ATTACHMENT A

PLANS AND TECHNICAL SPECIFICATIONS FOR

RECLAMATION OF WHITE MESA MILL FACILITY

BLANDING, UTAH

TABLE OF CONTENTS

1 SPECIAL PROVISIONS

1.1 Scope of Document

The following technical specifications have been prepared for reclamation and decommissioning of the Denison Mines (USA) Corp. (Denison), White Mesa Uranium Mill Facility in Blanding, Utah. These technical specifications have been prepared for review and approval by the Utah Department of Environment Quality ("DEQ"), Division of Radiation Control ("DRC") and are submitted as an attachment to the 2011 Reclamation Plan. The design drawings for reclamation are included in this attachment and are designated as the "Drawings". The Construction Quality Assurance/Quality Control Plan ("CQA/QC Plan") referenced in this document is provided as Attachment B to the 2011 Reclamation Plan.

These technical specifications have been written assuming (a) a contractor will conduct tailings impoundment reclamation under contract with Denison and under Denison's direction, and (b) the work quality will be checked with independent (third-party) construction quality assurance.

1.2 Definitions and Roles

Construction Quality Assurance (CQA) – A planned and systematic pattern of means and actions designed to assure adequate confidence that the materials or services meet contractual and regulatory requirements and will perform satisfactorily in service. CQA refers to means and actions employed by the involved parties to assure conformity of the project work with the CQA/QC Plan, the Drawings, and the Technical Specifications.

Construction Quality Control (CQC) – Actions which provide a means to measure and regulate the characteristics of an item or service in relation to contractual and regulatory requirements. CQC refers to those actions taken by the Contractor, technicians, or other involved parties to verify that the materials and the workmanship meet the requirements of the CQA/QC Plan, the Drawings, and the Technical Specifications.

Technical Specifications – The document that prescribes the requirements and standards for the specific elements of the reclamation. The Technical Specifications will be prepared in final form

prior to commencement of reclamation activities.

Drawings – The detailed project drawings to be used in conjunction with the Technical Specifications. The Drawings will be prepared in final form as construction drawings prior to reclamation.

Construction Project – The total authorized/approved reclamation project that requires several construction segments to complete.

Construction Segment – A portion of the total construction project involving a specific area or type of work. Several construction segments will likely take place simultaneously during reclamation.

Construction Task – A basic construction feature of a construction segment involving a specific construction activity.

ASTM Standards – The latest versions of the American Society for Testing and Materials specifications, procedures and methods.

For these Technical Specifications, Denison is referred to as the **Owner**, with overall responsibility for closure, as well as site reclamation.

The on-site **Construction Manager** is responsible for the conduct, direction and supervision of all reclamation activities as detailed in the Drawings and Technical Specifications.

The **Design Engineer** is responsible for the design of the various elements of the reclamation project and for preparing the Drawings and Technical Specifications.

The **Contractor** is defined as the group (or groups) selected by Denison and responsible for conducting the work tasks outlined in Section 1.3 under the direction of, and under contract with Denison.

The **Surveyor** is a party, independent from the Owner or Contractor, who is responsible for surveying, documenting, and verifying the location of all significant components of the work.

The **CQA/QC Consultant** is a party, independent from the Owner or Contractor, who is responsible for observing, testing, and documenting the various activities comprising the Reclamation Project in accordance with the CQA/QC Plan, the Technical Specifications and the Drawings.

The **CQA Officer** will be responsible for overall implementation and management of the CQA/QC Plan for the reclamation project.

The **CQA Site Manager** will be appointed by the CQA Consultant to provide day-to-day, on-site oversight of the CQA/CQC activities. The CQA Manager could be a Denison employee or a third-party consultant.

The CQA Consultant will utilize various **QC Technicians** to assist the on-site CQA Site Manager to perform specific tasks through the project to verify the adequacy of construction materials and procedures.

The **Document Control Officer** will be appointed by the Construction Manager to assist with managing the various documents that will be produced throughout the project.

The **CQA Laboratory** is a party, independent from the Owner and Contractor, responsible for conducting tests of soils and other project materials in accordance with ASTM and other applicable standards in either an on-site or off-site laboratory.

The **DRC Project Manager** will represent the DRC's interests in the reclamation project.

The CQA/QC Plan (Attachment B of the 2011 Reclamation Plan) contains more detailed descriptions of the project roles.

1.3 Scope of Work

The work outlined in these Technical Specifications consists of execution of the following tasks associated with reclamation of the disposal cells and associated site reclamation.

a. Preparation of borrow areas for material excavation by removal of vegetation; and stripping, salvaging, and stockpiling of topsoil;

b. Preparation of material staging and stockpile areas by removal of vegetation; stripping, salvaging, and stockpiling of topsoil; and providing for storm water diversion and internal water collection;

c. Removal of raffinates and PVC liner materials from Cell 1 and placement within the last active tailings cell;

d. Construction of a clay-lined disposal cell along the Cell 1 containment dike for disposal of mill demolition debris and contaminated soils;

e. Construction of a sedimentation basin in the location of Cell 1;

f. Excavation of process area structure foundations, paved areas, concrete pads and roadways, and placement of these materials in the disposal cell;

g. Excavation of contaminated subsoils from the process area, and placement in the last active tailings cell or Cell 1.

h. Construction of the cover system over the tailings cells, with placement of rock mulch and/or topsoil over the disposal cell cover surface.

i. Regrading and placement of topsoil over excavated areas, stockpile and staging areas, and other disturbed areas of the site.

j. Establishment of vegetation on the disposal cell surface and surrounding reclaimed areas on site.

Work not included in these Technical Specifications consists of salvage of facility equipment, demolition of facility structures, groundwater monitoring and remediation, and post-reclamation performance monitoring.

1.4 Applicable Regulations and Standards

The work shall conform to applicable Federal, State, and County environmental and safety regulations. The work shall conform to applicable conditions in the Owner's radioactive materials license. Geotechnical testing procedures shall conform to applicable ASTM standards, as documented in the most current edition of standards in force at the start of work. Personnel

safety procedures and monitoring shall be conducted in accordance with the Owner's Radiation Protection Manual for Reclamation and as directed by the Radiation Safety Officer (RSO).

1.5 Permits

The work will be conducted under the Owner's existing radioactive materials license and State of Utah Air Quality Approval Order (DAQE-AN1205005-06, issue date July 20, 2006). The Contractor will be responsible for applying for, and obtaining (permit fees included), all other necessary permits required to complete the work outlined in these Technical Specifications.

1.6 Inspection and Quality Assurance

In general, the QA/QC Plan details the Owner's organizational structure and responsibilities, qualifications of personnel, operating procedures and instructions, record keeping and document control, and quality control in the sampling procedure and outside laboratory. The Plan will adopt the existing quality assurance/quality control procedures utilized in compliance with the existing license.

The RSO (and approved assistants as needed) will conduct on-site training, and full-time personnel monitoring, and inspection of construction activities while the site reclamation work is in progress. The RSO (and assistants) will be independent representatives of and appointed by the Owner. The responsibilities and duties of the RSO shall be as outlined in the Owner's Protection Manual for Reclamation.

The CQA Manager (and approved assistants as needed) will provide full-time, on-site inspection of all construction activities and quality assurance testing outlined in these Technical Specifications and the CQA/QC Plan while the construction work is in progress. The CQA Manager and assistants will be independent representatives of and appointed by the Owner. The inspection and CQA testing conducted by the CQA Manager shall be under the supervision of the Reclamation Project Manager. Inspection and CQA testing shall include the tasks described in the CQA/QC Plan and listed below.

a. Observation of construction practices and procedures for conformance with the Technical Specifications.
b. Testing material characteristics to ensure that earthen materials used in the construction conform to the requirements in the Technical Specifications.
c. Documentation of construction activities, test locations, samples, and test results.
d. Notification of results from quality assurance testing to the Owner and the Contractor.
e. Documentation of field design modifications or approved construction work that deviates from the Technical Specifications.

The CQA Manager shall record the documentation outlined above on a daily basis. The Reclamation Project Manager shall approve deviations from the Technical Specifications (if necessary), with notification to the Owner and DRC or other appropriate Utah state regulatory agency personnel. Quality control procedures have been developed for reclamation and presented in Attachment B of this Reclamation Plan. Procedures will be used for testing, sampling, and inspection functions.

1.7 Construction Documentation

During construction, the CQA Manager will record documentation of construction inspection work on a daily basis. Documentation will include the following items.

a. Work performed by the Contractor.
b. CQA testing and surveying work conducted.
c. Discussions with the Owner and the Contractor.
d. Key decisions, important communications, or design modifications.
e. General comments including: weather conditions, work area surface conditions, and visitors to the site.

All earthwork test results will be documented on a daily basis, with a copy of the results given to the CQA Manager by the end of the following working day after the testing.

The CQA Manager or his representative will take photographs of key construction activities and critical items for documentation.

A final construction completion report, documenting the as-built conditions of the tailings impoundment reclamation components will be submitted to DRC at the end of construction. This report will include the following items.

a. All design modifications or changes to the Technical Specifications that were made during construction.
b. An as-built layout of the facility prior to, and at the completion of reclamation construction.
c. An as-built layout of other reclaimed areas of the site.
d. Documentation of soil cleanup verification work (soil radiation survey and soil sampling and analyses) in areas of contaminated soil excavation.
e. Documentation of the revegetation work (soil amendments, seed mix, and vegetation establishment).

1.8 Design Modifications

Design modifications (due to unanticipated site conditions or field improvements to the design) will be made following the protocol outlined below.

a. Communication of modification with the Reclamation Project Manager.
b. Possible submittal to, and review by, DRC for approval.
c. Documentation of modification(s) in the construction completion report.

1.9 Environmental Requirements

The Contractor shall store materials, confine equipment, and maintain construction operations according to applicable laws, ordinances, or permits for the project site. Fuel, lubricating oils, and chemicals shall be stored and dispensed in such a manner as to prevent or contain spills and prevent said liquids from reaching local streams or groundwater. If quantities of fuel, lubricating oils or chemicals exceed the threshold quantities specified in Utah regulations, the Contractor

shall prepare and follow a Spill Prevention Control and Countermeasures Plan (SPCCP), as prescribed in applicable Utah regulations. The Owner shall approve said plan. Used lubricating oils shall be disposed of or recycled at an appropriate facility. Disposal of all waste associated with the project work will be the responsibility of the Contractor.

1.10 Water Management

The Contractor shall construct and maintain all temporary diversion and protective works required to divert storm water from around work areas. The Contractor shall furnish, install, maintain, and operate all equipment required to keep excavations and other work areas free from water in order to construct the facilities as specified.

