TABLE 321.200m
GRAZING PRODUCTIVITY

SITE 4a
VALIDATION
PLOT SIZE: 0.96 sq. ft.

VEGETATION
SAGEBRUSH

TAXA	DRY WT. PROD.	% COMP
GRASSES		
Agropyron spicatum	7.2	8
Poa ampla	4.8	5
Arrhenatherum elatius	4.5	5
Poa fendleriana	1.2	1
Carex sp.	1.0	1
Total Grasses	18.7	20
FORBS		
Penstemon sp.	2.5	3
Aster sp.	.8	1
Senecio sp.	.8	1
Polemonium	.2	T
Gilia sp.	T	T
Total Forbs	4.3	5
BROWSE		
Artemisia tridentata	40.6	44
Symphoricarpos oreophilus	12.6	13
Purshia tridentata	10.0	11
Chrysothamnus viscidiflorus	3.2	3
Rosa woodsii	2.8	1
Pachystima myrsinites	.9	
Total Browse	70.1	75
Totals	93.1	100

Est. Potential Prod. for Site 932.0 lbs/ac.

TABLE 321.200n
PLANT COMMUNITY CHARACTERISTICS

SITE 4b.
REFERENCE

VEGETATION
SAGEBRUSH

TAXA	% COVER	% FREQ.	% COMP.
GRASSES			
Agropyron spicatum	26.0	76	21
Poa ampla	6.0	25	5
Poa fendleriana	3.3	20	2
Stipa lettermanii	1.7	3	1
Carex sp.	1.3	7	1
Bromus anomalus	.1	3	1
Stipa comata	T	2	T
Poa pratensis	T	2	T
Total Grass	37.4		31

SITE 4b. VEGETATION
REFERENCE SAGEBRUSH

TAXA	% COVER	% FREQ.	% COMP.
FORBS			
Penstemon watsonii	4.8	15	4
Lupinus argenteus	2.4	6	2
Aster sp.	1.1	3	1
Brickellia sp.	1.0	2	1
Castilleja linearis	.5	5	T
Cirsium foliosum	.4	6	T
Collinsia parviflora	.2	5	T
Erigeron speciosus	.2	7	T
Gayophytum nuttallii	.2	6	T
Cryptantha crassisepala	.1	3	T
Aster sp.	T	2	T
Chaenactis sp.	T	2	T
Epilobium sp.	T	2	T
Comandra umbellata	T	2	T
Grindelia sp.	T	2	T
Eriogonum umbellatum	T	2	T
Sisymbrium sp.	T	2	T
Total Forbs	10.9		8

TABLE 321.200o
PLANT COMMUNITY CHARACTERISTICS

SITE 4b. VEGETATION
REFERENCE SAGEBRUSH

TAXA	% COVER	% FREQ.	% COMP.
BROWSE			
Artemisia tridentata	34.2	62	26
Purshia tridentata	19.1	40	15
Symphoricarpos oreophilus	17.6	45	14
Amelanchier alnifolia	5.2	20	4
Chrysothamnus viscidiflorus	2.3	5	2
Rosa woodsii	.7	10	T
Artemisia sp.	.6	2	T
Mahonia repens	.5	5	T
Cercocarpus montanus	T	T	T
Total Browse	81.2		61
Totals (Combined with Table 321.200o Totals)	129.5		100

TABLE 321.200p
GRAZING PRODUCTIVITY

SITE 4b.
REFERENCE **VEGETATION**
PLOT SIZE: 0.96 sq. ft. **SAGEBRUSH**

TAXA	DRY WT. PROD.	% COMP.
GRASSES		
Poa ampla	20.7	16
Agropyron spicatum	17.4	13
Poa fendleriana	2.0	1
Carex sp.	.2	T
Total Grasses	40.3	30
FORBS		
Penstemon sp.	3.0	2
Lupinus sp.	1.5	1
Aster sp.	.5	T
Senecio sp.	.2	T
Total Forbs	5.2	3
BROWSE		
Artemisia tridentata	51.5	39
Purshia tridentata	30.4	22
Symphoricarpos oreophilus	4.9	3
Chrysothamnus viscidiflorus	4.8	3
Amelanchier alnifolia	.4	T
Total Browse	92.0	67
Totals	137.5	100

Est. Potential Prod. for Site 1375.0 lbs./ac.

TABLE 321.200q
PLANT COMMUNITY CHARACTERISTICS

SITE 5a **VEGETATION**
WHISKY CANYON VALIDATION **ASPEN**

TAXA	% COVER	% FREQ.	% COMP.
GRASSES			
Agropyron caninum	36.8	90	23
Poa pratensis	16.5	65	10
Bromus carinatus	13.6	45	8
Carex geyeri	8.2	25	5
Elymus glaucus	6.2	10	4
Stipa lettermanii	2.6	10	2
Stipa columbiana	1.7	50	1
Total Grass	85.6		53

SITE 5a
WHISKY CANYON VALIDATION

VEGETATION
ASPEN

TAXA	% COVER	% FREQ.	% COMP.
FORBS			
Lathyrus lanzwertii	7.9	60	5
Achillea millefolium	7.5	60	5
Helenium hoopesii	6.5	25	4
Silene menziesii	5.8	40	4
Smilacina stellata	4.0	35	3
Penstemon watsonii	3.2	10	2
Senecio serra	2.6	10	2
Geranium fremontii	2.1	35	1
Potentilla gracilis	1.9	5	1
Heliomerus multiflora	1.6	15	1
Fragaria virginiana	1.1	20	1
Hackelia floribunda	1.0	15	T
Erysimum asperum	.8	30	T
Polygonum sawatchense	.4	15	T
Stellaria jamesiana	.4	15	T
Thalictrum fendleri	.4	15	T
Polemonium foliosissimum	.1	5	T
Collinsia parviflora	.1	10	T
Total Forbs	47.4		29
BROWSE			
Symphoricarpos oreophilus	22.4	65	14
Abies lasiocarpa	6.1	10	4
Populus tremuloides	.8	5	T
Total Browse	29.3		18
Totals	162.3		100

TABLE 321.200r
GRAZING PRODUCTIVITY

SITE 5a.
WHISKY CANYON VALIDATION
PLOT SIZE: 0.96 sq. ft.

VEGETATION
APSEN

TAXA	DRY WT. PROD.	% COMP.
GRASSES		
Agropyron caninum	4.9	8
Stipa lettermannii	2.4	4
Poa pratensis	2.2	4
Carex sp.	1.5	3
Bromus carinatus	1.4	2
Total Grasses	12.4	21

SITE 5a.
WHISKY CANYON VALIDATION — VEGETATION
PLOT SIZE: 0.96 sq. ft. — APSEN

TAXA	DRY WT. PROD.	% COMP.
FORBS		
Geranium fremontii	2.5	4
Hackelia floribunda	1.9	3
Achillea millefolium	1.0	2
Lathyrus lanzwertii	.5	1
Silene menziesii	.5	1
Polemonium sp.	.4	1
Heliomeris multiflora	.2	T
Penstemon watsonii	.2	T
Chenopodium fremontii	T	T
Collinsia parviflora	T	T
Erysimum asperum	T	T
Fragaria virginiana	T	T
Galium sp.	T	T
Osmorhiza depauperata	T	T
Stellaria jamesiana	T	T
Taraxacum officinale	T	T
Thalictrum fendleri	T	T
Polygonum sawatchense	T	T
Total Forbs	7.2	12
BROWSE		
Symphoricarpos oreophilus	39.6	66
Abies lasiocarpa	.3	1
Total Browse	39.9	67
Totals	59.5	100

Est. Potential Prod. for site 595 lbs/ac.

