UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

January 31, 2008

Mr. Orval Baird
P.O. Box 87
Tendoy, ID 83468

SUBJECT: NRC INSPECTION REPORT 040-03400/07-001

Dear Mr. Baird:

This report refers to the inspection conducted on October 23-November 3, 2007, at the Salmon River Uranium Development (SRUD) site located near North Fork, Idaho. The inspection was an examination of activities as they relate to safety and compliance with the Commission's rules and regulations. Within these areas, the inspection consisted of a review of the site status and performance of decommissioning inspection activities, including radiological surveys and sampling. In addition, the NRC conducted in-office reviews and analyses of field measurements and sample results through January 14, 2008. Details of the inspection were presented to you via telephone on January 15, 2008. The final inspection results were also discussed with Mr. Greg Weigel of the U.S. Environmental Protection Agency (EPA) Region 10 via telephone on January 17, 2008. No violations were identified, therefore, no response to this letter is required.

During the inspection, the EPA and its contractors conducted cleanup activities at the site using the guidance provided in their Removal Action Work Plan. The NRC staff assisted the EPA onsite by providing radiation protection guidance and support during the cleanup activities. The NRC personnel also assisted the EPA by performing surveys to define areas with radiologically contaminated soils/materials that exceeded EPA's screening criteria. In addition, the NRC conducted radiological surveys and collected samples for comparison to the NRC's criteria for unrestricted release of the site. The surveys and samples included measurement of ambient gamma exposure rates, collection of soil and sand samples, collection of swipe samples for the detection of removable contamination from wall and floor surfaces, measurement of total contamination on wall and floor surfaces, and surveys of equipment located within the former mill building. The soil, sand, and swipe samples were submitted to the NRC's contractor, Oak Ridge Institute for Science and Education (ORISE), for laboratory analysis.

The NRC inspectors compared the sample and measurement results to the radiological criteria for license termination as specified in Subpart E to Title 10 of the Code of Federal Regulations (CFR) Part 20. Although many of the results exceeded the NRC's screening criteria, the NRC acknowledges that the screening criteria is based on conservative assumptions. The NRC staff plans to use the data as input in computer dose modeling of the site. Dose modeling should provide a more realistic assessment of the health and safety hazards associated with the site. Further, the dose modeling may be used to establish final cleanup criteria for this site.

As you are aware, the EPA and its contractors were unable to complete the removal of all hazardous and radioactive materials from the SRUD site. This delay was due, in part, to challenges encountered by the EPA in disposing of some of the materials. Accordingly, some radioactive materials remain onsite and are staged for future removal. After the removal action has been completed, the NRC plans to conduct additional radiological surveys and sampling, as appropriate, to help determine if the site can be released for unrestricted use. You will be notified of the results of any dose modeling and additional surveys at a later date, when the work has been completed.

Finally, you are requested to refrain from moving the staged materials around the site or removing the staged materials from the site, without prior NRC approval, to avoid the potential for spreading radiological contamination within the SRUD site or to off-site locations. In addition to the staged materials, you are requested to refrain from disposing or moving some of the process equipment in the north east section (process area) of the former mill building. In particular, we request that you do not move or dispose of the yellow grinder (mounted on the truck chassis) and the skid-mounted agitator (leach tank), as these pieces of equipment exceed NRC's screening criteria and will require further decontamination prior to being released for unrestricted use..

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact the undersigned at (817) 860-8197 or Mr. Robert J. Evans, Senior Health Physicist, at (817) 860-8234.

Sincerely,

//RA//

Jack E. Whitten, Chief
Nuclear Materials Safety Branch B

Docket No.: 040-03400
License Nos.: P-4001 (expired), R-230 (expired)

Enclosure:
NRC Inspection Report
040-03400/07-001

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	040-03400
License Nos.:	P-4001 (expired), R-230 (expired)
Report No.:	040-03400/07-001
Licensee:	Salmon River Uranium Development, Inc.
Property Owners:	Orval and Antonia Baird
Facility:	Salmon River Uranium Development Site
Location:	West of North Fork, Idaho
Dates:	October 23-November 3, 2007
Inspectors:	Robert Evans, PE, CHP, Senior Health Physicist Nuclear Materials Safety Branch B
	Janine F. Katanic, PhD, Health Physicist Nuclear Materials Safety Branch B
Accompanied by:	Rafael L. Rodriguez, Project Manager Decommissioning and Uranium Recovery Licensing Directorate Division of Waste Management and Environmental Protection Office of Federal and State Materials and Environmental Management Programs
Approved by:	Jack E. Whitten, Chief Nuclear Materials Safety Branch B
Attachments:	1. Supplemental Inspection Information 2. Figures and Tables

EXECUTIVE SUMMARY

Salmon River Uranium Development Site
NRC Inspection Report 040-03400/07-001

This inspection included a review of site status, decommissioning inspection, and closeout inspection and survey. The inspectors conducted radiological surveys including measurement of ambient gamma exposure rates, sampling of site sand and soils, and surface contamination levels. No violations of NRC requirements were identified.

Site History and Status

- The Salmon River Uranium Development Site (SRUD), was formerly licensed by the U.S. Atomic Energy Commission to possess, process, and transfer source material. Following site assessments performed by NRC and its contractor, NRC engaged the U.S. Environmental Protection Agency (EPA) for assistance in cleaning up the site. A Removal Action Work Plan was developed by EPA and implemented during October 23-November 2, 2007. In order to conduct additional radiological surveys, NRC personnel remained onsite until November 3, 2007 (Section 1).

Decommissioning Inspection Procedure for Materials Licenses

- The EPA and its contractors conducted clean up activities in accordance with their Removal Action Work Plan. NRC personnel assisted the EPA by performing surveys to identify radiologically contaminated soils/materials that exceeded EPA's screening criteria. Some unprocessed ore and hazardous (non-radiological) materials were permanently removed from the site. The remaining radioactive materials were staged onsite for future removal. At the end of the inspection period, the EPA and NRC reviewed characterization results and discussed disposal options for the remainder of the staged material (Section 2).

Closeout Inspection and Survey

- The NRC conducted radiological surveys and collected samples to help determine whether the site had been decontaminated to acceptable levels for unrestricted use. Many of the radiological survey results exceeded the screening criteria in NRC's guidance documents. Some of the soil samples collected containedtotal thorium in concentrations meeting the definition of source material, as defined in 10 CFR 40.4. Two of these soil samples were collected from exterior drain pathways and will require additional review by the NRC staff to determine if the locations require remediation. Measurements were obtained for total radiological contamination on mill building interior walls and floor surfaces, and floor surfaces of an outdoor pad. Nearly all of the total radiological contamination measurements exceeded the NRC's thorium-232 screening criteria. At a later date, these measurements will be used by the NRC as input for site-specific dose modeling. Two pieces of equipment in the mill building exceed NRC's limits for acceptable surface contamination. Measurements of removable radiological contamination on wall and floor surfaces indicated that the radiological contamination on

these surfaces is likely fixed and not removable. Surveys of the remaining outdoor areas will occur when EPA's completes its removal action (Section 3).

Report Details

1 Site History and Status

The U.S. Atomic Energy Commission (AEC) issued Source Material License P-4001 to Salmon River Uranium Development, Inc. (SRUD) on October 10, 1958. This license authorized SRUD to transfer and deliver possession of and title to raw source material. On March 30, 1959, the AEC issued Source Material License R-0230 to SRUD, which authorized the receipt and possession of source material for processing. After the licensee failed to respond to requests for additional information from AEC, Source Material License R-0230 expired on June 30, 1959. Subsequently, Source Materials License P-4001 expired on October 31, 1959. Based on interviews with the current property owner, both uranium and thorium ores were processed at the site and additional pilot plant operations were conducted at the site during the late-1970s.

The site was visited by the NRC during May 2001 and soil samples were collected at that time. Based on the information obtained during the May 2001 site visit, the NRC determined that the site most likely contained radioactive material in quantities that were greater than regulatory requirements for sites that have permanently discontinued operations. The results of this site visit were documented in a July 3, 2001, letter to the current property owner (ADAMS accession number ML011840018).

The NRC's contractor, Oak Ridge Institute for Science and Education (ORISE), conducted an expanded scoping survey during October 2003 to further assess and quantify the radioactive material present at the site. The results of this survey were used in the NRC's preliminary analysis of the radiological conditions of the site. The analysis determined that the radioactive material exceeded the screening criteria specified in NRC guidance documents including NUREG-1757, Volume 1, Revision 2, Consolidated Decommissioning Guidance, Appendix B, "Screening Values." The results of the October 2003 ORISE survey were submitted to the current property owner during January 2004 (ADAMS accession number ML040210209).

Following ORISE's 2003 expanded scoping survey of the site, the NRC consulted with the U.S. Environmental Protection Agency (EPA) Region 10 about the health and safety hazards present at the SRUD site. The EPA and one of its contractors, Techlaw, Inc., conducted a site assessment during June 2006. The assessment considered both radiological and non-radiological hazards. Field screening and laboratory sampling were conducted. Elevated sources of radioactivity and high concentrations of toxic (non-radioactive) metals were identified during the assessment. The results of the EPA's assessment were made available to the NRC during April 2007 (ADAMS Accession Number ML071560458). The NRC staff were present during the June 2006 site assessment and concurrently conducted an inspection of the site. NRC's findings were presented to the property owners in a report dated June 26, 2006 (ADAMS accession number ML061780326).

As a result of the EPA's and NRC's site assessments, the EPA elected to conduct a removal action at the SRUD site. A Removal Action Work Plan (ADAMS accession

number ML072880344) was developed by EPA that specified its step-by-step process for conducting cleanup activities. The EPA's proposed action was to remove and dispose of hazardous chemical and radiological contaminants that may pose an imminent and substantial endangerment to worker and public health and welfare, and the environment. The EPA's proposed removal action did not address fixed radiological contamination on equipment, floors, or building surfaces because the EPA had concluded that this contamination posed a lesser level of risk (ADAMS accession number ML072700761). Implementation of the EPA's work plan was conducted during October 23-November 2, 2007. NRC personnel remained on site until November 3, 2007, in order to conduct additional radiological surveys. As discussed below, 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. At the conclusion of the onsite inspection, final removal activities had not been yet been scheduled by EPA.

