

July 3, 2001

Mr. Ernie Scott
Anadarko Petroleum Corporation
Bear Creek Uranium Company
2515 Foothill Blvd., Suite 300
Rock Springs, WY 82901

SUBJECT: REVIEW OF THE BEAR CREEK TAILINGS RECLAMATION CONSTRUCTION
REPORT, AMENDMENT NO. 45 TO SOURCE MATERIAL LICENSE SUA-1310

Dear Mr. Scott:

By letter dated March 16, 2000, Bear Creek Uranium Company (BCUC) submitted the *Bear Creek Tailings Reclamation Construction Report* to document the completion of reclamation of the tailings disposal cell at the Bear Creek site. In conjunction with this report, BCUC submitted a letter, also dated March 16, 2000, requesting amendments to License Conditions (LCs) 2, 27, 33, 36, 37, 40, 44, 47, and 49 of Source Material License SUA-1310 to reflect completion of reclamation at Bear Creek and to facilitate eventual termination of the license. To facilitate the staff's review of the BCUC amendment request, the staff conducted a final inspection of the completed reclamation construction activities at Bear Creek on July 19, 2000. In a subsequent letter dated September 29, 2000, the staff responded to BCUC's request to amend LCs 2, 27, 33, 36, 37, 40, 47, and 49 but deferred action on LC 44 pending completion of the review of the *Bear Creek Tailings Reclamation Construction Report*. The staff has completed its review of this report as well as BCUC's request to amend LC 44. The staff's review included a gamma radiation survey performed by BCUC in January 2001 over the surface of the tailings impoundment to verify the adequacy of the overall decommissioning and reclamation effort to eliminate and dispose of radioactive contamination at Bear Creek. The results of this survey were submitted in a letter dated May 4, 2001. The staff's detailed review of the *Bear Creek Tailings Reclamation Construction Report* and supporting information and BCUC's request to amend LC 44 is provided in the enclosed Technical Evaluation Report (Enclosure 1).

Based on its review, the staff concludes that reclamation of the Bear Creek tailings disposal cell was performed in accordance with the requirements of 10 CFR Part 40, Appendix A, and the BCUC *Tailings Reclamation Plan* as specified in LC 44. Accordingly, BCUC's request to amend LC 44 to reflect completion of reclamation is acceptable. As part of this evaluation, the staff has also modified LCs 2 and 47 to make administrative corrections to BCUC's license. In this regard, the staff notes that, in July 2000, Union Pacific Resources merged with Anadarko Petroleum Corporation. As such, the mailing address for the licensee in LC 2 has been modified to reflect Anadarko Petroleum Corporation as the current addressee. Lastly, in License Amendment No. 43 (NRC letter dated September 29, 2000), the staff reviewed and approved BCUC's request to add four new wells (MW-108, MW-109, MW-110, and MW-111) to the Bear Creek groundwater compliance program specified in LC 47. However, the staff inadvertently omitted the four wells from its prior amendment of LC 47 of the license and this omission has been corrected in this action. The aforementioned modifications to LCs 2, 44, and 47 are provided as Amendment No. 45 to Source material License SUA-1310 (Enclosure 2). All other conditions of the license shall remain the same.

Mr. E. Scott

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If you have any questions regarding this letter or the enclosures, please contact Rick Weller, the NRC Project Manager for the Bear Creek facility, at (301) 415-7287 or by e-mail to RMW2@NRC.gov.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room).

Sincerely,
/RA/ Dan Gillen for

Melvyn Leach, Acting Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No.: 40-8452
License No.: SUA-1310

Enclosures:

1. Technical Evaluation Report
2. Amendment 45 to Source Material License
SUA-1310

cc: WDEQ

Mr. E. Scott

-2-

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Melvyn Leach, Acting Chief
Fuel Cycle Licensing Branch
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Office of Nuclear Material Safety
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Docket No.: 40-8452
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Enclosures:
1. Technical Evaluation Report
2. Amendment 45 to Source Material License
SUA-1310

cc: WDEQ

Case closed: L51934

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**TECHNICAL EVALUATION REPORT
FOR
THE BEAR CREEK TAILINGS RECLAMATION CONSTRUCTION REPORT**

