SAFETY EVALUATION REPORT
COMPLETION OF REMEDIATION ACTIVITIES
SALMON RIVER URANIUM DEVELOPMENT SITE, NORTH FORK, IDAHO
DOCKET NO. 040-03400

1.0 INTRODUCTION

The U.S. Atomic Energy Commission (AEC) issued Source Material License No. P-4001 to the Salmon River Uranium Development, Inc. (SRUD) on October 10, 1958. This license authorized SRUD to possess and transfer source material. On March 30, 1959, the AEC issued Source Material License No. R-0230 to SRUD. This license authorized the receipt and possession of source material for processing. The licensee failed to respond to requests from the AEC for additional information, and Source Material License No. R-0230 expired on June 30, 1959. Source Material License No. P-4001 subsequently expired on October 31, 1959. The property was sold to Orval and Antonia Baird in 1992.

Based on interviews with Mr. Baird, both uranium and thorium ores were processed at the site. Processing of source material occurred in two separate time frames, the late-1950s and the late-1970s. Processing operations were conducted in the late-1950s in accordance with the AEC licenses. During the late-1970s, pilot plant operations were conducted at the site to determine the viability of experimental ore processing techniques. Operations in the 1970s were not licensed.

The SRUD site was placed on the Site Decommissioning Management Plan (SDMP) list in 1994, after being identified as part of the NRC's Terminated License Review Project conducted by the Oak Ridge National Laboratory. In May 2001, staff from NRC's Region IV office visited the SRUD site and identified thorium contamination in the form of partially processed ore. Laboratory results confirmed that the material onsite was "source material" (i.e. greater than 0.05 wt % thorium). In 2003, NRC and the Oak Ridge Institute for Science and Education conducted scoping surveys of the site. During 2004 and 2005, the NRC staff worked with the Idaho Department of Environmental Quality and the U.S. Environmental Protection Agency (EPA) to establish an approach for remediation of the site.

The NRC staff consulted with EPA Region 10 staff about the health and safety hazards present at the SRUD site. As a result of the EPA's and NRC's site assessments, the EPA elected to conduct a removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the SRUD site. A Removal Action Work Plan which specified a step-by-step process for conducting cleanup activities at the SRUD site (ADAMS No. ML072880344) was developed by EPA and approved by NRC.

The Removal Action Work Plan specified the removal and disposal of hazardous chemical and radiological contaminants that may pose a threat to workers, public health and welfare, and the environment. EPA used a recreational use scenario for the site and established release criteria of 200 micro-rem per hour (μR/h) above background (ADAMS No. ML072700761).

Implementation of the EPA's work plan began on October 23, 2007. During this first phase of remediation, some of the radiological and non-radiological hazards were removed by EPA and their contractors, and the remainder of the material was staged onsite for future removal and disposal. The work was halted on November 2, 2007, in part, because EPA's disposal options had not been finalized for all of the staged material. Details about this first phase of reclamation can be found in NRC Inspection Report 040-03400/07-001 dated January 31, 2008 (ADAMS No. ML080320117).

By letter dated November 26, 2007 (ADAMS Nos. ML073370065 and ML073400507), EPA discussed its waste characterization and disposal options with NRC. In this letter, EPA questioned whether some of the waste material met the definition of byproduct material as defined in Section 11e.(2) of the Atomic Energy Act. The clarification of this definition was necessary before EPA could finalize its disposal options, because 11e.(2) byproduct material can only be accepted by a limited number of disposal sites. By letter dated March 24, 2008 (ADAMS No. ML080640172), NRC concluded that the SRUD waste material was not 11e.(2) byproduct material. Accordingly, the SRUD material could be disposed as low-level radioactive waste or naturally occurring radioactive material, and not 11e.(2) waste material.

Following resolution of its waste disposal options, EPA resumed remediation of the SRUD site. The EPA and its contractor remobilized at the site on May 28, 2008. During this second phase, the work consisted primarily of the permanent removal of the previously staged wastes. The field work was completed on June 3, 2008.

The NRC staff conducted radiological surveys of the remediated portions of the site. NRC staff performed radiological surveys of site structures and land areas and collected soil samples for analysis by NRC's independent laboratory contractor. The survey information and sample results were documented in Inspection Reports 040-03400/07-01 (ADAMS No. ML080320117) and 040-03400/08-01 (ADAMS No. ML082180190). NRC performed dose modeling consistent with the recreational scenario (ADAMS No. ML082060682) employed by EPA. The NRC survey information and dose modeling were used to determine whether the site meets the criteria for unrestricted release specified in 10 CFR Part 20 Subpart E, or whether additional work at the site would be necessary to meet the NRC release criteria.