Water required by the Contractor for dust suppression or soil-moisture conditioning shall be obtained from the Owner.

1.11 Historical and Archeological Considerations

The Contractor shall immediately notify the Owner if materials of potential historical or archeological significance are discovered or uncovered. The Owner may stop work in a specific area until the materials can be evaluated for historical, cultural, or archeological significance. All materials determined to be of significance shall be protected as determined by appropriate regulatory agencies, including removal or adjustment of work areas.

1.12 Health and Safety Requirements

Work outlined in these Technical Specifications shall be conducted under the Owner's Radiation Protection Manual for Reclamation, as directed by the RSO.

The Contractor shall suspend construction or demolition operations or implement necessary precautions whenever (in the opinion of the Reclamation Project Manager or RSO), unsatisfactory conditions exist due to rain, snow, wind, cold temperatures, excessive water, or unacceptable traction or bearing capacity conditions. The CQA Manager, Reclamation Project

Manager, and RSO each have the authority to stop Contractor work if unsafe conditions or deviations from Technical Specifications are observed.

1.13 Personnel Monitoring

Programs currently in place for monitoring of exposures to employees will remain in effect throughout the time period during which tailings cell reclamation, mill decommissioning and clean up of windblown contamination are conducted. These programs will include personal monitoring and the ongoing bioassay program. Access control will be maintained at the Restricted Area boundary to ensure employees and equipment are released from the site in accordance with the current License conditions. In general, no changes to the existing programs are expected and reclamation activities are not expected to increase exposure potential beyond the current levels. The Owner will assign an employee to act as RSO responsible for assuring site workers comply with the Owner's Radiation Protection Manual for Reclamation and the requirements set forth in the Owner's radioactive materials license.

1.14 Environmental Monitoring

Existing environmental monitoring programs will continue during the time period in which reclamation and decommissioning is conducted. This includes monitoring of surface and groundwater, airborne particulates, radon, soils and vegetation, according to the existing License conditions. In general, no changes to the existing programs are expected and reclamation activities are not expected to increase exposure potential beyond the current levels.

2 SITE CONDITIONS

2.1 Site Location

The White Mesa mill site is located about 6 miles south of Blanding, Utah in San Juan County, along County Road 191.

2.2 Climate and Geology

The climate of southeastern Utah is classified as dry to arid continental. Although varying somewhat with elevation and terrain, the climate in the vicinity of the mill can be considered as semi-arid with normal annual precipitation of about 13.3 inches. The mean annual relative humidity is about 44 percent and is normally highest in January and lowest in July. The average annual Class A pan evaporation rate is 68 inches (National Oceanic and Atmospheric Administration and U.S. Department of Commerce, 1977), with the largest evaporation rate typically occurring in July. (Denison, 2009)

The mill is located within the Blanding Basin of the Colorado Plateau physiographic province. The average elevation of the site is approximately 5,600 ft (1,707 m) above mean sea level (amsl). Typical of large portions of the Colorado Plateau province, the rocks underlying the site are relatively undeformed. The site is underlain by unconsolidated alluvium and indurated sedimentary rocks consisting primarily of sandstone and shale. The alluvial materials consist mostly of aeolian silts and fine-grained aeolian sands with a thickness varying from a few feet to as much as 25 to 30 ft (7.6 to 9.1 m) across the site. The alluvium is underlain by the Dakota Sandstone and Burro Canyon Formation, which are sandstones having total thicknesses ranging from approximately 100 to 140 ft (31 to 43 m). (Denison, 2009)

2.3 Past Operations

The mill is a uranium/vanadium mill that was developed in the late 1970's by Energy Fuels Nuclear, Inc. (“EFN”) as an outlet for the many small mines that are located in the Colorado Plateau and for the possibility of milling Arizona strip ores. Construction on the tailings area began on August 1, 1978. The mill was operated by EFN from the initial start-up date of May 6,

1980 until the cessation of operations in 1983 and then intermittently under different ownership through present-day. Denison (then named International Uranium (USA) Corporation), and its affiliates, purchased the assets of EFN in May of 1997 and is the current owner of the facility.

2.4 Facilities Demolition

Demolition of equipment, structures, and associated facilities at the mill site will be conducted according to applicable conditions of the radioactive materials license, the demolition plan for the facility, and the Owner's Radiation Protection Manual for Reclamation. Facilities demolition is not included in this document.

2.5 Disposed Materials

The materials to be placed in the disposal and tailings cells consists of process waste materials, structural debris, underlying liner materials, and subsoils from planned site cleanup activities. Additional detail on each material type is outlined later in the Specification. The four major types of materials are outlined below:

- Raffinate Crystals – located in Cell 1,
- Synthetic Liner – PVC liner from Cell 1,
- Contaminated Soils - soils located in and around the mill site with concentrations exceeding prescribed Radium-226 concentrations,
- Mill Debris – all equipment and structures from the demolition of the mill.

2.6 Construction Materials

Construction materials for the disposal cell liner, cover system, and for erosion protection of the cover and discharge channel will include soils and aggregates from on-site and off-site sources. These materials are outlined below.

2.6.1 Liner Materials

The disposal cell will be constructed, prior to the placement of contaminated soils and mill demolition debris, with a compacted clay liner consisting of fine-grained soils. The fine-grained soils will be obtained from suitable materials stockpiled on site during cell construction.

2.6.2 Random Fill

Random fill will be used within the disposal cell and tailings cells, placed on and around mill material and debris and placed for the components of the cover system. Fill materials will be obtained from soils stockpiled on site.

2.6.3 Topsoil

Topsoil for the surface of the disposal cell and surrounding areas to be revegetated will be obtained from on-site stockpile areas.

2.6.4 Rock Mulch

A mixture of gravel and topsoil will be used in select areas on the cover. The mixture will be 25% gravel (with a D_{100} less than 1-inch) by weight. The sources of rock are nearby commercial sources of alluvial gravel and cobbles. Rock mulch shall meet the particle-size distribution requirements outlined in Section 8.

2.6.5 Erosion Protection and Perimeter Apron Material

A layer of rock will form the erosion protection zone on the side slopes and on the perimeter apron of the disposal cell as well as within the discharge channel. The sources of rock are nearby commercial sources of alluvial gravel and cobbles. Perimeter apron material shall meet the particle-size distribution and durability requirements outlined in Section 8.

2.6.6 Filter Materials

Filter layer materials will be obtained from an off-site local commercial source or from select on-site borrow areas. Riprap materials shall meet requirements for rock durability outlined in NRC (1990) and Johnson (1999, 2002).

2.6.7 Granular Materials

Granular materials will be used for filter material. Granular materials may also be used for subsurface fill for the cell base. The sources of these materials are nearby commercial sources of alluvial sand and gravel.

2.7 Staging and Stockpile Areas

Areas on site identified as staging areas or stockpile locations shall be approved by the Owner. These areas will be constructed and used in a manner consistent with the Owner's plans for storm water management. The contractor shall maintain proper erosion control measures for stockpiles and may be required to cover piles in situations where precipitation is anticipated.

2.8 Access and Security

Access to the site will be controlled at gated entrances through the existing restricted area fencing. All gated entrances and security for Denison property will be maintained by the Owner.

2.9 Utilities

Utilities on site will be maintained by the Owner outside of work areas (areas to be demolished or reclaimed). Utilities inside of work areas will be provided and maintained by the Contractor.

2.10 Sanitation Facilities

The Contractor, in accordance with the Owner's Radiation Protection Manual for Reclamation, will maintain sanitation facilities required during construction.

3 WORK AREA PREPARATION

3.1 General

This Section describes the preparation of site areas for reclamation. This work will be conducted according to applicable sections of the Owner's Radiation Protection Manual for Reclamation.

3.2 Water Management

Preparation for work in the site area will include the water management tasks outlined below.

a. Removal of raffinate crystals from Cell 1.

b. Breach Cell 1 and construct the cell as a sedimentation basin. Re-route runoff from the mill area and areas immediately north of the cell into the sedimentation basin for discharge onto the natural ground via the channel to be located at the southwest corner of the basin.

c. Diversion of clean area storm water runoff from work areas (where facilities demolition and material excavation will take place) and from the disposal cell footprint area.

d. Collection of storm water runoff from within the work areas and the disposal cell footprint for treatment and permitted discharge, or for disposed material compaction or dust control. The planned storage location for this affected storm water is the sedimentation pond.

e. Isolation of water used for processing operations associated with reclamation from storm water runoff.

f. Water from processing operations or other contaminated water will not be used for disposal cell construction.

3.3 Cell Construction

A clay lined disposal area will be constructed adjacent to and parallel with the existing Cell 1 dike for permanent disposal of contaminated material and debris from the mill site decommissioning and the Cell 1 Tailings Area. The area will be lined with a 12-inch thick layer of compacted clay prior to placement of contaminated materials and installation of the final reclamation cap.

3.4 Soil Borrow Areas

Disposal cell fill and liner materials will be excavated from among the identified borrow areas on site. Cover and liner soil will be from suitable materials stockpiled on site during cell construction.

The use of specific soil borrow areas will be selected based on haul distance to the disposal cell, ease of excavation of cover material, geotechnical characteristics, uniformity of the borrow material, and acceptable radiological and geochemical characteristics.

Borrow area preparation will consist of setup for storm water management (Section 3.2) and clearing and stripping (Section 3.5).

3.5 Clearing and Stripping

For work areas that are vegetated, preparation work will include the tasks outlined below.

3.5.1 Clearing

Clearing of vegetation and grubbing of roots will be in identified work areas. Clearing and grubbing shall not extend beyond 20 feet from the edge of the work area, unless as shown on the Drawings or as approved by the Reclamation Project Manager.

Vegetation from clearing and grubbing may be shredded or chipped to form mulch. Alternative methods of on-site or off-site disposal or burning of stripped vegetation shall be conducted only as approved by the Reclamation Project Manager.

3.5.2 Stripping

Stripping of salvageable topsoil (if present) shall be done within the entire work area. Stripping of topsoil shall not extend beyond 10 feet from the edge of the work area, unless approved by the Reclamation Project Manager. The depth of stripping of reclamation soil shall be based on the presence of suitable topsoil and approved by the Reclamation Project Manager. Water shall be added to the area of excavation if the soils are dry and stripping work is generating dust.

Topsoil shall be stockpiled in approved stockpile areas. The final stockpile surface shall be graded and smoothed to minimize erosion and facilitate interim revegetation of the stockpile surfaces.

4 CELL 1 DISPOSAL AREA BASE CONSTRUCTION

4.1 General

This section outlines the work associated with construction of the disposal cell base for receipt of materials (as described in Section 7.0) within Cell 1. The base of the disposal cell will be lined with a compacted clay liner. The cell base will be constructed as shown on the Drawings and outlined in these Technical Specifications.

