MILL DECOMMISSIONING PLAN
ENERGY FUELS RESOURCES CORPORATION
URANIUM MILL LICENSING SUPPORT
PIÑON RIDGE MILL
MONTROSE COUNTY, COLORADO
KLEINFELDER PROJECT NO. 83088

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Rev. 0

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MILL DECOMMISSIONING PLAN

Rev. 0

IN SUPPORT OF THE APPLICATION FOR A
LICENSE FOR SOURCE MATERIAL MILLING FOR THE

PIÑON RIDGE URANIUM MILL

Montrose County, Colorado

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EXECUTIVE SUMMARY

Energy Fuels Resources Corporation (EFRC) is planning to license, build, and operate a conventional acid-leach uranium mill in the Paradox Valley of western Montrose County, Colorado. The mill will be located at 16910 Highway 90, Bedrock, Colorado 81411. The mill site (Site) consists of 880 acres on the south side of the eastern end of Paradox Valley. The majority of the Site is relatively flat with less than 200 feet of relief from south to north and is crosscut by minor ephemeral streams or washes. The Paradox Valley is sparsely populated.

The primary historic land use has been grazing. Land use adjacent to the Site includes mining, oil and gas exploration, timber harvesting, recreation, and grazing. Current and past mining activities have occurred to the southwest and southeast of the Site. No previous uranium mining or milling has occurred on the Site, but the drainage areas within the southern quarter of the site exhibit radiological anomalies from natural and possibly historic anthropogenic sources within the area. The natural source of the elevated radioactivity in the southern portion of the site originates from erosion of the Salt Wash member of the Morrison formation, which outcrops along the flank of the mesa south of the site. The Salt Wash member is the uranium ore host for the nearby uranium mines. Possible historic anthropogenic sources within the area include underground and surface uranium mining activities conducted in areas south of the site.

EFRC will decommission the site in accordance with regulatory requirements, restoring most of the Site to a condition consistent with surrounding land uses. The tailing cells area will be decommissioned to provide long term stability for the tailings, with use restricted to this objective. The tailing cells will be covered to limit the release of radon to 20 picoCuries per meter squared per second ($\rho Ci/m^2/s$). All other areas within the Site will be restored to radium concentration limits above background of 5 picoCuries per gram (ρCi/g) in the top 15 centimeters (cm) of soil and 15 ρCi/g in 15 cm intervals below 15 cm depth.

EFRC will provide financial assurance for both decommissioning of the Site and long-term care of the tailing cells area as required by 6 CCR 1007-1, Part 18.

The mill is expected to operate for 25 to 40 years. Decommissioning will begin after cessation of milling and approval of the Detailed Decommissioning Plan and is expected to be completed in 2.5 to 3 years. Post-decommissioning monitoring will be conducted as necessary based on residual levels of contamination in soil or water measured upon completion of decommissioning activities. No contaminant concentrations above regulatory limits are expected. Groundwater monitoring will be continued after decommissioning as needed to document that groundwater has not been impacted.

1.0 INTRODUCTION

Energy Fuels Resources Corporation (EFRC) is planning to license, build, and operate a conventional acid-leach uranium mill in the Paradox Valley of western Montrose County, Colorado. This facility, the Piñon Ridge Mill must satisfy the requirements for a Radioactive Source Material License in accordance with Section 18.8 of 6 CCR 1007-1, Part 18, Licensing Requirements for Uranium and Thorium Processing, of the Colorado Department of Public Health and Environment (CDPHE), enforced through its Radiation Management Unit. This Decommissioning Plan (Plan) is submitted in support of EFRC's application for the Radioactive Source Material License.

This document describes the general elements of the Plan that will be implemented after cessation of mill operations of the facilities. A detailed Decommissioning Plan will be submitted prior to closure based on the site-specific conditions and the regulatory requirements that exist at that time. The general plant layout is shown in Figure 1. The overall site layout is provided in Figures 2 and 3. Decommissioning and closure of the tailings cells are addressed separately in the Tailing Cell Closure Plan (Kleinfelder, 2009a).

1.1 Regulatory Requirements and Guidance

This Plan has been developed in accordance with applicable State of Colorado regulations and U.S. Nuclear Regulatory Commission (NRC) technical guidance documents. State requirements for decommissioning of the Piñon Ridge mill are contained in 6 CCR 1007-1, Part 3, RH 3.16.4 and in 6 CCR 1007-1, Part 18, RH18.3.1.5, RH 18.8 (Decommissioning Requirements) and in Criteria 5A , 6(6) and 6(7) of Appendix A thereto. Beyond these general requirements for decommissioning, the State of Colorado has no regulatory guidance of its own for mill decommissioning. Guidance for decommissioning plans is provided by the NRC in NUREG-1757, Vol. 1 (NRC, 2006) and in NUREG-1620 (NRC, 2003), as well as Regulatory Guide 4.14 (NRC, 1980). The contents of this Plan are organized according to the applicable topics of Table D.1, Appendix D of NUREG-1757.

1.2 Decommissioning Objectives and Practices

The objective of mill decommissioning, together with the tailing cell closure, is to restore the mill Site to a condition that is environmentally stable and consistent with the appearance and uses of the surrounding land, employing practices that are protective of worker and community health and safety. To achieve this objective, the Plan provides an overview of:

- Measures to be taken to remove mill facilities and establish long-term environmental stability of the site.

- Measures that will be protective of workers and those in the immediate vicinity of the decommissioning work and the mill site consistent with as-low-as- reasonably-achievable (ALARA) dose objectives.
- Radiation work permits (RWPs) for work that is reasonably expected to involve the potential for radiological exposure and not otherwise covered by standard procedures.
- Use of standard procedures and equipment to minimize the need for special training.
- Plans and protocols for supervision of each portion of the work.
- Training required for workers.
- Practices for minimizing the potential for excursions of radiological material beyond the established boundaries of the work areas.
- Quality practices that describe observations of work plan performance, documentation of the work, and corrective actions.
- Measures to be taken to monitor the post-closure environmental conditions of the site.

2.0 FACILITY OPERATING HISTORY

Prior to closure, the facility operating history will be summarized in the Decommissioning Plan. This will include descriptions of the current and past licensed activities on site, previous decommissioning activities, previous spills and cleanup activities, and prior on-site burials. The intent of this section is to provide a starting point for finalizing the closure design.

3.0 FACILITY DESCRIPTION

Descriptions of the environmental conditions of the Site and of the mill facilities are presented in the Environmental Report (ER) (Edge, 2009) and a series of exhibits provided as part of the Material License Application. The following information is condensed from those documents. This information will be updated when the final Plan is prepared.

