PATHFINDER MINES CORPORATION

SHIRLEY BASIN MINE

TAILINGS RECLAMATION PLAN

OCTOBER 1993

VOLUME 2

SUA-442

DOCKET 40-6622

PATHFINDER

A Cogema Resources Company

September 23, 1999

Mr. Mohammad Haque
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety & Safeguards
Mail Stop T 7-J-8
U. S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

Ref: Docket No. 40-6622
License No. SUA-442

Dear Mr. Haque:

Enclosed please find two current sets of the Shirley Basin Tailings Reclamation Plan as you requested. They represent the up-to-date version of the plan with all inserts. Note that any exhibits with a "9-99" revision date designation in the title block have been updated to reflect the five horizontal to 1 vertical reclaimed outslopes on the tailings embankments. Please call me if you have any questions.

Sincerely,

Tom Hardgrove

T. W. Hardgrove
Manager, Environmental and Regulatory Services

Enclosure

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SHIRLEY BASIN MINE
TAILINGS RECLAMATION PLAN

SOURCE MATERIAL LICENSE NO. SUA-442

VOLUME II

SUBMITTED TO:

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PREPARED FOR:

PATHFINDER MINES CORPORATION
SHIRLEY BASIN MINE
SHIRLEY BASIN, WYOMING

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10.0 CONSTRUCTION SPECIFICATIONS AND DRAWINGS

10.1 INTRODUCTION

The construction specifications and drawings include a general description of the methods and procedures to be used in construction of the Mill and Tailings Reclamation Plan. This section serves the dual purposes of: (1) providing necessary construction information to the NRC for their evaluation, and (2) providing a specifications document which can be used by Pathfinder Mines Corporation in soliciting interest by contractors for the construction work, or providing guidance in construction should the work be done in-house. The general format of this section is patterned after a typical construction specifications document with all contractual information eliminated. The term Contractor refers to the person or persons performing the actual construction and may include Pathfinder Mines Corporation personnel or a private contractor. Likewise, the terms Engineer and Engineer's representative refer to those overseeing the construction process and may include Pathfinder Mines Corporation personnel. The Owner described in the text is Pathfinder Mines Corporation.

Pathfinder expects that during construction, minor alterations to the plan will likely occur due to unanticipated conditions in the field. Pathfinder will evaluate such plan alterations to assure that they do not impact the adequacy of the approved plan relative to erosion protection or radon barrier design. If such alterations do not impact the erosion protection or radon barrier design, the alterations will be documented in the as-built construction report. However, if any proposed changes to the approved plan do appear to impact the approved erosion protection or radon barrier design, Pathfinder will submit the evaluation and a revised design to the NRC for review and approval prior to implementing such significant changes.

10.2 DESCRIPTION OF WORK

The major components of work to be accomplished under these specifications include the following:

a. Excavation, haulage and placement of contaminated soil and un-processed ore in the solid tailings area as directed by the Engineer.

b. Excavation, haulage and placement of contaminated materials from the areas northeast of the tailings and west of the mill which are designated as being contaminated by windblown tailings or other mill related activities.

c. Excavation, haulage and placement of contaminated materials from the solution pond area to the No. 4 Pond.

d. Placement and compaction of clay radon/infiltration barrier on areas designated as tailings or requiring protection as tailings.

e. Excavation and placement of cover materials/topsoil from designated stockpiles and borrow areas. Placement and grading of cover material shall be along the contour.

f. Construction of channels and berms to provide for stable drainage including the placement of riprap and filter where required.

g. Crushing, screening and haulage of granite rock to produce an appropriate rock mulch, riprap or filter material.

h. Haulage and placement of bedding material and rock mulch erosion protection on designated areas of the mill and tailings area.

i. Seeding of areas with designated seed mixes.

j. All miscellaneous work required to construct the project and final project clean up.

All construction to be performed under these specifications shall be confined within the right-of-ways and limits of operation shown on the construction drawings or as directed by the Engineer's Representative. All construction performed under these specifications shall be subject to inspection and approval by the Owner or its representatives. Estimated volumes and areas included in the scope of the reclamation are presented below.

Item No.	Item	Unit	Estimated Quantity
1	Contaminated Material Excavation	CY	687,900
2	Radon/Infiltration Barrier Cover Material	CY	1,374,000
3	Topsoil	CY	318,500
4	Large Riprap for Channel Erosion Control	CY	16,400
5	Intermediate Riprap for Channel Erosion Control	CY	7,700
6	Small Riprap for Channel Erosion Control	CY	16,400

7	Rock Filter	CY	27,000
8	Rock Mulch	CY	89,500
9	Rock Mulch Filter	CY	92,200
10	Disking	AC	316
11	Drill Seeding	AC	316

A series of plans are included in this document. The plans indicate the existing surface and design reclamation surface discussed in this document, as well as locations and details of the reclamation features. The plans include:

Title	Exhibit No.
LOCATION MAP OF THE SHIRLEY BASIN MILL AND TAILINGS	10-1
ROCK CHANNEL AREAS AND CHANNEL LOCATIONS FOR THE MILL AND TAILINGS	10-2
RECLAIMED SURFACE COVER AREAS WITH EXISTING TOPOGRAPHY	10-3
CROSS SECTION LOCATIONS AND CROSS SECTIONS	10-4
STREAM PROFILE LOCATIONS AND STREAM PROFILES	10-5
STREAM PROFILE LOCATION NORTH DETAIL	10-6
STREAM PROFILE LOCATION WEST DETAIL	10-7
STREAM PROFILE LOCATION SOUTH DETAIL	10-8

The plans also include the following:

Title	Figure No.
TYPICAL CHANNEL CROSS SECTION	10-1
SKETCH OF CHANNEL CROSS SECTION HCT-1	10-2
SKETCH OF CHANNEL CROSS SECTION HC4-3	10-3
RIPRAPPED END PROTECTION STRUCTURE	10-4
SCHEMATIC OF TYPICAL BERM CROSS SECTIONS	10-5
OVERLAND FLOW ROCK TOE STRUCTURE	10-6
ROCK CHECK DESIGN	10-7

10.3 LOCATION OF THE PROJECT

The project is located approximately 55 miles south of Casper approximately 4 miles east of State Highway 487, northeastern Carbon County, Wyoming. The primary access roads are State Highway 487 and the site access road from Highway 487. The access roads shall be maintained in their present condition by the Contractor. The Contractor shall maintain those existing private access and haul roads so that private access can occur at all times. The Contractor shall provide all signs, barricades, guards, flag persons, construction warnings and night lights in order to protect the public at all times from injury as a result of his operations.

10.4 DEFINITIONS

General

The following definitions are given to help the Contractor interpret and understand the meaning of some of the specialty work involved. They are for information only.

a. Unsuitable Materials - soil or other earthen materials which contain Radium 226 in concentration exceeding 8.0 pCi/gm; or material which may contain other deleterious constituents, or as directed by the Engineer's Representative. Unsuitable material shall not be used as cover material or topsoil.

b. Cover Materials - earthen material which exhibits low levels of radioactivity and other contaminants, which is suitable for use as an engineered cover material.

c. Engineer's Representative - the authorized representative of the Engineer or the Owner who is assigned to the Project site or any part thereof.

d. Ground Controlman - an individual or individuals provided by the Engineer trained in the use of and equipped with a hand held scintillation counter, working with the excavation and placement equipment to assure that the various levels of radioactive materials encountered during construction are properly identified and not placed as cover material or topsoil.

e. Overburden - the term overburden is used in these specifications in reference to any unconsolidated materials lying above bedrock. It shall include both natural formations, fill and all rubble stones or boulders.

f. Mine Waste Materials - any earthen material which has been left at the surface as a result of past mining activities. Certain mine waste material at the site may contain low levels of radioactivity.

g. Original Surface - generally that portion of material beneath any imported materials which exhibits characteristics of being the original undisturbed natural formation.

h. Radioactivity - the spontaneous release of energy or atomic particles from an unstable atom as it decays or changes to a more stable elemental form. For this project, radioactivity is measured in terms of gamma energy levels and pico curies per gram (pCi/gm) Radium 226 (Ra226).

i. Scintillation Counter - a hand held device which measures the gamma energy. Common devices measure gamma energy in terms of Micro R/hr or Counts Per Second (CPS). The Micro R/hr meter is

preferred. Any metering device used by the Contractor must be properly calibrated and approved by the Engineer's Representative.

j. Subsoil - generally, that portion of the overburden below the topsoil extending down to unaltered shale or sandstone, to be specifically defined by the Engineer's Representative for all soil salvage and/or borrow area. Subsoil is classified as Cover Material and may be encountered within the excavation of unclassified soil material.

k. Topsoil - generally, the uppermost Ø" to 6" of overburden to be specifically defined by the Engineer's Representative for all soil salvage and/or stripping. Topsoil material is considered suitable material, but may be stockpiled separately at the direction of the Engineer's Representative.

l. Clay Radon/Infiltration Barrier Soil - Earthen material excavated from designated borrow areas and is placed on tailings areas or areas designated as requiring tailings protection. This material will be placed to stringent compaction standards to assure integrity as a barrier material.

m. Unclassified Material - unclassified material is defined to include rock, sand, soil, wet or dry , that does not exceed the standards set for unsuitable material, that is removed from its present location and is hauled and placed in a new position or location to recontour the land. This material is not suitable for use as clay radon/infiltration barrier material unless specifically designated as such, but can be used as a cover material for non-tailings areas.

1Ø.5 EARTHWORK

Excavation for earth fill shall be made in accordance with this section. The materials are classified into the three major categories described in Section 1Ø.5.1. Excavation shall include all material classifications removed from within the designated areas to the required grades as provided in the plans or as directed by the Engineer's Representative. Excavation for all categories of materials shall consist of the excavation and disposal of all material encountered in the work including the removal and disposal of rocks, boulders, and other detached stones to the required grades shown on the drawings, or as directed by the Engineer's Representative. This work shall also include hauling, placing and grading of embankment fill (categorized as unsuitable materials, cover material and topsoil). Embankment construction consists of: placing approved materials in tailing piles, covering unsuitable materials, along with hauling and placing of approved materials within the designated areas and to the required grades. Selective handling of unsuitable materials, cover material and topsoil during excavation and embankment construction is required.