4.2 Materials Description

4.2.1 Subgrade Fill

The disposal cell footprint is likely to have an irregular surface from areas that have been excavated. Low areas of the excavated surface should be filled to form a smooth, competent foundation for clay liner construction. Subgrade fill will be used in excavated areas of the disposal cell footprint to meet desired grades and elevations for the disposal cell foundation (shown on the Drawings).

Subgrade fill may consist of off-site granular materials, or soils and weathered sedimentary rock from approved on-site excavation areas. Subgrade fill shall be minus 6-inch size, and shall be free from roots, branches, rubbish, and process area debris.

4.2.2 Clay Liner Material

Clay liner material shall be minus 1-inch size, and shall be free from roots, branches, rubbish, and process area debris. Clay liner material shall have a minimum of 40 percent passing the No. 200 sieve and a minimum plasticity index (PI) of 15%. Suitable materials will classify as CL, CH, or SC materials under the Unified Soil Classification System.

4.3 Work Description

4.3.1 Foundation Preparation

The footprint of the disposal cell shall form a competent foundation for clay liner and cover construction. The surface of the disposal cell footprint shall be filled (where required) in low areas to form a smooth, competent foundation for clay liner and cover construction. Subgrade fill (Section 4.2.1) shall be placed in lifts and compacted in excavated areas of the disposal cell footprint to meet desired grades and elevations for the disposal cell foundation (shown on the Drawings). The final filled surface shall be compacted with approved construction equipment to provide a foundation surface with uniform density for clay liner placement.

4.3.2 Disposal Cell Foundation Area

The footprint of the disposal cell is established along the north side of the tailings dike along the south edge of Cell 1 (shown on the Drawings).

4.3.3 Subgrade Fill Placement

Subgrade fill (Section 4.2.1) shall be placed in lifts and compacted in excavated areas of the disposal cell footprint to meet desired grades and elevations for the disposal cell foundation. Subgrade fill may be (1) granular material from off-site commercial sources, or (2) soils and weathered sedimentary rock from approved on-site excavation areas.

4.3.4 Clay Liner Material Placement

Clay liner material (Section 4.2.2) shall be placed in lifts with maximum compacted thickness of 6 inches to form a continuous layer with a total minimum compacted layer thickness of 12 inches. Clay liner material shall be placed over the prepared subgrade surface of the disposal cell (Section 4.3.1).

Compaction of the clay liner material shall be done with a sheepsfoot or tamping-foot roller of sufficient weight to achieve the required compaction specifications. Rubber-tired equipment shall not be used solely to compact the clay liner material.

If the moisture content of any layer of clay liner is outside of the allowable placement moisture content range specified, the material shall be moistened and/or reworked with a harrow, scarifier, or other suitable equipment to a sufficient depth to provide relatively uniform moisture content and a satisfactory bonding surface before the next succeeding layer of clay material is placed. If the compacted surface of any layer of clay liner material is too wet (due to precipitation), for proper compaction of the fill material to be placed thereon, it will be reworked with a harrow, scarifier or other suitable equipment to dry out the layer and reduce the moisture content to within the required limits and recompacted.

The layers of the placed clay liner will be such that the liner will, as far as practicable, be free of lenses, pockets, streaks or layers of material differing substantially in texture, gradation or moisture content from the surrounding material. Oversized material will be controlled through selective excavation of stockpiled material, observation of placement by a qualified individual with authority to stop work and reject material being placed and by culling oversized material from the fill.

No clay liner material will be placed when either the materials, or the underlying material, is frozen or when ambient temperatures do not permit the placement or compaction of the materials to the specified density, without developing frost lenses in the fill.

Any holes in the clay liner material resulting from testing should be repaired by hand by filling with clay fill, or by filling with bentonite powder which is hydrated to fully seal the hole.

4.4 Performance Standards and Testing

Test results indicating dry densities less than the specified values will be rejected. Such rejected material shall be reworked by the contractor as necessary and rerolled until a dry density equal to or greater than the specified percent of standard Proctor maximum density is attained. Material that is too dry or too wet to permit bonding of layers during compaction will be rejected and shall be reworked by the contractor until the moisture content is within the specified limits. Reworking may include removal, re-harrowing, reconditioning, rerolling, or combinations of these procedures.

4.4.1 Subgrade Testing

Where required, checking of compaction of compacted subgrade fill and the final subgrade surface shall consist of a minimum of one field density test per 1,000 cubic yards of material compacted. A minimum of two tests will be taken for each day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of compaction operations will be taken.

Field density tests shall be compared with standard Proctor tests (ASTM D698 Method A or C). Where required, standard Proctor or Maximum Index Density tests shall be conducted at a frequency of at least one test per 5,000 cubic yards of material compacted, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

Subgrade fill will be placed in lifts not exceeding 8 inches in loose thickness. Each lift shall be compacted to a minimum of 90 percent of standard Proctor (ASTM D698) density and within three percent of the optimum moisture content for the material.

4.4.2 Clay Liner Testing

Material specifications for the clay liner material shall be confirmed by gradation testing conducted by approved personnel. Testing shall consist of No. 200 sieve wash and maximum particle size testing (ASTM D422), and Atterberg limits testing (ASTM D4318) on samples of clay liner materials, at a frequency of at least one test per 1,000 cubic yards of fill placed, or when material characteristics show a significant variation.

Checking of compaction of the clay liner material shall consist of a minimum of one field density test per 500 cubic yards of material compacted. A minimum of two tests will be taken for each

day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of compaction operations will be taken.

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Standard Proctor tests shall be conducted at a frequency of at least one test per 2,500 cubic yards of material compacted, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

Each lift of clay liner material shall be compacted to at least 95 percent of the maximum dry density for the material, as determined by the standard Proctor test (ASTM D698). During compaction, the material shall be within 2 percent above to 2 percent below optimum moisture content for the material, as determined by the standard Proctor test. If water addition is required to achieve this range of moisture contents, the added water shall be thoroughly mixed into the material prior to compaction.

4.4.3 Grading Tolerances

The completed grading for the clay liner shall be within 1.0 foot (horizontally) of the lines as designed, and within 0.1 foot (vertically) of the elevations as designed. The final surfaces shall be smoothed to avoid abrupt changes in surface grade or areas of runoff concentration. The layer thicknesses shall meet the required minimum thicknesses.

5 DISCHARGE CHANNEL GRADING

5.1 General

This section outlines specifications for the work associated with excavating the discharge channel into competent bedrock. Portions of the grading for the sedimentation basin may be in soil, while other areas may require rock excavation. In general, the rock is believed to be rippable, however the Contractor should account for the possibility that harder rock may be encountered in the excavation areas.

5.2 Work Description

5.2.1 Discharge Channel Excavation

The discharge channel shall be excavated to the slopes and grades shown on the Drawings. The channel width(s) shall be constructed to the dimensions shown on the Drawings. The side slopes of the channel shall be 3:1 (horizontal to vertical).

Discharge channel excavation will include breaching of the Cell 1 embankment on the east side. Riprap will not be required to armor the discharge channel because the channel excavation will extend into competent sedimentary rock. The competency of the sedimentary rock must be verified, in the field, by the CQA Manager.

5.2.2 Grading Tolerances

The completed grading for the sedimentation basin, in soil, shall be within 1.0 foot (horizontally) of the lines as designed, and within 0.1 foot (vertically) of the elevations as designed. The final surfaces shall be smoothed to avoid abrupt changes in surface grade or areas of runoff concentration.

The completed grading for the discharge channel (and portions of the sedimentation basin) in rock shall be within 2.0 foot (horizontally) of the lines as designed, and within 0.5 foot (vertically) of the elevations as designed. The final rock surfaces will be rough and should not be filled to make grade. The bedrock channel should be constructed at or below the design grades in order to meet the intent of the design.

6 MILL DECOMMISSIONING

The following subsections describe decommissioning plans for the mill buildings and equipment, the mill site, and associated windblown contamination.

6.1 Mill Buildings and Equipment

The uranium and vanadium processing areas of the Mill, including all equipment, structures and support facilities, will be decommissioned and disposed of in tailings or buried on site as appropriate. All equipment, including tankage and piping, agitation equipment, process control instrumentation and switchgear, and contaminated structures will be cut up, removed and buried in tailings prior to final cover placement. Concrete structures and foundations will be broken up and removed. Concrete foundations may be left in place and covered with soil as appropriate.

These decommissioned areas will include, but not be limited to the following:

- Coarse ore bin and associated equipment, conveyors and structures;
- Grind circuit including semi-autogeneous grind (SAG) mill, screens, pumps and cyclones;
- The three pulp storage leach tanks to the east of the mill building, including all tankage, agitation equipment, pumps and piping;
- The seven leach tanks inside the main mill building, including all agitation equipment, pumps and piping;
- The counter-current decantation (CCD) circuit including all thickeners and equipment, pumps and piping;
- Uranium precipitation circuit, including all thickeners, pumps and piping;
- The two yellow cake dryers and all mechanical and electrical support equipment, including uranium packaging equipment;

- The clarifiers to the west of the mill building including the preleach thickener (PLT), clarifier, and claricone;
- The boiler and all ancillary equipment and buildings;
- The entire vanadium precipitation, drying and fusion circuit;
- All external tankage not included in the previous list including reagent tanks for the storage of acid, ammonia, kerosene, water, dry chemicals, etc. and the vanadium oxidation circuit;
- The uranium and vanadium solvent extraction (SX) circuit including all SX and reagent tankage, mixers and settlers, pumps and piping;
- The SX building;
- The mill building;
- The alternate feed processing circuit;
- The decontamination pads;
- The office building;
- The shop and warehouse building;
- The sample plant building; and
- The reagent storage building.

The sequence of demolition will proceed so as to allow the maximum use of support areas of the facility such as the office and shop areas. It is anticipated that all major structures and large equipment will be demolished with the use of hydraulic shears. This equipment will speed the process, provide proper sizing of the materials for transport and placement, and reduce exposure

to radiation and other safety hazards during the demolition. Any uncontaminated or decontaminated equipment to be considered for salvage will be released in accordance with the terms of License Condition 9.10. As with the equipment for disposal, any contaminated soils from the mill area will be disposed of in the tailings cells in accordance with Section 7.0 of the Technical Specifications.

6.2 Mill Site

Contaminated areas around the mill site are expected to be primarily superficial and include the ore storage area and surface contamination of some roads. All ore and alternate feed materials will have been previously removed from the ore stockpile area. All contaminated materials will be excavated and be disposed in one of the tailings cells in accordance with Section 7.0 of these Technical Specifications. The depth of excavation will vary depending on the extent of contamination and will be based on the criteria in Section 7.2.3 of these Technical Specifications. All other 11e.(2) byproduct materials will be disposed of in the tailings cells.