3.1 Site Location and Description

The proposed Piñon Ridge Project site is located in Paradox Valley at 16910 Highway 90, approximately 13 miles west of Naturita in Montrose County, Colorado. The Site's legal description is the Southwest ¼ of the Southeast ¼ of Section 5, all of Section 8, the North ¼ of Section 17, and the Southeast ¼ of the Northwest ¼ of Section 17, Township 46 North, Range 17 West, of the New Mexico Principal Base and Meridian. The Site is located on both the Davis Mesa Quadrangle (1955/1994) and Bull Canyon Quadrangle (1954/1994) 1:24,000 United States Geological Survey (USGS) geologic/topographic maps.

The Site consists of 880 acres on the south side of the eastern end of Paradox Valley. Elevations across the Site range from 6,020 feet above mean sea level (amsl) on the lower flank of Davis Mesa to the south to 5,417 feet amsl near the center of Paradox Valley to the north. The majority of the site is relatively flat with less than 200 feet of relief from south to north and is crosscut by minor ephemeral streams or washes.

The primary historic land use has been grazing. Land use adjacent to the Site includes mining, oil and gas exploration, timber harvesting, recreation, and grazing. Current and past mining activities have occurred to the southwest and southeast of the Site.

3.2 Population Distribution

The mill is located in a sparsely populated rural area of western Montrose County, Colorado. The population within 5 miles of the site consisted of six full-time residents and four part-time residents in 2009. The nearest residence is located about 2.5 miles northwest of the mill and the nearest downwind residence is about 3.5 miles southeast of the mill. Approximately 40,000 people lived in Montrose County in 2008; however, the majority of the county's residents live in the eastern portion of the county. The closest towns northwest of the site include the unincorporated towns of Bedrock (7 miles distance) and Paradox (14 miles distance). These towns and the surrounding area (i.e., area code 81411) had a population of 242 people in 2009 (Sperling's, 2009). The closest towns southeast of the site include the incorporated towns of Naturita (13 miles) and Nucla (15 miles) with 2009 populations of 653 and 727, respectively (Sperling's, 2009). Distances are calculated from the mill entrance based on "over-the-road" miles. Additional population information can be found in the Socioeconomic Baseline and Impact Analysis (Berger, 2009) and the ER (Edge, 2009).

3.3 Current/Future Land Use

Historically, the site has been used for low-density seasonal grazing of cattle. Wildlife is also present, including elk and deer that utilize the area in the winter when snow pushes them to lower elevations (Kleinfelder, 2009b). Land uses adjacent to the Site include mining, oil and gas exploration, timber harvesting, recreation (i.e., hunting), grazing, and wildlife habitat. After closure, the unrestricted portion of the site will be returned to grazing and wildlife use.

3.4 Meteorology and Climatology

The Site is located in a semi-arid area with an average annual precipitation of about 13 inches. Winds are from the northwest along the axis of the canyon during the day. At night, the wind typically shifts in the opposite direction but at much lower speeds. Wind speeds are highest in the spring and early summer and lowest in the winter months. Recorded temperatures at nearby Uravan indicate that the daily maximum temperatures range from 43°F in January to

96°F in July while daily minimum temperatures range from 15°F to 59°F in July. Evaporation is estimated to be about 66 inches per year at the Site. Additional information on climate is presented in the Meteorology, Air Quality, and Climatology Report (Kleinfelder, 2009c), which is included in the license application.

3.5 Geology and Seismology

The Site is located along the south side of the eastern end of Paradox Valley. The valley is a graben formed by the collapse and erosion of an anticline with an intrusive salt and gypsum core (diapir) bounded on the northeast and southwest by a series of normal faults. These faults are associated with the development of the diapir and show no evidence of being active. The majority of the Site is directly underlain by late Quaternary deposits of fine-grained alluvium and eolian (wind-blown) deposits with intermixed gravelly alluvial stream channel deposits. These sediments overlie the sandstone and siltstone of the Chinle Formation, sandstone of the Wingate Formation, and the shales and evaporites of the Hermosa Formation. The Hermosa Formation forms the core of the salt diapir that runs the length of the valley. Minor alluvial stream deposits are confined to the ephemeral stream or wash channels that drain across the site and terminate near the middle of the valley north of the Site. The Geologic Report (Kleinfelder, 2009d) provides additional information on the geology and seismology of the Site.

3.6 Surface Water Hydrology

The Site includes all or part of five drainage basins or individual watersheds, the largest of which is 1.26 square miles in area with estimated peak discharges of 46 cfs (cubic feet per second), 155 cfs, and 405 cfs for the 10-year, 100-year, and 1,000-year storm events, respectively. There are no wetlands or U.S. Army Corps of Engineers jurisdictional streams on the Site. The drainages ultimately discharge into East Paradox Creek, an ephemeral drainage located north of the Site. East Paradox Creek discharges into the Dolores River about 6 miles northwest of the Site near the town of Bedrock. Additional information on surface water hydrology is presented in the ER (Edge, 2009), the Surface Water Monitoring Summary Report (Golder, 2009c), the Baseline Surface Hydrology Modeling Report (Kleinfelder, 2009e), and Preliminary Delineation of Jurisdictional Waters of the United States (Kleinfelder, 2008).

3.7 Groundwater Hydrology

A baseline groundwater characterization and monitoring program was initiated in the last quarter of 2007 and continued through the third quarter of 2009. The groundwater monitoring program involved the drilling of nine wells at the Site, only four of which had sufficient groundwater to monitor on a quarterly basis. The groundwater characterization study was supplemented by the installation and monitoring of three production wells south of the Site, monitoring of off-site water wells and springs, and one-time sampling of exploration borings located both on and off Site.

Water is present in the Triassic Chinle and Triassic Moenkopi Formations beneath the southern part of the site. The depth to groundwater as measured in the boreholes is relatively deep and typically ranges in depth from 280 to 400 ft below the ground surface. The groundwater typically occurs near the contact between the Chinle and the Moenkopi Formations. Because these formations are underlain by non-water bearing evaporites and shales of the Hermosa Formation, groundwater at greater depths is not expected at the Site.

The northern two-thirds of the Site are underlain by the impermeable Hermosa Formation and do not contain groundwater. Groundwater was not encountered in the alluvium at the Site.

EFRC plans to supply the water for the mill from wells located south and west of the mill and completed in the Chinle Formation. The closest off-site groundwater wells are located approximately 2.5 to 3 miles southeast and northwest of the Site. These wells are also completed in the Chinle Formation. As part of its Special Use Permit with Montrose County, EFRC has committed to monitoring all the wells and springs within 5 miles of the site that are associated with the Chinle Formation.

Additional information on groundwater may be found in the Hydrogeologic Report (Golder, 2009a), Groundwater Monitoring Summary Report (Golder, 2009b), the Operational Monitoring Plan (Visus, 2009b), and the ER (Edge, 2009).

