

(SP-99-024, April 1999, Program, SA-900)  
DATED: APRIL 20, 1999

SIGNED BY: PAUL H. LOHAUS

AGREEMENT STATES WITH AUTHORITY TO REGULATE URANIUM  
RECOVERY OPERATIONS  
(COLORADO, ILLINOIS, TEXAS, WASHINGTON)

**PROGRAM MANAGEMENT INFORMATION: OSP PROCEDURE SA-900, TERMINATION OF  
URANIUM MILL LICENSES IN AGREEMENT STATES (SP-99-024)**

Enclosed is the Office of State Program Procedure SA-900, "Termination of Uranium Mill Licenses in Agreement States," issued April 20, 1999. This document contains information that was previously sent to you in the February 16, 1999, All Agreement States Letter (SP-99-009) for comment.

If you have any questions regarding this correspondence, please contact me or the individual named below.

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Paul H. Lohaus, Director  
Office of State Programs

Enclosure:  
As stated



## OSP Procedure Approval

### ***Termination of Uranium Mill Licenses in Agreement States - SA-900***

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Issue Date: April 20, 1999

Expiration Date: April 20, 2000

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Paul H. Lohaus  
*Director, OSP*

Original signed by:  
*Paul H. Lohaus*

*Date: 4/20/99*

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*Deputy Director, OSP*

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Original signed by:  
*Kevin Hsueh*

*Date: 4/20/99*

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#### ***NOTE***

***The OSP Director's Secretary is responsible for the maintenance of this master copy document as part of the OSP Procedure Manual. Any changes to the procedure will be the responsibility of the OSP Procedure Contact. Copies of OSP procedures will be distributed for information.***

	<b>Procedure Title:</b> <i>Termination of Uranium Mill Licenses in Agreement States</i> <b>Procedure Number: SA-900</b>	<b>Page: 1 of 7</b> <b>Issue Date:</b> 4/20/99
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## I. INTRODUCTION

This procedure describes the review process for making the determination that all applicable standards and requirements have been met prior to Agreement State uranium recovery license termination, as required by 10 CFR 150.15a(a) and Section 274c of the Atomic Energy Act of 1954, as amended (AEA).

## II. OBJECTIVES

- A. To establish the procedures to be followed by NRC staff for review of uranium license termination proposals submitted by Agreement States.
- B. To provide guidance for use by Agreement States on preparation and submittal of uranium license termination proposals for NRC staff review.

## III. BACKGROUND

- A. Section 150.15a(a) indicates that the Commission shall have made a determination that all applicable standards and requirements pertaining to material as defined in 10 CFR 150.3(c)(2) (i.e., uranium mill tailings) have been met prior to termination of any Agreement State license for such material. This provision in NRC's regulations stems from Section 274c(4) of the AEA which reads in part: "[t]he Commission shall also retain authority under any such agreement to make a determination that all applicable standards and requirements have been met prior to termination of a license for byproduct material, as defined in 11e.(2)."
- B. Two kinds of Agreement State uranium recovery licenses are involved: conventional and non-conventional (mainly in-situ uranium extraction licenses) uranium mill licenses. A conventional uranium mill is a facility that generates mill tailings and will be transferred to a custodial agency for long term care in accordance with 10 CFR § 40.28 after the entire license is terminated. A non-conventional uranium mill is a facility that generates limited byproduct materials which are normally transferred to tailings impoundments for disposal and therefore no land transfer is required at license termination. For both types of licenses, the Agreement State is expected to conduct its review for decommissioning, reclamation and/or groundwater restoration in accordance

with State standards and regulations which are compatible with the requirements of 10 CFR Part 40. Agreement States are responsible for approval of the remediation plans of uranium recovery facilities in their States and for site inspections to ensure that the actual remedial actions have been completed pursuant to the approved plans. With NRC concurrence, the Agreement State terminates the specific licenses for its licensees.

- C. Historically, the NRC has reviewed non-conventional uranium recovery license termination requests from Agreement States on a case-by-case basis without any specific guidance. This procedure describes the specific guidance the NRC staff would use to ensure consistency in the process and information that NRC would need from an Agreement State to make its determination prior to termination of pending and future Agreement State conventional and non-conventional uranium recovery licenses.

#### **IV. ROLES AND RESPONSIBILITIES**

- A. The Director, Office of State Programs (OSP), has overall responsibility for the review and making the determination required in Section 274c of the Act that all applicable standards and requirements have been met before an Agreement State terminates a license for byproduct material as defined in Section 11e.(2).
- B. The Reviewer is responsible for completing reviews of uranium license termination proposals submitted by Agreement States. The reviewer should consult with the Office of Nuclear Material Safety and Safeguards (NMSS) or other NRC offices as necessary to support completion of the review based on issues raised during the review and their significance. After completing the review, the reviewer prepares a response letter back to the State and obtains the concurrence from the Office of the General Counsel (OGC) and NMSS.

#### **V. GUIDANCE**

- A. With the approval of Management Directive 9.15, "Organization and Functions, Office of State Programs" on July 6, 1993, OSP was explicitly assigned responsibility for making determinations under §150.15a(a). Management Directive 9.15 provides, in part, that the Office "[m]akes the determination required in Section 274c of the Act of 1954 that all applicable standards and requirements have been met before an Agreement State terminates a license for

byproduct material as defined in Section 11e.(2). This determination will be made in consultation with the Office of Nuclear Material Safety and Safeguards.”

