Operation of Shootaring Canyon Uranium Mill

Amendment Request for
License Number UT 0900480

Utah Department of Environmental Quality
Division of Radiation Control
Radioactive Material License

PLATEAU Resources Ltd.
Shootaring Canyon Mill
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Appendices

1 Introduction

Plateau Resources Limited (PRL) began start-up testing of its Shootaring Canyon Uranium Mill on April 13, 1982, and continued testing through May, 1982. The plant capacity and metallurgical performance were as expected. PRL started commercial operations on June 1, 1982. The facility produced and sold 27,825 pounds of yellowcake (uranium oxide: U_3O_8) until August 18, 1982, when PRL suspended operations due to a decline in the market price for yellowcake.

The facility has been maintained on standby. Cleanup operations were completed and the solids were removed from all circuits except the calciner and product thickener. The doors to the calciner room were welded shut and doors to the 600 area were locked. A few process tanks and some of the laboratory equipment have been sold.

With the recent improvement in the economics of uranium production, PRL has made plans to operate the mill once all regulatory approvals are obtained and facility modifications are completed and fully functional.

The operating license for the Shootaring Mill was last renewed by submitting a license renewal application dated March 1, 1996 (PRL, 1996) as revised by submittals to the U.S. Nuclear Regulatory Commission (NRC) dated September 16 and November 15, 1996, and April 17, 1997. The NRC gave the State of Utah (the State) primary responsibility for approving the tailings management plan and new liner design for that submittal.

The intent of this document is to amend the March 1, 1996 renewal application with changes specified herein. It is our intent to retain the two modes of activity presented in the March 1, 1996 submittal: interim or "standby" status of the processing facility and the operations mode. The specific activities and plans associated with these modes relate in general to staffing levels, the frequency of environmental sampling, and extent of sample analysis.

There are four changes to the information given in the March 1, 1996 renewal application: the average grade of ore to be processed has been increased from 0.15 to 0.25 percent, significant improvements to managing the tailings are being proposed, a vanadium extraction circuit has been added, and a new decommissioning and tailings reclamation plan has been prepared to address the changes in the tailings management strategy. These changes are addressed in the following sections. All other information is available in the March 1, 1996 submittal and revisions. Details of these changes and the associated environmental impacts are provided in the following reports that are attached.

- Environmental Report Revision 1, December 2006
- Tailings Management Plan (Amended December 2006)
- Decommissioning and Tailings Reclamation Plan, December 2006

2 Modifications to the License Renewal Application (March 1, 1996 and Revisions)

2.1 Change in Uranium Oxide Content

The average ore grade stated in the March 1, 1996 amendment was estimated at 0.15 percent U_3O_8, based on tests of local ore. However, regional ore sources for the plant are expected to average 0.25 percent U_3O_8. The plant is expected to have an overall recovery rate of approximately 94 percent. Based on an average ore grade of 0.25 percent, the anticipated recovery, and average ore processing rate of 1,000 tons per day, the plant is capable of producing an annual average of approximately 4700 pounds per day.

The unprocessed ore is principally sandstone. The uranium minerals in the ore occur as coatings on sand grains; they also fill intergranular spaces. The uranium minerals are soluble in strong sulfuric acid solutions and are extracted from the ore by a conventional sulfuric acid leach process.

Uranium processing at the PRL facility consists of a series of operations. The ore is first ground in a semi-autogenous grinding (SAG) mill to sand-size particles. This allows the acid to contact the grain surfaces during the leaching process. After grinding, the ore is delivered in slurry form directly to a two-stage, multiple-tank leaching system.

After leaching, the slurry is pumped to six countercurrent decantation (CCD). The CCD tanks are operated in series; solids pass through the tanks in one direction and an acid wash solution in the opposite direction. The solids are discharged from the CCD system as waste material to the tailings facility. Most of the soluble uranium is recovered with the decanted acidic liquid, which is pumped to the first-stage leaching tanks.

A thickener between the two leaching stages separates the uranium-bearing solution from the solids. The overflow liquid from the thickener passes through a clarifier and sand filters to remove suspended solids.

The separated solids from these two processes return to the leaching system. The filtered liquid is transferred to a solvent extraction (SX) liquid ion exchange system.

The uranium-bearing liquor passes through a series of stages in the SX system in which the uranium is first transferred from the aqueous phase to an organic phase and then stripped from the solvent by an ammonium sulfate solution. The ammonia is added to the stripped solution to precipitate the uranium as ammonium diuranate. This product is dried, packaged, and shipped off-site to a uranium conversion facility. The depleted aqueous solution from the uranium solvent extraction, uranium raffinate, will be conveyed to the vanadium extraction circuit.

A listing of the reagents and associated processes is provided in Table 2-1.

Table 2-1. Reagents used in the Milling Process

Reagents	Process
Sulfuric Acid	Leach
Sodium chlorate	Leach
Flocculant	Leach, CCD, Precipitation
Ammonia	SX, Precipitation
Tridecanol, Tertiary Amine, Kerosene	SX
Sodium bicarbonate	SX
Sodium hydroxide	Precipitation
Charcoal (carbon)	Precipitation

Notes:
CCD = countercurrent decantation
SX = solvent extraction

2.2 Vanadium Extraction Circuit

A vanadium circuit addition is proposed for the uranium mill upon approval by the State. An engineering design will be prepared and submitted to the State for information purposes prior to construction. The basic process is described below.

The depleted aqueous solution from the uranium solvent extraction, the uranium raffinate, serves as the feed for vanadium concentration. Three raffinate holding tanks will discharge one of three pH/electromotive force (EMF) adjustment tanks. Anhydrous ammonia and sodium chlorate will be added to these tanks to adjust pH and oxidize tetravalent vanadium to the pentavalent state, respectively.

A sludge thickener will be used to settle, thereby concentrating particulate matter. The thickener underflow slurry will be discharged to the tailings facility. The thickener overflow solution will still contain a low concentration of solids (about 100 parts per million) that would interfere with subsequent solvent extraction. A flotation column cell with a rising stream of finely dispersed air bubbles will separate the solids into a floating froth that will be pumped to the tailings pond. The clarified liquor will flow to the vanadium SX feed tank with an estimated 45-minute retention time.

The SX process for vanadium concentrates and purifies the dilute and impure aqueous solution containing vanadium. This is accomplished with a recyclable organic solvent that typically contains an amine-based reagent (extractant), a long-chain alcohol (modifier), and kerosene (diluent). The extractant combines with the vanadium to form a specific complex. Amines are anionic in character and extract anionic complexes; only pentavalent vanadium forms anionic complexes, hence the oxidation step mentioned above.

There will be a maximum of 6 extraction stages: each comprises an agitated mixer box that overflows into a rectangular tank called a settler. Streams of aqueous solution and solvent enter the mixer and a suspension is formed of small droplets of one phase in a continuous liquid phase of the other. Whether that phase is “organic continuous” or “aqueous continuous” depends on

the relative volumes of the two. The phases separate in the settler. The lighter organic solvent (loaded solvent) floats on the aqueous layer, allowing separation by an overflow/underflow weir arrangement. The loaded solvent is processed further. The heavier vanadium raffinate from the extraction circuit, containing low concentrations of uranium and vanadium, is conveyed to the tailings facility.

The loaded solvent flows through a quiescent tank with an estimated 10-20 minutes retention time to allow entrained droplets of the aqueous solution to separate, coalesce, and sink to the bottom. It is then pumped back to the SX feed tank. The loaded solvent is then contacted with aqueous sodium carbonate. This solution strips most of the vanadium content.

Stripping requires fewer stages, typically 2-3, than extraction. The mixer/settler design is the same, although the sizes differ. The stripped solvent is recycled to the extraction circuit and the concentrated solution (vanadium pregnant liquor, VPL) flows to another flotation column in which entrained droplets in the solvent are separated. The clarified pregnant liquor is held in two tanks for up to 8 hours, isolating the extraction circuit from the purification and precipitation circuit during potential maintenance interruptions.

The VPL flows to either of two steam-heated sodium hexavanadate (red cake) precipitation tanks to which sulfuric acid and sodium chlorate is added. The red cake slurry is fed onto a belt filter, producing a water-washed filter cake and a filtrate that will be returned to the vanadium SX feed tank, or to tailings, depending on impurity content. The red cake is discharged into either of two steam-heated dissolving tanks along with sodium carbonate and sodium chlorate and held for approximately 3 hours. The resulting solution passes through a filter feed tank with an estimated 1-hour retention, then into a pressure filter that is pre-coated with diatomaceous earth, or equivalent. Solids periodically backwashed from the filter are sent to the tailings facility and the clarified solution is delivered through a water-cooled heat exchanger to the ammonium metavanadate (AMV) crystallizer feed tank.

Ammonium sulfate solution and ammonium hydroxide are combined with the clarified solution and fed into a series of three strongly-agitated crystallizer tanks. The slurry of AMV crystals is fed onto another water-washed belt filter and the crystals are conveyed to the AMV cake bin. The filtrate flows through a small propane-fired submerged combustion evaporator, then returns to the crystallizer feed tank.

The AMV cake is dried in a fuel-fired rotary dryer, then treated in one of three ways, depending on market requirements.
The AMV may be:

- Packaged and sold;
- Fed directly to a multiple-hearth calcining furnace (“deammoniator”), melted in a fusion furnace, tapped into a water-cooled casting wheel, and packaged as 99.5%V_2O_5 (black flake); or
- Dissolved with dilute sulfuric acid in an “acidulation” tank, followed by addition of ammonium hydroxide to a neutralization tank, from which the liquor flows through a water-cooled heat exchanger to a crystallizer tank. The slurry of re-crystallized AMV is

fed to a washing belt filter, then to the deammoniator, fusion furnace, and casting wheel described above. This product would contain 99.9% V_2O_5 and also be called black flake.