Material excavated and placed prior to monitoring by the Engineer's ground controlman shall not relieve the Contractor from his obligations to perform the work in accordance with the requirements of the specifications.

If the Contractor wishes to supply ground control personnel they shall be trained in the following subjects:

Radiological Safety

1. Principles and practices of radiation protection.
2. Mathematics and calculations basic to the use and measurement of radioactivity.
3. Biological effects of radiation.
4. Radioactivity measurement standardization, monitoring techniques, and instruments.
5. Accidents and incident procedures.
6. General safety precaution.

Instrument Operation

1. Instrument theory.
2. Operating procedures.
3. Maintenance.
4. Field application.
5. Instrument calibration.

Any metering device used by the Contractor must be properly calibrated and approved by the Engineer's Representative.

Accurate trimming of the slopes will not be required except where specifically stated or in drainageways, channels, ditches, and roads. However, all slopes will be bladed uniformly to provide continuity of and between the various slopes. Excavation and final grading for drainage channels and cover materials on slopes adjacent to the channels shall be within ±8% of the design slope and shall be within ±Ø.3 feet of the design elevation in areas where the channels merge with existing channels. In general, embankment and excavation areas shall be constructed to minimize deviation of slope from those shown on the plans. For areas under tailings protection which will not be covered with rock mulch, the required grade control is very rigid. The following grade control is prescribed only for the non-rock mulch areas under tailings protection criteria. For slopes less than or equal to Ø.ØØ5 ft/ft, maximum allowable deviation is Ø.ØØ1 ft/ft. For slopes greater than Ø.ØØ5 ft/ft and less than or equal to Ø.Ø25 ft/ft, maximum allowable deviation is Ø.ØØ2 ft/ft. For slopes greater than Ø.Ø25 ft/ft and less than or equal to Ø.Ø5 ft/ft, maximum allowable deviation is Ø.ØØ3 ft/ft. For slopes greater than Ø.Ø5 ft/ft, maximum allowable deviation is Ø.ØØ4 ft/ft. Excavation of the pre-disturbance land surface, topsoil, final grading for pilot channel and suitable material encountered in the excavation or other excavation requiring a high degree of selectivity will only be

conducted during daylight hours or as directed by the Engineer's Representative. Placing cover material and topsoil shall be performed during daylight hours.

10.5.1 Excavation and Placement

The Contractor shall excavate, haul, place, and grade the materials as shown on the grading plans or as directed by the Engineer's Representative. The materials to be excavated are categorized as follows:

1. Unsuitable Materials
2. Cover Material
3. Topsoil

The rock riprap, rock mulch, and filter materials are discussed in a following section.

Periodically, during the excavation and placement of material, a ground controlman supplied by the Engineer's Representative will monitor the level of radioactivity and other properties of the materials being excavated and assist Contractor personnel by identifying the materials. Selective excavation and placement of these materials to the lines and grades shown on the drawings and as directed by the Engineer's Representative is the sole responsibility of the Contractor. Material excavated and placed without monitoring by the ground controlman shall <u>not</u> relieve the Contractor from his obligations to perform the work in accordance with the requirements of the specifications.

Topsoil shall be obtained from existing stockpiles. Classification of other soils suitable for topsoil will be at the discretion of the Engineer's Representative.

10.5.1.1 Unsuitable Materials

Unsuitable materials may result from natural concentrations of radioactive elements from spillage, leaching, etc. of radioactive materials into existing surficial materials. Material will be considered unsuitable for cover material or topsoil if the level of radioactivity exceeds 3.0 pCi/gm radium 226 or as directed by the Engineer's Representative. Excavation of these materials shall be completed in a very selected manner so as to excavate only the unsuitable materials with minimal disruption to suitable materials surrounding or underlying the unsuitable materials. Excavation shall be as accurate as possible and shall be within ±0.3 feet where an accurate boundary can be established in the field.

Unsuitable materials encountered within the required excavation areas shall be handled in accordance with the following procedures.

a. All unsuitable materials encountered shall be identified with pin flags and documented by size, location, gamma energy, etc.

b. Unsuitable material will be removed and placed in an approved disposal area or stockpiled for later disposal as directed by the Engineer's Representative. Stockpiling for the Contractor's convenience of scheduling work shall not be measured.

c. The Engineer's ground controlman will inform the Contractor of any area which meets the parameters stated in Item b prior to excavation of said area.

10.5.1.2 Cover Material

Cover material is clay or sand from the overburden piles which does not exhibit unacceptable levels of radioactivity. The suitability of this material, encountered during the excavation of a borrow area, for cover will be determined by the Engineer's Representative. Specific materials properties are discussed in Section 11.2.

Estimated boundaries for cover material borrow area are shown on the plans; actual boundaries of cover material will be defined in the field by the Engineer's Representative and/or the Contractor. Prior to the start of excavation the Contractor and Engineer's Representative shall make exploratory excavations for the purpose of identifying sources and depths of cover material. Cover material shall be excavated by the Contractor and placed at the locations and to the lines and grades shown on the drawings and as directed by the Engineer's Representative. Excavation shall be as accurate as possible and shall be within $\pm$0.3 feet where an accurate boundary can be established in the field. Final contours in borrow areas will vary depending on volumes of materials required.

Cover material shall not be wantonly wasted or contaminated by the Contractor's construction activities. The Contractor is responsible to obtain the Engineer Representative's approval prior to wasting or stockpiling potential cover material. Cover material contaminated and declared unsuitable for replacement as cover material as a result of the Contractor's construction activities shall be replaced at the Contractor's expense.

10.5.1.3 Topsoil

Topsoil consists of any soil suitable for the growth of grass or other cover crops reasonably free from hard dirt, rocks, and materials which inhibit the germination of seeds or growth of cover crops. Classification of soils suitable for topsoil will be at the discretion of the Engineer's Representative.

Topsoil placement locations include all areas on the tailings surfaces that are planned for topsoil cover and surrounding areas where topsoil will be replaced following cleanup. The actual locations of topsoil stockpiles are shown on the plans or will be defined by the Engineer's Representative and the Contractor.

Topsoil shall not be wantonly wasted or contaminated by the Contractor's construction activities. The Contractor is responsible to obtain the Engineer Representative's approval prior to wasting or stockpiling potential topsoil. Topsoil contaminated and declared unsuitable for replacement as topsoil as a result of the Contractor's construction activities shall be replaced at the Contractor's expense.

10.5.2 Placement and Construction Methods

10.5.2.1 Unsuitable Material

The unsuitable material shall be excavated to the neat lines and elevations in accordance with radiometric surveys and the grading plans prior to placement of cover material.

The unsuitable material can be placed in the tailings areas below the cover material elevation. Grading and related operations shall be conducted such that terrain outside the slope limits and designated haul routes are not disturbed.

Density requirements will not apply to areas of fill in the tailings and for placement of the topsoil. In all areas, each lift shall be placed in approximately horizontal layers, leveled and smoothed using suitable leveling equipment to a thickness of 12± inches uncompacted. The Contractor shall conduct the placement in such a manner, as approved by the Engineer, to obtain the maximum wheel rolling by earth hauling equipment as practical. Equipment shall be routed over these layers to distribute the equipment traffic evenly over the entire fill areas. Accurate trimming of these fill areas will not be required but the slopes shall be constructed reasonably close (±0.5 feet) to the established lines and grades as shown on the plans or staked by the Engineer.

Finish work shall be done in proper sequence with other operations involved. Cut slopes shall be blended with adjacent terrain by rounding the top of slopes, erosion control ditches

constructed, and inslopes and backslopes trimmed to eliminate unsightly humps or hollows.

10.5.2.2 Cover Material

Two cover material configurations are specified for use on the tailings and the area where each cover configuration is presented on Exhibit 10-3. The first cover configuration consists of 2.5 feet of clay and 0.5 feet of upper sandy material and the second cover configuration consists of 3.0 feet of clay and 0.5 feet of upper sandy material. The mill area will be covered with the first cover configuration.

All cover material placement shall be constructed with moisture and density control. For those areas requiring moisture density control, the moisture content of the soil at the time of compaction shall be within plus 2 or minus 2 percentage points of the optimum moisture content as determined by ASTM D-698 (Standard Proctor). Field Density tests will be made in accordance with ASTM D-1556 (Sand Cone Method) or ASTM D-2922 (Nuclear Method) by the Engineer's Representative. Frequency of testing and calibration/ correlation tests are discussed in Section 11.2.

Clay cover material requiring moisture density control shall be constructed of approved materials compacted to not less than 95 percent of maximum density (Standard Proctor). Compaction will be by sheepsfoot roller or other methods as approved by the Engineers Representative.

Cover material requiring moisture density control shall only be placed when ambient temperatures permit the placement and compaction of the materials to specified densities without frost damage. Sustained periods of freezing that induce frost into previously placed materials or material being placed shall be cause for suspending work on such embankments.

Those areas where moisture density control for cover material is required shall be placed in horizontal layers of approximately six inch thickness, thoroughly mixed to provide uniform moisture distribution and compacted as specified before the next layer is placed. Effective spreading equipment shall be used on each lift to obtain a uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulation will be required to insure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. Moisture conditioning will be performed in the borrow area to the extent practicable. Construction equipment shall be routed uniformly over the entire surface of each layer.

10.5.2.3 Topsoil

The characteristics of the soil at the final graded surface along with the quantities of cover and topsoil encountered will be evaluated by the Engineer's Representative to determine the final combined depths of topsoil to be replaced. All topsoil, except that which is salvaged during reclamation, shall come from existing stockpiles.

Areas used as haul routes during execution of grading shall be scarified prior to placement of cover material/topsoil.

Stripping and Storing Topsoil. Stripping of topsoil shall be conducted in excavation areas as directed by the Engineer's Representative. This material will be stockpiled as directed by the Engineer's Representative.