2 Decommissioning Inspection Procedure for Materials Licenses (87104)

2.1 Inspection Scope

The purpose of this portion of the inspection was to determine if decommissioning activities were being conducted in a manner that was protective of site workers, the public, and the environment and to determine whether decommissioning activities were being conducted in accordance with NRC requirements.

2.2 Observations and Findings

At the time of the October 23-November 2, 2007, onsite inspection, the SRUD site consisted of a partially dismantled ore processing building (also known as "Building 1" or the "former mill building") and the concrete pads of former buildings. An overview of the SRUD site is presented in Figure 1 of Attachment 2 to this report. The radiological and hazardous materials at the SRUD site included several piles of processed and unprocessed ores, piles of uranium tailings, dried sulfuric acid, sodium hydroxide, arsenic, mixed wastes (lead and thorium), radiologically contaminated equipment, and radiological and non-radiological contaminants in site soils. A Removal Action Work Plan was developed by EPA to guide its contractor's actions in removing and disposing of the hazardous and radiological contaminants at the site.

The work conducted by the EPA's contractor included, but was not limited to:

- Site mobilization
- Staging roll-off boxes for hazardous (non-radiological) waste disposal
- Building an access road to the former tailings pond
- Removing hazardous (non-radiological) contents from two metal corrosive containers
- Excavating and consolidating radiologically contaminated soils from several locations around the former mill site and backfilling the excavated areas
- Packaging processed source material (thorium) that was located behind the former mill building

- Packaging contaminated sand-like material, apparently mixed waste consisting of lead and thorium, collected from within the former mill building
- Bagging uranium tailings material that had been located adjacent to the former mill building
- Creating manifests and shipping selected wastes for off-site disposal, including approximately 40-45 tons of unprocessed thorium ore
- Staging remaining waste piles and boxed waste material for future disposal actions
- Demobilization from the site

The clean up activities were conducted by EPA's contractor personnel, which included a response manager, two equipment operators, two cleanup technicians, an environmental engineer, and senior staff consultant. The work was supervised and coordinated by two EPA On-Scene Coordinators. The NRC inspectors observed the activities, in part, to provide assistance to EPA personnel and their contracted staff with respect to the implementation of appropriate site-wide operational radiation safety practices.

As part of the EPA's removal action, NRC personnel assisted the EPA by performing surveys to define any areas with radiologically contaminated soils/materials that exceeded EPA's screening criteria. The EPA elected to use a screening level of 200 µR/hr above background as their cleanup criteria. The background ambient gamma radiation level, measured by the NRC at a non-impacted area, was 15 µR/hr. The 200 µR/hr value was selected by EPA because it corresponds to a dose rate of 15 millirems per year using the recreational exposure pathway mode of analysis. [Recreational land use addresses exposure to people who spend a limited amount of time at or near a site while playing, fishing, hunting, hiking, or engaging in other outdoor activities.] The areas identified by the inspectors that exceeded EPA's screening criteria were outlined with flags and/or marking paint. After the areas were defined by NRC personnel, the results were discussed with the EPA On-Scene Coordinator. The EPA's contractor personnel then scraped the outlined ground surface areas with heavy equipment and hand-tools as appropriate, in order to collect and consolidate the radiologically contaminated soils. As the contractor personnel performed their removal tasks, NRC personnel continued to perform radiological surveys to determine if the removal was successful in lowering the exposure rate below EPA's criteria. The collected radiologically contaminated soils were subsequently consolidated into discrete piles for ease in conducting future removal and disposal activities.

The EPA permanently removed some hazardous material from the site including dried sulfuric acid residue and sodium hydroxide material. The EPA also packaged and shipped for disposal approximately 40-45 tons of unprocessed thorium ore. These hazardous and/or radioactive materials were shipped to authorized waste disposal sites.

When EPA's onsite activities were concluded, the NRC inspectors conducted an inventory of the radioactive material remaining at the site. In addition, the NRC inspectors conducted ambient gamma radiation surveys of the as-left staged materials. The radiological material remaining at the site included:

- A pile of unprocessed thorium ore measuring 12 feet by 16 feet by 3.5 feet. The exposure rate of the pile ranged from 200-1000 µR/hr at a distance of one meter from the pile. The area located adjacent to the pile that had been excavated by EPA had an exposure rate that ranged from 100-900 µR/hr at one meter.

- A pile of excavated soil that contained residual radioactive material. The pile measured 12 feet by 33 feet by 3 feet. The exposure rate of this pile ranged from 100-300 µR/hr at one meter and from 400-1000 µR/hr on contact.

- A waste and miscellaneous material pile measuring 10 feet by 18 feet by 4 feet that contained both processed and unprocessed ores. The exposure rate at approximately one meter from this pile ranged from 100-250 µR/hr.

- Eleven plastic drum liners of uranium tailings material that included residue material collected during decontamination of the agitator (leach tank). This bagged material had an exposure rate of up to 950 µR/hr on contact.

- Two cubic-yard containers of processed thorium and mixed wastes (lead and thorium) that measured 180-210 µR/hr at one meter and up to 1200 µR/hr on contact.

- Two contaminated mill components--the agitator (leach tank) and the yellow grinder. Both had residual surface contamination that exceeded the uranium and thorium limits specified in Table 1, Acceptable Surface Contamination Levels, to NRC Policy and Guidance Directive FC 83-23, “Termination of Byproduct, Source and Special Nuclear Materials Licenses.”

The former tailings pond was determined to contain hazardous materials (lead and arsenic) and thorium. As documented in Enclosure 2 to NRC Inspection Report 040-03400/2003-01, dated January 20, 2004, thorium concentrations were less than 42 pCi/g. The former tailings pond was not remediated during the EPA’s removal action.

In addition to the radioactive material staged at the site, the property owner was in possession of about 15 gallons of liquid product containing low levels of thorium and radium. At the time of the onsite inspection, the liquid product was stored on the property of the individual’s personal residence. With the permission of the property owner, the inspectors visited the location in order to inspect the storage of the material and determine the inventory of the liquid product. The liquid product had been previously sampled by the Idaho Department of Environmental Quality during 2003. The analysis of the sample indicated that the primary radionuclide present in the sample was radium-228. The amount of liquid product present during the current inspection was estimated to be several gallons less than that observed by NRC inspectors during previous inspection activities in 2003. Although some of the liquid had been removed for sampling, the remainder of the missing liquid could not clearly be accounted for by the property owner. The NRC had previously determined in NRC Inspection Report 040-03400/2003-01, dated January 20, 2004, that the liquid material was not a significant health and safety hazard. However, based on the sample results obtained by

the State of Idaho, the liquid material may need to be disposed in accordance with the requirements of Subpart K to 10 CFR Part 20.

Although radioactive material remained onsite at the conclusion of the inspection, none of the material exceeded an exposure rate of 5,000 μR/hr at 30 centimeters from the radiation source or from any surface that the radiation penetrates. Accordingly, none of the areas in the vicinity of the staged materials met the definition of a radiation area per 10 CFR 20.1003.

After the conclusion of the onsite inspection, by letter dated November 26, 2007, the EPA informed the NRC of its preliminary waste characterization and disposal plans for the remaining wastes (ADAMS accession numbers ML073370065 and ML073400507). The EPA provided estimated volumes and draft uranium/thorium concentrations for the staged materials. The EPA also requested the NRC's comments about the EPA's plans to designate the remaining material as non-11e.(2) byproduct material. At the end of the inspection period, the NRC had not formally responded to the EPA's letter.

2.3 Conclusions

The EPA and its contractors conducted clean up activities under the guidance provided in their Removal Action Work Plan. NRC personnel assisted the EPA by performing surveys to define any areas with radiologically contaminated soils/materials that exceeded EPA's screening criteria. Some of the unprocessed ore and hazardous (non-radiological) materials were permanently removed from the site. The remaining radioactive materials were staged onsite for future removal. At the end of the inspection period, the EPA and NRC discussed characterization results and disposal options for the remainder of the staged material.

3 Closeout Inspection and Survey (83890)

3.1 Inspection Scope

The inspectors conducted radiological surveys and collected samples to help establish whether the site had been decontaminated to acceptable levels for unrestricted use.

3.2 Observations and Findings

The NRC conducted radiological surveys and collected samples for laboratory analysis. The surveys included measurement of ambient gamma exposure rates, indoor surface contamination levels, selected outdoor concrete surface contamination levels, and equipment surface contamination levels. The inspectors also collected sand and soil samples and removable contamination "swipe" samples for laboratory analysis by ORISE. A list of the radiological survey and measurement equipment used during the inspection is provided in Attachment 1 to this inspection report.

The inspectors established a grid system for the systematic collection of samples and measurements based on guidance provided in NUREG-1575, Revision 1, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Section 4.8.5, "Reference

Coordination System." The former mill building's floor was estimated to be approximately 700-square meters in size. The floors and walls were divided into two categories based on guidance provided in MARSSIM. The building floor and wall surfaces were divided into Class 1 and Class 2 areas based on site history and previous radiological survey results. Class 1 areas have the greatest potential for contamination and therefore receive the highest degree of survey effort for the final status survey using a graded approach, followed by Class 2. Figure 2 of Attachment 2 to this report represents the layout of the interior of the former mill building.

The interior floor of the former mill building was subdivided into 30 five by two-meter survey units. Of the 30 survey units in the former mill building, eight were considered Class 1 survey units and 22 were considered Class 2 survey units. In addition, for the purposes of conducting total radiological contamination measurements, a two by two-meter grid was laid for the entire accessible surface of the floor of the former mill building.

The interior walls of the former mill building were subdivided into 17 five by five-meter survey units. Nine of the survey units were considered Class 1 survey units. A portion of one of these Class 1 survey units was inaccessible due to the configuration of the former mill building. Of the remaining eight wall survey units, one survey unit was inaccessible and seven survey units were considered Class 2 survey units. The Class 1 survey units were further subdivided into one by one-meter grids. The Class 2 survey units were subdivided into two by one-meter grids. Due to the configuration of the former mill building, not all grid locations were accessible.