3.8 Natural Resources

No economically recoverable minerals have been identified on the Site. No Threatened or Endangered species were identified on or adjacent to the Site. The Site is currently used for cattle grazing. The Salt Wash member of the Morrison Formation is exposed along the mesa south of the Site. This sandstone unit contains uranium and vanadium ore deposits. There are several underground mines and one surface mine in close proximity to the Site (i.e., on the mesa southeast and southwest of the Site boundary). Both naturally-occurring and mining-related dust and runoff from the mesa could potentially affect dose estimates for the Site. Natural resources are discussed in more detail in the ER (Edge, 2009).

4.0 RADIOLOGICAL STATUS OF THE FACILITY

At the time of the license application submittal, no facilities other than those required for collection of baseline environmental data (meteorological towers, air sampling stations, monitoring wells, and surface water sampling stations) had been constructed on the Site. The Baseline Radiological Investigation Report (ERG, 2009), which is included in the license application, found that most of the Site's soils had radium-226 concentrations between 0.5 and approximately 1 pCi/g; however, areas with more elevated radium-226 concentrations (up to 24 pCi/g) occur within the Site drainages, especially in the south portion of the Site immediately below the mesa. It appears that the higher radium-226 concentrations are due primarily to erosion of the uranium/radium-bearing sandstone from the Salt Wash outcrops above the Site. A large percentage of this eroded material is deposited at the base of the mesa by surface water runoff. Erosion of waste rock dumps at historic mines above the Site may also contribute to the higher radium concentrations.

Ambient gamma dose rates were measured on site using optically stimulated luminescence (OSL) dosimeters. These studies found that annual doses from cosmic and terrestrial radiation ranged from about 102 millirems (mrem) at the north end of the Site (near the highway) to 127 mrem at the south end of the Site (near the mill). The higher exposure rates in the southern portion of the site are presumably due to the proximity of the Salt Wash unit, higher radium concentrations in the southern drainages, and the presence of the currently inactive uranium mines. The Baseline Radiological Investigation Report (ERG, 2009) also established baseline radon-222 levels, radon flux levels, and radionuclide levels in radiation. A previous study by Ward Whicker determined radionuclide levels in animal tissues at the Site (Whicker, 2008). The report recommended that radium-226 levels in bone samples from rabbits be used for future studies.

4.1 Structures, Systems, and Equipment

The mill is designed and will be operated to contain contaminants within the systems and equipment that store, transport, and process solids and liquids. These systems and equipment will be in the Ore Handling and Grinding Area, Leaching Area, Counter-Current Decantation (CCD) Thickeners and Tailings Disposal Area, Solvent Extraction (SX) Area, Precipitation and Packaging Area, and Reagents Area. Double containment of all process liquids will provide protection against release of contaminants. These systems and equipment will be handled and disposed of during decommissioning, as appropriate, for the types and levels of contamination and the potential for, and cost of, decontamination and reuse versus disposal. Procedures for cleaning and sampling equipment and materials for release from the restricted area are provided in the Health and Safety Plan (EFRC, 2009a).

Mill structures that provide direct containment of ore, process liquids or solids, and tailing liquid or solids are subject to contamination. These structures include the ore pad and channel, stormwater ponds, tailing cells, and evaporation ponds.

The Operational Monitoring Plan (Visus, 2009b) describes the radiological and other environmental monitoring measures that will be conducted during mill operations to detect and document detectable releases from systems, equipment, and structures, and the corrective actions to be taken in response to out-of-limit releases, if any.

4.2 Soils

As previously discussed, localized occurrences of elevated (above general background) radiological concentrations were identified on the Site unrelated to any of the Project's activities (ERG, 2009). During operations, soil contamination (primarily surficial) may occur as the result of releases of ore, process liquids or solids, and tailing liquid or solids to the ground surface. Such releases may, in turn, lead to migration of contaminants into the subsurface soils. Control measures described in the Facility Operating Plan (Visus, 2009a) and monitoring and corrective action plans described in the Operational Monitoring Plan (Visus, 2009b) will minimize the risk of releases and potential consequences. Upon cessation of mill operations and before commencement of demolition, one or more radiological surveys will be performed to identify soils that have radiological contamination from the operations.

4.3 Surface Water

Only intermittent surface water runoff occurs on the site, as described in the ER (Edge, 2009) and the Surface Water Monitoring Summary Report (Golder 2009c). This runoff varies in quality depending on the drainage and intensity of the precipitation or snowmelt event. Surface water diversions will be constructed to divert run-on sheet flow away from the mill area. Site grading will divert runoff from direct precipitation on the mill area to diversion channels and, in turn, to lined stormwater ponds. The stormwater ponds will discharge to the evaporation pond should a large (i.e., plus 100-year) storm event occur (Kleinfelder, 2009f). Contaminants that might be carried in runoff from the mill site will be contained within this system of surface drainage controls and disposed of in the stormwater and evaporation ponds. The mill is designed to be a zero-discharge facility. The Stormwater Management Plan (Golder, 2009d) provides additional information regarding stormwater controls and surface water sampling.

4.4 Ground Water

Ground water investigations conducted for the baseline characterization and water resources study, and reported in the Hydrogeologic Report (Golder, 2009a) and ER (Edge, 2009), demonstrate that ground water is limited to the south portion of the Site and lies at approximately 300 hundred feet or more in depth. The water is technically non-potable, as several constituents exceed primary or secondary drinking water standards. These exceedances of the standards are, however, relatively minor and the Chinle Formation is used as a source of domestic water by nearby residents. Mill design elements and operational procedures discussed in the Facility Operating Plan (Visus, 2009a) will protect against infiltration of water from the surface that could impact this resource. Groundwater monitoring and leak detection monitoring, as described in the Operational Monitoring Plan (Visus, 2009b), are designed to detect spills or leaks of solutions from containment.

5.0 DOSE MODELING

EFRC will meet the specific radionuclide concentration and dose limits on the Site required for restricted use after decommissioning in accordance with 6 CCR 1007-1, Part 18, RH 18.8 (Decommissioning Requirements) and in Criteria 5A, 6(6) and 6(7) of Appendix A thereto, as well as NUREG-1549 (NRC, 1998) and NUREG-1757 Vol. 2 (NRC, 2006). Site-specific assessment and dose modeling appropriate for a Decommissioning Group 6 site will be performed in accordance with Tables 1.1 and 1.2 and Section 5.3 of the latter reference. The assessment will include:

- Information on the source term configuration, residual radioactivity spatial variability, and chemical form;
- Exposure scenario(s) - scenario identification, critical group determination, exposure pathways;
- Conceptual model(s);
- Numerical analyses (e.g., hand calculations or computer models);
- Uncertainty analysis; and
- Compliance with regulatory criteria.