Placing Topsoil. Topsoil shall be taken from existing stockpiles or piles stockpiled during excavation and placed in approximately horizontal layers parallel with the contours on sloping areas over the reclamation surface to a maximum depth of eight (8) inches or as directed by the Engineer's Representative. Topsoil will not be excavated or spread when excess moisture is present in the soil which may result in clodding, rutting or excess moisture conditions. Frozen topsoil shall not be placed and shall be cause for suspending work of topsoil placing.

10.5.3 Construction Sequence and Special Requirements

This section describes the general construction sequence for each individual area considered necessary to achieve the overall reclamation goals for the project. This section is not intended to release the Contractor of any obligation to provide a comprehensive schedule of work, but is rather provided to increase the Contractor's understanding of the project.

The general sequence of events for this project are as follows:

1. Clean up mill area that is not to be reclaimed in place, No. 3 pond that is not to be used for byproduct waste disposal, ore pad and windblown areas to remove all unsuitable materials and place them in the tailings area below the bottom cover material grade.

2. Complete grading operations to achieve subgrades before placement of cover material in the tailings and mill areas.

3. Placement of cover material.

4. Erosion control ditch and berm construction.

5. Installation of all required riprap, rock mulch and topsoil.

6. Disking to prepare seedbed.

7. Seeding & Mulching.

The following paragraphs are not intended to reflect a specific sequence of construction.

10.5.4 Tailings

The grading overview for the project area is to stabilize the tailings through placement of a rock mulch protection layer or through construction of low slopes to form a stable site drainage pattern.

As shown on the volume and area summary table presented in Section 10.2, an estimated 1,374,000 CY of cover material is needed to form an adequate cap on the tailings and mill area. Approximately 1,158,000 CY of this material is clay and the remaining 215,000 CY is coarser (sandier material).

The Contractor shall coordinate his grading activities to control and prevent soil erosion that will adversely affect construction operations or damage adjacent properties. Temporary erosion control measures may involve the construction of temporary berms, dikes, dams, sediment basins, silt fences, and other temporary control devices or methods as necessary to control erosion along with limiting the surface area exposed to erosion.

The Contractor shall incorporate all permanent erosion control features into the project at the earliest practicable time. Permanent erosion control features include ditches and berms, disking, seeding, and riprap installation. All areas disturbed during grading of the mill, tailings and solution pond areas shall have permanent erosion control features.

The Contractor will be required to install, maintain, and provide dust control for haul roads, excavation and embankment areas, and maintain site drainages for the project duration. Haul roads shall be removed upon completion of final grading and acceptance by the Engineer's Representative.

10.5.5 Dust Control

The Contractor shall provide dust control measures for health, safety and convenience, the reduction of the dust nuisance to

adjacent ongoing projects, and to minimize wind erosion. The measures shall consist of the application of water to the disturbed surfaces. Water shall be uniformly applied in a fine spray by means of controllable pressure and spray bars or nozzles; and in such a manner that will avoid ponding or overwetting.

The Owner will be responsible for furnishing the construction water source.

10.6 EROSION CONTROL

This work shall consist of mining, crushing (if required), screening (if required), hauling and installing rock mulch erosion protection, permanent erosion control ditches and berms, rock-lined channels, and riprap aprons at the locations shown on the plans or as directed by the Engineer's Representative. Figures 10-1 through 10-4 and the plans present detail of the rock channels. The profile of each channel is presented to show the slope of the channels. Exhibit 10-5 shows the location of the profile with station numbers for positioning on the profiles. Exhibits 10-6 and 10-7 present the channel profiles. Exhibit 10-2 presents the locations of the end protection that is shown on Figure 10-4. End protection was placed at the downstream rock areas below HC5-5, HCT-3, HC5-14 and the discharge point for the No. 5 dam outslope. The slopes of the channels downstream of the remainder of the rock sections are small and, therefore, head cutting into these rock channels should not develop. Rock toe protection will be placed as shown on Exhibit 10-2. The riprap, rock mulch and the filter material will be mined, crushed, screened (if required), and hauled from the granite quarry. Figure 10-5 presents the dimensions of a typical berm. These berms will be covered with rock mulch to ensure their long-term stability. The exact length and location of erosion control ditches and berms, and all riprap structures shall be at the direction of the Engineer's Representative.

10.6.1 Riprap for Erosion Control

10.6.1.1 Materials

Rock used for riprap shall be sound and durable, free from organic material, clay or shale seams, cracks, or other structural defects. Rock may be angular or sub-angular, but must be examined, approved, and placed in locations as specified by the Engineer. Broken concrete shall not be acceptable. Rock with a measurable fraction of stones with a greatest dimension/smallest dimension ratio greater than 3 will be placed in a manner that orients individual stones to provide a reasonably uniform surface. The rock surface will be free of protruding stones.

The rock must be obtained from a source which has legally procured a DEQ/LQD Mine Permit. The Owner shall furnish the Engineer and Contractor with a copy of this permit prior to riprap placement.

10.6.1.2 Material Testing

The suitability of material for use as riprap shall be determined by the Engineer's Representative prior to construction of riprap structures.

Additional rock durability testing will be required during construction and will be based on rock volume from each source and for each gradation. The Owner will be responsible for the rock testing.

A sample of at least 200 pounds of the stockpiled material shall be provided to the Engineer for testing. The costs of required testing shall be borne solely by the Owner. The rock will then be scored by the Engineer's Representative according to NRC durability scoring criteria (NRC, 1990). Based upon this scoring, the rock may be subject to approval for placement, restrictions on where the rock can be placed, additional processing and durability testing, or rejection.

10.6.1.3 Gradation

A total of four (4) rock gradations are specified for Shirley Basin mill, tailings and solution pond areas. The largest riprap specified has a D_{50} of 1.2 ft. The second riprap gradation has a minimum D_{50} of 0.60 ft. and will consist of crushed granite. The third gradation will have a minimum D_{50} of 0.4 ft and will be crushed granite. The fourth gradation is intended for rock mulch areas and will have a minimum D_{50} of 0.150 ft. and will be taken from the granite quarry area. Larger rock gradations may be substituted for smaller rock if the gradation criteria discussed in a following section are met. Slight adjustments in riprap specifications and placement thickness may be necessary based on availability.

General riprap gradations are subject to the availability of materials. The design D_{50} is the specification of primary concern and all rock must meet or exceed the specific D_{50} for a channel or mulch area as designated by the Engineer. The design D_{50}'s presented above are target D_{50}'s to enable general use of the rock

gradation in specified areas. Failure to meet the design D_{50} as indicated may place restrictions on where the rock can be used. The rock thickness will be equal to or greater than 2.0 times the D_{50}, or the D_{100}, whichever is greater. For rock mulch areas, the thickness requirement based on the D_{100} may be waived if a relatively smooth, contoured surface can be produced with the available rock. The minimum rock placement thickness is 3.6 inches.

Control of gradation will be by visual inspection and periodic testing as specified in section 11.5. The Contractor shall provide a sample of each size of riprap at the stockpile site of at least five (5) cubic yards meeting the specified gradation and typical of stockpiled material and the sample shall be used as a reference for judging the gradation of the riprap supplied.

10.6.1.4 Construction Requirements

No riprap material shall be placed until the foundation has been excavated, prepared and has been approved by the Engineer's Representative. Slopes on which riprap is to be placed shall be accurately cut to grade. The slopes shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. All soft and spongy material shall be removed as directed by the Engineer's Representative and replaced with approved materials. The approved slope shall be thoroughly scarified and compacted to the density specification as described in Section 11.2. Outside of the covered tailings area, the slope must be approved by the Engineer's Representative.

10.6.1.5 Riprap and Rock Mulch Placement

All Structures - General.

Stone for riprap or rock mulch shall be placed by methods that will produce a compact uniform mass of riprap having a reasonably uniform surface. Riprap shall be placed to its full thickness in one operation and in a manner to avoid displacing the underlying material. Placing of riprap materials by end dumping on the slope or by other methods likely to cause segregation or damage to the slope will not be permitted. Damage or displacement of the aggregate filter blanket shall be repaired prior to riprap placement.

A survey will be conducted prior to placement of filter, rock riprap or rock mulch. This survey will be conducted on a 50-foot by 50-foot grid over the reclaimed tailings impoundment top and will be used to develop as-built drawings. In addition to this, the center-line of channels on the tailings area will be surveyed on 100 foot centers and a minimum of 10 additional survey locations will be placed at each channel control section location. A fill stake will be placed at each survey location. Each fill stake will be clearly marked with the required thickness of filter(s) and rock. Fill stakes located in a channel will also have a maximum fill mark at 120% of the total required rock and filter thickness. The fill stakes will be of a design that will insure at least 25% of the stakes survive the construction process. Prior to placement of rock or filter, the survey results will be compared to design topography. Any significant deviation from design topography will be evaluated in terms of adequacy of the erosion protection. If additional analysis of rock sizing is needed, this analysis will be documented and submitted to the NRC prior to placement of the rock in question.

Channel filter and riprap thickness will be verified by use of fill stakes in the construction process. Following placement of the channel riprap, surviving channel fill stakes will be checked to insure fill thickness is between the 100% and 120% marks on the stakes. If the thickness is less than 100% of the required thickness or greater than 120% of the required thickness, rock will be added or removed as necessary. A minimum of 5 fill stakes will be used to evaluate the rock placement at channel control section locations.

Rock mulch and filter thickness will be verified by the use of fill stakes during the construction process. Following placement of the rock mulch, the surviving rock mulch fill stakes will be checked to insure that the fill thickness is a minimum of 100% of the required fill thickness and that no flow-diverting or flow-concentrating features result from rock mulch fill greater than 100% of required. If the total fill is measurably greater than the fill stake mark, the depth of excess fill will be measured (with a tape measure) and recorded. There is no upper limit on rock mulch fill, but adjacent fill measurements will be compared to assure that excess fill is uniform and that no undulations in the surface are present. Allowable deviations in fill thickness will be evaluated on the basis of differences in thickness between adjacent stakes. Assuming that the surviving stakes are 50' apart, the allowable difference in thickness between stakes will be limited to a maximum of 40% of the design thickness. If the surviving stakes are 100' apart, the allowable difference in thickness between

stakes will be limited to a maximum of 60% of the design thickness. It should be noted that the limitations apply only to the differences or deviations in thickness between adjacent stakes, not to the thickness itself. As an example, if measurements indicate that excess fill for a 3 inch thick rock mulch layer at one stake location is 2.4 inches (180% of required), excess fill at all adjacent 50-foot stakes must be in the range of 1.2 to 3.6 inches (140% to 220% of required). When applied to all surviving fill stakes, this method will not limit placement of excess rock, but will assure that it is done in a relatively uniform manner.