The inspectors used MARSSIM guidance to classify an outdoor concrete pad located behind the former mill building. This concrete pad had been used for many years to store processed thorium. Accordingly, this area was considered by the inspectors to be one MARSSIM Class 1 survey unit. The survey unit was subdivided into 24 one by one-meter survey grids. Figure 3 of Attachment 2 to this report represents the layout of the outdoor concrete pad.

The inspectors collected background measurements from areas that had not been impacted by previous operations involving radioactive material. Different material types, such as concrete, wood, and metal, were measured during the background surveys. Several of the background measurements were collected at the pump house. The pump house was a small wood and concrete structure located along the Salmon River and was owned by the SRUD property owner. The pump house was not located on the SRUD property and was considered an non-radiologically impacted structure of the same era as the former mill site structures. Because there were no accessible metal surfaces at the pump house, background measurements of metal were obtained using a large metal tank that was located on the SRUD site but outside of the former mill building.

One sand sample was collected from inside the former mill building and nine soil samples were collected from outside the former mill building, along the liquid effluent drain pathways, and from the three tailings pond berms. The samples were collected at a depth of approximately 6-inches using standard sample collection techniques. The

indoor sample was collected in Grid F-4, based on the grid system that NRC established during the inspection. Four soil samples were located using the outdoor grid system established by ORISE during October 2003. The remaining five samples were not located within an established grid system. The 10 samples were submitted by NRC to ORISE for laboratory analysis.

The sand and soil sample results were compared to the source material concentrations presented in NUREG-1717, Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials, Table 3.2.1, "Source Material Concentrations Associated With 0.05 Percent Weight of Source." Pursuant to 10 CFR 40.4, source material means: (1) uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of: (i) uranium, (ii) thorium or (iii) any combinations thereof. Per Table 3.2.1, the total natural uranium concentration that equals 0.05-percent by weight is 340 pCi/g, and the total natural/processed thorium concentration that equals 0.05-percent by weight is 110 pCi/g. Using this definition, if the total natural uranium concentration equals or exceeds 340 pCi/g or if the total natural/processed thorium concentration equals or exceeds 110 pCi/g, the material would be considered source material. It is necessary to distinguish whether the materials at the SRUD site are source material since this will impact the different disposal options that can be considered by the EPA. Therefore, the sand and soil samples obtained during the inspection were analyzed for uranium and thorium concentrations. The sample results are provided in Tables 1-4 in Attachment 2 to this inspection report, and are described in detail below.

Gamma spectroscopy results for thorium concentrations in the sand and soil samples are provided in Table 1. The gamma spectroscopy analyses provided by ORISE were compared to the concentrations described above for consideration as source material. Four samples exceeded the total thorium concentration of 110 pCi/g value as follows: (1) Sample No. NRC-1-S, sandy material collected from the interior of the former mill building (following the sample collection, this material was removed and consolidated for disposal); (2) Sample No. NRC-4-S, soil collected from the exterior of the former mill building near the foundation of the former building known as "Building 3" (this area appeared to have been backfilled with source material at some point in the past); (3) Sample No. NRC-6-S, soil collected from a potential exterior drain pathway; and (4) Sample No. NRC-7-S, soil collected from a second potential exterior drain pathway.

Two potential drain pathways were identified during the inspection that had not been identified during previous site surveys by NRC or EPA. During the inspection, the inspectors discovered a drain in the floor of the process area inside of the former mill building and began to search for potential exterior drain pathways. This drain may have been overlooked during previous site visits due to the large amount of debris and abandoned equipment on the floor in the process area. The inspectors removed the wood cover from the floor drain and examined the interior of the drain, which consisted of a black pipe. When the property owner was on site during the inspection, he was asked about the floor drain. The property owner identified an area exterior to the former mill building where he believed that the drain terminated. The inspectors surveyed this area and found the gamma exposure rate to be elevated. However, based on their observations, the inspectors believed that this area may have been a "washout" area for

part of the mill processes but did not appear to be the actual drain outlet from the mill building. The inspectors explored the hillside, and subsequently found a black pipe sticking out of the hillside. This pipe was consistent with that observed on the interior of the drain inside of the former mill building. Gamma exposure rate surveys in this area were also elevated. At both the “washout” and “drain” sites, some exposure rate measurements exceeded the 200 µR/hr action level established by EPA. These two drain pathways will require additional review to determine if the locations require future remediation based on soil sample results and ambient gamma exposure rates.

Gamma spectroscopy results for uranium concentrations in the sand and soil samples are provided in Table 2. The gamma spectroscopy results for uranium concentration provided were compared to 340 pCi/g, the total natural uranium concentration that equals 0.05-percent by weight. Based on the results provided by ORISE, no samples exceeded the total uranium concentration value of 340 pCi/g/.

Based on the results of the gamma spectroscopy, six of the ten samples were selected by the inspectors for alpha spectroscopy. These samples were analyzed by ORISE and the results are presented in Table 3 and Table 4. Table 3 presents the laboratory analysis results for thorium concentrations, and Table 4 presents the laboratory analysis results for uranium concentrations. Three of the six samples selected for alpha spectroscopy exceeded the total thorium concentration value of 110 pCi/g as follows: (1) Sample No. NRC-4-S, soil collected from the exterior of the former mill building near the foundation of the former building known as “Building 3" (this area appeared to have been backfilled with source material at some point in the past); (2) Sample No. NRC-6-S, soil collected from a potential exterior drain pathway; and (3) Sample No. NRC-7-S, soil collected from a second potential exterior drain pathway.

The NRC conducted radiological surveys (gamma exposure rate measurements) inside of the former mill building. One exposure rate measurement was collected per survey unit at the height of 1-meter for a total of 30 measurements. For accessible survey units, exposure rate measurements were taken at the center of the survey unit. For survey units that were partially or completely inaccessible, the exposure rate measurement was taken as near to the center of the survey as possible. The results are presented in Table 5. The exposure rates ranged from 15 µR/hr (background level) to 70 µR/hr. There is no NRC regulatory decommissioning limit for indoor exposure rates. However, for comparison purposes, the NRC has established an action level of 10 µR/hr above background for outdoor areas. This action level is provided in NRC Policy and Guidance Directive FC 83-23, Enclosure 3, “Acceptable Soil Contamination Levels.”

The inspectors conducted measurements of total radiological contamination on the interior walls and floor surfaces of the former mill building. The inspectors collected 118 measurements on the walls and 155 measurements on the floor. Because the south wall of the former mill building was previously dismantled and removed by the property owner, there are no wall surface measurements in this area. Also, due to the configuration of the former mill building, some wall and floor surfaces were inaccessible, and therefore, were not measured. The data obtained for accessible wall and floor surfaces were corrected for background and instrument efficiencies. Table 6 presents

the results for total radiological contamination measurements of interior wall surfaces, and Table 7 presents the results for total radiological contamination on floor surfaces of the former mill building.

The total alpha contamination on indoor wall surfaces ranged from -27 to 213 dpm/100 cm^2 with an average of 90 dpm/100 cm^2. The total beta contamination on indoor wall surfaces ranged from -39 to 9,539 dpm/100 cm^2 with an average of 2,278 dpm/100 cm^2. The total alpha contamination on interior floor surfaces ranged from -37 to 3,053 dpm/100 cm^2 with an average of 255 dpm/100 cm^2. Finally, the total beta contamination on indoor floor surfaces ranged from 329 to 25,303 dpm/100 cm^2 with an average of 2480 dpm/100 cm^2.

The inspectors compared the total radiological surface contamination measurements to the generic screening criteria provided in NUREG/CR-5512, Volume 3, Residual Radioactive Contamination From Decommissioning; Parameter Analysis, Table 5.19, "Concentration (dpm/100 cm^2) Equivalent to 25 millirem/y for the Specified Value of P_{crit}" (ADAMS accession number ML003726967). As noted in Table 5.19, the thorium-232 plus progeny value equivalent to 25 millrems per year is 6.03 dpm/100 cm^2 above background. The generic screening criteria provided in Table 5.19 can be used to conservatively demonstrate compliance with the radiological criteria for license termination (25-millirems per year) specified in Subpart E to 10 CFR Part 20. As illustrated in Tables 6 and 7 of this report, nearly all of the floor and wall measurements exceed the thorium-232 screening criteria.

Because the generic screening criteria in Table 5.19 is conservatively calculated, it may not be realistic to use it in this site-specific situation. As a result, the NRC staff plan to use the floor and wall total radiological surface contamination measurements as input in dose modeling. This modeling will be conducted at a later date, and the results of the modeling will be documented under different correspondence.

Surveys of total radiological contamination on equipment surfaces were conducted and compared to the limits provided in Table 1, "Acceptable Surface Contamination Levels" to NRC Policy and Guidance Directive FC 83-23. Twelve components in the former process area and one component outside of the process area of the former mill building were surveyed for total surface contamination. The results of the equipment surveys are presented in Table 8. Based on site history, two types of source material were processed at the mill--uranium ore and thorium ore. Table 1 to NRC Policy and Guidance Directive FC 83-23 provides different limits for uranium and for thorium to account for the different chemical and radiological properties of these two radionuclides. The inspectors compared the total radiological contamination results for the equipment to the limits for uranium. Uranium was selected because most components appeared to be contaminated with uranium ore residue. Additionally, the NRC's hand-held spectroscopy unit identified uranium contamination on several of the components. The surface contamination limits for uranium provided in Table 1 to NRC Policy and Guidance Directive FC 83-23, are 5,000 dpm per 100 cm^2 average and 15,000 dpm per 100 cm^2 maximum. Two components surveyed were found to exceed these limits for surface contamination: (1) the yellow grinder mounted on the truck chassis and (2) the skid-mounted agitator (leach tank). Both were decontaminated and re-surveyed during

the inspection. Following extensive decontamination by the inspectors, the surface measurements of both components still exceeded the uranium surface contamination limits. Further decontamination will be necessary prior to release of this equipment for unrestricted use.