- B. Each Agreement State license amendment that terminates a portion of the site from a license should be considered as a partial license termination and the NRC would make the AEA Section 274c(4) determination for each case.
- C. Standards and requirements to be used by NRC to make the determination:

The “standards and requirements” to be used by NRC in making a determination under Section 150.15a(a) would be the applicable regulations and license requirements in the Agreement State. Agreement States are also expected to adopt any changes to NRC’s uranium recovery rules or programs that are identified as required for compatibility or because of their health and safety significance within 3 years of their enactment.

- D. Bases to be used for NRC determination:

The determination that all applicable standards and requirements have been met prior to termination of an Agreement State license would have two primary supporting bases:

1. The first basis would be a completion review report requested from the Agreement State containing the conclusions from the State’s review of a licensee’s completed remedial actions. This report would document the State staff’s bases for its conclusion that all requirements have been met. NRC staff would request a completion review report similar to that contained in Appendix A. Upon receipt of the completion review report submitted by the State, the NRC staff would review the document for completeness of the State’s review process. If the content of the completion review report did not demonstrate that a complete review has been performed, the NRC could request additional information from the Agreement State prior to making its determination. The completion review report should include the following information depending on whether the license being terminated is a conventional or non-conventional uranium mill license.

- a. Conventional Uranium Mill License
  - (i) A brief description of licensee's activities associated with decommissioning, tailings remediation and/or groundwater cleanup.
  - (ii) Documentation that the completed surface remedial actions were performed in accordance with license requirements and regulations.
  - (iii) Documentation that the completed site decommissioning actions were performed in accordance with license requirements and regulations. This documentation should include a discussion of results of radiation survey and confirmatory soil samples which indicates that the subject site meets unrestricted release requirements.
  - (iv) Documentation that the completed groundwater corrective actions, if necessary, were performed in accordance with license requirements and regulations.
  - (v) Discussion of results of State's site closure inspection.
  - (vi) Documentation that release of this portion of the site will not negatively impact the remainder of the site to be closed at a later date, if it is a partial license termination case. Such documentation could be a statement from the appropriate State regulatory agency which confirms that the impact has been evaluated and includes the bases for the State's conclusion.
  
- b. Non-conventional Uranium Mill License (Mainly In-situ Uranium Extraction License)
  - (i) A brief description of licensee's activities associated with license termination.

- (ii) Groundwater information which demonstrates that the groundwater has been adequately restored to meet the State restoration criteria.
- (iii) Documentation that the production, injection, and monitoring wells have been closed and plugged in accordance with the State criteria. Such documentation could be a copy of correspondence from the State to the licensee which confirms that all wells have been closed and plugged in accordance with the State criteria or a statement from the appropriate State regulatory agency to that effect.
- (iv) Decommissioning information which documents that all contaminated materials have been removed from the site.
- (v) Discussion of results of radiation survey and confirmatory soil samples which indicates that the subject site meets unrestricted release requirements.
- (vi) Discussion of results of the State's site closure inspection.
- (vii) Documentation that release of this portion of the site will not negatively impact the remainder of the site to be closed at a later date, if it is a partial license termination case. Such documentation could be a statement from the appropriate State regulatory agency which confirms that the impact has been evaluated and includes the bases for the State's conclusion.

Note: Additional information may be required on a case-by-case basis for the termination of a non-in-situ uranium extraction license under the non-conventional uranium license category.

2. The second basis would be NRC reviews of the Agreement State's uranium recovery regulatory program, currently conducted under the Integrated Materials Performance Evaluation Program (IMPEP). The results of the IMPEP reviews would provide a basis for confidence on the determinations and conclusions reached by the Agreement State, as set out in the completion report, and also a basis of confidence that the State's reviews, licensing actions, and inspections associated with termination have been conducted appropriately. The

periodic reviews of selected technical areas, conducted under IMPEP, which also include training and qualifications of staff and adherence to necessary program procedures, e.g., license termination process for uranium recovery licenses or equivalent procedures, will also serve as a basis that all applicable standards and requirements are met.

Note that the NRC staff would not duplicate the State's review by conducting an independent detailed technical review of the proposed license termination or determination of any specific documentation for the Agreement State licensees. Rather, the NRC staff would rely on a review of the completeness and documentation of the Agreement State action as well as the normal periodic NRC review of the Agreement State program under IMPEP.

E. Process to be followed for NRC determination:

1. A detailed step by step license termination process for conventional and non-conventional uranium mill licenses in Agreement States is documented in Appendix B. The NRC staff would review the completion review report and rely on the adequacy and compatibility of the Agreement State's program to regulate uranium recovery licensees to confirm that the State's conclusions demonstrate that all appropriate requirements have been met by its licensee. An Agreement State request for amendment to release a portion of site from license also requires NRC to make a determination based on a site specific completion review report for that portion of the site. Similar license termination processes would be followed for both partial and entire license termination cases.
2. Given a determination that all applicable standards and requirements have been met, the NRC should notify the State of its determination by formal correspondence. Upon notification from the NRC, the Agreement State should be ready to terminate the specific license, if it is a non-conventional uranium mill license, or amend the license to remove the remediated portion from that license, if the license is being partially terminated.
3. For the full termination of a conventional uranium mill license, the NRC staff would also review a site Long-Term Surveillance Plan (LTSP) submitted by the custodial agency. Provisions and activities identified in the final LTSP will form the bases of the custodial agency's long-term surveillance at the site. Note that sites that have been partially terminated have involved areas surrounding

the actual milling area which were released without the need for a LTSP. The review of the LTSP would be very similar for both NRC and Agreement State licensees since the review and acceptance of the LTSP is conducted in accordance with 10 CFR § 40.28 which is the sole purview of the NRC. Given NRC's determination that all applicable standards and requirements have been met and upon notification from the NRC that a LTSP has been accepted, the Agreement State should be ready to terminate the conventional uranium license.

