ATTACHMENT D

Radiation Safety Program During Decommissioning And Reclamation

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1.0 INTRODUCTION

This program describes measures to protect workers, the public, and the environment during remediation. In recognition that the amount of radioactivity and therefore associated hazards will be reduced as the project progresses, the Radiation Safety Program may be modified to be commensurate with the activities being performed. SFC will review and approve the Radiation Safety Program, and any revisions that are made during the project. Any such adjustment to the requirements of the Radiation Safety Program shall be made in accordance with document control procedures.

2.0 RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS

The Radiation Safety Program will consist of procedures to protect workers, the public, and the environment from ionizing radiation. The SFC Manager, Health and Safety (Mgr. H&S) is responsible for implementation of the radiation safety program. A contractor may implement the program with oversight by the Mgr. H&S.

2.1 Air Sampling Program

2.1.1 Collection

Concentrations of radioactive material in air will be determined by sampling the air. Air sampling shall be conducted in accordance with or equivalent to the guidance provided in U.S. NRC Regulatory Guide 8.25, “Air Sampling in the Workplace”, 1992. Air sampling shall consider applicable guidance provided in NRC Regulatory Guide 8.30 “Health Physics Surveys in Uranium Mills”, 1983.Breathing zone air samples will be the primary method of monitoring the worker’s intake of radioactive material. The samples will be collected under known physical conditions (e.g. filter type, sample time, flow rate). The flow meters of air samplers shall be calibrated at least annually. Calibration shall also be performed after repair or modification of the flow meter.

Air samples will also be collected of general and localized areas when and/or where there is potential for generation of airborne radioactive material. These samples will be used to verify that the confinement of radioactive material is effective, and provide warning of elevated concentrations for planning or response actions. In each case, the sampling point will be located in the airflow pathway near the known or suspected release point(s). As necessary, more than one air sample location may be used in order to provide a reasonable estimate of the general concentration of radioactive material in air.

2.1.2 Action Level and Limit

An administrative action level shall be established for breathing zone air samples of one DAC; air sample results greater than this administrative action level shall be reported to the Mgr. H&S. An administrative limit shall be established for breathing zone air samples of 10 DAC-hours; individual exposure greater than this action level shall require the individual to be restricted from work involving potential exposure to airborne radioactive material unless approved by the Mgr. H&S.

2.2 Respiratory Protection Program

The respiratory protection program (RPP) provides guidance and instruction regarding protection of workers from occupational injury and illness due to exposure to airborne radioactive material. The RPP is implemented by written procedures. The RPP and implementing procedures are the primary means used to administratively establish safe respiratory protection practices and compliance with requirements of the NRC.

The RPP covers routine use of respiratory protection equipment. The functional areas of the RPP include medical evaluation, fit testing, selection, issue, inspection, cleaning, maintenance, storage, and training.

2.2.1 Medical Evaluation

Prior to the initial fit test, and at least every 12 months thereafter, an evaluation will be made of each worker required to wear respiratory protection equipment as part of the worker's duties as to whether or not the worker can wear the required respirator without physical risk. A worker will not be allowed to wear a particular type of respirator if, in the opinion of a physician, the worker might suffer physical harm due to wearing the respirator. A worker shall not be allowed to use a respirator without a current medical evaluation.

2.2.2 Fit Test

All workers required to wear respiratory protection equipment shall be required to successfully complete a fit test prior to initial use of the equipment. The fit test shall be repeated at least annually. A worker shall not be allowed to wear a respirator without a current successful fit test.

2.2.3 Selection

Respirators shall be selected from those approved by the National Institute for Occupational Safety and Health for the contaminant or situation to which the worker may be exposed. The Health and Safety Department shall select the respirator type. Selection shall be based on the physical, chemical, and physiological properties of the contaminant, the contaminant concentration likely to be encountered, and the likely physical conditions of the workplace environment in which the respirator will be used.

2.2.4 Issue

Workers may be assigned respirators for their exclusive use or they shall otherwise be issued by the Health and Safety Department. Respirators shall only be assigned or issued to workers qualified, with respect to the program, to use respiratory protection equipment. The type of respirator selected shall be documented on the Hazardous Work Permit.

2.2.5 Inspection

All respirators shall be inspected with regard to operability before, and routinely after, each use, and after cleaning.

2.2.6 Cleaning

Respiratory protection equipment that is used routinely shall be cleaned after each use. Respiratory protection equipment that is used by more than one worker shall be cleaned and disinfected after each use. The need for cleaning shall also be based on contamination surveys of the work area and of the respiratory protection equipment.

2.2.7 Maintenance

Respiratory protection equipment shall be maintained to retain its original effectiveness. Replacement or repair shall be done only by experienced persons, with parts designed for the respirator. No attempt shall be made to replace components or to make adjustments or repairs beyond the manufacturer's recommendations. Reducing valves or admission valves on regulators shall be returned to the manufacturer or equivalent for repair.

2.2.8 Storage

Respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored in dedicated carrying cases or cartons that protect from dirt and damage.