Vanadium extraction circuits have been employed at many ore processing plants, including licensed uranium mills. Vanadium in not listed as a carcinogen but the exposure to vanadium compounds, process fumes, ammonium hydroxide, and other reagents is of concern to PRL. Standard Operating Procedures (SOPs) will be prepared and operators will be trained on safety and safe operations, similar to the program for operators in the uranium extraction circuit of the mill.

2.3 Tailings Facility

A tailings management plan (TMP) for the Shootaring site was previously submitted to NRC and State of Utah Department of Environmental Quality (DEQ), Division of Radiation Control (DRC) in 1999. The attached TMP amends that plan, incorporating many of the general concepts included in the previous submittal but with significant improvements in the approach to tailings management. One of the primary proposed improvements is the provision for Reduced-Moisture Tailings Placement (RMTP). A belt press or similar fluid extraction equipment will be used to extract a significant portion of tailings solution from the tailings slurry, yielding moist tailings in solid form and a liquid stream of tailings solution. The tailings solution will be routed to a solution storage/evaporation pond for recycle or evaporation. The solid tailings will then be placed in the tailings cell(s) to a depth extending above grade. The extraction of water from the tailings slurry prior to delivery of the tailings to the cell reduces the drainage from the in-place tailings. Additional advantages of this approach include increased capacity for each tailings cell, potentially reducing the aerial extent of the reclaimed tailings and tailings containment structure failures, such as in berms or dams.

A seven-part liner with a drainage collection system and leak detection system is used for containment in the tailings cell(s). The proposed liner is discussed in more detail in the TMP (PRL, 2005) which is attached to this amendment request.

2.4 Decommissioning and Reclamation Plan

A decommissioning plan was prepared in 1996 and approved by the NRC (PRL, 1996). However a revised plan was needed to accommodate the changes made to the TMP, the addition of the vanadium circuit, and the increase in the average ore grade. The details of this plan are provided in the Tailings Reclamation and Decommissioning Plan (Hydro-Engineering, 2005) included with this submittal.

2.5 Safety and Environmental Review Panel

PRL has a performance-based license which allows some flexibility in the manner in which the site is operated. A well-defined process is followed in evaluating the environmental health and safety consequences of a proposed change in facility or process, procedure, or of a proposed test

or experiment. The consequences are assessed by a Safety and Environmental Review Panel (SERP), which for a particular proposed action, prepares a Safety and Environmental Evaluation (SEE) that documents the consequences of the proposed action. If the consequences meet criteria proposed in the license condition, then the proposed action may be implemented without a license amendment. The documentation and reporting requirements for actions involving the SERP are provided in the license and SOP AP-2. License condition 9.4 of PRL's Radioactive Material License UT 0900480 is repeated for convenience below.

A. The licensee may, without prior Executive Secretary approval, and subject to the conditions specified in Part B of this condition:

(1) make changes in the facility or process, as presented in the approved license application,

(2) make changes in the procedures presented in the approved license application, and

(3) conduct tests or experiments not presented in the approved license application.

B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied.

(1) the change, test, or experiment does not conflict with any requirement specifically stated in this license, or impair the licensee's ability to meet all applicable State and Federal regulations.

(2) There is no degradation in the essential safety or environmental commitments in the license application, or provided by the approved reclamation plan.

(3) The change, test, or experiment is consistent with the conclusion of actions analyzed and selected in the Environmental Assessment (EA) dated April 1997.

C. The licensee's determinations concerning Part B of this condition shall be made by a …SERP. The SERP shall consist of a minimum of three individuals. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the corporate radiation safety officer (CRSO) or equivalent, with the responsibility of assuring changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, specific earth sciences, and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants. At least one member of the SERP shall be designated as Chairman.

D. The licensee shall maintain records of any changes made pursuant to this condition until license termination. These records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining changes are in compliance with the requirements referred to in Part B of this condition. The licensee shall furnish, in an annual report to the Executive Secretary, a description of such changes, tests,

or experiments, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit to the Executive Secretary, a summary of changes made to the approved license application and copies of the revised documents that reflect the changes made upon this condition. The licensee's SERP shall function in accordance with the standard operating procedures submitted to the NRC by letter dated December 19, 1997.

The complexity of the SEE that the SERP prepares is dependent on the proposed action. When the potential consequences of the proposed action are similar to those analyzed in the Environmental Report (ER) (as updated), an analysis of similar complexity to that in the EIS, EA, or ER will be required to assure that the potential impacts meet the criteria in "B" above. These analyses may be done by the SERP members or by an outside consultant. Guidance in SOP AP-2 will be followed to assure that the procedures are followed and that the SEE clearly documents and supports the proposed action.

2.6 Bonding

The cost estimate for the Shootaring mill decommissioning and tailings reclamation has been prepared to show the cost for Decommissioning the Mill and Cell 1. A separate cost has been prepared for Reclaiming Cell 2 should Cell 2 be used. The total cost for the reclamation of the Mill Decommissioning and Cell 1 is $9,079,600. The total cost including Cell 2 is $16,703,200. These costs include a 15 percent contingency, 10 percent PRL management overhead, and a long-term management cost. The details of these costs are included in the Tailings Reclamation and Decommissioning Plan (Hydro-Engineering, 2006) which is attached to this submittal.

PRL proposes to increase the bond from $9,079,600 to $16,703,200 one year prior to constructing Cell 2. This will allow PRL the option to decommission the mill prior to construction of Cell 2 without additional bonding.

3 Operations

Section 3.0 presents the corporate organization, management, as low as reasonably achievable (ALARA) commitment, employee qualifications, training, security, and monitoring programs used to control exposure to source materials both within the mill and in the environment around the mill. Four monitoring programs are presented:

- Table 3.5-2 Operational Mill Monitoring Program
- Table 3.5-4 Interim Mill Monitoring Program
- Table 3.7-1 Operational Environmental Monitoring Program
- Table 3.7-2 Interim Environmental Monitoring Program.

The "Operational" programs apply to the mill when it is in normal commercial production of yellowcake. The contrasting "Interim" programs apply to the mill when it is in an interim or standby status when no yellowcake is being produced for 30 days or more. Similarly, the "Mill Monitoring Programs" refer to monitoring within the mill and the "Environmental Monitoring Programs" refer to monitoring in the environment outside the mill.

3.1 Corporate Organization and Administrative Procedures

The PRL corporate headquarters are located at 877 North 8th West, Riverton, Wyoming 82501 (307) 856-9271. The Shootaring Canyon Uranium Processing Facility is located at Ticaboo, Utah 84733.

The Vice President of Milling has overall policy and management responsibilities of the Shootaring Canyon Uranium Mill. The Mill Superintendent will enforce policies and represent the on-site management authority.

The organizational structure of the company has been designed to provide separate reporting channels for the CRSO or his designee (in the absence of the CRSO) to facilitate compliance with the Radiation, Health and Safety programs. Mill production is the responsibility of the Mill Superintendent. All departments within the milling facilities report to the Mill Superintendent.

The CRSO is responsible for implementing all radiological and environmental monitoring procedures and ensuring compliance with the regulations and requirements administered by the State of Utah DEQ. The CRSO oversees radiation safety, occupational monitoring, quality assurance, environmental monitoring programs and ALARA audits. The CRSO prepares and modifies procedures and assists the Director of Regulatory Affairs in licensing activities. In addition, the CRSO has the authority to partially or fully suspend operations that could be hazardous to workers. Technicians; that is, those who conduct sampling and monitoring as well as provide respirators and protective clothing to the mill workers, report to the CRSO. The Director of Regulatory Affairs is responsible for all licensing and permitting of the mill and submission of surety bonds and License Amendments to the State of Utah.

3.1.1 Management Control

Written operating procedures have been established for routine production activities involving the handling and processing of radioactive materials and include routine radiation safety practices. Non-routine operations posing radiological health risks to workers require review of the procedures by the CRSO or his staff and issuance of radiation work permits, which establish radiological health protection measures for these operations. Copies of the operational and radiation safety procedures are available at the mill site and are discussed in the following sections. All written procedures for both operational and non-operational activities are reviewed and approved in writing by the Mill Superintendent and CRSO before implementation and whenever a change in procedure is proposed so that proper radiation protection principles are being applied. In addition, the CRSO will perform a documented review of all existing operational procedures at least annually during operations and at least once every two years during extended periods of standby. Obsolete procedures are deleted or updated during the review and new procedures are added as required.

3.1.2 Visual Inspections and Report to Management

During normal mill operations the CRSO or designee conducts a weekly visual walk-through inspection of the mill and the ore stockpiles. The primary purpose of this inspection is to observe work practices and working conditions in the mill. Recommendations are made or current procedures enforced to minimize the spread of contamination and to maintain exposures to levels that are ALARA. Observations are documented weekly and each month during mill operations. The CRSO provides a written summary of these of visual observations monthly to the Mill

Superintendent and Vice President of Milling. During non-operational periods lasting 30 days or more, documented visual inspections will be conducted quarterly.

3.1.3 ALARA Philosophy

The purpose of the radiation protection program at PRL is to maintain radiation exposures to levels that are as low as reasonably achievable (ALARA) for all employees, contractors, visitors, and members of the public. The implementation of a successful ALARA program is the responsibility of everyone involved in the processing of uranium ores. Responsibilities for the ALARA program are shared by the Vice President of Milling, Mill Superintendent, the CRSO, and all mill workers. The ALARA policy for PRL is as follows:

ALARA POLICY STATEMENT

Plateau Resources Limited is firmly committed to the philosophy that exposures to anthropogenic sources of ionizing radiation should not occur without the expectation of benefit resulting from such exposure and that these exposures be kept at levels that are "as low as is reasonably achievable (ALARA)." Implementation of the ALARA program is the responsibility of every employee by adhering to all rules, notices and operating procedures for radiation safety, by promptly reporting to the CRSO and supervisors any equipment malfunctions or violations of standard procedures that could result in increased radiological hazard to any individual, and by submitting suggestions for improvements in ALARA program.