## **VI. APPENDICES**

Appendix A - Completion Review Report

Appendix B - Termination Process for Conventional and Non-conventional Uranium Mill Licenses in Agreement States

## **VII. REFERENCES**

1. Section 274 Atomic Energy Act of 1954, as amended.
2. 10 CFR Part 150, Exemptions and Continued Regulatory Authority in Agreement States and in Offshore Waters Under Section 274.
3. Management Directive 5.6, "Integrated Materials Performance Evaluation Program."
4. Management Directive 9.15, "Organization and Functions, Office of State Programs."
5. SECY-99-025, "Guidance to Terminate Agreement State Uranium Recovery License under Requirement of 10 CFR 150.15a(a) and Section 274c."

## APPENDIX A

### COMPLETION REVIEW REPORT

DATE: March 1997

DOCKET NO.: 40-8902      LICENSE NO.: SUA-1470

LICENSEE: Atlantic Richfield Company

FACILITY: Bluewater Uranium Mill

PROJECT MANAGER: Kenneth Hooks

TECHNICAL REVIEWERS: Elaine Brummett, Ted Johnson, Dan Rom

#### Introduction

The Atlantic Richfield Company's (ARCO's) Bluewater site is one of the conventional uranium mill and tailings sites to be decommissioned and reclaimed by individual U.S. Nuclear Regulatory Commission licensees under Title II of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). UMTRCA requires that prior to termination of the license, the NRC shall determine whether the licensee has complied with all applicable standards and requirements. This report documents the NRC staff's bases for its conclusion that decommissioning and reclamation have been acceptably completed at the Bluewater site.

#### Background

The Bluewater Uranium Mill site is located about 10 miles northwest of the city of Grants in Cibola County, New Mexico. The mill began operation in 1953, and ARCO discontinued milling operations and began site reclamation in 1982. The NRC assumed licensing responsibility for the site from the state of New Mexico in 1986. ARCO (then Anaconda Minerals Company) submitted its site reclamation plan to the NRC in 1986 (ARCO, 1986), and submitted a revised plan in 1990 (ARCO, 1990). The NRC approved the plan in 1990 (NRC, 1990). Decommissioning of the mill was begun in 1987, and completed in 1990 (ARCO, 1991). Reclamation of the site was completed in 1995 and ARCO submitted its Bluewater Uranium Mill Completion Report (CR) in April 1996 (ARCO, 1996A).

#### Evaluation of Completion of Site Reclamation

The following sections provide the results of the evaluation of ARCO's site reclamation by technical specialists in geotechnical engineering, surface water hydrology and erosion protection, radiation cleanup and control, and groundwater hydrology.

#### Geotechnical Engineering

The NRC staff reviewed the CR to evaluate whether the geotechnical engineering aspects of site reclamation were completed and documented in accordance with 10 CFR Part 40, Appendix A, Criteria 4 and 6, the approved Reclamation Plan (ARCO, 1990) and ARCO construction specifications. Items reviewed included descriptions of construction operations; as-built drawings; laboratory and field testing data; and quality control inspection reports. In addition to review of the CR, the evaluation was based on staff observations and reviews of records during site visits and on-site inspections (Attachment 2).

During its review, the NRC staff noted the following:

1. Appropriate tests (gradation and Atterberg limits) and inspections were performed by ARCO or its agents to ensure that the proper material type was placed in each phase of construction. Placement and compaction of construction materials were routinely inspected to ensure that moisture and density requirements were met, and soil moisture was uniform throughout the compacted lifts. The loose thickness of the lifts was verified periodically to ensure compliance with the specification requirements for each particular type of material.
2. Laboratory and field testing was conducted in accordance with acceptable test procedures by trained and qualified personnel. Records indicating acceptable calibration of measuring and testing equipment were provided during on-site inspections and in the CR.
3. The CR shows that frequencies of material testing and inspection complied with those specified in the Reclamation Plan (ARCO, 1990) and the NRC Staff Technical Position on Testing and Inspection Plans (NRC, 1989A).
4. Continuous inspections confirmed that the volume of organics included in the construction materials was limited to the range in the Reclamation Plan (ARCO, 1990) and in ARCO's specifications.
5. The radon barrier layer was continually inspected to ensure that the specified lift thicknesses and compaction levels were achieved.
6. The material type, placement, and compaction methods used for the radon barrier layer resulted in the desired permeability and density of the barrier.
7. As-built drawings in the CR adequately document that the completed reclamation activities were consistent with the NRC-approved Reclamation Plan (ARCO, 1990).

The NRC staff concludes that the geotechnical engineering aspects of reclamation were generally performed in accordance with the requirements of 10 CFR Part 40, Appendix A, Criteria 4 and 6, the Reclamation Plan (ARCO, 1990) and ARCO construction specifications.

#### Surface Water Hydrology and Erosion Protection

NRC staff reviewed the surface water hydrology and erosion protection aspects of remedial actions at ARCO to ensure that they were constructed in accordance with the applicable construction specifications. Areas of review included construction operations, laboratory and field testing, and as-built drawings. In addition, the review was based on NRC observations of the remedial actions and review of records and testing during NRC onsite inspections.

The reclamation design included erosion protection in several specific areas, including riprapped top slopes and side slopes. The top and side slopes were designed to prevent long-term erosion and gulying of the cell cover.

The NRC staff reviewed each of these features and determined that the testing, placement, and final configuration complied with specifications in the reclamation plan. The review was partially based on NRC staff observations and review of onsite records, as well as assessment of the verification results presented in the CR. In addition, the NRC staff reviewed records of the placement of riprap on the top and side slopes.