All ancillary contaminated materials including pipelines will be removed and will be disposed of by disposal in the tailing cells in accordance with Section 7.0 of these Technical Specifications.

Disturbed areas will be covered, graded and vegetated as required and shown on the plans.

6.3 Windblown Contamination

Windblown contamination is defined as mill derived contaminants dispersed by the wind to surrounding areas. The potential areas affected by windblown contamination will be surveyed using scintillometers taking into account historical operational data from the semi-annual effluent reports and other guidance such as prevailing wind direction and historical background data. Areas covered by the existing mill facilities and ore storage pad, the tailings cells and adjacent stockpiles of random fill, clay and topsoil, will be excluded from the survey. Materials from these areas will be removed in conjunction with final reclamation and decommissioning of the mill and tailings cells.

6.4 Guidance

The necessity for remedial actions will be based upon an evaluation prepared by the Owner, and approved by the DRC, of the potential health hazard presented by any windblown materials identified. The assessment will be based upon analysis of all pertinent radiometric and past land use information and will consider the feasibility, cost-effectiveness, and environmental impact of the proposed remedial activities and final land use. All methods utilized will be consistent with the guidance contained in NUREG-5849: "Manual for Conducting Radiological Surveys in Support of License Termination."

6.5 General Methodology

The facility currently monitors soils for the presence of Ra-226, Th-230, and natural uranium, such results being presented in the second semi-annual effluent report for each year. Guideline values for these materials will be determined and will form the basis for the cleanup of the mill site and surrounding areas. For purposes of determining possible windblown contamination, areas used for processing of uranium ores as well as the tailings and evaporative facilities will be excluded from the initial scoping survey, due to their proximity to the uranium recovery operations. Those areas include:

- The mill building, including CCD, Pre-Leach Thickener area, uranium drying and packaging, clarifying, and preleach;
- The SX building, including reagent storage immediately to the east of the SX building;
- The alternate feed circuit;
- The ore pad and ore feed areas;
- Tailings Cells No. 2, 3, 4A, and 4B; and
- Evaporation Cell No. 1.

The remaining areas of the mill will be divided up into two areas for purposes of windblown determinations:

- The restricted area, excluding the areas listed above; and

- A halo around the restricted area.

6.6 Scoping Survey

Areas within the restricted area will be initially surveyed on a 30 x 30 meter grid as described below. The halo around the suspected area of contamination will be initially surveyed on a 50 x 50 meter grid using the methodologies described. Any areas which are found to have elevated activity levels will be further evaluated. Initial surveys of the areas surrounding the mill and tailings area have indicated potential windblown contamination only to the north and east of the ore storage area, and to the southwest of Cell 3.

Areas contaminated through process activities or windblown contamination from the tailings areas will be remediated to meet applicable cleanup criteria for Ra-226, Th-230, and natural uranium. Contaminated areas will be remediated such that the residual radionuclides remaining on the site, that are distinguishable from background, will not result in a dose that is greater than that which would result from the radium soil standard (5 pCi/g above background).

Soil cleanup verification will be accomplished by use of several calibrated beta/gamma instruments. Multiple instruments will be maintained and calibrated to ensure availability during Remediation efforts.

Initial soil samples will be chemically analyzed to determine on-site correlation between the gamma readings and the concentration of radium, thorium and uranium, in the samples. Samples will be taken from areas known to be contaminated with only processed uranium materials (i.e. tailings sand and windblown contamination) and areas in which it is suspected that unprocessed uranium materials (i.e. ore pad and windblown areas downwind of the ore pad) are present. The actual number of samples used will depend on the correlation of the results between gamma readings and the Ra-226 concentration. A minimum of 35 samples of windblown tailings materials and 15 samples of unprocessed ore materials is proposed.

Adequate samples will be taken to ensure that graphs can be developed to adequately project the linear regression lines and the calculated upper and lower 95 percent confidence levels for each of the instruments. The 95 percent confidence limit will be used for the guideline value for

correlation between gamma readings and radium concentration. Because the unprocessed materials are expected to have proportionally higher values of uranium in relation to the radium and thorium content, the correlation to the beta/gamma readings are expected to be different than readings from areas known to be contaminated with only processed materials. Areas expected to have contamination from both processed and unprocessed materials will be evaluated on the more conservative correlation, or will be cleaned to the radium standard which should ensure that the uranium is removed.

Radium concentration in the samples should range from 25% of the guideline value (5 pCi/g above background) for the area of interest, through the anticipated upper range of radium contamination. Background radium concentrations have been gathered over a 16-year period at sample station BHV-3 located upwind and 5 miles west of the mill. The radium background concentration from this sampling location is 0.93 pCi/g. This value will be used as an interim value for the background concentration. Prior to initiating cleanup of windblown contamination, a systematic soil sampling program will be conducted in a geologically similar (soil types and soil chemistry) area within 3 miles of the site that is similar to the areas to be cleaned, to determine the average background radium concentration, or concentrations, to be ultimately used for the cleanup.

An initial scoping survey for windblown contamination will be conducted based on analysis of all pertinent radiometric and past land use information. The survey will be conducted using calibrated beta/gamma instruments on a 30 meter by 30 meter grid. Additional surveys will be conducted in a halo, or buffer zone, around the projected impact area. The survey in the buffer area will be conducted on a 50 meter by 50 meter grid. Grids where no readings exceed 75% of the guideline value (5 pCi/g above background) will be classified as unaffected, and will not require remediation.

The survey will be conducted by walking a path within a grid as shown on Figure A-1. The paths are designed so that a minimum of 10% of the area within the grid sidelines will be scanned, using an average coverage area for the instrument of one meter wide. The instrument will be swung from side to side at an elevation of six inches above ground level, with the rate of coverage maintained within the recommended duration specified by the specific instrument

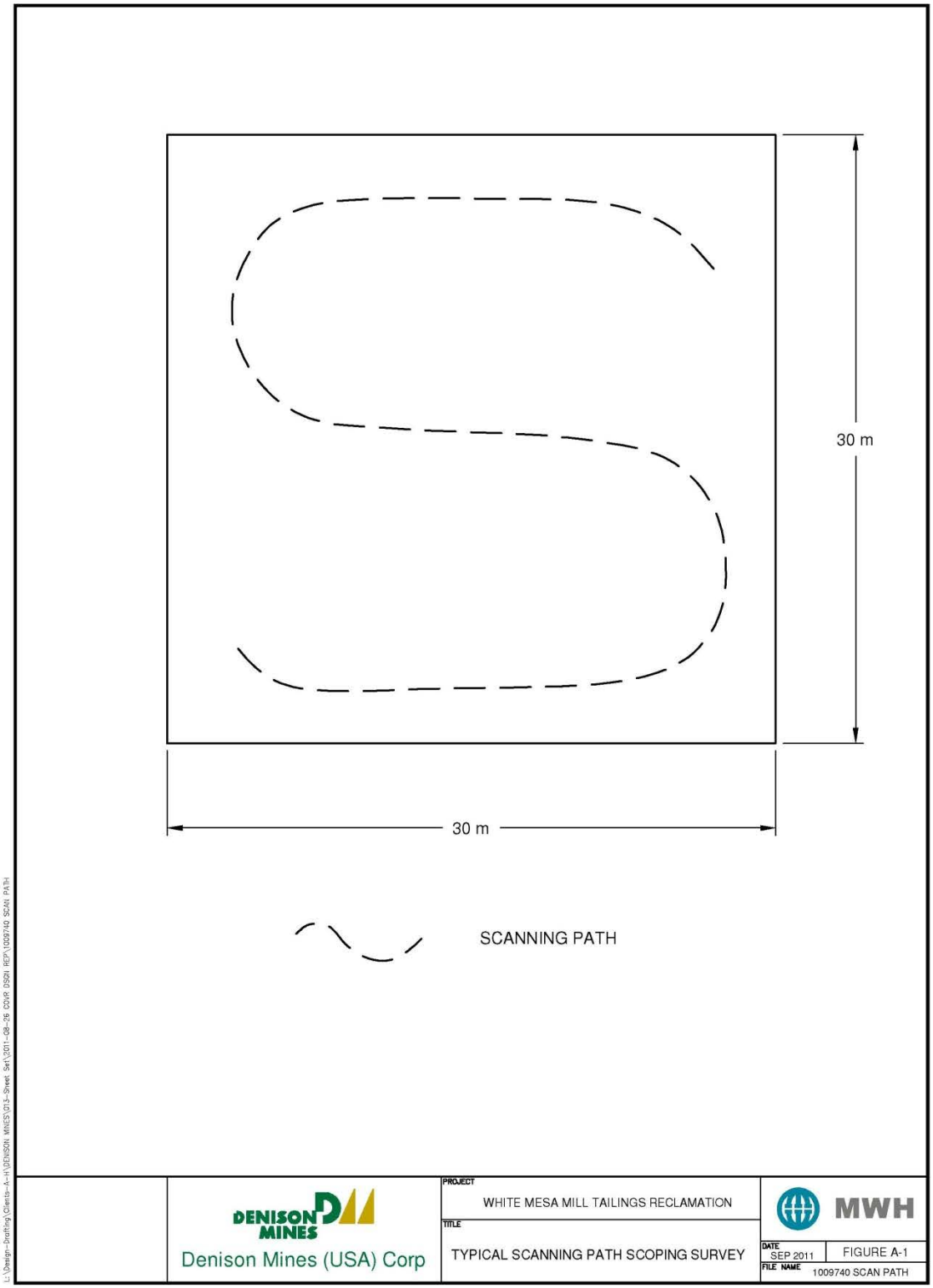
manufacturer. In no case will the scanning rate be greater than the rate of 0.5 meters per second (m/sec) specified in NUREG/CR-5849 (NRC, 1992).

6.7 Characterization and Remediation Control Surveys

After the entire sub-area has been classified as affected or unaffected, the affected areas will be further scanned to identify areas of elevated activity requiring cleanup. Such areas will be flagged and sufficient soils removed to, at a minimum, meet activity criteria. Following such remediation, the area will be scanned again to ensure compliance with activity criteria. A calibrated beta/gamma instrument capable of detecting activity levels of less than or equal to 25 percent of the guideline values will be used to scan all the areas of interest.