DOCKET NO.: 40-8452

LICENSE NO.: SUA-1310

LICENSEE: Bear Creek Uranium Company

FACILITY: Bear Creek

PROJECT MANAGER: Rick Weller

TECHNICAL REVIEWERS: Elaine Brummett, Ted Johnson, Dan Rom, and Rick Weller

Introduction

The Bear Creek Uranium Company (BCUC) Bear Creek site is the location of a former conventional uranium mill that is being decommissioned and reclaimed by the licensee under Title II of the Uranium Mill Tailings Radiation Control Act of 1978, as Amended (UMTRCA). UMTRCA requires that, prior to termination of BCUC's Source Materials License, the U.S. Nuclear Regulatory Commission (NRC) shall determine whether the licensee has complied with the decontamination, decommissioning, and reclamation standards prescribed by the NRC. The NRC standards for decontamination, decommissioning, and reclamation of uranium mill tailings sites are codified in 10 CFR Part 40, Appendix A. This technical evaluation report (TER) focuses on BCUC's reclamation of the tailings disposal cell and evaluates the acceptability of reclamation activities in accordance with NRC requirements and the conditions of BCUC's Source Materials License.

Background

The Bear Creek site is located approximately 45 miles northwest of Douglas, Wyoming. The Bear Creek mill operated from September 1977 until January 1986. Decommissioning of the mill occurred between August 1987 and March 1989. The mill and associated structural material were buried onsite. As a byproduct of milling operations, 4.7 million tons of uranium ore "tailings" were generated and placed in an earthen impoundment. BCUC submitted its *Tailings Reclamation Plan* in September 1986. The reclamation plan was subsequently revised in December 1989 and November 1991. The staff approved the BCUC reclamation plan in February 1992. The plans and specifications embodied in the *Tailings Reclamation Plan* are structured to ensure compliance with the standards for reclamation in 10 CFR Part 40, Appendix A.

Reclamation of the tailings impoundment was initiated in June 1997 and was completed in November 1999. In a letter dated March 16, 2000, BCUC submitted the *Bear Creek Tailings Reclamation Construction Report* to document the completion of reclamation in accordance with NRC requirements and the conditions of its Source Materials License. In conjunction with the

Bear Creek Tailings Reclamation Construction Report, BCUC submitted a letter, also dated March 16, 2000, requesting administrative and other amendments to Source Materials License SUA-1310 to reflect completion of reclamation and to facilitate eventual termination of the license. In this regard, BCUC requested amendments to License Conditions (LCs) 2, 27, 33, 36, 37, 40, 44, 47, and 49. To facilitate the staff's review of the BCUC amendment request, the staff conducted a final inspection of the completed reclamation construction activities at the Bear Creek Site on July 19, 2000. This final inspection was documented in a report dated August 18, 2000. In a letter dated September 22, 2000, BCUC responded to the observations and findings in the staff's inspection report and provided supplemental information for the *Bear Creek Tailings Reclamation Construction Report*. In a subsequent letter dated September 29, 2000, the staff responded to BCUC's request to amend LCs 2, 27, 33, 36, 37, 40, 47, and 49 but deferred action on LC 44 pending completion of the review of the *Bear Creek Tailings Reclamation Construction Report*.

Lastly, in January 2001, BCUC performed a gamma radiation survey over the surface of the reclaimed tailings impoundment to verify the adequacy of the overall decommissioning and reclamation effort to eliminate and dispose of radioactive contamination. The results of this survey were submitted in a letter dated May 4, 2001.

License Condition 44

LC 44 references the plans and specifications that BCUC was required to follow to reclaim the tailings disposal area. Those plans and specifications are specified in the approved November 1991 *Tailings Reclamation Plan*, as amended by submittals dated March 20, 1992, April 8, 1997 and October 22, 1997. As reclamation was completed at Bear Creek in November 1999, BCUC requested that LC 44 be deleted since the condition was now satisfied. Since the staff has completed the review of the *Bear Creek Tailings Reclamation Construction Report* as documented herein, this TER evaluates BCUC's compliance with the reclamation requirements of LC 44.