During the review, the NRC staff noted the following:

1. Tests (gradation and durability) and inspections were performed to ensure that erosion protection materials were properly selected. The review of the documentation indicated that placement of materials was routinely inspected to ensure that the rock size and gradation specifications were met. Likewise, the thickness of the rock layers were verified periodically to ensure compliance with the specifications for the particular type of material.
2. Laboratory and field testing was conducted in accordance with specified test procedures.
3. Testing and inspection frequencies for materials used at the site for erosion protection were documented as complying with the frequencies specified in the reclamation plan.
4. On June 10, 1996 (NRC, 1996B) the staff conducted an inspection of the rock placement at the ARCO site. During the inspection, the staff observed that several areas existed where the rock did not appear to be adequately placed. In several areas, particularly on the spillway of the main tailings impoundment, there were several large areas where the rock had not been placed in accordance with gradation and thickness specifications. Several areas appeared to be thin and did not appear to have rock of adequate size to meet the requirements of the construction specifications. The NRC staff requested that ARCO either repair the rock or provide additional justification that the rock had been properly placed.

By letter dated October 8, 1996, ARCO provided "Bluewater Mill Site Main Tailings Spillway Rock Verification." (ARCO, 1996F). This report supplemented the original CR and provided the results of additional sampling and construction of the erosion protection at the site. The staff reviewed this information and concluded that the rock repairs were properly made and that the rock in the spillway area is now in conformance with applicable requirements of the license. ARCO replaced rock in several areas and provided the results of in-place tests performed in several areas.

Based on NRC staff observations and review of onsite records during remedial actions, as well as assessment of the verification results presented in the CR and supplements to the CR, the NRC staff concludes that the required durability and gradation tests were performed during the remedial action. Based on these tests, the riprap is of adequate quality and has been acceptably placed.

Based on the information provided by ARCO, the staff concludes that the erosion protection that has been constructed at the site meets the requirements of the approved Reclamation Plan (ARCO, 1990) identified in License Conditions Nos. 36 and 38, and the following criteria of 10 CFR Part 40, Appendix A:

Criterion 1(c): Erosion, disturbance, and dispersion by natural forces over the long term are minimized.

Criterion 4(d): The rock cover reduces wind and water erosion to negligible levels, including consideration of such factors as the shape, size, composition, and gradation of the rock particles; rock cover thickness and zoning of particle size; and steepness of underlying slopes. Rock fragments are dense, sound, and resistant to abrasion, and free from cracks, seams, and other defects.

Criterion 6: The design will be effective for a period of 1000 years, or at least 200 years.

Criterion 12: Active on-going maintenance is not necessary to preserve isolation of tailings.

The contaminated tailings are protected from flooding and erosion by a properly-constructed rock riprap layer. The riprap has been designed, selected, and placed in accordance with the guidance suggested by the NRC staff. The selected rock meets durability requirements and is capable of providing the necessary erosion protection for a long period of time. Further, the riprap layers were placed in accordance with accepted engineering practice and in accordance with appropriate testing and quality assurance controls. The staff considers that the erosion protection will be effective over the 1000-year design life.

#### Radiation Cleanup and Control

The NRC staff reviewed radiation aspects of remedial actions at the ARCO Bluewater mill site to ensure that contaminated material was cleaned up and controlled in accordance with specifications in the Reclamation Plan, License Conditions 31 and 36, criteria in 10 CFR 40.42, and Part 40 Appendix A Criterion 6. Areas of review included contaminated material excavation, soil cleanup verification procedures and data, final radon flux measurements, and cover radiological data. The review was based partially on the staff's assessment of information presented in the CR, as amended by submittals dated September 23 (ARCO, 1996B), October 18 (ARCO, 1996C), November 5 (ARCO, 1996E), and December 3, 1996 (ARCO, 1996G). The Windblown Contamination

Cleanup Report of October 1992 (ARCO, 1992) was also reviewed. The Mill Decommissioning Report was reviewed previously by NRC staff and found acceptable (NRC, 1991). No buildings remain on the remediated portion of the site.

Decommissioning records review and confirmatory survey activities were conducted by staff during inspections performed June 10 to 12 (NRC, 1996B), October 3, 1996 (NRC, 1996C), and January 7, 1997 (NRC, 1997). These inspections documented that the data reviewed and the radiological survey results were acceptable, except for some Th-230 values which are addressed below.

The criteria and methods for site cleanup and for control of gamma exposure and radon flux from the disposal cell were established in the Reclamation Plan and concurred in by NRC staff (NRC, 1990) as providing assurance that the processing site and disposal cells would meet the requirements of 10 CFR Part 40 Appendix A. Subsequently, several approved revisions were made to the plan, as documented in License Conditions 31 and 36.

The regulations to be met for this portion of the CR review include 10 CFR 40.42(j) which requires, in part, NRC Form 314 or equivalent information, and a radiation survey and report with gamma radiation levels in mSieverts or microrentgen per hour at one meter. Also, Part 40.42(k) states that licenses will be terminated when NRC determines reasonable effort has been made to eliminate residual radioactive contamination, and the radiation survey and other submitted information demonstrate the premises are suitable for release. In addition, Part 40 Appendix A Criterion 6 has radiological requirements for the disposal cell cover and limits for radium (Ra-226) in soil.

Part 40 Appendix A does not contain criteria for thorium (Th-230) soil cleanup, although 40.42(k) indicates any residual contamination must be addressed. Therefore, a cleanup guideline for thorium (Th-230) was proposed in the event significant Th-230 levels had leached to a depth below the excavation depth for Ra-226, beneath the evaporation ponds. The guideline of 14.5 pCi/g Th-230 for surface material was based on meeting the 5 pCi/g Ra-226 criterion for 1000 years. This approach was considered appropriate by NRC staff because the ponds area is next to the disposal cell and is part of the parcel that will be deeded to the long-term custodian for perpetual maintenance.