The inspectors also conducted surveys of an outdoor concrete pad located behind the former mill building. This is the location where processed thorium in deteriorated gunny sacks had been stored for many years. The inspectors collected 36 systematic measurements using this one by one-meter grid system. The 36 systematic measurements included both surveys for total radiological contamination and gamma exposure rate measurements. The exposure rate measurements were taken at each of the corners of the grids at a height of 1 meter. The total surface contamination measurements were taken at each of the corners of the grids. The results are presented in Table 9.

On the outdoor concrete pad, the total alpha contamination ranged from 117-8,467 dpm/100 cm^2 with an average of 1,847 dpm/100 cm^2. The total beta contamination ranged from 851-52,470 dpm/100 cm^2 with an average of 11,714 dpm/100 cm^2. As noted above, the screening value for thorium-232 with progeny is 6.03 dpm/100 cm^2. All of the total contamination measurements of this area exceeded the thorium-232 screening value. However, the NRC staff plans to use these sample results as input for dose modeling. The results of this dose modeling will determine whether the concrete pad will require further decontamination to meet the radiological criteria for license termination and unrestricted use as specified in Subpart E to 10 CFR Part 20.

Finally, the inspectors collected 36 samples for the measurement of removable radiological contamination ("swipes"). The inspectors collected 33 swipes from inside of the former mill building. Of these samples, 27 were from floor surfaces, one was taken at the floor drain point, and five were taken of surfaces of equipment in the former process area (the skid mounted agitator (leach tank), the yellow grinder mounted on a truck chassis, the screw pump, a metal tub, and the agitator tank pump). Three swipes were taken on the outdoor concrete pad behind the former mill building. The swipes were submitted to ORISE for analysis and the results for removable radiological contamination are presented in Table 10. The results for all 36 samples were less than the minimum detectable concentrations of the measuring equipment. The inspectors concluded, based on the ORISE analysis, that the surface contamination on the mill floor, the selected pieces of equipment, and the outdoor concrete pad is likely fixed radiological contamination and not removable radiological contamination.

At the end of the onsite inspection period, radioactive material remained staged for removal and subsequent disposal. The inspectors were unable to conduct outdoor radiological surveys because further reclamation work may be necessary during removal of the remaining piles of staged material. The inspectors planned to conduct the remainder of the outdoor surveys at a later date, when the remaining radioactive material is removed from the site for disposal.

3.3 Conclusions

The NRC conducted radiological surveys and collected samples to help determine whether the site had been decontaminated to acceptable levels for unrestricted use. Many of the results exceeded the NRC's screening criteria. Alpha spectroscopy analysis indicated that three soil samples had total thorium concentrations consistent with source material. Two of these soil samples came from exterior drain pathways that will require additional review to determine if the locations require remediation. Measurements were obtained for total radiological contamination on the interior walls and floor surfaces of the former mill building, and floor surfaces of an outdoor concrete pad. Nearly all of the total radiological contamination measurements exceed the NRC's thorium-232 screening criteria, based on a conservative model. At a later date, the total radiological surface contamination measurements will be used as input in site-specific dose modeling. Surveys of total radiological contamination on equipment surfaces indicated that two components exceed NRC's limits for acceptable surface contamination. Measurements of removable radiological contamination on wall and floor surfaces as well as equipment indicated that the radiological contamination on these surfaces is likely fixed and not removable. Surveys of the remaining outdoor areas will occur when EPA completes its removal action is complete.

4 Exit Meeting Summary

The final inspection results were telephonically presented the to the property owner on January 15, 2008. Additionally, the final inspection results were telephonically discussed with a representative of EPA Region 10 on January 17, 2008. Both parties were informed that further surveys of the site would be necessary when the EPA completes the removal action so that NRC can make a determination as to whether the site could be released for unrestricted use. The property owner was requested by the NRC not to move, remove, or disturb the staged materials on the site to ensure that radiological contamination would not be spread onsite or offsite. The property owner was also requested, based on the NRC's inspection results, not to move, remove, or otherwise disturb the yellow grinder and agitator (leach tank). During the telephonic exit meetings, both the property owner and the EPA representative did not identify any information discussed during the calls as proprietary.

SUPPLEMENTAL INSPECTION INFORMATION

Partial List of Persons Contacted

Property Owner

O. Baird

U.S. Environmental Protection Agency

G. Weigel, On Scene Coordinator, Region X
D. Thangamani, On Scene Coordinator, Region X
B. Chernick, Response Manager, Phoinix Corporation
F. Jewell, Senior Staff Consultant, TechLaw

Idaho Deparment of Environmental Quality

D. Jones, Health Physicist
H. Crawford, Health Physicist

U.S. Forest Service

R. Henderson, Minerals Program Manager
R. Bjorklund, Minerals Program Specialist

U.S. Ecology

D. Westlund, Manager, NARM & Field Services

Items Opened, Closed, and Discussed

Open

None

Closed

None

Discussed

None

Inspection Procedures Used

IP 83890	Closeout Inspection and Survey
IP 87104	Decommissioning Inspection Procedure for Materials Licenses

List of Acronyms and Abbreviations Used

CFR	Code of Federal Regulations
dpm	disintegrations per minute
EPA	U.S. Environmental Protection Agency
IP	Inspection Procedures
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
ORISE	Oak Ridge Institute for Science and Education
pCi/g	picoCuries per gram
μR/hr	microRoentgens per hour
SRUD	Salmon River Uranium Development, Inc.

Radiological Survey Instrumentation Used

SAIC GR135 Plus Exploranium, Serial No. 6181, NRC No. 088183, calibration due date of April 27, 2008

Ludlum Model 19 MicroRoentgen Meter, Serial No. 36514, NRC No. 016338, calibration due date of February 12, 2008 (calibrated to radium-226)

Ludlum Model 19 MicroRoentgen Meter, Serial No. 33532, NRC No. 015546, calibration due date of February 12, 2008 (calibrated to radium-226)

Eberline E600 count rate meter with SHP380AB alpha-beta probe, Serial No. 2463, NRC No. 079977, calibration due date of September 25, 2008

Ludlum Model 3 survey meter with Model 44-9 probe, Serial No. 52705, NRC No. 21123G, calibration due date of July 10, 2008