TABLE 321.200s
TREE PRODUCTIVITY

SITE 5a. — VEGETATION
WHISKY CANYON VALIDATION — ASPEN

TAXA	MEAN DISTANCE (ft)		RELATIVE FREQUENCY		DENSITY PER ACRE		
Populus tremuloides	16.9		88		134.1		
Abies concolor	12				18.3		
	<1" Diameter		>1" Diameter				
	< 3'tall	> 3'tall	1"-3"	3"-6"	6"-12"	12"-15"	<15"
Populus tremuloides			3	18	13		
Abies concolor			2		2		1

TABLE 321.200t
PLANT COMMUNITY CHARACTERISTICS

SITE 5b. VEGETATION
WHISKY CANYON REFERENCE ASPEN

TAXA	% COVER	% FREQ.	% COMP
GRASSES			
Agropyron caninum	36.1	90	23
Bromus carinatus	23.0	70	15
Poa pratensis	16.2	65	10
Stipa columbiana	11.1	40	7
Stipa lettermanii	3.9	15	2
Bromus ciliatus	1.9	5	1
Elymus glaucus	.8	5	T
Carex sp.	.8	5	T
Total Grass	93.8		58
FORBS			
Lathyrus lanzwertii	15.6	70	9
Smilacina stellata	13.5	40	8
Geranium fremontii	5.6	30	3
Mertensia ciliata	4.5	15	3
Achillea millefolium	3.4	30	2
Fragaria virginiana	3.1	30	2
Aster chilensis	3.0	20	2
Senecio serra	2.2	15	1
Hackelia floribunda	1.1	20	1
Helenium hoopesii	.8	5	T
Thalictrum fendleri	.8	5	T
Heliomeris multiflora	.2	.4	15
Stellaria jamesiana	.1	10	T
Descurainia californica	.1	5	T
Erysimum asperum		5	T
Total Forbs	54.4		31
BROWSE			
Symphoricarpos oreophilus	14.1	40	9
Populus tremuloides	2.8	15	2
Total Browse	16.9		11
Totals	165.2		100

TABLE 321.200u
TREE PRODUCTIVITY

SITE 5b. VEGETATION
WHISKY CANYON REFERENCE ASPEN

TAXA	MEAN DISTANCE (ft)			RELATIVE FREQUENCY		DENSITY PER ACRE	
Populus tremuloides	11.04			95		339.3	
Abies Concolor				5%		17.9	
	<1" Diameter		>1" Diameter				
	<3'tall	>3'tall	1"-3"	3"-6"	6"-12"	12"-15"	>15"
Populus tremuloides				21	17		
Abies concolor			2				

TABLE 321.200v
PLANT COMMUNITY CHARACTERISTICS

SITE 6 — **VEGETATION**
WHISKY CANYON REFERENCE — **SPRUCE-FIR**

TAXA	% COVER	% FREQ.	% COMP.
GRASSES			
Stipa columbiana	3.9	10	7
Agropyron caninum	1.1	20	2
Bromus carinatus	1.0	15	2
Poa pratensis	1.0	15	2
Carex sp.	.1	5	T
Total Grass	7.1		13
FORBS			
Lathyrus lanzwertii	10.8	30	19
Arnica cordifolia	5.4	40	10
Pyrola secunda	2.0	10	4
Aquilegia coerulea	1.5	10	3
Fragaria virginiana	1.5	35	3
Helenium hoopesii	1.5	10	3
Thalictrum fendleri	1.0	15	2
Viola adunca	1.0	20	2
Osmorhiza depauperata	.9	10	2
Aster engelmannii	.8	5	1
Castilleja miniata	.8	5	1
Smilacina stellata	.8	5	1
Achillea millefolium	.6	25	1
Mitella sp.	.4	15	T
Geranium fremontii	.2	10	T
Hackelia floribunda	.2	10	T
Erigeron superbus	.1	5	T
Stellaria jamesiana	.1	5	T
Total Forbs	29.6		52
BROWSE			
Shepherdia canadensis	6.9	15	12
Abies lasiocarpa	6.6	25	12
Symphoricarpos oreophilus	.2	10	11
Pachystima myrsinites	.2	10	T
Populus tremuloides	.2	10	T
Total Browse	20.1		35
Totals	56.8		100

TABLE 321.200w
TREE PRODUCTIVITY

SITE 6 — VEGETATION
WHISKEY CANYON VALIDATION — SPRUCE-FIR

TAXA	MEAN DISTANCE (ft)			RELATIVE FREQUENCY		DENSITY PER ACRE	
Populus tremuloides				40%		173.4	
Picea pungens				50%		216.8	
Abies lasiocarpa	10.0			2%		8.7	
Pseudotsuga menziesii				8%		34.7	
	<1" Diameter		>1" Diameter				
	< 3'tall	> 3'tall	1"-3"	3"-6"	6"-12"	12"-15"	>15"
Populus tremuloides					5		
Picea pungens			1	10	4		
Abies concolor			3	10	1		3
Pseudotuga menziesii					2	1	

TABLE 321.200x
PLANT COMMUNITY CHARACTERISTICS

SITE 6b. — VEGETATION
WHISKY CANYON REFERENCE — SPRUCE-FIR

TAXA	% COVER	% FREQ.	% COMP.
GRASSES			
Bromus ciliatus	1.0	15	3
Total Grass	1.0		3
FORBS			
Arnica cordifolia	5.6	35	20
Fragaria virginiana	5.6	30	20
Aquilegia coerulea	1.5	10	5
Osmorhiza depauperata	1.5	35	5
Thalictrum fendleri	.8	5	3
Pyrola secunda	.5	20	2
Mitella sp.	.4	15	1
Silene menziesii	.2	10	1
Viola adunca	.2	5	1
Erigeron superbus	.1	5	T
Geranium fremontii	.1	5	T
Helenium hoopesii	.1	5	T
Total Forbs	16.6		58
BROWSE			
Mahonia repens			
Rosa woodsii	3.1	5	11
Lonicera utahensis	2.2	15	8
Vaccinimum	1.9	5	6
membranaceum	1.5	10	5
Symphoricarpos	.9	5	3
oreophilus	.8	5	3
Populus tremuloides	.5	20	2
Abies lasiocarpa	.2	10	1
Pachystima myrsinites			
Total Browse	11.1		39
Totals	28.7		100

TABLE 321.200y
TREE PRODUCTIVITY

SITE 6b
WHISKY CANYON REFERENCE

VEGETATION
SPRUCE-FIR

TAXA	MEAN DISTANCE (ft)			RELATIVE FREQUENCY		DENSITY PER ACRE	
Populus tremuloides				25%		110.8	
Picea pungens				52%		230.6	
Abies lasiocarpa	9.9			15%		66.5	
Pseudotsuga menziesii				8%		35.5	
	<1" Diameter		>1" Diameter				
	< 3'tall	> 3'tall	1"-3"	3"-6"	6"-12"	12"-15"	>15"
Populus tremuloides				8	2		
Picea pungens			4	5	7	2	3
Abies concolor			1	1	2	2	1
Pseudotsuga menziesii					2		

TABLE 321.200z
PLANT COMMUNITY CHARACTERISTICS

SITE 7.
PORTAL YARD REFERENCE

VEGETATION
SPRUCE-FIR

TAXA	% COVER	% FREQ.	% COMP.
GRASSES			
Bromus ciliatus	3.5	20	10
Poa pratensis	1.1	20	3
Bromus carinatus	.8	5	2
Carex sp.	.4	15	1
Total Grass	5.8		16
FORBS			
Lupinus sp.	10.9	30	30
Viola adunca	3.4	35	10
Lathyrus lanzwertii	3.1	30	9
Arnica cordifolia	2.8	15	7
Osmorhiza depauperata	2.5	50	7
Achillea millefolium	2.4	25	6
Aquilegia coerulea	1.5	10	4
Fragaria virginiana	1.2	25	3
Erigeron superbus	.9	10	2
Silene menziesii	.9	5	2
Hackelia floribunda	.8	5	2
Helenium hoopesii	.8	5	2
Epilobium angustifolium	.1	5	T
Ranunculus inamoenus	.1	5	T
Taraxacum officinale	.1	5	T
Total Forbs	31.5		84
BROWSE			
Abies lasiocarpa	.1	5	T
Sambucus racemosa	.1	5	T
Total Browse	.2		0
Totals	37.5		100

TABLE 321.200aa
TREE PRODUCTIVITY

SITE 7 — VEGETATION
PORTAL YARD REFERENCE — SPRUCE-FIR

TAXA	MEAN DISTANCE (ft)			RELATIVE FREQUENCY		DENSITY PER ACRE	
Picea pungens	12.3			60%		173.1	
Abies lasiocarpa				40%		115.4	
	<1" Diameter		>1" Diameter				
	< 3'tall	> 3'tall	1"-3"	3"-6"	6"-12"	12"-15"	>15"
Picea pungens			1	2	8	7	6
Abies concolor			0	4	6	4	2