During the review, with respect to the above criteria and commitments, NRC staff noted the following:

1. Soil Cleanup and Verification: NRC granted an exemption/alternative (license amendments 8 and 23) to the soil Ra-226 cleanup standards for 252 acres (210 acres south of the main pile and adjacent to the east edge of the carbonate pile, plus 42 acres of scattered outcrops in the restricted area) because the rough volcanic rock surface was difficult and costly to clean to the standard. The average Ra-226 value for these areas that will be deeded to the government for perpetual care is 9.9 pCi/g above background.

The evaporation ponds area was remediated and contoured to the final drainage design before all the Th-230 analyses were submitted to the NRC. Of 95 composite samples, the average value is 9.6 pCi/g. However, over approximately 30 acres, 13 Th-230 values exceed the guideline with a maximum value of 79.9 pCi/g (ARCO, 1996B). Staff noted an inconsistency with the ARCO data for 3 of the 12 archived samples analyzed by the NRC contractor laboratory. For one of these, the ARCO value was significantly higher than the value reported by other laboratory, but the source of the discrepancy could not be identified. The staff then requested that the licensee perform a risk assessment to determine the acceptability of the residual contamination assumed to remain.

ARCO provided a risk analysis (ARCO, 1996B) with one scenario involving an on-site maintenance worker one week a year, and the other involving a resident at the property fence (one mile from the thorium deposit). The dose to the worker at the maximum gamma level, based on a soil concentration of Th-230 of 70 pCi/g (resulting in 25 pCi/g Ra-226 in 1000 years), was calculated to be 2 mrem/year and the CEDE for inhalation contributed 0.2 mrem/year. The estimated inhalation dose to the downwind resident from the average soil Th-230 (10 pCi/g) was approximately 0.3 mrem/year.

The staff utilized the RESRAD computer code to calculate the maximum dose within 1000 years to a worker on-site two weeks a year and a resident farmer on site. Only the radon, soil, and ground pathways were used for the worker. All but the radon, fish, and dairy exposure pathways were used for the resident. The Th-230 soil levels (assumed 1.5 feet in depth) were assumed to be 50 pCi/g for the worker and an average of 20 pCi/g for the resident. The resulting maximum doses were 0.9 and 24.5 mrem/year for the worker and resident, respectively. These conservative scenarios indicate that potential exposure to the public would not approach the 100 mrem/yr limit, if the Th-230 material were to remain unexcavated. Because a maintenance worker would not be expected to spend more than a few hours a year in the elevated Th-230 area, and there will not be a farmer within a mile of the area, the public health is protected, even if the average Th-230 value is twice what ARCO reported.

In addition, ARCO submitted (ARCO, 1996G) a cost estimate of \$674,000 for remediation of the residual Th-230. This amount for construction appears reasonable and did not include the cost of additional soil sampling and analysis that would be necessary to demonstrate compliance with the guideline. Therefore, staff concludes that any potential minor health benefit from remediation of the Th-230 deposits is not justified because of the cost.

The CR indicates that standard procedures for soil verification were appropriately applied. The licensee reported values of counts/half minute with a shielded probe 4 inches above the ground. This procedure was approved with the Reclamation Plan as being most appropriate in areas with a large gamma "shine" field. The site, except for the outlying 1600 acres, was divided into 33 X 33 foot (10 x 10 meter) grids and composite soil samples or gamma readings were taken, as designated in the plan, to

verify cleanup levels. Staff determined that the quality assurance program delineated in the plan had been followed, and that the data is adequate to demonstrate compliance with the soil Ra-226 cleanup standards.

2. **Equipment and Building Cleanup:** A potential problem with the determination of surface activity was discovered during the inspection of October 3, 1996 (NRC, 1996C), because an incorrect efficiency factor was used for converting instrument readings (counts) to activity (disintegrations). However, the licensee had enforced a surface release limit 25 percent lower than the guideline value so no material exceeding the guideline limit was released from the site.
3. **Radon Flux:** Previous NRC approval was provided for the Main Tailings Pile (NRC, 1995B) and the Carbonate Tailings Pile (NRC, 1995A) radon flux data, and the data for the other disposal cells were reviewed with the CR. Radon flux measurements were performed as required by Criterion 6 (2) and (4) and the average flux values are well below the 20 pCi/m<sup>2</sup>s limit. The long-term radon flux design was approved with the Reclamation Plan (NRC, 1990).
4. **Cover Radiation Levels:** Staff determined that the number of measurements and resulting data for all of the disposal cells is acceptable for demonstrating that the cell covers have reduced gamma exposure levels from the waste to approximately background. Also, the licensee provided data (Appendix C of the Reclamation Plan) indicating that the material to be utilized for the radon barrier of the cover had Ra-226 values within the range of local soil background values.

Based on the above observations, and on the results of on-site inspections performed by NRC staff during and after construction, the NRC staff concludes that the radiological aspects of construction were performed in accordance with the approved Reclamation Plan and radiological cleanup and control verification data demonstrate compliance with Criterion 6 in 10 CFR Part 40, Appendix A. Information equivalent to NRC Form 314, radiation survey data, and a report were provided by the licensee. The NRC staff determined that the information provides reasonable assurance that the land, beyond the area to be deeded to the federal government, is suitable for release.