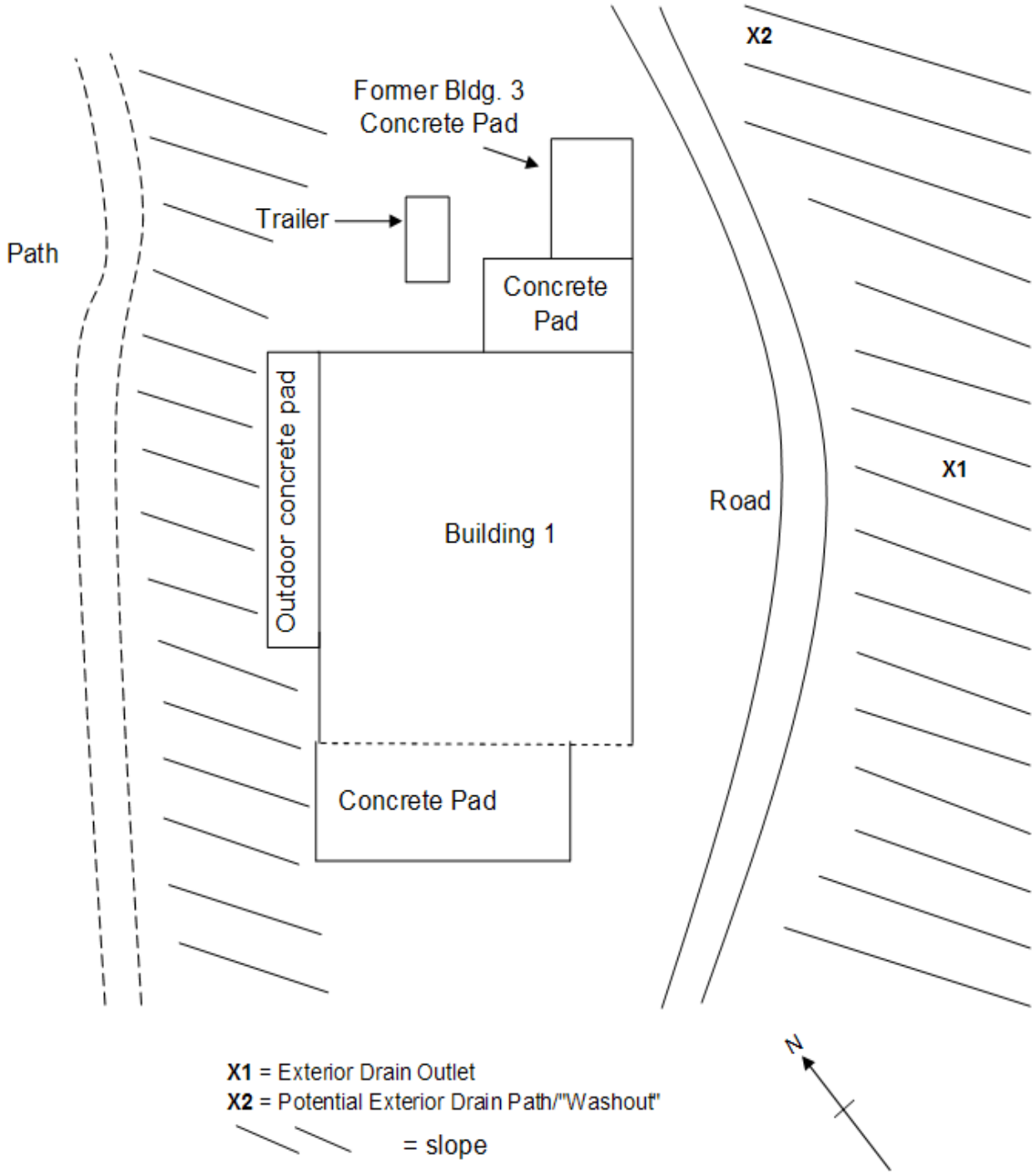

Figure 1. Salmon River Uranium Development Site Overview

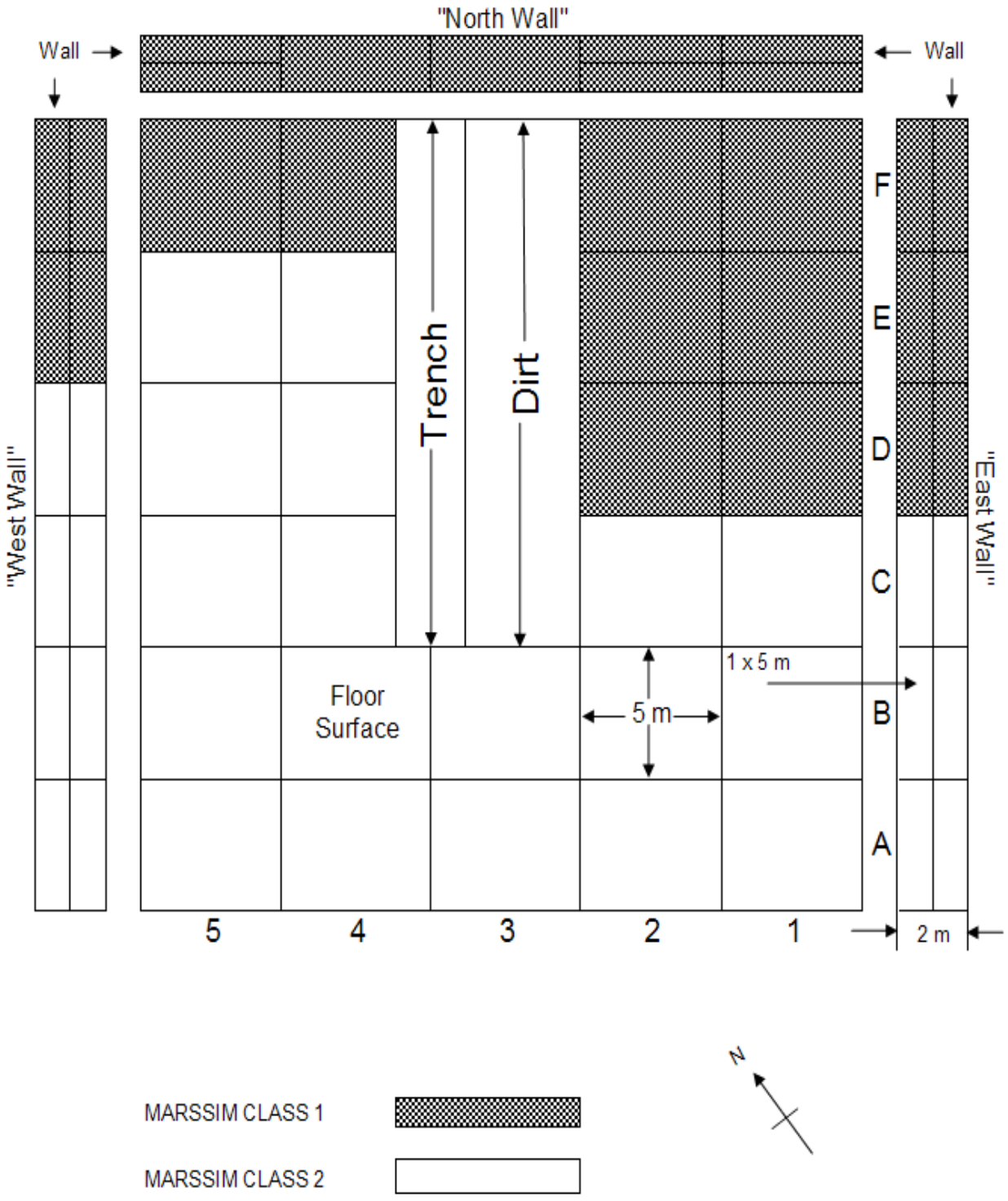

Figure 2: Interior of the Former Mill Building

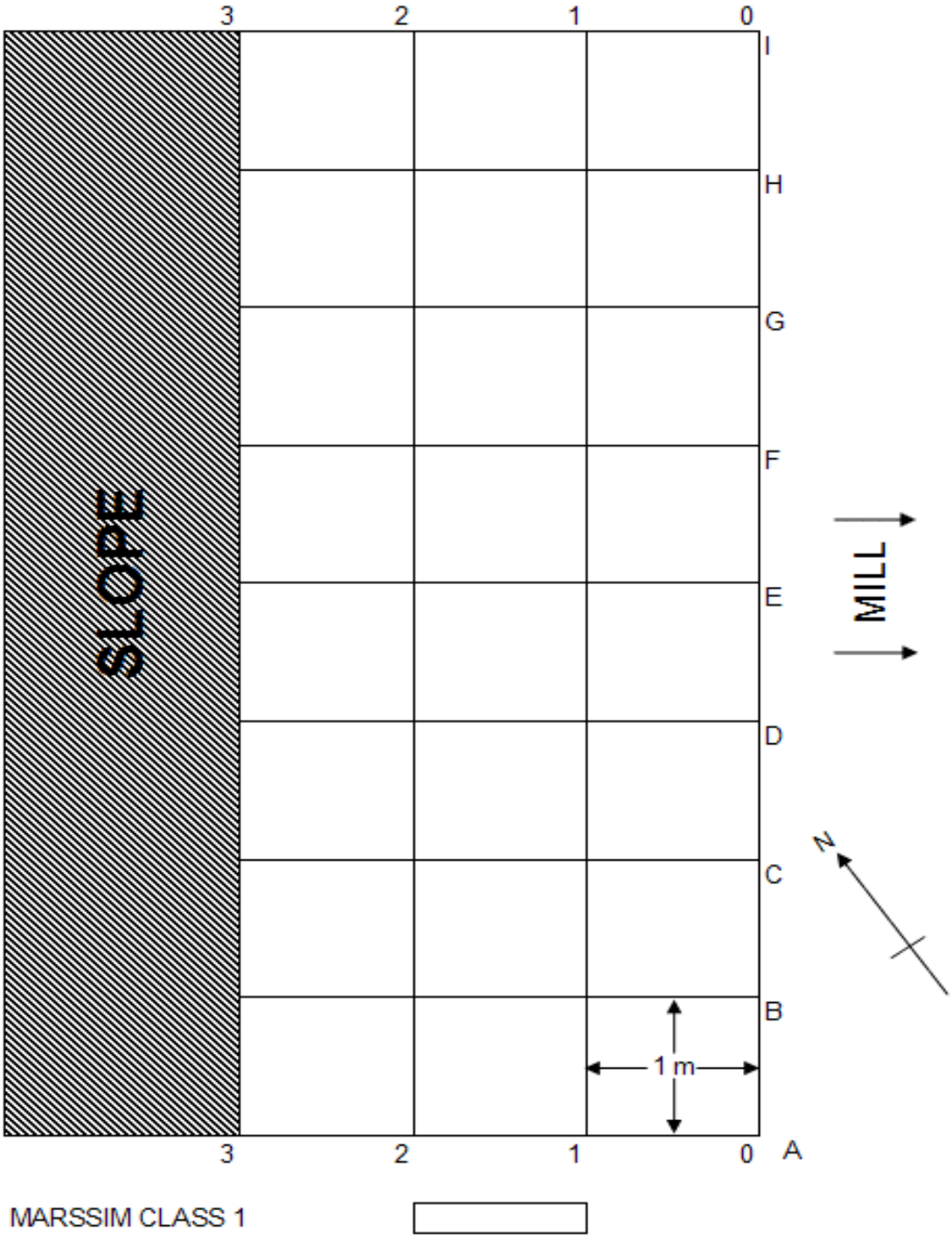

Figure 3. Exterior Concrete Pad Behind Former Mill Building

TABLE 1				
Gamma Spectroscopy Results of Thorium Concentration in Collected Samples [a, b]				
Sample No.	**Location**	**Thorium-228 pCi/g**	**Thorium-232 pCi/g**	**Total Thorium pCi/g**
NRC-1-S	Grid F-4, Interior, NE corner Building 1, sand	58.8 ± 3.2	65.7 ± 5.1	124.5 ± 6.0
NRC-2-S	Grid F-2, Exterior, NE corner Building 1, soil	2.28 ± 0.15	2.62 ± 0.35	4.90 ± 0.38
NRC-3-S	Grid H-3, Exterior, N end of Building 3 pad, soil	15.26 ± 0.88	16.4 ± 1.3	31.7 ± 1.6
NRC-4-S	Grid G-3, Exterior, W edge Building 3 pad, soil	156.7 ± 8.7	177 ± 14	334 ± 16
NRC-5-S	Grid G-3, Exterior, W side Building 3 pad, soil	20.7 ± 1.2	23.0 ± 1.9	43.7 ± 2.2
NRC-6-S	Drain Path, Downstream of Building 1, soil	91.8 ± 5.2	111.6 ± 8.7	203 ± 10
NRC-7-S	Drain Pipe, Downstream of Building 1, soil	212 ± 12	246 ± 19	458 ± 22
NRC-8-S	Upper Tailings Pond Berm, soil	20.0 ± 1.1	21.9 ± 1.8	41.9 ± 2.1
NRC-9-S	Middle Tailings Pond Berm, soil	1.80 ± 0.13	1.98 ± 0.27	3.78 ± 0.30
NRC-10-S	Lower Tailings Pond Berm, soil	1.64 ± 0.12	1.85 ± 0.25	3.49 ± 0.28

[a.] Thorium-228 was estimated by using lead-212 concentrations, and thorium-232 was estimated by using actinium-228 concentrations. Total thorium is the sum of thorium-228 and thorium-232 concentrations.

[b.] NUREG-1717, Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials, Table 3.2.1, "Source Material Concentrations Associated With 0.05 Percent Weight of Source": the total natural/processed thorium concentration that equals 0.05% by weight is 110 pCi/g. Shaded values exceed this concentration for total thorium.

