OTTER CREEK MINE

EXHIBIT 313G

REVEGETATION PLAN

POWDER RIVER COUNTY, MONTANA

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1.0 INTRODUCTION

This revegetation plan is designed to establish a vegetative cover that is:

- diverse, effective and permanent
- composed of native species or as approved by the Department
- equal in cover to natural vegetation in the area
- capable of stabilizing the soil surface

Reestablished vegetation will:

- be compatible with the approved post-mine land use
- have the same seasonal growth characteristics as original vegetation
- be capable of self-regeneration and succession
- be compatible with plant and animal species of the area
- meet the requirements of applicable seed, poisonous and noxious weeds, and introduced species regulations.

Reestablished vegetation will be appropriate to the post-mine land use, in that:

- grazing land and pastureland/hay cropland will provide post-mine livestock stocking rates equal to or greater than pre-mine rates
- fish and wildlife habitat, forestry and recreation are not post-mine land uses, however, wildlife enhancement features (WHEF) will be incorporated to benefit wildlife habitat.

2.0 PRE- AND POST-MINING LAND USES (17.24.313(1)(a); 17.24.762)

Pre-mining land uses are discussed in Baseline Report 304M – Pre-Mining Land Use.

Post-mine land uses will be grazing land for livestock and pastureland/hay cropland as outlined in 82-4-203 and 82-4-232 MCA and discussed in Exhibit 313A "Post-Mining Land Use". No alternative post-mine land use is proposed. Post-Mining Land Use/Revegetation Specifications have been developed to provide details for reclaiming mine areas toward specific post-mining land uses and revegetation types. These specifications appear in Appendix 313G-1 "Post-Mining Land Use/Revegetation Specifications".

3.0 SEEDING/PLANTING (17.24.711)

3.1 PERMANENT REVEGETATION SEED MIXTURES (17.24.711(1)(a) and (b))

Vegetation physiognomic types identified in the Otter Creek vegetation baseline study area include: Grassland (cool season and warm season), Tame Pasture, Shrub/Grassland, Breaks, Ponderosa Pine-

Juniper Forest and Savannah, and Drainage Bottom. Proposed permanent post-mining revegetation seed mixtures include the following:

Permanent Post-Mining Revegetation Mixtures	Number of Mixtures
Grazing Land – Grassland	
Cool Season Grassland	1
Warm Season Grassland	1
Pastureland/Hay Cropland	1
Wildlife Enhancement Features	
Upland Shrub	3
Breaks/Badlands	1
Upland Tree	2
Riparian/Wetland	3
TOTAL	**12**

Seed mixes are shown in Table 1 and are summarized as follows:

Cool Season Grassland: Basic grass, forb, and shrub mix.

Warm Season Grassland: Basic grass, forb, and shrub mix.

Pastureland/Hay Cropland: Introduced/native grass and legume mix.

Upland Shrub Silver Sagebrush Cool Season Grassland: Cool season grassland at 50 percent seeding rate plus shrubs.

Upland Shrub Big Sagebrush Cool Season Grassland: Cool season grassland at 50 percent seeding rate plus shrubs.

Upland Shrub Big Sagebrush Warm Season Grassland: Warm season grassland at 50 percent seeding rate plus shrubs.

Breaks / Badlands: Specialty grass and shrub mix.

Upland Tree Cool Season: Cool season grassland at 50 percent seeding rate with tree planting.

Upland Tree Warm Season: Warm season grassland at 50 percent seeding rate with tree planting.

Herbaceous Riparian: Specialty mix.

Woody Riparian: Herbaceous riparian at 50 percent seeding rate with tree planting.

Herbaceous Wetland: Specialty mix.

A correlation of pre-mining community types with permanent post-mining revegetation mixtures and post-construction acreages is presented in Table 2. The location of permanent post-mining revegetation mixtures is shown on Map 13.

Proposed permanent revegetation mixtures are compatible with post-mining land uses (Grazing Land and Pastureland/Hay Cropland) and anticipated site conditions (topography, aspect, slope, soils); have

similar species composition and seasonality as pre-mining vegetation communities; are capable of self-regeneration and succession; are compatible with plant and animal species in the area; and meet requirements of applicable seed, poisonous and noxious weeds, and introduced species regulations.

Seed mixtures are exclusively native with the exception of the Pastureland/Hay Cropland mix which is made up of non-native and native grasses and legumes. Seed mixtures can be expected to provide a diverse, effective, and permanent vegetative cover that is capable of stabilizing the post-mining soil surface.

Seed that is genotypically and phenotypically adapted to the project area and from within the Northern Great Plains will be used when commercially available in sufficient quantity and acceptable quality. Seeding rates have been calculated on a Pure Live Seed (PLS) basis. Purity and germination rates will be documented. All seed will be noxious weed-free.

3.2 SEEDING AND PLANTING RATES (17.24.716(3))

Permanent revegetation mixtures are presented in Appendix 313G-1 "Post-Mining Land Use/ Revegetation Specifications". Seeding and planting rates are summarized by mixture in Table 1. Grasses, forbs, and shrubs will be seeded; trees will be planted. In all WHEF mixtures containing shrubs, the grass and forb seeding rates are reduced by 50 percent; grass, forb and shrub mixtures may be seeded together using a broadcast drop seeder. Where grasses are drill-seeded, they will be applied separately from shrubs to alleviate herbaceous competition and promote the establishment of shrubs. Shrubs will generally be broadcast-seeded. Seed application rates are given on a per-square-foot basis in Appendix 313G-1.

Post-mining tree planting rates are based on pre-mine densities of trees greater than four inches dbh (diameter at breast height), adjusted for an anticipated survival rate of 50 percent.

3.3 SEEDING AND PLANTING METHODS (17.24.716; 17.24.717)

Seedbed Preparation

Soils will be prepared for seeding by subsoil or chisel plowing to relieve compaction, and disking or culti-packing to prepare a firm seedbed.

Seeding

Both broadcast and drill-seeding will be used. Drill-seeding will be used wherever equipment can safely negotiate the terrain, and will be conducted on the contour wherever practicable. Seeding depth will generally be ¼ to ½-inch. A rangeland drill, broadcast drop seeder or comparable equipment will be used.

Broadcast seeding will be conducted for all shrubs, on slopes exceeding 33 percent, and on areas with high coarse fragment content. Seed will be broadcast using manually or mechanically-operated cyclone-type bucket spreaders or a drop-seeder. On small or hard-to-access sites, hand raking will be used to cover seed.

Hydroseeding may be utilized on a limited basis. If hydroseeding is used, seed, mulch and tackifier will be applied using manufacturer's recommended rates and procedures.

Planting

Tree planting stock will consist of tubelings. Trees will be planted at densities specified in Appendix 313G-1 as summarized below:

Permanent Revegetation Mixture	Total Trees per Acre	Tree Planting Pattern
Upland Tree – Cool Season	275	1 tree on 12.5' centers
Upland Tree – Warm Season	225	1 tree on 14' centers
Woody Riparian	250	1 tree on 13' centers

3.4 INTERIM REVEGETATION (17.24.714)

Operational disturbances such as soil stockpiles, sediment control structures, and roadsides will be stabilized using the following native Interim revegetation mixture:

			Broadcast Seeding Rate[1]	
Species	**Common Name**	**Variety**	**Pounds PLS/Acre**	**PLS/sq.ft.**
GRASSES:				
Agropyron smithii	Western wheatgrass	Rosana	10	25
Agropyron trachycaulum	Slender wheatgrass	Pryor	4	14
Stipa viridula	Green needlegrass	Lodorm	10	40
		TOTAL	**24**	**79**

[1]If drill-seeding is used, the rate will be halved.

The Interim revegetation mixture may be broadcast, drilled, or hydroseeded, depending on site condition, as detailed previously.

3.5 SEEDING AND PLANTING PERIODS (17.24.713)

Seeding

Seeding will be coordinated with other reclamation activities to occur as soon after seedbed preparation as possible. Fall seeding (early October to late November) is preferred, based on climatic considerations, local soil moisture patterns, and germination requirements of selected species. When soil moisture conditions are suitable, late summer/ early fall seeding (mid-August to mid-October) may be employed, particularly for warm-season mixes. Spring seeding (early April up to mid-June) will be practiced if areas are ready for revegetation, climatic conditions are acceptable, and access is possible. Interim revegetation will be implemented to stabilize sites prior to permanent revegetation, such as sediment control structures or topsoil stockpiles, as soon after their construction as possible.

Planting

Trees will be planted concurrently with other reclamation activities in the fall or spring.

4.0 HUSBANDRY PRACTICES, SOIL STABILIZATION AND MANAGEMENT

4.1 COVER/NURSE CROPS (17.24.313(1)(h)(vii); 17.24.714)

In accordance with NRCS recommendations (NRCS Plant Materials Technical Note No. WY-14, Seedbed Preparation and Seeding Technical Note, March 2008), nurse crops (companion crops) will not be included with perennial grass/forb seed mixtures since nurse crops provide unwanted competition and will typically reduce stand establishment and forage yield of desired species.

Cover crops, which may include cereal grains, annual ryegrass, or sterile hybrids of cereal grains, may be seeded as necessary for erosion control when seeding of perennial mixtures will be delayed until the next appropriate season. Other erosion control measures (mulching, tackifying, watering to form a soil crust, etc.) may be used in lieu of a cover crop depending on factors such as acreage, field conditions, or location (proximity to drainages, accessibility, etc.).

4.2 MULCHING (17.24.313(1)(h)(vii) AND (viii); 17.24.714; 17.24.718)

Straw mulch may be applied as necessary to steeper slopes (generally slopes $\geq$33 percent where rock cover does not provide adequate erosion control), longer slopes with erosive soils, and other locations where necessary to reduce soil loss and prevent off-site sedimentation. Hydromulch may be used in lieu of straw mulch on some sites such as rail loop cut/fill slopes, steeper slopes that are not safely negotiable by surface equipment, and areas too small for equipment to operate. As discussed above, mulching is also an option where interim erosion control is necessary.

Where utilized, mulch will be certified noxious weed seed-free cereal grain straw. Straw will be crimped on the contour, or will be dozer-tracked with tracked grousers perpendicular to the slope.

Hydromulch and tackifier will be applied at a rate to produce a uniform mat on the ground at rates recommended by the manufacturer. Fibers will be dyed to facilitate visual metering.

4.3 FERTILIZATION (17.24.313(i)(h)(viii))

Fertilization of revegetated areas is not planned. Fertilization may be used as a management measure in the event vegetation monitoring indicates a soil nutrient deficiency, and the deficiency is confirmed by soil testing.

4.4 GRAZING AND OTHER LAND USE PRACTICES (17.24.718(3))

Reclamation land use practices including, but not limited to, grazing, haying, or herbicide applications, will not be conducted in a manner or at a time that interferes with the establishment and/or persistence of revegetation or other reclamation requirements. Grazing and haying will not be conducted until at least two growing seasons after seeding. In most cases grazing and mowing will not occur until sufficient area is available for a logical management unit.

The treatment of noxious weeds using herbicides will be conducted in a manner that minimizes impacts to seeded/volunteer forbs and shrubs, and woody species plantings.

4.5 REPAIR OF RILLS AND GULLIES (17.24.721)

Rills or gullies that disrupt approved post-mining land use, establishment of vegetation, or potentially cause or contribute to a violation of water quality standards outside of the permit area will be filled, graded or otherwise stabilized. Minor erosional features and small eroded areas will constitute normal conservation practices; a plan will be prepared in consultation with the department to mitigate areas of extensive rill and gully formation.

4.6 NOXIOUS WEED MANAGEMENT (17.24.716(4))

Noxious weeds will be managed in accordance with Exhibit 308E "Noxious Weed Management Plan".

5.0 EQUIPMENT (17.24.313(1)(h)(xii))

Reclamation equipment will include:

- tractors (rubber-tired and/or tracked)
- rangeland-type drill seeder
- drop-type seeder
- disk
- harrow
- cultipacker
- plow (subsoil plow, chisel plow,disk plow or other type depending on site conditions)
- mulch spreader
- mulch crimper
- hydroseeder/mulcher

Reclamation equipment will be maintained at the mine, leased as needed or subcontracted. Other reclamation equipment, such as mechanical or manual broadcast seeders will be obtained as necessary.

6.0 SCHEDULE (17.24.313(1)(h)(ii), (vi); 17.24.313)

Seeding and planting will be conducted during the first appropriate period after final seedbed preparation unless a variance is approved by the department. Primary seeding and planting periods are early April to mid-May in the spring, and mid-October to late November in the fall, with shoulder seasons extending to mid-June in spring and beginning in mid-August in fall depending on soil moisture conditions.

7.0 MONITORING (17.24.723(1-4))

Otter Creek Coal will conduct periodic monitoring of vegetation, soils and wildlife under plans submitted to MDEQ pursuant to ARM 17.24.312(1)(d), ARM 17.24.313(1)(f)(iv) and (1)(g)(ix), and with consideration of the approved post-mine land use. A Revegetation Monitoring Plan for the Otter Creek Mine is presented in Appendix 313G-2.

8.0 REVEGETATION SUCCESS CRITERIA (17.24.724; 725; 726)

Success of revegetation will be determined by comparison with technical standards that are representative of vegetation and related site characteristics occurring on lands with good ecological integrity, as described in Appendix 313G-3.

Table 1

Grazing Land, Pastureland/Hay Cropland and Wildlife Enhancement Feature Permanent Revegetation Mixtures , Otter Creek Mine

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	Grazing Land		Pastureland and Hay Cropland	Wildlife Enhancement Feature								
			Cool Season Grassland	Warm Season Grassland		Upland Shrub Silver Sagebrush-Cool Season Grassland	Upland Shrub Big Sagebrush-Cool Season Grassland	Upland Shrub Big Sagebrush-Warm Season Grassland	Breaks/ Badlands	Upland Tree - Cool Season	Upland Tree - Warm Season	Herbaceous Riparian	Woody Riparian	Herbaceous Wetland
GRASSES:			Seeding Rate (Pounds Pure Live Seed/Acre)[2]											
Agropyron smithii	Western wheatgrass	Rosana	2.00	1.50	2.00	1.00	1.00	0.75		1.00	0.75	1.50	0.75	
Agropyron cristatum	Crested wheatgrass	VNS			0.50									
Agropyron dasystachyum	Thickspike wheatgrass	Critana							0.50					
Agropyron elongatum	Tall wheatgrass	VNS			1.00									
Agropyron intermedium	Intermediate wheatgrass	VNS			2.00									
Agropyron smithii	Western wheatgrass	Rosana							0.50					
Agropyron spicatum	Bluebunch wheatgrass	Goldar	1.50	1.00		0.75	0.75	0.50	1.25	0.75	0.50			
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.50	0.50		0.25	0.25	0.25		0.25	0.25	0.25	0.10	
Andropogon scoparius	Little bluestem	Badlands		1.00				0.50	0.75		0.50			
Bouteloua curtipendula	Sideoats grama	Pierre		1.25				0.60	1.00		0.60	1.50	0.75	
Bouteloua gracilis	Blue grama	Bad River	0.30	0.20		0.15	0.15	0.10	0.20	0.15	0.10			
Calamovilfa longifolia	Prairie sandreed	Bowman		0.60				0.30	0.50		0.30	0.75	0.40	
Distichlis stricta	Alkali saltgrass	Site adapted							0.20			0.50	0.25	0.70
Elymus canadensis	Canada wildrye	Site adapted										2.25	1.10	
Elymus cinereus	Basin wildrye	Trailhead			2.00									
Hordeum jubatum	Foxtail barley	Site adapted										2.25	1.10	1.50
Juncus torreyi	Torrey's rush	Site adapted												0.02
Koeleria cristata	Prairie junegrass	Site adapted	0.10			0.05	0.05			0.05				
Panicum virgatum	Switchgrass	Dacotah												0.75
Poa pratensis	Kentucky bluegrass	VNS			0.25									
Poa sandbergii	Sandberg's bluegrass	High Plains	0.20	0.20		0.10	0.10	0.10	0.10	0.10	0.10			
Scirpus americanus	American bulrush	Site adapted												1.50
Spartina pectinata	Prairie cordgrass	Site adapted												1.50
Sporobolus airoides	Alkali sacaton	Site adapted							0.10			0.10	0.05	0.20
Stipa comata	Needle-and-thread	Site adapted	1.50	1.00		0.75	0.75	0.50		0.75	0.50			
Stipa viridula	Green needlegrass	Lodorm	1.50			0.75	0.75			0.75		1.50	0.75	
FORBS:														
Achillea millefolium	Yarrow	Great Northern	0.01	0.01		0.01	0.01	0.01		0.01	0.01	0.01	0.01	
Artemisia frigida	Fringed sagewort	Site adapted		0.01				0.01			0.01			
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01			0.01	0.01			0.01		0.01	0.01	
Dalea purpurea	Purple prairie-clover	Site adapted	0.50	0.50		0.25	0.25	0.25		0.25	0.25			
Echinacea angustifolia	Purple coneflower	Site adapted		0.50				0.40			0.40			
Gaillardia aristata	Blanket-flower	Site adapted		0.30				0.30			0.30			
Liatris punctata	Dotted blazingstar	Site adapted	0.40	0.40		0.20	0.20	0.25		0.20	0.25			
Linum lewisii	Blue flax	Site adapted	0.05			0.02	0.02			0.02				
Medicago sativa	Alfalfa	VNS			1.00									
Melilotus officinalis	Yellow sweetclover	VNS			1.00									
Ratibida columnifera	Prairie coneflower	Site adapted	0.10	0.10		0.05	0.05	0.05		0.05	0.05			
Sphaeralcea coccinea	Scarlet globemallow	Site adapted	0.10			0.05	0.05			0.05				

Table 1

Grazing Land, Pastureland/Hay Cropland and Wildlife Enhancement Feature Permanent Revegetation Mixtures , Otter Creek Mine

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	Grazing Land		Pastureland and Hay Cropland	Wildlife Enhancement Feature								
			Cool Season Grassland	Warm Season Grassland		Upland Shrub Silver Sagebrush-Cool Season Grassland	Upland Shrub Big Sagebrush-Cool Season Grassland	Upland Shrub Big Sagebrush-Warm Season Grassland	Breaks/ Badlands	Upland Tree - Cool Season	Upland Tree - Warm Season	Herbaceous Riparian	Woody Riparian	Herbaceeous Wetland
SHRUBS:			**Seeding Rate (Pounds Pure Live Seed/Acre)[2]**											
Artemisia cana	Silver sagebrush	Site adapted	1.00	1.25		2.00	0.75	0.75	1.00				2.50	
Artemisia tridentata	Big sagebrush	Site adapted	0.50	0.40		0.60	1.00	1.00	0.50					
Atriplex confertifolia	Shadscale saltbush	Site adapted	-	-	-	-	-	-	6.00	-	-	-	-	-
Ceratoides lanata	Winterfat	Site adapted	-	-	-	-	3.00	3.00	-	-	-	-	-	-
Chrysothamnus nauseosus	Rubber rabbitbrush	Site adapted	-	-	-	-	-	-	1.00	-	-	-	-	-
Prunus virginiana	Common chokecherry	Site adapted	-	-	-	-	-	-	-	-	-	-	1.00	-
Rhus aromatica	Skunkbush sumac	Site adapted	-	-	-	-	-	-	10.00	-	-	-	4.00	-
Rosa woodsii	Wood's rose	Site adapted	-	-	-	-		-	-	-	-	-	2.00	
Sarcobatus vermiculatus	Black greasewood	Site adapted	-	-	-	-	-	-	1.00	-	-	-	-	-
Symphoricarpos occidentalis	Western snowberry	Site adapted				3.00							2.50	
TOTAL			**10.27**	**10.72**	**9.75**	**9.99**	**9.14**	**9.62**	**24.60**	**4.39**	**4.87**	**10.62**	**17.27**	**6.17**
TREES:			**Planting Rate (stems/acre)[3]**											
Acer negundo	Boxelder	-	-	-	-	-	-	-	-	-	-	-	100	-
Fraxinus pennsylvanica	Green ash	-	-	-	-	-	-	-	-	-	-	-	50	-
Juniperus scopulorum	Rocky Mountain juniper	-	-	-	-	-	-	-	225	125	100	-	75	-
Pinus ponderosa	Ponderosa pine	-	-	-	-	-	-	-	75	150	125	-	-	-
Populus deltoides	Plains cottonwood	-	-	-	-	-	-	-	-	-	-	-	25	-
TOTAL			**-**	**-**	**-**	**-**	**-**	**-**	**300**	**275**	**225**	**-**	**250**	**-**

[1]"Site adapted" seed originates from within the Northern Great Plains region. "VNS" = Variety Not Stated.
[2]Seeding Rates are given in pounds Pure Live Seed (PLS) per acre.
[3]Planting Rates are given as stems per acre.

NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

Table 2
Correlation of Pre-Mining Community Types in the Otter Creek Study Area With Revegetation Mixtures and Post-Construction Acreages.

PRE-MINING COMMUNITY TYPE	POST-CONSTRUCTION REVEGETATION MIXTURE	POST-CONSTRUCTION ACREAGE
GRAZING LAND - GRASSLAND		**2024**
Agropyron smithii / Bouteloua gracilis	Cool Season Grassland	1630
Agropyron smithii / Stipa viridula		
Stipa comata / Agropyron smithii		
Stipa comata / Carex filifolia		
Agropyron spicatum / Stipa comata		
Agropyron spicatum / Bouteloua curtipendula		
Andropogon scoparius / Carex filifolia	Warm Season Grassland	394
Andropogon scoparius / Agropyron spicatum		
Andropogon scoparius / Bouteloua curtipendula		
Andropogon scoparius / Andropogon gerardii		
Andropogon scoparius / Calamovilfa longifolia		
Calamovilfa longifolia / Stipa comata		
TAME PASTURE		**227**
Tame Pasture	Pastureland/Hay Cropland	227
WILDLIFE ENHANCEMENT FEATURE – UPLAND SHRUB		**1435**
Artemisia cana / Agropyron smithii	Silver Sagebrush Cool Season Grassland	210
Artemisia tridentata / Agropyron smithii	Big Sagebrush Cool Season Grassland	837
Artemisia tridentata / Agropyron spicatum		
Artemisia tridentata / Andropogon scoparius	Big Sagebrush Warm Season Grassland	388
WILDLIFE ENHANCEMENT FEATURE – BREAKS/BADLANDS		**477**
Grass-Dominated Breaks	Breaks/Badlands	303
Agropyron smithii Breaks		
Agropyron spicatum Breaks		
Sporobolus airoides Breaks		
Calamovilfa longifolia Breaks		
Shrub-Dominated Breaks		
Artemisia tridentata-Sarcobatus vermiculatus-Chrysothamnus nauseosus / Agropyron smithii		
Artemisia tridentata-Sarcobatus vermiculatus-Chrysothamnus nauseosus / Agropyron spicatum	Steep Slopes, Rock Outcrops and Bluffs	174
Rhus aromatica / Agropyron spicatum-Andropogon scoparius		
Artemisia tridentata-Rhus aromatica-Chrysothamnus nauseosus / Agropyron spicatum		
Artemisia tridentata-Rhus aromatica-Sarcobatus vermiculatus / Agropyron spicatum		
Artemisia tridentata-Atriplex confertifolia-Sarcobatus vermiculatus / Agropyron spicatum		
Artemisia tridentata-Atriplex confertifolia-Rhus aromatica / Agropyron spicatum		
Conifer-Dominated Breaks		
Juniperus scopulorum/Agropyron spicatum Breaks		
Pinus ponderosa-Juniperus scopulorum / Agropyron spicatum Breaks		
Pinus ponderosa-Juniperus scopulorum / Andropogon scoparius Breaks		
Pinus ponderosa-Juniperus scopulorum / Artemisia tridentata Breaks		
Pinus ponderosa-Juniperus scopulorum / Artemisia tridentata-Atriplex confertifolia Breaks		
WILDLIFE ENHANCEMENT FEATURE – UPLAND TREE		**339**
Ponderosa Pine-Juniper / Grass		
Pinus ponderosa-Juniperus scopulorum / Agropyron spicatum	Upland Tree – Cool Season	134
Juniperus scopulorum-Pinus ponderosa / Oryzopsis micrantha		
Pinus ponderosa-Juniperus scopulorum / Festuca idahoensis		
Pinus ponderosa-Juniperus scopulorum / Andropogon scoparius	Upland Tree – Warm Season	205

Table 2
Correlation of Pre-Mining Community Types in the Otter Creek Study Area With Revegetation Mixtures and Post-Construction Acreages.

PRE-MINING COMMUNITY TYPE	POST-CONSTRUCTION REVEGETATION MIXTURE	POST-CONSTRUCTION ACREAGE
Ponderosa Pine-Juniper / Shrub		
Drainage *Juniperus scopulorum-Pinus ponderosa / Symphoricarpos occidentalis-Agropyron smithii*	Upland Tree – Cool Season	see above
Pinus ponderosa-Juniperus scopulorum / Prunus virginiana		
WILDLIFE ENHANCEMENT FEATURE – RIPARIAN/WETLAND		**215**
Mesophytic/Hydrophytic Herbaceous Bottom	Herbaceous Riparian	215
Distichlis stricta / Agropyron smithii		
Distichlis stricta / Hordeum jubatum		
Sporobolus airoides / Agropyron smithii		
Sporobolus airoides / Distichlis stricta		
Spartina gracilis / Distichlis stricta	Herbaceous Wetland	
Spartina pectinata / Bromus inermis		
Spartina pectinata / Poa pratensis		
Spartina pectinata / Hordeum jubatum		
Spartina pectinata / Puccinellia nuttalliana		
Spartina pectinata / Panicum virgatum		
Spartina pectinata / Scirpus americanus		
Scirpus maritimus / Sporobolus airoides-Distichlis stricta		
Scirpus maritimus / Scirpus americanus-Eleocharis palustris		
Eleocharis palustris / Scirpus americanus-Juncus torreyi		
Typha latifolia / Bromus inermis		
Typha latifolia / Spartina pectinata		
Scirpus acutus–Scirpus validus / Spartina pectinata		
Scirpus acutus–Scirpus validus / Typha latifolia		
Mesophytic Low Shrub Bottom	Woody Riparian	
Symphoricarpos occidentalis-Artemisia tridentata-Sarcobatus vermiculatus / Agropyron smithii		
Artemisia cana-Rosa woodsii / Agropyron smithii-Poa pratensis		
Symphoricarpos occidentalis-Artemisia cana / Agropyron smithii-Poa pratensis		
Symphoricarpos occidentalis-Rosa woodsii / Poa pratensis-Agropyron smithii		
Mesophytic Tall Shrub Bottom		
Prunus virginiana / Symphoricarpos occidentalis-Poa pratensis		
Salix exigua / Scirpus americanus-Juncus torreyi		
Mesophytic Deciduous Tree Bottom		
Populus deltoides / Bromus inermis		
Populus deltoides-Acer negundo / Bromus inermis		
Populus deltoides-Fraxinus pennsylvanica-Acer negundo / Poa pratensis		
Populus deltoides / Symphoricarpos occidentalis-Poa pratensis		
Populus deltoides-Fraxinus pennsylvanica-Acer negundo / Symphoricarpos occidentalis		
Populus deltoides-Salix amygdaloides / Poa pratensis		
Populus deltoides-Salix amygdaloides / Salix exigua		
Populus deltoides / Prunus virginiana		
Populus deltoides-Fraxinus pennsylvanica-Acer negundo / Prunus virginiana		
Acer negundo / Bromus inermis		
Acer negundo / Spartina pectinata		
Acer negundo / Prunus virginiana		
Fraxinus pennsylvanica/Poa pratensis		
WILDLIFE ENHANCEMENT FEATURE – PONDS		**7**

Table 2
Correlation of Pre-Mining Community Types in the Otter Creek Study Area With Revegetation Mixtures and Post-Construction Acreages.

PRE-MINING COMMUNITY TYPE	POST-CONSTRUCTION REVEGETATION MIXTURE	POST-CONSTRUCTION ACREAGE
	TOTAL	4724

OTTER CREEK MINE

EXHIBIT 313G

APPENDIX 313G-1

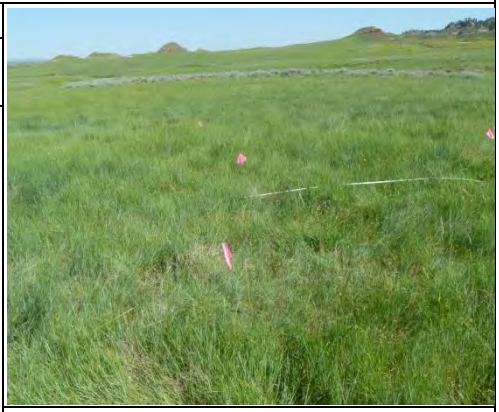
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SPECIFICATION	PAGE
GRAZING LAND – COOL-SEASON GRASSLAND (GL-CSG)	1
GRAZING LAND – WARM-SEASON GRASSLAND (GL-WSG)	3
PASTURELAND/HAY CROPLAND (PL/HC)	5
WILDLIFE HABITAT ENHANCEMENT FEATURE – BREAKS/BADLANDS (WHEF-B/B)	6
WILDLIFE HABITAT ENHANCEMENT FEATURE – SHRUB SEEDINGS (WHEF-SS)	8
WILDLIFE HABITAT ENHANCEMENT FEATURE – TREE PLANTINGS (WHEF-TP)	12
WILDLIFE HABITAT ENHANCEMENT FEATURE – STEEP SLOPES, ROCK OUTCROPS AND BLUFFS (Topographic Features) (WHEF-TF)	15
WILDLIFE HABITAT ENHANCEMENT FEATURE – PONDS (WHEF-P)	16
WILDLIFE HABITAT ENHANCEMENT FEATURE – RIPARIAN/WETLAND (WHEF-R/W)	17

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

NAME: **GRAZING LAND – COOL-SEASON GRASSLAND**

CODE: **GL-CSG**



Pre-mining cool-season grassland dominated by western wheatgrass and green needlegrass on moderately deep to deep silty to loamy soils.

DESCRIPTION: Pre-mining cool-season grassland used for cattle grazing comprises about 25 percent of the mine area and will be a major post-mining land use/revegetation type. **Pre-mining composition** is:

Species	*Percent Cover*
Western wheatgrass	**30**
Bluebunch wheatgrass	**1**
Threadleaf sedge	**3**
Prairie junegrass	**1**
Sandberg's bluegrass	**1**
Needle-and-thread	**7**
Green needlegrass	**9**
Blue grama	**8**

LOCATION: Pre-mining distribution of cool-season grassland is shown on Plate 1 in Baseline Report 304J; post-mining location of GL-CSG is shown on Map 13.

RECLAMATION GOALS:
- Establish self-sustaining native grasses and forbs suitable for livestock grazing
- Minimize erosion by implementing appropriate BMPs
- Achieve revegetation success criteria for cover, production and diversity as specified in Revegetation Plan
- Incorporate wildlife habitat enhancement features
- Manage noxious weeds in accordance with Exhibit 308E.

SPOIL HANDLING: Spoil surfaces will be scarified on the contour.

SOIL REDISTRIBUTION: A horizon: 6-12 inches
Subsoil (B/C) horizons: 12-24 inches

Soil will be redistributed to achieve a total thickness (topsoil plus subsoil) of 18 to 36 inches. Thickness will vary within GL-CSG to increase diversity within the type.

AMENDMENTS: **Fertilizer**: Fertilizer will be applied only if monitoring indicates and testing confirms soil nutrient deficiencies.

EROSION CONTROL: Mulch or other erosion control measures will be applied as necessary on slopes $\geq$33% and on areas where sheet erosion, rilling or gullying is expected or occurring.

SEEDBED PREPARATION: Seedbeds with established annual grasses or forbs will be tilled or chemically treated prior to seeding. Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction.

SEEDING METHOD: Since PMT slopes in this type are mostly gentle to moderate, drill seeding on the contour will be used in most situations. Broadcast seeding will be used on steeper slopes. Shrubs will be broadcast seeded using a manual seeder, a mechanically operated cyclone-type bucket spreader, or a drop type seeder with a seed covering attachment.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURE AND RATE:

Otter Creek Coal
Grazing Land - Cool Season Grassland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	2.00	/	4
Agropyron spicatum	Bluebunch wheatgrass	Goldar	1.50	/	4
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.50	/	2
Bouteloua gracilis	Blue grama	Bad River	0.30	/	6
Koeleria cristata	Prairie junegrass	Site adapted	0.10	/	5
Poa sandbergii	Sandberg's bluegrass	High Plains	0.20	/	5
Stipa comata	Needle-and-thread	Site adapted	1.50	/	4
Stipa viridula	Green needlegrass	Lodorm	1.50	/	6
		SUB-TOTAL GRASSES:	**7.60**	**/**	**36**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.50	/	2
Liatris punctata	Dotted blazingstar	Site adapted	0.40	/	1
Linum lewisii	Blue flax	Site adapted	0.05	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.10	/	2
Sphaeralcea coccinea	Scarlet globemallow	Site adapted	0.10	/	1
		SUB-TOTAL FORBS:	**1.17**	**/**	**9**
SHRUBS:					
Artemisia cana	Silver sagebrush	Site adapted	1.00	/	20
Artemisia tridentata	Big sagebrush	Site adapted	0.50	/	29
		SUB-TOTAL SHRUBS	1.50	/	49
		TOTAL	**10.27**	**/**	**94**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a drill seeding rate of approximately 45 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

NAME: **GRAZING LAND – WARM-SEASON GRASSLAND**

CODE: **GL-WSG**

DESCRIPTION: Pre-mining warm-season grassland used for cattle grazing comprises about 5 percent of the mine area and will be a major post-mining land use/revegetation type. **Pre-mining composition** is:

Species	*Percent cover*
Little bluestem	**10**
Sideoats grama	**5**
Blue grama	**4**
Prairie sandreed	**3**
Plains muhly	**1**
Western wheatgrass	**2**
Bluebunch wheatgrass	**5**
Threadleaf sedge	**7**
Prairie junegrass	**2**
Sandberg's bluegrass	**<1**
Needle-and-thread	**7**
Green needlegrass	**<1**

Typical pre-mine warm season grassland on upper slope.

LOCATION: Warm-season grassland occurs predominantly in the northeastern portion of the mine area (Plate 1 in Baseline Report 304J); post-mining location of GL-WSG is shown on Map 13.

RECLAMATION GOALS:
- Establish self-sustaining native grasses and forbs suitable for livestock grazing
- Minimize erosion by implementing appropriate BMPs
- Achieve revegetation success criteria for cover, production and diversity as specified in Revegetation Plan
- Incorporate wildlife enhancement features
- Manage noxious weeds in accordance with Exhibit 308E
- Reestablish warm-season grass component in the post-mining landscape.

SPOIL HANDLING: Spoil surfaces will be scarified on the contour.

SOIL REDISTRIBUTION: A horizon: 6-12 inches
Subsoil (B/C) horizons: 12-24 inches

Soil will be redistibuted to achieve a total thickness (topsoil plus subsoil) of 18 to 36 inches. Thickness will vary within GL-WSG to increase vegetative diversity within the type.

AMENDMENTS: **Fertilizer**: Fertilizer will be applied only if monitoring indicates and testing confirms soil nutrient deficiencies.

EROSION CONTROL: Mulch or other erosion control measures will be applied as necessary on slopes ≥33% and on areas where sheet erosion, rilling or gullying is expected or occurring.

SEEDBED PREPARATION: Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction.

SEEDING METHOD: Since PMT slopes in this type will vary considerably from gentle to steep, drill or broadcast seeding may be conducted based on slope and other factors. Shrubs will be broadcast seeded using a manual seeder, a mechanically operated cyclone-type bucket spreader, or a drop type seeder with a seed covering attachment.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURE AND RATE:

Otter Creek Coal

Grazing Land - Warm Season Grassland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	1.50	/	3
Agropyron spicatum	Bluebunch wheatgrass	Goldar	1.00	/	3
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.50	/	2
Andropogon scoparius	Little bluestem	Badlands	1.00	/	6
Bouteloua curtipendula	Sideoats grama	Pierre	1.25	/	6
Bouteloua gracilis	Blue grama	Bad River	0.20	/	4
Calamovilfa longifolia	Prairie sandreed	Bowman	0.60	/	4
Poa sandbergii	Sandberg's bluegrass	High Plains	0.20	/	5
Stipa comata	Needle-and-thread	Site adapted	1.00	/	3
		SUB-TOTAL GRASSES:	**7.25**	**/**	**36**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia frigida	Fringed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.50	/	2
Echinacea angustifolia	Purple coneflower	Site adapted	0.50	/	1
Gaillardia aristata	Blanket-flower	Site adapted	0.30	/	1
Liatris punctata	Dotted blazingstar	Site adapted	0.40	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.10	/	2
		SUB-TOTAL FORBS:	**1.82**	**/**	**9**
SHRUBS:					
Artemisia cana	Silver sagebrush	Site adapted	1.25	/	25
Artemisia tridentata	Big sagebrush	Site adapted	0.40	/	23
		SUB-TOTAL SHRUBS:	**1.65**	**/**	**48**
		TOTAL	**10.72**	**/**	**93**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a drill seeding rate of approximately 45 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

NAME:	**PASTURELAND/HAY CROPLAND**
CODE:	**PL/HC**
DESCRIPTION:	Pastureland/Hay Cropland is categorized as Tame Pasture (TP) in Baseline Report 304M-Pre-Mining Land Use and includes go-back crested wheatgrass fields, hay meadows and fields seeded for grazing. Species composition varies between fields, the common denominator being a prevalence of introduced species. Tame Pasture comprises about 17 percent of the Project. Dominants include crested wheatgrass, smooth brome, alfalfa and yellow sweetclover with intermediate wheatgrass, tall wheatgrass and Russian wildrye dominating some fields.

Hay meadow along Otter Creek

LOCATION:	Pastureland/Hay Cropland is located primarily along Otter, Threemile and Tenmile Creeks with go-back fields or dryland seeded pasture occasionally in uplands (Plate 1 in Baseline Report 304J); post-mining location of Pastureland is shown on Map 13.
RECLAMATION GOALS:	• Provide site conditions and vegetation suitable for grazing or hay production. • Achieve revegetation success criteria for production. • Manage noxious weeds in accordance with Exhibit 308E • Work with landowners or lessees to develop specific locations and plans that best suit their ranching operation.
SPOIL HANDLING:	Spoil surfaces will be scarified on the contour. Ensure that no materials deleterious to plant growth are present to a depth of 8 feet from the surface in areas proposed to be seeded to grass/alfalfa or alfalfa.
SOIL REDISTRIBUTION:	A horizon: 12-18 inches Subsoil (B/C) horizons: 30-36 inches Soil will be redistributed to achieve a uniform thickness of about 48 inches.
AMENDMENTS:	Fertilizer application will be based on soil tests to achieve nutrient values pertinent to hayland or upland pasture.
SEEDBED PREPARATION:	Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction.
SEEDING METHOD:	Drill seed on the contour.

SEED MIXTURE AND RATE:

Otter Creek Coal
Pastureland/Hay Cropland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron cristatum	Crested wheatgrass	VNS	0.50	/	3
Agropyron elongatum	Tall wheatgrass	VNS	1.00	/	2
Agropyron intermedium	Intermediate wheatgrass	VNS	2.00	/	4
Agropyron smithii	Western wheatgrass	Rosana	2.00	/	4
Elymus cinereus	Basin wildrye	Trailhead	2.00	/	6
Poa pratensis	Kentucky bluegrass	VNS	0.25	/	12
		SUB-TOTAL GRASSES:	**7.75**	**/**	**31**
FORBS:					
Medicago sativa	Alfalfa	VNS	1.00	/	5
Melilotus officinalis	Yellow sweetclover	VNS	1.00	/	6
		SUB-TOTAL FORBS:	**2.00**	**/**	**11**
		TOTAL	**9.75**	**/**	**42**

[1]VNS = Variety Not Stated. Seed mix composition and varieties will be solicited from landowners or lessees prior to seeding.
[2]Based on a drill seeding rate of 42 Pure Live Seed (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
NOTE: Species or rates may be revised based on commercial availability, or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

NAME: **WILDLIFE HABITAT ENHANCEMENT FEATURE- BREAKS/BADLANDS**

CODE: **WHEF-B/B**

DESCRIPTION:

Several breaks/badlands vegetation types are present in the pre-mine landscape comprising a little over 13 percent of the mine area. Soils are highly variable but generally shallow and frequently rocky. **Pre-mining composition** averaged for the various grass- and shrub-dominated plant communities is:

	Grass-dominated communities	Shrub-dominated communities
Species	**Percent cover**	**Percent cover**
Thickspike wheatgrass	2	2
Western wheatgrass	6	3
Bluebunch wheatgrass	2	5
Alkali sacaton	2	<1
Little bluestem	1	<1
Blue grama	1	1
Prairie sandreed	1	<1
Inland saltgrass	1	<1
Few-flowered buckwheat	1	1
Broom snakeweed	4	2
Big sagebrush	<1	8
Shadscale saltbush	<1	2
Rubber rabbitbrush	<1	2
Skunkbush sumac	<1	1
Greasewood	<1	2

Breaks/badlands

LOCATION: Breaks/badlands are scattered throughout the pre-mine area (Plate 1 in Baseline Report 304J); post-mining location of WHEF-B/B is shown on Map 13.

RECLAMATION GOALS:
- Provide forage diversity and cover for ungulates
- Provide nesting habitat for birds
- Provide habitat for small mammals and reptiles.

SPOIL HANDLING: Spoil surfaces will be scarified on the contour.

SOIL REDISTRIBUTION: Vary soil depth of A and B/C horizons to create diversity. Opportunistically utilize coarser-textured soils and soils with higher coarse fragment content, especially on steeper slopes. Redistributed soil thickness in WHEF B/B will vary from 6 to 12 inches.

AMENDMENTS: Use of amendments is not planned

EROSION CONTROL: Breaks/badlands are expected to be more erosive than other revegetated areas due to steeper slopes and shallow soils. Erosion control devices will be installed on the downslope perimeter of WHEF-B/B where erosion is anticipated. Erosion control may include low (1 to 3 foot tall) berms, log rolls, or commercial sediment control products with the goal of trapping sediment near the base of the WHEF.

SEEDBED PREPARATION: Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction.

SEEDING METHOD: Where PMT slopes in this type are mostly gentle to moderate, drill seeding on the contour will be used. Broadcast seeding will be used on steeper slopes.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURE AND RATE:

Otter Creek Coal
Breaks/Badlands Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron dasystachyum	Thickspike wheatgrass	Critana	0.50	/	2
Agropyron smithii	Western wheatgrass	Rosana	0.50	/	1
Agropyron spicatum	Bluebunch wheatgrass	Goldar	1.25	/	4
Andropogon scoparius	Little bluestem	Badlands	0.75	/	4
Bouteloua curtipendula	Sideoats grama	Pierre	1.00	/	4
Bouteloua gracilis	Blue grama	Bad River	0.20	/	4
Calamovilfa longifolia	Prairie sandreed	Bowman	0.50	/	3
Distichlis stricta	Alkali saltgrass	Site adapted	0.20	/	2
Poa sandbergii	Sandberg's bluegrass	High Plains	0.10	/	2
Sporobolus airoides	Alkali sacaton	Site adapted	0.10	/	4
		SUB-TOTAL GRASSES:	**5.10**	**/**	**30**
SHRUBS:					
Artemisia cana	Silver sagebrush	Site adapted	1.00	/	20
Artemisia tridentata	Big sagebrush	Site adapted	0.50	/	28
Atriplex confertifolia	Shadscale saltbush	Site adapted	6.00	/	10
Chrysothamnus nauseosus	Rubber rabbitbrush	Site adapted	1.00	/	10
Rhus aromatica	Skunkbush sumac	Site adapted	10.00	/	6
Sarcobatus vermiculatus	Black greasewood	Site adapted	1.00	/	6
		SUB-TOTAL SHRUBS:	**19.50**	**/**	**80**
		TOTAL	**24.60**	**/**	**110**

TREES[3]:			**Planting Rate[4] (stems/acre)**
Juniperus scopulorum	Rocky Mountain juniper	-	225
Pinus ponderosa	Ponderosa pine	-	75
		TOTAL TREES:	**300**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a broadcast seeding rate of approximately 110 Pure Live Seeds (PLS) per square foot. Where drill seeding is used, the rate of grasses will be halved.
[3]Trees will be planted only on sites capable of supporting conifers as determined in the field.
[4]Trees will be planted on 12-foot centers.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE POST-MINING LAND USE / REVEGETATION SPECIFICATIONS		
NAME:	**WILDLIFE HABITAT ENHANCEMENT FEATURE – SHRUB SEEDINGS**	 Big sagebrush grassland
CODE:	**WHEF-SS**	
DESCRIPTION:	Shrub-dominated communities comprise nearly 29 percent of the mine area. Silver sagebrush/western wheatgrass, big sagebrush/western wheatgrass or bluebunch wheatgrass, and big sagebrush/little bluestem are the dominant upland shrub community types. Silver sagebrush usually occurs on low topography (bottoms/banks, terraces, and swales) on silty clay loam soils. Big sagebrush stands dominated by cool season species are usually found on middle to upper, gentle to moderate slopes on silt loam soils. Big sagebrush stands dominated by warm season species occur on moderate to moderately steep middle to upper slopes and ridges on shallow clays, silts, and loams.	
LOCATION:	Upland shrubs occur throughout the pre-mine area (Plate 1 in Baseline Report 304J). Post-mining locations of WHEF-SS are depicted on Map 13.	
RECLAMATION GOALS:	• Provide forage diversity and cover for ungulates • Provide nesting habitat for birds • Provide habitat for small mammals and reptiles	
SPOIL HANDLING:	Spoil surfaces will be scarified on the contour to relieve compaction and promote root penetration and permeability.	
SOIL REDISTRIBUTION:	A horizon: 6-12 inches Subsoil (B/C) horizons: 12-24 inches Soil will be redistributed to achieve a total thickness (topsoil plus subsoil) of 18 to 36 inches. Thickness will vary within WHEF-SS to increase vegetative diversity within the type.	
AMENDMENTS:	Use of amendments is not planned	
EROSION CONTROL:	Mulch: Mulch or other erosion control measures will be applied if necessary on slopes $\geq$33% and on areas where sheet erosion, rilling or gullying is expected or occurring.	
SEEDBED PREPARATION:	Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction.	
SEEDING METHOD:	Grasses and forbs will be drill seeded at a rate designated in each of the three mixtures below. A drop seeder or rangeland drill will be used to plant grass/forb seed. Drill seeding will be conducted on the contour when practicable. Shrubs will be broadcast seeded at a rate specified in the three mixes below. Seed will be broadcast using a manual or mechanically-operated cyclone-type bucket spreader or a drop type seeder with a seed covering attachment.	

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURES AND RATES:

Otter Creek Coal
WHEF-SS
Silver Sagebrush-Cool Season Grassland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	1.00	/	2
Agropyron spicatum	Bluebunch wheatgrass	Goldar	0.75	/	2
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.25	/	1
Bouteloua gracilis	Blue grama	Bad River	0.15	/	3
Koeleria cristata	Prairie junegrass	Site adapted	0.05	/	3
Poa sandbergii	Sandberg's bluegrass	High Plains	0.10	/	3
Stipa comata	Needle-and-thread	Site adapted	0.75	/	2
Stipa viridula	Green needlegrass	Lodorm	0.75	/	3
		SUB-TOTAL GRASSES:	**3.80**	**/**	**19**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.25	/	1
Liatris punctata	Dotted blazingstar	Site adapted	0.20	/	1
Linum lewisii	Blue flax	Site adapted	0.02	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.05	/	1
Sphaeralcea coccinea	Scarlet globemallow	Site adapted	0.05	/	1
		SUB-TOTAL FORBS:	**0.59**	**/**	**7**
SHRUBS:[3]					
Artemisia cana	Silver sagebrush	Site adapted	2.00	/	40
Artemisia tridentata	Big sagebrush	Site adapted	0.60	/	34
Symphoricarpos occidentalis	Western snowberry	Site adapted	3.00	/	6
		SUB-TOTAL SHRUBS:	**5.60**	**/**	**80**
		TOTAL	**9.99**	**/**	**106**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Grasses and forbs will be drill seeded at 26 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
[3]Shrubs will be broadcast seeded at a rate of 80 PLS per square foot.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURES AND RATES:

Otter Creek Coal
WHEF-SS
Big Sagebrush-Cool Season Grassland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	1.00	/	2
Agropyron spicatum	Bluebunch wheatgrass	Goldar	0.75	/	2
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.25	/	1
Bouteloua gracilis	Blue grama	Bad River	0.15	/	3
Koeleria cristata	Prairie junegrass	Site adapted	0.05	/	3
Poa sandbergii	Sandberg's bluegrass	High Plains	0.10	/	3
Stipa comata	Needle-and-thread	Site adapted	0.75	/	2
Stipa viridula	Green needlegrass	Lodorm	0.75	/	3
		SUB-TOTAL GRASSES:	**3.80**	**/**	**19**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.25	/	1
Liatris punctata	Dotted blazingstar	Site adapted	0.20	/	1
Linum lewisii	Blue flax	Site adapted	0.02	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.05	/	1
Sphaeralcea coccinea	Scarlet globemallow	Site adapted	0.05	/	1
		SUB-TOTAL FORBS:	**0.59**	**/**	**7**
SHRUBS:[3]					
Artemisia cana	Silver sagebrush	Site adapted	0.75	/	15
Artemisia tridentata	Big sagebrush	Site adapted	1.00	/	57
Ceratoides lanata	Winterfat	Site adapted	3.00	/	8
		SUB-TOTAL SHRUBS:	**4.75**	**/**	**80**
		TOTAL	**9.14**	**/**	**106**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Grasses and forbs will be drill seeded at 26 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
[3]Shrubs will be broadcast seeded at a rate of 80 PLS per square foot.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEEDMIXTURES AND RATES:

Otter Creek Coal
WHEF-SS
Big Sagebrush-Warm Season Grassland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	0.75	/	2
Agropyron spicatum	Bluebunch wheatgrass	Goldar	0.50	/	2
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.25	/	1
Andropogon scoparius	Little bluestem	Badlands	0.50	/	3
Bouteloua curtipendula	Sideoats grama	Pierre	0.60	/	2
Bouteloua gracilis	Blue grama	Bad River	0.10	/	2
Calamovilfa longifolia	Prairie sandreed	Bowman	0.30	/	2
Poa sandbergii	Sandberg's bluegrass	High Plains	0.10	/	3
Stipa comata	Needle-and-thread	Site adapted	0.50	/	1
		SUB-TOTAL GRASSES:	**3.60**	**/**	**18**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia frigida	Fringed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.25	/	1
Echinacea angustifolia	Purple coneflower	Site adapted	0.40	/	1
Gaillardia aristata	Blanket-flower	Site adapted	0.30	/	1
Liatris punctata	Dotted blazingstar	Site adapted	0.25	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.05	/	1
		SUB-TOTAL FORBS:	**1.27**	**/**	**7**
SHRUBS:[3]					
Artemisia cana	Silver sagebrush	Site adapted	0.75	/	15
Artemisia tridentata	Big sagebrush	Site adapted	1.00	/	57
Ceratoides lanata	Winterfat	Site adapted	3.00	/	8
		SUB-TOTAL SHRUBS:	**4.75**	**/**	**80**
		TOTAL	**9.62**	**/**	**105**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Grasses and forbs will be drill seeded at approximately 25 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
[3]Shrubs will be broadcast seeded at a rate of approximately 80 PLS per square foot.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE POST-MINING LAND USE / REVEGETATION SPECIFICATIONS		
NAME:	**WILDLIFE HABITAT ENHANCEMENT FEATURE- TREE PLANTINGS**	 Ponderosa pine-juniper forest/savannah
CODE:	**WHEF-TP**	
DESCRIPTION:	Ponderosa pine-juniper forest/savannah is found on around 8 percent of the pre-mine landscape. The cool season-dominated community types are often found on middle slopes to ridges on generally steeper slopes having shallow soils. The warm season-dominated type occurs on all topographic positions, on variable slope gradients and aspects, and usually on shallow clay or loam soils.	
LOCATION:	Ponderosa pine-juniper forest/savannah is scattered throughout the pre-mine area (see Plate 1, Baseline Report 304J). Post-mine locations of WHEF-TP are shown on Map 13.	
RECLAMATION GOALS:	• Provide forage diversity and cover for ungulates • Provide nesting habitat for birds • Provide habitat for small mammals and reptiles	
SPOIL HANDLING:	Spoil surfaces will be scarified on the contour to relieve compaction and promote root penetration and permeability.	
SOIL REDISTRIBUTION:	Vary redistributed soil depth of A and B/C horizons to create diversity. Opportunistically utilize coarser-textured soils and soils with higher coarse fragment content, especially on steeper slopes. Redistributed soil thickness in WHEF-TP will vary from 6 to 12 inches.	
AMENDMENTS:	Use of amendments is not planned	
EROSION CONTROL:	On steeper, more erosive sites, erosion control devices will be installed on the downslope perimeter of WHEF-TP where erosion is anticipated. Erosion control may include low berms, log rolls, or commercial sediment control products with the goal of trapping sediment near the base of the WHEF.	
SEEDBED PREPARATION:	Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction. Where soils are loose or clods may inhibit seeding on gentle to moderate slopes, a packer or cultipacker will be used to prepare a firm seedbed.	
SEEDING METHOD:	Where PMT slopes in this type are mostly gentle to moderate, drill seeding on the contour will be used. A drill designed for rangeland seeding will be used. Broadcast seeding will be used on steeper slopes. Grass and forb seeding rates have been reduced in each of the cool season and warm season mixes below to avoid herbaceous competition with trees.	

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURES AND RATES:

Otter Creek Coal
WHEF-TP
Cool Season Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	1.00	/	2
Agropyron spicatum	Bluebunch wheatgrass	Goldar	0.75	/	2
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.25	/	1
Bouteloua gracilis	Blue grama	Bad River	0.15	/	3
Koeleria cristata	Prairie junegrass	Site adapted	0.05	/	3
Poa sandbergii	Sandberg's bluegrass	High Plains	0.10	/	3
Stipa comata	Needle-and-thread	Site adapted	0.75	/	2
Stipa viridula	Green needlegrass	Lodorm	0.75	/	3
		SUB-TOTAL GRASSES:	**3.80**	**/**	**19**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.25	/	1
Liatris punctata	Dotted blazingstar	Site adapted	0.20	/	1
Linum lewisii	Blue flax	Site adapted	0.02	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.05	/	1
Sphaeralcea coccinea	Scarlet globemallow	Site adapted	0.05	/	1
		SUB-TOTAL FORBS:	**0.59**	**/**	**7**
		TOTAL	**4.39**	**/**	**26**

TREES:			**Planting Rate[3] (stems/acre)**
Juniperus scopulorum	Rocky Mountain juniper	-	125
Pinus ponderosa	Ponderosa pine	-	150
		TOTAL TREES:	**275**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a drill seeding rate of 26 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
[3]Trees will be planted on 12.5-foot centers.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEEDMIXTURES AND RATES:

Otter Creek Coal
WHEF-TP
Warm Season Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	0.75	/	2
Agropyron spicatum	Bluebunch wheatgrass	Goldar	0.50	/	2
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.25	/	1
Andropogon scoparius	Little bluestem	Badlands	0.50	/	3
Bouteloua curtipendula	Sideoats grama	Pierre	0.60	/	2
Bouteloua gracilis	Blue grama	Bad River	0.10	/	2
Calamovilfa longifolia	Prairie sandreed	Bowman	0.30	/	2
Poa sandbergii	Sandberg's bluegrass	High Plains	0.10	/	3
Stipa comata	Needle-and-thread	Site adapted	0.50	/	1
		SUB-TOTAL GRASSES:	**3.60**	**/**	**18**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia frigida	Fringed sagewort	Site adapted	0.01	/	1
Dalea purpurea	Purple prairie-clover	Site adapted	0.25	/	1
Echinacea angustifolia	Purple coneflower	Site adapted	0.40	/	1
Gaillardia aristata	Blanket-flower	Site adapted	0.30	/	1
Liatris punctata	Dotted blazingstar	Site adapted	0.25	/	1
Ratibida columnifera	Prairie coneflower	Site adapted	0.05	/	1
		SUB-TOTAL FORBS:	**1.27**	**/**	**7**
		TOTAL	**4.87**	**/**	**25**

TREES:			Planting Rate[3] (stems/acre)
Juniperus scopulorum	Rocky Mountain juniper	-	100
Pinus ponderosa	Ponderosa pine	-	125
		TOTAL TREES:	**225**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a drill seeding rate of approximately 25 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
[3]Trees will be planted on 14-foot centers.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE POST-MINING LAND USE / REVEGETATION SPECIFICATIONS		
NAME:	**WILDLIFE HABITAT ENHANCEMENT FEATURE – STEEP SLOPES, ROCK OUTCROPS AND BLUFFS (Topographic Features)**	 Steep Slopes
CODE:	**WHEF-TF**	
DESCRIPTION:	Steep slopes are a common feature in the pre-mine landscape; rock outcrops are less common but occur at scoria, clinker or sandstone outcrops; bluffs occur as vertical or near vertical, generally sandstone exposures where soils have been eroded from the base leaving the more indurate, less erosive rock. Vegetation is highly variable with many sites only sparsely vegetated.	
LOCATION:	Steep slopes occur along the sides of drainages and hillslopes, and are often associated with the breaks complex of vegetation types (Plate 1 in Baseline Report 304J). Steep slopes and bluffs are more common on the eastern side of the mining area. Rock outcrops are scattered primarily along the coal burn outcrop and at remnant sandstone outcrops.	 Rock Outcrops
RECLAMATION GOALS:	• Control erosion by implementing appropriate BMPs • Provide wildlife habitat diversity • Manage noxious weeds in accordance with Exhibit 308E	
SPOIL HANDLING:	Spoil surfaces will be scarified on the contour where practicable.	
SOIL REDISTRIBUTION:	Vary soil redistribution depth specific to the topographic feature created. Where soils higher in coarse fragment content are available from direct-haul or stockpile, utilize these soils on steep slopes to reduce surface erosion. Soil will not be redistributed on overly steep slopes and bluffs.	 Bluffs
AMENDMENTS:	Amendments are not anticipated.	
EROSION CONTROL:	Stabilize steep slopes using soils higher in coarse fragment content when available, mulch or spread woody debris if available. Install BMPs as necessary at the base of steep slopes to retain sediment near the toe. Rills and gullies are a natural component of steep slopes; they will be repaired on a site-specific basis if they create erosion issues on the adjacent land use. Steeper slopes adjacent to drainages will be stabilized if excessive bank erosion occurs.	
SEEDBED PREPARATION:	Seedbeds will be left in a roughened condition to reduce erosion and provide microsites for plant establishment and growth.	
SEEDING METHOD:	WHEF-TF will generally be broadcast seeded due to topographic constraints or safety factors.	
SEED MIXTURE AND RATE:	The seed mix will vary depending on adjacent land use. The breaks/badlands mix will be favored on steep slopes. Drill seed rates will be doubled for broadcast seeding.	

OTTER CREEK MINE POST-MINING LAND USE / REVEGETATION SPECIFICATIONS		
NAME:	**WILDLIFE HABITAT ENHANCEMENT FEATURE- PONDS**	 Typical pre-mining pond
CODE:	**WHEF-P**	
DESCRIPTION:	Several pre-mining ponds are present in the mining area providing water for livestock and habitat for various wildlife species. Pond size is variable. Duration of water is highly dependent on seasonal precipitation as surface inflow is the primary water source.	
LOCATION:	Ponds are located throughout the pre-mine area as shown on Plate 1, Baseline Report 304J. Post-mining ponds will be located where drainage basin size, predicted runoff and site conditions are suitable, generally at the confluence of several drainages. Ponds may be excavated and/or embanked, depending on site and engineering considerations.	
RECLAMATION GOALS:	• Provide seasonal water for wildlife and livestock • Ensure water quality is suitable for post-mining livestock use	
SPOIL HANDLING:	Place suitable spoil within top 2 feet of surface. Use spoil material of low permeability or, if necessary, amend and/or compact spoil to prevent water loss through the pond bottom.	
SOIL REDISTRIBUTION:	Redistribute soil around pond perimeter to support desired plant community.	
AMENDMENTS:	No amendments are anticipated.	
EROSION CONTROL:	Design spillway to minimize down-gradient erosion.	
SEEDBED PREPARATION:	Not applicable unless temporary seeding is necessary for dust control.	
SEEDING METHOD:	Not applicable unless temporary seeding is necessary for dust control.	
SEED MIXTURE AND RATE:	In general, pond bottoms will not be seeded. If necessary for dust or erosion control, the interim mixture or an annual cover crop will be seeded. Embankments and pond perimeters will be seeded with the mixture for the adjacent post-mining land use/revegetation type.	

OTTER CREEK MINE POST-MINING LAND USE / REVEGETATION SPECIFICATIONS		
NAME:	**WILDLIFE HABITAT ENHANCEMENT FEATURE – RIPARIAN/WETLAND**	 Riparian zone along Otter Creek
CODE:	**WHEF-R/W**	
DESCRIPTION:	Riparian areas dominated by shrubs, trees or herbaceous species are generally restricted to larger drainages; herbaceous wetlands are relatively uncommon occurring primarily as a fringe around Otter Creek, around ponds and in the bottom of drainages below ponds. Riparian tree types are dominated by boxelder, plains cottonwood or occasionally, green ash. Riparian shrub types are dominated by western snowberry, silver sagebrush and Wood's rose or, less frequently by chokecherry or sandbar willow. Herbaceous riparian and wetland types are highly variable, depending on moisture regime, soils and topography. Dominant understory species include alkali saltgrass, alkali sacaton, alkali cordgrass, prairie cordgrass, alkali bulrush, and common spikesedge.	
LOCATION:	Pre-mining distribution of riparian and wetland types is shown on Plate 1, Exhibit 304J; proposed post-mining locations are shown on Map 13.	 Wetland below stockpond
RECLAMATION GOALS:	• Provide wildlife habitat for riparian- or wetland-dependent species • Manage noxious weeds in accordance with Exhibit 308E	
SPOIL HANDLING:	Spoil surfaces will be scarified on the contour to a depth of 12-inches to prevent slippage at the spoil/topsoil interface, to relieve compaction and promote root penetration and permeability.	
SOIL REDISTRIBUTION:	A horizon: 12-18 inches Subsoil (B/C) horizons: 12-18 inches	
AMENDMENTS:	Amendments are not anticipated.	
EROSION CONTROL:	Install erosion control BMPs (commercial sediment control products, bioengineered structures, riprap or other) as necessary to control bank erosion and bed scour.	
SEEDBED PREPARATION:	Seedbeds with established annual grasses or forbs will be tilled or chemically treated prior to seeding. Seedbeds will be firm but not compacted. Redistributed soil will be disked, chisel-plowed or ripped depending on degree and depth of compaction.	
SEEDING METHOD:	Drill or broadcast as site conditions dictate.	

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEED MIXTURES AND RATES:

Otter Creek Coal
Woody Riparian Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	0.75	/	2
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.10	/	1
Bouteloua curtipendula	Sideoats grama	Pierre	0.75	/	3
Calamovilfa longifolia	Prairie sandreed	Bowman	0.40	/	2
Distichlis stricta	Alkali saltgrass	Site adapted	0.25	/	3
Elymus canadensis	Canada wildrye	Site adapted	1.10	/	3
Hordeum jubatum	Foxtail barley	Site adapted	1.10	/	2
Sporobolus airoides	Alkali sacaton	Site adapted	0.05	/	2
Stipa viridula	Green needlegrass	Lodorm	0.75	/	3
		SUB-TOTAL GRASSES:	**5.25**	**/**	**21**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01	/	1
		SUB-TOTAL FORBS:	**0.02**	**/**	**2**
SHRUBS:[3]					
Artemisia cana	Silver sagebrush	Site adapted	2.50	/	48
Prunus virginiana	Common chokecherry	Site adapted	1.00	/	1
Rhus aromatica	Skunkbush sumac	Site adapted	4.00	/	2
Rosa woodsii	Wood's rose	Site adapted	2.00	/	2
Symphoricarpos occidentalis	Western snowberry	Site adapted	2.50	/	4
		SUB-TOTAL SHRUBS:	**12.00**	**/**	**57**
		TOTAL	**17.27**	**/**	**80**

TREES:			Planting Rate[4] (stems/acre)
Acer negundo	Boxelder	-	100
Fraxinus pennsylvanica	Green ash	-	50
Juniperus scopulorum	Rocky Mountain juniper'	-	75
Populus deltoides	Plains cottonwood	-	25
		TOTAL TREES:	**250**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a broadcast seeding rate of approximately 80 Pure Live Seeds (PLS) per square foot. Where drill seeding is used, the rate of grasses will be halved.
[3]Trees will be planted only on sites capable of supporting them as determined in the field.
[4]Trees will be planted on 13-foot centers.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE
POST-MINING LAND USE / REVEGETATION SPECIFICATIONS

SEEDING MIXTURES AND RATES:

Otter Creek Coal
Herbaceous Riparian Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Agropyron smithii	Western wheatgrass	Rosana	1.50	/	4
Agropyron trachycaulum	Slender wheatgrass	Pryor	0.25	/	1
Bouteloua curtipendula	Sideoats grama	Pierre	1.50	/	7
Calamovilfa longifolia	Prairie sandreed	Bowman	0.75	/	5
Distichlis stricta	Alkali saltgrass	Site adapted	0.50	/	6
Elymus canadensis	Canada wildrye	Site adapted	2.25	/	6
Hordeum jubatum	Foxtail barley	Site adapted	2.25	/	4
Sporobolus airoides	Alkali sacaton	Site adapted	0.10	/	4
Stipa viridula	Green needlegrass	Lodorm	1.50	/	6
		SUB-TOTAL GRASSES:	**10.60**	**/**	**43**
FORBS:					
Achillea millefolium	Yarrow	Great Northern	0.01	/	1
Artemisia ludoviciana	Cudweed sagewort	Site adapted	0.01	/	1
		SUB-TOTAL FORBS:	**0.02**	**/**	**2**
		TOTAL	**10.62**	**/**	**45**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a drill seeding rate of approximately 45 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

Otter Creek Coal
Herbaceous Wetland Revegetation Mixture

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	SEEDING RATE[2] Pounds PLS/Acre		PLS/ Sq.ft.
GRASSES:					
Distichlis stricta	Alkali saltgrass	Site adapted	0.70	/	8
Hordeum jubatum	Foxtail barley	Site adapted	1.50	/	3
Juncus torreyi	Torrey's rush	Site adapted	0.02	/	6
Panicum virgatum	Switchgrass	Dacotah	0.75	/	7
Scirpus americanus[3]	American bulrush	Site adapted	1.50	/	6
Spartina pectinata	Prairie cordgrass	Site adapted	1.50	/	7
Sporobolus airoides	Alkali sacaton	Site adapted	0.20	/	8
		TOTAL	**6.17**	**/**	**45**

[1]Site adapted seed originates from within the Northern Great Plains region.
[2]Based on a drill seeding rate of 45 Pure Live Seeds (PLS) per square foot. Where broadcast seeding is used, the rate will be doubled.
[3]If unavailable, suitable substitutions would include *Scirpus maritimus, Scirpus acutus or Scirpus validus.*
NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

OTTER CREEK MINE

EXHIBIT 313G

APPENDIX 313G-2

REVEGETATION MONITORING PLAN

OTTER CREEK MINE

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1.0 INTRODUCTION

Otter Creek Coal, LLC, with the assistance of WESTECH Environmental Services, Inc., has prepared this Revegetation Monitoring Plan (17.24.723) to address two levels of inventory to be implemented within Otter Creek Mine reclamation:

- Regular, on-going annual (or periodic) monitoring of revegetated stands to qualitatively evaluate vegetation stability and composition pursuant to Phase II bond release, and in preparation for Phase III bond release.
- Detailed quantitative monitoring of eligible revegetated stands using approved technical standards (see Appendix 313G-3) to prepare applications for Phase III bond release.

This Plan of Study (POS) will be reviewed with the Montana Department of Environmental Quality (MDEQ) to solicit agency comments.

Revegetated stands in reclaimed areas at the Otter Creek Mine will be mapped on a topographic base map and submitted annually to MDEQ. Revegetated stands will be identified by seed mix, and season and year of seeding. Based on qualitative annual/periodic monitoring, each revegetated stand will be designated as Grazing Land (dominated by native plant species) or Pastureland (predominantly introduced plant species). Technical standards for each of these two post-mine land use categories are proposed in Appendix 313G-3 for evaluation of revegetation success (Phase III). Additional standards are proposed in Appendix 313G-3 for Shrub-Enhanced Grazing Land and Wildlife Habitat Enhancement Feature (WHEF) revegetation treatments. The success standards will be reviewed in consultation with MDEQ, and revised as necessary for preliminary approval. As additional monitoring data are collected, these standards will be reviewed and updated as necessary.

Scopes of work for both levels of inventory are discussed below.

2.0 ANNUAL/PERIODIC MONITORING

A Periodic Revegetation Monitoring Form (attached) will be submitted to MDEQ for review and approval of format. This form will be used to record pertinent vegetation stability/composition data on an annual or periodic schedule, as necessary for each established revegetation stand. Current regulation requires that each stand be monitored on an annual basis until Phase II bond release has been achieved. Thereafter, a stand will be monitored on an approximately three-year schedule until Phase III bond release has been achieved.

Annual/periodic monitoring reports will include:

- A summary of bond release history for all stands monitored in a given year of sampling.
- Completed periodic monitoring forms for each stand sampled.
- Recommended corrective action(s) as necessary, including digital photographs.
- A map delineating all stands sampled in the year of monitoring.

Annual Mining Report: Periodic Revegetation Monitoring Form

Field ID: _____ Report Year: _____

FIELD INFORMATION

Acres:
Initial Seeding/Planting Date: *(Date used to determine period of responsibility)*
Other Seeding/Planting Dates: *(Normal husbandry interseeding or planting)*
Target Post-Mine Land Use:

VEGETATION ASSESSMENT

Comments are required on Fair and Poor condition ratings and are optional on Good or Excellent condition ratings. Recommended corrective actions must be included for Fair and Poor ratings.

First or Second Year after Seeding

Germination and Survival of Seeded Species: *(If collected, please include seedling density results here.)*

Excellent Good Fair Poor

Comment: **Not Applicable**

Subsequent Years

Establishment and Propagation of Desirable Perennial Species

Excellent Good Fair Poor

Comment:

Health and Vigor of Desirable Vegetation

Excellent Good Fair Poor

Comment:

Diversity of Desirable Vegetation with Respect to the Target Post-Mine Land Use

Excellent Good Fair Poor

Comment:

Site Resistance to Erosion

Excellent Good Fair Poor

Comment:

Weeds

Non-Noxious Weed Presence

None Identified *(Excellent)* Low *(Good)* Moderate *(Fair)* High *(Poor)*

Comment:

Noxious Weed Infestations

None Identified Present

Comment:

Annual Mining Report: Periodic Revegetation Monitoring Form

Field ID: _____ Report Year: _____

Recommended Corrective Actions: *(Include photographs here, if taken.)*

3.0 PHASE III MONITORING

3.1 REVEGETATION MAPPING/POST-MINE LAND USE DELINEATION

A proposed map of the post-mine land use revegetation plan is presented in Map 13. As revegetation stands are established and monitored, mapping will be updated to indicate the delineation and distribution of post-mine Land Use types in the reclaimed area. Periodically, it will be determined which reclaimed (block) areas are eligible for Phase III bond release. An application for Phase III bond release will be submitted to MDEQ after two years' monitoring data indicate that all success standards have been met in each year of inventory (sampling years need not be consecutive). Eligibility for Phase III monitoring requires two conditions:

- A revegetated stand must be in place at least six full growing seasons, regardless of the season of seeding/planting, prior to the first year of Phase III inventory.
- All revegetated stands included in an application for Phase III release must have been in place a minimum of 10 years prior to submittal of the application. This is a vegetation longevity/ durability consideration which will be ascertained by MDEQ in a field verification subsequent to the application submittal.

A 100-foot grid will be overlaid on the map of eligible revegetation stands to select sample sites using a stratified random procedure based on projected sample size for each Post-Mine Land Use type.

Revegetated stands in the proposed Bond Release Area will be well-established and stable, and generally represent a seral successional stage of vegetation. Direct comparisons of sampled parameters (cover, production, seasonality and diversity) will be made between the Bond Release Area and approved Technical Standards. Methods proposed for quantitative inventory (Section 3.3), including stratified random distribution of sample sites, will be identical for the inventory of the Grazing Land and Pastureland Land Use types, as well as WHEF areas.

3.2 POST-MINE LAND USE TYPES

Land Use types in the Bond Release Area will be determined primarily by relative composition of native versus introduced perennial grass species. Accordingly, two principal Land Use types are designed for revegetated areas in the Otter Creek Project, including Grazing Land stands dominated by native grasses and Pastureland stands dominated by introduced grasses. The preliminary delineation of post-mine Land Use types (Map 13) is designed to establish the following:

- **Grazing Land** – Grazing Land constitutes approximately 2024 acres (43%) of initial designations for post-mine reclamation, dominated by native perennial species. Cool-season grasses will predominate, however warm-season grasses will sometimes be codominant. Shrubs will be well-represented in some stands, particularly western snowberry (*Symphoricarpos occidentalis*), rose (*Rosa woodsii, Rosa arkansana*) and/or sagebrush (*Artemisia tridentata, Artemisia cana*), indicating development of an upland or drainage shrub type.

- **Pastureland** – Pastureland comprises approximately 227 acres (5%) of the initially conceived post-mine reclamation area, dominated by introduced perennial species. These stands will also be evaluated using approved Technical Standards.
- **Shrub-enhanced Grazing Land and WHEF** – These areas will receive increased treatments of woody plant seedings and/or plantings, and will also be evaluated according to specific standards to be reviewed and approved by MDEQ. Initial post-mine design comprises about 2473 acres (52%) of total reclamation.

3.3 QUANTITATIVE INVENTORY

Sampling of Land Use types will be conducted as described for the following components. Quantitative data will be collected near peak growing season.

3.3.1 Sample Location and Sample Size

Locations will be selected by a stratified random procedure in the office prior to the field inventory. A recent aerial photo-map of the proposed Bond Release Area will be gridded at a spacing of 100 feet, and sample sites will be randomly distributed for postulated sample sizes within each Land Use type in the study area. Sample locations will be identified in the field using the aerial photo-map and a hand-held GPS unit. Sample sites will be shown on a map exhibit in the final report.

Sample size will vary by Land Use type according to the relative areal extent of each type within the proposed Bond Release Area. Sample sites will also be apportioned to account for sample adequacy considerations. Sample size will be based on current MDEQ guidelines and hypothesis testing (Reverse Null Hypothesis) of data collected during the Phase III vegetation inventory.

Plot sizes at each sample site are listed below for each sample parameter:

1) estimation of canopy cover will be made on a 0.01-acre circular plot centered on each randomly selected point;
2) annual production will be harvested in a 0.5m^2 rectangular plot centered on each point;
3) shrub density will be determined by recording all live individuals by species and health class in a 2 x 20-meter belt transect centered on each point;
4) tree density will be estimated by recording all live individuals by species and dbh class in a 0.1-acre circular plot centered on each random point.

3.3.2 Canopy Cover

On each sample field form, location will be recorded along with date, personnel, percent slope gradient, aspect (exposure), topography, slope configuration and surface soil texture. Each plot will also be identified as to its occurrence in either a Grazing Land or Pastureland stand.

In each 0.01-acre plot (11.8-feet radius), an ocular estimate will be made of percent cover for ground cover classes, including bare ground, rock, litter, lichens, moss and basal vegetation to total 100 percent. Nonstratified canopy cover will be estimated to the nearest percent in each plot for total live vascular

plant cover, for each morphological (*i.e.*, functional) class category (tree, shrub, perennial graminoid, annual graminoid, perennial forb and annual/biennial forb), and for each vascular plant species.

Cover data will be tabulated in the report by plot, and summarized by Post-Mine Land Use type. Using these data, stratified cover values and relative cover values will be generated in the office to evaluate composition and diversity with respect to technical standards.

3.3.3 Production

In each 0.5 m^2 quadrat, annual above-ground herbaceous production will be clipped and separated for the following herbaceous classes rooted within the quadrat: perennial grasses and sedges, perennial forbs, and annual grasses combined with annual/biennial forbs. The perennial classes will be further separated as to origin (native vs. introduced). Additionally, introduced perennial forbs will be segregated as to noxious versus non-noxious weed status. Shrub production will not be harvested. In the laboratory, all production samples will be dried until constant weight is achieved and weighed to the nearest 0.01 gram.

3.3.4 Shrub Density

Shrub density will be determined for each shrub species by counting the number of live individuals rooted within a 2 x 20-meter belt transect centered on each sample point. Individuals will be recorded as healthy (immature to mature) or decadent. Belt transects will be aligned along the contour on slopes; on drainage bottoms, belt transects will be aligned with the general direction of the drainage.

3.3.5 Tree Density

Tree density will be recorded on 0.1-acre circular plots (37.2-feet radius) centered on each sample point. Live trees will be counted in each plot by species for the following diameter-at-breast-height (dbh) classes: less than 1-inch dbh, 1- to 4-inch dbh, etc. The 0.1-acre plot perimeter will be measured with a fiberglass tape and marked with pin-flags.

3.3.6 Species Composition and Diversity

Species composition, origin, seasonality and diversity parameters are inherently determined for each Land Use type using cover and production data. Species diversity will be evaluated in accordance with approved Technical Standards for each Land Use type. Species nomenclature and functional groups will follow the comprehensive species list compiled during baseline vegetation inventories for Otter Creek Mine during the period 2011-2013, adapted to reflect the recent work by Lesica (2012).

3.3.7 Species List

All vascular plant species encountered in the proposed Bond Release Area will be recorded and a comprehensive list will be compiled. Taxa not readily identified in the field will be collected and identified in the laboratory using a stereozoom binocular scope and taxonomic references including Lesica (2012), Flora of North America Editoral Committee (1993+), Hitchcock *et al.* (1955-1969), Hitchcock and Cronquist (1973), Dorn (1984 and 2001), Great Plains Flora Association (1986), Cronquist

et al. (1972-2012) and Gleason and Cronquist (1991). Nomenclature of vascular plant species will follow Lesica (2012).

Noxious or declared weeds currently listed by the Montana County Weed Control Act will be qualitatively assessed for distribution and abundance, as well as quantitatively sampled on cover estimation plots.

3.3.8 Utility and Rangeland Health

In conjunction with this quantitative inventory to evaluate success based on approved numeric standards, MDEQ will conduct an examination of utility/rangeland health to evaluate revegetation success based on descriptive performance standards. This will involve a qualitative/semi-quantitative field investigation following the methods described in the Department's *Framework for Technical Vegetation Standards*, Chapter 4 – *Standards for Ecological Integrity.* Otter Creek Mine can provide experienced field personnel to team with MDEQ investigators if so requested.

4.0 REFERENCES

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OTTER CREEK MINE

EXHIBIT 313G

APPENDIX 313G-3

PROPOSED TECHNICAL STANDARDS

FOR THE OTTER CREEK MINE

Determination of Phase III Reclamation Success Standards (17.24.724)

Revegetated areas will be evaluated for Phase III bond release using revegetation technical standards (Table 1). The standards proposed in Table 1 are based on a review of cover, production, density and diversity data compiled in the Otter Creek baseline vegetation report (304J).

Grazing Land, Pastureland and Wildlife Habitat Enhancement Features (WHEF) – Ground cover will be ocularly estimated in 0.01 acre (11.8 foot radius) circular plots. Annual above-ground production will be clipped within $0.5m^2$ quadrats. A minimum of 30 randomly located plots will be sampled for each post-mine land use, to insure sample adequacy.

Ground cover and production will be considered equal to the approved success standard when they are not less than 90 percent of the success standard.

The Reverse Null Hypothesis test will be used to evaluate revegetation data with technical standards, using a 90 percent confidence interval. The test statistic (Neter *et al.* 1985) is:

$$t^* = \frac{\bar{x} - 0.9\,(\text{technical standard})}{\frac{s}{\sqrt{n}}}$$

where

t^* is the calculated *t*-statistic

$\bar{x}$ is the sample mean

s is the standard deviation of the sample

n is the sample size

The α- level of the test is set at 0.10 by regulation, and the decision rules are

If $t^* < t(1 - \alpha; n - 1)$, conclude failure to meet the performance standard

If $t^* \geq t(1 - \alpha; n - 1)$, conclude that the performance standard was met

Table 1
Proposed Revegetation Technical Standards by Land Use Category, Otter Creek Mine.

	LAND USE		
PARAMETER	**GRAZING LAND**	**PASTURELAND**	**SHRUB-ENHANCED GRAZING LAND AND WHEF**
Non-stratified Cover (excluding trees)	(total) 58 percent (perennial) 50 percent	(total) 50 percent (perennial) 40 percent	(total) 40 percent (perennial) 30 percent
Herbaceous Production	(total) 1050 pounds/acre (perennial) 850 pounds/acre	(total) 2000 pounds/acre (perennial) 1800 pounds/acre	NA
Diversity/ Seasonality	Minimum of 4 native perennial cool-season grasses present with this functional group contributing a minimum 25% relative cover Minimum of 2 native perennial warm-season grasses present with this functional group contributing a minimum 4% relative cover Minimum of 6 native perennial forbs, shrubs and/or sub-shrubs present, with these functional groups contributing, in combination, a minimum 10% relative cover Maximum contribution of introduced perennial cool-season grasses functional group of 20% relative cover Maximum contribution of introduced perennial forbs functional group of 3% relative cover (excluding listed noxious weeds)	Adapted forage plants	Minimum of 4 native perennial cool-season grasses present with this functional group contributing a minimum 25% relative cover Minimum of 2 native perennial warm-season grasses present with this functional group contributing a minimum 4% relative cover Minimum of 6 native perennial forbs, shrubs and/or sub-shrubs present, with these functional groups contributing, in combination, a minimum 10% relative cover Maximum contribution of introduced perennial cool-season grasses functional group of 20% relative cover Maximum contribution of introduced perennial forbs functional group of 3% relative cover (excluding listed noxious weeds)
Woody Plant Density	NA	NA	300 shrubs/trees per acre
Utility	Documentation of livestock grazing (stocking rate) and/or hay production	Documentation of livestock grazing (stocking rate) and/or hay production	Documentation of livestock grazing (stocking rate)

NA = Not Applicable
Note: Listed noxious weeds will not be included in evaluation of cover, production or diversity.

OTTER CREEK MINE

EXHIBIT 313G

MAP 13

POST-MINING LAND USE/REVEGETATION PLAN MAP

TRACT 1
TRACT 2
TRACT 3
TRACT 2

Map Unit	Specification*
1	Grazing Land – Cool-Season Grassland (GL-CSG)
2	Grazing Land – Warm-Season Grassland (GL-WSG)
3	Pastureland/Hay Cropland (PL/HC)
4	Wildlife Habitat Enhancement Feature – Breaks/Badlands (WHEF-B/B)
5	Wildlife Habitat Enhancement Feature – Shrub Seedings (WHEF-SS)
5a	Silver Sagebrush
5b	Big Sagebrush - cool season
5c	Big Sagebrush - warm season
6	Wildlife Habitat Enhancement Feature – Tree Plantings (WHEF-TP)
6a	Ponderosa Pine / Juniper - cool season
6b	Ponderosa Pine / Juniper - warm season
7	Wildlife Habitat Enhancement Feature – Steep Slopes, Rock Outcrops And Bluffs (Topographic Features) (WHEF-TF)
8	Wildlife Habitat Enhancement Feature – Ponds (WHEF-P)
9	Wildlife Habitat Enhancement Feature – Riparian/Wetland (WHEF-R/W)

*Specifications are detailed in Appendix 313G-1 of Exhibit 313G

LEGEND
- Study Area
- Tract Boundary
- Disturbance Boundary

0 350 700 1400 2100
Feet

OTTER CREEK COAL, LLC
P.O. BOX 7152 Billings, Mt. 59103

Post-Mining Land Use / Revegetation Plan Map

WESTECH
Environmental Services, Inc.
P.O. Box 6045
Helena, Montana 59604
406-442-0950

SCALE: 1"=700'	
DATE: 10/07/14	
DESIGN BY: KS	
DRAWN BY: DC	
CHECKED BY: DC	
FILE: OC14_RecLdwg	

Map 13
SHEET: 1 of 1 | REV: 0