2.0 EVALUATION

2.1 Disposal of Radioactive Material

In the EPA Action Memorandum for Approval of Time-Critical Removal Action – Salmon River Uranium Development Site, North Fork, Idaho (ADAMS No. ML072610613), EPA estimated that the waste at the SRUD site, including hazardous, radioactive, and mixed wastes (both hazardous and radioactive), requiring removal from the SRUD site was approximately 25 tons, 95 cubic yards and 2 cubic yards respectively. During June 2008, EPA completed removal of the wastes from the site in accordance with EPA's Removal Action Work Plan (ADAMS No. ML072880344). The contaminated wastes above the unrestricted release criteria were shipped to licensed disposal sites permitted to receive the material.

The NRC staff observed the sampling of waste, loading of shipping containers, and transfer of the materials to the conveyance vehicles. The NRC staff also reviewed the shipment manifests required by the U.S. Department of Transportation (DOT) and surveyed all vehicles prior to departure from the SRUD site. Based on the reviews, the staff has determined that the EPA and its contractor properly transported the waste from the site and disposed of the wastes in

accordance with applicable NRC, DOT, and licensed disposal site requirements, respectively. The materials removed from the site included:

- Approximately 44 tons of unprocessed thorium ore that was shipped as bulk materials to an EPA licensed disposal site in Idaho.
- Approximately 83 tons of processed thorium ore that was shipped to a licensed disposal site in Washington State. The shipment included 2 cubic feet (cu. ft.) of mixed waste containing arsenic, lead and thorium and 1 cu. ft. of uranium waste.

The EPA did not make any onsite disposals of radioactive material, and there were no radioactive effluents released to the environment from the SRUD site. The staff concludes that the removal and disposal of the nuclear materials were conducted in accordance with federal regulations and consistent with the EPA Removal Action Work Plan.

2.2 Release Criteria

The EPA employed a recreational scenario in its dose assessment to determine its release criteria for the SRUD site. The staff considers the EPA approach consistent with NRC policy for using realistic scenarios, as appropriate, and is adequate for protection of the public and environment.

2.3 Final Status Survey

The FSS is the radiation survey performed after an area has been fully characterized, remediation has been completed, and the area is ready to be released for unrestricted use. The purpose of the FSS is to demonstrate that the site meets the radiological criteria for unrestricted use.

Upon completion of the remediation activities EPA performed final status surveys to ensure the 200 μR/h release criteria had been met. The NRC staff conducted confirmation surveys of the SRUD site. Details of the NRC's results were provided in the following inspection reports:

- NRC Inspection Report 040-03400/07-01 (ADAMS No. ML080320117)
- NRC Inspection Report 040-03400/08-01 (ADAMS No. ML082180190)

NRC conducted a number of performance-based, in-process inspections during the remediation process. The purpose of the inspections was to verify that the work was being conducted in accordance with EPA's Removal Action Work Plan commitments and to verify the quality of the EPA radiological surveys, methodology, and equipment. In addition, the NRC conducted independent confirmatory surveys of the site to verify the EPA results. NRC confirmatory surveys consisted of surface scans for alpha, beta and gamma radiation, direct measurements for total alpha and beta activity, the collection of smear samples for determining removable radioactivity levels and soil samples to determine the residual activity in the environment.

The staff's results are documented in the above referenced inspection reports and summarized below.

2.3.1 NRC Inspection Report 040-03400/07-01 (ADAMS No. ML080320117)

During this inspection, the staff conducted surveys of the interior and exterior surfaces of the mill building and the exterior land areas around the mill building, including the tailings pond.

- Gamma surveys from the interior of the mill building and associated concrete surfaced areas averaged 15 µR/h above background.
- Direct survey measurements on mill floors for alpha and beta activity averaged 255 and 2480 disintegrations per minute per 100 square centimeters (dpm/100 cm^2) above background respectively.
- Direct survey measurements on mill walls for alpha and beta activity averaged 90 and 2278 dpm/100 cm^2 above background respectively.
- Direct survey measurements on outside concrete pads and loading docks alpha and beta activity averaged 810 dpm/100 cm^2 and 5661 dpm/100 cm^2 respectively.
- Smear measurements determined that the removal residual activity on mill and outside surfaces was less than the minimum detectable activity of 20 dpm/100 cm^2 alpha and 30 dpm/100 cm^2 beta activity.
- Tailings pond berm soil samples averaged 1.6 pCi/g uranium and 16.4 pCi/g thorium.