TABLE 2				
Gamma Spectroscopy Results of Uranium Concentration in Collected Samples [a, b]				
Sample No.	**Location**	**Uranium-235 pCi/g**	**Uranium-238 pCi/g**	**Total Uranium pCi/g**
NRC-1-S	Grid F-4, Interior, NE corner Building 1, sand	0.19 ± 0.72	3.9 ± 2.0	8.0 ± 4.1
NRC-2-S	Grid F-2, Exterior, NE corner Building 1, soil	-0.05 ± 0.13	0.98 ± 0.80	1.9 ± 1.6
NRC-3-S	Grid H-3, Exterior, N end of Building 3 pad, soil	-0.13 ± 0.21	4.0 ± 1.3	7.9 ± 2.6
NRC-4-S	Grid G-3, Exterior, W edge Building 3 pad, soil	-0.12 ± 0.95	7.2 ± 2.1	14.3 ± 4.3
NRC-5-S	Grid G-3, Exterior, W side Building 3 pad, soil	0.04 ± 0.31	2.3 ± 1.7	4.6 ± 3.4
NRC-6-S	Drain Path, Downstream of Building 1, soil	0.5 ± 1.0	8.1 ± 3.8	16.7 ± 7.7
NRC-7-S	Drain Pipe, Downstream of Building 1, soil	2.8 ± 1.9	31.8 ± 8.4	66 ± 17
NRC-8-S	Upper Tailings Pond Berm, soil	-0.22 ± 0.26	2.6 ± 2.0	5.0 ± 4.0
NRC-9-S	Middle Tailings Pond Berm, soil	0.09 ± 0.12	0.80 ± 0.86	1.7 ±1.7
NRC-10-S	Lower Tailings Pond Berm, soil	0.05 ± 0.13	1.19 ± 0.76	2.4 ± 1.5

[a.] Uranium-238 was estimated by using thorium-234 concentrations. Total uranium is the sum of uranium-235 and twice the uranium-238 concentration (to account for the uranium-234 activity).

[b.] NUREG-1717, Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials, Table 3.2.1, "Source Material Concentrations Associated With 0.05 Percent Weight of Source": the total uranium concentration that equals 0.05% by weight is 340 pCi/g. None of the sample results exceeded this concentration.

TABLE 3				
Alpha Spectroscopy Results of Thorium Concentration in Selected Samples [a]				
Sample No.	**Location**	**Thorium-228 pCi/g**	**Thorium-230 pCi/g**	**Thorium-232 pCi/g**
NRC-3-S	Grid H-3, Exterior, N end of Building 3 pad, sand	16.0 ± 1.6	1.98 ± 0.42	15.7 ± 1.5
NRC-4-S	Grid G-3, Exterior, W edge Building 3 pad, soil	137 ± 18	10.3 ± 4.0	138 ± 18
NRC-5-S	Grid G-3, Exterior, W side Building 3 pad, soil	23.0 ± 2.1	1.90 ± 0.43	22.7 ± 2.1
NRC-6-S	Drain Path, Downstream of Building 1, soil	100.9 ± 9.2	5.9 ± 1.5	100.9 ± 9.1
NRC-7-S	Drain Pipe, Downstream of Building 1, soil	267 ± 22	163 ± 14	272 ± 22
NRC-8-S	Upper Tailings Pond Berm, soil	14.1 ± 1.5	1.37 ± 0.38	14.2 ± 1.5

[a.] NUREG-1717, Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials, Table 3.2.1, "Source Material Concentrations Associated With 0.05 Percent Weight of Source": the total natural/processed thorium concentration that equals 0.05% by weight is 110 pCi/g. Shaded values equal or exceed this concentration for total thorium.

TABLE 4				
Alpha Spectroscopy Results of Uranium Concentration in Selected Samples [a]				
Sample No.	**Location**	**Uranium-234 pCi/g**	**Uranium-235 pCi/g**	**Uranium-238 pCi/g**
NRC-3-S	Grid H-3, Exterior, N end of Building 3 pad, soil	1.70 ± 0.20	0.04 ± 0.07	1.38 ± 0.19
NRC-4-S	Grid G-3, Exterior, W edge Building 3 pad, soil	7.8 ± 2.2	0.3 ± 1.0	7.9 ± 1.7
NRC-5-S	Grid G-3, Exterior, W side Building 3 pad, soil	2.31 ± 0.25	0.18 ± 0.10	2.18 ± 0.24
NRC-6-S	Drain Path, Downstream of Building 1, soil	2.70 ± 0.53	0.22 ± 0.15	2.75 ± 0.54
NRC-7-S	Drain Pipe, Downstream of Building 1, soil	21.9 ± 3.4	1.18 ± 0.75	20.2 ± 3.2
NRC-8-S	Upper Tailings Pond Berm, soil	1.62 ± 0.20	0.09 ± 0.05	1.56 ± 0.19

[a.] NUREG-1717, Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials, Table 3.2.1, "Source Material Concentrations Associated With 0.05 Percent Weight of Source": the total uranium concentration that equals 0.05% by weight is 340 pCi/g. None of the sample results exceeded this concentration.

TABLE 5					
Exposure Rate Measurements Interior of Former Mill Building [a, b, c]					
Grid Location	**Exposure µR/hr**	**Grid Location**	**Exposure µR/hr**	**Grid Location**	**Exposure µR/hr**
A-1	25	C-1	29	E-1	60
A-2	25	C-2	25	E-2	35
A-3	19	C-3	41	E-3	30
A-4	20	C-4	29	E-4	25
A-5	20	C-5	31	E-5	25
B-1[d]	35/25	D-1	25	F-1	40
B-2	30	D-2	39	F-2	35
B-3	25	D-3	70	F-3	15
B-4	21	D-4	25	F-4	25
B-5	25	D-5	25	F-5	30
				Average	**30**

[a.] The MARSSIM Class 1 survey units for the floor were D-1, D-2, E-1, E-2, F-1, F-2, F-4, and F-5. All other areas were MARSSIM Class 2 survey units.
[b.] The background exposure rate, obtained at the pump house, was 15 µR/hr. The exposure rate measurements listed above were not corrected for background.
[c.] Measurements taken with Ludlum Model 19 MicroRoentgen Meter, Serial No. 36514, NRC No. 016338, calibration due date of February 12, 2008 (calibrated to radium-226).
[d.] Grid B-1 was re-surveyed after radioactive material that had been packaged and staged for disposal was temporarily removed from the area.

TABLE 6			
Wall Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, side of building, measurement location number	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Material**
A-1, east wall, 1	43	592	wood
A-1, east wall, 2	43	1,553	wood
A-1, east wall, 3	33	763	wood
A-1, east wall, 4	163	2,053	wood
A-1, east wall, 5	23	2,303	wood
A-5, west wall, 1	113	882	concrete
A-5, west wall, 2	113	1,421	concrete
A-5, west wall, 3	53	671	concrete
A-5, west wall, 4	53	1,342	concrete
A-5, west wall, 5	83	1,250	concrete
B-1, east wall, 1	163	724	wood
B-1, east wall, 2	23	1,303	wood
B-1, east wall, 3	43	776	wood
B-1, east wall, 4	93	908	wood
B-1, east wall, 5	23	737	wood
B-5, west wall, 1	43	-39	concrete
B-5, west wall, 2	103	816	concrete
B-5, west wall, 3	53	1,158	concrete
B-5, west wall, 4	163	539	concrete
B-5, west wall, 5	163	908	concrete
C-1, east wall, 1	93	711	wood
C-1, east wall, 2	83	1,447	wood
C-1, east wall, 3	-27	408	wood
C-1, east wall, 4	43	868	wood
C-1, east wall, 5	33	276	wood
C-5, west wall, 1	83	-39	concrete
C-5, west wall, 2	123	342	concrete
C-5, west wall, 3	153	1,395	concrete
C-5, west wall, 4	73	1,158	wood

TABLE 6			
Wall Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, side of building, measurement location number	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Material**
C-5, west wall, 5	73	711	wood
D-1, east wall, 1	103	1,329	wood
D-1, east wall, 2	113	1,763	wood
D-1, east wall, 3	63	1,184	wood
D-1, east wall, 4	153	1,539	wood
D-1, east wall, 5	53	724	wood
D-1, east wall, 6	63	1,526	wood
D-1, east wall, 7	53	421	wood
D-1, east wall, 8	53	1,355	wood
D-1, east wall, 9	103	592	wood
D-1, east wall, 10	73	855	wood
D-5, west wall, 1	213	684	concrete
D-5, west wall, 3	93	592	concrete
D-5, west wall, 4	63	1,158	concrete
D-5, west wall, 5	43	197	concrete
E-1, east wall, 1	73	2,776	wood
E-1, east wall, 2	153	3,974	wood
E-1, east wall, 3	113	2,868	wood
E-1, east wall, 4	133	3,474	wood
E-1, east wall, 5	133	5,250	wood
E-1, east wall, 6	163	2,868	wood
E-1, east wall, 7	153	5,605	wood
E-1, east wall, 8	163	2,763	wood
E-1, east wall, 9	133	2,671	wood
E-1, east wall, 10	63	2,526	wood
E-5, west wall, 1	73	1,066	concrete
E-5, west wall, 2	133	1,408	concrete
E-5, west wall, 3	-27	1,066	concrete
E-5, west wall, 4	33	1,961	concrete

