Fall 9-27-2024

Butte Priority Soils Operable Unit (BPSOU) Butte Hill Revegetation Specifications (BHRS)

Mike McAnulty
Atlantic Richfield Company

Atlantic Richfield Company

317 Anaconda Road
Butte MT 59701

Mike Mc Anulty
Liability Manager

Direct (406) 782-9964
Fax (406) 782-9980

September 27, 2024

Molly Roby
Remedial Project Manager
US EPA – Montana Office
Baucus Federal Building
10 West 15th Street, Suite 3200
Helena, Montana 59626

Will Lindsey
US EPA Region 8 Office of Regional Counsel
CERCLA Enforcement Section
1595 Wynkoop Street
Denver, CO 80202
Mail Code: 8ORC-C

Daryl Reed
DEQ Project Officer
P.O. Box 200901
Helena, Montana 59620-0901

Jonathan Morgan, Esq.
DEQ, Legal Counsel
P.O. Box 200901
Helena, Montana 59620-0901

RE: Butte Priority Soils Operable Unit (BPSOU) Butte Hill Revegetation Specifications (BHRS)

Agency Representatives:

I am writing to you on behalf of Atlantic Richfield Company and Butte Silver-Bow to submit the Revised Butte Hill Revegetation Specifications (BHRS). The BHRS are included as Appendix B.3 of the Final Reclaimed Areas Maintenance and Monitoring Plan (Atlantic Richfield Company and Butte-Silver Bow, 2022).

The revised BHRS may be downloaded at the following link:

Revised Butte Hill Revegetation Specifications.

If you have any questions or comments, please call me at (907) 355-3914 or Eric Hassler at (406) 497-5042.

Sincerely,

Mike Mc Anulty
Liability Manager
Remediation Management Services Company
An affiliate of **Atlantic Richfield Company**

Eric Hassler, Director
Department of Reclamation
and Environmental Services
Butte-Silver Bow

Atlantic Richfield Company

Mike Mc Anulty
Liability Manager

317 Anaconda Road
Butte MT 59701
Direct (406) 782-9964
Fax (406) 782-9980

Cc (email only):

Chris Greco / Atlantic Richfield
Josh Bryson / Atlantic Richfield
Tim Hilmo / Atlantic Richfield
Loren Burmeister / Atlantic Richfield
Dave Griffis / Atlantic Richfield
Jean Martin / Atlantic Richfield
Irene Montero / Atlantic Richfield
David A. Gratson / Environmental Standards
Mave Gasaway / DGS
Adam Cohen / DGS
Lucas Satterlee / DGS
Brianne McClafferty / Holland & Hart
Carolina Balliew / EPA
Emma Rott / EPA
David Shanight / CDM
Curt Coover / CDM
James Freeman / DOJ
Amy Steinmetz / DEQ
Logan Dudding / DEQ
Katie Garcin-Forba / DEQ
Doug Martin / NRDP
Jim Ford / NRDP
Pat Cunneen / NRDP
Katherine Hausrath / NRDP
Ted Duaime / MBMG
Gary Icopini / MBMG
Becky Summerville / MR
John DeJong / UP
Robert Bylsma / UP
John Gilmour / Kelley Drye
Leo Berry / BNSF
Robert Lowry / BNSF
Brooke Kuhl / BNSF
Lauren Knickrehm / BNSF
Doug Brannan / Kennedy Jenks
Matthew Mavrinac / RARUS
Harrison Roughton / RARUS
Brad Gordon / RARUS
Mark Neary / BSB
Brandon Warner / BSB
Abigail Peltomaa / BSB
Aaron Rains / BSB
Sean Peterson/BSB
Josh Vincent / WET
Kevin Bethke / W&C
Scott Bradshaw / W&C
Emily Evans / W&C
Paddy Stoy / W&C
Joe McElroy / Pioneer
Mark Meyer / Pioneer
Pat Sampson / Pioneer
Troy Colvin / Pioneer
Karen Helfrich / Pioneer
Brad Hollamon / Pioneer
Randa Colling / Pioneer
Rich Keeland / Aspect
Andy White / Aspect
Ian Magruder/ CTEC
CTEC of Butte
Scott Juskiewicz / Montana Tech

File: RMO – upload
BPSOU SharePoint - upload

BUTTE HILL REVEGETATION SPECIFICATIONS

(Revised September 2024)

BUTTE HILL LIME STABILIZATION

GENERAL

Work described in this section shall consist of preparing the ground surface for limestone stabilization and hauling, placing, and spreading the limestone and fill on prepared areas in accordance with this Specification at the locations shown on the Drawings.

MATERIALS

Environmental Protection Agency (EPA) will approve lime sources. Lime may be from any approved source and shall have a calcium carbonate ($CaCO_3$) equivalent content of not less than 65%. All limes must be less than 1 inch in diameter and 50% (weight basis) must pass a 60 mesh (less than 0.25 millimeter [mm]) sieve. Types of lime may include lime rock and/or sugar beet lime depending on site specific stabilization needs.

CONSTRUCTION REQUIREMENTS

pH Testing of Subgrade

Atlantic Richfield Company will test the subgrade soil pH of all areas to be revegetated. The frequency of testing shall not be less than 1 test per 40,000 square feet (an approximately 200-foot by 200-foot grid). Limestone addition shall include areas to be revegetated where the subgrade soil has a pH of less than 5.5. Acid-base accounting (ABA) may be required by EPA under certain circumstances, such as the presence of acid-generating minerals, and the method used to determine ABA shall be as described in EPA-600/2-78-054. Documentation of this sampling effort, including a map showing sampling locations and sample results, shall be included in the final construction completion document(s) for the project.

Installation of Lime

The surface of the subgrade in the area to be covered shall be brought to grade and finished smooth and uniform immediately prior to dumping and spreading the lime. The lime shall be placed prior to placement of cover soil. A minimum 2-inch-thick layer of lime shall be placed on the low pH soil. Placement of the lime layer on a site will be based on site-specific data and approved by EPA prior to lime placement.