6.8 Final Survey

After removal of contamination, final surveys will be taken over remediated areas. Final surveys will be calculated and documented within selected, specific ten meter by ten meter grids with sample point locations, as shown in Figure A-2. Soil samples from 10% of the surveyed grids will be chemically analyzed to confirm the initial correlation factors utilized and confirm the success of cleanup effort for radium, thorium and uranium. Ten percent of the samples chemically analyzed will be split, with a duplicate sent to an off-site laboratory. Spikes and blanks, equal in number to 10% of the samples that are chemically analyzed, will be processed with the samples.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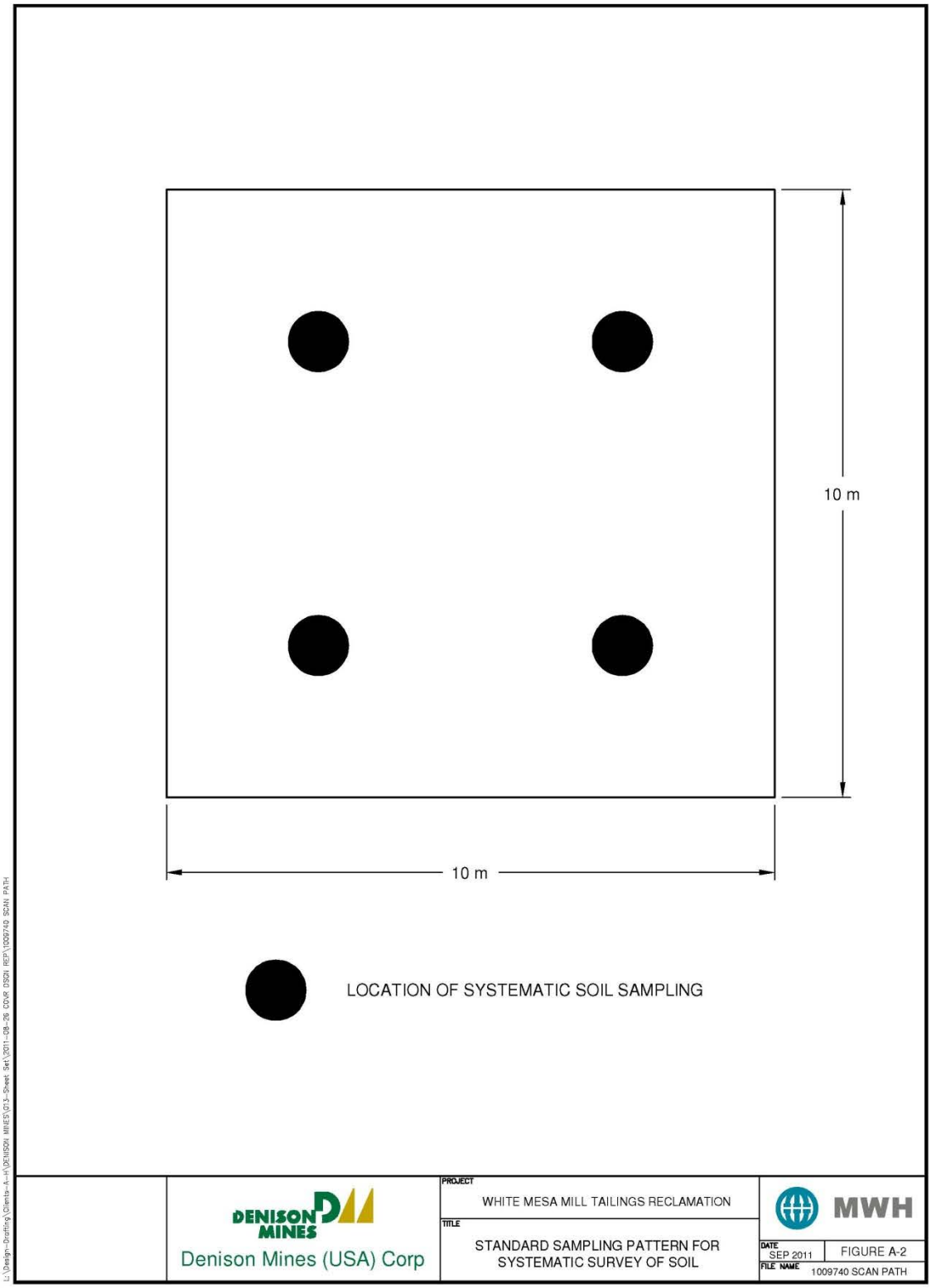
TYPICAL SCANNING PATH SCOPING SURVEY
MWH
DATE
SEP 2011
FIGURE A-1
FILE NAME
1009740 SCAN PATH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Denison Mines (USA) Corp
PROJECT
WHITE MESA MILL TAILINGS RECLAMATION
TITLE
STANDARD SAMPLING PATTERN FOR SYSTEMATIC SURVEY OF SOIL
MWH
DATE
SEP 2011
FIGURE A-2
FILE NAME
1009740 SCAN PATH

6.9 Employee Health and Safety

Programs currently in place for monitoring of exposures to employees will remain in effect throughout the time period during which tailings cell reclamation, mill decommissioning and clean up of windblown contamination are conducted. This will include personal monitoring and the ongoing bioassay program. Access control will be maintained at the Restricted Area boundary to ensure employees and equipment are released from the site in accordance with the current License conditions. In general, no changes to the existing programs are expected and reclamation activities are not expected to increase exposure potential beyond the current levels.

6.10 Environment Monitoring

Existing environmental monitoring programs will continue during the time period in which reclamation and decommissioning is conducted. This includes monitoring of surface and groundwater, airborne particulates, radon, soils and vegetation, according to the existing License conditions. In general, no changes to the existing programs are expected and reclamation activities are not expected to increase exposure potential beyond the current levels.

6.11 Quality Assurance

In general, the QA/QC Plan details the Owner’s organizational structure and responsibilities, qualifications of personnel, operating procedures and instructions, record keeping and document control, sampling procedures and outside laboratory testing.

7 MATERIAL DISPOSAL

7.1 General

This section outlines the work associated with placement of materials in the disposal cell and tailings cells.

7.2 Materials Description

The types of materials to be disposed of are outlined below.

7.2.1 Raffinate Crystals

After the residual liquid in Cell 1 has been evaporated, the contractor will remove the raffinate crystals from Cell 1 and move them to the tailings disposal cells. The crystals are likely to have the consistency of a granular material with larger crystal masses which may require being broken down for loading and transport (using the loading equipment).

7.2.2 Synthetic Liner

The existing PVC liner shall be removed from Cell 1 and disposed of in the tailings disposal area.

7.2.3 Contaminated Soils

Soils located in and around the mill site with concentrations of Radium-226 averaged over any area of 100 square meters exceeding the background level by more than:

- 5 pCi/g averaged over the first 15 cm of soils below the surface, and
- 15 pCi/g averaged over a 15 cm thick layer of soils more than 15 cm below the surface;

The contaminated soils will be placed in the tailings disposal cells. Soils excavated from Cell 1 shall be placed in the tailings disposal cells.

7.2.4 Mill Debris

The mill debris will include all equipment, including tankage and piping, agitation equipment, process control instrumentation and switchgear, and contaminated structures; including concrete structures and foundations, will be placed in the disposal cell.

7.3 Work Description

The materials described will be spread over the working surface as much as possible to provide relatively uniform settlement and consolidation characteristics of the cleanup materials.

7.3.1 Raffinate Crystals

Raffinate crystals will be removed from Cell 1 and transported to the tailings cells. Placement of the crystals will be performed as a granular fill, with care being taken to avoid nesting of large sized material. Voids around large material will be filled with finer material or the crystal mass will be broken down by the equipment. Actual placement procedures will be evaluated by the QC officer during construction as crystal materials are placed in the cells and modified with the agreement of the DRC.

7.3.2 Synthetic Liner

The PVC liner will be cut, folded (when necessary), removed from Cell 1, and transported to the tailings cells. The liner material will be spread as flat as practical over the designated area. After placement, the liner will be covered as soon as possible with at least one foot of soil, crystals or other materials for protection against wind uplift, as approved by the CQA Manager.

7.3.3 Contaminated Soils

The extent of contamination of the mill site will be determined by a scintillometer survey. If necessary, a correlation between scintillometer readings and U-nat/Radium-226 concentrations will be developed. Scintillometer readings can then be used to define cleanup areas and to monitor the cleanup. Soil sampling will be conducted to confirm that the cleanup results in levels that meet the criteria described in 7.2.3.

Where surveys indicate the above criteria have not been achieved, the soil will be removed to meet the criteria. Soil removed from Cell 1 will be excavated and transported to the tailings cells.

7.3.4 Mill Debris

Placed debris will be spread across the bottom of the disposal cell to avoid nesting and to reduce the volume of voids present in the disposed mass. Stockpiled soils and/or other approved materials will be placed over and into the scrap in sufficient amount to fill the voids between the large pieces and the volume within the hollow pieces to form a coherent mass. It is recognized that some voids will remain because of the scrap volume reduction specified, and because of practical limitations of these procedures. Reasonable effort will be made to fill the voids. The approval of the CQA Manager or a designated representative will be required for the use of materials other than stockpiled soils for the purpose of filling voids.

7.3.5 Material Sizing and Preparation

Demolition debris to be placed in the disposal cell will consist of equipment and structural material from facilities demolition. The demolition procedures are outlined in the Preliminary Mill Decommissioning Plan. Because of the wide variety in shape and size of demolition debris, material of odd shapes will be cut or dismantled, to the extent practical, prior to disposal, to facilitate handling and placement and minimize void spaces in the disposal cell. The maximum size of dismantled or cut materials shall not exceed 20 feet in the longest dimension and a maximum volume of 30 cubic feet for placement in the cells. Smaller dimensions may be necessary for loading, handling, hauling, and placement of material in the disposal cell.

The debris, after having been reduced in dimension and volume, if required, will be placed in the tailings cells as directed by the CQA Manager.

7.3.6 Incompressible Debris

Material that is not compressible (steel columns and beams, concrete, and other solid material) shall be reduced in size for loading, hauling, and placement in the disposal cell. Incompressible

debris shall be placed, oriented, or spread in a manner that minimizes void spaces below, between, and above these materials. Incompressible debris shall be placed on and covered with soils or similar materials (Specification Section 7.3.3). Incompressible debris such as steel members shall be placed in the disposal cell with the longest dimension oriented horizontally.

Thick-walled pipe, conduit, tanks, vats, pressure vessels, and other hollow materials that cannot be crushed or dismantled shall be transported to the planned location within the disposal cell and oriented for filling and burial. The voids on the inside of the item shall be filled with sand or grout (controlled low-strength material, flowable fill, etc.). Contaminated soil (Section 7.3.3) or sand will be placed outside of the items and compacted with standard compaction equipment (where possible) or hand-operated equipment to the compaction requirements in Specification Section 7.4. Several lifts of compacted contaminated soil may be necessary to fill around and cover these items.