TABLE 6			
Wall Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, side of building, measurement location number	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Material**
E-5, west wall, 5	123	934	concrete
E-5, west wall, 6	33	829	concrete
E-5, west wall, 7	93	1,908	concrete
E-5, west wall, 8	153	1,237	concrete
E-5, west wall, 9	133	303	concrete
E-5, west wall, 10	113	2,158	concrete
F-1, east wall, 1	143	3,711	wood
F-1, east wall, 2	33	4,158	wood
F-1, east wall, 3	93	3,447	wood
F-1 ,east wall, 4	43	3,947	wood
F-1 ,east wall, 5	73	3,632	wood
F-1 ,east wall, 6	93	3,684	wood
F-1, east wall, 7	103	3,474	wood
F-1, east wall, 8	73	3,658	wood
F-1, east wall, 9	33	2,276	wood
F-1, east wall, 10	113	3,316	wood
F-1, north wall, 1	153	4,671	wood
F-1, north wall, 2	213	5,184	wood
F-1, north wall, 3	73	3,671	wood
F-1, north wall, 4	13	5,000	wood
F-1, north wall, 5	33	3,684	wood
F-1, north wall, 6	93	5,276	wood
F-1, north wall, 7	23	3,553	wood
F-1, north wall, 8	93	5,079	wood
F-1, north wall, 9	73	3,750	wood
F-1, north wall, 10	113	5,487	wood
F-2, north wall, 1	93	4,934	wood
F-2, north wall, 2	213	6,355	wood
F-2, north wall, 3	93	4,724	wood

TABLE 6			
Wall Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, side of building, measurement location number	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Material**
F-2, north wall, 4	143	6,263	wood
F-2, north wall, 5	203	6,316	cardboard
F-2, north wall, 6	133	6,382	cardboard
F-2, north wall, 7	113	7,092	cardboard
F-2, north wall, 8	113	7,421	cardboard
F-2, north wall, 9	163	9,539	wood
F-2, north wall, 10	133	8,632	wood
F-4, north wall, 1	-7	382	wood
F-4, north wall, 2	33	158	wood
F-4, north wall, 3	133	158	wood
F-4, north wall, 4	83	197	wood
F-4, north wall, 5	113	1,026	wood
F-4, north wall, 6	53	1,237	wood
F-5, west wall, 1	3	2,355	concrete
F-5, west wall, 2	113	1,132	concrete
F-5, west wall, 3	33	579	concrete
F-5, west wall, 4	43	2,053	concrete
F-5, west wall, 5	103	553	concrete
F-5, west wall, 6	83	1,197	concrete
F-5, west wall, 7	153	1,447	concrete
F-5, west wall, 8	53	1,605	concrete
F-5, west wall, 9	93	2,368	concrete
F-5, west wall, 10	173	2,092	concrete
F-5, north wall, 1	53	1,092	wood
F-5, north wall, 2	73	1,224	wood
F-5, north wall, 3	53	1,632	wood
F-5, north wall, 4	53	1,447	wood
F-5, north wall, 5	173	1,605	wood
F-5, north wall, 6	83	1,632	wood

TABLE 6			
Wall Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, side of building, measurement location number	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Material**
F-5, north wall, 7	53	2,432	wood
F-5, north wall, 8	63	1,421	wood
Average	**90**	**2,278**	

[a.] MARSSIM Class 1 wall survey units were grids D-1-east wall, E-1-east wall, F-1-east wall, F-1 north wall, F-2 north wall, F-4 north wall, F-5 north wall, F-5 west wall, E-5-west wall. All other grids were Class 2 survey units.

[b.] Measurements taken with Eberline E600 count rate meter with SHP380AB alpha-beta probe, Serial No. 2463, NRC No. 079977, calibration due date of September 25, 2008. Measurements were corrected for total efficiency and background.

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
A-1, 1-1	133	2,250	wood
A-1, 1-2	63	1,737	concrete
A-1, 1-3	83	895	concrete
A-1, 2-1	103	1,013	concrete
A-1, 2-2	143	842	concrete
A-1, 2-3	53	882	concrete
A-1, 3-1	183	776	concrete
A-1, 3-2	173	1,092	concrete
A-1, 3-3	23	947	concrete
B-1, 1-1	93	1,395	concrete
B-1, 1-2	-37	684	concrete
B-1, 1-3	33	1,408	concrete
B-1, 2-1	83	1,605	concrete
B-1, 2-2	113	763	concrete
B-1, 2-3	73	842	concrete
C-1, 1-1	143	1,039	concrete
C-1, 1-2	43	961	concrete
C-1, 1-3	43	1,026	concrete
C-1, 2-1	73	803	concrete
C-1, 2-2	33	526	concrete
C-1, 2-3	83	789	concrete
C-1, 3-1	93	1,303	concrete
C-1, 3-2	13	803	concrete
C-1, 3-3	63	1,461	concrete
D-1, 1-1	523	3,724	wood
D-1, 1-1	283	882	concrete
D-1, 1-2	103	513	concrete
D-1, 1-3	-7	671	concrete
D-1, 2-1	313	2,974	concrete

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
D-1, 2-2	23	1,816	concrete
D-1, 2-3	83	2,632	concrete
E-1, 1-1	1,053	7,711	concrete
E-1, 1-2	1,023	14,658	concrete
E-1, 1-3	1,293	6,250	concrete
E-1, 2-1	1,423	25,303	concrete
E-1, 2-2	1,613	11,474	concrete
E-1, 2-3	3,053	13,592	concrete
E-1, 3-1	1,613	10,039	concrete
E-1, 3-2	1,193	9,803	concrete
E-1, 3-3	253	4,145	concrete
F-1, 1-1	413	3,487	concrete
F-1, 1-2	213	4,842	concrete
F-1, 1-3	463	3,132	concrete
F-1, 2-1	313	2,974	concrete
F-1, 2-2	213	2,947	concrete
F-1, 2-3	273	3,013	concrete
F-1, 3-1	583	7,632	concrete
F-1, 3-2	153	2,342	concrete
F-1, 3-3	243	2,461	concrete
A-2, 1-1	33	329	concrete
A-2, 1-2	153	934	concrete
A-2, 1-3	133	855	concrete
A-2, 2-1	83	1,053	concrete
A-2, 2-2	53	329	concrete
A-2, 2-3	83	632	concrete
A-2, 3-1	33	1,079	concrete
A-2, 3-2	43	671	concrete
A-2, 3-3	-	-	not accessible

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
B-2, 1-1	143	1,000	concrete
B-2, 1-2	213	2,197	concrete
B-2, 2-1	83	1,316	concrete
B-2, 2-2	223	1,053	concrete
C-2, 1-1	93	1,303	concrete
C-2, 1-2	-	-	not accessible
C-2, 2-1	103	1,263	concrete
C-2, 2-2	213	1,645	concrete
C-2, 3-1	213	895	concrete
C-2, 3-2	213	1,474	concrete
D-2, 1-1	213	1039	concrete
D-2, 1-2	53	882	concrete
D-2, 2-1	73	1,592	concrete
D-2, 2-2	63	1,316	concrete
E-2, 1-1	853	10,961	concrete
E-2, 1-2	173	2,579	concrete
E-2, 2-1	733	6,908	concrete
E-2, 2-1 Drain	483	23,855	concrete channel
E-2, Floor drain	403	9,289	wood drain cover
E-2, 2-2	323	2,184	concrete
E-2, 3-1	623	5,763	concrete
E-2, 3-2	263	3,934	concrete
F-2, 1-1	353	2,882	concrete
F-2, 1-2	233	2,474	concrete
F-2, 2-1	83	1,026	concrete
F-2, 2-2	153	1,908	concrete
F-2, 3-1	153	1,632	concrete
F-2, 3-2	193	1013	concrete
A-3, 1-1	123	1,092	concrete

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
A-3, 1-2	223	737	concrete
A-3, 2-1	233	803	concrete
A-3, 2-2	203	1,355	concrete pedestal
A-3, 3-1	203	1,368	concrete
A-3, 3-2	-	-	not accessible
B-3, 1-1	-	-	not accessible
B-3, 1-2	13	1,132	concrete
B-3, 2-1	173	934	concrete pedestal
B-3, 2-2	173	1,171	concrete
C-3	-	-	not accessible
D-3	-	-	not accessible
E-3	-	-	not accessible
F-3, 3-1	223	2,987	concrete
F-3, 3-2	93	1,539	concrete
F-3 Bathroom floor	93	1,829	
F-3 Shower floor	93	1,816	
A-4, 1-1	103	1,053	concrete
A-4, 1-2	153	2,158	concrete
A-4, 1-3	243	1,803	concrete
A-4, 2-1	163	1,013	concrete
A-4, 2-2	163	1,829	concrete
A-4, 2-3	143	1,211	concrete
A-4, 3-1	173	1,447	concrete
A-4, 3-2	-	-	not accessible
A-4, 3-3	63	1,039	concrete
B-4, 1-1	223	1,566	concrete
B-4, 1-2	173	1,342	concrete
B-4, 1-3	-	-	not accessible
B-4, 2-1	93	882	concrete

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
B-4, 2-2	183	934	concrete
B-4, 2-3	143	697	concrete
C-4, 1-1	193	1,711	concrete
C-4, 1-2	173	776	concrete
C-4, 1-3	193	1,000	concrete
C-4, 2-1	143	1,658	concrete
C-4, 2-2	-	-	not accessible
C-4, 2-3	223	4,487	concrete
C-4, 3-1	203	1,382	concrete
C-4, 3-2	223	1,592	concrete
C-4, 3-3	133	1,697	concrete
D-4, 1-1	293	2,132	concrete
D-4, 1-2	353	1,316	concrete
D-4, 1-3	143	1,329	concrete
D-4, 2-1	263	1,829	concrete
D-4, 2-2	313	1,461	concrete
D-4, 2-3	103	1,132	concrete
E-4, 1-1	283	2,013	concrete
E-4, 1-2	163	1,868	concrete
E-4, 1-3	173	2,382	concrete
E-4, 2-1	133	1,487	concrete
E-4, 2-2	653	3,355	concrete
E-4, 2-3	173	1,184	concrete pedestal
E-4, 3-1	103	842	concrete
E-4, 3-2	133	1,487	concrete
E-4, 3-3	103	2,539	concrete
F-4, 1-1	233	1,882	concrete
F-4, 1-2	383	1,250	concrete
F-4, 1-3	143	1,461	concrete

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
F-4, 2-1	-	-	not accessible
F-4, 2-2	143	1,513	wood
F-4, 2-3	-	-	not accessible
F-4, 3-1	-	-	not accessible
F-4, 3-2	183	1,539	wood
F-4, 3-3	-	-	not accessible
A-5, 1-1	-	-	not accessible
A-5, 2-1	233	1,789	concrete
A-5, 3-1	-	-	not accessible
B-5, 1-1	-	-	not accessible
B-5, 2-1	213	1,145	concrete
C-5, 1-1	43	684	concrete
C-5, 1-2	93	987	concrete
C-5, 2-1	-	-	not accessible
C-5, 2-2	-	-	not accessible
C-5, 3-1	153	1,066	concrete
C-5, 3-2	103	1,750	concrete
D-5, 1-1	263	1,105	concrete pedestal
D-5, 1-2	113	1,382	concrete
D-5, 2-1	63	566	concrete pedestal
D-5, 2-2	173	1,632	concrete
E-5, 1-1	193	1,289	concrete
E-5, 1-2	403	2,250	concrete
E-5, 2-1	343	1,066	concrete pedestal
E-5, 2-2	253	2,684	concrete
E-5, 3-1	333	1,526	concrete
E-5, 3-2	113	1,566	concrete
F-5, 1-1	163	2,211	concrete
F-5, 1-2	363	3,553	concrete

TABLE 7			
Floor Surface (Total Radiological Contamination) Measurements [a, b] Interior of Former Mill Building			
Grid, Floor Location	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Surface Type**
Average	**255**	**2,480**	

[a.] The MARSSIM Class 1 survey units for the floor were grids D-1, D-2, E-1, E-2, F-1, F-2, F-4, and F-5. All other grids were MARSSIM Class 2 survey units.