For the Site, the post-decommissioning dose modeling would involve the covered tailings as the primary source term. Other potential sources will be removed from their original locations and combined with the tailings, leaving only the tailings and the below-limit byproduct-derived Ra-226 in the soil as the source terms to be modeled. The below-limit radium in the soil to be included in the modeling will be those concentrations between background levels and (1) 5 ρCi/g of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 cm below the surface, and (2) 15 ρCi of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15 cm below the surface.

6.0 ENVIRONMENTAL INFORMATION

Environmental information about the Site is presented in detail in the ER prepared by Edge Environmental, Inc. and submitted with the Source Materials License Application in 2009.

7.0 ALARA ANALYSIS

The As Low As Reasonably Achievable (ALARA) Program, described in the Health and Safety Plan (EFRC, 2009d), will apply to all decommissioning operations. The ALARA analysis will follow the guidance in NUREG-1757, Vol. 2, Section 6. Achievement of ALARA goals requires an integrated approach to the conduct of site activities that have an impact on dose to workers or the public.

Each activity must be justified, optimized, and doses limited. Consideration will be given to the lifecycle (short- and long-term) impacts from process and equipment modifications, manpower utilization, and changes to operating procedures and maintenance programs.

ALARA analysis will be supported by a tracking and feedback system, including inspections, reviews, audits, communications, documentation, and training. The areas for review to be developed in support of the ALARA analysis include:

- A description of the preferred decommissioning method(s) showing compliance with the ALARA requirement at the time of decommissioning and how EFRC will achieve a decommissioning goal below the dose limit;
- A cost-benefit analysis (or qualitative arguments), and the basis for the cost estimate, for the preferred option of removing residual radioactivity to a level that meets or exceeds the applicable limit; and
- A demonstration that the doses to the average member of the critical group are ALARA.

A safety evaluation of decommissioning methods will be performed based on information developed under Section 5 of this Plan.

Due to the conservatism in soil generic screening levels developed by NRC staff, EFRC will not need to provide analyses to demonstrate that these screening levels are ALARA (NUREG-1757, Vol. 2, Section 6).

The ALARA analysis will consider appropriate potential benefits including:

- collective dose averted,
- regulatory costs avoided,
- changes in land values,
- esthetics, and
- reduction in public opposition.

The ALARA analysis will be prepared as part of the Detailed Decommissioning Plan.

8.0 PLANNED DECOMMISSIONING ACTIVITIES

In general, decommissioning will consist of decontamination and demolition of mill facilities within the license boundary (Figure 2). The notable exception will be the tailing cells, which will be closed according to the tailing cell closure design (Kleinfelder, 2009a) for permanent protection of byproduct materials in accordance with Appendix A of 6 CCR 1007-1, Part 18.

The mill is expected to operate for 25 to 40 years. Decommissioning will begin after cessation of milling and approval of the Detailed Decommissioning Plan and is expected to be completed in 2.5 to 3 years. The decommissioning activities for the mill components will occur generally in the following order:

- Preparation of Detailed Decommissioning Plan
- Removal of Uncontaminated Systems, Equipment, and Structures
- Removal of Contaminated Systems and Equipment
- Removal of Contaminated Structure
- Soil Remediation
- Surface Restoration
- Surface and Ground Water Protection.

Each activity is discussed in the sections that follow.

8.1 Detailed Decommissioning Plan

A Detailed Decommissioning Plan will be prepared by EFRC prior to decommissioning activities. In addition to the items discussed in Sections 2 through 7, the detailed plan will include the following items, which are detailed in Sections 10 through 14.

- Permits, including modification of the Air Pollution Emission Notification (APEN) permit, to reflect change from operations to decommissioning
- Work Plans, including identification of Radiation Work Permits needed
- Waste-handling Plans
- Radiological Surveys and Sampling Plans
- Health and Safety Operating Protocols, both Radiological and Non-radiological
    - Training
    - Air Sampling Program
    - Respiratory Protection Program
    - Internal Exposure Determination
    - External Exposure Determination
    - Instrumentation Program
    - Audits, Inspections, and Record keeping
- Environmental Monitoring and Control
    - Environmental ALARA Evaluation Program
    - Effluent Monitoring Program
    - Effluent Control Program
- Quality Assurance

- Organization
- Quality Assurance Program
- Document Control
- Control of Measuring and Testing Equipment
- Corrective Action
- Records

- Completion Report
  - Quarterly Progress Report
  - Final Completion Report

8.2 Uncontaminated Systems, Equipment, and Structures

Upon permanent cessation of milling, the inventory and radiological assessment (surveying) of mill systems and equipment will be updated, following the procedures described in Section 14, to show the levels of contamination. Based on the results of these surveys and the radiological release limits in effect at the time of decommissioning, the systems and equipment will be classified as uncontaminated or contaminated. Before any contaminated equipment is removed, other equipment, materials, and structures that are shown by appropriate screening procedures to be uncontaminated (radiological levels below release limits) will be removed from the mill area and sold, recycled for off-site use, or disposed of in accordance with regulatory requirements in effect at that time. Uncontaminated systems and equipment could include electrical controls, communications, water tanks and pumps, and similar equipment that have not been exposed to radiological materials.

Uncontaminated systems and equipment are expected to include much of the equipment in the following:

- AREA 800 – REAGENTS
  - Storage and Handling Vessels
- AREA 900 – UTILITIES AND BUILDINGS
  - Electric Power Distribution
  - Propane Heating System
  - Diesel and Gasoline Fuel Storage
  - Water Supply System, includes potable and fire suppression systems
  - Septic Systems (above-ground components)
- AREA 1000 – GENERAL PLANT
  - Warehouse and Shops Equipment
  - Laboratory Equipment
  - Environmental Monitoring Systems

- Emergency Response Systems

Structures associated with Areas 800, 900, and 1000 will house systems and equipment not expected to result in radiological contamination. Non-radiological contamination (e.g., resulting from chemical leaks or spills) will be contained by systems included in the mill design and will be managed and removed routinely during mill operations (Visus, 2009a; EFRC, 2009b). Structures in these areas might be salvaged, in whole or in part, and recycled or sold for off-site re-use. Alternatively, they might be demolished and placed in the vault with the contaminated materials

All facilities outside of the license boundary, including the administration building, meteorological towers, air monitoring stations, the guard house, well field, and the main access road (Figure 2), are expected to be uncontaminated and to remain in service during and after decommissioning to support decommissioning activities and post-closure environmental monitoring.

8.3 Contaminated Systems and Equipment

After uncontaminated systems and equipment are removed from the mill area, the systems and equipment that are known or very likely to be contaminated above release limits will be removed from the mill area and placed into the vault in Tailing Cell C, described in the Tailing Cell Closure Design Report (Kleinfelder, 2009a).