TABLE 321.200bb
PLANT COMMUNITY CHARACTERISTICS

SITE 8. — VEGETATION
PORTAL YARD REFERENCE — ASPEN

TAXA	% COVER	% FREQ.	% COMP.
GRASSES			
Bromus carinatus	33.5	75	31
Agropyron caninum	23.0	70	21
Poa pratensis	13.8	45	13
Stipa lettermannii	13.1	25	12
Poa reflexa	1.8	20	1
Stipa columbiana	1.1	35	1
Total Grass	86.3		79
FORBS			
Lathyrus lanzwertii	7.8	75	7
Galium bifolium	3.1	25	3
Delphinium barbeyi	2.8	15	3
Archillea millefolium	1.9	5	2
Gayophytum ramosissimum	.9	10	1
Helenium hoopesii	.9	10	1
Senecio serra	.9	10	1
Hackelia floribunda	.8	5	T
Polygonum sawatchense	.5	20	T
Osmorhiza occidentalis	.1	5	T
Chenopodium fremontii	.1	5	T
Cirsium foliosum	.1	5	T
Collinsia parviflora	.1	5	T
Descurainia californica	.1	5	T
Nemophila breviflora	.1	5	T
Total Forbs	20.2		18
BROWSE			
Sambucus racemosa	3.1	5	3
Total Browse	3.1		3
Totals	109.6		100

TABLE 321.200cc
GRAZING PRODUCTIVITY

SITE 8.
PORTAL YARD REFERENCE — VEGETATION
PLOT SIZE: 0.96 sq. ft. — ASPEN

TAXA	DRY WT. PROD.	% COMP.
GRASSES		
Bromus carinatus	9.5	13
Carex sp.	9.0	12
Stipa lettermannii	4.4	6
Agropyron caninum	3.9	5
Poa pratensis	1.5	2
Stipa columbiana	1.4	2
Total Grasses	29.7	40
FORBS		
Delphinium occidentale	12.6	18
Hackelia floribunda	8.1	11
Lathyrus lanzwertii	7.0	9
Helenium hoopesii	5.0	7
Senecio serra	2.2	3
Collinsia parviflora	T	T
Descurainia californica	T	T
Erysimum asperum	T	T
Galium sp.	T	T
Gayophytum ramosissimum	T	T
Nemophila breviflora	T	T
Polygonum sawatchense	T	T
Total Forbs	34.9	48
BROWSE		
Sambucus racemosa	7.5	10
Populus tremuloides	1.8	2
Total Browse	9.2	12
Totals	73.8	100

Est. Potential Prod. for Site 738.0 lbs/ac.

TABLE 321.200dd
TREE PRODUCTIVITY

SITE 8
PORTAL YARD REFERENCE — VEGETATION
(LOCATION IS ABOVE YARD) — ASPEN

TAXA	MEAN DISTANCE (ft)			RELATIVE FREQUENCY		DENSITY PER ACRE	
Populus tremuloides	26.3 ft			100%		63.1	
	<1" Diameter		>1" Diameter				
	< 3'tall	> 3'tall	1"-3"	3"-6"	6"-12"	12"-15"	>15"
Populus tremuloides				6	8	8	4

TABLE 321.200ee
SUMMARY OF TREE GROWTH DATA

LOCATION	SPECIES	AV DIAM., IN.	AV HT. FT.	AVG AGE	GROWTH,DIAM./yr. mm.
Lower Canyon	Spruce	10.8	37	54	.38
Lower Canyon	Aspen	7.4	32	54*	.22*
Whisky Canyon	Spruce	13.1	51	74	.34
Whisky Canyon	Fir	6.2	48	79	.27
Whisky Canyon	Aspen	-	-	53	.24
Portal Area	Aspen	10.7	42	44	.50
Portal Area	Spruce	10.0	49	53	.38
Portal Area	Fir	14.0	64	65	.48

* Estimated due to partially rotted cores.

A total of 19 species occurred along the transect in the lower canyon spruce-fir understory with grasses and sedges providing the most cover at 46 percent. These species were low in frequency percentages and sparse enough to contribute little if any forage.Forb and grass productivity measurements were thus eliminated in this type. The overstory of spruce and fir provided a high (near 100%) canopy cover, and their average productivity (diameter increase) of 0.38 mm per year was approximately that of other spruce-fir types measured in the permit area. The composition of trees in this forest type was near equal with spruce having a relative frequency of 52 percent and 163 trees per acre while fir had a 48 percent frequency and 150 trees per acre. The stand was considered a dynamic stand as both species had representatives in all size classes studied Table 321.200b and 321.200d.

Aspen stands along the permit area comprised about 32 percent of the total permit area. In the aspen stands along the lower permit area total cover of understory species was 97 percent, with 90 percent of the total attributable to grass species. Usually the well developed aspen stands are the most productive for forage but this stand only contributed approximately 390 pounds per acre. Aspen tree growth was sparse in having 496 trees per acre with a diameter growth increment of only 0.32 mm per year. Further evidence of the unproductive nature of this stand was observed in the size class distribution study; no trees were found in the small or large size classes, all trees being either 3-6 or 6-12 inches in diameter. Rotten centers were found in 67 percent of the trees sampled and thus the stand could be considered decadent and not likely to become a dynamic and productive stand of aspen.

Openings along the aspen stands at one time were dominated by palatable species of grass, forbs, and elderberry. Due to excessive grazing, palatable species have been largely replaced by undesirable species such as stinging neetle, sneezeweed, stickseed, and thistle. These areas constituted about three percent of the total permit area route.

Where the permit area is parallel to the Skyline Project conveyor corridor the vegetation is mostly sagebrush with a mixture of grasses. Sagebrush and grasses contribute 72 percent cover, the palatable forbs contribute about 11 percent cover, and browse other than sagebrush contribute 46 percent cover. This sagebrush type is the most common of any type along the permit area and comprises 34 percent of the total. Transect data indicates a total cover of about

130 percent with 34 species contributing. Productivity value of the sagebrush type was greatest among the sites studied with 1375 pounds per acre Table 321.200p.

Along Whisky Canyon both aspen and spruce-fir communities were encountered. The aspen community was among the most diverse in species with a total of 28 species contributing to the understory cover of 162 percent. The species contributing most to forage production were grasses. Forage production of grasses and forbs combined provided 595 pounds per acre Table 321.200r. Aspen trees here were more productive, with the stands containing some mature trees greater than 15 inches in diameter as well as numerous intermediate sizes down to 1 inch in diameter. All core samples appeared healthy and little evidence of diseased trees was found. The average increment of growth was 0.24 mm per year.

Sample data in the Whisky Canyon spruce-fir community included four species of trees with spruce and aspen being most abundant. The stand could be considered successional with spruce being the potential climax. Intermediate size classes of aspen were most abundant, with few large trees and very few small replacement trees evident. Douglas fir was apparantly giving way to the spruce climax as there were only a few large trees, with little evidence of seedling replacement. Tree density for all species was 434 trees per acre with the growth rate for spruce and fir at 0.34 mm per year and 0.27 mm per year respectively. The understory species, limited by dense shade, comprised a total of 28 percent.

The reference area for the spruce-fir type was established adjacent and above the portal area; construction activities preclude the establishment of validation sites. The community was dominated by fir trees which constituted a density of 173 trees per acre. These trees were abundant in all size classes indicating a permanent and near-climax community of spruce and fir. Spruce trees, although less abundant (115 trees per acre), were also represented in all size classes. Growth rates for these trees was 0.38 mm per year for spruce and 0.48 mm per year for fir. The understory consists of 21 species, having a total cover percentage of only 38.

The portal aspen reference area studies were also taken adjacent to and above the disturbance areas, on the south-facing slope. Here there were 22 species with grasses contributing 86 percent of the total cover of 110 percent. Total forb productivity was 738 lbs per acre, which is somewhat more than that measured in the aspen stand along the Whisky Canyon corridor. Trees averaged a diameter increase of 0.50 mm per year, which is greatest for all trees sampled.

A summary of data for the permanent reference sites for the Mine Permit Area is ~~as follows:~~is shown in Table 321.200ff.

Sample Adequacy. In preliminary studies prior to actual sampling it was determined that approximately twenty 2 x 5 plots would be inadequate; with this number of plots a 10 percent increase in the number of plots fails to yield to a 10 percent increase in number of species. Sample size is believed adequate to reveal diversity of species along the transect.

Results of adequacy of sample and site similarity calculations are summarized in Table 321.200gg. In stands where the understory cover was very spotty such as in the dense shade of spruce, quadrat cover data were extremely variable, resulting in a calculated requirement for a prohibitively large number of quadrats. It should be noted that overstory canopy data are not

included in transect cover data; inclusion of such data would greatly diminish the variability of sample means as well as the projected required sample size.