Evaluation of Reclamation of the Tailings Disposal Cell

The following sections provide the results of the staff's evaluation of BCUC's completed reclamation of the tailings disposal cell as documented in the *Bear Creek Tailings Reclamation Construction Report*. The staff's evaluation focused on the geotechnical engineering, surface water hydrology, erosion protection, and radiation cleanup and control aspects of reclamation construction and corresponding determinations of compliance with the plans and specifications of the *Tailings Reclamation Plan* and NRC's standards for reclamation in 10 CFR Part 40, Appendix A.

Geotechnical Engineering Review

NRC staff reviewed the *Bear Creek Tailings Reclamation Construction Report* to determine whether the geotechnical engineering aspects of the remedial action were completed in accordance with the applicable construction specifications in the *Tailings Reclamation Plan* and, correspondingly, the requirements of 10 CFR Part 40, Appendix A. Items reviewed included descriptions of construction operations, as-built drawings, laboratory and field testing data, construction inspection reports, and quality assurance summaries. The review was also based on

visual observations of the remedial action and an evaluation of test data and records during an on-site inspection.

The reclamation included the construction of an earthen cover on the stabilized tailings. The cover was placed to reduce radon emanation from the tailings. The engineered cover will also provide frost protection against degradation of the compacted soils.

NRC staff reviewed field and laboratory test records and determined that the material placement was in accordance with the project specifications. The review was based on NRC observations and a review of the written records made during reclamation. The review also confirmed that the specified testing frequencies were met.

During its review, the NRC staff noted the following:

1. Appropriate tests (gradation and Atterberg limits) and inspections were performed by the licensee to assure that the proper material type was placed in each phase of construction. Placement and compaction of construction materials were routinely inspected by the licensee to assure that the moisture and density requirements were met and that the soil moisture was uniform throughout the compacted lifts. The loose thickness of the lifts was verified periodically by the licensee to ensure compliance with the specification requirements for each particular type of material.
2. Laboratory and field testing by the licensee was conducted in accordance with acceptable test procedures and by trained and qualified personnel.
3. Frequencies of material testing and inspection comply with the rates specified in the NRC Staff Technical Position on Testing and Inspection Plans.
4. The radon barrier layer was continually inspected by the licensee to assure that the specified lift thicknesses and compaction levels were achieved.
5. The material type, placement, and compaction methods specified for the radon barrier layer resulted in the desired density of the barrier.
6. As-built drawings adequately document that the completed remedial action is consistent with the NRC-approved design.
7. Final slope, elevation, and compaction operations of the various cover layers were adequately inspected to ensure that the final conditions were consistent with those stated in the reclamation plan.
8. A self-sustaining vegetative cover has been established over the tailings cell in accordance with the reclamation plan.

Based on the above observations, the NRC staff concludes that the geotechnical engineering aspects of the tailings cell design and construction are in accordance with the specifications identified in the *Tailings Reclamation Plan* and the requirements of 10 CFR Part 40, Appendix A, Criteria 4(c), 4(d), and 6(1).

Surface Water Hydrology and Erosion Protection Review

NRC staff reviewed the surface water hydrology and erosion protection aspects of remedial actions at the Bear Creek site to determine whether they were completed in accordance with the applicable construction specifications as stipulated in the *Tailings Reclamation Plan* and, correspondingly, the requirements of 10 CFR Part 40, Appendix A. Areas of review included construction operations, laboratory and field testing, and quality assurance audits. In addition, the review was also 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 top slopes, side slopes, diversion channels, and rock toes at the outlets of the diversion channels. The riprap for the top and side slopes of the cell was designed to prevent long-term erosion and gullying of the cell cover. The riprap toes were placed to prevent erosion and migration of gullies.

The NRC staff reviewed each of the erosion protection features described above and determined that riprap testing, placement, and configurations complied with specifications in the reclamation plan. The review was partially based on NRC staff observations and review of onsite records during the reclamation activities, as well as assessment of the verification results presented in the *Bear Creek Tailings Reclamation Construction Report*. In addition, the staff reviewed records of the placement of riprap on the top and side slopes of the cell and in the diversion channels.

During the review, the NRC staff noted the following:

1. Tests (gradation and durability) and inspections were performed by BCUC 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 was verified periodically by BCUC to ensure compliance with the specifications for the particular type of material.
2. Laboratory and field testing was conducted by BCUC in accordance with specified test procedures.
3. Testing and inspection frequencies used at the site for erosion protection were in compliance with the frequencies specified in the *Tailings Reclamation Plan*.

