. Within three months of NRC approval of a revised reclamation/decommissioning plan, the licensee shall submit, for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within 3 months of written NRC approval.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criteria 9 and 10, shall be submitted to the NRC at least 3 months prior to the anniversary date which is designated as June 4 of each year. If the NRC has not approved a proposed revision to the surety coverage 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing surety arrangement 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 fee, changes in engineering plans, activities performed and any other conditions affecting estimated costs for site closure. The basis for the cost estimate is the NRC approved reclamation/decommissioning plan or NRC approved revisions to the plan. The previously provided guidance entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates" outlines the minimum considerations used by the NRC in the review of site closure estimates. Reclamation/decommissioning plans and annual updates should follow this outline.

The currently approved surety instrument, a Performance Bond issued by National Union Fire Insurance Company in favor of the NRC, and the associated Standby Trust Agreement, dated April 29, 1997, shall be continuously maintained in an amount not less than \$9,682,467 for the purpose of complying with 10 CFR 40, Appendix A, Criteria 9 and 10, until a replacement is authorized by the NRC.

[Applicable Amendments: 2, 3, 5, 13]

- 9.6 Standard operating procedures shall be established and followed for all operational process activities involving radioactive materials that are handled, processed, or stored. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for non-operational 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 mill area to which it applies.

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

- 9.7 Before engaging in any activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (as

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

SUA-1358, Amendment No. 13

Docket or Reference Number

40-8681

amended) and its implementing regulations (36 CFR 800), and the Archaeological Resources Protection Act (as amended) and its implementing regulations (43 CFR 7).

In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance shall occur until the licensee has received authorization from the NRC to proceed.

The licensee shall avoid by project design, where feasible, the archeological sites designated "contributing" in the report submitted by letter dated July 28, 1988. When it is not feasible to avoid a site designated "contributing" in the report, the licensee shall institute a data recovery program for that site based on the research design submitted by letter from C. E. Baker of Energy Fuels Nuclear to Mr. Melvin T. Smith, Utah State Historic Preservation Officer (SHPO), dated April 13, 1981.

The licensee shall recover through archeological excavation all "contributing" sites listed in the report which are located in or within 100 feet of borrow areas, stockpile areas, construction areas, or the perimeter of the reclaimed tailings impoundment. Data recovery fieldwork at each site meeting these criteria shall be completed prior to the start of any project related disturbance within 100 feet of the site, but analysis and report preparation need not be complete.

Additionally, the licensee shall conduct such testing as is required to enable the Commission to determine if those sites designated as "Undetermined" in the report and located within 100 feet of present or known future construction areas are of such significance to warrant their redesignation as "contributing." In all cases, such testing shall be completed before any aspect of the undertaking affects a site.

Archeological contractors shall be approved in writing by the Commission. The Commission will approve an archeological contractor who meets the minimum standards for a principal investigator set forth in 36 CFR Part 66, Appendix C, and whose qualifications are found acceptable by the SHPO.

- 9.8 The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the licensee's milling operations authorized by this license. Mill tailings shall not be transferred from the site without specific prior approval of the NRC in the form of a license amendment. The licensee shall maintain a permanent record of all transfers made under the provisions of this condition.
- 9.9 The licensee is hereby exempted from the requirements of Section 20.1902 (e) of 10 CFR Part 20 for areas within the mill, provided that all entrances to the mill are conspicuously posted in accordance with Section 20.1902 (e) and with the words, "Any area within this mill may contain radioactive material."
- 9.10 Release of equipment or packages from the restricted area shall be in accordance with "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

SUA-1358 Amendment No. 13  
Docket or Reference Number

40-8681

Material," dated May 1987, or suitable alternative procedures approved by the NRC prior to any such release.

- 9.11 The final reclamation shall be in accordance with the May, 1999, Reclamation Plan Revision 2.0 and Attachment A submitted on June 22, 1999.

**SECTION 10: Operational Controls, Limits, and Restrictions**

- 10.1 The mill production rate shall not exceed 4380 tons of yellowcake per year.
- 10.2 All liquid effluents from mill process buildings, with the exception of sanitary wastes, shall be returned to the mill circuit or discharged to the tailings impoundment.
- 10.3 Freeboard limits for Cells 1-I, 3, and 4A, and tonnage limits for Cell 3, shall be as stated in Section 3.0 to Appendix E of the approved license application.
- 10.4 Disposal of material and equipment generated at the mill site shall be conducted as described in the licensee's submittals dated December 12, 1994 and May 23, 1995, with the following addition:
- A. The maximum lift thickness for materials placed over tailings shall be less than 4-feet thick. Subsequent lifts shall be less than 2-feet thick. Each lift shall be compacted by tracking of heavy equipment, such as a Cat D-6, at least 4 times prior to placement of subsequent lifts.
- 10.5 In accordance with the licensee's submittal dated May 20, 1993, the licensee is hereby authorized to dispose of byproduct material generated at licensed in situ leach facilities, subject to the following conditions:
- A. Disposal of waste is limited to 5000 cubic yards from a single source.
- B. All contaminated equipment shall be dismantled, crushed, or sectioned to minimize void spaces. Barrels containing waste other than soil or sludges shall be emptied into the disposal area and the barrels crushed. Barrels containing soil or sludges shall be verified to be full prior to disposal. Barrels not completely full shall be filled with tailings or soil.
- C. All waste shall be buried in Cell No. 3 unless prior written approval is obtained from the NRC for alternate burial locations.
- D. All disposal activities shall be documented. The documentation shall include descriptions of the waste and the disposal locations, as well as all actions required by this condition. An annual summary of the amounts of waste disposed of from off-site generators shall be sent to the NRC.
- 10.6 The licensee is authorized to receive and process source materials from the Allied Signal Corporation's Metropolis, Illinois, facility in accordance with the amendment request dated June 15, 1993.