TABLE 321.200ff
SUMMARY OF PERMANENT REFERENCE SITES

TRANSECT MAPPING NO.	LOCATION	TOTAL COVER %	NO. OF SPECIES	PROD LB/ACRE	TREES PER ACRE
1	Eccles Canyon Spruce-Fir	53	19	-	313
2	Aspen opening (nettle)	163	18	-	-
3	Eccles Canyon Aspen	97	18	389	633
4	Sagebrush	129	34	1375	-
5	Whisky Canyon Aspen	165	25	595	357
6	Whisky Canyon Spruce-Fir	57	2	-	433
7	Portal Spruce-Fir	38	21	-	288
8	Portal Aspen	110	22	738	63

TABLE 321.200gg
ADAQUACY OF SAMPLE AND SITE SIMILARITY FOR COVER ANALYSIS

TRANSECT MAPPING NO.	LOCATION AND VEGETATIVE TYPE	NO OF QUADRANTS	PROJECTED REQUIRED SAMPLE SIZE	SIMILARITY INDEX
1.	Lower Canyon, Spruce-Fir			
	Validation	20	201	
	Reference	20	339	.56
2.	Aspen Opening(nettle)			
	Validation	20	18	
	Reference	20	23	.73
3.	Lower Canyon, Aspen			
	Validation	20	18	
	Reference	20	19	.57
4.	Sagebrush			
	Validation	30	37	
	Reference	60	57	.60
5.	Whisky Canyon, Aspen			
	Validation	20	49	
	Reference	20	12	.71
6.	Whisky Canyon, Spruce-Fir			
	Validation	20	202	
	Reference	20	200	.72
7.	Portal Yard, Spruce-Fir			
		20	206	
8.	Portal Yard, Aspen			
		20	36	

Threatened and Endangered Plant Species.

Passage of the Endangered Species Act of 1973 (Public Law 23-205) provided the legal basis for establishment of lists of endangered and threatened plant species. Such lists were prepared under direction of the Smithsonian Institution, and were published subsequently in the Federal Register (40:27824-27924, 1975; and 41:24524-24572, 1976). Work on endangered and threatened plants of Utah has been reviewed by Welsh, Atwood, and Reveal (1975), and re-evaluated by Welsh (1978). More recently an illustrated manual of endangered and threatened plants of Utah was written by Welsh and Thorne (1979).

The region under investigation was included in a report on threatened and endangered species of the Central Coal Lands of Utah (Welsh, 1976).

A survey of the literature has failed to indicate the presence of any of the proposed endangered or threatened plant species in the area. This lack of critical or unique species is supported by the field surveys of the lease areas during this investigation, and during investigation of adjacent and coincident lands of the Skyline Project lease. The region was searched by walking parallel transects on a quarter-section by quarter-section basis, with each community type within each quarter-section being traversed. None of the proposed threatened or endangered species were encountered in either the lease area or in the surrounding areas.

322. FISH AND WILDLIFE INFORMATION.

322.100 THRU 322.230.

Fish and wildlife information obtained for this permit meets the requirements of the sections.

Resource information has been gathered for the area within the Mine Permit Area and for those portions of the adjacent areas where effects on the resource may be expected to occur.

The information presented is based on the regulatory authority's determination as to level of detail required and the area of study to be involved. It includes published data and site specific information gathered by the applicant and various consultants.

Fish. (Winget, 1980)

Table 322.200a summarizes the status of the streams which could possibly be impacted by the Belina Project. The only streams of importance to the fisheries as reproductive habitat are Eccles Creek and James Canyon Creek. The other streams may have an importance as sources of food organisms for the fisheries downstream but not as spawning, nursery or maintenance habitat.

James Canyon should not be impacted from this project, but its extreme upper reaches could be affected. If it becomes evident that James Canyon Creek will be impacted, this stream will at that time be inventoried and described as has been done for Eccles Creek.

The other streams mentioned in Table 322.200a are of marginal fisheries value. Since these streams will receive no surface disturbance, no further study of these streams is recommended at this time.

TABLE 322.200a
AQUATIC RESOURCE STATUS OF STREAMS.

STREAM	LENGTH (MILES)	STATUS
Eccles Creek	1.5	P,F,R
Whisky Creek	1.0	I
Slaughterhouse Creek	1.0	I
Boardinghouse Canyon Creek	2.5	P/I
Finn Canyon Creek	2.4	I
Long Canyon Creek	2.5	I
Long Canyon Creek above Eccles	2.0	P/I
Mud Creek below Eccles	4.0	P,F,R
James Canyon Creek	1.5	P,F,R

P = perennial I = intermittent
F = trout fishery R = natural fish reproduction

Eccles Creek runs along the edge of the permit area and within the adjacent area. Eccles Creek provides habitat for naturally reproducing resident populations of cutthroat trout. Scofield Reservior receives cutthroat trout recruitment stock from small feeder tributaries including Eccles Creek.

Discharges in Eccles Creek frequently go as low as less than 1 cfs during late summer, fall and winter seasons, and yearly high flows seldom exceed 36 cfs, even at the mouth. Mud Creek flows are similar to Eccles Creek in the seasonal regime, but flows are higher.

Water temperatures fluctuate greatly in Eccles and Mud Creeks because the turbulence from the rough channel coupled with low flows allows the water temperature to quickly equilibrate with existing air temperatures. During November to March the water temperature remains fairly constant between 0 and 2 degrees Centigrade. In the warmer months it is not uncommon to have a daily fluctuation of 12 to 15 degrees Centigrade, but the daily high temperature seldom exceeds 20 degrees Centigrade. Water temperatures in Mud Creek are similar to those in Eccles Creek, except maximum temperatures are probably 2 to 5 degrees Centigrade higher. The aquatic organisms of Eccles and Mud Creeks have evolved with tolerances to these natural thermal fluctuations but most are susceptible to changes beyond their natural evolutionary exposure (Lowe and Heath, 1963; Welch and Wojtalik, 1968).

Eccles Creek intersects the Black Hawk Group and Castlegate Sandstone formations. These formations are primarily sandstone with some substone, shale, and coal. Through natural erosion during runoff periods, Eccles Creek becomes quite turbid, but due to steep channel gradients and high water velocities during these periods, the fine sediments are generally carried out of the canyon rather than being deposited on coarser substrate materials. Mud Creek has a lower gradient than Eccles Creek with an expected higher level of fine sediments.

The aquatic communities, fish and macroinvertebrates, of Eccles and Mud Creeks have adapted to natural stream sediment levels, but during recent history, man controlled activities, sheep and cattle grazing, unpaved roads, mining, fires, and recreation, have resulted in some watershed degradation and erosion. This has resulted in above natural sedimentation of these streams with occasional reduction in numbers of, or elimination of, aquatic macroinvertebrates and one or more age classes of fishes.

The macroinvertebrate communities of Eccles Creek have considerable species diversity. See Tables 322.200b Thru 322.200j.

TABLE 322.200b
MACROINVERTEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR THE SOUTH FORK OF ECCLES CREEK, STATION ECSF, CARBON COUNTY, UTAH.