## Groundwater Remediation

The initial NRC license for ARCO's Bluewater site, issued by NRC letter dated November 21, 1986 (ARCO, 1996), required ARCO to continue to meet certain State of New Mexico discharge permits. The NRC approved a groundwater sampling program in Amendment 3 to the license, issued by letter dated June 1, 1988 (NRC, 1988), to gather data to establish appropriate background concentration limits. Such limits were established, for natural uranium, molybdenum and selenium, in LC 34 issued by Amendment 6, February 17, 1989 (NRC, 1989B). ARCO's groundwater corrective action program (CAP), essentially pumping and evaporation to return groundwater concentrations to background, was approved by the NRC in Amendment 7, dated August 18, 1989 (NRC, 1989C). This CAP was operated for a short time, but it proved to be ineffective in reducing contaminant concentrations. Consequently, a modified CAP, using a wick system to remove tailings liquor from the tailings impoundment, was approved by Amendment 20 issued February 16, 1993 (NRC, 1993).

The NRC staff agrees with ARCO's conclusions in the CR (ARCO, 1996A) that the groundwater corrective action program (CAP), approved by the NRC (NRC, 1993) and implemented by ARCO, reduced groundwater contaminants from the tailings impoundments to levels protective of human health and the environment, which were approved by the NRC as alternate concentration limits (ACL's) for natural uranium, molybdenum and selenium (ARCO, 1996A). ARCO conducted measurements in 1997 that demonstrated groundwater contaminant levels at the point of compliance wells met applicable standards, including those in 10 CFR Part 40, Appendix A, Criterion 5c and the ACL's. In addition, ARCO demonstrated that the final radon barrier on the impoundments met permeability requirements which will limit infiltration such that future exceedance of the standards is not expected. Staff review found the measurement techniques and results acceptable. Therefore, the groundwater is in compliance with Criteria 5 and 13 of 10 CFR Part 40, Appendix A, and License Condition 34.

## Summary and Conclusions

The NRC staff reviewed geotechnical engineering, surface water hydrology and erosion protection, radiation cleanup and control, and groundwater hydrology aspects of the reclamation of ARCO's Bluewater Mill site. Based on its evaluation of the CR and observations made during periodic on-site inspections, the NRC staff concludes that reclamation of the site was performed in accordance with accepted design and applicable standards. Therefore, the NRC staff concludes that reclamation of the 11e(2) byproduct material is acceptable, and license SUA-1470 for ARCO can be terminated contingent upon payment by ARCO of acceptable long-term care funding and acceptance by the NRC of the final Long-Term Surveillance Plan submitted by DOE.

## References

### Atlantic Richfield Company (ARCO), Grants, New Mexico

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- ARCO. 1996C Completion Report Addendum 2. Responses to Inspection Exit Questions. October 18, 1996
- ARCO. 1996D Completion Report Addendum 3. Well Locations and Abandonment. November 14, 1996
- ARCO. 1996E Completion Report Addendum 4. Construction Report for PCB and Waste Cells. November 5, 1996
- ARCO. 1996F Supplement to Completion Report Appendix C. Spillway Rock Verification. October 8, 1996
- ARCO. 1996G Cost Estimate for Thorium 230 Remediation. December 3, 1996

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- NRC. 1989A Staff Technical Position on Testing and Inspection Plans During Construction of DOE's Remedial Action at Inactive Uranium Mill Tailings Sites. Revision 2. January 1989.
- NRC. 1989B Approval of Groundwater Standards and Compliance Monitoring Program. License Amendment No. 6. August 18, 1989
- NRC. 1989C Approval of Groundwater Corrective Action Plan. License Amendment No. 7. August 18, 1989

NRC. 1990 Approval of Reclamation Plan. License Amendment No. 11.  
August 10, 1990

NRC. 1991 Memorandum for Docket File 40-8902. "Review of ARCO's Bluewater  
Mill Decommissioning Report." June 12, 1991

NRC. 1993 Approval of Modified Corrective Action Plan. License Amendment  
No. 20. February 16, 1993

NRC. 1995A Letter "Radon Flux Measurements on Carbonate Tailings Pile."  
March 10, 1995

NRC. 1995B Letter "Radon Flux Measurements on the Bluewater Mill Site Main  
Impoundment." December 13, 1995

NRC. 1996A Approval of Groundwater Alternate Concentration Limits. License  
Amendment No. 30. February 22, 1996

NRC. 1996B Inspection Report 40-88902/96201. August 1, 1996

NRC. 1996C Inspection Report 40-8902/96-01. December 9, 1996

NRC. 1997 Inspection Report 40-8902/97-01. January 27, 1997

## Partial List of Inspections/Site Visits

<u>DATE</u>	<u>STAFF</u>	<u>PURPOSE</u>
7/7-11/86	N. Shopenn R. Heyer L. Wilborn R. Brich C. Jierree P. Garcia	Site assessment and radiation safety inspection
11/17-18/87	H. Rose R. Heyer	Radiation safety inspection
9/27/89	P. Garcia	Radiation safety inspection
2/5/90	P. Garcia G. Konwinski	Radiation safety inspection
4/9/91	R. Gonzales	Radiation safety inspection
3/22/91	D. Ward	Radiation safety inspection
4/23/91	D. Ward P. Garcia	Radiation safety inspection
5/20/93	P. Garcia	Decommissioning operations and radiation safety program
9/1/93	G. Konwinski	Decommissioning activities
3/29/94	R. Gonzales T. L. Johnson L. C. Carson	Decommissioning and reclamation activities
5/11/94	R. Evans L. C. Carson P. Garcia R. Gonzales K. Hooks	Site visit
8/30/94	D. Rom T. Harris	On-site construction review
3/8/95	L. C. Carson	Radiation safety inspection
3/27/95	T. L. Johnson	Inspection of erosion protection activities

DATE

STAFF

PURPOSE

6/10-12/96

K. Hooks  
T. L. Johnson  
M. L. McLean  
D. Rom  
E. Abelquist  
S. Abt  
J.C. Chen

Construction completion inspection

10/3/96

R. Evans  
R. Morton  
T. Vitkus

Soil cleanup inspection

1/7/97

R. Evans

Inspection of site reclamation

## **APPENDIX B**

### **Termination Process for Conventional and Non-Conventional Uranium Mill Licenses in Agreement States**

Termination of uranium licenses in Agreement States has been divided into two major parts as follows: (a) termination of conventional uranium mill licenses; and (b) termination of non-conventional uranium mill licenses (mainly in-situ uranium extraction licenses).