7.3.7 Compressible Debris

Materials that are compressible (such as thin-walled piping and thin-walled tanks) shall be flattened or crushed in the disposal cell, prior to final placement. Flattening or crushing shall be done with hydraulic excavator attachments, or with a dozer or other steel-tracked equipment.

These materials shall be placed in the disposal cell and spread to form a lift with a maximum thickness of two feet. Spreading shall be done in a manner resulting in materials laying flat and minimizing void spaces. All pipe that shall be cut into lengths of approximately 10 feet or less for disposal. Pipe larger than 12 inches in diameter shall be longitudinally split or cut.

7.3.8 Organic Debris

The volume of organic materials (such as wood and paper) that may be prone to long-term biodegradation within the cell is anticipated to be a small percentage of the material being disposed. However, to limit the potential for settlement due to consolidation of organics, the contractor shall not dispose of organic materials in any lift thicker than 12 inches. The material shall be spread with a dozer in lifts, or thoroughly mixed with soil that will be placed around incompressible debris, and compacted.

7.3.9 Soils and Similar Materials

Soils and soil-like materials to be placed in the disposal cell will be from on-site areas identified by the Owner for excavation. Soil or soil-like material shall be placed and compacted over each lift of debris (Section 7.2.4) or other materials in lifts not to exceed two feet in loose thickness and compacted prior to placement of additional lifts. Soils will also be used for interim soil cover to minimize exposure of demolition materials and other materials to air and meteoric water.

7.4 Performance Standards and Testing

7.4.1 Material Compaction – Debris Lifts

During construction, the compaction requirements for the crystals will be evaluated based on field conditions and material quantities. The compaction requirements will be determined by the CQA Manager and the Reclamation Project Manager or a designated representative, with the agreement of the Owner.

The debris, contaminated soils and other materials for the first lift will be placed to a depth of up to four feet thick, in a bridging lift, to allow access for placing and compacting equipment. The first lift will be compacted by the tracking of heavy equipment, such as a Caterpillar D6 Dozer (or equivalent), using at least 4 passes, prior to the placement of the next lift. Subsequent lifts will not exceed 12 inches and will be compacted using a minimum of 4 passes with the tracked equipment.

Soil or similar material shall be compacted with a minimum of 6 passes with self-propelled, towed, or hand-held vibratory compaction equipment. The number of passes shall be confirmed with actual compaction equipment on site with a field test section of soil to establish a correlation between the field compaction method and 80 percent of maximum dry density for the soil, as determined by the Standard Proctor test (ASTM D698). During compaction, the material shall be within 1 percent above to 4 percent below optimum moisture content for the material, as determined by the Standard Proctor test. If water addition is required to achieve this range of

moisture contents, the added water shall be thoroughly mixed into the material prior to compaction.

The CQA technicians will monitor and approve of the final debris placement. In areas where voids are observed during placement, the contractor shall re-excavate the area, fill any voids encountered with soil and recompact the materials, or grout the voids.

7.4.2 Material Compaction - Disposed Materials

The upper 12 inches of the final disposed material surface shall be compacted to 90 percent of the maximum dry density for the material, as determined by the Standard Proctor test. During compaction, the material shall be within 1 percent above to 4 percent below optimum moisture content for the material, as determined by the Standard Proctor test. If water addition is required to achieve this range of moisture contents, the added water shall be thoroughly mixed into the material prior to compaction.

7.4.3 Testing Frequency

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Standard Proctor tests shall be conducted at a frequency of at least one test per 5,000 cubic yards of material compacted, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

The frequency of the field density and moisture tests will be not less than one test per 1,000 cubic yards of compacted fill. A minimum of two tests will be taken for each day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of compaction operations will be taken.

7.4.4 Final Slope and Grades

The final disposed material surface shall have maximum side slopes of 5:1 and a top surface sloping in the directions and grades shown on the Drawings. The side slopes and top surface shall be free from abrupt changes in grade or areas of runoff concentration. The final disposed material surface shall be compacted with approved construction equipment to form a smooth surface with uniform density for subsequent cover placement.

8 COVER CONSTRUCTION

8.1 General

This section outlines the work associated with construction of the earthen cell cover. A multi-layered earthen cover will be placed over tailings Cells 2, 3 and 4A and a portion of Cell 1 used for disposal of contaminated materials (the Cell 1 Tailings Area).

8.2 Materials Description

8.2.1 Cover Random Fill

The random fill for the radon attenuation layers, and the water storage/frost protection layer will consist of a mixture of sands and silts with varying amounts of clay.

In the initial bridging (platform) lift of the tailings, rock sizes of up to 2/3 of the thickness of the lift will be allowed. On all other fill lifts, rock sizes will be limited to 2/3 of the lift thickness, with at least 30 percent of the material finer than the no. 40 sieve. The portion passing the no. 40 sieve, will classify as CL, SC, ML or SM materials under the Unified Soil Classification System. Oversized material will be controlled through selective excavation at the stockpiles and through the utilization of a grader, bulldozer or backhoe to cull oversize materials from the fill.

The source of these materials will be on-site stockpiles from previous cell construction activities.

8.2.2 Organic Matter Amendment

The organic matter amendment Biosol® will be used to amend the properties of the water storage/frost barrier fill for plant growth. The current amendment proposal is to add 1.5 tons/acre of Biosol®, however the final amount will be based on analysis of the soils during construction.

8.2.3 Rock Mulch

Gravel will be mixed with topsoil and placed on portions of the cover on Cells 2, 3, 4A, and 4B top surfaces (as shown on the Drawings) for erosion protection. Rock mulch material shall be shall be free from roots, branches, rubbish, and debris.

The rock portion of the rock mulch will consist of granular materials from approved off-site areas. The mixture shall be 25% gravel by weight. The rock (gravel) portion of the rock mulch shall be a screened product and have a D_{100} particle size of less than 1-inch (100% passing the 1-inch sieve).

The soil portion of the rock mulch will consist of select material from the on-site topsoil borrow area (Section 3.5).

8.2.4 Erosion Protection and Perimeter Apron Rock

Material for the perimeter apron erosion protection will consist of granular materials from approved off-site sources. The perimeter apron rock will be placed along the toe of the disposal cell and the tailings cells in the erosion protection areas (as shown on the Drawings). Perimeter apron rock shall meet NRC long-term durability requirements (a rock quality designation of 65 or more).

Perimeter apron rock shall be shall be a screened product, free from roots, branches, rubbish, and debris. The specifications as given below are for rock quality designations of 70 or higher. If actual rock quality designation is between 65 and 69, oversizing will be required. Rock quality designations below 65 will not be acceptable.

Designated gradations for the apron rock will be specified on the final drawings for construction. Apron rock will be imported from off-site.

- Side Slope riprap will have a minimum D_{50} of 7.4 in.;
- Rock Apron #1 will have a minimum D_{50} of 7.4 in.,

- Minimum layer thickness of 24 inches;

- Rock Apron #2 will have a minimum D_{50} of 15 in.,
  - Minimum layer thickness of 45 inches.

8.2.5 Erosion Protection Filter

Erosion protection filter material shall be shall be free from roots, branches, rubbish, and debris. The filter material will generally classify as sand containing gravel and fines and shall meet the following gradation specifications.

Table 8.1 – Filter Material Gradation

Sieve Size	Percent Passing, By Weight
3-inch	100
No. 4	70-100
No. 20	35-70
No. 200	5-15

8.2.6 Topsoil

Topsoil will consist of select material from the designated, on-site topsoil borrow area (Section 3.5). The topsoil shall have a plasticity index (PI) less than 10 (%), as determined by Atterberg limits testing.

8.3 Work Description

The contractor will place cover materials based on a schedule determined by the Owner and the Owner's analysis of settlement data, piezometer data and equipment mobility considerations. The DRC must approve fill grades and elevations prior to placement of final cover materials. Settlement monitoring points (both temporary and permanent) will be established and monitored in accordance with Sections 8.3.1 to 8.3.3 of the Technical Specifications and the Settlement Monitoring Plan approved by DRC for the site.

In each layer of the cover, the distribution and gradation of the materials throughout each fill layer will be such that the fill will, as far as practicable, be free of lenses, pockets, or layers of material differing substantially in texture, gradation or moisture content from the surrounding material. Nesting of oversized material will be controlled through selective excavation of stockpiled material, observation of placement by a qualified individual with authority to stop work and reject material being placed and by culling oversized material from the fill utilizing a grader. Successive loads of material will be placed on the fill so as to produce the best practical distribution of material.

If the compacted surface of any layer of fill is too dry or smooth to bond properly with the layer of material to be placed thereon, it will be moistened and/or reworked with a harrow, scarifier, or other suitable equipment to a sufficient depth to provide relatively uniform moisture content and a satisfactory bonding surface before the next succeeding layer of fill is placed. If the compacted surface of any layer of fill in-place is too wet, due to precipitation, for proper compaction of the fill material to be placed thereon, the contractor will rework the material with a harrow, scarifier or other suitable equipment to reduce the moisture content to the specified range. The contractor will then recompact the fill.

No material will be placed when either the material being compacted, or the underlying material, is frozen or when ambient temperatures do not permit the placement or compaction of the materials to the specified density, without developing frost lenses in the fill.

8.3.1 Monitoring Interim Cover Settlement

The contractor will maintain the existing settlement monitoring points located within tailings disposal cells by extending them through additional fill placement. For areas without settlement monitoring points, the contractor will install temporary settlement points to monitor settlements of the interim cover surface. The temporary settlement points will consist of wooden stakes, rebar, or an approved equivalent; set a minimum of 12 inches into the interim cover surface. Settlement data will be collected and analyzed; and the reclamation techniques and schedule will be adjusted accordingly.

8.3.2 Monitoring Final Cover Settlement

After placement of final cover material, the contractor will install permanent settlement plates to monitor settlement of the final cover surface. The settlement plates will consist of a corrosion resistant steel plate (1/4-inch thick; two-foot square to which a one-inch diameter corrosion resistant monitor pipe has been welded. The one-inch diameter monitor pipe will be surrounded by a three-inch diameter guard pipe which will not be attached to the base plate.

The installation will consist of leveling an area on the surface and placing the base plate directly on the cover soil. A minimum of two feet of initial soil will be placed on the base plate for a minimum radial distance of five feet from the center pipe.

8.3.3 Monitoring Settlement Points

Settlement monument placement and data collection will be made in accordance with the DRC approved Settlement Monitoring Plan.