Contaminated materials removed from the mill area will be transported within the license boundary over a temporary haulage/service road along the west side of the tailings cells (Figure 3). This road, originally a two-track dirt road used to access the license boundary fence and to service the pipeline from the west stormwater pond to the evaporation pond, will be improved as needed to support heavy equipment and trucks during all weather conditions. Improvements could include placement of additional granular fill, which might be obtained from uncontaminated fill used originally in the ore pad or mill pad. This fill might be reused again in the closure of the vault in Tailing Cell C.

The contaminated systems and equipment will include:

- AREA 100 – ORE HANDLING AND GRINDING
  - Ore Storage Pad
  - Feed Hopper and Conveyor System
  - SAG Mill and Pulp Storage
- AREA 200 – LEACHING
  - Pre-leach Tanks, Pipes, Pumps, and Valves
  - Leach Tanks, Pipes, Pumps, and Valves
- AREA 300 – CCD THICKENERS AND TAILINGS DISPOSAL
  - Counter-current Decantation (CCD) Thickeners

  - Tailings Slurry Pipes, Valves
- AREA 400 – URANIUM SOLVENT EXTRACTION (SX)
  - Polishing Filters and Feed Tanks
  - Uranium SX Extraction Equipment
  - Uranium Scrub and Strip Equipment
- AREA 500 – URANIUM PRECIPITATION
  - Uranium Precipitation Tanks
  - Uranium Dewatering Equipment
  - Uranium Drying and Packaging Equipment
- AREA 600 – VANADIUM OXIDATION AND SOLVENT EXTRACTION
  - Vanadium Oxidation and Polishing Filters
  - Vanadium SX Extraction
  - Vanadium Scrub and Strip
  - Raffinate Solution Management
- AREA 700 – VANADIUM PRECIPITATION
  - Vanadium Precipitation Tanks
  - Vanadium Filtering and Drying
  - Vanadium Fusion and Packaging

Decontamination of equipment and removal and disposal of contaminated equipment will be performed in accordance with written procedures documented and controlled by standard procedures or RWPs. Based on radiological surveys of these systems and equipment conducted at the time, it may be determined that some decontamination can be performed cost effectively, considering the remaining market value for re-use or sale. Such decontamination will be performed at EFRC's discretion; otherwise, the contaminated system or equipment will be disposed of in the vault in Tailing Cell C.

Methods employed to remove contaminated systems and equipment will be mechanical, manual, or a combination of both. Methods will be selected by the decommissioning contractor and EFRC based on considerations of worker safety, protection against release of contaminants using ALARA principles, and cost-effectiveness. As necessary for dust suppression, water sprays will be used; run-off (if any) from this activity will be collected in the stormwater ponds and discharged to the evaporation ponds.

Any contaminated materials that are intended to leave the site, both salvaged mill materials as well as equipment used in mill decommissioning, will be decontaminated before being released from the site. Decontamination will be performed at the truck decontamination station located at the northeast corner of the mill pad (Figure 3).

Contaminated equipment and other materials remaining on site for disposal will be transported by truck along the service road to the vault for disposal. Trucks and heavy equipment used for this purpose will remain within the license boundary until no longer needed, then decontaminated and scanned before leaving the mill site.

8.4 Contaminated Structures

For the purposes of this Plan, the structures in the following areas are expected to be contaminated:

- AREA 100 – ORE STORAGE PAD
- AREA 200 – GRINDING AND LEACH BUILDING
- AREA 300 – CCD THICKENER BUILDING
- AREAS 400 & 600 – SOLVENT EXTRACTION (SX) BUILDING
- AREAS 500 & 700 – PRECIPITATION AND PACKAGING BUILDING

These structures will be decontaminated as necessary to facilitate safe handling and will be demolished using primarily mechanical methods, with specific equipment selected by the demolition contractor and EFRC based on considerations of worker safety, protection against release of contaminants using ALARA principles, and cost-effectiveness. Scaling and high-pressure washing might be employed to remove surface contamination. Large hydraulic shears and claws mounted on crawler excavators are commonly used and are most likely to be selected by a contractor. As necessary for dust suppression, water sprays will be used; run-off (if any) from this activity will be collected in the stormwater ponds and discharged to the evaporation ponds.

Foundations of structures and equipment will be removed and disposed of in the vault. The exception will be those foundations below uncontaminated structures and located in areas where the mill pad was cut or excavated below natural grade; these foundations may be left in place and covered during final site grading.

Contaminated structural materials will be transported by truck along the service road to the vault for disposal. Trucks and heavy equipment used for this purpose will remain within the license boundary until no longer needed, then decontaminated and scanned before leaving the mill site.

8.5 Sequence of Removal of Systems, Equipment, and Structures

The sequence of activities for removal of systems, equipment, and structures will be included in the detailed decommissioning plan. In general, the sequence will be removal of:

- Waste materials
- Uncontaminated systems and equipment

- Uncontaminated structures
- Contaminated systems and equipment
- Contaminated structures
- Stormwater ponds and pipeline
- Evaporation ponds (one might be left until liquids from tailing dewatering are evaporated)

The truck decontamination station will remain in operation for this purpose for as long as necessary, and then removed with all materials going into the vault. A temporary decon station will be used as needed after the truck decontamination station is removed.

8.6 Soils

8.6.1 Soil Remediation

After removal of mill systems, equipment, and structures, the soil within and adjacent to the mill will be surveyed to determine if contaminant levels meet the concentration limits in 6 CCR 1007-1, Part 18, Appendix A, Criterion 6(6). The background radiological levels in soil were established as part of the baseline characterization described in the Baseline Radiological Investigation Report (ERG, 2009). At the time of decommissioning, if the residual Ra-226 [and/or Ra-228 if thorium (Th-232) byproduct] in any location exceeds the background level at that location by more than 5 ρCi/g of radium-226, averaged over the first 15 cm below the surface, and 15 ρCi/g of radium-226 averaged over 15-cm thick layers more than 15 cm below the surface, such contaminated soil will be removed and disposed of in the vault in Tailing Cell C. Soil clean-up will be to "levels which are as low as reasonably achievable" in accordance with Criterion 6(6).

The Piñon Ridge decommissioning soil clean-up will be "required to reduce residual radioactivity, that is, byproduct material, as defined by 10 CFR Part 40, to levels based on the potential dose, excluding radon, resulting from the application of the radium (Ra-226) standard at the site," the radium benchmark dose approach (Appendix H, NUREG-1620). The radium benchmark dose applies for cleanup of residual radionuclides other than radium [primarily uranium (U-nat) and thorium (Th-230)] in soil. If EFRC can demonstrate at the time of decommissioning that no contaminated buildings will remain, and that soil thorium-230 (Th-230) does not exceed 5 ρCi/g (above background) in the surface and 15 ρCi/g in subsurface soil in any 100-square-meter area that meets the radium standard, and the natural uranium (U-nat; that is, U-238, U-234, and U-235) level is less than 5 ρCi/g above background, radium benchmark dose modeling is not required (NRC, 2003, App. H). The radiological analysis of ores processed during mill operations will be reviewed for the ratios of Ra-226/U-238 and Ra-226/Th-230 to determine if non-equilibrium conditions could exist in the contaminated soil.