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	8	258	73	108
Gastropoda	--	--	22	108
Pelecypoda	--	--	11	108
Planorbidae	--	22	--	108
Oligochaeta	38	116	269	108
Turbellaria	1,501	654	1,420	108
Hydracarina	619	482	118	108
Copepoda	51	129	8	108
Ostracoda	417	745	438	108
Collembola	--	--	78	108
Ephemeroptera				
Baëtis	845	882	1,913	72
Cinygmula	958	3,796	3,548	21
Paraleptophlebia	35	43	91	24
Ephemerella	--	409	159	48
Ephemerella grandis	129	--	--	24
Ephemerella coloradensis	--	46	--	18
Ephemerella inermis	100	638	--	48
Plecoptera				
Prostoia besametsa	8	22	--	24
Zapada cinctipes	1,149	516	422	16
Taenionema	--	--	46	48
Megarcys signata	62	67	32	24
Capniidae	--	164	638	32
Skwala parallela	5	--	--	18
Chloroperlidae	30	55	59	24

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Trichoptera				
Rhyacophila	288	202	105	18
Arctopsyche	--	22	--	18
Hydropsyche	--	22	27	108
Parapsyche	16	--	32	6
Limnephilidae	--	--	19	108
Oligophlebodes	81	2,655	83	24
Neothremma	32	--	54	8
Dicosmoecous	--	3	8	24
Chyranda	3	--	--	18
Brachycentrus	5	--	8	24
Micrasema	8	--	--	24
Coleoptera				
Hydrophilidae	--	--	11	--
Elmidae	70	229	113	108
Diptera				
Tipulidae	8	--	--	72
Dicranota	27	22	35	24
Hexatoma	62	65	11	36
Holorusia grandis	24	11	11	72
Ptychopteridae	8	--	--	72
Pericoma	62	94	75	36
Simuliidae	13	51	30	108
Chironomidae	2,340	5,173	409	108
Ceratopogonidae	32	94	19	108
Euparyphus	91	92	32	108
Hemerodromia	196	--	27	108
Mean Number/m2	9,321	17,773	10,453	
Standard Dev.	7,243	10,150	4,180	
Coeff. of Var.	77.7	57.1	40.0	
Mean Dry Wt. gm/m2	2.1	1.5	1.5	
Number of Taxa	35	32	37	
H (Shannon-Weaver)	3.51	3.32	3.29	
CTQa	58	63	68	

TABLE 322.200c
MACROINVERTEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR ECCLES CREEK BELOW SOUTH FORK ECCLES, STATION EC03, CARBON COUNTY, UTAH.

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	19	--	22	108
Pelecypoda	--	43	3	108
Hirudinea	--	--	--	108

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	19	--	22	108
Oligochaeta	369	237	105	108
Turbellaria	616	118	325	108
Hydracarina	126	140	452	108
Copepoda	56	43	269	108
Ostracoda	91	11	156	108
Collembola	--	--	56	108
Ephemeroptera				
Baetis	9,870	7,693	5,485	72
Cinygmula	1,310	8,005	4,732	21
Paraleptophlebia	97	86	210	24
Ephemerella	--	1,162	231	48
Ephemerella grandis	153	11	--	24
Ephemerella coloradensis	--	22	--	18
Ephemerella doddsi	--	11	43	4
Ephemerella inermis	--	204	202	48
Ephemerella margarita	--	--	--	24
Plecoptera				
Prostoia besametsa	43	118	--	24
Zapada cinctipes	807	775	320	16
Amphinemoura	--	11	--	6
Taenionema	56	97	--	48
Megarcys signata	24	75	48	24
Capniidae	--	2,012	1,501	32
Isoperla fulva	--	--	--	48
Diura knowltoni	--	97	--	24
Chloroperlidae	11	86	14	24
Hesperoperla pacifica	--	22	--	18
Trichoptera				
Rhyacophila	487	43	89	18
Parapsyche	--	3	5	6
Oligophlebodes	11	86	43	24
Neothremma	--	43	32	8
Micrasema	483	--	75	24
Coleoptera				
Dytiscidae	--	--	3	--
Elmidae	183	97	51	108
Diptera	32	237	221	24
Dicranota	--	22	--	36
Hexatoma	5	11	--	72
Holorusia grandis	--	--	3	36
Tipula	22	3	--	72
Ptychopteridae	81	86	11	36
Pericoma	--	32	24	108
Simuliidae	2,967	1,356	1,020	108
Chironomidae	94	11	11	108
Euparyphus	30	108	19	108
Hemerodromia	51	--	19	108
Mean Number/m2	18,093	23,247	15,871	
Standard Dev.	8,455	10,395	11,841	
Coeff. of Var.	46.5	44.7	74.6	

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	19	--	22	108
Mean Dry Wt. gm/m2	4.2	3.1	1.4	
Number of Taxa	27	37	33	
H (Shannon-Weaver)	2.45	2.74	2.89	
CTQa	64	55	62	

TABLE 322.200d
MACROINVERTIEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR ECCLES CREEK BELOW SOUTH FORK ECCLES, STATION EC03, CARBON COUNTY, UTAH.

TAXA	14 APR 1980	TQ
Nematoda	14	108
Pelecypoda	--	108
Hirudinea	29	108
Oligochaeta	29	108
Turbellaria	990	108
Hydracarina	29	108
Copepoda	--	108
Ostracoda	29	108
Collembola	--	108
Ephemeroptera		
Baetis	9,081	72
Cinygumla	2,654	21
Paraleptophlebia	--	24
Ephemerella	--	48
Ephemerella grandis	--	24
Ephemerella coloradensis	--	18
Ephemerella doddsi	--	4
Ephemerella inermis	--	48
Ephemerella margarita	3,013	24
Plecoptera		
Prostoia besametsa	301	24
Zapada cinctipes	430	16
Amphinemmoura	--	6
Taenionema	43	48
Megarcys signata	118	24
Capniidae	143	32
Isoperla fulva	--	48
Diura knowltoni	--	24
Chloroperlidae	100	24
Hesperoperla pacifica	--	18

TAXA	14 APR 1980	TQ
Trichoptera		
Rhyacophila	114	18
Parapsyche	--	6
Oligophlebodes	--	24
Neothremma	--	8
Micrasema	--	24
Coleoptera		
Dytiscidae	--	--
Elmidae	43	108
Diptera		
Dicranota	--	24
Hexatoma	--	36
Holorusia grandis	--	72
Tipula	--	36
Ptychopteridae	--	72
Pericoma	--	36
Simuliidae	72	108
Chironomidae	8,838	108
Ceratopogonidae	43	108
Euparyphus	22	108
Hemerodromia	57	108
Mean Number/m2	26,251	
Standard Dev.	5,119	
Coeff. of Var.	19.5	
Mean Dry Wt. gm/m2	2.0	
Number of Taxa	23	
H (Shannon-Weaver)	2.41	
CTQa	70	

TABLE 322.200e
MACROINVERTEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR ECCLES CREEK BELOW WHISKY CREEK, STATION ECO4, CARBON COUNTY, UTAH.

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	43	54	272	108
Gastropoda	8	--	--	108
Pelecypoda	--	11	11	108
Oligochaeta	1,364	646	503	108
Turbellaria	223	65	75	108
Hydracarina	207	506	272	108
Copepoda	11	--	43	108
Ostracoda	19	75	59	108
Collembola	16	--	16	108

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Ephemeroptera				
Ameletus	8	--	--	48
Baetis	6,779	8,468	21,757	72
Cinygmula	369	3,605	2,674	21
Epeorus	16	--	--	21
Paraleptophlebia	13	--	145	24
Ephemerella	--	366	43	48
Ephemerella grandis	75	129	40	24
Ephemerella coloradensis	--	65	54	18
Ephemerella doddsi	--	22	--	4
Ephemerella inermis	22	151	38	48
Ephemerella margarita	--	--	--	24
Plecoptera				
Megarcys signata	22	--	--	24
Prostoia besametsa	301	516	54	24
Zapada cinctipes	223	990	1,943	16
Taenionema	46	291	966	48
Capniidae	--	473	2,383	32
Isoperla	--	--	8	48
Skwala parallela	--	--	5	18
Diura knowltoni	--	--	3	24
Chloroperlidae	19	--	13	24
Hesperoperla pacifica	--	22	--	18
Trichoptera				
Rhyacophila	417	420	161	18
Hydropsyche	--	108	108	108
Limnephilidae	--	43	--	108
Oligophlebodes	11	452	110	24
Neothremma	--	--	8	8
Lepidostoma	--	43	--	18
Brachycentrus	11	--	--	24
Micrasema	135	430	245	24
Diptera				
Antocha monticola	11	22	32	24
Dicranota	19	108	105	24
Hexatoma	--	22	--	36
Holorusia grandis	3	3	11	72
Ptychopteridae	22	--	--	72
Pericoma	27	22	43	36
Simuliidae	--	52	--	108
Chironomidae	861	6,553	1,614	108
Ceratopogonidae	30	22	97	108
Euparyphus	19	161	99	108
Atherix pachypus	--	--	8	24
Hemerodromia	207	172	89	108
Limnophora	--	--	19	108
Mean Number/m2	11,634	25,273	34,233	
Standard Dev.	7,222	10,619	22,842	
Coeff. of Var.	62.1	42.0	66.7	
Mean Dry Wt. gm/m2	1.2	2.3	2.2	
Number of Taxa	35	35	39	
H (Shannon-Weaver)	2.45	3.06	2.23	
CTQa	62	63	60	

TABLE 322.200f
MACROINVERTEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR ECCLES CREEK BELOW WHISKY CREEK, STATION ECO4, CARBON COUNTY, UTAH.