8.3.4 Platform Layer Fill

A layer of 2.5 feet of platform fill will be placed over the tailings surface to form a stable working platform for subsequent controlled fill placement. This initial lift will be placed by pushing random fill material or contaminated materials across the tailings in increments, slowly enough that the underlying tailings are displaced as little as possible. The fill soils shall be placed in lifts of 12-inch maximum loose thickness to form a uniform subsoil layer for the cover system. If water addition is required to achieve the required range of moisture contents, the added water shall be thoroughly mixed into the material prior to compaction.

8.3.5 Highly Compacted Layer

The highly compacted layer shall be placed in lifts with maximum compacted thickness of 6 inches to form a continuous layer with a total minimum compacted layer thickness of 30 inches. If water addition is required to achieve the required range of moisture contents, the added water shall be thoroughly mixed into the material prior to compaction.

8.3.6 Water Storage Layer Fill Placement

Random fill will be placed to a minimum of 42 inches thick, above the highly compacted layer in 12-inch lifts. If oversized material is observed during the excavation of fill material, it will be removed, as far as practicable, before it is placed in the fill. If water addition is required to achieve the required range of moisture contents, the added water shall be thoroughly mixed into the material prior to compaction.

8.3.7 Organic Matter Amendment

The organic matter amendment Biosol® will be applied prior to the placement of topsoil or the topsoil-gravel mixture. Biosol® will be uniformly spread over the surface of the water storage layer (frost barrier) and mixed to a depth of 12 in. (30 cm). The proposed application rate may be adjusted, up or down, based on soil chemical analysis that is conducted prior to placement of frost barrier fill material (the water storage layer). The soil amendment will be applied prior to placement of the topsoil and topsoil-rock mixture.

8.3.8 Rock Mulch Placement

The contractor shall provide a method of thoroughly mixing the topsoil and the gravel mixture to provide the 25% gravel- 75% topsoil mixture (by weight). The mixture shall be prepared prior to transport to the placement areas. Gradation samples will be collected at the point of placement (on the topdeck) to verify the mixture's content. The CQA manager will approve the contractor's proposed method of mixing based on the gradation results during initial placement.

The mixture shall be placed in one or more loose lifts to form a uniform layer with a final thickness of 6 inches on the slope surfaces of the disposal cell (shown on the Drawings). The gravel-topsoil mixture shall be spread with tracked equipment and compacted using two passes with rubber-tracked equipment. Low-ground pressure equipment may be necessary to prevent over-compaction of the mixture. Field density tests will be conducted to monitor and prevent overcompaction of the material.

The topsoil-gravel erosion control layer will not be amended for organic matter or nutrients to avoid the stimulation of undesirable weedy species.

Following placement of the topsoil-gravel erosion protection layer, the area shall be harrowed to reduce any compaction that may have occurred during placement of the cover and to create an uneven surface for optimum seedbed conditions.

8.3.9 Topsoil Placement

Topsoil (Section 8.2.7) shall be placed in one or more lifts to form a uniform layer with a final thickness of 6 inches on the top and side slope surfaces of the disposal cell (shown on the Drawings). The topsoil shall be spread with tracked equipment and compacted using two passes with rubber-tracked equipment. Low-ground pressure equipment may be necessary to prevent over-compaction of the topsoil.

The topsoil layer will not be amended for organic matter or nutrients to avoid the stimulation of undesirable weedy species.

Following placement of the topsoil layer, the area will be harrowed to reduce any compaction that may have occurred during placement of the cover and to create an uneven surface for optimum seedbed conditions.

8.3.10 Rock and Filter Material Placement

The side slopes of the reclaimed cover will be protected by rock surfacing. Riprap, perimeter apron rock (Section 8.2.5), and erosion protection filter material (Section 8.2.6) shall be placed in one or more lifts to the depths outlined in the Drawings and using the methods outlined below.

The Drawings show the location of rock protection with the size and thickness requirements for the various side slopes and aprons.

Filter material and rock shall be handled, loaded, transported, stockpiled, and placed in a manner that minimizes segregation. Rock and filter material shall be placed in or near its final location by dumping, then spreading with a small dozer, the bucket of a trackhoe, or other suitable equipment. Rock and filter material shall be placed and spread in a manner that minimizes displacement of underlying cover soils, natural soils, or filter material. Each layer of rock and

filter material shall be track-walked with a small dozer, tamped with the bucket of a trackhoe, or densified by other approved methods.

Placement of the riprap will avoid accumulation of riprap sizes less than the minimum D_{50} size and nesting of the larger sized rock. The riprap layer will be compacted by at least two passes by a D7 Dozer, tamping with the bucket of a trackhoe, or equivalent methods in order to key the rock for stability. The completed layer of rock mulch and filter material shall be well-graded in particle-size distribution and free from pockets of smaller material and free from large voids or loose areas.

8.4 Performance Standard and Testing

8.4.1 Platform Fill Testing

Compaction of the initial lift will be limited to what the weight of the placement equipment provides. Placement of fill will be monitored by a qualified individual with the authority to stop work and reject material being placed.

Testing shall consist of No. 200 sieve wash and particle-size distribution testing (ASTM D422) and Atterberg limits (ASTM D4318) at a frequency of at least one test per 2,000 cubic yards of fill placed, or when material characteristics show a significant variation. The lower portion of the platform fill layer will be compacted to a minimum of 80% maximum dry density for the material, as determined by the standard Proctor test (ASTM D698) and the top surface (upper 6 inches) of the platform fill will be compacted to 95% maximum dry density for the material, as determined by the standard Proctor test (ASTM D698). Water contents should be adjusted as needed to meet the density requirements. If additional water is required to achieve this range of water contents, the added water shall be thoroughly mixed into the material prior to placement and/or compaction. The contractor may moisture condition the borrow materials in the borrow areas and/or during placement.

The frequency of the field density tests will be not less than one test per 1,000 cubic yards of compacted platform (random fill). A minimum of two tests will be taken for each day that an

applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of compaction operations will be taken.

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Standard Proctor tests shall be conducted at a frequency of at least one test per 5,000 cubic yards of material compacted, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

8.4.2 Highly Compacted Layer Testing

Each lift of the highly compacted layer shall be compacted to at least 95 percent of the maximum dry density for the material, as determined by the standard Proctor test (ASTM D698). Water contents should be adjusted, as needed, to meet the density requirements.

Material specifications for the random fill material shall be confirmed by gradation testing conducted by approved personnel. Testing shall consist of No. 200 sieve wash and particle-size distribution testing (ASTM D422) and Atterberg limits (ASTM D4318) at a frequency of at least one test per 2,000 cubic yards of fill placed, or when material characteristics show a significant variation.

Checking of compaction shall consist of a minimum of one field density test per 500 cubic yards of material compacted. A minimum of two tests shall be taken for each day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of compaction operations will be taken.

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Standard Proctor tests shall be conducted at a frequency of at least one test

per 2,500 cubic yards of material compacted, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

8.4.3 Water Storage Layer Fill Material Testing

Material specifications for the random fill for water storage layer shall be confirmed by gradation testing conducted by approved personnel. Testing shall consist of No. 200 sieve wash and particle-size distribution testing (ASTM D422) and Atterberg limits (ASTM D4318) at a frequency of at least one test per 2,000 cubic yards of fill placed, or when material characteristics show a significant variation. Cover material compaction will be verified by the maximum lift thickness outlined in Section 8.3.6.

Each lift of this upper fill material layer shall be compacted to at least 85 percent of the maximum dry density for the material, as determined by the standard Proctor test (ASTM D698). Water contents should be adjusted, as needed, to meet the density requirements.

The frequency of the field density and moisture tests will be not less than one test per 1,000 cubic yards of compacted fill. A minimum of two tests will be taken for each day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of compaction operations will be taken.

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Standard Proctor tests shall be conducted at a frequency of at least one test per 5,000 cubic yards of material compacted, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear

density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

8.4.4 Topsoil Testing

Material specifications for the topsoil material shall be confirmed by Atterberg limits testing (ASTM D4318) on samples of the topsoil, once for each 1,000 cubic yards of total topsoil material placed (including the quantity of topsoil added to the rock mulch mixture).

The topsoil shall be compacted to between 80 and 85 percent of the maximum dry density for the material, as determined by the standard Proctor test. During placement, the material shall be within the optimum moisture content and 3 percent below the optimum moisture content for the material, as determined by the standard Proctor test.

Checking of compaction of the topsoil shall consist of a minimum of one field density test per 500 cubic yards of material placed. A minimum of two tests shall be taken for each day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of placement operations will be taken.

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Standard Proctor tests shall be conducted at a frequency of at least one test per 2,500 cubic yards of material placed, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

8.4.5 Rock Mulch Testing

The maximum particle size for the rock used for rock mulch material shall be confirmed by gradation testing prior to mixing with the topsoil, to determine the maximum particle size. Testing shall consist of particle-size distribution testing (ASTM D422) at a frequency of at least

one test per 2,000 cubic yards of rock delivered to the site, or when rock characteristics show a significant variation.

The gradation specifications for the rock mulch material (topsoil-gravel mixture) (Specification Section 8.2.4) shall be confirmed by gradation testing, on samples collected from the point of placement (on the topdeck). Testing shall consist of particle-size distribution testing (ASTM D422) at a frequency of at least one test per 2,000 cubic yards of mixture placed, or when the characteristics of the mixture show a significant variation. The QA Manager may choose to conduct to increase the frequency of testing at the beginning of placement to evaluate the mixing method proposed by the contractor.

Rock mulch thickness will be controlled through the establishment of grade stakes placed on a 200 x 200 foot grid on the top of the cells and by a 100 x 100 foot grid on the cell slopes. Physical checks of rock mulch depth will be accomplished through the use of hand dug test pits at the center of each grid in addition to monitoring the depth indicated on the grade stakes.

The rock mulch mixture shall be compacted to between 80 and 85 percent of the maximum dry density for the material, as determined by the standard Proctor test. During placement, the material shall be within the optimum moisture content and 3 percent below the optimum moisture content for the material, as determined by the standard Proctor test.

Checking of compaction of the rock mulch mixture shall consist of a minimum of one field density test per 500 cubic yards of material placed. A minimum of two tests shall be taken for each day that an applicable amount of fill is placed in excess of 150 cubic yards. A minimum of one test per lift and at least one test for every full shift of placement operations will be taken.

Field density tests shall be compared with Standard Proctor tests (ASTM D698 Method A or C) on the same material. Rock corrections (ASTM D4718) for oversize particles may be required for the mixture depending on the gradation of the gravel material selected. Standard Proctor tests shall be conducted at a frequency of at least one test per 2,500 cubic yards of material placed, or when material characteristics show significant variation.