[b.] Measurements taken with Eberline E600 count rate meter with SHP380AB alpha-beta probe, Serial No. 2463, NRC No. 079977, calibration due date of September 25, 2008. Measurements were corrected for total efficiency and background.

TABLE 8				
Surface (Total Radiological Contamination) Measurements of Equipment [a, b] Interior of Former Mill Building				
Equipment	**Approximate Grid Location**	**Beta, average dpm/100 cm²**	**Beta, maximum dpm/100 cm²**	**Comments**
Screw pump, Denver Equipment	E-2	1,389	12,500	
Tall yellow pressure vessel	E-2	463	463	exterior readings only
Short yellow pressure vessel	E-1	463	463	exterior readings only
Wood table	F-1	463	463	
Large metal water tank	E-1	463	463	
Metal tub	E-1	1,389	12,500	residue at bottom
Yellow grinder	E-1/F-1 boundary	Not Recorded	53,241	processed ore in grinder
Yellow grinder (after decontamination)[c]	E-1/F-1 boundary	4,167	16,204	
Yellow corrosive liquid tank	C-4	463	463	
Agitator tank pump	E-1	4,389	8,796	
Small metal water tank	E-1	463	463	white residue in tank
Metal trench	E-1/F-1 boundary	3,241	4,167	ground ore dust in trench
Agitator (leach tank)	E-1/D-1 boundary	1,389	27,315	external readings partial survey only
Agitator (leach tank) (after decontamination)[c]	E-1/D-1 boundary	4,167	16,204	external readings only
Blue fiberglass tank	E-2	1,389	1,389	

[a.] Measurements taken with Ludlum Model 3 survey meter with Model 44-9 probe, Serial No. 52705, NRC No. 21123G, calibration due date of July 10, 2008. The minimum detectable activity of the survey meter was 566 dpm/100 cm^2. Any measurement below this value is considered to be background.

[b.] The surface contamination limits for uranium provided in Table 1 to NRC Policy and Guidance Directive FC 83-23 are 5,000 dpm per 100 cm^2 average and 15,000 dpm per 100 cm^2 maximum. Shaded values exceed this limit.

[c.] The yellow grinder and agitator (leach tank) and were decontaminated and re-surveyed. The first measurement was taken prior to decontamination, and the second measurement was taken after decontamination.

TABLE 9			
Surface (Total Radiological Contamination)[a] and Exposure Rate[b] Measurements Outdoor Concrete Pad Behind Former Mill Building			
Outdoor Concrete Pad Grid No.	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Exposure Rate µR/hr**
A-0	997	2,575	32
A-1	1,377	9,746	32
A-2	277	2,404	35
A-3	117	2,167	45
B-0	1,307	4,746	35
B-1	2,217	12,338	37
B-2	397	2,299	40
B-3	907	4,707	40
C-0	1,767	14,009	40
C-1	4,807	31,812	40
C-2	1,387	8,983	40
C-3	1,077	4,654	40
D-0	4,987	5,2470	47
D-1	8,467	44,838	42
D-2	1,887	10,641	35
D-3	917	5,720	32
E-0	3,447	36,812	42
E-1	8,287	42,338	38
E-2	2,007	11,536	35
E-3	457	2,167	30
F-0	1,377	7,917	38
F-1	2,647	9,364	38
F-2	697	2,957	30
F-3	337	2,391	30
G-0	1,607	14,207	40
G-1	2,097	11,957	35
G-2	617	1,943	35
G-3	207	851	30
H-0	1,827	8,667	35

TABLE 9			
Surface (Total Radiological Contamination)[a] and Exposure Rate[b] Measurements Outdoor Concrete Pad Behind Former Mill Building			
Outdoor Concrete Pad Grid No.	**Alpha dpm/100 cm^2**	**Beta dpm/100 cm^2**	**Exposure Rate µR/hr**
H-1	3,417	22,733	35
H-2	427	2,746	30
H-3	167	1,154	30
I-0	1,547	12,654	40
I-1	1,667	10,378	38
I-2	697	2,641	35
I-3	127	2,193	30
Average	**1,847**	**11,714**	

[a.] Measurements taken with Eberline E600 count rate meter with SHP380AB alpha-beta probe, Serial No. 2463, NRC No. 079977, calibration due date of September 25, 2008. The total surface contamination results were corrected for both background and instrument efficiency.
[b.] Measurements taken with Ludlum Model 19 MicroRoentgen Meter, Serial No. 33532, NRC No. 015546, calibration due date of February 12, 2008 (calibrated to radium-226). The background exposure rate, obtained at a non-impacted area, was 15 µR/hr. The exposure rate measurements were not corrected for background.

TABLE 10			
Removable Radiological Contamination (Swipe) Results [a, b] Various Surfaces			
Swipe No.	**Surface, Location**	**Gross Alpha pCi/100 cm^2**	**Gross Beta pCi/100 cm^2**
NRC-5-W	Floor, Interior Grid A-1, 1-2	< 8.9	< 15
NRC-6-W	Floor, Interior Grid B-1, 2-1	< 8.9	< 15
NRC-77W	Floor, Interior Grid C-1, 3-3	< 8.9	< 15
NRC-8-W	Floor, Interior Grid D-1, 2-1	< 8.9	< 15
NRC-9-W	Floor, Interior Grid E-1, 2-1	< 8.9	< 15
NRC-10-W	Floor, Interior Grid F1, 3-1	< 8.9	< 15
NRC-11-W	Floor, Interior Grid F-2, 1-1	< 8.9	< 15
NRC-12-W	Floor, Interior Grid E-2, 2-1	< 8.9	< 15
NRC-13-W	Floor, Interior Grid D-2, 2-1	< 8.9	< 15
NRC-14-W	Floor, Interior Grid C-2, 2-2	< 8.9	< 15
NRC-15-W	Floor, Interior Grid B-2, 1-2	< 8.9	< 15
NRC-16-W	Floor, Interior Grid A-2, 3-1	< 8.9	< 15
NRC-17-W	Floor, Interior Grid A-3, 3-1	< 8.9	< 15
NRC-18-W	Floor, Interior Grid B-3, 2-2	< 8.9	< 15
NRC-19-W	Floor, Interior Grid F-3, 3-1	< 8.9	< 15
NRC-20-W	Floor, Interior Grid F-4, 1-1	< 8.9	< 15
NRC-21-W	Floor, Interior Grid E-4, 2-2	< 8.9	< 15
NRC-22-W	Floor, Interior Grid D-4, 1-2	< 8.9	< 15
NRC-23-W	Floor, Interior Grid C-4, 3-2	< 8.9	< 15
NRC-24-W	Floor, Interior Grid B-4, 1-1	< 8.9	< 15
NRC-25-W	Floor, Interior Grid A-4, 1-3	< 8.9	< 15
NRC-26-W	Floor, Interior Grid A-5, 2-1	< 8.9	< 15
NRC-27-W	Floor, Interior Grid B-5, 2-1	< 8.9	< 15
NRC-28-W	Floor, Interior Grid C-5, 1-2	< 8.9	< 15
NRC-29-W	Floor, Interior Grid D-5, 1-1	< 8.9	< 15
NRC-30-W	Floor, Interior Grid E-5, 1-2	< 8.9	< 15
NRC-31-W	Floor, Interior Grid F-5, 1-2	< 8.9	< 15
NRC-32-W	Floor, Interior Grid E-2 drain	< 8.9	< 15
NRC-33-W	Agitator (leach tank), E-1/D-1 boundary	< 8.9	< 15

TABLE 10			
Removable Radiological Contamination (Swipe) Results [a, b] Various Surfaces			
Swipe No.	**Surface, Location**	**Gross Alpha pCi/100 cm^2**	**Gross Beta pCi/100 cm^2**
NRC-34-W	Yellow grinder, E-1/F-1 boundary	< 8.9	< 15
NRC-35-W	Screw pump, Denver Equipment, E-2	< 8.9	< 15
NRC-36-W	Metal tub, E-1	< 8.9	< 15
NRC-37-W	Agitator (leach tank) pump, E-1	< 8.9	< 15
NRC-38-W	concrete pad, Outdoor Grid D-1	< 8.9	< 15
NRC-39-W	concrete pad, Outdoor Grid E-1	< 8.9	< 15
NRC-40-W	concrete pad, Outdoor Grid D-0	< 8.9	< 15

[a.] The alpha minimum detectable concentration was 8.9 pCi/swipe and the beta minimum detectable concentration was 15 pCi/swipe.

[b.] Each swipe was a 12 inch long smear sample, using a 47-millimeter diameter filter paper, taken with moderate pressure in an “S” configuration. Therefore, each swipe was the equivalent of approximately 100 cm^2 of surface area.