Management is responsible for providing the tools, money, and labor necessary to implement the ALARA program, the enforcement of the program and the surveillance to ensure future compliance with the program.

The CRSO and staff are responsible for the technical adequacy and correctness of the ALARA program,

In summary, PRL's commitment to ALARA requires the involvement of every employee to accomplish our objective of maintaining occupational exposures as low as reasonably achievable.

Semiannual ALARA-Quality Assurance Audits

The CRSO shall initiate a semiannual audit, performed by a knowledgeable “off-site” professional, of operating procedures, exposure records, monthly inspection reports, and training programs to evaluate the overall effectiveness of the program and adherence to the ALARA philosophy during operational status. During non-operational status an annual ALARA audit will be conducted and documented. Audit results and annual ALARA audit shall be documented and sent to the Vice President of Milling, Mill Superintendent, and to the Director, Division of Radiation Control, Utah Department of Environmental Quality.

3.2 Qualifications

The minimum qualifications for the **CRSO** are:

1. Education: A bachelor's degree in the physical sciences, industrial hygiene, or engineering from an accredited college or university or an equivalent combination of training and relevant experience in uranium mill radiation protection. Two years of relevant experience will generally be considered equivalent to one year of academic study.

2. Health Physics experience: At least one year of uranium mill work experience in applied health physics, radiation protection, industrial hygiene, or similar area. This experience should involve hands-on work with radiation detection and measurement equipment, not strictly administrative work.

3. Specialized training: At least four weeks of specialized classroom training in health physics.

4. Specialized knowledge: A thorough knowledge of the health physics instrumentation used in the mill, the chemical and analytical procedures used for radiological sampling and monitoring, methods used to calculate personnel exposure to uranium and its daughters, the uranium milling process, and the mill hazards and their control.

The minimum qualifications for a **Technician are:**

1. Education: An associate degree or two or more years of study in the physical sciences, engineering, or a health-related field,

2. Training: Four weeks of generalized training (up to two weeks may be on-the-job training) in radiation health protection applicable to uranium mills,

3. Experience: One year of work experience with sampling and analytical laboratory procedures used in health physics, industrial hygiene, or industrial safety measures applicable to a uranium mill; or

    1. Education: A high school diploma,

    2. Training: A total of at least three months of specialized training (up to two months may be on-the-job training) in radiation health protection

    3. Experience: One year of relevant work experience in applied radiation protection, and a working knowledge of health physics instruments, surveying and sampling techniques, and personnel dosimetry.

3.3 Training

3.3.1 Initial Training

Prior to working at the site, all site workers and supervisors will be instructed by means of a documented training class in the risks of radiation exposure and the fundamentals of protection against exposure to uranium and its decay. Other guidance to be provided as appropriate is found in Regulatory Guide 8.13, *Instruction Concerning Prenatal Radiation Exposure* (NRC, 1987), and Regulatory Guide 8.29, *Instruction Concerning Risks from Occupational Radiation Exposure* (NRC, 1981). The course of instruction will include the following topics:

- Fundamentals of Health Protection
    - ◊ The radiological and toxicological hazards of exposure to uranium and its progeny,
    - ◊ How uranium and its progeny enter the body (inhalation, ingestion, and skin penetration), and
    - ◊ Why exposures to uranium and their progeny should be kept ALARA.
- Personal Hygiene
    - ◊ Wearing protective clothing,
    - ◊ Using respirators correctly,
    - ◊ Eating, drinking, and smoking only in designated areas, and
    - ◊ Using proper methods for decontamination (for example, showers).
- Facility-Provided Protection
    - ◊ Ventilation systems and effluent controls,
    - ◊ Cleanliness of the work place,
    - ◊ Features designed for radiation safety for process equipment,
    - ◊ SOPs, and
    - ◊ Security and access control to designated areas.
- Health Protection Measurements
    - ◊ Measurement of airborne radioactive materials,
    - ◊ Bioassays to detect radionuclides,
    - ◊ Surveys to detect contamination of personnel and equipment, and
    - ◊ Personnel dosimetry.
- Radiation Protection Regulations
    - ◊ Regulatory authority of the State, NRC, and Mine Safety and Health Administration (MSHA),
    - ◊ Employee rights in Utah Administrative Rule (UAR) 313-18, and
    - ◊ Radiation protection requirements in UAR R313-15.

- Emergency/contingency Plans

A written or oral test with questions directly related to the training topics will be given to each worker. The instructor will review the test results and discuss incorrect answers with each worker. Workers who fail the test will be retested after receiving additional training. These tests and results will be maintained on file.

All new workers will be given specialized instruction on the health and radiation safety aspects of the specific jobs they will perform. This instruction will be in the form of individualized on-the-job training. Radiation safety matters of concern that arise during operations will be discussed with all workers during regularly scheduled safety meetings.

3.3.2 Refresher Training

Each permanent worker and supervisor will be provided annual refresher training. Refresher training will include relevant information that has become available during the past year, a review of safety problems that have arisen during the year, changes in regulations and license conditions, exposure trends, and other current topics.

3.3.3 Visitor Training

All visitors who have not received training will be escorted by someone trained and knowledgeable about the hazards at the site. At a minimum, visitors will be instructed specifically on what they should do to avoid possible hazards in the areas of the site they will be visiting.

3.3.4 CRSO Training

The RSO will receive a minimum of 40 hours of refresher training in health physics at least once every two years.

3.3.5 Training Documentation

All workers will be required to sign a statement that they have received radiation safety training. The statement will indicate the content of the training, the date(s) the training was received, and will be co-signed by the instructor. This documentation will be prepared and maintained for the initial and refresher training.

3.4 Site Security

The boundary limits of the processing facility are posted and enclosed by a fence, except in sections where cliffs or other topographic features form a natural boundary. The process plant, mill ore storage area, ancillary facilities (such as laboratory, warehouse and maintenance facilities, electrical power distribution, and reagent storage), and the entire tailings disposal area are located within the restricted area boundary of the facility. The restricted area is posted with "Caution Radioactive Materials" signs. The requirements of UAR R313-15-902 (5) are met by Utah Radioactive Materials License UT0900480, Condition 9.9 which allows the posting of all entrances to the mill with signs containing the words "Any Area Within This Mill May Contain Radioactive Material."

Access to all areas is controlled by fences and gates. Warning and information signs are posted near the main gate. Twenty-four hour security will be provided when the processing facility is in operation. During extended periods of non-operation, access to the restricted area is through the main gate which is locked when personnel are not present. All fencing and gates will be inspected semi-annually by security personnel or other responsible employees to assess system integrity. This inspection will be conducted monthly during operation. The results of the inspections will be recorded in a log.

Visitors, including contract workers, will be admitted only by permission of the Mill Superintendent or CRSO. Each visitor will be checked in and out on a visitors' register and will be escorted while in the restricted area. All visitors are required to read and sign a hazard training form. A list of authorized personnel who have completed training or have been authorized to enter the restricted area is maintained in the mill office. Visitors are given instructions on how to avoid possible hazards in the mill. After receiving the training described in Section 3.3.1, temporary workers such as repairmen or contractors may be allowed to perform their duties without escort.

3.5 Radiation Safety

The purpose of the radiological protection program is to maintain radiation exposures to levels that are ALARA. Sections 3.5.1 through 3.5.8 below address both the operating mill monitoring programs and the interim mill operating programs. The latter addresses periods when the mill is NOT in operation for 30 days or more. Where program commitments vary between the two programs, the operational program commitments will be stated first, followed by the interim program commitments in parentheses.

Trend analyses are an ongoing process conducted by the CRSO or his staff. The analysis of trends of gradually increasing or decreasing monitoring data requires that data be collected over enough time to observe the trends. In addition to the review and analysis of monitoring data as they are collected, an annual trend analysis of occupational and environmental monitoring data is conducted and documented.

3.5.1 Radiation Work Permits

The CRSO or his designee, at the request of an operations or maintenance management representative, will prepare a Radiation Work Permit (RWP) prior to the start of any work or maintenance activity that has radiation safety implications and for which no written procedure exists. The CRSO may, at his/her discretion, require a RWP for any work.

It is the joint responsibility of the Mill Superintendent and the CRSO to ensure that RWPs are in place, as appropriate.

The information to be provided on the RWP includes:

- RWP requester name,
- date and time of the RWP request;
- RWP number;
- location(s) and nature of the work to be done;

- results of recent, appropriate radiological measurements of the work area(s);
- estimated time to complete the work;
- names of the supervisor(s) and employee(s) working under RWP;
- list of monitoring requirements;
- specific engineering controls required;
- specific personal protective equipment (PPE) required by task;
- decontamination requirements; and
- approval signature of the CRSO or CRSO's designee.
- Sign-off of supervisor and/or employees working under the RWP acknowledging that they understand the conditions of the permit.

The active RWP will be posted near the work area throughout the conduct of the associated work. Upon completion of the work, the RWP will be terminated and copies of associate monitoring data will be attached or filed in appropriate locations.

3.5.2 Radiation Protection Limits and Action Levels

It is important to distinguish between distinct types of radiation protection standards: namely, basic limits, derived or secondary concentrations, and administrative action levels.

The basic, primary regulatory limits are bifurcated into limits for workers and public individuals. These primary regulatory limits are, with one exception, dose limits over discrete time integration periods, typically one year. The secondary limits designed to control internal exposures are effluent concentrations (EC) in air and water for public individuals, and derived air concentrations (DACs) and annual limits on intake (ALIs) for workers.

Administrative action levels may be of the form of reference, recording, investigation, or intervention levels. The intent of such action levels is to identify in advance a course of action to be taken when a particular value of a parameter exceeds or is predicted to exceed the established threshold or action level. The actions to be taken may range from simply recording the information, through investigations into cause and consequences, up to intervention measures.