Field density testing may be conducted with the sand cone test (ASTM D1556) or a nuclear density gauge (ASTM D6938, or as modified by the QA Manager). Correlation of nuclear density gauge results shall be by comparison with results from sand cone test(s) and laboratory testing for water content(s) using the oven drying method (ASTM D2216) on similar material.

The durability of the rock shall be verified by durability tests outlined in Specification Section 8.4.8.

8.4.6 Erosion Protection and Perimeter Apron Rock Testing

Material specifications for the perimeter apron rock shall be confirmed by gradation testing conducted by approved personnel. Testing shall consist of particle-size distribution testing (ASTM D422) at a frequency of at least one test per 2,000 cubic yards of rock delivered to the site, or when rock characteristics show a significant variation.

Rock layer thickness will be controlled through the establishment of grade stakes placed on a 200 x 200 foot grid on the top of the cells and by a 100 x 100 foot grid on the cell slopes. Physical checks of riprap depth will be accomplished through the use of hand dug test pits at the center of each grid in addition to monitoring the depth indicated on the grade stakes.

The durability of the rock shall be verified by durability tests outlined in Specification Section 8.4.8.

8.4.7 Erosion Protection Filter Testing

Material specifications for erosion protection filter material (Section 8.2.6) shall be confirmed by gradation testing conducted by approved personnel. Testing shall consist of No. 200 sieve wash and maximum particle size testing (ASTM D422) at a frequency of at least one test per 2,000 cubic yards of fill placed, or when material characteristics show a significant variation.

Filter layer thickness will be established during construction with grade stakes placed on a grid or centerline and offset pattern and layer thickness marks on each grade stake. The minimum thickness of the layer will be verified by spot checking of layer thickness by hand excavation in selected locations.

8.4.8 Rock Durability Testing

For riprap materials, each load of material will be visually checked against standard piles for gradation prior to transport to the tailings piles. Prior to delivery of any riprap materials to the site, rock durability tests will be performed for each gradation to be used. Test series for riprap durability will include specific gravity, absorption, sodium soundness and LA abrasion. During construction, additional test series and gradations will be performed for each type of riprap when approximately one-third (1/3) and two-thirds (2/3) of the total volume of each type have been produced or delivered. For any type of riprap where the volume is greater than 30,000 cubic yards, a test series and gradations will be performed for each additional 10,000 cubic yards of riprap produced or delivered.

8.5 Surface Slopes and Grades

The final cover surface shall have maximum side slopes of 5:1 and a top surface sloping in the direction and grade shown on the Drawings. The side slopes and top surface shall be free from abrupt changes in grade or areas of runoff concentration. The perimeter apron at the toe of the side slopes shall have a minimum width of 20 feet from the toe of the side slopes and slope away from the toe of the side slopes (as shown on the Drawings).

8.6 Grading Tolerances

The completed cover surface shall be constructed to within 1.0 foot (horizontally) of the lines as designed, and within 0.1 foot (vertically) of the elevations as designed. The final surface of the subsoil zone shall be smoothed to avoid abrupt changes in surface grade. The layer thicknesses shall meet the required minimum thicknesses.

The completed riprap shall be placed to within 5.0 foot (horizontally) of the layout as designed, and within 0.5 foot (vertically) of the elevations as designed. The rock layer thicknesses shall meet the minimum requirements.

9 REVEGETATION

9.1 General

Following topsoil placement, the cover surface and other areas disturbed during reclamation work will be revegetated. This section outlines the requirements for vegetation establishment where required. This section may be revised as necessary based on field requirements and soil nutrient analyses at the time of revegetation.

9.2 Materials Description

The soil amendments, seed mixture, and erosion control materials for revegetation are outlined below. Submittals for each of the following products shall be provided to the Owner for approval prior to use of such products.

9.2.1 Soil Amendments

The proposed application rate may be adjusted up or down based on soil chemical analysis that is conducted prior to placement of the water storage layer.

Biosol® shall be added at a rate 1.5 tons/acre and uniformly spread over the surface of the water storage layer and mixed to a depth of 30 cm. This treatment will be applied after the water storage layer is in-place and before placement of the topsoil-gravel erosion protection layer.

9.2.2 Seed Mix

Species selection for the seed mixture was based on native vegetation found at the site area as well as soil and climatic conditions of the area. Changes to the seed mixture will be as approved by the Owner. The following seed mixture shall be used on all seeded areas.

Table 9.1 – Seed Mixture

Scientific Name	Common Name	Native/ Introduced	Seeding Rate (# PLS/ft^2) †	Seeding Rate (lbs PLS/acre)†
Grasses				
Pascopyrum smithii	Western wheatgrass	Native	6.0	3.0
Pseudoroegneria spicata	Bluebunch wheatgrass	Native	8.0	3.0
Elymus trachycaulus	Slender wheatgrass	Native	5.0	2.0
Elymus lanceolatus	Streambank wheatgrass	Native	5.5	2.0
Elymus elymoides	Squirreltail	Native	7.0	2.0
Thinopyrum intermedium	Pubescent wheatgrass	Introduced‡	1.5	1.0
Achnatherum hymenoides	Indian ricegrass	Native	8.0	4.0
Poa secunda	Sandberg bluegrass	Native	9.0	0.5
Festuca ovina	Sheep fescue	Native	9.0	1.0
Bouteloua gracilis	Blue grama	Native	13.0	1.0
Forbs				
Achillea millefolium	Common yarrow	Native	23.0	0.5
Artemisia ludoviciana	White sage	Native	23.0	0.5
Total			118.0	21.0

†Seeding rate is for broadcast seed and presented as number of pure live seeds per ft^2 & pounds of pure live seed per acre.
‡Introduced refers to species that have been 'introduced' from another geographic region, typically outside of N. America.

Seed shall be purchased as pounds of pure live seed and will be certified by the Utah State Department of Agriculture and Food Certification that the seed is correctly identified and genetically pure. Once the seed is obtained, seed labels will be checked to determine the percent PLS and the date that the seed was tested for percent purity and percent germination. If the test date is greater than 6 months old, the seed must be tested again before being accepted.

9.2.3 Erosion Control Materials

Wood fiber mulch will consist of specially prepared wood fibers and will not be produced from recycled material such as sawdust, paper, cardboard, or residue from pulp and paper plants. The fibers will be dyed an appropriate color, with non-toxic, water-soluble dye to facilitate visual

metering during application. Wood-fiber mulch will be supplied in packages and each package will be marked by the manufacturer to show the air-dry weight.

A tackifier will be used with the wood-fiber mulch to improve adhesion. The tackifier will be a biodegradable organic formulation processed specifically for the adhesive binding of mulch. In addition, the tackifier will uniformly disperse when mixed with water and will not be detrimental to the homogeneous properties of the mulch slurry.

9.3 Work Description

Revegetation efforts shall be directed at all reclaimed and disturbed areas. The goal of the revegetation plan is to ensure that a self-sustaining vegetative community is established.

9.4 Soil Amendment Application

Following the final placement and grading of the frost barrier layer, amendments will be applied as necessary (Section 9.2.1). Organic amendments will be applied based on the nature of organic material used. Inorganic sources of nitrogen, phosphorus, and potassium will be applied to the soil by broadcast spreader. Rates of application will be determined from soil analyses.

9.5 Growth Zone Preparation

A favorable seedbed shall be prepared on the topsoil layer or topsoil-rock mixture, prior to seeding operations. The soil should be loose and friable so as to maximize contact with the seed. The soil will be tilled, following site contours with a disc or harrow (or similar approved equipment) to a maximum depth of 6 inches. The depth of valleys and the height of ridges caused by the final tillage operations are not to exceed 3 inches.

9.6 Seed Application

Seeding will follow the application of soil amendments and seedbed preparation, by broadcast spreading method. This procedure will use a centrifugal type broadcaster, also called an end gate seeder. The broadcasters will have a minimum effective spreading width of 20 feet. Seed will

be applied in two separate passes. One-half of the seed will be spread in one direction and the other half of seed will be spread in a perpendicular direction. This will ensure that seed distribution across the site is highly uniform and also provide the opportunity to adjust the seeding rate if the specified rate is not being achieved. Seeding will not occur if wind speeds exceed 10 mph.

Immediately following seeding, the area will be lightly harrowed to provide seed coverage and to maximize seed-soil contact. Broadcast seed shall be harrowed into the soil to a depth of 0.25 to 0.75 inches.

Seeding will take place as soon as practical after the cover system is in place. Successful seeding in southeastern Utah can occur either in late fall (e.g. October) as a dormant seeding, with germination and establishment occurring the following spring or can be conducted in June, prior to the summer monsoon season. The timing for seeding will be dependent upon the construction schedule for the cover system.

9.7 Erosion Control Material Application

Mulch will be applied immediately following seeding. A weed-free, wood-fiber mulch shall be applied to the seeded area at a minimum rate of 1.0 ton/acre. The wood-fiber mulch will be applied by means of hydraulic equipment that utilizes water as the carrying agent. A continuous agitator action, that keeps the mulching material and approved additives in uniform suspension, will be maintained throughout the distribution cycle.

The pump pressure will be capable of maintaining a continuous non-fluctuating stream of slurry. The slurry distribution lines will be large enough to prevent stoppage and the discharge line will be equipped with a set of hydraulic spray nozzles that will provide an even distribution of the mulch slurry to the seedbed. Mulching will not be done in the presence of free surface water resulting from rains, melting snow, or other causes.

Tackifier may be added either during the manufacturing of the mulch or incorporated during mulch application.

9.8 Performance Standard and Testing

The following section describes performance-based criteria for successful revegetation.

9.8.1 Seeding Rates

Prior to seeding, a known area will be covered with a tarp and seed will be distributed using the broadcaster and simulating conditions that would exist under actual seeding conditions. Seed will then be collected and weighed to determine actual seeding rate in terms of pounds per acre. This process will be repeated until the specified seeding rate is obtained.

During the seeding process, the seeding rate will be verified at least once by comparing pounds of seed applied to the size of the area seeded.

9.8.2 Erosion Control

The cover shall be inspected two times per year for eroded areas. Any area that has experienced erosion shall be backfilled and reseeded. Erosion control materials shall also be reapplied over reseeded areas.

9.8.3 Weed Control

The cover shall be inspected for the presence of weedy species at least two times per year (once in late spring, and once in mid-summer). Weed species should be identified and the approximate coverage should be noted. Spot-spraying of weeds may be necessary to control unwanted species.

9.8.4 Vegetation Establishment Performance

Total vegetative cover sampling shall be performed at a future date to ascertain vegetation establishment success. The revegetation effort shall be deemed successful if the total vegetation cover on the mill tailings cover is at least 70 percent of the total cover of a nearby background reference area for two consecutive years. Areas that do not meet this performance criterion shall be reseeded.

10 REFERENCES

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