10.6.1.6 Aggregate Filter Blanket

Crushed granite filter material will be placed as bedding for all rock. The crushed granite filter may consist of a dual filter or single filter design. Minimum placement thickness for the filter is 2 inches/filter layer.

The filter material will be placed at a minimum thickness equivalent to the rock mulch thickness for rock mulch areas, a minimum thickness of nine inches for channel riprap depths of up to 1.0 ft, and at a thickness of 1.0 ft for channel riprap thickness greater than 1.0 ft.

If a dual filter design is specified, the lower filter material may consist of a coarse sand and gravel or other specified material and will not be subject to a maximum fines content or quality considerations. The upper filter material will consist of crushed and processed granite and will be subject to gradation criteria as discussed in section 11.4 and will be subject to quality considerations. Maximum placement thickness for the lower filter material will be 4 inches with the remainder of the required filter thickness consisting of the crushed and processed granite.

All material comprising the upper filter of a dual filter design or a single filter design shall be composed of tough durable particles reasonably free of thin, flat or elongated particles, and shall not contain any organic matter.

10.6.1.7 Placement of Aggregate Filter

Aggregate filter blankets shall be one or more layers of gravel, crushed stone, rocks or sand as shown on the plans. The aggregate filter blanket shall conform to the gradation limits given in section 11.4.

10.6.2 Erosion Control Berms

Berms shall be constructed so that they conduct water safely to areas of low slope or as directed by the Engineer. Berms are included as integral parts of the drainage system and should be constructed according to criteria for the surrounding area. Berms are considered subsidiary to surface contouring and are not separated for the purpose of measurement.

Berms shall be constructed in maximum six inch lifts and compacted to 95% Standard Proctor within ±2% of optimum moisture. Berms will be covered with topsoil or rock mulch and filter as presented in the plans and specifications.

10.7 REVEGETATION

This work shall consist of furnishing all labor, equipment, and materials necessary to complete the rough grading, seedbed preparation, and seeding of the topsoiled surface as required by these specifications. Disking will be done prior to seeding.

Areas disturbed during construction, including cut and fill areas, will be reclaimed and revegetated in accordance with these specifications and in conformance to the plans. Exceptions to the above areas such as roads, trails, and operating areas may be broadcast seeded as directed by the Engineer's Representative.

10.7.1 Materials

Materials shall meet the requirements listed in this section.

10.7.1.1 Grass Seed

All seeds shall be furnished in containers and shall be plainly labeled showing:

a. The commonly accepted name of the kind and variety of seed.
b. The full name and address of the supplier.
c. The percentage of pure seed, crop seed, inert matter, weed seeds by weight, germination and hard seed.
d. The month and year of the germination test.
e. Origin of the seed.

f. Lot number.
g. Name and number of each kind of secondary noxious weed seeds as listed in Wyoming Seed Law. Seed shall not contain any of the primary noxious weed seeds as designated by the Wyoming Seed Law.
h. Net weight of seed in each container.

Prior to seeding, the Contractor shall furnish to the Engineer duplicate copies of a certification signed by the vendor, certifying that each lot of seed has been tested by a recognized State Seed Testing Laboratory or by a commercial laboratory employing a certified seed analysis technician(s). The seed must have been tested not more than nine months prior to the date of seeding on the project.

The Contractor shall also furnish to the Engineer duplicate copies of the seed analysis reports as prepared by the respective Seed Testing Laboratory. A Tetrazolium Viability Test will be accepted in lieu of the germination portion of the Service Sample Seed Analysis Report as prepared by the respective testing laboratory.

The total percentage of "crop seed" shall not exceed three (3%) percent by weight.

All seed must be certified, and planting rates stated are for the pure live seed (PLS). Bag tags shall be submitted to the Engineer from all seed bags used on the project.

All seed must be in good condition prior to planting.

10.7.1.2 Seed Mixture

	PLS/ACRE (lbs.)
Western wheatgrass (Agropyron smithii) "Rosana"	2.0
Thickspike wheatgrass (Agropyron dasystachyum) "Critana"	2.0
Streambank wheatgrass (Agropyron riparium) "Sodar"	2.0
Bluebunch wheatgrass (Agropyron spicatum) "Secor"	2.0
Beardless wheatgrass (Agropyron inerme) "Whitmar"	2.0
Green needlegrass "Lodorm"	2.0
Basin wild rye (Elymus cinereus) "Magnar"	2.0
Smooth brome (Bromus inermis) "Manchar"	2.0
	16.0 lbs

10.7.1.3 Pure Live Seed (PLS) Calculation

This is a method of calculating an amount of seed to be planted which takes into account the variation of seed germination and purity of the seed source.

Pure live seed (PLS) = % Germination x % Purity

Example:
A recommended seed mixture requires that 5 lbs. (PLS) of Intermediate Wheatgrass be planted

Intermediate wheatgrass germination = 80%
Intermediate wheatgrass purity = 90%
80% x 90% (PLS) = 0.72

$$\frac{\text{5 lbs. (PLS) to be planted}}{\text{0.72 (PLS factor)}}$$ = Approximately 7 lbs of bagged seed should be included in the mixture so that 5 lbs of PLS will be planted

10.7.1.4 Rate of Seed Application

Prior to general seeding activities, test plots shall be established for the initial seeding in order to calibrate the mechanical seeders and insure the proper seed application rate. Calibration shall be accomplished in the presence of the Engineer's Representative and recalibration may be required as directed by the Engineer's Representative. Maintaining the proper seed application rate shall be the responsibility of the Contractor.

10.7.1.5 Mulch

Dry mulch shall consist of small grain straw or native hay. All dry mulch shall be free of noxious weeds or other seed-bearing weeds that would be detrimental to the seeded area.

10.7.2 Construction Requirements

Prior to seeding, the slopes to be seeded shall be completed to the designated line and grade. Topsoil shall be uniformly spread on the prepared slopes in accordance with Section 10.5.2.

Prior to seeding, the entire seed bed shall be disked horizontally (level to the eye) to a depth of approximately 8 inches, leaving definite furrows, and left in an uncompacted, workable condition for seeding. If any damage by erosion or other causes before beginning reclamation activities, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage. Agronomic activities shall only be done when the soil and environmental conditions provide an acceptable seed bed for plant growth. This may necessitate delaying seeding and mulching until soil and environmental conditions are suitable.

10.7.2.1 Time of Seeding

Seeding shall be completed in dry weather between September 1 and November 30, or during spring when moisture conditions will allow. In no case shall seeding be conducted when the soil moisture is high enough to allow excessive compaction of the soil during the seeding operations as determined by the Engineer's Representative.

10.7.2.2 Seeding Methods

A rangeland drill shall be used for all seeding. Rangeland drills equivalent to Laird or Metal Master range drills are required. Lighter duty "rangeland" drills, grain drills, and grass drills, are not acceptable. The drill shall have individual drill row assemblies with spacing not to exceed eight inches and down pressure of one hundred fifty (150 lbs) pounds or greater, an angle of approximately thirty (30°) degrees from a line parallel to drill movement for each disk, and shall accurately place seed to a depth of one-half (0.5") inch, plus or minus one-quarter (0.25") inch. It shall be equipped with cover chains to cover seed after drilling.

10.7.2.3 Preservation of Seeded Areas

The Contractor shall protect seeded areas from damage by traffic or construction equipment through to final acceptance. Any area damaged by these activities or causes will be repaired.

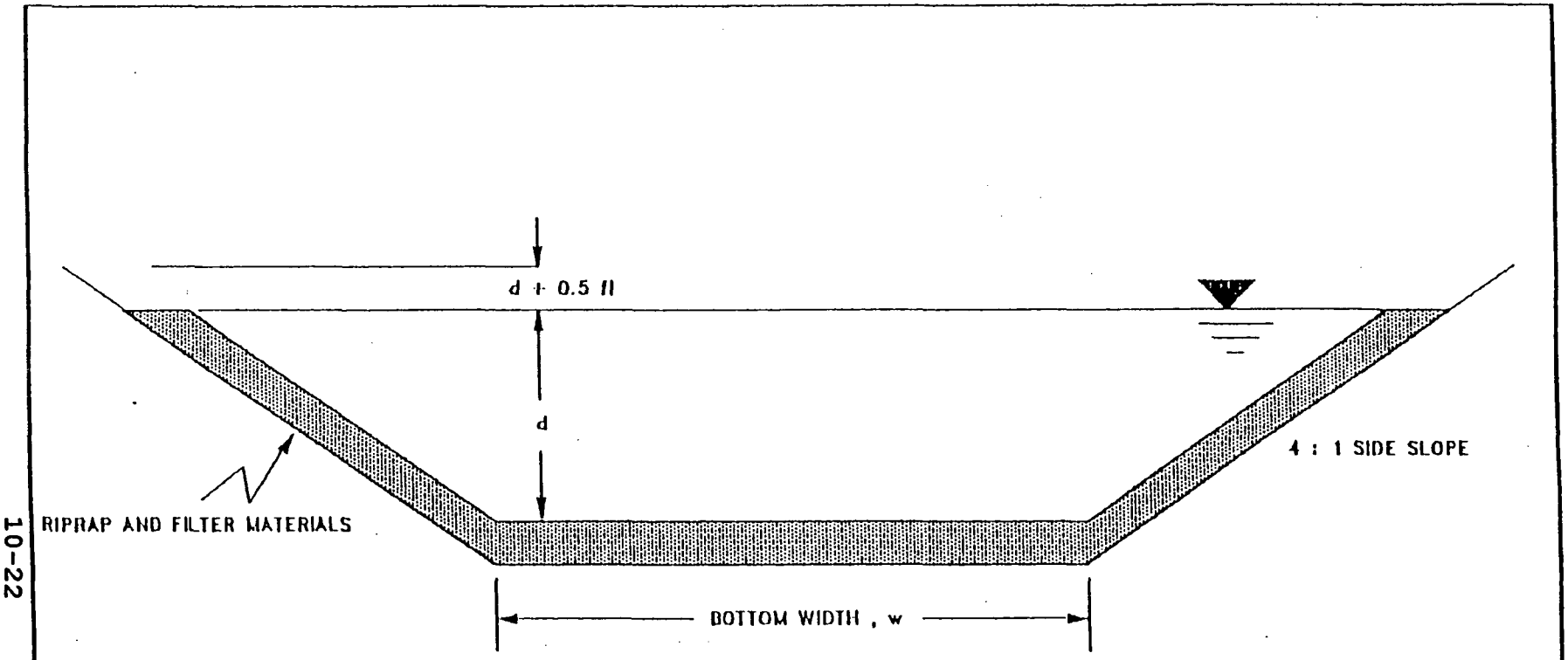


FIGURE 10-1. TYPICAL CHANNEL CROSS SECTION.