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

**SUA-1358, Amendment No. 13**  
Docket or Reference Number

**40-8681**

- 10.7 The licensee is authorized to receive and process source material from Allied Signal, Inc. of Metropolis, Illinois, in accordance with the amendment request dated September 20, 1996, and amended by letters dated October 30, and November 11, 1996.
- 10.8 The licensee is authorized to receive and process source material, in accordance with the amendment request dated March 5, 1997. [Applicable Amendments: 1]
- 10.9 The licensee is authorized to receive and process source material from Cabot Performance Materials' facility near Boyertown, Pennsylvania, in accordance with the amendment request dated April 3, 1997, as amended by submittals dated May 19, and August 6, 1997. [Applicable Amendments: 4]
- 10.10 The licensee is authorized to receive and process source material from the Ashland 2 Formerly Utilized Sites Remedial Action Program (FUSRAP) site, located near Tonawanda, New York, in accordance with the amendment request dated May 8, 1998, as amended by the submittals dated May 27, June 3, and June 11, 1998. [Applicable Amendment: 6]
- 10.11 The licensee is authorized to receive and process source material from Cameco Corporation's Blind River and Port Hope facilities, located in Ontario, Canada, in accordance with the amendment request dated June 4, 1998, and by the submittals dated September 14, September 16, September 25, October 7, and October 8, 1998.
- However, the licensee is not authorized to receive or process from these facilities, the crushed carbon anodes identified in these submittals, either as a separate material or mixed in with material already approved for receipt or processing.
- 10.12 The licensee is authorized to receive and process source material from the Ashland 1 and Seaway Area D Formerly Utilized Sites Remedial Action Program (FUSRAP) site, located near Tonawanda, New York, in accordance with statements, representations, and commitments contained in the amendment request dated October 15, 1998, as amended by letters dated November 23, 1998, November 24, 1998, December 23, 1998, January 11, 1999, January 27, 1999, and February 1, 1999.
- [Applicable Amendment: 10]
- 10.13. The licensee is authorized to receive and process source material from the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) site, in accordance with statements, representatives and commitments contained in the amendment request dated March 2, 1999, and as amended and supplemented by submittals dated June 21, 1999; June 29, 1999 (2); and July 8, 1999

[Applicable Amendments 11, 12]

**SECTION 11: Monitoring, Recording, and Bookkeeping Requirements**

- 11.1 The results of sampling, analyses, surveys and monitoring, the results of calibration of equipment, reports on audits and inspections, all meetings and training courses required by this license and any subsequent reviews, investigations, and corrective actions, shall be

|                            |                            |    |   |       |
|----------------------------|----------------------------|----|---|-------|
| PAGE                       | 7                          | OF | 9 | PAGES |
| License Number             |                            |    |   |       |
| Docket or Reference Number | SUA-1358, Amendment No. 13 |    |   |       |
|                            | 40-8681                    |    |   |       |

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

documented. Unless otherwise specified in the NRC regulations all such documentation shall be maintained for a period of at least five (5) years.

11.2 The licensee shall implement the effluent and environmental monitoring program specified in Section 5.5 of the renewal application, as amended by the submittal dated June 8, 1995, and as revised with the following modifications or additions:

- A. Stack sampling shall include a determination of flow rate.
- B. Surface water samples shall also be analyzed semiannually for total and dissolved U-nat, Ra-226, and Th-230, with the exception of the Westwater Creek, which shall be sampled annually for water or sediments and analyzed as above. A sediment sample shall not be taken in place of a water sample unless a water sample was not available.
- C. Groundwater sampling shall be conducted in accordance with the requirements in License Condition 11.3.
- D. The licensee shall utilize lower limits of detection in accordance with Section 5 of Regulatory Guide 4.14 (Revision 1), for analysis of effluent and environmental samples.
- E. The inspections performed semiannually of the critical orifice assembly committed to in the submittal dated March 15, 1986, shall be documented. The critical orifice assembly shall be calibrated at least every 2 years against a positive displacement Roots meter to obtain the required calibration curve.

