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MINING & MINERALS
DIVISION

Cullum Mine Preliminary Vegetation Evaluation

In November 1999, MGF staff sampled the vegetative communities at Cullum Mine. Four distinct sample areas were identified: (1) the overburden piles; (2) the side slopes of the overburden piles; (3) the flat areas between overburden piles, and; (4) the adjacent unmined area. Of these, the second (side slopes of overburden) was eliminated from the sampling design as the vegetative cover was very sparse and could be assessed visually. This preliminary evaluation will discuss the measurements made for the overburden and the flat areas within the permit area.

Methods

The overburden piles and flat areas were sampled using a "point-step" method as described in the Draft Closeout Plan Guidelines [New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD)1996]. In each of these two areas, three sub-areas were randomly located along a transect. Within these areas, five transects of 50 feet each were taped out, and "hits" recorded at every foot along the tape. Total cover and cover by species was recorded and combined to give a value for cover by each species, and a value for total cover.

Results

The overburden areas had a total vegetative cover of 45%. Of that, the dominant species was rubber rabbitbrush (*Chrysothamnus nauseosus*) at approximately 14.5%, with a co-dominant sweetclover (*Melilotus* sp.) of 13.5%. A sub-dominant on the overburden areas was sagewort (*Artemisia campestris*) at 5.7%. The remainder of the plant community was composed of grass and forb species that each represented less than 5% cover. These included blue grama (*Bouteloua gracilis*), sand dropseed (*Sporobolus cryptandrus*), cheatgrass (*Bromus tectorum*), and several species of aster (*Aster* spp.). In addition, a component of cryptogammic crust was present.

Bare ground measured at 12%, litter at 6.2%, and gravel at just under 2%. These surface characteristics were only recorded when they were exposed, with no canopy or ground cover. Therefore, the gravel component is not well represented by this figure, as approximately 90-95% of the ground surface is coarse gravel.

The range site description "Gravelly Hills Complex" WP2 (USDA-NRCS, Section IE, Technical Guide) describes a plant community of 15% grasses, 5-10% shrubs and sub-shrubs, and 40-60% surface gravel.

Table 1. Comparison of Existing Vegetation on Overburden Piles with USDA-NRCS Range Site Description

Existing		NRCS	
Species	Percent Cover	Species	Percent Cover
Total Cover(live veg)	45	Total Cover (live veg)	25
Sagewort	13.5	Sagewort	1-3%
Rubber rabbitbrush	14.5	Shrubs	1-3%
Sweetclover	13.5%	Perennial forbs	1-5%
Blue grama	Present <5%	Blue grama	1-5%
Sand dropseed	Present <5%	Sand dropseed	1-5%
Three awn	Present<5%	Three awn	1-3%
Broom snakeweed	Present<5%	Broom snakeweed	1-5%

The flat areas between overburden were much more sparsely vegetated, although they do support a number of small stands of ponderosa pine (*Pinus ponderosa*), and also appear to have more cryptogamic crusts.

This plant community had almost equal representation of four primary species: (1) rubber rabbitbrush at 1.8%; (2) sweetclover at 2.4%; (3) sagewort at 2.53%, and; (4) mullein (*Verbascum thapsus*) at 3.8%. Surface gravel measured 27.4%, litter 7%, and bare ground at 1.53%. Cryptogamic crusts measured at 1.7%, cheatgrass at 1.06 %, blue grama at 1.265, and bottlebrush squirreltail (*Elymus elymoides*) at 1.6%.

Flat area at the bottom of the pit areas

Existing		NRCS	
Species	Percent Cover	Species	Percent Cover
Total Cover (live veg)	24	Total Cover (live veg)	25
Sagewort	2.53	Sagewort	1-3%
Rubber rabbitbrush	1.8	Shrubs	1-3%
Sweetclover	2.4	Perennial forbs	1-5%
Blue grama	1.26	Blue grama	1-5%
Sand dropseed	Present < 5%	Sand dropseed	1-5%
Three awn	Present < 5%	Three awn	1-3%
Broom snakeweed	Present < 5%	Broom snakeweed	1-5%
Little bluestem	Present < 5%	Grasses	1-5%
Bottlebrush squirreltail	Present < 5%	Bottlebrush squirreltail	1-5%

<u>Grasses and Grasslike 90-95%</u>		<u>Shrubs-Woody 1-5%</u>	<u>Forbs 1-5%</u>		
Sideoats grama	15-40	Pinon-juniper	1-3	Perennial forbs	1-5
Black grama	15-40	Broom snakeweed	1-5	Annuals	1-5
Galleta	5-15	Biglow sagewort	1-3		
Hairy grama	5-10	Longleaf ephedra	1-3		
New Mexico feather grass	} 5-10	Small soapweed	1-3		
Needleandthread		Feathered dalea	1-3		
Blue grama	1-5	Cholla	1-3		
Sand dropseed	1-5	Mountain mahogany	} 1-3		
Threeawn spp.	1-3	Oak sp.			
Bottlebrush squirltail	1-5	Others	1-3		
Sedge	1-5				
Other grasses	1-5				