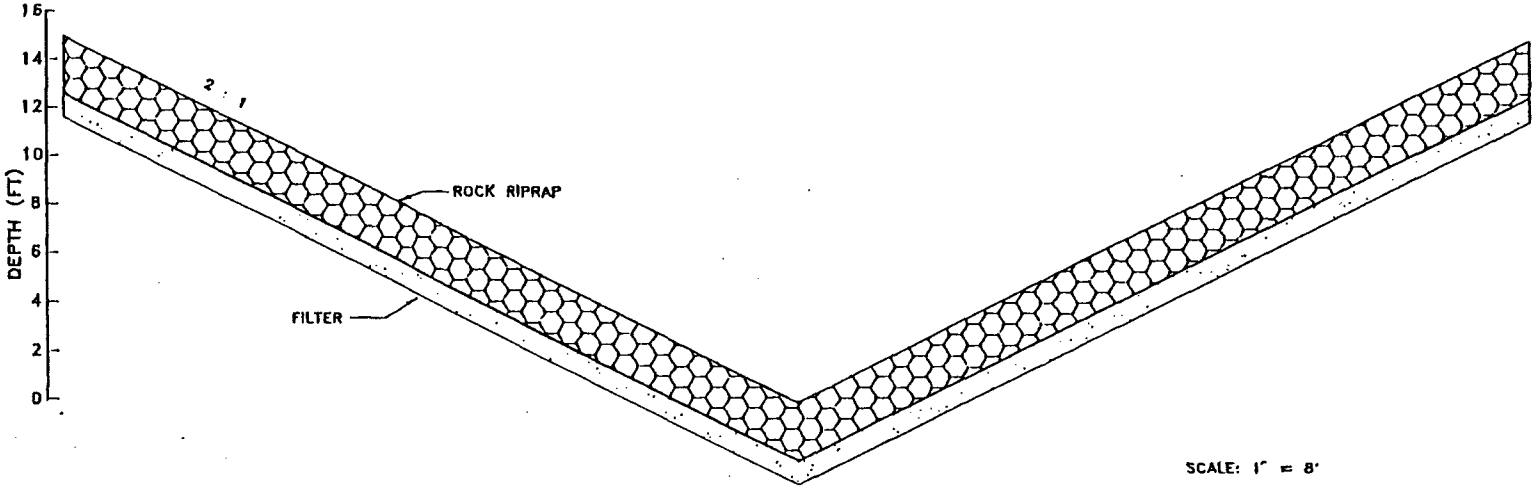


FIGURE 10-2. SKETCH OF CHANNEL CROSS SECTION HCT-1.

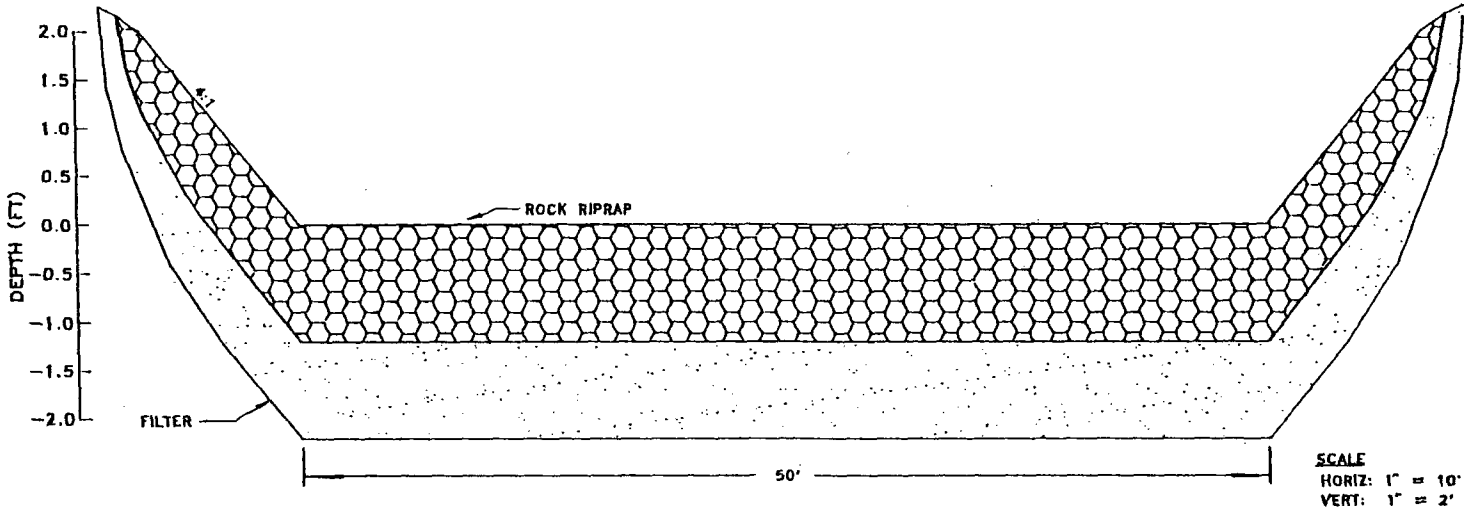


FIGURE 10-3. SKETCH OF CHANNEL CROSS SECTION HC4-3.

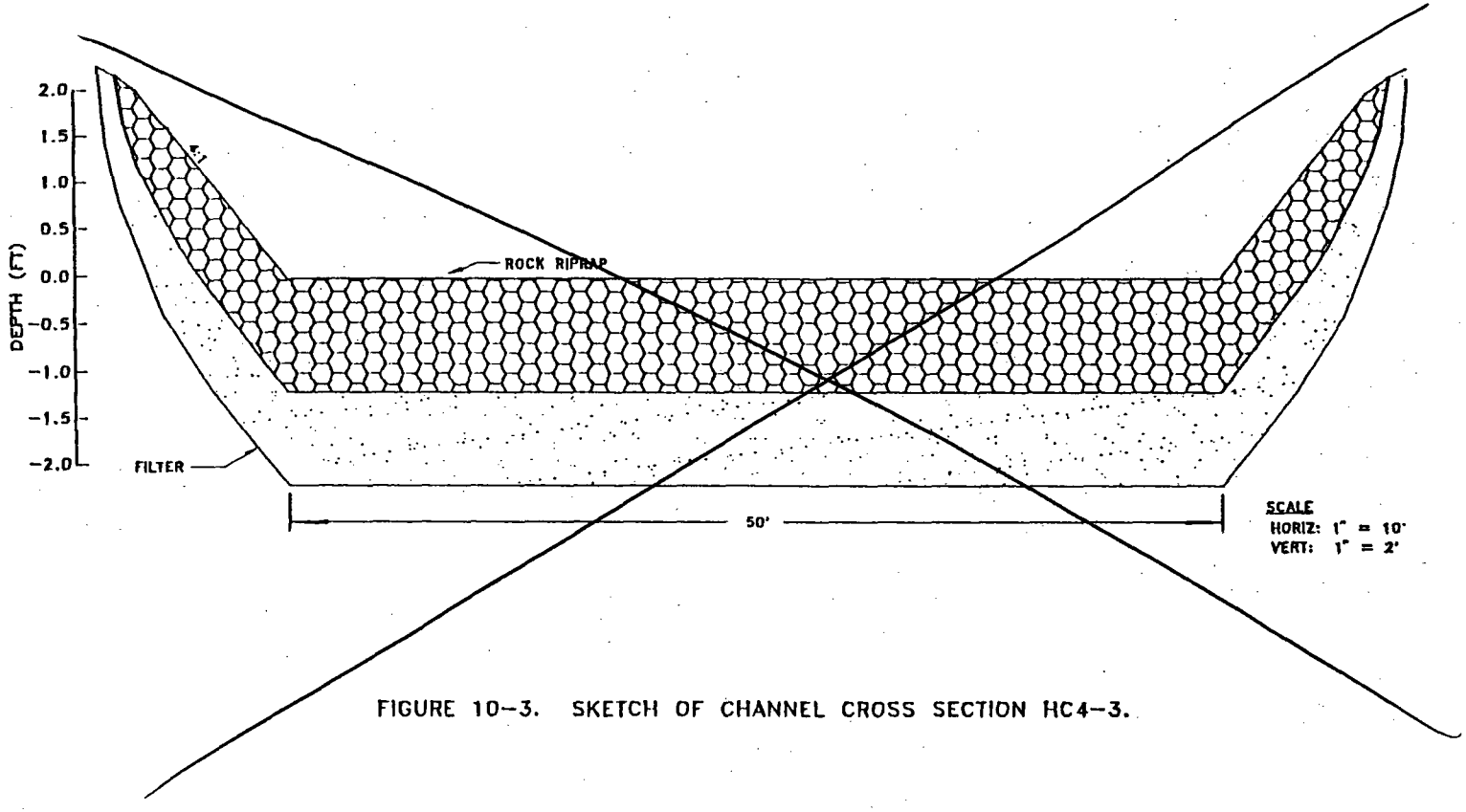
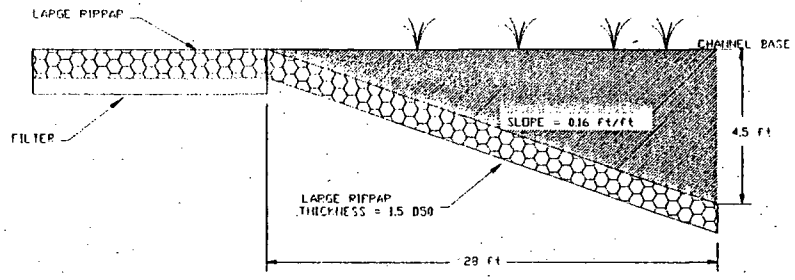
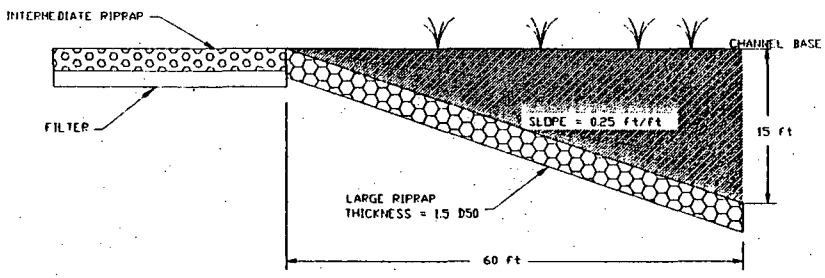


FIGURE 10-3. SKETCH OF CHANNEL CROSS SECTION HC4-3.