3.5.2.1 Primary Limits

The limit on the allowed intakes by and doses to workers and public individuals are stipulated by State and Federal regulations. These limits are the basis for derived radiation protection guides for concentrations of radioactivity in air and water. The primary limits are provided in Table 3.5-1.

Table 3.5-1 Primary Radiation Protection Limits

Public Individuals	Limits	Source
Total effective dose equivalent (excluding sanitary sewerage discharges)	0.1 rem/yr	R313-15-301(1)(a)
Dose (external sources)	0.002 rem/hr	R313-15-301 (1)(b)
Dose equivalent (whole body excluding radon/progeny)	25 mrem/yr	R313-15-301 (4)
Dose equivalent (thyroid excluding radon/ progeny)	75 mrem/yr	R313-15-301 (4)
Dose equivalent (any organ but thyroid-radon/progeny excluded)	25 mrem/yr	R313-15-301 (4)

Workers	Limits	Source
Total effective dose equivalent, or	5 rem/yr	R313-15-201(1)(a)(i)
Deep-dose equivalent plus committed dose equivalent (any organ or tissue except lens of eye)	50 rem/yr	R313-15-201 (1)(a)(ii)
Dose equivalent (lens of eye)	15 rem/yr	R313-15-201 (1)(b)(i)
Shallow-dose equivalent (skin or any extremity)	50 rem/yr	R313-15-201 (1)(b)(ii)
Soluble uranium intake	10 mg/wk	R313-15-201 (5)
Dose (embryo/fetus of declared pregnant woman)	0.5 rem/pregnancy	R313-15-208 (1)
Employees under the age of 18	0.5 rem/yr	R313-15-207

3.5.2.2 Secondary Limits

The fundamental secondary limits are designed to limit occupancy in radiation fields and to limit the annual intake of radionuclides such that the primary limits are not exceeded.

The relevant occupational secondary limits are summarized as follows:

Internal Exposure	Annual Occupational Limits
Intake, all pathways	1 ALI
Inhalation (all but radon/progeny)	2000 DAC hours
Inhalation, Rn-222 with progeny	4 Working Level Months

3.5.3 Surveys and Action Levels for External Radiation

Most, but not all, mill workers receive external gamma radiation doses of less than 1.2 rem per year. Radiation exposure rates are generally below 1 milliRoentgen per hour (mR/hr) near ore surfaces and are about 1 mR/hr near fresh yellowcake surfaces. Due to the build-up of uranium decay products, the radiation levels increase following yellowcake production.

As summarized in Table 3.5-2, gamma radiation surveys are performed semiannually throughout the mill at a minimum of 20 areas that are representative of where workers are potentially exposed (see Table 3.5-3). Areas with exposure rates measured at approximately 1 meter above ground surface that are greater than 5 mR/hr are considered a radiation area and shall be posted as "Caution, Radiation Area". Areas with exposure rates measured at approximately 1 meter above ground surface that are greater than 100 mR/hr will is considered a high radiation area and shall be posted as "Caution, High Radiation Area". It is unlikely areas in the mill will require high radiation area postings.

The CRSO will evaluate methods to lower exposure rates to levels that are ALARA. Gamma surveys performed for this purpose must be representative of both routine and non-routine work so that their whole-body radiation exposures can be estimated. Thus, measurements are generally made at about waist height and 12 inches from surfaces. Surface "contact" exposure rate measurements are not used to establish radiation area boundaries or estimating personnel whole-body exposures, because these exposures are not representative of the worker's true exposures.

The gamma radiation surveys will be summarized in the monthly reports submitted from the CRSO to the Vice President of Milling and Mill Superintendent who review the reports for possible corrective actions to reduce exposures.

To determine the need for personnel monitoring, the radiation exposures expected for each category of plant worker may be calculated from measured radiation levels and predicted occupancy times. During full operations at the mill, personal dosimeters will be worn by all mill personnel. No employee will be allowed to take a dosimeter home. During non-work time, dosimeters will be stored on racks, along with a background control dosimeter.

The following Administrative Action Levels for external radiation exposures to individual workers apply;

- A Deep Dose Equivalent (DDE) greater than 125 mrem per calendar quarter or 500 mrem per calendar year will result in a CRSO investigation of affected workers.

- A Shallow Dose Equivalent (SDE) greater than 1250 mrem per calendar quarter or 5,000 mrem per calendar year will result in a CRSO investigation of affected workers

- A Deep Dose Equivalent (DDE) greater than 312 mrem per calendar quarter or 1,250 mrem per calendar year will result in work restrictions for the affected workers until a CRSO investigation has determined that the Total Effective Dose Equivalent (TEDE) for the year is unlikely to exceed 5 rem and that the doses are ALARA.

- Work restrictions will be imposed on all declared pregnant workers to preclude any and all work activities for the affected individuals in areas where the whole body gamma radiation exposure rates have been measured, or are believed to exist, in excess of 250 microRoentgen per hour (μR/hr) at one meter.

3.5.4 Surveys and Action Levels for Airborne Radionuclides

The following sections describe surveys for airborne uranium ore dust, yellowcake and radon progeny.

3.5.4.1 Surveys and Action Levels for Radioactive Airborne Particulates

Surveys for airborne uranium ore dust are necessary to:

1. Demonstrate compliance with the 10 mg soluble uranium weekly intake limit for workers specified in UAR R313-15-201 (5).
2. Demonstrate compliance with internal dose limits specified in UAR R313-15-201(1)(a)(i)
3. Determine the areas that need to be posted as "Airborne Radioactivity Areas" as specified in UAR R313-15-902(4).
4. Determine whether precautionary procedures, such as additional administrative or engineering controls, limitations on working times, use of respiratory equipment, or other precautions need to be implemented.
5. Determine whether exposures to airborne radioactive materials are being maintained to levels that are ALARA.

Breathing-zone and area air samples are used to estimate radionuclide intakes via inhalation by mill workers. The DAC for uranium ore dust is 6.0×10^{-11} micorCuries per milliliter (μCi/ml) of gross alpha activity from uranium-238, uranium-234, thorium-230 and radium-226, 3×10^{-11} μCi/mL if only natural uranium is determined by analytical methods, or 45 micrograms of natural uranium (U-nat) per cubic meter ($\mu g/m^3$) of air. For areas of the mill where yellowcake is the predominant airborne radionuclide (such as yellowcake precipitation and packaging areas) the DAC ranges from 5×10^{-10} (class D) to 2×10^{-11} (class Y) μCi/mL. For areas in the mill that are not predominately ore dust or yellowcake areas, the thorium-230 (class W) DAC of 3×10^{-12} μCi/mL can be assumed or an area-specific DAC for the mixture of radionuclides present in the mill can be calculated using PRL's SOP HP-3 "Radiation Dose Calculations," revision 10. Where airborne radioactivity is equal to or exceeds 1 DAC, or is such that workers can accumulate more than 12 DAC hours in a week, the area shall be posted with a sign containing the words “Caution Airborne Radiation Area”, the source of the dust shall be identified and corrective actions implemented to reduce the dust concentrations to levels that are ALARA. Administrative action levels for airborne radionuclide concentrations resulting from normal mill operating conditions will be developed once concentrations have been adequately characterized

Exposure to soluble uranium is limited to a weekly intake of 10 mg based on chemical toxicity. Air monitoring results should be reviewed by the CRSO or designee within two working days after receipt of the analytical results. Occupational dose calculations should be performed within three weeks of the end of the calendar year provided analytical results needed to perform calculations are available. During periods of interim operations, breathing zone air samples are collected and analyzed when work is conducted under a RWP.

Under routine mill operating conditions, breathing zone air samples are used to assess radionuclide concentrations in air when those concentrations are greater than 0.1 DAC. In contrast, area air samples may be used to measure air concentrations in areas where the radionuclide concentrations range from 0.01 to 0.1 DAC. Below 0.01 DAC, air samples are not required but should be collected periodically to demonstrate radionuclide concentrations are low. Using the above criteria, the CRSO makes the decision as to the type of air sample most appropriate for the work conditions.

3.5.4.2 Surveys and Action Levels for Radon-222

Significant air concentrations of radon-222 and its progeny may occur near ore storage bins, near crushing and grinding circuits, or in enclosed locations where large quantities of dry ore are found. At PRL, indoor working level (WL) measurements are made in preference to radon concentration measurements because the concentrations of decay progeny can increase and present a greater hazard to workers than is presented by radon-222 alone.

WL measurements will be made at the 20 sampling locations specified in Table 3.5-2, at a frequency dependant upon the following WL concentrations observed in those areas:

- Weekly: for >0.08 WL
- Monthly: for 0.08-0.03 WL
- Quarterly: for <0.03 WL

(Interim program - Working Level Measurements are made prior to working in the 600 area under an RWP). Samples are taken to be representative of worker exposure.

The modified Kusnetz method for measuring working levels is used at PRL and is described in SOP HP-5 of the procedures manual.

3.5.4.3 Dose Calculations and Respiratory Protection Program

PRL SOP HP-3 "Radiation Dose Calculations" presents the methods for determining DACs for radionuclide mixtures within the mill. In addition, the procedure presents methods use to calculate the CEDE and TEDE for mill personnel.

PRL SOP HP-18 "Respiratory Protection" presents the respiratory protection program. The program was prepared using USNRC Regulatory Guide 8.15 "Acceptable Methods for Respiratory Protection" and NUREG-0041 "Respiratory Protection Manual."

3.5.5 Bioassay Program

Bioassays are required for all mill department personnel during both routine and non-routine operations where reason exists that an exposure could exceed 30 percent of the ALI or a weekly intake of 3 mg weekly intake of soluble uranium. Action levels related to bioassay results are presented in Tables 1 and 2 of PRL SOP HP-10 "Bioassays".