Based on the above observations, the NRC staff has determined that specified durability and gradation tests were performed during the remedial action. The riprap is of adequate quality and has been placed in an acceptable manner. The staff concludes that the erosion protection aspects of the tailings cell design and construction are in accordance with the specifications in the *Tailings Reclamation Plan* and the requirements of 10 CFR Part 40, Appendix A, Criteria 1(c), 4(d), 6(1), and 12.

Radiation Control Review

The criteria and methods for site cleanup and radon flux control were established in the *Tailings Reclamation Plan* and concurred in by the NRC staff in February 1992, providing assurance that the former processing site and disposal cell would meet the requirements of 10 CFR Part 40, Appendix A, Criterion 6. The *Bear Creek Tailings Reclamation Construction Report*, supplemented by the gamma radiation survey submitted on May 4, 2001, was reviewed by NRC staff and the evaluation is as follows.

Land and Structures:

On September 28, 1990, the NRC staff approved the BCUC site decommissioning verification (final status) survey by License Amendment No. 24, after performing confirmatory measurements (soil analysis and gamma survey). The survey indicated that the land radium levels meet Criterion 6(6). All structures were removed from the site or buried in the tailings pile. The control of non-radiological hazards associated with the milling wastes required by Criterion 6(7) should be accomplished by meeting the land cleanup and cell cover criteria.

Radon Flux Measurement and Long-term Radon Release Estimate:

Radon flux measurements were performed by the licensee in 1998 on the radon barrier of the disposal cell cover. The submitted data were approved by NRC letter of May 3, 1999, as meeting the requirements of Criterion 6(2) to limit releases of radon-222 to levels not exceeding 20 picocuries per square meter per second (pCi/m² s).

The Completion Report indicates that the radon barrier was placed on the disposal cell in 1997 and 1998. The radon barrier average measured density was 107.8 lbs/cu.ft., the average moisture was 17.7 percent, and 65.7 percent of barrier material passed the #200 sieve while specifications require a minimum of 35 percent passing. The construction data for the placed radon barrier substantiated that the measured barrier values (density, moisture, and percent fines) were more conservative than the estimated values used in the radon flux model. Therefore, the cover, as designed and constructed, substantiates the model results that the cover will meet the long-term radon flux limit of 20 pCi/m² s in Criterion 6(1).

Cover Radiation Levels:

To demonstrate compliance with a portion of Criterion 6(1) and with Criterion 6(5), BCUC provided data to substantiate that the direct gamma exposure from the tailings or wastes is reduced to background levels and that the near surface cover material does not contain rocks or waste containing elevated levels of Ra-226. Based on the gamma readings on the pile cover and the gamma readings from near-by background locations, the licensee demonstrated that the cover radioactivity is essentially the same as surrounding soils.

Conclusions:

Based on the above information and on the results of on-site inspections performed by NRC staff during and after decommissioning and reclamation, the staff concludes that the radiological control aspects of reclamation were performed in accordance with the approved *Tailings Reclamation Plan* and demonstrate compliance with the radiological criteria in 10 CFR Part 40, Appendix A, Criteria 6(1), 6(2), 6(5), 6(6), and 6(7).

Summary and Recommended License Changes

Based on the foregoing evaluation of the geotechnical engineering, surface water hydrology and erosion protection, and radiation control aspects of the reclamation of the Bear Creek tailings disposal cell, the staff concludes that reclamation was performed in accordance with the requirements of 10 CFR Part 40, Appendix A, and the *Tailings Reclamation Plan* as specified in LC 44 of Source Materials License SUA-1310. Accordingly, the staff recommends that LC 44 be deleted, as requested by BCUC in its March 16, 2000, letter, since reclamation is acceptably complete. The staff also recommends several administrative corrections to the BCUC license. In July 2000, Union Pacific Resources merged with Anadarko Petroleum Corporation and the staff notes that the licensee mailing address in LC 2 should be amended to reflect Anadarko Petroleum Corporation as the current addressee. Lastly, in License Amendment No. 43 (NRC letter dated September 29, 2000), the staff reviewed and approved BCUC's request to add four new wells (MW-108, MW-109, MW-110, and MW-111) to the Bear Creek groundwater compliance monitoring program specified in LC 47. However, the staff inadvertently omitted the four new wells from its prior amendment of LC 47 of the license and this omission should be corrected in this action. Therefore, LCs 2, 44, and 47 should be revised as follows:

2. Anadarko Petroleum Corporation
2515 Foothill Blvd. Suite 300
Rock Springs, WY 82901

[Applicable Amendments: 25, 43, 45]

44. DELETED by Amendment No. 45.

47. The licensee shall implement a groundwater compliance monitoring program containing the following:

- A. Sample Well Nos. MW-9, MW-12, MW-14, MW-43, and MW-74 on an annual frequency for nickel, combined radium-226 and -228, selenium, thorium-230, and uranium. Sample Well Nos. MW-12 and MW-74 on an annual frequency for beryllium, cadmium, chromium, and molybdenum. Sample Well Nos. MW-108, MW-109, MW-110, and MW-111 on an annual frequency for nickel, combined radium-226 and -228, thorium-230, uranium, chloride, and sulfate.

- B. Comply with the following groundwater protection standards at point of compliance Well Nos. MW-12 and MW-74, with background water quality established in Well No. MW-9: beryllium = 0.01 mg/L, cadmium = 0.01 mg/L, chromium = 0.05 mg/L, molybdenum = 0.02 mg/L, selenium = 0.025 mg/L, thorium-230 = 2.6 pCi/L, nickel = 3.8 mg/L, combined radium-226 and -228 = 46 pCi/L, and uranium = 2038 pCi/L.

- C. In the event the limits for the constituents in Subsection (B) are exceeded, the licensee will propose a new corrective action program with the objective of returning concentrations of those constituents to the concentration limits specified in Subsection (B).

The licensee shall, on an annual frequency, submit a groundwater monitoring report. Should a new corrective action program be required under Subsection (C), the licensee

also shall submit a corrective action program review, by December 31 of each year, that describes the progress towards attaining groundwater protection standards.

[Applicable Amendments: 39, 43, 45]

Environmental Impact Evaluation

An environmental assessment for this action is not required because this action is categorically excluded under 10 CFR Part 51.22(c)(11).

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and the applicable parts of Title 10, Code of Federal Regulations, Chapter I, Parts 19, 20, 30, 31, 32, 33, 34, 35, 36, 39, 40, 51, 70, and 71, and in reliance on statements and representations heretofore made by the licensee, a licensee is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. Bear Creek Uranium Company		3. License Number SUA-1310 Amend No. 45
2. Anadarko Petroleum Corporation 2515 Foothill Blvd. Suite 300 Rock Springs, WY 82901 [Applicable Amendments: 25, 43, 45]		4. Expiration Date <small>Until NRC determines site reclamation is adequate [Applicable Amendment: 16]</small>
		5. Docket or Reference 40-8452
6. Byproduct, Source, and/or Special Nuclear Material Natural Uranium	7. Chemical and/or Physical Form Any	8. Maximum Amount that License May Possess at Any One Time Under This License Residual contamination from previously licensed activities [Applicable Amendment: 21]
9. Authorized place of use: The licensee's facilities located in Converse County, Wyoming. [Applicable Amendments: 21]		
10. The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings and other byproduct wastes generated from past operations at the site. [Applicable Amendments: 14]		
11. For use in accordance with statements, representations, and conditions contained in the licensee's submittal dated August 15, 1988, except where superseded by license conditions below. Whenever the word "will" is used in the above referenced document, it shall denote a requirement. [Applicable Amendments: 12, 21]		
12. DELETED by Amendment No. 14.		
13. DELETED by Amendment No. 14.		
14. The licensee is hereby exempted from the requirements of Section 20.203(e)(2) of 10 CFR 20, provided that the restricted area is conspicuously posted. The restricted area is defined in the BCUC submittal dated March 16, 2000, as all of Section 16, T38N, R73W, 6 th p.m., the S/2 Section 9, T38N, R73W, 6 th p.m., the S/2 SW/4 NE/4 Section 9, T38N, R73W, 6 th p.m., and S/2 SE/4 NE/4 Section 9, T38N, R73W, 6 th p.m. [Applicable Amendments: 21, 43]		