Contaminated soil will typically be excavated and hauled to the vault using scrapers. Isolated small patches of contaminated soil will be excavated by loader or backhoe, and the soil will be hauled by truck to the vault. This earthmoving equipment used for soil clean-up will be decontaminated at the decon station.

8.6.2 Soil Remediation Sequence

Soil remediation will be performed in the following sequence after mill equipment and structures have been removed:

- Initial survey
- Soil clean-up
- Verification survey
- Final soil clean-up
- Final closure of Tailing Cell C (Cells A and B closed previously)

Final regrading of the mill site will follow the verification survey. Some elements of regrading and revegetation related directly to the closure of Tailing Cell C may be delayed until that activity is complete.

The access road will be maintained throughout the decommissioning process and will be left intact, or restored where necessary, for use after decommissioning for post-closure monitoring access.

8.7 Surface Restoration

8.7.1 License Boundary Contraction

After contamination has been removed from the mill area and the evaporation pond area and the verification survey has confirmed that these areas meet the standards for Ra-226 and other radionuclides described in Section 14, the license boundary will be contracted as shown on Figures 2 and 3. The remaining boundary will enclose the tailings cells for long-term protection against byproduct (tailings) release as required by 6 CCR 1007-1, Part 18; the other portions of the original license area may be released for unrestricted use.

8.7.2 Regrading and Revegetation

With the exception of the tailing cells, the mill site area surface will be restored by regrading to approximately the original (pre-construction) configuration, as illustrated in the closure design in Kleinfelder, 2009a. The primary earthwork involved in this restoration is removal of the ore pad and mill pad, with redistribution of the fills in these areas to backfill the cut areas. The surface water diversions constructed for the mill will be left in place to divert runoff away from the tailing cells. The regraded surfaces will be revegetated using the procedures and seed mixes described in Golder, 2009e.

The main road will be slightly realigned around the northeast toe of Tailing Cell C to provide space for the final 10H:1V outslope of that cell. Otherwise, the main access road will be left in place for the subsequent user of the land surface outside of the final license boundary as well as for access to monitor wells and air monitoring stations.

At the time of surface restoration, the two meteorological towers will be taken out of service except for the air monitoring components.

8.8 Surface and Groundwater

8.8.1 Surface Water

Surface water drainages on the Site experience intermittent flow following large precipitation and snowmelt events. After decommissioning, the tailing cells will be the only mill features remaining that could be impacted by, or cause impact to, surface water. Surface water control structures originally constructed to divert sheet flow away from the mill and the tailing cells will be left in place and protected with riprap as described in the site drainage design (Kleinfelder, 2009f). The tailing cell closure design (Kleinfelder, 2009a) addresses erosion control measures, including grading and rock cover, to protect the tailing cells against erosion by surface water runoff. Those erosion control measures are designed to protect the tailings from release for at least 1,000 years, accomplished by designing for erosion protection against the peak runoff from the probable maximum precipitation (PMP) event, as required by 6 CCR 1007-1, Part 18, Appendix A.

Surface water runoff from direct precipitation on the mill area will be collected in the two stormwater ponds, one at the northeast corner and the other at the northwest corner of the mill area. When the soil clean-up is completed and before the verification survey is performed, these stormwater ponds will be removed and the sediments, liners, discharge pipes (to the evaporation pond), and control apparatus will be placed in the vault. Sheet flow conditions will be restored when the mill and ore pads are regraded to establish near-original contours. Runoff from the restored mill area will flow to the north, toward Tailing Cell A, where it will be intercepted and diverted to the east and west by a diversion berm constructed in front of (south of) the south outslope of Tailing Cell A (Kleinfelder, 2009a).

8.8.2 Groundwater

Groundwater resources at the Site are limited to the southern third of the site (Golder, 2009a; Kleinfelder, 2009d) and are, for the most part, hydraulically upgradient of the mill area. The design and operations of the mill, tailing cells, and evaporation ponds include measures that protect this groundwater by containment and detection of contaminants and corrective actions, as necessary, during operations (CH2M Hill, 2009; Golder, 2008a, b, and c; Visus, 2009a and b). Therefore, no groundwater remedial actions are expected at decommissioning. The tailing cell closure design (Kleinfelder, 2009a) and post-closure monitoring will provide long-term protection against releases that could reach groundwater.

8.9 Schedule

A representative schedule for completing the decommissioning and reclamation activities is provided in the Piñon Ridge Mill Decommissioning and Reclamation Cost Estimate (EFRC, 2009c). The schedule is largely dependent on the size of the demolition and earthwork crews employed on Site. For costing purposes, a smaller crew of about 10 people working over a longer schedule was selected for the reclamation cost estimate. Based on an average construction crew of 10 people, approximately 32 to 33 months were estimated to complete the work.

9.0 PROJECT MANAGEMENT AND ORGANIZATION

9.1 Decommissioning Organization Management

EFRC will appoint a Decommissioning Project Manager (DPM). The DPM will have responsibility for developing the detailed decommissioning plan and for overall management of decommissioning activities. The organization under the DPM will include:

- Task managers (TM) for each task
- Radiation Safety Officer (RSO)
- Contracting Officer
- Quality Assurance Coordinator (QAC)

All five of the positions described above will be assigned to separate individuals if the project is to be completed in a relatively short time frame using multiple crews. If the demolition and reclamation is to be completed by a smaller workforce over an extended time period, an individual may hold multiple positions. For example, the DPM may serve as both the DPM and TM and the same individual may serve as both the Contracting Officer and QAC. Alternately, individuals may be contracted on a part-time basis for job assignments that do not require full-time site involvement.

The decommissioning activities will be executed as tasks, each with a TM. A TM may have responsibility for more than one task. The TM will oversee the task including the work of subcontractors performing those tasks. TMs will have experience in performing the work required in the task. The level of experience will depend on the task. If a candidate for a TM position lacks the necessary experience, that candidate may receive training for that role that is acceptable to CDPHE.

Tasks involving potential or expected radiological exposures will be performed in accordance with a standard procedure or an RWP. The TM will have primary responsibility for preparing the RWP and will assure that persons performing the work are qualified and trained to the specific task. Each RWP will be approved by the DPM and the RSO before starting the work.