Grades on the area to be covered shall be maintained in a true and even condition. Where grades have not been established, the areas shall be graded and sloped to drain. The surface shall be left smooth in an even and properly compacted condition to prevent, as far as practical, the formation of low places or pockets where water will stand.

Additional installation instructions may be included in site-specific remedial work plans.

END OF SECTION

BUTTE HILL COVER SOIL

GENERAL

The work of this section covers all operations required for furnishing, excavating, hauling, stockpiling, spreading, and preparing the seedbed of approved cover soil.

SUBMITTALS

Cover soil submittals will be provided in the Design Report or under separate cover and approved by EPA prior to use. The following submittals shall be provided to EPA for each cover soil source:

- The intended cover soil source site location, existing site conditions including details on the area and depth to be excavated at the source site location or amount of material previously stockpiled, and details on where the stockpiled material was generated.
- For each cover soil source, Atlantic Richfield Company will be required to secure at least three soil samples from the source area. EPA will be notified in advance of the sampling effort and the approximate location and depth where samples shall be collected.
- Analytical results will undergo Stage 2A data validation as described in the *Butte Priority Soils Operable Unit (BPSOU) Backfill and Cover Soil Quality Assurance Project Plan (QAPP)* (Atlantic Richfield Company, 2024).

MATERIALS

Cover soil sources will be approved by EPA through submittal of analytical results described in the *BPSOU Backfill and Cover Soil QAPP* (Atlantic Richfield, 2024). Material types and intended uses throughout the BPSOU are provided below.

Type A-Minus Material

Type A-minus material shall be used to construct the lower 12 inches of the 18-inch-thick Butte Hill Revegetation Specifications (BHRS) vegetated cap and shall meet metals criteria requirements and soil classification specified in the BHRS.

Type A-Plus Material Growth Media

Type A-plus Material will be used to construct the top 6-inch-thick layer of the 6-inch and 18-inch vegetated caps meeting all cover soil requirements specified in the BHRS. The Type A-plus material may be from an Agency-approved source meeting all requirements of the BHRS, or Agency-approved Type A-minus material amended to meet organic content greater than 1%.

Type B (3-Inch Minus) Material

Type B (3-inch minus) material may be used to construct the lower 9 inches of a 12-inch-thick engineered non-vegetated cap and shall meet metals criteria requirements, soil classification, and material gradation.

1½-Inch Minus (Base Course):

Base course material may be used to construct the upper 3 inches of the 12-inch-thick engineered non-vegetated cap and be used as filter bedding material in constructed channels. Base course material shall meet metals criteria requirements specified in the BHRS and material gradation.

Cover soil material shall be reasonably free of any trash, rocks, lumps of soil, stumps, and brush. Rock content (i.e., particles greater than 2.0 mm) must constitute less than 45% (by volume) of the cover soil and the maximum allowable rock size is 6 inches in diameter. To the extent possible, the cover soil source should be free of any noxious weeds.

VEGETATED CAPS SOIL SUITABILITY

Butte Hill cover soil shall be a friable material with the less than 2.0 mm fraction characterized as loam, sandy loam, sandy clay loam, sandy clay, clay loam, silty clay, silty clay loam, silt loam, or silt in accordance with the U.S. Department of Agriculture (USDA) Soil Conservation Service textural classification provided below and meet the specifications and textural classification provided in Table 1 below.

Per approval of EPA, loamy sand may be acceptable from 6 to 18 inches in certain circumstances. Sand and clay texture classifications will not be permitted.

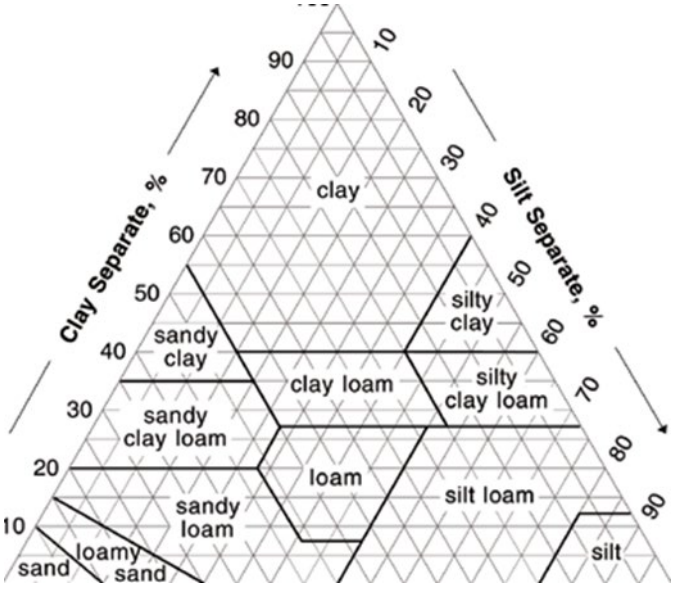

Figure 1. Graphic guide for textural classification of the less than 2 mm portion (Source: USDA Soil Conservation Service).

Overall, Butte Hill cover soil suitability criteria are summarized in the table below.

Table 1. Butte Hill Cover Soil Suitability Criteria

Parameters	Criteria	Test Method[1]
Texture	Cannot be sand, clay, or loamy sand (unless EPA approved)	ASA 15-5
Rock Fragments (> 2 mm)	< 45% by volume	SSSA 15-2
Saturation Percentage	> 25% and < 85%	USDA27a
Saturated Paste pH	> 5.5 and < 8.5 standard units	ASA 10-3
Electrical Conductivity (Saturated Paste)	<4 mmhos/cm	ASA 10-3
Sodium Adsorption Ratio	< 12	Calculation/SW6010B
Organic Matter	> 1% (existing or added)	Walkley Black (ASA29-3)
Arsenic	< 97 mg/kg	EPA 6010/6020
Cadmium	< 4 mg/kg	EPA 6010/6020
Copper	< 250 mg/kg	EPA 6010/6020
Lead	< 100 mg/kg	EPA 6010/6020
Mercury	< 5 mg/kg	EPA 7471B
Zinc	< 250 mg/kg	EPA 6010/6020
Nitrate ($NO_{3)}$	N/A	ASA33-8
Phosphorus	N/A	ASA24-5
Potassium	N/A	SW6010B

mg/kg: milligrams per kilogram. mmhos/cm: millimhos per centimeter.
[1] Method listed or approved equivalent

The chemical suitability criteria listed in Table 1 were established for the Butte Hill and may not be appropriate for use at other Clark Fork River Basin Superfund Sites. It should be noted that some exceedances of the above criteria may still allow successful long-term vegetation. Therefore, if cover soil sampling shows a variance from the chemical suitability criteria, Atlantic Richfield Company will notify EPA, and a plan to address the usability of that cover soil source will be discussed. EPA must approve in writing any cover soil sources which exceed the above suitability criteria.