The urinalysis program conducted at the mill follows NRC Regulatory Guide 8.22, "*Bioassay at Uranium Mills*" and NRC Regulatory Guide 8.25, "*Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program.*"

During the interim program, employees performing maintenance under an RWP will be required to submit periodic bioassay samples.

In vivo lung counts are conducted on mill workers with work assignments in Airborne Radioactivity areas. In vivo lung counts are not conducted during the Interim Program. The in vivo lung counts

are conducted following NRC Regulatory Guide 8.22, "*Bioassay at Uranium Mills*." The actions taken in response to the results of in-vivo lung counting are outlined in Table 2 of NRC Regulatory Guide 8.22.

3.5.6 Surface Contamination Surveys

Controlling the spread of radioactive contamination within and out of radiation restricted areas is critical to minimize radiation doses to workers and the public.

Area-specific radiation surveys will be routinely performed to characterize the distribution of radioactive materials in the respective areas. Contamination control activities include, but are not limited to:

- Clearly post controlled contamination areas including information relative to contamination levels, exposure rate measurements, and any other appropriate information for effective contamination control.
- Establish an access or contamination control point to limit general access and to assure that personnel, equipment, and other items leaving the site have been properly monitored for radioactivity prior to proceeding beyond the contamination control point.
- Provide proper receptacles for contaminated waste materials and provisions for temporary storage of contaminated items.
- Monitor all items for radioactivity, such as PPE, equipment, tools, and vehicles, prior to departure from the contamination control point. If such items are not leaving direct control of PRL, absence of removable radioactivity is all that is required for the item to be released beyond the contamination control point.
- Monitor radioactivity on all personnel prior to their departure from the contamination control point.
- Supervise the decontamination of personnel and equipment, when required, prior to the release from the contamination control point.

A reasonable effort will be made to remove all detectable radioactive contamination from personnel and equipment prior to exit or release from the site. However, when complete contamination removal is not practical, the levels provided in Table 3.5.5 are acceptable for the release of personnel and equipment from the site.

For hazard awareness and contamination control purposes, the following defines alpha and beta-gamma surface activities and posting requirements for a "Controlled Contamination Area".

"Caution - Controlled Contamination Area"	> 10,000 dpm removable alpha/100 cm^2 and/or > 22,000 dpm removable beta-gamma/100 cm^2

The radiological monitoring program to be used within the mill during mill operations is summarized in Tables 3.5-2. The sampling and monitoring locations are listed in Table 3.5-3. Table

3.5-4 summarizes the radiological monitoring program to be used within the mill when the mill is NOT in operation for 30 days or more (interim period).

Table 3.5-2				
MILL RADIOLOGICAL MONITORING PROGRAM - OPERATIONAL				
Sample Collection or Inspection				
Type	**Location**	**Frequency**	**Method**	**Parameter to be Measured**
Airborne long lived radionuclides	See Table 3.5-3	Occupied Areas > 1.0 DAC Daily 0.3-1.0 DAC Weekly <0.3 DAC. Monthly	Breathing zone samples for >0.1 DAC, area air samples may be used for 0.01-0.1 DAC	Gross alpha activity
Radon progeny	See Table 3.5-3	Weekly >0.08 WL Monthly 0.03-0.08 WL Quarterly <0.03 WL	Modified Kusnetz	Radon progeny in Working Levels (WL)
Mill Penetrating Radiation	See Table 3.5-3	Semiannually	Survey meter	Exposure Rate (μR/hr)
Personnel gamma	Mill operations personnel Declared Pregnant Worker	Quarterly Monthly	Dosimeter	Skin Dose Equivalent Lens Dose Equivalent Deep Dose Equivalent
Surface contamination	Eating areas, change areas, control rooms	Weekly if above 500 dpm alpha per100 cm^2 otherwise every two weeks	Direct surface measurement and smear.	Removable, average and max alpha contamination
	Administrative offices	Monthly	Direct surface measurement and smear.	Removable, average and max alpha
	Yellowcake Areas	Daily	Visual	Particulate Contamination
	Personnel	Leaving restricted area	Direct surface measurement of skin and clothing.	Alpha contamination
Urinalyses	All mill workers,	Monthly	Urinalysis	U-nat
	Yellowcake packaging	Weekly	Urinalysis	U-nat
In vivo lung count	Mill personnel with work assignments in airborne radioactivity areas	Two consecutive urinalysis results >35 ug/L or on urinalysis result >130 ug/L.	In vivo Lung Measurement	U-nat

Table 3.5-2				
MILL RADIOLOGICAL MONITORING PROGRAM - OPERATIONAL				
Sample Collection or Inspection				
Type	**Location**	**Frequency**	**Method**	**Parameter to be Measured**
Water flow and pressure drops	Yellowcake scrubber	Approximately every four hours during operations	Documented visual inspection	Water flow and pressure drops
Instrument calibrations	All instruments in use	Semiannually or mfg's suggested interval whichever is sooner	Voltage plateau Pulse Source	Instrument response
Air sampler calibrations	Air samplers	Quarterly	Bubble tube or equivalent	Flow rate
Visual inspections	Mill work and storage areas	Daily Documented Weekly	Visual inspections	Radiation work practices
Trend analyses	N/A	Annually	Routine monitoring programs	Trends
Reports	N/A	Monthly	Summary of mill and environmental monitoring data	N/A
Radiological & Operational Procedures	N/A	Annual Review	Performed by CRSO	Procedure adequacy for current Mill operating conditions
ALARA audit	N/A	Annually	Performed by independent knowledgeable individual(s)	License Compliance and workplace conditions.
Fence Inspection	Perimeter	Monthly	Visual	Security and Posting
Radiological survey of equipment leaving restricted area	N/A	As needed	Alpha surface measurement alpha smear if >75 cpm Beta-Gamma	Alpha, Beta-Gamma surface contamination.
Respiratory protection program	As required by RWP 600 area	Weekly in YC precip.	N/A	N/A

Table 3.5-3
AIRBORNE RADIATION SAMPLE LOCATIONS

1.	Ore feed hopper
2.	Ore conveyor gallery
3.	Ore sampling preparation area
4.	Semi-Autogenous mill ore feed area
5.	Semi-Autogenous mill ore discharge area
6.	Leach tank area
7.	Countercurrent Decant thickener area
8.	Solvent extraction area
9.	Yellowcake precipitation tank area
10.	Yellowcake thickener area
11.	Yellowcake drum filter area
12.	Yellowcake drier area
13.	Yellowcake packaging area
14.	Yellowcake storage area
15.	Laboratory area
16.	Lunch area
17.	Change room
18.	Maintenance shop area
19.	Shift foreman office
20.	Main office area

Table 3.5-4			
INTERIM MILL RADIATION SAFETY MONITORING PROGRAM (Mill not operational for 30 days or more)			
Sample Collection or Inspection			
Type	Location	Frequency	Method
Mill airborne particulates	Representative workers performing maintenance inside 600 area	When maintenance is performed under an RWP	Breathing zone
Radon progeny	600 area	Prior to working in 600 area under an RWP	Area or lapel sampling, modified Kusnetz
Mill gamma	N/A	None	N/A
Personnel gamma	None	None	N/A
Surface contamination surveys	Offices	Semiannually	Surface smear, surface measurement
	Lunchrooms areas, control rooms	Semiannually	Surface smear, surface measurement
	Change rooms	Semiannually	Surface smear, surface measurement
Urinalysis	Mill employees performing maintenance work under RWP	As required by RWP with follow-up as per Reg. Guide 8.22	Fluorimetry
In-vivo lung count	N/A	None	N/A
Instrument calibrations	All instruments in use	Semiannually or mfg's suggested interval whichever is sooner	Voltage plateau Pulse Source
Air sampler calibrations	Air samples in use	Prior to use	Bubble tube or equivalent
Visual inspections	Mill work and storage areas	Quarterly	Documented visual inspection
Trend analyses	N/A	Annually	Routine monitoring programs
Reports	N/A	N/A	As specified above
Radiological & Operational Procedures	N/A	Every 2 years	Review and approval
Quality assurance audit	N/A	Annually	Audit by quality assurance consultant

Table 3.5-4			
INTERIM MILL RADIATION SAFETY MONITORING PROGRAM (Mill not operational for 30 days or more)			
Sample Collection or Inspection			
Type	Location	Frequency	Method
Fence Inspection	Perimeter	Semiannually	Visual inspection of fence and signs
Radiological survey of equipment leaving restricted area	N/A	As required by Annex A	As required by Annex A
Respiratory protection program	As required by RWP	As required by RWP	N/A

Table 3.5-5[1]			
ACCEPTABLE SURFACE CONTAMINATION LEVELS			
Nuclides [a]	Average [b c f]	Maximum [b d f]	Removable [b e f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm alpha/100 cm^2	15,000 dpm alpha/100 cm^2	1,000 dpm alpha/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emissions or spontaneous fission) except Sr-90 and others noted above	5,000 dpm beta-gamma/100 cm^2	15,000 dpm beta-gamma 100 cm^2	1,000 dpm beta-gamma/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

[1] Reprinted from U.S. Nuclear Regulatory Commission, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material," November 1976.