TAXA	14 APR 1980	TQ
Nematoda	43	108
Gastropoda	--	108
Pelecypoda	--	108
Oligochaeta	441	108
Turbellaria	151	108
Hydracarina	140	108
Copepoda	--	108
Ostracoda	11	108
Collembola	--	108
Ephemeroptera		
Ameletus	--	48
Baetis	732	72
Cinygmula	11	21
Epeorus	54	21
Paraleptophlebia	--	24
Ephemerella	--	48
Ephemerella grandis	22	24
Ephemerella coloradensis	--	18
Ephemerella doddsi	--	4
Ephemerella inermis	--	48
Ephemerella margarita	86	24
Plecoptera		
Megarcys signata	13	24
Prostoia besametsa	463	24
Zapada cinctipes	32	16
Taenionema	86	48
Capniidae	398	32
Isoperla	--	48
Skwala parallela	--	18
Diura knowltoni	--	24
Chloroperlidae	11	24
Hesperoperla pacifica	--	18
Rhyacophila	323	18
Hydropsyche	--	108
Limnephilidae	--	108
Oligophlebodes	43	24
Neothremma	--	8
Lepidostoma	--	18
Brachycentrus	97	24
Micrasema	--	24
Coleoptera		
Haliplidae	--	54
Elmidae	86	108

TAXA	14 APR 1980	TQ
Nematoda	43	108
Diptera		
Antocha monticola	--	24
Dicranota	43	24
Hexatoma	--	36
Holorusia grandis	11	72
Ptychopteridae	--	72
Pericoma	--	36
Simuliidae	--	108
Chironomidae	2,249	108
Ceratopogonidae	11	108
Euparyphus	32	108
Atherix pachypus	--	24
Hemerodromia	22	108
Limnophora	11	108
Number/m2	13,420	
Standard Dev.	11,040	
Coeff. of Var.	82.3	
Mean Dry Wt. gm/m2	2.2	
Number of Taxa	28	
H (Shannon-Weaver)	2.30	
CTQa	61	

TABLE 322.200g
MACROINVERTEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR ECCLES CREEK AT MOUTH, STATION ECO5, CARBON COUNTY, UTAH.

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	43	--	51	108
Pelecypoda	--	--	--	108
Oligochaeta	143	126	597	108
Turbellaria		--	16	108
Hydracarina	202	75	188	108
Ostracoda	--		16	108
Collembola	--		51	108
Ephemeroptera				
Baetis	5,942	51	656	72
Cinygmula	81	116	67	21
Epeorus	30	--	8	21
Paraleptophlebia	22	--	8	24
Ephemerella	--	--	11	48
Ephemerella grandis	43	--	24	24
Ephemerella inermis	51	--	--	48
Ephemerella margarita	--	--	--	24

TAXA	11 MAY 1979	23 AUG 1979	02 OCT 1979	TQ
Nematoda	43	--	51	108
Odonata				
Argia	--	--	5	108
Plecoptera				
Malenka	22	--	--	36
Prostoia besametsa	4,842	--	--	24
Zapada cinctipes	186	167	1,560	16
Taenionema	--	8	--	48
Megarcys signata	13	--	--	24
Capniidae	--	54	40	32
Isoperla	11	--	30	48
Skwala parallela	18	--	--	18
Chloroperlidae	19	24	22	24
Trichoptera				
Rhyacophila	291	30	183	18
Hydropsyche	67	62	673	108
Cheumatopsyche	--	--	--	108
Limnephilidae	--	8	35	108
Hesperophylax	8	--	--	108
Brachycentrus	148	--	352	24
Micrasema	--	--	11	24
Coleoptera				
Elmidae	11	11	67	108
Diptera				
Antocha monticola	--	--	27	24
Dicranota	56	--	8	24
Hexatoma	8	8	8	36
Holorusia grandis	13	--	8	72
Tipula	--	8	--	36
Eriocera	--	--	--	72
Pericoma	16	15	36	108
Simuliidae	--	--	56	108
Chironomidae	5,958	1,385	9,130	108
Ceratopogonidae	30	105	56	108
Stratiomyidae	--	--	--	108
Euparyphus	--	--	--	108
Hemerodromia	398	247	382	
Mean Number/m2	18,661	2,526	14,308	
Standard Dev.	12,773	1,06	6,806	
Coeff. of Var.	68.4	42.2	47.6	
Mean Dry Wt. gm/m2	4.5	0.6	3.5	
Number of Taxa	28	18	32	
H (Shannon-Weaver)	2.28	2.59	2.15	
CTQa	65			

TABLE 322.200h
MACROINVERTEBRATE COMMUNITY DATA AS MEAN NUMBER/m2 FOR ECCLES CREEK AT MOUTH, STATION EC05, CARBON COUNTY, UTAH.

TAXA	14 APR 1980	TQ
Nematoda	22	108
Pelecypoda	3	108
Oligochaeta	420	108
Turbellaria	118	108
Hydracarina	420	108
Ostracoda	22	108
Collembola	--	108
Ephemeroptera		
Baetis	1,818	72
Cinygmula	22	21
Epeorus	--	21
Paraleptophlebia	--	24
Ephemerella	--	48
Ephemerella grandis	--	24
Ephemerella inermis	11	48
Ephemerella margarita	11	24
Odonata		
Argia	--	108
Plecoptera		
Malenka	--	36
Prostoia besametsa	3,110	24
Zapada cinctipes	--	16
Taenionema	--	48
Megarcys signata	3	24
Capniidae	--	32
Isoperla	--	48
Skwala parallela	--	18
Chloroperlidae	5	24
Trichoptera		
Rhyacophila	32	18
Hydropsyche	22	108
Cheumatopsyche	43	108
Limnephilidae	--	108
Hesperophylax	56	108
Brachycentrus	97	24
Micrasema	--	24
Coleoptera		
Elmidae	22	108

TAXA	14 APR 1980	TQ
Nematoda	22	108
Diptera		
Antocha monticola	11	24
Dicranota	65	24
Hexatoma	--	36
Holorusia grandis	8	72
Tipula	--	36
Eriocera	43	72
Pericoma	--	36
Simuliidae	--	108
Chironomidae	5,757	108
Ceratopogonidae	11	108
Stratiomyidae	3	108
Euparyphus	22	108
Hemerodromia	387	108
Mean Number/m2	12,560	
Standard Dev.	3,906	
Coeff. of Var.	31.1	
Mean Dry Wt. gm/m2	3.7	
Number of Taxa	28	
H (Shannon-Weaver)	2.32	
CTQa		

TABLE 322.200i
MACROINVERTEBRATE COMMUNITY DESCRIPTION AS MEAN NUMBER/m2 FOR MUD CREEK 100m ABOVE ECCLES CREEK, STATION MC02, CARBON COUNTY, UTAH.

TAXA	11 MAY 1979	23 AUG 1979	TQ
Nematoda	--	22	108
Oligochaeta	215	140	108
Hydracarina	382	2,130	108
Copepoda	--	22	108
Ostracoda	54	54	108
Collembola	--	33	108
Ephemeroptera			
Baetis	1,837	15,247	72
Heptagenia	--	113	48
Paraleptophlebia	40	--	24
Ephemerella	--	54	48
Ephemerella grandis	19	124	24
Ephemerella inermis	1,033	22	48

TAXA	11 MAY 1979	23 AUG 1979	TQ
Nematoda	--	22	108
Plecoptera			
Prostoia besametsa	11	--	24
Capniidae	--	16	32
Pteronarcella badia	8	5	24
Isoperla	--	43	48
Isoperla fulva	19	--	48
Trichoptera			
Rhyacophila	8	3	18
Hydropsyche	382	570	108
Arctopsyche	24	2,927	18
Stactobiella	--	32	108
Limnephilidae	--	167	72
Brachycentrus americanus	210	11	24
Coleoptera			
Elmidae	1,044	2,233	108
Diptera			
Tipulidae	--	527	72
Antocha monticola	83	--	24
Dicranota	124	22	24
Holorusia grandis	19	22	72
Eriocera	89	103	36
Simuliidae	11	301	108
Chironomidae	23,457	1,840	108
Ceratopogonidae	22	135	108
Stratiomyidae	11	27	108
Hemerodromia	78	75	108
Mean Number/m2	29,178	27,016	
Standard Dev.	14,485	4,546	
Coeff. of Var.	50	17	
Mean Dry Wt. gm/m2	8.29	6.46	
Number of Taxa	24	30	
H (Shannon-Weaver)	1.306	2.354	
CTQa		70	

TABLE 322.200j
MACROINVERTEBRATE COMMUNITY DESCRIPTION AS MEAN NUMBER/m2 FOR MUD CREEK 2 km BELOW ECCLES CREEK, STATION MC01, CARBON COUNTY, UTAH.