#### (a) Termination of Conventional Uranium Mill Licenses

Step 1 through step 7 are applied to entire license termination cases; steps 1, 2, 5 and 6 are applied to partial license termination cases.

#### **Step 1: Licensee Documentation of Completed Remedial and Decommissioning Actions**

Licensees are required under 10 CFR 40.42(j) or equivalent Agreement State regulations to document the results of site decommissioning, which is accomplished by conducting a radiation survey of the premises where the licensed activities were carried out. The results of this survey, the contents of which are specified at the Agreement State regulation equivalent to 10 CFR 40.42(j)(2), are submitted to the State for review.

Criteria 5A-5D, along with Criterion 13, of Appendix A under 10 CFR 40 or equivalent Agreement State regulations incorporate the basic groundwater protection standards imposed by U.S. Environmental Protection Agency (EPA) in 40 CFR Part 192, Subparts D and E. These standards apply during operations and prior to the end of closure. Licensees may refer to the introduction section of the 10 CFR 40, Appendix A, or equivalent Agreement State regulations with respect to the use of alternative standards for groundwater protection.

If the groundwater protection standards are exceeded, the licensee is required to put into operation a groundwater corrective action program (CAP). The objective of the CAP is to return the hazardous constituent concentration levels to the concentration limits set as standards. For licensees with continuing groundwater cleanup, State approval is required for the termination of corrective action. Appropriate groundwater monitoring data and other information that provide reasonable assurance that the groundwater has been cleaned to meet the appropriate standards are submitted to the State for review.

#### **Step 2: Review of Completed Closure Actions by the Agreement State**

Upon receipt of the decommissioning report, and if necessary, groundwater completion report, the State staff should review the content of the reports for documentation of acceptable completion of the applicable aspect of closure. The State staff should also review the licensee's completed reclamation of the tailings disposal cell. As part of its review, the State staff should

conduct site inspections, examining first-hand the closure actions taken. Additionally, the State staff should conduct a final construction-completion inspection, which is expected to consist of a site walk-over.

Typically, there is an observational period following the completion of surface remedial actions for the State to assess the potential long-term stability of the tailings disposal cell. Licensees should report significant cell degradation occurring during this period. All identified hazardous constituents for which groundwater compliance sampling is being conducted at a licensed site must be returned to the concentration limits set as standards prior to termination of the specific license. At license termination, the State should require licensees to sample for all constituents previously identified in the tailings liquor to ensure that no further remediation is necessary. The State should not terminate a specific license while a groundwater CAP is in operation.

### **Step 3: Long-Term Site Surveillance Funding**

Prior to termination of the specific license, the State should establish the final amount of the long-term site surveillance fund to be paid by the licensee in accordance with Criterion 10 of Appendix A under 10 CFR 40 or equivalent Agreement State regulations. The State's process for determining this amount should include consultations with the custodial agency. Payment of this amount to the appropriate State agency or the custodial agency is required prior to termination of the specific license.

### **Step 4: Preparation of the Long-Term Surveillance Plan (LTSP)**

While surface remediation and groundwater cleanup activities are ongoing, it is in the best interest of the licensee to begin interaction with the custodial agency with regard to that agency's preparation of the site LTSP. The custodial agency's responsibilities under the general license are defined in the LTSP. The required contents of which are provided at 10 CFR 40.28 and in Criterion 12 of Appendix A.

In addition to the regulatory requirements, the NRC should also require that the LTSP contain documentation of title transfer of the site from the licensee to the custodial agency. Because the LTSP must reflect the remediated condition of the site, it is expected that the existing licensee will interact with the custodial agency in the preparation of the LTSP.

### **Step 5: Site Ready for License Termination**

When a licensee has completed site reclamation, decommissioning, and/or groundwater corrective action, and is ready to terminate its specific source material license, the licensee should formally notify the State of its intentions.

## **Step 6: Termination of the Specific License**

Under Section 150.15a(a), the NRC determines whether all applicable standards and requirements have been met by the licensee in the completion of site reclamation, decommissioning, and/or groundwater corrective action. After completing the review of the licensee's performance of remedial actions, the State will be requested to submit a completion review report documenting the State staff's bases for its conclusion that all requirements have been met to the NRC for review.

Upon receipt of the completion review report submitted by the State, the NRC staff would review the document for completeness of the State's review process. If the content of the completion review report did not demonstrate that a complete review has been performed, the NRC could request additional information from the State prior to making its determination. The completion review report, similar to that contained in Appendix A of the SA-900 procedure, should include the following information:

1. A brief description of licensee's activities associated with decommissioning, tailings remediation and/or groundwater cleanup.
2. Documentation that the completed surface remedial actions were performed in accordance with license requirements and regulations.
3. Documentation that the completed site decommissioning actions were performed in accordance with license requirements and regulations. This documentation should include a discussion of results of radiation survey and confirmatory soil samples which indicates that the subject site meets unrestricted release requirements.
4. Documentation that the completed groundwater corrective actions, if necessary, were performed in accordance with license requirements and regulations.
5. Discussion of results of State's site closure inspection.
6. Documentation that release of this portion of the site will not negatively impact the remainder of the site to be closed at a later date, if it is a partial license termination case. Such documentation could be a statement from the appropriate State regulatory agency which confirms that the impact has been evaluated and includes the bases for the State's conclusion.