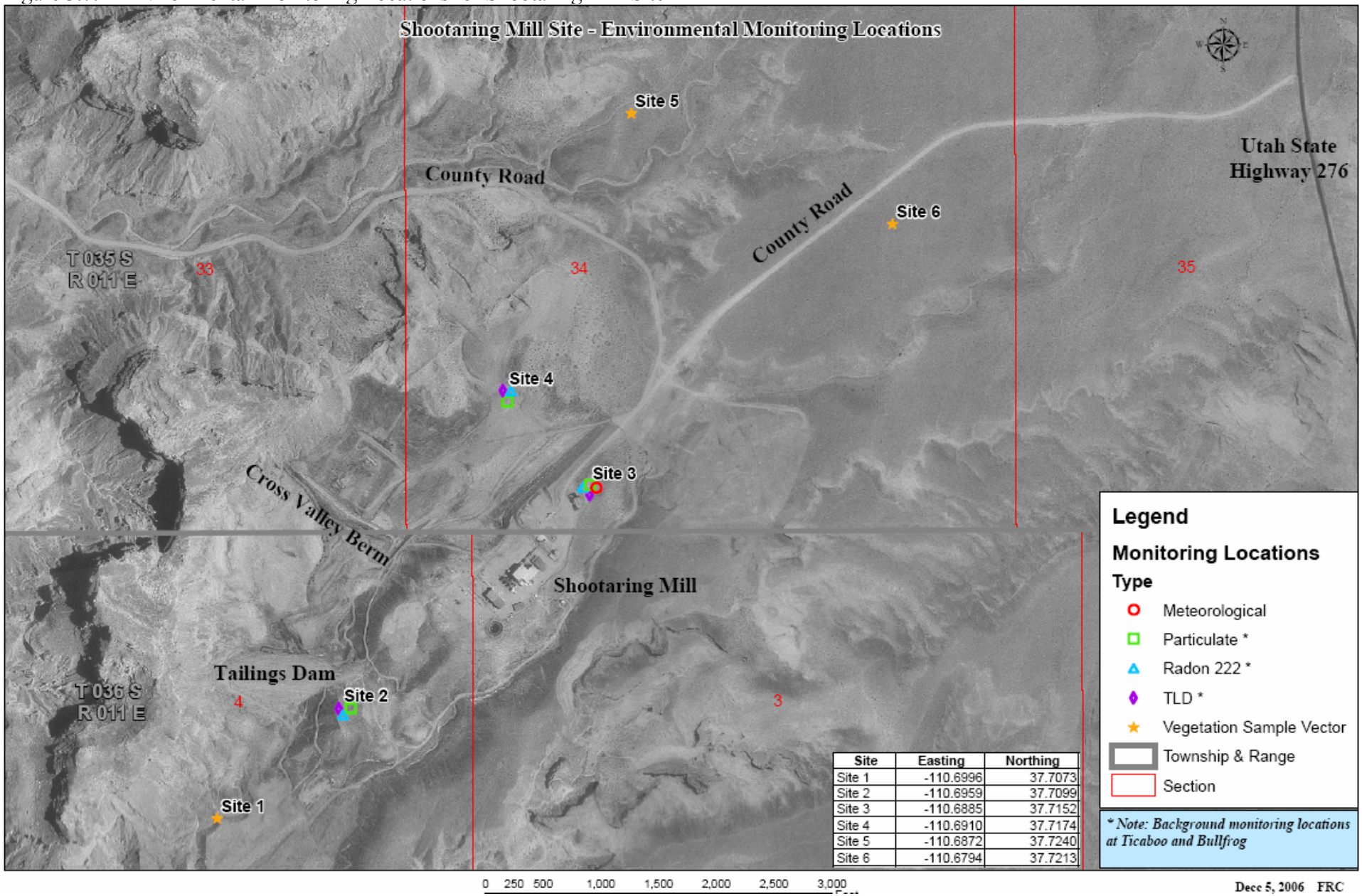
3.6 Shipping, Transport, and Packaging of Radioactive Material

Transportation of radioactive materials from the mill site will be controlled by the, 'Transportation Plan for Shootaring Canyon Uranium Mill" included as Appendix A.

3.7 Environmental Monitoring

The environmental monitoring program conducted during mill operations is outlined in Table 3.7-1 and the sampling and monitoring locations are indicated on Figure 3.7-1. The environmental monitoring program conducted during non-operational (interim) periods lasting greater than 30 days is presented in Table 3.7-2. The laboratory procedures used in PRL's environmental laboratory are presented in "*The Handbook of Analytical Procedures for Metallurgical and Analytical Laboratory*" available at the site. During operations, analysis will be completed by the mill laboratory, with one or more commercial laboratories utilized for quality assurance. Where program commitments in the following descriptions vary between mill operations and interim periods, the operational program commitments are stated first, followed by the interim program commitments in parentheses.

Figure 3.7.1 Environmental Monitoring Locations for Shootaring Mill Site



3.7.1 Airborne Effluent Survey Program

Table 3.7-1 presents the effluent monitoring program for the yellowcake drying and packaging stack and ore crusher stack. Quarterly isokinetic samples are collected from the yellowcake stack and semiannual grab samples from the ore crusher stack. Sampling is not conducted during the interim program because stacks are not operational. The isokinetic sampling procedures are presented in PRI, SOP EP-6 and are derived from EPA Test Method 5.

The environmental air particulate monitoring sites are illustrated on Figure 3.7-1 and are described in Table 3.7-1 (Interim - Program is described in Table 3.7-2). The operational environmental air particulate monitoring stations operate continuously at five sites around the mill, including one each in the towns of Ticaboo and Bullfrog Marina. (The interim environmental air particulate sampling program is conducted at one downwind site for 20 hours each quarter).

All environmental air particulate monitoring sites are accessible throughout the year, are served by electric power, and meet the following criteria for air particulate monitoring site locations as specified in NRC Regulatory Guide 4.14 "*Radiological Effluent and Environmental Monitoring at Uranium Mills*":

1. Locations at or near the site boundaries and sectors that have the highest predicted concentrations of airborne particulates,
2. At the nearest residence(s),
3. Background location(s).

Action levels for both the stack and environmental monitoring programs are based on sampling results and trend analyses. If individual environmental sampling results approach 10 Code of Federal Regulations (CFR) § 20, Appendix B, Table II effluent concentrations or increasing temporal trends of radionuclide concentrations from either the stacks or environmental sampling locations are apparent, the CRSO will investigate the occurrence and implement corrective actions to mitigate if needed.

Ambient radon-222 concentrations are monitored continuously using Track Etch detectors at each of the five environmental air particulate monitoring locations. Detectors are exchanged quarterly. The quarterly exchange frequency allows the detector sufficient time to accumulate a response that is sufficient to meet the lower limits of detection listed in NRC Regulatory Guide 4.14. (For the interim environmental monitoring program radon is not monitored).

Table 3.7-1					
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - OPERATIONAL					
Sample Type	**SAMPLE COLLECTION AND MEASUREMENT**				
	No.	**Location**	**Method and Frequency**	**Test Frequency**	**Type of Measurement**
Air stack particulate	1	Ore dump point stack	Semi-annual grab sample	Semiannually	Natural uranium Th-230, Ra-226, Pb-210 and flow rate
	1	Yellowcake Dryer and packaging stack	Isokinetic sample	Quarterly	Natural uranium, Th-230, Ra-226, Pb-210 and flow rate
Env. particulate	3	At site boundaries and areas with highest predicted air concentrations	Continuous; weekly filter change or as required by dust loading	Quarterly composite	Natural uranium, Th-230, Ra-226, and Pb-210
	1	At nearest residence - Ticaboo	Continuous; weekly filter change or as required by loading	Quarterly composite	Natural uranium Th-230, Ra-226, and Pb-210
	1	Background location	Continuous; weekly filter change or as required by dust loading	Quarterly composite	Natural uranium, Th-230, Ra-226, Pb-210
Radon	5	Same as for air particulates	Continuous Track Etch	Quarterly	Rn-222
Surface water	2	Seeps 1 and 2	Semiannually grab samples	Semiannually	Natural uranium, gross alpha, As, Se, pH, specific conductivity
Direct radiation	5	Same as for air particulate samples	TLDs	Quarterly	Gamma
Vegetation	1	Animal grazing areas downwind of mill	Annual grab sample in spring growing season	Annually	Th-230, Ra-226, Pb-210
Soil	5	Same as for air particulate samples	Annual grab samples	Annually	Natural uranium Th-230, Ra-226
Instrument calibrations	5	N/A	Quarterly	Quarterly	Flow rate
Surface Evaluation	N/A	Tailings Facility	Daily, Monthly, Quarterly, Per SOP	N/A	Examination Measurements Surveys
Meteorology	1	Near office	Continuously; wind speed & direction	N/A	N/A

Table 3.7-1					
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - OPERATIONAL					
Sample	**SAMPLE COLLECTION AND MEASUREMENT**				
Type	**No.**	**Location**	**Method and Frequency**	**Test Frequency**	**Type of Measurement**
Trend analyses	1	N/A	Annually in Environmental Monitoring Report.	N/A	N/A
Reports	1	N/A	Semiannually effluent monitoring report	N/A	N/A
Quality assurance audit	N/A	N/A	Semiannually	N/A	N/A
Wildlife	N/A	Tailings Facility	Daily Visual	N/A	Record Observations
Security	N/A	Mill & Tailing Facility	Inspection	24 hr.	Visual

Table 3.7-2 INTERIM ENVIRONMENTAL MONITORING PROGRAM (Mill not operational for 30 days or more)					
Sample Type	**Sample Collection and Measurement**				
	No.	**Location**	**Method and Frequency**	**Test Frequency**	**Type of Measurement**
Air particulates	1	Downwind of tailing facility and ore stockpiles	20 hrs/quarter	Semiannually composited	Natural uranium and Ra-226
Radon	None	N/A	N/A	N/A	N/A
Water - Surface Water (Seeps)	None	N/A	N/A	N/A	N/A
Direct Radiation	None	N/A	N/A	N/A	N/A
Soil	None	N/A	N/A	N/A	N/A
Vegetation	None	N/A	N/A	N/A	N/A
Instrument calibrations	All in use	N/A	Semiannually or at mfg's suggested intervals, whichever is sooner	Voltage Plateau Pulse Source	
Surface Evaluations	N/A	Tailings Facility	Monthly & Yearly Per SOP	N/A	Examination Measurement Surveys
	N/A	Ore stockpiles	Monthly	N/A	N/A
Meteorology	None		N/A	N/A	N/A
Trend analyses	Routine program	N/A	Annually	N/A	N/A
Reports	1	N/A	Semiannually effluent monitoring report	N/A	N/A
Audit	1	N/A	Annually ALARA	N/A	
Security	N/A	Mill & Tailing Facility	Inspection	Daily	Visual

3.7.2 Liquid Effluent Survey Program

Surface water is monitored at the locations specified in Table 3.7-1, and 3.7-2. The "*Groundwater Monitoring Assurance Plan*" (PRL, 2005) presents the details of the groundwater monitoring program. The ground and surface water sampling locations were selected as representative of the waters potentially subject to tailings pond seepage entering surface waters or groundwaters.