9.2 Decommissioning Management Positions and Qualifications

9.2.1 Decommissioning Project Manager (DPM)

The DPM will be appointed by, and report to, EFRC's Chief Operating Officer (COO). The DPM will have training and experience in radiological facility operations and/or decommissioning that is acceptable to CDPHE.

The DPM will have primary responsibility for preparing the detailed decommissioning plan and for managing the decommissioning activities.

9.2.2 Task Manager (TM)

The TM for each task will have training and experience in the activity of the assigned task. The TM will be responsible for the work plan, and RWP if applicable, for the assigned task as well as for the execution of the task. The TM will report to the DPM

9.2.3 Contracting Officer (CO)

The CO will be appointed by EFRC's COO and will report to the DPM. The CO will be responsible for procurement of subcontracted services and of materials and equipment required for decommissioning. The CO will issue bid documents and will receive and maintain records of measurement and payment of work completed.

9.2.4 Radiation Safety Officer (RSO)

The RSO must have completed training in radiation protection in a program approved by the CDPHE. The RSO will report to the DPM and be responsible for radiological health and safety training and procedures for all on-site workers. The RSO will approve RWPs and will monitor work to assess compliance with RWPs and procedures.

9.2.5 Quality Assurance Coordinator (QAC)

The QAC will report to the DPM and be responsible for establishing and ensuring compliance with the Quality Assurance Program. The QAC will set up and monitor the Document Control Program and the requirement for control of measuring and testing equipment. The QAC will alert the DPM and TMs when corrective actions are required and will maintain records of compliance with program requirements.

10.0 HEALTH AND SAFETY PROGRAM DURING DECOMMISSIONING

Standard operating protocols, including most of the health and safety training and procedures developed for mill operations, will be utilized for decommissioning. These procedures are included in the mill Health and Safety Plan (EFRC, 2009a). Work plans will be prepared for each major activity of decommissioning that will involve potential radiological exposures or non-radiological hazards to workers. Unless already covered by an existing standard procedure, each activity involving radiological hazards will be addressed in a Radiation Work Permit (RWP). The work plans will address objectives, responsibilities, hazard identification, relevant health and safety procedures, equipment and materials to be used, and recording and documentation requirements.

11.0 ENVIRONMENTAL MONITORING AND CONTROL PROGRAM

The environmental monitoring and control program will comply with the regulatory requirements in 10 CFR20 to protect workers, the public, and the environment from ionizing radiation during decommissioning activities in accordance with applicable standards and ALARA. 10 CFR 20 requires the environmental monitoring and control program to include descriptions of the:

- Environmental exposure evaluations to be performed during decommissioning;
- Effluent monitoring for radioactive material at potential points of release to the environment; and
- Controls that the licensee will use to ensure that radioactive material in effluents does not exceed applicable NRC, State of Colorado, or local requirements.

11.1 Environmental ALARA Evaluation Program

EFRC will develop and implement an ALARA Evaluation Program in accordance with 10 CFR Part 20.1101(b) and (d) using guidance in Regulatory Guide 8.37, "ALARA Levels for Effluents from Materials Facilities," July 1993; and NRC Regulatory Guide 4.20, "Constraint on Releases of Airborne Radioactive Materials to the Environment for Licensees Other Than Power Reactors," December 1998. The program will include descriptions of:

- ALARA goals for effluent control;
- Procedures, engineering controls, and process controls to maintain doses ALARA; and
- ALARA reviews and reports to management.

11.2 Effluent Monitoring Program

This program will be an extension of the monitoring program conducted during operations. It will include provisions for the collection and analysis of airborne and liquid effluents, for assessing radiation exposures to members of the public, and for demonstrating compliance with applicable regulations. The program will include a:

- Demonstration that background and baseline concentrations of radionuclides in air, water and soil have been established through appropriate sampling and analysis;
- Description of the known or expected concentrations of radionuclides in effluents;
- Description of the physical and chemical characteristics of radionuclides in effluents;
- Summary or diagram of all effluent discharge locations;
- Demonstration that samples will be representative of actual releases; and
- Summary of the sample collection and analysis procedures, including the minimum detectable concentrations of radionuclides.

11.3 Effluent Control Program

EFRC will demonstrate, through the mill operations and decommissioning protocols, that it has a program to control radioactive material in effluents and to comply with all applicable standards and permit requirements related to the release of radioactive material in effluents, as required in applicable sections of 10CFR20.

12.0 RADIOACTIVE WASTE MANAGEMENT PROGRAM

At the time of cessation of mill operations, some radiological and non-radiological wastes will remain in the mill systems and inventory. For the purposes of this Plan, specific waste-handling plans will include:

- Removal of product – any remaining milling product will be removed for sale or placed in the disposal vault (vault) in Tailing Cell C (Kleinfelder, 2009a);
- Disposal of process liquids – organic and inorganic process liquids will be stripped and neutralized as necessary for either on-site disposal in the evaporation pond or off-site disposal at a licensed facility;
- Removal of circuit residues – liquid mill circuits will be flushed to the evaporation pond and solid residues will collected for disposal in the vault;

- Removal of pond solids – evaporation pond solids will be allowed to dry, then mixed with soil as needed to excavate and handle as dry solids for disposal in the vault;
- Removal of reagents – reagents that are uncontaminated will be returned to the vendor. Contaminated reagents will be handled as process liquids; and
- Oil and Lubricants – oil and lubricants that are uncontaminated will be returned to the vendor; if contaminated they will be sent to a licensed mixed waste facility for treatment and disposal.

13.0 QUALITY ASSURANCE PROGRAM

A Quality Assurance (QA) program will be prepared as part of the Detailed Decommissioning Plan. It will include descriptions of the:

- QA organization;
- Manner in which QA activities are controlled through development, issuance, and revision;
- Control of measuring and test equipment to ensure that equipment used to support decommissioning activities is properly controlled, calibrated, and maintained;
- Corrective actions for conditions adverse to quality, to ensure that measures have been established to assure that conditions adverse to quality are promptly identified and corrected;
- Procedures to adequately maintain and store the QA program records; and
- Audits and surveillances that are performed as part of the QA program to verify compliance with all aspects of the QA program and to determine the effectiveness of the QA program.

The QA staff will perform or oversee those functions based on written policies, procedures and instructions that, if effectively implemented, will ensure that the information submitted to support the decommissioning is accurate and of sufficient quality to justify the conclusions drawn from the information.