2.2.9 Training

All workers required to use respiratory protection equipment shall be instructed in the content and applicability of the program and implementing procedures, and especially in the proper use of the equipment and its limitations. A worker shall not be allowed to use a respirator without current successful completion of training.

2.3 Internal Exposure Determination

Individual monitoring shall be provided for workers who require monitoring of the intake of radioactive material pursuant to 10CFR 20.1502(b). Monitoring of intake shall normally be conducted by use of air samples, particularly of the breathing zone. Internal dose shall be determined by converting airborne concentrations to intakes in accordance with NRC Regulatory Guide 8.34 "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses", July 1992.

When a potential or actual condition exists where the worker(s) could have received an unmonitored intake of radioactive material, and cannot otherwise be estimated, the intake shall be determined by measurements of quantities of radionuclides excreted from or retained in the body. These measurements shall be made consistent with the guidance provided in NRC Regulatory Guide 8.9 "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program", 1993. These measurements shall consider applicable guidance provided in NRC Regulatory Guide 8.22 "Bioassay at Uranium Mills", 1988.

Determination of radiation dose to the embryo/fetus shall be performed in accordance with NRC Regulatory Guide 8.36 "Radiation Dose to the Embryo/Fetus", 1992.

Work restrictions shall be implemented for any worker with an intake in excess of 50% of the applicable limit in 10 CFR 20. Work restrictions shall be implemented for any worker with an intake in excess of 50% of the chemical toxicity limit for soluble uranium.

2.4 External Exposure Determination

Individual monitoring devices shall be provided to workers who require monitoring for external exposure pursuant to 10 CFR 20.1502(a). External monitoring shall be conducted in accordance with or equivalent to NRC

Regulatory Guide 8.34, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses", July 1992.

External exposure monitoring, when required, shall be accomplished using thermoluminescent dosimeters worn on the front of the upper torso. Radiological surveys may be performed to supplement personnel monitoring when work is being performed where workers are required to be monitored.

Dosimeters shall be processed at lease quarterly by a vendor accredited by NVLAP.

Work restriction shall be implemented for any worker reaching 50% of the annual limits of 10 CFR 20.

2.5 Summation of Internal and External Exposures

Results of internal and external monitoring shall be used to calculate total organ dose equivalent and total effective dose equivalent to workers for which monitoring is required. Summation of internal and external doses shall be performed in accordance with NRC Regulatory Guide 8.34 "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses", July 1992.

2.6 Contamination Control Program

Contamination control shall be managed by exposure control and monitored by radiation surveys. Contamination control measures shall also be made consistent with the applicable guidance provided in NRC Regulatory Guide 8.30 "Health Physics Surveys in Uranium Mills", 1983.

2.6.1 Exposure Control

Personnel exposure to radioactive material will be controlled by application of engineering, administrative, and personnel protection provisions. The priority of application will be descending with respect to their order of description below.

Engineering

Engineering controls will be used, as practicable, to minimize or prevent the presence of uncontained radioactive material. Engineering controls will predominantly be comprised of containment, isolation, ventilation, and decontamination.

Administrative

Administrative controls will be used to control work conditions and work practices. Administrative controls will predominantly be comprised of the following:

Access Control

Routine access to work areas will be limited to personnel necessary to accomplish tasks or activities. Access will also be controlled with respect to training and use of specified personnel protection equipment.

Postings and barriers

Postings will be used to inform personnel of relevant hazards or conditions and associated access requirements. Barriers may be used to prevent unauthorized access.

Procedures

Written procedures may be used to describe specific radiation safety requirements necessary for tasks that involve radioactive material.

Hazardous Work Permits

The requirements for Hazardous Work Permits (HWP) are described in Section 9.2. HWPs will be used to describe specific or special worker protection requirements for activities involving radioactive material and not covered by a procedure. HWPs may also be used in conjunction with a procedure.

Contamination Control

Action levels and limits for radiation surveys, described later in this section, will be used to control the levels of radioactivity on equipment and in areas.

Personal Protective Equipment

Personal protective equipment will be used to control personnel exposure to radioactive material when administrative controls are not sufficient and engineering controls are not practicable. Personal protective equipment may include head covering, eye protection, respiratory protection, impervious outerwear, gloves, and/or protective shoes or shoe covers.

2.6.2 Radiation Surveys

Radiation surveys will be performed to describe the radiation types and levels in an area or during a task, to identify or quantify radioactive material, and to evaluate potential and known radiological hazards.

The types of radiation surveys and their frequency are described in the following subsections.

Contamination Measurements

Measurements will be made of removable alpha and/or beta-gamma. The measurements will be made by wiping an area with cloth, paper, or tape. The radiation levels will be measured on the wipe. Contamination surveys shall be performed at the end of each workday where invasive demolition of contaminated material was performed.

Radiation

Exposure rate measurements will be performed using an ion chamber or equivalent. Measurements will be made at 30 centimeters.
Measurements may also be made at contact

Personnel

Personnel will be frisked prior to leaving access controlled areas.