Water quality monitoring of two seeps near the facility constitutes the surface water monitoring program. The program as outlined in Table 3.7-1 is patterned after the groundwater monitoring program and is designed for the early detection of mill-related constituents in seepage from the tailings area.

Action levels for surface water are based on 10 CFR § 20, Appendix B, Table I values and trend analyses. If individual sampling results approach 10 CFR § 20, Appendix B, Table I values or if increasing temporal trends in concentrations are observed, the CRSO will investigate the reason for the occurrence and identify potential corrective actions. Analytical procedures used in the PRL'S environmental laboratory are presented in PRL's "*Handbook of Analytical Procedures for Metallurgical and Analytical Laboratory*" which is available at the site. Currently all analyses, with the exception of pH and specific conductivity, are performed by commercial laboratories. During operations, analysis will be completed by the mill laboratory with one or more commercial laboratories utilized for quality assurance.

3.7.3 Other Environmental Monitoring

Tables 3.7-1 and 3.7-2 present the monitoring programs for direct radiation, soil, vegetation, and meteorology. Figure 3.7-1 presents the monitoring locations

The operational monitoring program and interim monitoring programs were designed to meet the following criteria presented in NRC Regulatory Guide 4.14:

1. Sample vegetation from animal grazing areas near the mill site in the direction of the highest predicted airborne radionuclide concentrations.

2. Sample soils and measure gamma radiation at each of the locations chosen for air particulate samples.

Any increasing trend for a monitored parameter will be investigated by the CRSO or his staff to determine the cause and identify potential corrective actions. Meteorological monitoring during operations consists of continuous wind speed and direction measurements. This information can be used in the unlikely event of a puff-type release from one of the mill stacks (interim program - suspension of meteorological monitoring).

Fish sampling and sediment sampling is not conducted because there are no streams flowing through the processing facility.

3.8 Records

UARs R313-12 and R315-15 enumerate a number of recordkeeping requirements for workers who may be exposed to radioactive materials. Such records are valuable in that they may be of legal significance, sources of information indicating trends in site conditions, and sources of general information to support future work planning. These records will be meaningful and useful, if they are recorded legibly, and information therein is factual, clear, complete, concise, dated, and signed by the persons recording the information.

Health and safety recordkeeping requirements for this site include:

- medical surveillance records,
- respirator program records,
- training records, and
- worker exposure records.

Following is a discussion of these recordkeeping requirements at this site.

3.8.1 Medical Records

Employee medical records will be filed and retained as required by site policies.

The records will include the following information:

- The name and social security number of the employee,
- Physician's written opinions, recommended limitations, and results of examinations and tests,
- Any employee medical complaints related to exposure to hazardous substances, and
- A copy of the information provided to the examining physician by the employer

3.8.2 Respiratory Protection Program Records

The following associated records regarding the Respiratory Protection Program, will be maintained on-site:

- training,
- selection, issuance, and fitting,
- inspections,

- cleaning, maintenance, and subsequent contamination surveys of respirators,
- QA checks of new equipment, and
- QA checks of stored equipment.

3.8.3 Training Records

Records for radiation safety training will be maintained on-site.

The following associated records as discussed in Section 3.3 will be maintained:

- initial training with test results,
- annual refresher training,
- visitor training, and
- CRSO refresher training.

3.8.4 Worker Exposure Records

For the purposes of this proposed amendment, worker exposure records include radiological health records.

The primary function of radiological health recordkeeping is to document annual, committed, and cumulative (lifetime) radiation doses of individual workers, as appropriate. This may be accomplished through a combination of external dose measurement records and internal dose calculations based on bioassay and exposure (workplace) measurements. Workers must also provide documentation of prior radiation exposures and doses to the extent practicable through prior employer records. If this information is not obtained, the worker may not participate in any planned special exposures during the year he or she is hired.

Secondary recordkeeping functions include documentation of surveys and monitoring, and worker specific investigations.

3.8.4.1 Surveys and Monitoring

The results of surveys and monitoring will be maintained to allow the evaluation of:

- radiation levels,
- concentrations or quantities of radioactive materials, and
- potential radiological hazards.

3.8.4.2 Exposure/Dose Records

Records of doses received by all individuals for whom monitoring was required by UAR R313-15 "*Standards for Protection Against Radiation*" will be maintained. These records will include, when applicable:

- the DDE to the whole body, eye dose equivalent, shallow dose equivalent to the skin, and shallow dose equivalent to the extremities,
- the estimated intake of radionuclides, when required,
- the committed effective dose equivalent assigned to the intake of radionuclides,
- the specific information used to calculate the committed effective dose equivalent,
- the TEDE, when required, and
- the total of the DDE and the committed dose to the organ receiving the highest total dose when required

3.8.5 Other Records

PRL is also required to maintain records of public dose monitoring, waste disposal, and releases for decommissioning purposes pursuant to UARs R313-15 Parts 1102 through 1110, R313-12 and R313-22.

3.8.6 Recordkeeping Frequency/Format

Record entries required by UAR R313-15-1107 will be made at intervals not to exceed one year. These records will be maintained on Form DRC-6, DRC-5, or in clear and legible records containing equivalent information.

All other records will be kept in a clear and legible format with information required in R313-15 and radioactive materials license UT0900480, Amendment #3.

3.8.7 Records Retention

Records retention periods required by DRC are specified UAR R313-15 and generally extend to license termination.

4.0 References

ERG, 2005. "Environmental Report for Operating the Shootaring Uranium Mill." December 2005. Prepared by Environmental Restoration Group, Inc., 8809 Washington NE, Albuquerque, NM 87113.

Hydro-Engineering, 2005 "Tailings Reclamation and Decommissioning Plan for Shootaring Canyon Uranium Project," December 2005 . Prepared by Hydro-Engineering, 4685 East Magnolia, Casper, WY 82604 and Environmental Restoration Group, Inc., 8809 Washington NE, Albuquerque, NM 87113.

PRL, 1996, Shootaring Canyon Uranium Processing Facility Decommissioning & Reclamation Plan, December 1996, PRL Resources, Ltd. 877 North 8th West, Riverton, WY 82501.

PRL, 1998. Renewal of License for Operating the Shootaring Mill", PRL Resources Limited, Source Material License\SUA-1371\\NRC Docket No. 40-8698, March 1, 1996

PRL, 2005 "Tailings Management Plan for Shootaring Canyon Uranium Processing Facility (Amended December 2005)." Prepared by Plateau Resources, Ltd., 877 North 8th West, Riverton, WY 82501 and Hydro-Engineering, 4685 East Magnolia, Casper, WY 82604.

PRL, 2006 "Groundwater Monitoring Assurance Plan"

Appendix A

Transportation Plan for Plateau Resources

ACRONYMS
CFR Code of Federal Regulations
DOT U.S. Department of Transportation
FMCSR Federal Motor Carrier Safety Regulations
RCT Radiological Control Technician

1 Introduction

This transportation plan should be used as a guide to safely manage the transport of yellowcake from the Shootaring Canyon Uranium Processing Facility (the facility or mill), owned and operated by Plateau Resources, Limited (PRL).

Transportation of hazardous materials within the boundary of the site is not in commerce; therefore, it is not regulated by the Department of Transportation (DOT) Hazardous Material Regulations (49 CFR Parts 100-185) or Federal Motor Carrier Safety Regulations (FMCSR): 49 CFR Parts 303, 325, 350, 355, 356, 360, 365-368, and 370-399.

Transportation of ore and hazardous chemicals to the facility is the sole responsibility of the suppliers until receipt at the facility. These materials are not considered in this plan.

1.1 Background

Background information on the mill and associated facilities is contained in the updated "Environmental Report for Shootaring Canyon Uranium Processing Facility" (PRL, 2006) which supports the license amendment application.

1.2 Purpose

This plan identifies the approach by which PRL will meet off-site transport regulations in accordance with Titles 10 and 49 of the Code of Federal Regulations (CFR).

1.3 Applicability

This plan applies to all off-site shipments of yellow cake from the Shootaring Mill, starting with the point when packages of yellowcake are placed on the truck and ending with the removal of the packages at the point of receipt. Securing the loaded packages is also addressed. Loading of the packages will be addressed in a PRL Standard Operating Procedure (SOP) prior to the start-up of the facility.

This plan applies to all personnel who ship or transport radioactive material and all personnel who supervise operations that involve shipments or transportation of radioactive material.

2 Reference Documents

2.1 Regulations

Regulations related to packaging and transportation, which are used as a basis for the identification, classification, packaging, hazard communication of yellow cake are as follows:

- 10 CFR § 71, Packaging and Transportation of Radioactive Material
- Utah Administrative Code R313, Standards for Protection against Radiation
- 49 CFR §§ 303, 325, 350, 355, 356, 360, 365-368, and 370-399, Federal Motor Carrier Safety Regulations
- 49 CFR §§ 100-199, Research and Special Programs Administration

2.2 Transportation Standard Operating Procedures

PRL will develop SOPs for the following activities, prior to start-up of the facility:

- *Packaging Yellow Cake for Transport*
- *Loading and Securing Methods for the Transport of Yellow Cake*
- *Guidelines for Motor Carriers*
- *Placarding Requirements for the Transportation of Yellow Cake*
- *Labeling and Marking Requirements for the Transportation of Yellow Cake*
- *Shipping Paper Requirements*
- *Transportation Oversight of Plateau Resources Subcontractors*

3 Transportation Objective

The objective of the PRL transportation program is to ensure that off-site movement of articles, items, or hazardous materials it owns are conducted in accordance with DOT regulations governing shipments or in a manner that would provide the safety equivalent to that which would be afforded if DOT regulations were met.