TAXA	11 MAY 1976	11 MAY 1979	23 AUG 1979	TQ
Nematoda	--	8	54	108
Oligochaeta	22	48	65	108
Hydracarina	323	30	751	108
Copepoda	--	--	22	108

TAXA	11 MAY 1976	11 MAY 1979	23 AUG 1979	TQ
Nematoda	--	8	54	108
Ostracoda	32	--	--	108
Collembola	151	8	--	108
Ephemeroptera				
Ameletus	11	--	--	48
Baetis	7,532	1,028	6,800	72
Cinygmula	2,733	30	108	21
Ephemerella grandis	--	24	32	24
Ephemerella doddsi	43	--	--	18
Ephemerella coloradensis	581	--	--	4
Ephemerella inermis	--	65	--	48
Plecoptera		43		--
Malenka	--	--	22	36
Prostoia besametsa	--	22	--	24
Zapada cinctipes	1,076	22	--	16
Capniidae	22	--	22	32
Pteronarcella badia	--	32	43	24
Perlodidae	11	--	22	48
Megarcys signata	11	--	--	24
Diura knowltoni	--	8	--	24
Chloroperlidae	65	22	43	24
Hemiptera				
Ambrysus mormon	11	--	--	72
Trichoptera				
Rhyacophila	129	8	3	18
Agapetus	11	--	--	32
Hydropsyche	11	38	818	108
Arctopsyche	--	--	65	18
Parapsyche	22	--	--	6
Dicosmoecous	--	--	3	24
Hesperophylax	11	8	--	108
Oligophlebodes	301	--	3	24
Brachycentrus	11	13	43	24
americanus	--	8	--	24
Micrasema				
Coleoptera				
Dytiscidae	--	--	3	72
Elmidae	--	204	204	108
Diptera				
Dicranota	--	--	22	24
Holorusia grandis	11	--	--	72
Eriocera	--	8	129	36
Bittacamorpha clavipes	--	3	--	72
Pericoma	151	--	--	36
Simuliidae	22	--	140	108
Chironomidae	3,572	678	872	108
Ceratopogonidae	22	16	43	108
Stratiomyidae	--	--	11	108
Hemerodromia	54	22	86	108
Muscidae	--	--	--	108
Mean Number/m2	16,995	2,176	10,416	
Standard Dev.	--	887	4,457	
Coeff. of Var.	--	41	43	
Mean Dry Wt. gm/m2	--	1.08	1.90	

TAXA	11 MAY 1976	11 MAY 1979	23 AUG 1979	TQ
Nematoda	--	8	54	108
Number of Taxa	29	23	28	
H (Shannon-Weaver)	2.461	2.406	2.103	
CTQa	58	68		

Representatives include all trophic levels: algal scrapers-Baetis and Cinygmula mayflies; shredders-Zapada, Capniidae and Taenionema stoneflies; collectors-Ephemerella gradis and E. inermis mayflies; filter feeders-Macrasema and Hydropsyche caddisflies and Simuliidae black flies; and predators-Megarcys, Isoperla and Chloroperlidae stone flies, and Rhyacophila caddisflies. The large number of Ephemeroptera, Plecoptera and Trichoptera taxa are evidence of the high quality of the water in Eccles Creek.

Water quality of Eccles Creek is excellent for most uses. Eccles Creek is adquate nitrate nitrogen for good algal growth most of the year, but phosphate levels are generally low. Scofield Reservior has periodic nuisance level algal blooms. Nutrient inputs form recreation, cattle and sheep, and domestic sources are frequently high enough to bring the total nutrient input of Scofield Reservior to excessive levels (Southeastern Utah Association of Governments, 1976). According to survey results, Eccles Creek to date has not had excessive nutrient levels, and thus contributes only slightly to the algal blooms in Scofield Reservior.

Macroinvertebrate Communities

Eccles Creek - 1979

The samples of macroinvertebrates from Eccles Creek during May, June, August, and October, 1979, contained numerous taxa Tables 322.200b, 322.200c, 322.200e, and 322.200g. Included in the communities were fragile forms found only in high quality waters-Cinygmula, Epeorus, and Paraleptophlebia mayflies; Zapada, Megarcys, Skwala, Diura, and Chloroperlid stoneflies; Rhyacophila, arctopsyche, Parapsyche, Neothremma, Oligophlebodes,Brachycentrus and Micrasema caddisflies; and Antocha, Dicranota, and Pericoma flies. The majority of taxa collected are tolerant to moderate sedimentation loads, typical of small streams in Utah that are subject to low flows, shale and sandstone formations and grazing impacts.

In 1979 several taxa exhibited an evident response to the land slough along the turn-off road to the Belina Mines. The result of the slough has been an increased sediment load in Eccles Creek below the slough. Most of the stream substrates had a visible covering of fine sediments in August, 1979, during the fish stocking surveys. Twenty-four taxa, through reduced number or absence from samples at Station EC05, as compared with upstream stations showed an impact from these sediments.
Included were: copepod and ostracod zooplankton; turbellarian worms; Baetis, Cinygmula, Paraleptophlebia, Ephemerella grandis and E. coloradensis mayflies; Zapada, Taenionema, Prostoia, Megarcys and capniid stoneflies; Oligophlebodes and Micrasema caddisflies; elmid riffle beetles; and Dicranota, Holorusia, and simuliid and stratiomyid flies Tables 322.200c, 322.200e,

and 322.200g. Seven taxa at Station EC04 showed similar responses as at EC05 although the changes were not as severe. Aquatic macroinvertebrates are active drifters, being carried downstream by the stream currents. This helps account for the continued diversity at Station EC04 in 1979 Table 322.200e.

Samples taken from Station EC04 and EC05 in May, 1979, Tables 322.200e and 322.200g were before the major emergence period when the macroinvertebrate larvae were nearly all late instar (large) larvae. The larger larvae can tolerate more sedimentation than smaller or earlier instar larvae. This helps explain the relatively small community change in May, 1979, below the land slough. By the August, 1979, the adult stage, mated, laid eggs and died. The small early instar larvae resulting from the hatch of eggs entered a harsh environment due to the presence of increased fine sediment levels. These small larvae, being unable to tolerate the levels of sediments, were eliminated resulting in the more drastic community change in August, 1979, compared to May, 1979 Tables 322.200e and 322.200g.

A new macroinvertebrate community evaluation tool (community tolerance quotient, CTQa) developed by Winget and Mangum, 1979, shows a change in species composition at Stations EC04 and EC05. The CTQa is the arithmetic mean of the tolerance quotients (TQ) of the actual taxa of macroinvertebrates sampled from the stream station on the given date. The tolerance quotient is a value assigned each taxon based upon its tolerance and selectivity for various substrate materials, stream gradients, levels of alkalinity and sulfate concentrations. TQ's range from 2 (very fragile, narrow tolerance limits) to 108 (wide tolerance limits for all 4 parameters).

In 1979 the macroinvertebrates of lower Eccles Creek, especially at Station EC05, showed a trend towards a more tolerant, less diverse macroinvertebrate community (CTQa increased to 67, number of taxa dropped to only 18 and number per square meter dropped to only 2,526). Stream substrates were covered with fine silts which probably caused the reduced fish spawn success and macroinvertebrate community condition. Stabilization of the hillside at Whisky Canyon and completion of the culverts and sedimentation pond upstream will eliminate future sedimentation from those sources.

Eccles Creek - 1980

Eccles Creek stations were sampled 3 times in 1980. The results of the Spring set of samples are contained in this report Tables 322.200d, 322.200f, and 322.200h. As in 1979 the sample data in 1980 from Station EC05, compared with 1979 EC05 data and 1979 and 1980 EC04 data, showed a degradation in community condition Table 322.200e, 322.200f, 322.200g, and 322.200h: reduced numbers and weight per square meter and increased CTQa to 70 from 57-67 in 1979. Changes in community structure at EC05 were similar to those discussed for 1979, only more severe indicating suspected degradation trends appears a reality in the lower reaches of Eccles Creek.