14.0 FACILITY RADIATION SURVEYS

14.1 Equipment and Structures Surveys

The mill design, Facility Operating Plan (Visus, 2009a), Operational Monitoring Plan (Visus, 2009b), and Material Containment Plan (EFRC, 2009b) have been developed to minimize the risk of release of contamination, detect releases, and take corrective action (including immediate clean-up) in the event of a release. After cessation of mill operations and removal of wastes, surveys will be performed to determine what remaining equipment and structures are contaminated. Survey methods will include the following procedures, which are found in the Health and Safety Plan (EFRC, 2009a):

- Alpha, Beta Contamination Surveys
- Beta and/or Gamma Exposure Rate Surveys
- Release of Equipment to Unrestricted Areas

The results of these surveys will be used in deciding the disposition of equipment and structures as described in following sections. If necessary to facilitate these decisions, the RESRAD-BUILD Code will be used to estimate radiation doses and risks from residual radioactive materials in equipment, buildings, and structural materials.

14.2 Initial Soil Survey

After demolition and removal of mill facilities (except for the environmental monitoring equipment, administration building, access roads, and well field), an initial gamma (direct radiation) survey will be performed to evaluate potential areas where soil contamination might exceed background radium levels, based on gamma-radium correlations established in the baseline radiological investigation (ERG, 2009). This survey will be conducted on grids with 10-meter spacing across the "contaminated" systems and equipment areas (Areas 100-500, Section 3.2), the evaporation ponds, main road, and the route of the haulage/ service road along the west side of the tailing cells. The haulage/ service (service) road will follow the track of the dirt road used during operations for security patrol and maintenance of the pipeline to the evaporation pond.

Soil samples will be collected and tested at locations that register gamma readings that correlate with Ra-226 concentrations of more than 5 ρCi/g above background in the top 15 cm of soil and 15 ρCi/g in 15 cm intervals below 15 cm depth. Samples will be tested for concentrations in depth intervals of 0 to 15 cm and from below 15 cm. These locations will be cleaned up and resurveyed as needed to achieve levels not exceeding 5 ρCi/g of Ra-226 above background. The GPS-based gamma survey and soil sampling will be conducted along transects spaced at approximately 10-meter intervals over and adjacent to: the ore storage pad (Area 100), the grinding and leach building (Area 200), the CCD thickeners and tailings pipe line (Area 300), the solvent extraction building (Areas 400 and 600), the precipitation and packaging building (Areas 500 and 700), and the evaporation ponds.

The survey and sampling intervals will be 30 meters over other areas within the licensed area (Figure 2). Closer survey and sampling intervals will be applied to delineate the extent of contamination if detected in the 30-meter survey.

If needed to assess potential doses from contaminated soil as a basis for making decisions about the extent of soil clean-up, the RESRAD Code will be used to estimate radiation doses and risks from residual radioactive materials in soils.

14.3 Verification of Soil Clean-up

After soil clean-up has been performed and before final closure of Tailing Cell C, a verification survey will be performed on those areas that were used, and possibly contaminated, during decommissioning or that were found to have excessive Ra-226 levels in the soil during the initial surveys. The survey will be conducted on a 10-meter grid over the last evaporation pond not previously surveyed, the west service road from the mill to Tailing Cell C, and any other areas over which demolition debris or contaminated soil was hauled.

For the verification survey, soil samples will be collected as described above for the initial survey at 1) grid points where gamma readings indicate that excessive Ra-226 may persist after clean-up, and 2) random grid locations constituting up to 10% of the initial survey grid points.

NUREG-1620, Appendix H, Section H, 2.0 states in part:

> *The unity "rule" mentioned in .....Criterion 6(6) applies to all licensed residual radionuclides. Therefore, if the ore (processed by the facility), tailings, or process fluid analyses indicate that elevated levels of Th-232 could exist in certain areas after cleanup for Ra-226, some verification samples in those areas should be analyzed for Th-232 or Ra-228. The thorium (Th-232) chain radionuclides (above local background levels) in milling waste would have soil cleanup criteria similar to the uranium chain radionuclides. The staff considers the EPA memorandum of February 12, 1998, (Directive No. 9200.4–25) concerning use of 40 CFR Part 192 soil criteria for Comprehensive Environmental Response, Compensation and Liability Act sites, an acceptable approach. This means that the Th-230 and Th-232 should be limited to the same concentration as their radium progeny with the 5 ρCi/g (0.19 Bq/g) criterion applying to the sum of the radium constituents (Ra-226 plus Ra-228) as well as the sum of the thorium constituents (Th-230 plus Th-232) above background.*

Consequently, EFRC may need to test for Th-232 or Ra-228 in the initial survey and, if necessary, in the verification survey, as well. The necessity of additional Th-232/Ra-228 testing will be determined from analyses of ore, tailings, and process fluids conducted during mill operations.

With the precautions taken in the mill design, the Facility Operating Plan (Visus, 2009a), the Operational Monitoring Plan (Visus, 2009b), and the Material Containment Plan (EFRC, 2009b), it is unlikely that conditions will develop during operations or upon decommissioning that would necessitate radium benchmark dose modeling, as described in NUREG-1620, Appendix H. Therefore, radium benchmark dose modeling is not planned but will be performed in conjunction with the initial radiological survey, if required.

15.0 FINANCIAL ASSURANCE

The Piñon Ridge Mill Decommissioning and Reclamation Cost Estimate (EFRC, 2009c), prepared by EFRC, provides a cost estimate for closing the mill in accordance with the methods outlined in the Tailings Cell Closure Design Report (Kleinfelder, 2009a), the Specifications for Closure and Reclamation of Mill Facilities (Golder, 2009e), and this Plan. The costs include having a third-party contracting team prepare project design and contracting documents and completing all of the proposed demolition and reclamation work. The cost estimate also includes state administrative costs.

A Certification Statement and selection of the preferred financial assurance mechanism are provided in the Radiation Material License Application submitted to CDPHE.

16.0 RESTRICTED USE

Decommissioning of the Site will result in the permanent stabilization of the mill tailings in the tailing cells. Upon approval of the NRC, title to the tailing cell area (Figure 4) must be transferred to the United States in accordance with Criterion 9C of 6 CCR 1007-1, Part 18. Therefore, the tailings cells area will be restricted from future use other than protection of the tailings. All other portions of the Site will be decontaminated and reclaimed to a condition suitable 1) for subsequent use consistent with the limitations for radium and thorium in Criterion 6(6) of 6 CCR 1007-1, Part 18, and 2) for transfer of title in accordance with Criterion 9D of 6 CCR 1007-1, Part 18. The restricted area that will transfer to the United States is delineated on Figure 4.

To restrict access, the tailing cell area will be enclosed by an approved fence with warning signs. Institutional controls (limitation of entry, periodic inspection and repairs as needed) will be maintained by EFRC under the jurisdiction of CDPHE until title transfer to the United States, after which the U.S. Department of Energy will take custody and responsibility in perpetuity for the tailing cell area. EFRC will establish a financial assurance arrangement, as required in 6 CCR 1007-1, Part 18 RH 18.5, adequate to cover the cost for long-term care and monitoring.

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