STOCKPILE DEVELOPMENT

Upon Agency approval of validated analytical data, borrow material may be stockpiled for future use. Additional sampling shall be performed at a frequency specified in the *BPSOU Backfill and Cover Soil QAPP* (Atlantic Richfield Company, 2024) and results provided for Agency review and approval.

DIRECT HAUL APPLICATIONS

Visual inspection of excavated cover soil shall be a continuous process to carefully observe and recognize changes in source material characteristics. Visual inspection, in conjunction with hand-texturing of the less than 2.0 mm fraction, shall be used to determine the adequacy of the borrow material ahead of excavation, to ensure that current material meets textural criteria, and

to identify areas to move to if material begins to fall out of specification. Each inspection shall record the location, test number for that day, date, time, estimated rock content percentage, and soil texture (less than 2.0 mm fraction). The frequency of inspection is dependent on the variability of the cover soil source material but must be performed and recorded at least once daily during periods of source material excavation and transport. It is desirable to have the same person perform the inspections for the duration of excavation at a particular source area. In addition to the visual inspections described above, textural analysis by laboratory hydrometer testing may be requested by EPA at a rate not to exceed 1 test for every 5,000 cubic yards of cover soil material excavated. These tests will be used for comparison and guidance for field testing and field observations. Copies of all inspection records and laboratory analyses shall be provided to EPA for review. Summaries of inspection records and analyses shall be included in the final construction completion documents for the project.

CONSTRUCTION REQUIREMENTS

Cover soil placement shall not begin until soil samples analytical results are known and Agency approval has been secured.

Final cover soil thickness shall be a minimum of 18 inches, unless otherwise approved by EPA in writing. Eighteen inches is considered the minimum thickness required for long-term vegetation success. Sufficient cover soil should be applied to account for settling, sloughing, and erosion.

For revegetation purposes, slopes must not exceed a maximum of 3H:1V (horizontal to vertical) unless previously agreed to by EPA and Atlantic Richfield Company because of site-specific requirements. Cover soil shall not be placed until the areas to be covered have been properly prepared, the lime layer appropriately applied (if required), all construction work in the area has been completed and approved by Atlantic Richfield Company, and EPA notified that all subgrade preparations have been completed.

After spreading the cover soil, large clods, hard lumps, rocks, and large roots over 6 inches in diameter, litter, or other foreign material (exposed iron, timbers, etc.) shall be raked up, removed from the cover soil, and disposed of properly. Further preparation of the cover soil for seeding is provided in the specifications for Seeding and Fertilizing.

Atlantic Richfield Company will grade the source area borrow site(s) to existing contours at slopes not to exceed 3H:1V (unless previously agreed to by EPA and Atlantic Richfield Company because of site-specific requirements) and to provide positive drainage. Atlantic Richfield Company will replace stockpiled topsoil at the borrow area. The borrow area shall be prepared for seeding, mulching, and fertilizing as are other areas receiving cover soil.

END OF SECTION

BUTTE HILL ORGANIC AMENDMENT APPLICATION

GENERAL

Organic amendment application shall consist of furnishing, applying, and incorporating soil amendments, such as manure and compost (or other suitable alternatives) at locations and rates designated on the Drawings.

SUBMITTALS

Organic amendment submittals shall be provided in the Design Report or under separate cover and approved by EPA prior to use. The following submittals shall be provided to EPA for each organic amendment source:

- Location of Supplier.
- For each supplier, at least three organic amendment analyses, including gravimetric water content, rock and other fragment content, and organic matter content, as described further under Materials.
- Proposed organic amendment application and incorporation methods and equipment.

MATERIALS

Analyses for organic amendments (such as manure, compost, etc.) shall include the gravimetric water content (%, dry weight), the percentage of rock and/or other fragments greater than 2.0 mm fraction (%, dry weight), and organic matter content of the less than 2.0 mm fraction (%, dry weight). The organic matter content of the less than 2.0 mm fraction shall be determined in the laboratory using loss of ignition (LOI) at 550C procedure, ASA, Meth. Soil Anal., 1986, Method 29-3.5.2.

If manure is used as the organic amendment source, cattle manure is the preferred manure type. Straw bedding material mixed into the manure is acceptable, but it shall not constitute more than 20% of the dry weight.

Alternatives

Alternative amendments may be proposed for Agency approval on a site-specific basis. Alternative amendments may include:

- Biological granulated materials (i.e., BioSol).
- Partially combusted biology materials (i.e., BioChar).
- Partially decomposed natural organic carbon sources (straw, peat moss, wood chips, etc.).

IN SITU APPLICATION RATE

The field application rate shall be calculated using 3% organic amendment (assuming a maximum organic content is 50%) on a dry weight basis in the upper 6 inches of cover soil to achieve a target of greater than 1% organic content of reclaimed soil. Upon approval or direction from EPA, the 3% application rate may be modified to account for site-specific conditions. Analyses for organic amendments shall be submitted for each Supplier on a regular basis to determine if adjustments to the field application rates are necessary. The water and rock and/or other fragment content shall be deducted in calculating the field organic amendment application rate. Documentation of the organic amendment application, including application rate calculations, shall be included in the final construction completion document(s) for the project.