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15. 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 documented. Unless otherwise specified in NRC regulations, all such documentation shall be maintained for a period of at least 5 years.
16. DELETED by Amendment No. 14.
17. DELETED by Amendment No. 21.
18. Release of equipment or packages from the restricted area shall be in accordance with the NRC report, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984.
- [Applicable Amendments: 31]
19. DELETED by Amendment No. 24.
20. DELETED by Amendment No. 24.
21. The licensee shall conduct an annual survey of land use (private residences, grazing areas, private and public potable water and agricultural wells, and non-residential structures and uses) in the area within two kilometers of any portion of the restricted area boundary and submit a report of this survey to the Chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. This report shall indicate any differences in land use from that described in the last report. [Applicable Amendments: 24, 31]
22. DELETED by Amendment No. 24.
23. DELETED by Amendment No. 14.
24. The licensee shall immediately notify the NRC, Operations Center (301-816-5100), by telephone, of any failure to the tailings dam or tailings discharge and solution return system which results in a release of radioactive material and/or of any unusual conditions which if not corrected could lead to such a failure. This requirement is in addition to the requirements of 10 CFR 20. [Applicable Amendments: 31]
25. Before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not assessed or that is greater than that assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment.
26. DELETED by Amendment No. 14.

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27. 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 site, for reclamation of any tailings or waste disposal areas, ground-water restoration as warranted and the long-term surveillance fee. Within 3 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 January 30. 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 licensee shall also provide the NRC with all surety related correspondence submitted to the State, a copy of the State's surety review and the final approved surety arrangement. The licensee shall also ensure that the surety, where authorized to be held by the State, expressly identifies the NRC portion of the surety and covers the decommissioning and decontamination of the mill site, reclamation of the tailings and waste disposal areas, soil and water sample analyses to confirm decontamination, groundwater restoration as warranted and the transfer of the long-term surveillance fee to the U.S. General Treasury. The basis for the cost estimate is the NRC approved reclamation/decommissioning plan or NRC approved revisions to the plan. The NRC report, "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.

Bear Creek's currently approved surety, a Letter of Credit with the State of Wyoming, shall be continuously maintained in an amount no less than \$1,031,022 for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9 and 10, until a replacement is authorized by both the State of Wyoming and the NRC.

[Applicable Amendments: 10, 19, 30, 31, 38, 40, 42, 43, 44]

28. Prior to termination of this license, the licensee shall provide for transfer of title to byproduct material and land, including any interests therein (other than land owned by the United States or the State of Wyoming), which is used for the disposal of such byproduct material or is essential to ensure the long term stability of such disposal site to the United States or the State of Wyoming, at the state's option.
29. DELETED by Amendment No. 21.
30. DELETED by Amendment No. 21.
31. DELETED by Amendment No. 25.
32. DELETED by Amendment No. 34.

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SUPPLEMENTARY SHEET**

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Amendment No. 45

33. Written procedures shall be established for site reclamation, personnel and environmental monitoring, and survey instrument calibrations. These procedures shall be reviewed and approved in writing by the RSO/EC before implementation and whenever a change in procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the RSO/EC shall perform a documented review of all existing site procedures at least annually. An up-to-date copy of each written procedure shall be kept by the RSO/EC.

[Applicable Amendments: 21, 43]

34. DELETED by Amendment No. 21.

35. DELETED by Amendment No. 12.

36. DELETED by Amendment No. 43.

37. The RSO/EC shall have the following education, training, and experience:

- A. Education: A bachelor's degree in the physical sciences or engineering from an accredited college or university.
- B. General Experience: One (1) year of supervisory experience and one (1) year of experience in a uranium mill or related industry.
- C. Health Physics Experience: One (1) year of work experience in applied health physics, radiation protection, industrial hygiene, or similar work. This experience shall involve actually working with radiation detection measurement equipment rather than only administrative or "desk" work.
- D. DELETED by Amendment No. 21.
- E. Specialized knowledge: A thorough knowledge of the proper application and use of all health physics equipment used in the uranium milling industry, the chemical and analytical procedures used for radiological sampling and monitoring, and the methods used to calculate personnel exposure to uranium and its daughters.

If the individual selected for the RSO position does not meet the educational requirements specified above, but possesses prior work experience in radiation safety, the licensee may consider two (2) years of radiation safety work experience as a substitute for each year of the college level educational requirements. If the RSO possesses a graduate level degree, with major emphasis in the area of radiation safety, the above specialized training requirement may be waived.