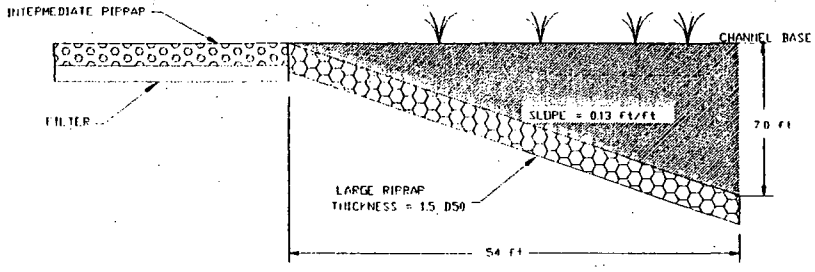
CHANNEL H END PROTECTION



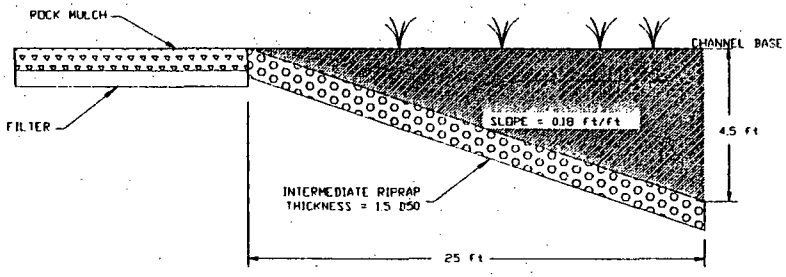
CHANNEL N END PROTECTION



CHANNEL Q END PROTECTION



SUBBASIN 5-4 END PROTECTION



(NOT TO SCALE)

FIGURE 10-4. RIPRAPPED END PROTECTION STRUCTURES.

(Revised 05/20/96)
(Revised 11/24/97)

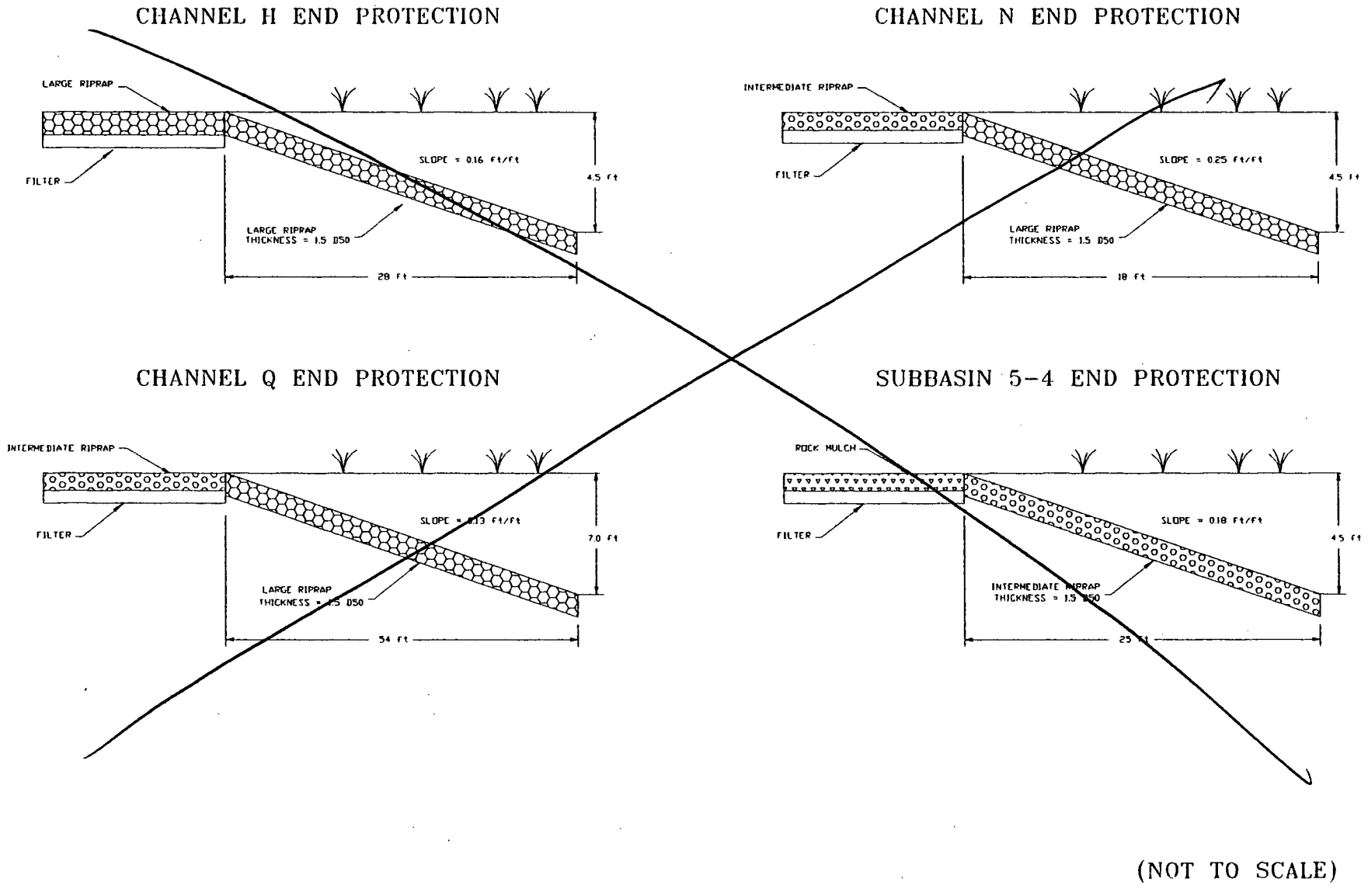
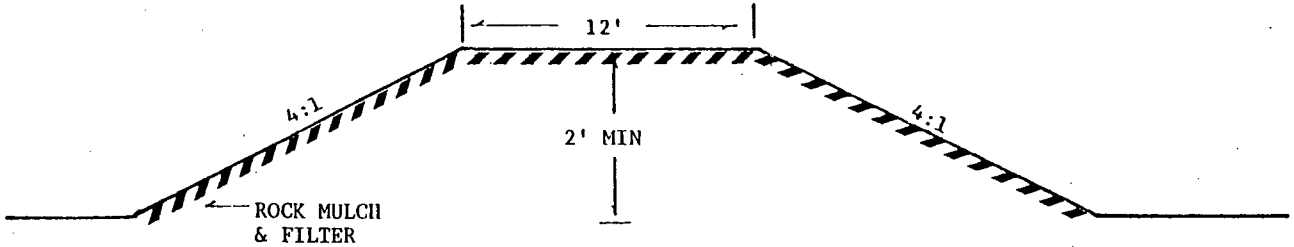
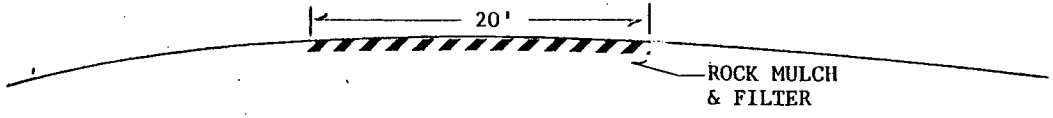


FIGURE 10-4. RIPRAPPED END PROTECTION STRUCTURES.