CONSTRUCTION REQUIREMENTS

Stockpiling Organic Amendment

Prior to stockpiling organic amendment on site or at a stockpile location, Contractor shall develop an acceptable stockpiling plan. The plan shall include the location of the stockpile and adequate measures to prevent contamination of underlying and adjacent soil and prevent air or water pollution.

Site Grading

Prior to placement of the organic amendment, all areas shall be graded as necessary to approximately restore the design contours of the ground or to produce a contour that will blend with contours of adjacent areas. This shall include grading erosion channels in revegetated areas that are to receive organic amendment.

Organic Amendment Application

Organic Amendment shall be applied with agricultural manure spreaders or other approved application equipment that enables spreading a uniformly regulated amount of material.

For a specified application rate, Contractor shall apply the organic amendment in a uniform manner across the landscape. Localized organic amendment application thicker than 6 inches is unacceptable.

Contractor shall calibrate the organic amendment spreader prior to each use of the equipment unless site conditions have not changed and equipment settings have not been altered since previous calibration. Calibration records shall be furnished by Contractor to project oversight personnel. Upon request, copies of equipment calibration shall be provided to EPA for review. All calibration records shall be included in the final construction completion document(s) for the project.

Under no circumstances shall Contractor apply the organic amendment during wind conditions strong enough to displace material onto adjacent sites.

Organic Amendment Incorporation

Following organic amendment application, the soil shall be ripped to a 6-inch depth at 12-inch centers. The soil shall then be tilled to a depth of 6 inches with a disc, rototiller, moldboard plow, or chisel plow. An agricultural disc with a disc diameter of approximately 20 inches having cone-shaped discs at a spacing width of 6 to 8 inches is recommended. Multiple tilling equipment passes may be required to achieve adequate incorporation. Adequate incorporation will be a complete and uniform mixing of the manure and soil to a depth of 6 inches. All tillage procedures shall be completed as soon as practicable after amendment application.

END OF SECTION

BUTTE HILL STOCKPILED ORGANIC AMENDMENT MATERIALS AND APPLICATION

GENERAL

Organic amendment application may consist of amending an approved cover soil prior to placement of soil to meet the minimum final percent organic matter (greater than 1% organic matter) content specified in the cover soil suitability criteria. Several factors may require cover soil to be amended prior to placement. Previously amended soils shall consist of furnishing, applying, and incorporating soil amendments, such as manure and compost, at locations and rates designated on the Drawings.

SUBMITTALS

Organic amendment submittals shall be provided in the Design Report or under separate cover and approved by EPA prior to use. The following submittals shall be provided to EPA for each organic amendment source:

- Location of Supplier.
- For each supplier, at least three organic amendment analyses, including gravimetric water content, rock and other fragment content, and organic matter content, as described further under Materials.
- Proposed organic amendment application and incorporation methods and equipment.

MATERIALS

Analyses for organic amendments (such as manure, compost, etc.) shall include the gravimetric water content (%, dry weight), the percentage of rock and/or other fragments greater than 2.0 mm fraction (%, dry weight), and organic matter content of the less than 2.0 mm fraction (%, dry weight). The organic matter content of the <2.0 mm fraction shall be determined in the laboratory using Loss on Ignition at 550 degrees Celsius procedure, Method S-9.20.

If manure is used as the organic amendment source, cattle manure is the preferred type. Straw bedding material mixed into the manure is acceptable, but it shall not constitute more than 20% of the dry weight.

Application Rate

The application rate or amendment ratio (soil: organic amendment) can be calculated using analysis from both materials to achieve the final target minimum % organic matter content specified in the cover soil suitability criteria. Amendment ratios shall be based on existing soil parameters (soil dry densities, existing organic matter content, and quantity to be amended) together with the properties of the organic amendment source (wet bulk density, percent moisture, organic matter content, and coarse fragments). Physical properties of these materials can be used to calculate an amendment ratio and amendment quantity needed to amend a known

quantity of stockpiled soil to the target % organic matter content. Amendment ratios shall be determined on a project level as design input variables may differ from project to project. The goal of a blending operation is to mix two approved materials at the most efficient rate possible to achieve the minimum % organic matter content required for a cover soil. Post amendment mixing confirmation quality assurance (QA) sampling shall be performed to confirm minimum % organic matter content was achieved during the blending process. Amendment ratios may be adjusted accordingly pending QA sampling results. The QA sampling frequency shall be specified on a project-specific basis.

CONSTRUCTION REQUIREMENTS

Stockpiling Organic Amendment

Prior to stockpiling organic amendment on site, Contractor shall develop an acceptable stockpiling plan. The plan shall include the location of the stockpile and adequate measures to prevent contamination of underlying and adjacent soil and prevent air or water pollution.

Organic Amendment Application and Incorporation

Organic matter application and incorporation for amending stockpiled soil shall consist of thoroughly and evenly applying and mixing the two parts (soil and organic amendment) to achieve a final product that has a homogenous mixture of the two parts at the appropriate amendment ratio. Means and methods of application and blending shall be provided in the Borrow Amendment Work Plan or site-specific remedial work plan, as appropriate, and approved by EPA prior to amendment activities commencing. Several means may be acceptable that may include specialized soil mixers (batch mixer, pug mill, trommel, in-line mixer, etc.) or mechanical means (front-end loader, excavator, etc.) so long as the process achieves a homogenous mixture without creating adverse conditions such as excessive dust, flying particles/debris, or other potential health and safety concerns.

Final blended organic matter concentration shall be confirmed with QA confirmation sampling completed at the minimum required frequency for cover soil suitability criteria. If the soil medium was previously approved except for % organic matter content, then % organic matter content via Walkley Black shall be the only analysis necessary for QA confirmation sampling per the *BPSOU Backfill and Cover Soil QAPP* (Atlantic Richfield Company, 2024). Amendment ratios may be adjusted for ongoing blending operations pending the results of the QA sampling.

END OF SECTION

SODDED TURF GRASS INSTALLATION/REPLACEMENT

GENERAL

The work of this section covers all operations required for furnishing, excavating, hauling, stockpiling, spreading, and preparing sodded turf grass application typical in Residential and Non-Residential yard excavation and backfill/cover scenarios.

SUBMITTALS

Replacement soil submittals shall be provided in the Design Report or under separate cover and approved by EPA prior to use. Cover soil submittals shall be consistent with requirements specified in the Butte Hill Cover Soil Section above.

MATERIALS

Replacement soil sources shall be consistent with requirements specified in the Butte Hill Cover Soil Section above summarized in the Table 1 above.

Sod Material

All sod installed shall originate from planted grass species on cultivated agricultural land and grown specifically for cultivated turfgrass sod purposes. It shall be irrigated and mowed regularly and otherwise carefully maintained from planting to harvest to ensure reasonable quality and uniformity. All sod shall be 100% free of all noxious weeds.

1. Thickness of Cut: Sod shall be machine cut at uniform soil thickness of 0.60 inch (15 mm), plus or minus 0.25 inch (6 mm), at the time of cutting. Measurement for thickness shall exclude top growth and thatch.
2. Pad Size: Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus 0.5 inch (15 mm) on width and plus or minus 5% on length. Broken pads and torn or uneven ends will not be accepted.
3. Strength of Turf Sod Sections: Standard size sections of sod shall be strong enough that it can be picked up and handled without damage.
4. Moisture Content: Sod shall not be harvested or transplanted when its moisture content (excessively dry or wet) may adversely affect its survival.
5. Mowing Height: Before harvesting, the sod shall be mowed uniformly.
6. Thatch: Sod shall be relatively free of thatch, up to 0.5 inch (15 mm) allowable (uncompressed).
7. Diseases, Nematodes and Insects: Sod shall be reasonably free of diseases, nematodes and soil-borne insects.

CONSTRUCTION REQUIREMENTS

After excavation and depth verification has been completed, the replacement soil shall be deposited and evenly placed on the subgrade in lifts not to exceed 6 inches post compaction in depth, where compaction is required. Replacement backfill shall not be applied when the ground or replacement soil is frozen, excessively wet, or otherwise in a condition detrimental to the work. The final lift of replacement soil shall be applied over the compacted soil to a minimum depth of 6 inches, so that it matches the surrounding ground surface elevation or existing surfaces (i.e., sidewalks, pavement, and other hard surfaces) after sod is applied. Typically, plus or minus 1.5 inches is needed to account for sod mat thickness to ensure final surface elevations are even. Any large, stiff clods and hard lumps of soil shall be broken with a pulverizer or other effective means, and all stones or rocks (2 inches or greater in diameter), roots, litter, or foreign material shall be raked up and disposed of accordingly.

Acceptable depth tolerance for backfill replacement soil materials shall be the specified depth (12 or 24 inches) plus or minus 0.1 foot measured after grading and compaction. Following backfill of the excavations with replacement soil (and compaction where specified), the backfill or soil shall be brought to the lines, grades, and cross-sections shown on the Drawings so that the final soil and sod surface matches the surrounding ground surface elevation and topography. Where specific grades have not been established, the areas shall be smooth graded and the surface left at the prescribed grades in an even and properly compacted condition to prevent, as far as practical, the formation of low areas or pockets where water will stand and to facilitate positive drainage away from buildings.

After grading of areas has been completed, areas to be sodded shall be raked or otherwise cleared of stones larger than 1 inch in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other means occurs after grading of areas, Contractor shall repair such damage, to the satisfaction of Engineer or oversight personnel. This may include filling low areas, smoothing irregularities, and repairing other incidental damage. Soil surface preparation shall be performed using a cultipacker, hand roller, or other proposed method(s) approved by Engineer or oversight personnel.

Sod shall be installed within 48 hours from the time it is delivered by the supplier from the source unless circumstances beyond the Contractor’s control make storage necessary. In such cases, upon approval of Engineer/oversight personnel, the sod shall be stacked, kept moist, and protected from exposure to the air and sun and shall be protected from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Sod shall be placed as soon as practical after backfilling of the specified area occurs.

Sod placement shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used. All areas specified to receive sod shall be watered to moisten and lower the temperature of the prepared soil immediately prior to laying the sod. The quantity of water applied to the prepared soil shall be limited to a practical amount that does not cause excessively muddy conditions. The sod shall be moist and shall be placed on a moist earth bed. Pitchforks shall not be used to handle sod, and dumping sod from vehicles will not be

permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward.

Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until installation is complete and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities of water and shall avoid damage to the finished surface. Contractor shall provide general care for the sodded areas as soon as the sod has been laid until Engineer has accepted the work and Contractor has removed all equipment from the site. After the sod installation has been approved by Engineer/oversight personnel, care for the new sod becomes the responsibility of Landowner.

END OF SECTION

BUTTE HILL SEEDING AND FERTILIZING

GENERAL

Revegetation work described in this section includes fertilization, seeding, and mulching on all project designated and disturbed areas upon completion of construction work. These areas include finished embankment slopes, borrow areas, areas to be revegetated, and disturbed areas.

MATERIALS

Seed

Hand collected native species and some of the special wetland species collected cannot meet the following requirements. All seed shall comply with, and be labeled in accordance with the Montana Seed Law. Montana Code Annotated (MCA) 80-5-104 (2) states ... Indigenous seeds, as defined in 80-5-101, in amounts of one pound or more, whether in packages or bulk, must be labeled with the following information:

1. The statement “Labeled only for reclamation purposes”.
2. Lot number or other distinguishing mark.
3. The common name, genus, species, and subspecies, when applicable, including the name of each kind of seed present in excess of 5%. When two or more kinds of seed are named on the label, the label shall specify the percentage of each. When only one kind of seed is present in excess of 5% and no variety name or type designation is shown, the percentage must apply to seed of the kind named. If the name of the variety is given, the name may be associated with the name of the kind. The percentage in this case may be shown as pure “live seed” and must apply only to the seed of the variety named.
4. State or county of origin.
5. The approximate percentage of viable seed, together with the date of test. When labeling mixtures, the percentage viability of each kind shall be stated.
6. The approximate percentage, by weight, of pure seed, meaning the freedom of seed from inert matter and from other seeds.
7. The approximate percentage, by weight, of sand, dirt, broken seeds, sticks, chaff, and other inert matter.
8. The approximate total percentage, by weight, of other seeds.
9. The name and approximate number of each kind of species of prohibited and restricted noxious weed seeds occurring per pound of seed.
10. The full name and address of person, firm, or corporation selling the seed.

As listed in the Montana Seed Law, seed shall contain no “PROHIBITED” noxious weed seed. The seed shall contain no “RESTRICTED” noxious weed seed in excess of the maximum numbers per pound, as specified by MCA 80-5-105, or as specified by the appropriate Butte-Silver Bow (BSB) County Weed Board, whichever is more stringent.

As defined by MCA 80-5-101(4), indigenous seeds include the seeds of those plants that are naturally adapted to an area where the intended use is for revegetation of disturbed sites. These species include grasses, forbs, shrubs, and legumes.

Contractor must supply Atlantic Richfield Company with all seed bag tags and certification from the supplier stating that the seed complies with the Federal Seed Act and the Montana Seed Laws (MCA 80-5-101- through 305). Upon request, copies of said tags shall be submitted to EPA for review. Copies of seed bag tags and certification shall be included in the final construction completion documentation for the project.

When legumes are seeded as the predominant mixture, the seed supplier shall include inoculants (rhizobia) and provide documentation as specified in the Seed Certification. Seed Certifications shall be submitted to Atlantic Richfield Company prior to any seeding. The Contractor shall also submit a copy of the bill or other documentation from the seed supplier showing actual bulk weights of the individual seed types combined in the mix and verification of legume inoculation. The required certifications and documentation shall be provided to Atlantic Richfield Company at least 3 days prior to the seeding.

Fertilizer

Fertilizer shall be delivered in standard-size bags of the manufacturer showing weight analysis and manufacturer's name, or in bulk quantities accompanied with written certifications from the manufacturer stating that the fertilizer supplied complies with applicable Specifications.

Fertilizer shall be a soluble commercial carrier of available plant food elements or combination thereof. The fertilizer to be used on the project shall supply the quantities of available chemical elements stipulated below. The fertilizer shall be of uniform composition and in good condition for application by suitable equipment. It shall be labeled with the manufacturer's guaranteed analysis, as governed by applicable fertilizer laws. Any fertilizer that becomes contaminated or damaged, making it unsuitable for use, shall not be accepted. All required fertilizer certificates shall be provided to Atlantic Richfield Company a minimum of 3 days prior to fertilizing. The certification shall include the guaranteed analysis of the fertilizers stated in the terms of the percentages of nitrogen, and available phosphorous, potash, and boron, in that order.

Mulch

Vegetative mulch shall be either grass hay or straw. Grass hay material shall be composed primarily of perennial grasses. The grass hay mulch shall contain greater than 70% grass by weight and shall not contain more than 10% alfalfa, crested wheatgrass or yellow sweet clover. Grass hay shall be relatively free of noxious weeds and other undesirable species.

Straw mulch material shall be clean grain straw, shall be relatively free of noxious weeds and other undesirable species, and shall not contain greater than 5% cereal seed by weight, i.e., seed heads. Wheat straw shall be used whenever possible. Harvesting shall be performed with modern combines, which leave less grain in the straw.

Written approval of straw and hay sources from the supervisor of the BSB County Weed Board shall be obtained.

Chopped or ground material is not acceptable. The mulch material is not acceptable if it is damaged by rotting, molding, etc. to seriously limit its use for mulch. It shall be relatively free of stones, dirt, roots, stumps, or other foreign material.

Application rates shall be 3,000 pounds per acre on flat non-critical erosion and potential dust generating areas and 4,000 pounds per acre on all critical runoff and potential dust generating areas. Exact application rates shall be adjusted in the field to accommodate differences in mulch material and seedbed conditions.

CONSTRUCTION REQUIREMENTS

Seedbed Preparation

Prior to executing the seeding, fertilizing, and mulching work items, the seed bed at all sites shall be prepared so these items can most efficiently be completed, with the areas resulting in reasonable conformity to specified line and grade. The fertilizing, seeding, and mulching work items shall be executed only after the seedbed condition has been approved by Atlantic Richfield Company. The cover soil shall be prepared as described in the Cover Soil specifications.

The seedbed surface must be in a condition that does not preclude growth at the time of application of seed. Conditions that may preclude growth include, but are not limited to, large clumps, clods, and impervious crusts of dirt, areas too tightly compacted to allow seed growth, and areas of loose soil which could possibly become too compacted during the seed applications to allow growth. Atlantic Richfield Company will make the decisions on the conditions of the seedbed. If Atlantic Richfield Company determines the seedbed is inadequate for seeding, Contractor shall treat the inadequate areas, as directed by Atlantic Richfield Company, to attain as nearly as practicable the adequate condition at no additional cost to Atlantic Richfield Company.

Excessively tight or compacted soil shall be loosened to the minimum depth of 6 inches. Discing, chiseling, or tilling of the soil shall be done at right angles to the natural flow of water on the slopes, unless otherwise directed or approved by Atlantic Richfield Company.
Compaction of the soil, when required, shall be performed by equipment that shall produce a uniform rough-textured surface ready for seeding and mulching. Existing structures and facilities shall be adequately protected, and any damage done by Contractor shall be repaired or adjusted to the satisfaction of Atlantic Richfield Company.

Seed Application

General

Slopes and areas finished during the period of October 15 through June 15 may be permanently seeded within this time period. Contractor must obtain Atlantic Richfield Company's permission to commence seeding operations. Slopes and areas finished during the period June 16 through

October 14 shall receive an annual cover crop from the straw mulch seed to protect the in-place cover soil during this period. The control of noxious weeds and other undesirable species shall also be addressed during this period. The perennial seed mix shall then be applied to the areas after October 15. EPA shall be notified prior to commencement of seeding activities.

Specifications of each type of seed mix are outlined below. The seeding of steep slopes, narrow medians, or small areas that are impractical to seed by drill may be performed by using the hydraulic seeding methods, when approved by Atlantic Richfield Company. The hydraulic seeding methods shall be used when the seedbed surface is too wet or swampy to permit seeding by drill. Hydraulic seeding methods shall not be used during adverse weather, as determined by Atlantic Richfield Company.

The applied seed, regardless of the method of application, shall not be covered by a soil thickness greater than 1 inch.

Seed Application Equipment

Drill Seeding

Seeding equipment used for applying grass/forb seed must be designed, modified or equipped to regulate the application rate and planting depth of the seed mixture. Seed must be uniformly distributed in the drill hopper during the drilling operation. Acceptable drills are custom seeders, furrow drills, disc drills, or other drills approved by Atlantic Richfield Company. All seeding equipment shall be operated perpendicular to the slope. Contractor shall calibrate the drill seeder prior to each use of the equipment unless site conditions have not changed and equipment settings have not been altered since the previous calibration. Calibration records shall be furnished to Atlantic Richfield Company. Upon request, copies of equipment calibration shall be provided to EPA for review. A summary of all calibration records shall be included in the final construction completion document(s) for the project.

Planting depth shall be regulated by depth bands or coulters. The drill box shall be partitioned by dividers no more than 24 inches apart in order to provide for more even distribution on sloping areas. The rows of planted seed shall be a maximum of 8 inches apart. Drilling depth shall be from ¼ to 1 inch.

Broadcast Seeding

Seeding by hand or mechanical broadcasting shall be permitted on areas inaccessible to drills or impractical to seed by other prescribed methods. The broadcast seeding rate shall not be less than twice the drill seeding rate. Following the seeding, the soil shall be hand-raked to cover the seed. Broadcast seeding requires the prior approval of Atlantic Richfield Company.

Hydraulic Seeding

Contractor must provide 1 pound of wood fiber mulch per each 3 gallons of water in the hydraulic seeder as a cushion against seed damage. The mulch used as a cushion may be part of

the total required mulch with the remainder applied after the seed is in place. Contractor may be required to use extension hoses to reach the extremities of slopes.

When using vegetative mulch, Contractor may mix the seed with the fertilizer if the hydraulic seed equipment is capable of uniformly mixing water, fertilizer, and seed, in that order, and power blowing or spraying the mixture uniformly over the seedbed. After blending, the slurry shall be applied to the seedbed within 45 minutes after the seed has been added to the water-fertilizer mixture. If the slurry cannot be applied within the specified time, it shall be fortified, at no cost to Atlantic Richfield Company, with the correct ratio of seed to the remaining slurry and a new 45-minute time frame established for applying the fortified mixture. At no time shall seed and fertilizer remain in a slurry for more than 45 minutes.

Seed Application Areas/Rates

The Butte Hill Primary General Seed Mixtures include the following:

Pal Mixture, 2020		
Common Name	**Species**	**lbs PLS/Acre**
Bluebunch wheatgrass	*Pseudoroegneria spicata*	11.1
Idaho fescue	*Festuca idahoensis*	3.6
Western wheatgrass	*Pascopyrum smithii*	3.6
Prairie junegrass	*Koeleria macrantha*	0.2
Sandberg bluegrass	*Poa sandbergii*	0.5
Quick guard (sterile triticale)	*Triticale*	5.8
Blue flax	*Linum lewisii*	0.2
Rubber rabbitbrush	*Ericameria nauseosa*	0.1
	Total	**24.9**

lbs: pound. PLS: pure live seed.

Alternative seed species may be proposed for Agency approval on a case-by-case basis to accommodate seed availability, economic factors, or site-specific characteristics.

Pal Mixture, 2017		
Common Name	**Species**	**lbs PLS/Acre**
Bluebunch wheatgrass	*Pseudoroegneria spicata*	11.12
Idaho fescue	*Festuca idahoensis*	2.7
Prairie junegrass	*Koeleria macrantha*	0.08
Sandberg bluegrass	*Poa sandbergii*	0.28
Western wheatgrass	*Pascopyrum smithii*	3.96
Perennial lupine	*Lupinus perennis*	5.33
Rocky mountain beeplant	*Cleome serrulata*	0.66
Canada milkvetch	*Astragalus canadensis*	0.48
Common sunflower	*Helianthus annuus*	0.73
Blanketflower	*Gaillardia aristata*	0.2
Blue flax	*Linum lewisii*	0.19
Mountain big sage	*Artemesia tridentata*	0.03
Rubber rabbitbrush	*Ericameria nauseosa*	0.13
	Total	**25.9**

lbs: pound. PLS: pure live seed.

Pal Mixture, 2015		
Seed Mixture	**Rate**	
Bluebunch wheatgrass	11.12	PLS/Acre
Idaho fescue	3.58	PLS/Acre
Rouch fescue	1.96	PLS/Acre
Prairie junegrass	0.17	PLS/Acre
Sandberg bluegrass	0.47	PLS/Acre
Quick guard (sterile triticale)	5.76	PLS/Acre
Blue flax	0.19	PLS/Acre
Rubber rabbitbrush	0.06	PLS/Acre
Total	23.3	PLS/Acre

PLS: pure live seed.

Butte Hill
Alternate Seed Mixture No. 1 - Gentle Sloped Areas (Less than 10:1) Revegetation Mix

Seed Mixture	Rate, lbs PLS/Acre	Planting
Bozoisky russian wildrye	5.0	Initial seeding, drill seeded on 15- to18-inch centers.
Ladak alfalfa	2.0	Interseeded during following years as determined by vegetation monitoring.
Total	**7.0**	PLS/Acre

lbs: pounds. PLS: pure live seed.

Butte Hill
Alternate Seed Mixture No. 2 B Grass-lined Ditches

Seed Mixture	Rate, lbs PLS/Acre
Smooth brome	5.0
Birdsfoot trefoil	1.0
Red clover	0.5

lbs: pounds. PLS: pure live seed.

Butte Hill
Alternate Seed Mixture No. 3 – General Seed Mixture

Common Seed Name	Rate	
Bluebunch wheatgrass	11.12	PLS/Acre
Idaho fescue	2.71	PLS/Acre
Rough fescue	0.87	PLS/Acre
Prairie junegrass	0.08	PLS/Acre
Sandberg bluegrass	0.28	PLS/Acre
Western wheatgrass	3.96	PLS/Acre
Quick guard (sterile triticale)	5.76	PLS/Acre
Silky lupine	5.33	PLS/Acre
Canada mikvetch	0.48	PLS/Acre
Rocky mountain beeplant	0.66	PLS/Acre
Common sunflower	0.73	PLS/Acre
Blanket flower	0.20	PLS/Acre
Fuzzy-tongue penstemon*	0.12	PLS/Acre
Blue flax	0.19	PLS/Acre
Big sage brush	0.03	PLS/Acre
Rubber rabbitbrush	0.13	PLS/Acre
Grand Totals	**32.6**	PLS/Acre

PLS: pure live seed.
* Fuzzy-tongue Penstemon only used in Fall (after October 15) seeding applications.

Pure live seed application rates shall be as specified in the tables.

The primary seed mixture, which was adjusted in 2015, 2017, and 2020 by BSB County in collaboration with Montana Tech's native species vegetation specialist, is based on monitoring results for successful revegetation within the Butte area and has been reviewed and approved by BSB County, EPA, and the State for use in upland areas of the BPSOU. The 2020 seed mix is the current preferred seed mix. As previously stated, further alterations to the mixture may be proposed.

The Alternate Seed Mixture No. 1 will only be used in areas with slopes of less than 10H:1V that are particularly susceptible to weed infestation. Additional optimal conditions for use of the alternative seed mix include locations with high moisture holding capacity and shelter from strong wind conditions. The Alternate Seed Mixture No. 2 has been proposed by BSB County and is an option for hand seeding grass-lined ditches and detention basins.

Calculations of pure "live seed" may be made on the basis of either a germination test or a tetrazolium test in addition to the purity analysis. Seed shall be applied on a pure "live seed" basis. The quantity of pure "live seed" in a 100-pound container shall be determined by the following formula:

- 100 multiplied by germination percentage, and this product multiplied by the purity percentage.

For example, if the seed is 85% pure and tests at 90% germination, then a 100-pound container would contain 76.5 pounds of pure "live seed".

Fertilizer Application

If surface soil nutrient availability data are not available, fertilizer shall be applied at a rate to achieve soil concentrations of 60 pounds of nitrogen (N) per acre, 80 pounds of P_2O_5 per acre, and 150 pounds of K_2O per acre. Mechanical or hydraulic methods of application are allowed, providing a uniform application at the specified rate is accomplished. The application method is subject to approval by Atlantic Richfield Company. When scheduling and soil conditions permit, the fertilizer shall be incorporated into the soil by discing, raking, or shallow plowing to the full depth of the topsoil or to a maximum depth of six inches, whichever is less.

Fertilizer shall be applied to the prepared seedbed prior to seeding or mulching and shall be blended with the top layer of soil or concurrently with the seed (as "no-till" drills allow). Upon EPA approval, fertilizer may be applied subsequent to seeding and mulching. Refertilization following seedling establishment will not require incorporation. In no instance shall subsoil be incorporated into the seedbed as a result of the fertilization operation.

Mulch Application

Mulch is usually applied during the summer and early fall and drill seeded after October 15. The mulch shall be applied in a uniform manner by a mulch spreader at rates varying from 2,000 to 4,000 pounds per acre. The actual rate used shall depend upon site conditions (i.e., slope, erosion potential, etc.) and will be approved by Atlantic Richfield Company and EPA prior to application. The mulch spreader shall be designed specifically for this type of work. The vegetative material shall be fed in the mechanical spreader at an even, uniform rate.

The mulch shall be anchored into the seedbed by using a mulch tiller (crimper). Straw or hay shall be clean grain straw and shall be pliable.

Mulch tillers shall have round, flat, notched blades of these approximate dimensions: 0.25 inch thick by 18 inches in diameter and spaced 8 inches apart. The tiller shall have sufficient weight to force the vegetative mulch a minimum of 3 inches into the soil and shall be equipped with disc scrapers. Mulch tilling shall be done on all slopes capable of being safely traversed by a tracked vehicle. All mulch tilling shall be done perpendicular to the flow line of the slope.

Mulch, where required, will be applied to seeded areas as close as possible to the completion of seeding operations for the area. Mulch shall not be applied in the presence of free surface water, but may be applied upon damp ground.

Mulch shall not be applied to areas having a substantial vegetative growth, such as grasses, weeds, and grains. Areas not to be mulched will be determined by Atlantic Richfield Company. Mulching shall not be done during adverse weather conditions or when wind prevents uniform distribution. Application shall be in a manner to not seriously disturb the seedbed surface.

BPSOU Reclamation Field Work Approximate Performance Periods

Task	Application/Field Work	No Work Performed
*Capping	March 2 - November 30	*December 1 - March 1
Seeding	October 16-30; March 1 - June 14	June 15 - October 15
Fertilizing	October 16-30; March 1 - June 14	June 15 - October 15
Mulching	June 1 - October 14	October 15 - May 31
Weed Spraying	March 2 - November 30	December 1 - March 1

*Engineered caps may be constructed during this period.
Periods may vary based on site conditions.

Areas prepared for seeding during the period of June 16 through October 14 may be seeded with a temporary seed mix. The temporary seed mix used shall be as follows:

Temporary Seed Mix for Upland Areas

Common Name	Pounds PLS/acre [1]
Quick guard (sterile triticale)	20.0
Total	**20.0**

PLS = Pure Live Seed
[1] Reported rates are for drill seeding; rates shall be doubled for hydraulic seeding and broadcast seeding.

Permanent seeding of these areas shall then commence during the fall performance period at a time approved by Engineer.

END OF SECTION