NRC's determination shall rely upon the State's reviews and acceptance of the documentation provided by the licensee. In addition, results of the State site closure inspection activities, potentially including limited confirmatory radiological surveys, will provide supplemental information to the NRC's determination. NRC's periodic Integrated Materials Performance Evaluation Program (IMPEP) reviews of the Agreement State's regulatory program provide

confidence that the State's reviews, licensing actions, and inspections associated with termination have been conducted appropriately, from a health and safety (adequacy) and compatibility perspective. Given a determination that all applicable standards and requirements have been met, the NRC should notify the State of its determination by formal correspondence. If it is a partial license termination case which an LTSP is not required, the State should be ready to amend the license to remove the remediated portion from it.

### **Step 7: Termination of the Specific License/Issuance of the General License**

In termination of an entire license, an LTSP is required prior to termination of the specific license and placement of the site and byproduct material under the 10 CFR 40.28 general license. Review and acceptance of the LTSP is the sole purview of the NRC. Lack of NRC acceptance of a site LTSP can delay termination of the specific license.

The NRC staff's acceptance of an LTSP should be documented in written notification to the relevant Agreement State, custodial agency, and, separately, by noticing the action in the Federal Register. Given NRC's determination that all applicable standards and requirements have been met and upon notification from the NRC that LTSP has been accepted, the Agreement State should be ready to terminate the specific license and to transfer the long-term care funds to the U.S. general treasury. The long-term custodian, for its part, should be prepared to accept title to the land and byproduct material.

#### **(b) Termination of Non-Conventional Uranium Mill Licenses (Mainly In-Situ Uranium Extraction Licenses)**

The following steps are applied to both partial and entire license termination cases.

### **Step 1: Licensee Documentation of Completed Decommissioning and/or Groundwater Restoration Actions**

When the surface reclamation and/or groundwater restoration is complete, the licensee should submit (i) groundwater information which demonstrates that groundwater has been restored in accordance with the State criteria and (ii) documentation indicating that the production, injection, and monitoring wells have been closed and plugged in accordance with the State criteria, to the State for review.

Licensees are also required under 10 CFR 40.42(j) or equivalent Agreement State regulations to document the results of site decommissioning, which is accomplished by conducting a radiation survey of the premises where the licensed activities were carried out. The results of this survey, the contents of which are specified at the Agreement State regulation equivalent to 10 CFR 40.42(j)(2), are submitted to the State for review.

When a licensee is ready to terminate its specific source material license, the licensee should formally notify the State of its intents.

### **Step 2: Review of Completed Closure Actions by the Agreement State**

Upon receipt of the decommissioning report, and if necessary, groundwater restoration report, the State staff should review the content of the report for documentation of acceptable completion of the applicable aspect of closure. As part of its review, the State staff should conduct site inspections, examining first-hand the closure actions taken. Additionally, the State staff should conduct a final site inspection, which is expected to consist of a site walk-over.

### **Step 3: Termination of the Specific License**

Under Section 150.15a(a), the NRC determines whether all applicable standards and requirements have been met by the licensee in the completion of decommissioning and/or groundwater restoration actions. After completing the review of the licensee's performance of remedial actions, the State will be requested to submit a completion review report documenting the State staff's bases for its conclusion that all requirements have been met to the NRC for review.

Upon receipt of the completion review report submitted by the State, the NRC staff would review the document for completeness of the State's review process. If the content of the completion review report did not demonstrate that a complete review has been performed, the NRC could request additional information from the State prior to making its determination. The completion review report, similar to that contained in Attachment 1, should include the following information:

1. A brief description of licensee's activities associated with license termination.
2. Groundwater information which demonstrates that the groundwater has been adequately restored to meet the State restoration criteria.
3. Documentation that the production, injection, and monitoring wells have been closed and plugged in accordance with the State criteria. Such documentation could be a copy of correspondence from the State to the licensee which confirms that all wells have been closed and plugged in accordance with the State criteria or a statement from the appropriate State regulatory agency to that effect.
4. Decommissioning information which documents that all contaminated materials have been removed from the site.

5. Discussion of results of radiation survey and confirmatory soil samples which indicates that the subject site meets unrestricted release requirements.
6. Discussion of results of the State's site closure inspection.
7. Documentation that release of this portion of the site will not negatively impact the remainder of the site to be closed at a later date, if it is a partial license termination case. Such documentation could be a statement from the appropriate State regulatory agency which confirms that the impact has been evaluated and includes the bases for the State's conclusion.

Note: Additional information or steps may be required on a case-by-case basis for the termination of a non-in-situ uranium extraction license under the non-conventional uranium license category.

NRC's determination will rely primarily upon the State's reviews and acceptance of the documentation provided by the licensee. In addition, results of the State site closure inspection activities, potentially including limited confirmatory radiological surveys, provide supplemental information to the NRC's determination. NRC's periodic IMPEP reviews of the Agreement State's regulatory program provide confidence that the State's reviews and licensing actions associated with termination have been conducted appropriately, from a health and safety (adequacy) and compatibility perspective.

Given a determination that all applicable standards and requirements have been met, the NRC should notify the State of its determination by formal correspondence. Upon notification from the NRC, the Agreement State should be ready to terminate the specific license or amend the license to remove the remediated portion from it, if the license is being partially terminated.