TYPICAL BERM CROSS SECTION
NEAR CHANNEL

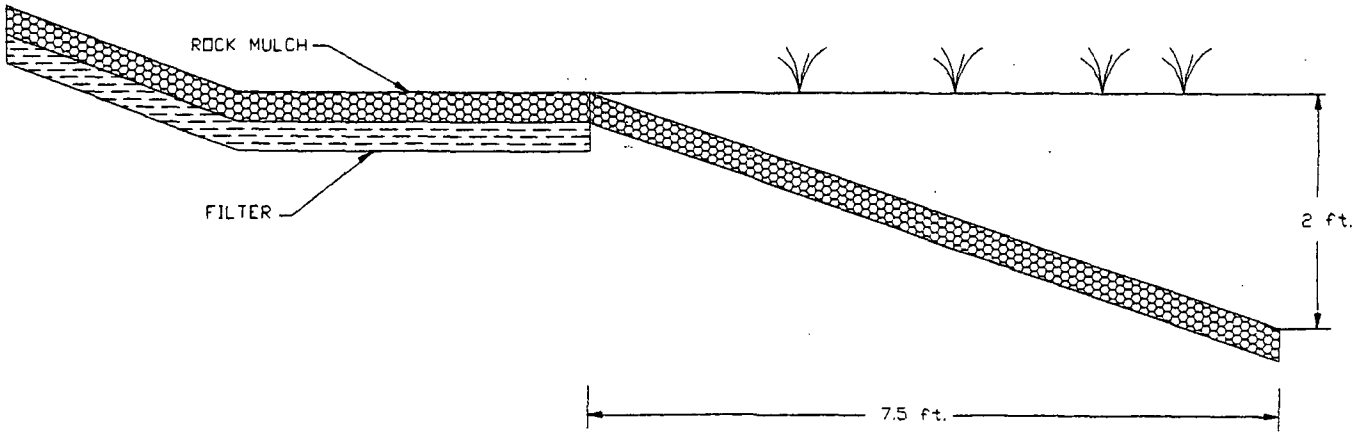
HOR. 1" = 10'
VER. 1" = 5'



TYPICAL BERM CROSS SECTION
AWAY FROM CHANNEL

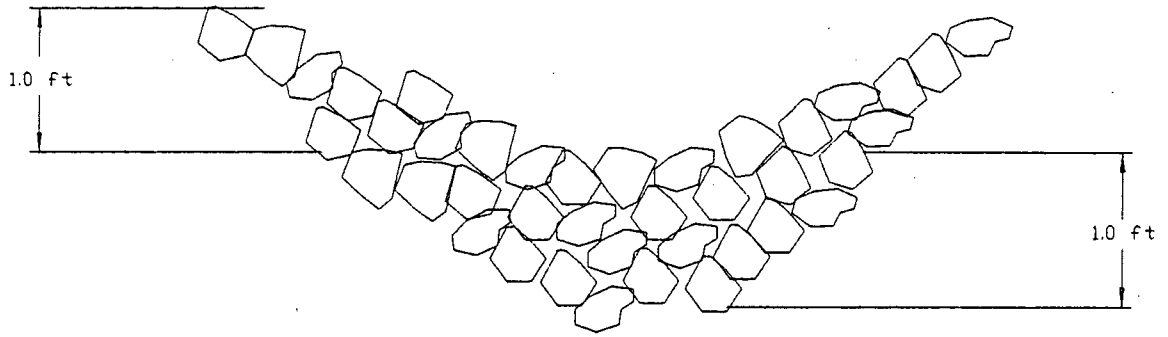
NOT TO SCALE

FIGURE 10-5. SCHEMATIC OF TYPICAL BERM CROSS SECTIONS.



(NOT TO SCALE)

FIGURE 10-6. OVERLAND FLOW ROCK TOE STRUCTURE



LOOKING DOWNSTREAM

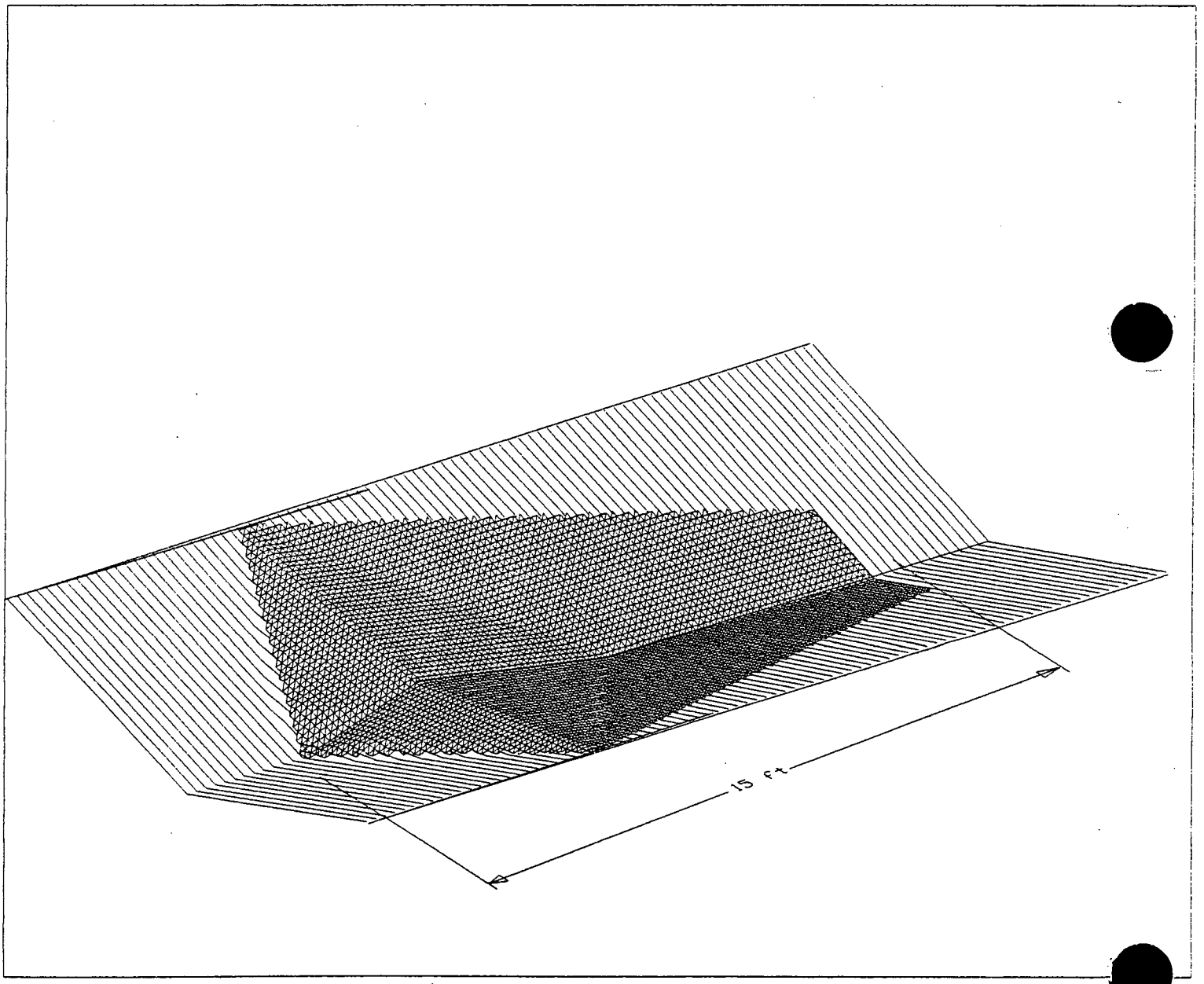


FIGURE 10-7. ROCK CHECK DESIGN

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

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DRAWING NO.: EXHIBIT 10-1, "LOCATION MAP OF THE SHIRLEY BASIN MILL AND TAILINGS"

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D-01

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

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DRAWING NO.: EXHIBIT 10-2, "ROCK CHANNEL AREAS AND CHANNEL LOCATIONS FOR THE MILL AND TAILINGS"

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D-02

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D-03

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D-04

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D-05

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D-06

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D-07

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D-08

11.0 QUALITY ASSURANCE/CONTROL

11.1 General Considerations

Large volumes of materials are designated for excavation, relocation, and construction as an engineered fill or cover material. Periodic inspection and testing of these materials is necessary to assure compliance with design specifications and design objectives. The following testing frequencies and criteria are presented as a means of evaluating quality control during construction of the mill and tailings reclamation plan.

11.2 Radon/Infiltration Barrier

The radon/infiltration barrier will consist of a combination of a compacted clay layer and a sandy layer. The clay will comprise the majority of the cover. Testing of the clay radon/infiltration barrier materials during construction will include: gradation, Atterberg limits, in-place density, moisture, and Proctor compaction tests.

The clay in the overburden dump is from a massive clay unit from the White River formation. Guidelines presented in the Nuclear Regulatory Commission's "Staff Technical Position on Testing and Inspection Plans During Construction of DOE's Remedial Action at Inactive Uranium Mill Tailings Sites" were employed in developing the sampling regime. Some reduction in sampling frequency may be allowed if materials properties do not deviate from specified values. If unacceptable or anomalous results occur during testing, the sampling frequency will be increased. Inferior material will not be used in the construction of the radon/infiltration barrier. If testing indicates portions of the radon/infiltration barrier are constructed from inferior material, the affected area will be reworked and the material replaced with acceptable material.

Compaction testing frequencies of the radon/infiltration barrier testing are as follows: A minimum of one moisture/density field test will be taken per 500 cubic yards of compacted radon/infiltration barrier. A minimum of one test will be taken for every day that at least 150 cubic yards of compacted barrier material is placed, and at least one test per lift or one test per shift of compaction operations will be conducted. The specified compaction standard is at least 95% standard Proctor density at optimum moisture content ±2%.

Approved methods will be used for determining the moisture content and density. If a nuclear density gauge is used (ASTM D-2922 for density and ASTM D-3017 for moisture content), a correlation test with the sand cone method (ASTM D-1556) and oven drying method (ASTM D-2216) will be conducted at a frequency of one per ten nuclear gauge tests. A verification series of 10 tests will also be conducted prior to construction and any time there is a correlation failure. A failure in the density measurement verification or calibration will be defined by a difference of 2.5% or greater between measurements by the nuclear density gauge and the sand cone method. A failure in the moisture content measurement verification or calibration will be defined as a difference in moisture content of 1% by weight or greater between the ASTM-3017 method and the oven drying method. The moisture contents may also be determined using the microwave oven method (ASTM D-4643 or the speedy moisture meter (AASHTO T217). If ASTM D-4643 is used, a verification series of 10 tests will be conducted using both the oven drying method and microwave oven method every time there is a correlation failure. A correlation failure is a deviation greater than plus or minus one percent moisture content. An additional oven drying test will be conducted at the frequency of one per ten microwave oven tests with the same definition of a correlation failure. An oven drying calibration/correlation test will also be conducted at the rate of one per ten speedy moisture meter tests, or more frequently if the speedy moisture meter requires recalibration after every ten tests.

Initial frequency of gradation testing of the clay radon/infiltration barrier material will be one test per 1000 cubic yards of material. A minimum of 1 test will be conducted if total emplaced volume for the day exceeds 150 cubic yards. The gradation testing will be by sieve analysis only to the #200 sieve. The gradation sampling frequency may be reduced to one test per 2500 cubic yards of radon/infiltration barrier material following 50 consecutive tests with no rejection of material. If radon/infiltration barrier material is subsequently rejected based on gradation testing or Atterberg limits test results, the gradation testing frequency will be increased to one test per 1000 cubic yards of material until another 50 consecutive successful tests have been conducted. The gradation of the material will be considered acceptable if 83% of the material passes a #200 sieve. Inferior gradation material may be placed as the sandy radon/infiltration barrier layer, but not as part of the clay radon/infiltration barrier.