2.3.2 NRC Inspection Report 040-03400/08-01 (ADAMS No. ML082180190)

At the completion of the EPA Removal Action Plan activities and removal of radioactive waste from the site, the staff conducted confirmatory surveys of the interior and exterior surfaces of the mill building and the exterior land areas around the mill building. These surveys included the following:

- Resurveys were performed on the floor on southwest corner of the mill after removal of contaminated soil. Direct survey measurements on mill floors for alpha and beta activity averaged 118 and 1025 dpm/100 cm^2 above background respectively.
- Resurveys were performed on of loading dock area of building 3 after removal of the contaminated soil. Direct survey measurements on the concrete for alpha and beta activity averaged 1159 and 7748 dpm/100 cm^2 above background respectively.
- Surveys were performed on of the outdoor concrete pad northwest of the mill building. Direct survey measurements on the concrete for alpha and beta activity averaged 234 and 1752 dpm/100 cm^2 above background respectively.
- Surveys of the outdoor concrete slab southwest of the mill building were performed after packaged waste staged for disposal was removed. Direct survey measurements on the concrete pad for alpha and beta activity averaged -2 and 1025 dpm/100 cm^2 above background respectively.
- Direct measurements on the grinder and agitator averaged 1724 dpm/100cm^2 beta activity.
- Gamma survey scan measurements of outside soil areas averaged 27 µR/h with small elevated areas from 30 to150 µR/h.
- Ten random soil samples and five biased soil samples were taken in the outside areas. The biased samples were taken at elevated areas and included the remediated area at the building drain on the north east slope of the facility. The soil samples were reported to the NRC by the Oak Ridge Institute for Science and Education laboratory in a letter dated June 24, 2008 (ADAMS No. ML081820796).

3.0 DOSE ASSESSMENT

EPA conducted dose modeling evaluations for the development of the Removal Action Plan. Based on these evaluations, EPA selected a remediation approach to achieve unrestricted release of the SRUD site based on a recreational scenario. The EPA limit for the recreational scenario for releasing the site was 200 μR/h, which is equivalent to 15 mrem/yr.

The staff evaluated the EPA's dose assessment and concluded that the source term, scenario, and exposure pathways used in the assessment were appropriate. Further, staff concluded that the conceptual model and input parameters were consistent with site conditions. The staff concludes that the bounding assessment is acceptable and provides reasonable assurance that the dose criterion in 10 CFR 20.1402 will be met for unrestricted release of the site.

EPA's final dose assessment indicates that the average outdoor dose rate from residual radioactivity is 27 μR/h (above background). This dose rate is approximately equivalent to 2.0 mrem/yr. The indoor dose rate from residual radioactivity is 15 μR/h (above background), which is approximately 1.1 mrem/yr.

The NRC staff performed an independent dose assessment to reflect the as-left conditions of the site. The NRC staff determined that the maximum dose is 2.6 mrem/yr. This estimated dose represents a small fraction of the 25 mrem/yr all pathways allowable dose (10 CFR 20.1402) for unrestricted release of a site.

4.0 STATE CONSULTATION

This Safety Evaluation Report (SER) was prepared by the NRC staff without input from the State of Idaho. However, the State is on distribution for all correspondence between NRC and EPA, has observed several NRC inspections, and thus, has been informed of NRC's intention to release the SRUD site for unrestricted release.

5.0 ENVIRONMENTAL CONSIDERATIONS

The scope of 10 CFR Part 51 is limited to the NRC's licensing functions, and the SRUD site is not an NRC-licensed site. The EPA performed remediation activities in accordance with CERCLA, as amended, 42 U.S.C. §§9601(14) and (33). Accordingly, the NRC need not prepare an Environmental Assessment regarding the remediation activities at the SRUD site.

6.0 CONCLUSION

Based on the considerations discussed above, the NRC has concluded that: (i) the remediation has been performed in accordance with the EPA Removal Action Plan; and (ii) the FSS and associated documentation demonstrate that the SRUD site meets the criteria for release of the site for unrestricted use that are stipulated in the EPA Removal Action Plan.

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