[Applicable Amendment: 5]

11.3 The licensee shall implement a groundwater detection monitoring program to ensure compliance to 10 CFR Part 40, Appendix A. The detection monitoring program shall be in accordance with the report entitled, "Points of Compliance, White Mesa Uranium Mill," submitted by letter dated October 5, 1994, and the following:

- A. The licensee shall sample monitoring wells WMMW-5, -11, -12, -14, -15, and -17, on a quarterly basis. Samples shall be analyzed for chloride, potassium, nickel, and uranium, and the results of such sampling shall be included with the environmental monitoring reports submitted in accordance with 10 CFR 40.65.

In addition, the licensee shall implement a monitoring program of the leak detection systems for the disposal cells as follows:

- B. The licensee shall measure and record the "depth to fluid" in each of the tailings disposal cell standpipes on a weekly basis. If sufficient fluid is present in the leak detection system (LDS) of any cell, the licensee shall pump fluid from the LDS, to the extent reasonably possible, and record the volume of fluid recovered. Any fluid pumped from an LDS shall be returned to a disposal cell.

If fluid is pumped from an LDS, the licensee shall calculate the flow rate by dividing the recorded volume of fluid recovered by the elapsed time since fluid was last pumped or

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

SUA-1358 Amendment No. 13  
Docket or Reference Number

40-8681

increases in the LDS fluid levels were recorded, whichever is the more recent. The licensee shall document the results of this calculation.

- C. Upon the initial pumping of fluid from an LDS, the licensee shall collect a fluid sample and analyze the fluid for pH and the parameters listed in paragraph A of this license condition. The licensee shall determine whether the LDS fluid originated from the disposal cell by ascertaining if the collected fluid contains elevated levels of the constituents listed in paragraph A of this license condition or has a pH level less than 5.0. If either elevated constituent levels or a pH less than 5.0 is observed, the licensee shall assume that the disposal cell is the origin of the fluid.

If the LDS fluid is determined not to have originated from the disposal cell, the licensee shall continue with weekly measurements of "depth to fluid" in the LDS standpipes. The licensee shall confirm, on an annual basis, that fluid from the disposal cell has not entered the LDS by collecting (to the extent possible) and analyzing an LDS fluid sample for the above stated parameters.

- D. Upon indication that the LDS fluids originated from the disposal cell, the licensee shall determine the flow rate through the liner by the calculation method in paragraph B of this license condition. If the flow rate is equal to or greater than one gallon per minute, the licensee shall:
1. Evaluate the cause of the liner distress and take appropriate and timely actions to mitigate the leak and any consequent potential impacts;
  2. Continue to measure and record LDS "depth to fluid" measurements weekly; and
  3. Notify NRC by telephone within 48 hours, in accordance with License Condition 9.2, and submit a written report within 30 days of notifying NRC by telephone, in accordance with License Condition 9.2. The written report shall include a description of the mitigative action(s) taken and a discussion of the mitigative action results.

If the calculated flow rate is less than one gallon per minute, the licensee shall continue with weekly measurements of "depth to fluid" in the LDS standpipes.

- E. All sampling, analysis, and evaluation of LDS fluids shall be documented and retained onsite until license termination for NRC inspection.

[Applicable Amendment: 8]

11.4

Annually, the licensee shall collect, during mill operations, a set of air samples covering eight hours of sampling, at a high collection flow rate (i.e., greater than or equal to 40 liters per minute), in routinely or frequently occupied areas of the mill. These samples shall be analyzed for gross alpha. In addition, with each change in mill feed material or at least annually, the licensee shall analyze the mill feed or production product for U-nat, Th-230, Ra-226, and Pb-210 and use the analysis results to assess the fundamental constituent composition of air sample particulates.

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

**SUA-1358 Amendment No. 13**

Docket or Reference Number

**40-8681**

[Applicable Amendment: 7]

- 11.5 Calibration of in-plant air and radiation monitoring equipment shall be performed as specified in the license renewal application, under Section 3.0 of the "Radiation Protection Procedures Manual," with the exception that in-plant air sampling equipment shall be calibrated at least quarterly and air sampling equipment checks shall be documented.
- 11.6 The licensee shall perform an annual ALARA audit of the radiation safety program in accordance with Regulatory Guide 8.31.

**SECTION 12: Reporting Requirements**

- 12.1 DELETED by Amendment 13.

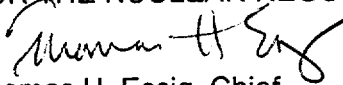
[Applicable Amendment: 13]

- 12.2 The licensee shall submit a detailed decommissioning plan to the NRC at least twelve (12) months prior to planned final shutdown of mill operations that includes a detailed Quality Assurance Plan. The plan will be in accordance with Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs," and NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), or equivalent most current guidance.

[Applicable Amendment: 13]

Date 2/10/2000

FOR THE NUCLEAR REGULATORY COMMISSION

  
Thomas H. Essig, Chief  
Uranium Recovery and Low-Level  
Waste Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards