STATE OF COLORADO

Simmons - DNR, Leigh <leigh.simmons@state.co.us>

CDRMS Permit C-1981-022 Response to CDRMS MT-7 Findings for the Elk Creek and Sanborn Creek Mines

Doug Smith <Doug.Smith@oxbow.com> Fri, Sep 28, 2018 at 1:34 PM
To: "leigh.simmons@state.co.us" <leigh.simmons@state.co.us>
Cc: Mike Ludlow <Mike.Ludlow@oxbow.com>

Leigh,

Please find the Attached response letter for MT-7 Findings. Please review and see if it is agreeable. If so, I will submit required changes in Minor Revision 110 (MR-110). Also attached is the requested change to Exhibit 2.05-E6 on page H-9, which is highlighted. The highlighting will be removed and submitted as part of MR-110.

I will wait for your review before submitting MR-110, so that three copies can be sent to you and proper notifications can be made.

Thanks for your attention to this matter,

Doug Smith

Oxbow Mining, LLC

(970) 929-6034

2 attachments

Signed MT-7 Response letter.pdf
3042K

Exhibit 2.05-E6- page H8 modified.pdf
270K

OXBOW MINING, LLC
3737 Hwy 133 P.O. Box 535 Somerset, Colorado 81434 USA Tel (970)929-5122 Fax (970)929-5177

September 28, 2018

Mr. Leigh Simmons
Environmental Protection Specialist
Colorado Division of Reclamation, Mining and Safety
1313 Sherman Street, Room 215
Denver, Colorado 80203

Re: Oxbow Mining, LLC., CDRMS Permit C-1981-022, Response to CDRMS MT-7 findings for the Elk Creek and Sanborn Creek Mines

Dear Mr. Simmons:

This package is submitted for CDRMS Permit C-1981-022 for the Elk Creek and Sanborn Creek Mines, in response to items noted in Section VI, Identified Issues and Required Revisions portion of the Mid Term Review (MT-7) dated July 12, 2018.

In Section VI - Identified Issues and Required Revisions the Division had the following comments and requirement for revision of the permit document;
1. "The revegetation plan is described in general terms in Exhibit 2.05-E6. On page H-8 of the Exhibit, under the heading Revegetated Area Sampling Design, the first paragraph concludes with the following sentence: "The methodology in coordination with DMG prior to the beginning of sampling", which is presumably a typographical error, and should read: "The methodology will be determined in coordination with DMG prior to the beginning of sampling". The sentence should be deleted and replaced with a detailed plan of the sampling methodology. The plan should:

a. Define vegetation reference areas in the text and on a map. These should be sufficient to account for at least the identified dominant vegetation communities (Juniper Woodland and Mountain Shrub), and the topographic variation found within the permit area. This could potentially be achieved by multiple defined reference areas for each community at a range of representative elevations, or by an extended reference area.
b. Quantify the disturbed acres by vegetation community type (given that the currently approved revegetation plan cites the weighted average method described in Rule 4.15.7(4)(b))
c. State the success criteria for vegetative cover, herbaceous productivity, species diversity, and woody plant density, in accordance with Rules 4.15.7 and 4.15.8.

2. In Exhibit 2.05-E6, on page H-8, the third paragraph contains an incorrect reference to Rule 3.15.7(4)(b) which should be corrected."

Response to CDRMS Mid-Term Review 7 Revegetation Comments

Michael Savage of Savage and Savage, Inc. conducted a review of the permit document, as well as pertinent minor, technical, and permit revisions, mid-term reviews, and permit renewal findings documents from 2000 to date at the request of Oxbow Mining, LLC (OMLLC).

With regard to the revegetation plan in Exhibit 2.05-E6 he found notable differences between the content identified in Mid-Term Review 7 and that present in Exhibit 2.05-E6 of the permit document at the mine as detailed below.

Exhibit 2.05-E6 Revegetation Plan in Volume 12 of the Montgomery Watson August 2000 permit document at the mine contains descriptions of the approved revegetation plan, including text addressing soil replacement depths, seedbed preparation, seed mixes, seeding rates and techniques, mulch, planting seasons, irrigation, fertilization, weed control, vegetation monitoring, sampling dates, revegetation sampling methods, and revegetation success criteria [mine Exhibit appended]. Text pages within the mine Exhibit 2.05-E6 note the source of the text approvals and specifically identify Permit Revision 04 (2001), MR83 (2006), and Permit Renewal 06 (2013).

Review of revision approvals and/or findings documents, mid-term reviews, and permit renewal findings documents additionally confirms that the reclamation and revegetation plan elements have been submitted, revised and approved by the Division, including but not limited to revegetation sampling methodology, the two reference areas and their location (depicted on Map 2.04-M8 sheets 1 and 2) and revegetation success criteria (Table A).

From the above research, it was concluded that Division Mid-Term Review concerns 1, 1a and 1b have been previously addressed and approved by the Division. OMLLC would request the Division stipulate that Exhibit 2.05-E6 from the mine contains the currently approved reclamation plan.

The incorrect reference noted in comment 2 was found in the mine Exhibit 2.05-E6 and was determined that the correct reference should be 4.15.7(4)(b) which will be corrected in the text.

Oxbow Mining further proposes the following future revisions as reclamation proceeds.

Proposed Revision to OMLLC Reclamation Plan

As there have been a number of revisions to the permit document, and the review revealed text and approvals which may not reflect the requirements of the Act, regulations or current reclamation plans; OMLLC proposes to revise Exhibit 2.05-E6 to align the reclamation plan with current regulations, status of the mine, and reclamation goals of OMLLC. The proposed revision will address changes to the post-mining land uses at the mine and the pertinent revegetation success for each post-mining land use, industrial and/or commercial areas that will remain post-reclamation and their applicable revegetation success criteria, pre- and post- SMRCRA revegetation standards and the areas to which they apply, and revisions to revegetation success criteria and methods for revegetation sampling. The revision will strive to clarify and define reclamation plan elements and revegetation success criteria, and their applicability to each area or facility of the mine.

TABLE A. OXBOW MINING, LLC ELK CREEK MINE
CDRMS RECLAMATION PLAN FINDINGS AND APPROVALS: 2000 to PRESENT

DATE	ACTION	NUMBER	FINDING	COMMENT
Sep 2000	Permit Renewal	03	Finding: Post-SMCRA disturbances: Hubbard Creek Ventilation Fan #2 facility, 3 Dip Methane Degas Well Field, Sanborn Creek Tract	***Superseded by RN04***
Sep 2000	Permit Renewal	03	Post-mining land use rangeland /wildlife habitat.	***Superseded by RN06***
Apr 2001	Mid-Term Review	coincided with review of PR04		
Jan 2002	Permit Revision	04	Findings: Native only seed mix, mulching at 2T/acre, cover, productions success methods in Appendix H, Species diversity criterion, cover & production on most reclaimed areas based on comparison with reference areas, success standards for small riparian community at Hubbard Creek, Division approval of comparisons and standards, reference areas approved, reference area use approved.	
Jan 2003	Permit Revision	05	Findings: Seed mix revisions, mulching at 2T/acre, cover, productions success methods in Appendix H, Species diversity criterion, cover & production on most reclaimed areas based on comparison with reference areas, success standards for small riparian community at Hubbard Creek, Division approval of comparisons and standards, reference areas approved, reference area use approved. (Seed mix changes from PR04 findings)	
Oct 2003	Permit Renewal	04	Finding: Post-SMCRA disturbances: Hubbard Creek Ventilation Fan #2 facility, methane degas wells, Sanborn Creek Tract	***Superseded by RN05***
Oct 2003	Permit Renewal	04	Post-mining land use rangeland /wildlife habitat.	***Superseded by RN06***
Apr 2006	Mid-Term Review		Elements of Revegetation Plan Reaffirmed (No changes from PR05 findings)	
Sep 2006	Minor Revision	83	Noted Approval of MR77 Weed Control Plan Revised BLM and USFS Seed Mixes for Public Lands	***Superseded by RN06***
Feb 2009	Permit Renewal	05	Noted Approval of MR77 Weed Control Plan	
Feb 2009	Permit Renewal	05	Finding: Post-SMCRA disturbances: Hubbard Creek Ventilation Fan #2 facility, methane degas wells, Sanborn Creek Tract, Elk Creek Facilities, West Valley & II West Coal Refuse Facilities, and the New Bear Creek Fan site Facility.	
Feb 2009	Permit Renewal	05	Post-mining land use rangeland /wildlife habitat.	***Superseded by RN06***
Feb 2009	Permit Renewal	05	Elements of Revegetation Plan Reaffirmed (No changes from RN04 findings)	
Jul 2011	Mid-Term Review		No identified changes to reclamation plan	
Jun 2012	Permit Revision	06	Elements of Revegetation Plan Reaffirmed (No changes from PR05 findings)	

TABLE A. OXBOW MINING, LLC ELK CREEK MINE
CDRMS RECLAMATION PLAN FINDINGS AND APPROVALS: 2000 to PRESENT continued

DATE	ACTION	NUMBER	FINDING	COMMENT
Nov 2013	Permit Renewal	06	Finding: Post-SMCRA disturbances: Hubbard Creek Ventilation Fan #2 facility, methane degas wells, Sanborn Creek Tract, Elk Creek Facilities, West Valley & II West Coal Refuse Facilities, and the New Bear Creek Fan site Facility. (No change from RN05)	
Nov 2013	Permit Renewal	06	Elements of Revegetation Plan Reaffirmed (No changes from RN05 findings)	
Nov 2013	Permit Renewal	06	Finding: Post-mining land use is Undeveloped Lands (p.26)	***Supersedes RN05 findings***
Nov 2013	Permit Renewal	06	Revised BLM and USFS Seed Mixes for Public Lands	***Supersedes MR83***
Dec 2015	Technical Revision	76	Change in post-mining land use to industrial/commercial for 5 areas: Bear Creek Fan site & powerline, Upper Elk Creek Facilities Fan/Utility Bench, access roads and powerlines, former Sanborn Creek Portal area Pipeline, and East Elk Creek/Sanborn Creek Road, former Sanborn Creek Fan site Methane Project & Utility Area, Lower Elk Creek Mine Facilities, Bathhouses, Office, Warehouse/Welding Shop Complex, Small Vehicle Maintenance Bldg., and Entrance Road to Cemetery & NFELLC Facilities (=/- 15.5 ac.)	***Supersedes all prior findings***
As of August 2018	Exhibit in Mine Copy of Permit Document	2.05-E6	Revegetation Plan Elements as noted in Table: Revegetation Plan Requirements, Success Criteria, and Methods, Exhibit 2.05-E6 [Volume 12, Montgomery Watson Permit Document August 2000]	***Supersedes All Prior Permit Versions; Revisions through PR04, MR83, and RN06***

In Section VI - Identified Issues and Required Revisions the Division had the following comments and requirement for revision of the permit document;

3. Discrepancies appear to have crept into Exhibit 2.03-E4. In the laserfiche version the fourth page of the table of contents (TOC) appears not to have been updated with MR-72, and the two items that are missing from the TOC are also missing from the Exhibit itself (USDA, Forest Service temporary use permit 7730-3; and Union Pacific Railroad Company crossing permits). The Exhibit and the TOC should be updated with those two permits

Response to CDRMS Mid-Term Review 7 Comments:

Oxbow records show that these changes were made to the PAP with RN-06. Copies can be provided by Oxbow, if necessary.

In Section VI - Identified Issues and Required Revisions the Division had the following comments and requirement for revision of the permit document;

4. The Division does not have an adequate copy of Map 2.05-M4, Sheet 1 of 6, in either paper or electronic form. The version on file shows that it was issued with PR-04, then updated with MR-63 and again with RN-06, but the print quality does not allow all the features on the map to be identified.
A good quality copy of the map should be submitted

Response to CDRMS Mid-Term Review 7 Comments:

Although no bond release has yet been requested by Oxbow Mining, a large portion of the reclamation of the Elk Creek and Sanborn Creek Mines has been completed in compliance with the PAP. With the reclamation of the Elk Creek Drainage, as noted in Exhibit 2.05-E6 Section 2.9 listed as RN-06, dated July 2013, "The current sediment control system consisting of ditches and ponds will also be removed. To protect the Elk Creek drainage and prevent the addition of additional sediment to the streamflow, Oxbow will have to use alternative sediment control measures such as topographic roughness, small sediment traps, straw wattles, silt fence, wood logs, mulching as appropriate to control runoff from the reseeded slopes located above the reclaimed stream channel."

Presently, the drainage is more closely represented by the maps included in TR-76 (Post Mine Topography Drawing No.'s 1-7). Culverts and ditches have either been removed or restored as roadway ditches during reclamation activities, with great attention to prevention of addition of additional sediment to stream flows. Oxbow proposes to instead create as built drawings of the site in the near future, when reclamation activities are sufficiently complete, that will address remaining sediment control devices and will be submitted at a later time

In Section VI - Identified Issues and Required Revisions the Division had the following comments and requirement for revision of the permit document;

5. Map 2.05-M4, sheet 3 of 6, raises several issues:

a. The same ditch is labelled as both Ditch D3 Lower and Ditch D4

b. The map does not identify a culvert found in Ditch D6, north of the location of the rock dust tanks

c. Culvert DBa appears to be significantly longer than is shown on the map, and discharges to the south of where it is shown.

d. A second culvert discharges at the same point as DBa, but is not shown on the map.

e. The presumed Ditch D3 Lower discharges to an unidentified culvert under the road used to access the powerline road. A little past the outlet of the unidentified culvert another unidentified culvert outlets into a settling box in the ditch.

f. Ditch D5 discharges to culvert DG, which discharges into ditch D3 Lower, before the combined flows immediately enter an unidentified culvert.

The drainage and sediment control plan should be reviewed. The structures on the ground should be in accordance with the maps, and the designs in Exhibit 2.05-E3. Any discrepancies should be either corrected on the ground, or redesigned. Given that much of the Elk Creek facilities area is currently being reclaimed the Division recognizes that this may be an ongoing process, however it is important that structures on the ground are in accordance with their designs, and that they are accurately mapped.

Response to CDRMS Mid-Term Review 7 Comments:

a: With reclamation, Ditch D3 lower and D4 are now combined into a single road side ditch and drains to the Elk Creek through an existing rip rap channel,

b: There is no culvert in Ditch D6.

c.. Culvert Dba has been removed and Ditches D6 and D2 have been connected and serve as a road side ditch that drains to Culvert DB. . The culverts noted in items b and c, previously served as internal drainages that reported to D pond. D pond has necessarily been removed with the approved reclamation activities

d. The second culvert, noted in item d, has been removed and Ditch D5 upper restored as a road side ditch, that drains to Elk Creek

e: The unidentified culvert is Culvert DH and it remains in the combined road side ditch (discussed in item (a)), to allow truck access across the ditch to the road that accesses the powerline. Culvert DH location will be shown in the proposed as built reclamation drawings. Settling box and culverts were removed in reclamation,

f: Culvert DG and Ditch D5 middle were necessarily removed in reclamation.

Rather than submit maps of structures that are being modified or replaced with alternative sediment control devices, Oxbow proposes to instead create as built drawings of the site in the near future, when reclamation activities are sufficiently complete, that will address remaining sediment control and will be submitted at a later time

In Section VI - Identified Issues and Required Revisions the Division had the following comments and requirement for revision of the permit document;

6. On pages 2.05-52 and -53 the reclamation schedule for the Bear Creek facilities area should be updated.

Response to CDRMS Mid-Term Review 7 Comments:

The facilities referred to no pages 2.05-52 and 53 are for portals of the Somerset Mine workings and were reclaimed in 1996 as noted in the PAP. The Bear Creek Powerline which crosses this area remains in service for operation of the Vessels Flaring Operations located at the Elk Creek Mine, Bear Creek Fan location and cannot be removed at this time. Oxbow sees no need for a change to the PAP at this time.

In Section VI - Identified Issues and Required Revisions the Division had the following comments and requirement for revision of the permit document;

7. It appears that pages 2.05-54 and -55 in the currently approved PAP are duplicates. It is possible that this error was introduced with TR-49 in 2005. Please review archived versions of these pages and comment or clarify. The archived version of page 2.05-55 from PR-04, August 2000, includes the reclamation schedule for the Upper Hubbard Creek area, which should be updated to describe the work completed and the year in which it took place. Changes should also be made to pages 2.05-65 and -65a.

Response to CDRMS Mid-Term Review 7 Comments:

Oxbow agrees that the page 2.05-54 submitted in 2005 with TR-49, was intended to replace 2.05-54 from PR-04, submitted in 2000, in the PAP.

There have been no changes to the Upper Hubbard Creek Area (Somerset Mine) since TR-49 was submitted. The site is not listed as reclaimed in the Annual Reclamation Report and has not been abandoned, thus, Year 1 and Year 2 schedules remain valid. Very preliminary discussions with the US Forrest Service have been initiated, but no changes to the existing plan have been made. Oxbow sees no need for modification of page 2.05-55 at this time.

As Oxbow Mining continues and nears completion of the Final Reclamation for the Elk Creek Mine, Oxbow would like to leave the existing pages 2.05 -65 and 65a in place as this is the plan that Oxbow is working from. As noted abov, Oxbow will provide an update and as built drawings in the near future, showing all of the extensive demolition, removal, backfill, grading and top soil work that has already been completed at the Elk Creek Mine site. Oxbow is waiting for reclamation activities to be sufficiently complete, which only requires completion of the West Valley II gob pile reclamation and east yard configuration before we can gather data to provide accurate maps for the work that has been done and to determine what work remains.

Thank you for this opportunity to respond to issues noted in the mid-term review. Other items to be submitted by Oxbow will follow CDRMS review of this response, and will be submitted as Minor Revision 110 (MR-110) with the appropriate number of copies and required notifications.

Respectfully Yours,

Doug A. Smith

Doug A. Smith
Chief Engineer
Oxbow Mining, LLC
(970) 929-6034

1.0 INTRODUCTION

This revegetation plan is designed to restore the physical landscape disturbances associated with the development and operation of the Somerset Mine (now sealed), the Sanborn Creek Mine and the Elk Creek Mine. Operations in the Somerset Mine began in 1902 and continued until 1985. In 1991, Somerset Mining Company opened the Sanborn Creek Mine. Oxbow Mining, LLC (OMLLC) (formerly dba as Somerset Mining Company) is proceeding with development of the Elk Creek Mine.

Approximately 72 acres of disturbance (historic figure for Somerset and Sanborn Creek Mine – See Table 2.05-T1 for current disturbance acreages) are associated with the surface plant facilities, mine portals, power line roads, and other minor disturbances. These disturbances, which occur on both private and federal land, will continue for the life of the mine. The disturbance affects two major vegetation types, Mountain Shrubland and Juniper Woodland. Topsoil was not salvaged during the early construction ("pre-law" or prior to SMCRA) activities at the minesite. Therefore, revegetation will be initiated on surface soils produced by regrading existing surface materials. By the time revegetation activities occur in the future, it has been assumed that areas of old shale materials from pre-law refuse piles will be weathered to a consistency similar to the other materials to be revegetated at the Somerset, Sanborn Creek and Elk Creek Mines.

Analytical results from seventeen surface soil collections in disturbed and undisturbed areas provide an indication of the suitability of surface materials as a medium for plant growth. These data, as analyzed by Ford Chemical Laboratories on August 8, 1980 indicated that there are no problems with salts. Conductivity and sodium adsorption ration (SAR) values are all below the conservative limits of 4000 umhos/cm and 6, respectively (see WRDC 1981).

The data on heavy metals are total values derived from acid extraction and thus cannot be compared to most standards for reclamation suitability (see Shafer 1979, WDEQ 1981). If samples for undisturbed areas are compared with those from disturbed locations, it is apparent that total heavy metal levels are comparable throughout for boron, cadmium, copper, iron, lead, manganese, mercury, molybdenum, nickel, and selenium. Again however, note that the data examined were acid extractable totals and not plant-available levels. Data for heavy metals are not in a form to evaluate the hazard for plant growth. However, total heavy metals in disturbed materials and undisturbed soils are not significantly different.

In the case of soil texture the 17 samples had a reported texture of either "sandy loam" or "clay". However, this classification was produced without a particle size analysis. The occurrence of numerous samples in two diverse textural classification and the absence of intermediate textural ranges suggest an imprecise determination. Therefore, the soil textural data may not represent sufficiently precise determination to merit serious evaluation as to their suitability for reclamation.

During 1986, soil sample sites for the lower Elk Creek facilities were sampled. These results indicated the soil on the north storage yard is acceptable for revegetation. Other areas of the lower Elk Creek facilities require six inches of suitable root zone material.

In 1987, soil test pits were dug on the west bench, central yard and east bench areas. The results are tabulated in Table 1. These test pits confirm the need for 6 inches of topsoil for the central yard area and east bench. The west bench area appears to have sufficient subsoil for revegetation. The coal material layer is generally less than 6 inches thick. This gob material will either be scarified and mixed with underlying material prior to topsoil placement or scraped up by mobile equipment for use as fill material.

Table 1 Soil Test Pit Results Lower Elk Creek Facilities August 1987				
Location	**Cross Section Reference**	**Soil Description**	**Interval Feet**	**Total Depth Feet**
West Bench	B-B	Coaly Subsoil Coal & Subsoil Subsoil	1+ 1.5 1.5 2.33	6.33
West Bench	D-D'	Subsoil	3.5	3.5
Central Yard	F-F' Lower	Coal Refuse & Ashes	6	6
Central Yard	F-F' Upper	Gob Subsoil/Rock	3 2.5	5.5
East Bench	I-I'	Coal Refuse	6	6
East Bench	K-K	Coal Refuse	7.5	7.5
East Bench	M-M'	Subsoil Coal Refuse	2.08 2.42	6.5

2.0 REVEGETATION PRACTICES

2.1 SEEDBED PREPARATION

As a first step in seedbed preparation, in areas where soil will be replaced, compacted surfaces will be ripped to a depth of at least 12 inches before applying soil. In areas where soil is not available for replacement or where surface materials are suitable, areas will not be ripped to a depth that exposes any undesirable underlying materials. If this depth is less than six inches, then soil will be added to attain a minimum depth of six inches. In areas where broadcast seeding or hydromulching is to be employed, the soil surfaces will be left somewhat roughened condition. Dozers or other tracked equipment may be used to prepare the surface for hydromulching or broadcast seeding. If the seedbed surface is hard and crusty, then tracked equipment will be used to roughen the surface prior to hydroseeding or broadcast seeding.

2.2 SEED MIXTURES

The revegetation seed mixtures have some inherent flexibility built-in and is designed to restore disturbances in Juniper Woodland habitats of south and southwest facing slopes, disturbances in the Mountain Shrubland habitat type on somewhat more mesic east-facing slopes, and riparian disturbance areas. The present vegetation community on these sites represents a low range condition due to past over-grazing practices. The shrub components of Utah Juniper and Gambel's Oak dominate these sites with an understory dominated by wheatgrasses, native bluegrass, needlegrasses, cheatgrass, quackgrass, Indian ricegrass and Japanese bromegrass. OMLLC desires to reclaim to an improved vegetative community that approximates the climax potential for these sites. The diverse mixture of species selected was developed to target the post-mine land use of a quality habitat capable of supporting the approved post-mining land uses. The established species diversity will be consistent with the potential climax plant community for these sites.

The seed mix design and composition was developed by selecting species similar to the major species components (dominant diversity, seasonality and growth form) found in the predominant range sites correlated with the underlying soil communities. See Table 2. The reclamation area is predominantly underlain with soil types of Torriorthents-rock outcrop (70%), Absarokee Beenom Soil Complex (30%). These soils are correlated to the Rocky Loam and Brushy Loam range sites which have a climax plant community that is dominated with grasses and a sub-dominant shrub community. Due to the mixing of soils, waste rock, and other materials that now constitute the available plant-growth medium, a selection of similar vegetation species from the three soil types and their correlated range sites were selected as the proposed reclamation seed mix. (Table 3) Seeding rates are expressed in pounds of Pure Live Seed (PLS) per acre and are specified at a rate of approximately 45 live seeds per square foot. To achieve diversity in the final reclaimed stand of vegetation approximately 25% of the seed mix is comprised of grasses, 25% of the seed mix is comprised of shrub/half shrubs and 50% of the seed mix is comprised of forbs.

Table 4 and Table 5 are also included for seed mixes required by the BLM and USFS on those lands managed by those two agencies.

Table 2 Soil Types and Correlated Range Sites OMLLC Somerset, Sanborn Creek, and Elk Creek Mines			
Soil Type	**Range Site Name**	**Species**	**% at Climax**
Absarokee	Brushy Loam	Gambel Oak Serviceberry Mountain Brome Elk Sedge Wheat Grasses Needle Grasses Snowberry	20% 10% 10% 10% 10% 5% 5%
Beenom	Rocky Loam	Western wheatgrass Blue Bunch wheatgrass Prairie June grass Poa Species Needle & Thread grass Idaho Fescue grass Big Sagebrush	20% 15% 10% 10% 5% 5% 5%
Torriorthents Rock Outcrop	N/A	Wheatgrass	100% in pockets

2.3 SEEDING TECHNIQUES AND RATES

Depending on the site-specific conditions of the particular disturbed area, seeding will be accomplished at rates indicated in Table 3 using drill, broadcast or hydroseeding methods. The most desirable seed bed will be one where the surface will be left in a semi-roughened condition so that the seed can work its way into surficial cracks and small openings. If necessary, to improve the coverage of the seed by soil materials and to improve soil contact, areas may be dragged by chains, rakes or similar implements to aid in seed coverage. Some hand-raking may also be necessary to cover seed with soil materials.

2.4 MULCHING

If necessary to control erosion and conserve soil moisture, mulching of reclaimed areas will be employed after seeding is completed. Mulch may consist of the use of clean straw or hay mulch, hydromulching, or erosion control blankets, etc. A tackifier may also be applied at the rates recommended by the manufacturer to aid in retention of mulch materials on steeper slopes.

2.5 PLANTING TIME

The seed mix is comprised primarily of cool season species. Fall planting will primarily be employed to allow these species to benefit from cold winter temperatures and moisture for spring germination requirements. Early spring seeding may also be employed if soil moisture and temperature conditions are conducive to seedling establishment.

2.6 IRRIGATION AND FERTILIZATION

Use of the planting and mulching methods specified above will result in satisfactory plant establishment, barring abnormally dry conditions. There are no plans to irrigate the reclaimed areas.

Table 3 OMLLC Seed Mixture Somerset, Sanborn Creek, and Elk Creek Mines					
	ORIGIN	SEEDS PER POUND	POUNDS PLS/ACRE	PURE LIVE SEED PER ACRE	PURE LIVE SEED PER FT^2
GRASSES					
Thickspike Wheatgrass (Critana) *Agropyron dasystachyum* *(Elymus lanceolatus lanceolatus)*	N	154,000	0.125	19,250	0.5
Beardless Bluebunch Wheatgrass (Whitmar) *Agropyron spicatum* *(Pseudoroegneria spicata inermis*	N	117,000	0.5	58,500	1.3
Western Wheatgrass (Arriba) *Agropyron spicatum* *(Pascopyron smitthii)*	N	110,000	0.25	40,000	0.9
Green Needlegrass *Stipa viridula*	N	181,000	0.25	45,250	1.0
Mountain Brome *Bromus marginatus*	N	90,000	0.75	67,500	1.5
Sheep Fescue *Festuca ovina ovina*	N	560,000	0.5	75,000	1.7
Basin Wildrye *Elymus cinereus* *(Leymus cinereus)*	N	150,000	0.25	37,500	.9
Sanberg Bluegrass *Poa sandbergii*	N	925,000	0.06	55,500	1.3
Total Grasses			**2.69**		**9.1**
FORBS					
Western Yarrow *Achillea millefolium*	N	4,125,000	0.03	123,750	2.8
Pacific Aster *Aster chilensis*	N	2,668,000	0.063	168,084	3.9
Cicer milkvetch (Lutana) *Astragalus cicer*	I	145,000	1.0	145,000	3.3
Blue Flax *Linum lewisii*	N	278,000	0.33	91,740	2.1
Sanfoin *Onobrychis viciaefolia*	I	20,000	1.0	20,000	0.5
Rocky Mtn. Penstemon *Penstemon strictus*	N	280,000	0.25	70,000	1.6
Palmer Penstemon *Penstemon palmeri*	N	610,000	0.125	76,250	1.75
Total Forbs			**2.79**		**15.95**

SHRUBS/HALF SHRUBS					
Silver Sagebrush *Artemisia cana*	N	850,000	0.06	51,000	1.2
Fringed Sagebrush *Artemisia frigida*	N	4,500,000	0.03	135,000	3.1
Mtn. Big Sagebrush *Artemisia tridentata vaseyana*	N	2,500,000	0.06	150,000	3.4
Rubber Rabbitbrush *Chrysothamnus nauseous*	N	335,000	0.25	83,750	1.9
Antelope Bitterbrush *Purshia tridentata*	N	15,000	0.75	11,250	.26
Total Shrubs/Half Shrubs			**1.15**		**9.86**
Total Mixture			**6.63**		**34.91**

N=Native, I=Introduced
Note: The Table 3 seed mix is for non-USFS lands only

TABLE 4
SEED MIXTURE FOR USE ON BLM LANDS
Source: Exploration License COC-68482

Species	#/acre
Western Wheatgrass v. Arriba	0.96
Slender Wheatgrass v. San Luis	0.66
Mountain Brome v. Bromar	1.5
Big Bluegrass v. Sherman	0.18
Bottlebrush Squirreltail	0.96
Canada Wildrye	0.94
American Vetch	0.6
Rocky Mountain Penstemon	0.09
Western Yarrow	0.06
Total	5.95 (double rate for broadcasting)

TABLE 5
SEED MIXTURE FOR USE ON USFS LANDS
Source: Exploration License COC-67643

Species	#/acre
Mountain Brome	4.0
Prairie Junegrass	1.5
Western Wheatgrass	4.0
Indian Ricegrass	1.5
Sandberg Bluegrass	4.0
Bluebunch Wheatgrass	3.0
Penstemon strictus	0.3
Coreopsis lanceolota	0.1
Achillea millefolium v. occidentalis	0.3
Total	18.7

2.6 IRRIGATION AND FERTILIZATION (CONT)

Dr. Ed Redente at Colorado State University and Dr. Terry McLendon at the University of Texas at El Paso have conducted research in Colorado, Utah, Wyoming, Texas, and New Mexico on limiting nitrogen to assist in accelerating secondary native plant succession and recovery. Their work has shown that if native plant establishment and the reduction of weeds is the goal then available soil

nitrogen must be limited in the soil. Their recommendation for establishing native plants from shrubs to grasses to grasses to forbs is to forgo the application of supplemental nitrogen, and in cases where weed are a major or potential problem, tie-up the available soil nitrogen with an available carbon source such as sugar.

OMLLC, therefore, does not propose any addition of supplemental nitrogen. Soil fertility analysis may call for the addition of supplemental phosphorus. If supplemental phosphorus is called for OMLLC will apply 50 to 75 lbs per acre of phosphorus fertilizer (P_2O_s) to be incorporated to a depth of 1-3 inches by mechanical means. This incorporation of the phosphate in the upper 3 inches of the plant growth medium will assist with the establishment and the growth of the germinating species during the critical early seedling development phases. There may be site-specific conditions (steep slope areas for example) where the application of phosphorus may not be practical or possible for safety, rocky or other site-specific reasons.

2.7 CONTROL OF WEEDS

This weed control plan is concerned with the control of a wide variety of noxious weeds, thistles, etc. located on mine disturbance areas.

The Delta County Noxious Weed website and personnel have been consulted regarding a Noxious Weed Program. Disturbed areas, topsoil stockpiles and reclaimed/seeded areas could be invaded by the following noxious weed species with control afforded by the described techniques.

Musk, Scotch Thistles, Burdock, Houndstongue, Tamarisk, Puncturevine – Controlled by Banvel/2,4-D mixture, Curtail or Redeem Herbicides and non-ionic surfactant applied in spring or early summer.

Canada Thistle, Russian, Diffuse and Spotted Knapweeds, Yellow Toadflax and Oxeye Daisy, Bindweed – Controlled by Curtail or Redeem or Tordon hjerbicides and surfactant applied in Spring or Fall.

White Top – controlled by Escort or Telar herbicides with surfactant in the spring.

Leafy spurge – Controlled by Tordon in spring or early summer.

The herbicides and surfactant will be applied in accordance with the individual label requirements using a hand held or backpack or pickup/ATV mounted sprayer. Contractors and/or OMLLC employees may apply the herbicides. Care will be taken to avoid drift onto desirable species and to avoid windy conditions.

OMLLC will maintain records of herbicide use on the property for inspection by Division personnel. The weed control records will document the location where weed control was performed, the type of weed control employed, and the date when the weed control was performed.

As part of its Annual Reclamation Report (ARR) required under Rule 2.04.13, OMLLC will summarize its weed control activities for the year.

Other mechanical or biological means of weed control such as discing, shoveling and insects may also be employed to control weeds on disturbed areas

2.8 TECHNIQUES FOR EVALUATION OF RECLAMATION SUCCESS

The reclamation success will be qualitatively evaluated during routine inspections of the reclaimed sites. These evaluations shall include an assessment of noxious weeds, species diversity and the general health of the vegetation. Results of these evaluations will be included in the annual reclamation reports required under Rule 2.04.13.

Reclaimed areas will be checked annually after snowmelt for the formation of rills and gullies. To document each inspection, a report will be prepared and the report will be available for inspection as required under Rule 5.02.4. Rills and gullies deeper than nine inches will be noted on the report. By the end of September of the same year, laborers or small equipment will be used to fill, grade or otherwise stabilize rills and gullies deeper than nine inches. The repaired area will be seeded and mulched by the end of the same year. Mulch will be anchored to the ground with netting if appropriate.

A common reference area has been established for the juniper woodland and mountain shrubland plant communities. Evaluations of reclamation success will include comparisons of total vegetative cover, herbaceous production, and species diversity. The evaluations for the total vegetative cover and herbaceous production will be based on a comparison of reclaimed area and reference area non-noxious, perennial values. Data will be collected for each parameter in the reclaimed area and the reference area and statistically compared if necessary.

Species diversity success will be evaluated via technical standards. The evaluation of species diversity success will depend o the size of the land unit being released. Because there is a cumulative effect to species diversity (as opposed to the other vegetative parameters) where larger area can be expected to accumulate more species as habitat diversity increases, smaller areas are expected to be less diverse than larger tracts. Where a bond release request involves acreage summing to more than 10 acres, the following species diversity standard will apply:

> Of the perennial species present in the reclaimed areas, at least four will have a relative cover between 3 and 60%. Of these four species, at least one will be a forb or shrub, and applicable perennial grasses will be cool-season species.

Where a bond release request involves acreage summing to less than 10 acres, the following species diversity standard will apply:

> Of the perennial species present in the reclaimed areas, at least three will have a relative cover between 1 and 60%. Of these three species, at least one will be a forb or shrub, and applicable perennial grasses will be cool-season species.

Quantitative monitoring of revegetation success will occur in parallel with Phase II and Phase III bond release requests. As part of a Phase II bond release request, which is planned to occur prior to the fifth year after seeding, reclaimed areas will be sampled for absolute cover to determine if the reclaimed community has been achieved 90% of the cover success standard. Only first-hit cover data will be collected. No production data would be collected at this time. The diversity is checked in accordance with the Division's Bond Release Guidelines, to assess the progress of revegetation to determine if sufficient number of species are being established.

Quantitative sampling will also take place in the ninth and tenth years after seeding reclaimed surfaces if a Phase III bond release request is considered warranted at that point. Sampling methodology will reflect that outlined below.

Revegetated Area Sampling Design

It is not anticipated that the sampling methods used during the baseline study will be repeated when the operator determines whether revegetation has been successful. The following methods are proposed. The methodology in coordination with DMG prior to the beginning of sampling.

Disturbed areas are mapped as juniper woodland, mountain shrubland, or riparian. Comparison of the General Facilities Map, (Map 2.05 – M1) and the Regional Vegetation Map (Map 2.04-M8) indicates how the disturbed areas correspond to the preceding natural communities. One deviation is noted from the map. Because of their close similarity in slope and exposure, the disturbances at Bear Creek and at Lower Hubbard Creek are both considered to have had a juniper woodland community. Thus, the Lower Hubbard Creek area should be sampled and compared as a complete unit (with other JW areas) to the juniper woodland reference area data.

The weighted average method outlined in Rule 4.15.7 (4)(b) will be utilized to compare the reference areas sampling data and the revegetated areas in evaluating cover and production. Thus, three sampling units will be sampled when the reclaimed areas are mapped as both juniper woodland and mountain shrubland. The reclaimed area will comprise a single unit, and each reference community will also be a sample unit. Within each sample unit, sample placement will be either on a simple random or a proportional allocation design. A minimum of 10 samples will be collected in each reference area while at least 15 samples will be taken in the reclaimed area. Samples will be collected in each sample unit until sample adequacy is reached. Sample locations will be drawn randomly from a gridded map of the areas to be samples and then located in the field through the use of a compass and pacing.

Total Vegetative Cover:

Total vegetative cover will be estimated using either an optical point frame or a mechanical point frame. Point sitings will be located at regular intervals along a 25 meter (or smaller) transect stretched in a random direction from the sample location. Because of the small sizes of the reclaimed areas, 25 meter or smaller transects are recommended. Fifty data points will be sampled per transect, comprising a single sample unit for the purposes of sample adequacy calculations. Cover will be identified by species, or as rock, litter, or bare ground. For the purposes of estimating total vegetative cover, only first hit data will be used. Only hits 4 feet and lower will be collected in both the reclaimed and reference area as allowed on page 7 of the DMG Vegetation Guidelines (Guidelines for Compliance with Land Use and Vegetation Requirements of the Colorado Mined Land Reclamation Board for Coal Mining; October, 1988.). Sample adequacy calculations will be based on total vegetative cover. Comparisons between reclaimed and reference areas will be based on total non-noxious, perennial cover. Noxious weed and annual species cover will not be included in the comparison.

Species Diversity:

For a Phase III bond release request, multiple hit data (first, second, third…) will be used to evaluate species diversity success. However, for the purposes of a Phase II bond release request, species diversity will be evaluated using only first-hit data since first hits generally far exceed all other vegetative hits combined (especially with a herbaceous dominated vegetation). The diversity is checked in accordance with the Division's Bond Release Guidelines, to assess the progress of revegetation to determine if sufficient number of species are being established.

Herbaceous Productivity:

Production plots will be a ½ meter by ½ meter in size unless otherwise agreed upon with DMG. All current herbaceous production inside the production plots will be clipped, separated according to life form, and bagged. The four life forms will include perennial grasses, perennial forbs, annual species, and noxious weeds. Production data will not be the basis of species diversity, and therefore sorting

by species is unnecessary. All production samples will be oven dried at 110 degrees Fahrenheit to a constant weight. Sample adequacy calculations will be based on total herbaceous production. Comparisons between reclaimed and reference areas will be based on total non-noxious, perennial herbaceous production. Noxious weed and annual species production will not be included in the comparison.

Sample Adequacy and Statistical Evaluations:

For each parameter, a statistically adequate number of samples will be collected in determining reclamation success. Statistical methods and formulas will be consistent with those outlined in the Division's latest version of the Bond Release Guidelines. Statistical tests will comply with requirements set out in Rule 4.15.7(2)(c). Prior to sampling, the operator will meet with the Division to discuss sampling and statistical analysis procedures.

Time of Sampling

Vegetation cover and production data will be collected in July and density work conducted during August.

Grazing

Should grazing occur to the extent that revegetation success standards can not be met, then the operator will fence the affected areas.

2.9 ELK CREEK DRAINAGE RECLAMATION

When the Elk Creek mine facilities are reclaimed, the Elk Creek culvert will be removed and the drainage reconstructed. The current sediment control system consisting of ditches and ponds will also be removed. To protect the Elk Creek drainage and prevent the addition of additional sediment to the streamflow, Oxbow will have to use alternative sediment control measures such as topographic roughness, small sediment traps, straw wattles, silt fence, wood logs, mulching as appropriate to control runoff from the reseeded slopes located above the reclaimed stream channel.

If available, Salix willow species, such as *S. exigua* and *S. geyeriana* and *S. monticola* and Narrowleaf Cottonwood *Populus angustifolia* can be planted among the reconstructed rock protected drainage and wet fringe areas to provide additional erosion control and wildlife habitat.