4 Transporation Route

A transportation route is not provided in this plan. PRL will retain the flexibility of transporting the yellowcake to a temporary storage facility or one or more uranium refinement and/or enrichment facilities. PRL will instruct its transportation subcontractors of the intended route prior to each shipment.

5 Roles and Responsibilities

5.1 Division of Responsibilities between PRL and Transportation Contractors

There is a division in responsibilities of PRL and its transportation contractors:

PRL will:

- Package and label drums of yellowcake in accordance with relevant regulations.
- Load drums onto tractor trailers.
- Perform radiological surveys of each drums and departing tractor-trailer for DOT-compliance.
- Provide emergency response information, such as Material Safety Data Sheets (MSDS), to the transportation contractor.
- Prepare shipping manifests.

The transportation contractor will:

- Placard each of its tractor-trailers in accordance with relevant regulations
- Ensure an emergency response plan appropriate for the shipment is in the possession of the driver
- Provide qualified drivers
- Secure drums on each tractor-trailer
- Be responsible for the security of the shipment during transport
- Be responsible for emergency response.

5.2 Roles within PRL

The Site Superintendent is responsible for implementing this plan. Major tasks related to demonstrating compliance with the regulations will be managed by the Corporate Radiation Safety Officer.

6 Transportation Requirements

This section addresses applicable DOT materials classes and shipping, packaging, marking and labeling, placarding, employee training, accident reporting, and transporting requirements.

Offsite transport of Low Specific Activity (LSA) materials is addressed under 10 CFR § 71.5(a), which directs compliance to the DOT regulations, published in 49 CFR Parts 170 through 189. 49 CFR § 173.427 describes requirements to transport LSA-I, Class 7, materials. The yellow cake will be transported in 55-gallon steel drums as DOT Radioactive Material Hazard Class 7, Normal Form, exclusive use, LSA-I materials.

Yellowcake will be transported from the mill using a tractor-trailer or equivalent. The transportation vehicle will be operated in compliance with the FMCSR. The FMCSR also provides the standards for safe means of transportation in commerce. Complying with the FMCSR will ensure safe transportation conditions.

PRL's transportation contractor(s) will secure the drums to the tractor-trailer in accordance with the FMCSR Subpart I, *Protection against Shifting and Falling Cargo.*

There are no conveyance activity limits for LSA material, according to Table 9 in 49 CFR § 173.427 (f). PRL will implement the following requirements for strong tight, exclusive use containers on a flat-bed tractor-trailer:

- Render the levels of radioactive contamination on external surfaces ALARA;
- Achieve external dose rates less than 200 millirem per hour (mrem/hr) at any point on the outer lateral surfaces of the package (49 CFR § 173.441);
- Achieve unshielded external dose rates less than 1000 millirem per hour (mrem/hr) at any point 3 meters from packages (49 CFR § 173.427);
- Achieve external dose rates less than 200 mrem/hr on vertical planes projected from outer edges of the tractor-trailer and the top of the load (49 CFR § 173.441);
- Achieve an external dose rate less than 10 mrem/hr at points 2 meters from vertical planes extending from the tractor-trailer (49 CFR § 173.441);
- Achieve external dose rates less than 2 mrem/hr in any normally occupied space (the cab) (49 CFR § 173.441);
- Achieve an external dose rate less than 200 mrem/hr on the underside of the tractor-trailer (49 CFR § 173.441);
- Brace packages to prevent shifts of lading under normal transport conditions;
- Achieve activities of beta, gamma, and low-toxicity alpha emitters in representative 300-cm^2 swipe samples collected from the external surface of the package less than $1*10^{-4}$ microcuries per square centimeter ($\mu Ci/cm^2$) (equivalent to 220 dpm/cm^2) before transport and 10 times this value during transport (49 CFR §173.443); and
- Achieve activities of all other alpha emitters in representative 300-cm^2 swipe samples collected from the external surface of the package less than $1*10^{-5}$ $\mu Ci/cm^2$ (equivalent to 22 dpm/cm^2) before transport and 10 times this value during transport (49 CFR § 173.443).

PRL will meet the following packaging requirements for outgoing drums:

- Container integrity will not be reduced by the range of temperatures to which it will be subjected;
- Container integrity will not be reduced by mixing internal gases or vapors;
- The container will be compatible with its contents in terms of corrosivity, permeability, softening, premature aging, and embrittlement;
- The container and its contents will not react chemically or galvanically;
- The plastic liner in the container will be compatible with the yellowcake and will not be

permeable to an extent that a hazardous condition is likely to occur during transportation and handling;

- The closed container will be secure and leak proof; that is, identifiable releases to the environment will not occur;
- The container will be easy to handle and secure on tractor-trailers and railroad cars during transport;
- Each lifting attachment that is a structural part of the container will be designed with a minimum safety factor of three against yielding when used to lift the container in the intended manner;
- There will be no other structural parts of the container that could be used to lift the container;
- The external surface will be free of protruding features, pockets, or crevices;
- No features will be added to the containers;
- The container will withstand normal transport ranges of acceleration, vibration, or vibration resonance;
- There will be no valves through which container contents could escape; and
- The exterior surfaces of the containers will be clean.

The first six bullet points address the applicable requirements of 49 CFR § 173.24 (General Requirements for Packaging and Packages); the others address the requirements of 49 CFR § 173.410 (General Design Requirements).

6.1 Placarding

The PRL transportation contractor(s) will placard tractor-trailers in accordance with 49 CFR Part 172. The placards used will conform to specifications in 49 CFR §172.504 (General Placarding Requirements), §172.506 (Providing and Affixing Placards: Highway), §172.507 (Special Placarding Provisions: Highway), §172.516 (Visibility and Display of Placards), §172.519 (General Specifications for Placards), §172.527 (Background Requirements for Certain Placards), and §172.556 (Radioactive Placards).

6.2 Marking and Labeling

LSA, exclusive use shipments are exempt from most labeling and marking requirements. PRL will label each 55-gallon drum as “Radioactive-LSA” and its contents.

The markings will be durable, legible, in English, and printed on or firmly affixed to the package. The markings will be displayed on a background of a sharply contrasting color. Markings will be located away from other markings, such as advertising, that could substantially

reduce the noticeability of the marking. Markings will not be covered or obscured by labels or attachments.

6.3 Shipping Papers

PRL will complete the shipping papers for each shipment, including the following entries:

- The basic description, in sequence: proper shipping name, Hazard Class (7), U.N. Identification No (UN2912)
- Proper page numbering (e.g., Page 1 of 4)
- 24-hour emergency response telephone number (not an answering machine)
- The total quantity of the material described in appropriate units
- The number and type of packages
- The name of each radionuclide and activity in SI units
- A description of the chemical and physical form
- Shipper's certification statement, worded exactly as described in 49 CFR § 172.204(a), and signature
- The words "Exclusive Use-Shipment"

Special instructions for exclusive use shipment controls for LSA material will also be included with the shipping papers.

The yellowcake will be shipped on public highways. Thus, a shipping paper will be within the driver's immediate reach while he/she is restrained by the lap belt and either readily visible to a person entering the driver's compartment (that is, NOT in the glove compartment)or in a holder mounted to the inside of the door on the driver's side of the vehicle.

Rejection of a shipment may imply that it is not compliant with transport regulations; that is, it could potentially endanger public health and safety. Thus, the receiving facility will identify non-compliant shipments prior to their return to the Shootaring mill.

6.4 Recordkeeping

PRL will maintain a record of each shipment of a DOT Specification 7A package (a Type A package) for at least two years after the latest shipment, and provide to DOT on request, DOT package performance test records [49 CFR 173.415(a)].

7 Hazard Communication and Training

Hazard communication associated with yellowcake transport will be achieved through correct marking, labeling, placarding, completing shipping papers properly, and emergency response information.

7.1 Emergency Response Information

PRL will supply emergency response information on shipping papers and/or an MSDS, in accordance with 49 CFR § 172.600. This emergency information will contain:

- The basic description as required by 49 CFR 172.202;
- The immediate health hazards;
- The risk of fire or explosion;
- Precautions to be taken in the event of an accident;
- Methods for handling fires;
- Methods for handling spills or leaks; and
- First aid measures.
- A 24-hour emergency response telephone number

PRL will also provide the transportation contractor(s) with this information, which will be in English and located away from the package containing the yellow cake. The information will be accessible to persons entering the vehicle.

The emergency response number will be manned by a person who is either knowledgeable of the radioactive material and knows the proper emergency response procedures or has immediate access to someone who does. The emergency number must be for either the person making the radioactive material shipment or for a company willing to accept the responsibility for emergency response. The person making the shipment must ensure that the company is capable of performing the emergency response necessary.

7.2 Employee Training

PRL will train its employees at least once every two years, to ensure that they can recognize and identify hazardous materials, know how to respond in an emergency situation; and know self-protection measures and accident prevention methods.

7.3 Emergency Response

The transportation contractor will develop an emergency response plan for routine shipments that will be available to PRL emergency response personnel. The emergency response information will be available for every transport operation. The information must be available within the transport vehicle or with the escorts (if needed) and to the emergency response personnel or representative. The document should contain the appropriate information for emergency responders to mitigate the hazards associated with the material. 49 *CFR* 173 Subpart G, *Emergency Response Information,* should be used in part as guidance to assemble the

required information. Where specific program procedures and work practices require the use of additional emergency response information, assembling the additional information is required.