50% of species for composition

3. Canopy Cover

Shrubs and half-shrubs 5-10%

4. Ground Cover (Average Percent of Surface Area)

Grasses and forbs	15
Bare ground	12
Surface gravel	40-60
Surface cobble & stones	10
Litter - % of area with avg. depth in 2 cm.	3

overall cover within 75% nonweedy non noxious

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry; lbs/Ac)

	<u>North Slopes</u>	<u>South Slopes</u>
Favorable years Avg.	400	500
Unfavorable years Avg.	100	150

CULLUM MINE BROADCAST SEED MIX

SCIENTIFIC NAME	COMMON NAME/VARIETY	GROWTH FORM*	BULK SEEDS PER PLS LB.	% PURITY	% GERM	DENSITY PLS/LB.	APPLICATION RATE PLS/AC	PLS/SQ FT
<i>Artemesia frigida</i>	Fringe sage	S	4,536,000	53.000	92.000	2,211,753.600	0.06	3.17
<i>Bouteloua curtipendula</i>	Sideoats grama (Vaughn or Niner)	W	191,000	86.600	91.000	151,214.700	1.00	3.47
<i>Bouteloua gracilis</i>	Blue grama (Hacia or Alma)	W	825,000	92.500	85.000	65,216.500	2.00	2.99
<i>Ceratoides lanata</i>	Winterfat	S	56,700	78.500	78.000	34,938.540	2.00	1.60
<i>Chrysothamnus naseosus</i>	Rubber rabbitbrush, chamisa	S	400,000	21.900	99.000	87,120.000	0.50	1.00
<i>Coereopsis lancaolata</i>	Lance-leaved coreopsis	F	221,000	96.900	82.000	170,346.800	0.50	1.96
<i>Elymus elymoides</i>	Bottlebrush squirreltail	C	192,000	99.700	91.000	174,720.000	1.50	6.02
<i>Fallugia paradoxa</i>	Apache plume	S	420,000	39.800	82.000	137,760.000	0.50	1.58
<i>Koeleria cristata</i>	Prairie junegrass	C	2,315,400	79.500	83.000	1,537,425.600	0.12	4.24
<i>Linum lewisii</i>	Blue flax Appar	F	293,000	99.400	96.000	267,157.400	0.50	3.07
<i>Melilotus officinalis</i>	Yellow sweetclover	F	260,000	99.700	88.000	228,800.000	0.25	1.31
<i>Oryzopsis hymenoides</i>	Indian ricegrass (Paloma)	W	141,000	99.600	98.000	138,180.000	1.00	3.17
<i>Schizachyrium scoparium</i>	Little bluestem (Cimmaron)	W	260,000	76.900	79.000	158,158.000	1.50	5.45
<i>Sporobolus cryptandrus</i>	Sand dropseed	W	5,298,000	99.500	89.000	4,715,220.000	0.06	6.77
	Total Mixture						11.50	45.80

Seed Mix Diversity	Number of Species	% of Mixture
Warm season grasses (W)	5	0.48
Cool season grasses ©	2	0.22
Shrubs (S)	4	0.16
Forbs (F)	3	0.14
TOTALS	14	1.000

Cullum Mine Preliminary Species List for Disturbed Areas
M. Sonett November 1999

Scientific Name	Common Name
<i>Aristida divaricata</i>	Poverty threeawn
<i>Aristida longiseta</i>	Purple threeawn
<i>Artemesia frigida</i>	Fringe sage
<i>Artemesia sp.</i>	Sagewort
<i>Aster chilensis</i>	Purple aster
<i>Aster sp. (tall)</i>	
<i>Bouteloua gracilis</i>	Blue grama
<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush
<i>Cryptogamic crust</i>	
<i>Dasyochloa pulchella</i>	Fluffgrass
<i>Elymus elymoides</i>	Bottlebrush squirreltail
<i>Eriogonum sp.</i>	Buckwheat
<i>Euphorbia prostrata</i>	Spurge
<i>Fallugia paradoxa</i>	Apache plume
<i>Gutierrezia sarothrae</i>	Broom snakeweed
<i>Haplopappas spinulosus</i>	Perennial goldenweed
<i>Hymenoxys ricardsonii</i>	Colorado rubberweed
<i>Juniperus monosperma</i>	One-seed juniper
<i>Lycurus setosus</i>	Wolftail
<i>Melilotis officinalis</i>	Yellow sweetclover
<i>Mentzelia sp.</i>	Stickleaf
<i>Moss</i>	
<i>Muhlenbergia torreyii</i>	Ring muhly
<i>Opuntia polyacantha</i>	Prickly pear cactus
<i>Oryzopsis hymenoides</i>	Indian ricegrass
<i>Pinus edulis</i>	Pinon pine
<i>Pinus ponderosa</i>	Ponderosa pine
<i>Polygala alba</i>	Milkwort
<i>Schizachyrium scoparium</i>	Little bluestem
<i>Sisymbrium altissimum</i>	Tumble mustard
<i>Stipa comata</i>	Needle and thread
<i>Tragopogon dubius</i>	Yellow salsify
<i>Verbascum thapsus</i>	Mullien
<i>Yucca glauca</i>	Soapweed yucca