Action Levels

Action levels are established to inform facility personnel when a situation needs to be evaluated so that corrective actions can be taken. Action levels are set so that corrective actions can be made before a regulatory limit is exceeded.

Exceedance of action levels requires investigation including evaluation of preventative and/or corrective action. The investigation, and documentation of such, is completed commensurate with the significance of the condition.

Radiation levels exceeding the values described in the following subsections will be reduced below the respective levels as soon as practicable.

Removable

The action level for removable alpha or beta-gamma radiation on a surface is 1000 dpm/100cm2.

Exposure Rate

The action level for exposure rate is two millirem per hour at 30 centimeters.

Personnel

The action level for personnel is three times the background count rate of the survey instrument.

Limits

Limits, as release criteria, are described in SFCs license. The limits are administered such that when exceeded, action must be taken to reduce the levels or additional controls must be applied.

Items or areas will not be released for unrestricted use until the relevant limits are satisfied.

All accessible surfaces and areas that exceed the respective limits will be decontaminated on a timely basis. In no case will the delay to initiate control exceed one normal workday. In the case of personnel contamination, there will be no delay to initiate decontamination.

2.7 Instrumentation Program

Instrumentation utilized for personnel monitoring will be calibrated and maintained in accordance with radiation safety procedures. These procedures utilize the manufacturers calibration guidance. Portable instruments are calibrated on a semi-annual basis or as required due to maintenance. Specific requirements for instrumentation include traceability to NIST standards, field checks for operability, background radioactivity checks, operation of instruments within established environmental bounds (i.e., temperature and pressure), training of individuals, scheduled performance checks, calibration with isotopes with energies similar to those to be measured, quality assurance tests, data review, and recordkeeping. Where applicable, activities of sources utilized for calibration are also corrected for decay. All calibration and source check records are completed, reviewed, signed off and retained in accordance with Quality Assurance Program requirements. A list of typical radiation instrumentation and minimum detectable activities (MDA) is given in Table 2-1. Typical personnel monitoring equipment is shown in Table 2-2.

In the event an instrument of the type listed in Table 2-1 is employed during decommissioning, its background count rate or exposure rate and its lower limit of detection will be estimated for its application. Alternative instrumentation must also be able to measure adequately to assess compliance with radiological safety requirements.

Table 2-1 Typical Instruments for Performing Radiation Surveys

MEASUREMENT	METER	DETECTOR
Direct alpha	Multipurpose scaler/ratemeter	ZnS(Ag) scintillation
Direct beta	Multipurpose scaler/ratemeter	Dual phosphor ZnS(Ag) scintillator
Direct alpha/beta/gamma	Multipurpose scaler/ratemeter	Gas filled (Geiger-Mueller) pancake
Removable	Computer software	Gas-flow proportional
Exposure rate	Multipurpose scaler/ratemeter or, integral with detector	NaI(Tl) scintillator Ion chamber or NaI(Tl) scintillator

Table 2-2 Typical Equipment for Performing Personnel Monitoring

EQUIPMENT DESCRIPTION	PURPOSE
Personal Air Samplers (lapel)	Breathing zone air monitoring
Area Air Samplers	High volume air monitoring
Area Air Samplers	Work area low volume air monitoring
Personnel Dosimetry (TLD)	Deep dose, eye dose, skin dose
Handheld direct alpha or direct beta instrument	Contamination monitoring
Micro-R meter	Exposure rate
Ion Chamber	Dose rate

3.0 NUCLEAR CRITICALITY SAFETY

This topic is not applicable to the decommissioning or reclamation at SFC.

4.0 HEALTH PHYSICS AUDITS, INSPECTIONS, AND RECORD-KEEPING PROGRAM

The radiation safety program shall be subject to an annual audit and periodic inspections. Each are performed to determine if radiological operations are being conducted in accordance with regulations, license conditions, and written procedures.

An audit of the radiation safety program shall be conducted annually. The audit shall be conducted by the Mgr. H&S or designee. The audit will consider the basic functional areas of the radiation safety program; e.g. Hazardous Work Permits, radiation safety procedures, radiological surveys and air monitoring, ALARA program, individual and area monitoring results, access controls, respiratory protection program, training, etc.

The audit shall be conducted in accordance with a specific audit plan developed by the auditor. A written report shall be generated upon completion of the audit describing the results. The report shall be distributed to site management. As necessary, a written corrective action plan shall be prepared to address non-compliance issues. All corrective actions shall be tracked to completion. Once corrective actions have been completed, a written closure report shall be distributed to management documenting the completion of corrective actions.

Periodic inspections shall be conducted by the Health and Safety Department staff. These inspections shall be routine reviews performed of operations and activities. The inspections shall normally be completed against a pre-established checklist. Checklists may be developed independently for differing periods; e.g. daily, weekly, monthly, etc. The checklist items shall usually be comprised of routine procedural requirements. Any findings discovered during the routine inspection shall be recorded on a tracking log. The log shall be maintained by the Health and Safety Department. The log shall include a description of planned corrective action and date of completion of corrective action.