Atterberg limits tests will be conducted at a frequency of at least one per day when emplaced volume exceeds 150 cubic yards. If the combination of liquid limit and plasticity index indicate a

clay material of medium to high plasticity or the liquid limit is greater than 40 and the plasticity index is greater than 23, the material will be considered acceptable as a clay barrier material.

One-point Proctor tests will be conducted at a frequency of one test per five field density tests. A complete Proctor density test will be conducted at a frequency of one test per 15 field density tests. The frequency will be increased if there is excessive variation in test results. The clay barrier material will have a maximum dry density greater than or equal to 91 lb/ft^3. The clay radon barrier will be compacted to at least 95% of the material's maximum dry density per ASTM D-698 (Standard Proctor). The sandy radon barrier/cover material will have a minimum of 20% (by weight) material that will not pass a #200 screen. The sandy radon barrier/cover material will be placed and compacted in thin horizontal lifts and will be uniformly compacted to at least 90% of maximum dry density per ASTM D-698 (Standard Proctor). Particles which are of a size or shape that results in protrusion above the surface will be removed.

Daily inspections and construction records will document thicknesses and volumes of radon/infiltration barrier placed.

11.3 Other Cover and Fill Materials

The topsoil material for non-rock protected areas is topsoil stripped from the site. This material will be placed without compactive effort beyond that occurring in normal construction. It is not considered part of the radon/infiltration barrier. Topsoil will be selected primarily from existing stockpiles and tested at a frequency of one test per 10000 cubic yards for Atterberg limits and gradation by sieve analysis.

There is no specified testing program for general fill materials or contaminated materials to be placed in the tailings area. The bulk of the contaminated materials will be placed on nearly saturated and consolidating areas of the tailings where compaction would be difficult if not impossible. The expected settlement in fill materials should be insignificant in comparison to that which will occur in the tailings. Other fill areas are non-critical zones where compaction occurring as a result of normal construction practices should provide a stable subgrade material. No compaction specifications are provided for general subgrade

materials as the settlement monitoring program should assure stable subgrade prior to construction of the cover.

11.4 Rock and Filter

Testing of rock quality and characteristics will follow guidelines established by the NRC. Laboratory durability tests which have already been conducted will be considered sufficient for the initial durability testing. Durability tests will include specific gravity, absorption, sodium sulfate soundness, and L.A. abrasion. Substitute tests such as a Schmidt Hammer test may also be used. Testing frequency will be one test for every 10,000 cubic yards of each type of rock. For small volumes of rock (less than 30000 cubic yards), a minimum of three tests will be conducted. Gradation sampling will be conducted at this same frequency, with additional tests whenever crushing or mining techniques are changed appreciably. There will be a minimum of three gradation tests for each rock gradation produced.

Rock quality scores will be evaluated following testing and, if necessary, adjustments in design criteria or restrictions on rock placement will be mandated. NRC rock quality scoring criteria provides a concise method of assessing acceptability of the rock or determining the need for oversizing, and judgments on rock quality will be based on these criteria. Rock gradation will be acceptable if; the rock D_{50} meets or exceeds the design D_{50}, the rock D_{100} is less than the maximum for thickness considerations or can be placed to achieve the desired surface, and the gradation meets the criteria presented below.

* Lower limit of $W_{100} > 2W_{50}$
* Upper limit of $W_{100} < 5W_{50}$
* Lower limit of $W_{15} > 1/16$ upper limit of W_{100}
* Upper limit of $W_{15} < W_{50}$
* W_0 through W_{25} can be used instead of W_{15} in the preceding criteria if better suited to available rock.

The criteria presented above may be converted to an equivalent rock diameter.

The filter may consist of a dual or single filter design. If the dual filter design is employed, the lower filter will be required to meet the following criteria:

$$d_{15}/d_{85} < 9$$

where: d_{15} is the screen diameter through which 15% of the lower filter material passes

d_{85} is the screen diameter through which 85% of the base material passes

The upper filter will be required to meet the following criteria:

$$d_{15}/d_{85} < 9$$

where: d_{15} is the screen diameter through which 15% of the upper filter material passes

d_{85} is the screen diameter through which 85% of the lower filter material passes

$$D_{15}/D_{85} < 5$$

where: D_{15} is the screen diameter through which 15% of the rock passes

D_{85} is the screen diameter through which 85% of the upper filter passes

The dual filter system will consist of a lower filter composed of a sand and gravel material. The upper filter will consist of crushed and processed granite. If a single filter system is selected, the following criteria will apply:

$$d_{15}/d_{85} < 25$$

where: d_{15} is the screen diameter through which 15% of the filter material passes

d_{85} is the screen diameter through which 85% of the base material passes

$$D_{15}/d_{85} < 15$$

where: D_{15} is the screen diameter through which 15% of the rock passes

d_{85} is the screen diameter through which 85% of the filter material passes

Gradation sampling frequency will be the same as that for rock gradation sampling.

11.5 Organic Matter

Very little organic material will be placed in the tailings area, and the majority of this will be placed in the area designated for mill rubble. The volume of organic material which will be placed outside of the mill rubble area is inconsequential. The placement and compaction of mill rubble is addressed in the mill decommissioning plan.

11.6 Settlement

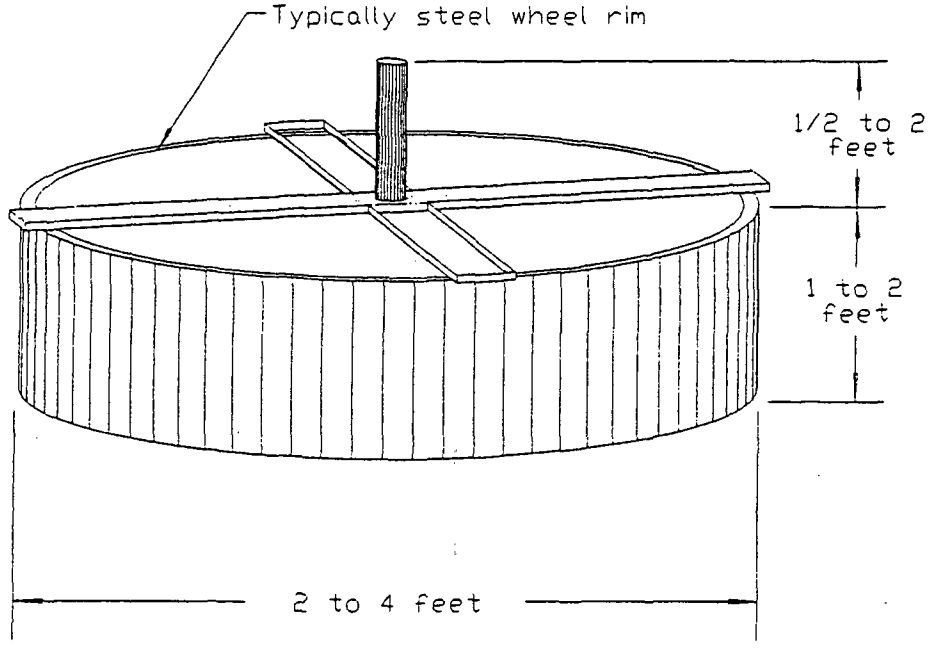
Settlement monuments were installed on the tailings surface beginning in 1995, and additional monuments will be added as areas become accessible. Figure 11-1 presents a the typical construction of the monuments. Fifteen additional monuments or monitoring points will be installed before January 2001. Monuments will be installed to be equally distributed over slimes, sand, and sand-slimes deposits. Settlement monitoring will be performed on a monthly basis until water levels in both ponds are approaching the base of the tailings or until the primary consolidation can be shown to have reached 90% of its predicted value (t_{90}). The confirmation of reaching t_{90} will be done by plotting settlement vs. square root of time or by plotting settlement vs. log of time. Settlement monitoring for each monument will continue until the t_{90} for the area has been reached.

11.7 Reporting

Construction and inspection records will detail construction activities on a daily basis. Progress and adequacy of the construction will be presented, as well as results of all inspections, measurements and tests. Weekly reports will include a summarization of daily activities and a summary of emplaced volumes. Testing will be by approved methods and will be documented in construction records. All pertinent information will be included in the reporting of testing, including; sample description, date, name of tester, description of testing method or reference to previously documented methods, results of the test, equipment description (if applicable) and interpretation of the results (acceptability, etc.). Deviations, nonconformances and stop work order situations will be documented per DOE procedures as presented in the Remedial Action Inspection Plan (NRC, 1990). An as-built construction report will be submitted to the NRC within 6 months following completion of construction.

11.8 Post Reclamation Contamination Cleanup Confirmation

During the retrieval of contaminated material in the vicinity of the ore pad, windblown tailings areas, solution and tailings ponds, and any other isolated areas of contamination not planned for reclamation with a radon barrier and erosion stability for 1000 years, field gamma surveys will be utilized to define materials requiring removal. These surveys will conducted in accordance with the "Soil Cleanup Verification and Sampling Plan for the Shirley Basin Mill Tailings Site", April, 1997 as amended. All aspects of the initial gamma surveys, post-cleanup verification gamma surveys and soil sampling/analysis will be dictated by that document.



NOT TO SCALE

FIGURE 11-1. SETTLEMENT MONUMENT CONSTRUCTION.

12.Ø VOLUME II REFERENCES

Sherard, J.L., L.P. Dunnigan and J.R. Talbot, 1984, "Basic Properties of Sand and Gravel Filters", Journal of Geotechnical Engineering, American Society of Engineers, Vol. 11Ø, No. 6, pp. 684-7ØØ, June.

U.S. Nuclear Regulatory Commission (NRC), 1989, Staff Technical Position on Construction of DOE's Remedial Action at Inactive Uranium Mill Tailings Sites, January.

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