[Applicable Amendments: 21]

38. DELETED by Amendment No. 14.

39. DELETED by Amendment No. 12.

40. DELETED by Amendment No. 43.

**MATERIALS LICENSE
SUPPLEMENTARY SHEET**

License Number SUA-1310

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Amendment No. 45

41. DELETED by Amendment No. 21.
42. DELETED by Amendment No. 21.
43. The licensee shall follow the lower limits of detection (LLD) contained in the NRC report, "Lower Limits of Detection (LLD) for Sample Analysis," for the analysis of samples collected pursuant to the Environmental Monitoring Program of this license. [Applicable Amendments: 31]
44. DELETED by Amendment No. 45.
45. DELETED by Amendment No. 21.
46. DELETED by Amendment No. 21.
47. The licensee shall implement a groundwater compliance monitoring program containing the following:
- A. Sample Well Nos. MW-9, MW-12, MW-14, MW-43, and MW-74 on an annual frequency for nickel, combined radium-226 and -228, selenium, thorium-230, and uranium. Sample Well Nos. MW-12 and MW-74 on an annual frequency for beryllium, cadmium, chromium, and molybdenum. Sample Well Nos. MW-108, MW-109, MW-110, and MW-11 on an annual frequency for nickel, combined radium-226 and -228, thorium-230, uranium, chloride, and sulfate.
 - B. Comply with the following groundwater protection standards at point of compliance Well Nos. MW-12 and MW-74, with background water quality established in Well No. MW-9: beryllium = 0.01 mg/L, cadmium = 0.01 mg/l, chromium = 0.05 mg/l, molybdenum = 0.02 mg/l, selenium = 0.025 mg/l, thorium-230 = 2.6 pCi/L, nickel = 3.8 mg/l, combined radium-226 and -228 = 46 pCi/L, and uranium = 2038 pCi/L.
 - C. In the event the limits for the constituents in Subsection (B) are exceeded, the licensee will propose a new corrective action program with the objective of returning concentrations of those constituents to the concentration limits specified in Subsection (B).
- The licensee shall, on an annual frequency, submit a groundwater monitoring report. Should a new corrective action program be required under Subsection (C), the licensee also shall submit a corrective action program review, by December 31 of each year, that describes the progress towards attaining groundwater protection standards.
- [Applicable Amendments: 39, 43, 45]
48. DELETED by Amendments 13 and 39.
49. The licensee shall complete site reclamation in accordance with the approved reclamation plan and the groundwater corrective action plan as authorized by License Conditions 44 and 47, respectively, in accordance with the following schedules:
- A. To ensure timely compliance with target completion dates established in the Memorandum of Understanding with the Environmental Protection Agency (56FR 55432, October 25, 1991), the licensee shall complete reclamation to control radon emissions as expeditiously as practicable, considering technological feasibility, in accordance with the following schedule:

**MATERIALS LICENSE
SUPPLEMENTARY SHEET**

License Number SUA-1310

Docket or Reference
Number 40-8452

Amendment No. 45

- (1) Windblown tailings retrieval and placement on the pile - Completed.
- (2) Placement of the interim cover to decrease the potential for tailings dispersal and erosion - Completed.
- (3) Placement of the final radon barrier designed and constructed to limit radon emissions to an average flux of no more than 20 pCi/m²/s above background:

For tailings pile surface areas not covered by evaporation ponds constructed as part of the groundwater corrective action program - Completed.

For the total tailings pile surface after evaporation pond removal - Completed.

[Applicable Amendment: 41]

- B. Reclamation, to ensure required longevity of the covered tailings and groundwater protection, shall be completed as expeditiously as is reasonably achievable, in accordance with the following target dates for completion.

- (1) Placement of erosion protection as part of reclamation to comply with Criterion 6 of appendix A of 10 CFR Part 40 - Completed.
- (2) Projected completion of groundwater corrective actions to meet performance objectives specified in the groundwater corrective action plan - Completed.

[Applicable Amendment: 41, 43]

- C. DELETED by Amendment No. 43.

- D. DELETED by Amendment No. 43.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/ Dan Gillen

Dated: July 3, 2001

Melvyn Leach, Acting Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety
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