Station EC04 in April, 1980, showed a reduction in number of taxa compared with May, 1979, Tables 322.100e and 322.200f but the change did not show up in a change in community tolerance (CTQa). There may yet be a change in species composition occuring at Station EC04. The summer and fall, 1980, samples should help clear this up. Evidence indicates several important taxa are under stess and may perhaps be eliminated if the stress continues for a long period of time or increases in severity-reduction in number of Baetis, Cinygmula, E. grabis,

Zapada, and Micrasema. Associated with the drop in density of the aforementioned taxa was an obvious increase in chironomid midges and capniid stoneflies (a burrowing, sediment tolerant taxom).

There appears to be a trend in the Eccles Creek macroinvertebrate communities towards a more tolerant assemblage of species.

Mud Creek, 1976 and 1979

Table 322.200i gives a summary of the results of the 1979 macroinvertebrate samples taken from Station MC02, above the mouth on Eccles Creek. There was little change in actual community structure other than the natural seasonal changes due to emergence and egg hatch. The community is in fair condition, especially considering the periodic low flows occuring in Mud Creek above the confluence with Eccles Creek.

Table 322.200j contains a data summary for samples taken from Station MC01, 2 Km below the confluence with Eccles Creek. In 1976 29 taxa were collected compared with only 23 in 1979. Population density in 1976 was 16,995 per square meter compared with only 2,176 in 1979. The CTQa was 58 in 1976 and 62 in 1979, a small change by itself but significant when compared with the othercommunity descriptors.

There appears to have been some significant impacts on the community between May, 1976, and May, 1979. Of special interest is the presence of Arctopsyche caddisflies above Eccles Creek and the obvious lack of them below. Arctopsyche is found only in high quality streams.

Substrate Composition

Eccles Creek-1979

Sediments of Eccles Creek at certain locations may at times not be suitable for trout spawning. Sediment composition of potential gravel spawning beds is shown in Table 322.200k.

There was more gravel and less fine sand in upper Eccles Creek, station EC02, than at either of the lower stations EC04 or EC05. The levels of silt and clay were the same at all stations. Fine sand is the first fraction of suspended sediments to settle as stream gradients are reduced. It is not surprising to see deposition of fine sands at stations below the Whisky Canyon hillside land slough since these stations have sections of reduced gradient with reduced water velocities.

During the fish shocking survey conducted August 20-21, 1979, numerous young-of-the-year (y-o-y) cutthroat trout were observed from Whisky Creek upstream to the forest boundary but y-o-y trout were not seen below Whisky Creek. They may have been present below Whisky Creek and just not observed, but the substrates below were covered with a heavier layer of fine sediments than was seen above. This may have caused a reduced cutthroat reproductive success below Whisky Creek.

TABLE 322.200k
SEDIMENT COMPOSITION OF POTENTIAL GRAVEL SPAWNING BEDS

PARTICLE SIZE	EC02	EC04	EC05	MC02	MC01
Gravel >4.75 mm	73.6	70.8	70.6	71.9	71.6
Coarse Sand 2.0-4.75 mm	8.7	8.5	9.2	7.3	9.0
Medium Sand 0.50-1.99 mm	5.5	5.2	6.1	7.6	5.8
Fine Sand 0.074-0.49 mm	12.0	15.3	13.9	12.9	13.2
Silt/Clay <0.074 mm	0.2	0.2	0.2	0.3	0.4
Fines <0.850 mm	13.5	16.9	15.8	15.7	15.2

NOTE: Sediment composition based on percent by weight for five size classes at five stations (1) EC02, Eccles Creek above South Fork; (2) EC04, Eccles Creek below Whisky Creek; (3) EC05, Eccles Creek at the mouth; (4) MC02, Mud Creek above Eccles Creek; and (5) MC01, Mud Creek below Eccles Creek. Samples taken 24 August 1979

Mud Creek-1979

Table 322.200k presents the analysis of one set of sediment samples taken on August 24, 1979, at two stations on Mud Creek. Sediment composition was nearly identical at both stations. The percent fines (less than 0.850 mm in diameter) was 15.7 and 15.2, above and below Eccles Creek, respectively. These values indicate gravels may be suitable for trout spawning but level of fines is close to the limiting level, using 15% as maximum acceptable level.

Table 322.2001 contains a summary of stream substrate composition at three stations on Eccles Creek. Substrates are divided as percent stream bottom cover for six classes of materials. Determinations are occular estimates made on site.

TABLE 322.2001
SUBSTRATE COMPOSITION OF ECCLES CREEK LISTED AS PERCENT COVER. SURVEYED 11 JUNE L979. STATION LOCATIONS SHOWN IN TABLE 322.200a.

SUBSTRATE TYPE, DIAMETER	STATION		
	EC02	EC04	EC05
Boulder >31 cm	0	5	5
Lg. Rubble 15.1-31 cm	20	20	15
Sm. Rubble 7.7-15.0 cm	30	25	20
Lg. Gravel 2.6-7.6 cm	20	15	15
Sm. Gravel 0.5-2.54 cm	20	15	20
Sand/Silt <0.5 cm	10	20	25

Mud Creek-1980

Sedimentation impacts from Eccles Creek have appeared to be greater in 1980 than during previous years. Two sets of sediment samples have been taken from Mud Creek in 1980, one in August and one in September. The resultant data should help determine the cumulative affect from these sediments on the substrates of Mud Creek.

Stream channel

Eccles Creek

Channel gradient is listed as a decimal of the number of vertical feet drop per linear feet of stream length. Tortuosity is the actual stream length between two points divided by the shortest distance between the same two points. Table 322.200i gives gradient and tortuosity value for 4 stream reaches.

Upper forks of Eccles Creek, from approximately the forest boundary upstream, are typically steep (over 10% gradient), narrow, low tortuosity streams Table 322c. The potential for supporting a trout fishery is almost nil due to summer/fall/winter low flows.

TABLE 322.200m
STREAM CHANNEL CHARACTERISTICS OF ECCLES CREEK AS MEASURED JUNE 11, 1979, AT EC02 AND EC05.

CHANNEL CHARACTERISTIC	ECO2	ECO5
Channel gradient	0.04	0.03
Channel Tortuosity	1.22	1.40
Mean width at flow	2.8 ft. @ 3.5 cfs	3.6 ft. @ 6.3 cfs
Mean depth at flow	0.51 ft. @ 3.5 cfs	0.62ft @ 6.3 cfs
Tall bank mean width	37.0 ft.	26.2 ft.
Riffle: Pool ratio	3:2	3:2
Mean bank stability	90%	85%
Bank vegetation in order of dominance	grasses shrubs evergreens dec. trees	grasses evergreens shrubs dec. trees

From the forest boundary downstream the stream has lower gradients plus areas of increased tortousity. This allows formation of higher quality pools that are essential to fish survival during the low flow periods and unusually high runoffs. Channel width ranges from 20 to 55 feet with the watered width being limited to 2 to 5 feet most of the year. Water depths seldom exceed 1 foot except in infrequent deep pools which have maximum depths of 3 feet. Mean depth at

EC02 was 0.51 feet and 3.5 cfs and at EC05 mean depth was 0.62 feet at 6.3 cfs. Yearly flows are considerably less than these which were measured June 11, 1979.

Stream banks are steep along most of the canyon. Except for localized problems, the banks are stable with established dense riparian vegetation. The stream channel, through bank erosion has lost some of its previous meanders in one canyon section between Whisky Creek and South Fork. Active beaver activity has resulted in some high beaver dam structures immediatley above Whisky Creek that have become silted in upstream and caused downstream vertical drops of up to 5 feet which is too high for fish passage upstream. This has isolated the fish above Whisky Creek by preventing upstream migration, indicating a self sustaining population of cutthroat trout in this short upper Eccles Creek reach.

Mud Creek

From the mouth of Eccles Creek downstream, Mud Creek is mostly a willow-lined meandering valley stream. Cattle grazing is common along the stream but stream banks are mostly stable with fairly good vegetative cover. There are isolated areas with exposed banks and sedimentation problems. The habitat at stations MC02, 100 meters above Eccles Creek, and MC01, 2 kilometers downstream, will be evaluated and described in September/October, 1980. It appears that Mud Creek is more water limited than habitat limited for a fisheries development.

Fisheries

Eccles Creek

Eccles Creek is classified by Utah Division of Wildlife Resources as a Class III Stream with natural reproduction. It is categorized no higher than a Class III stream because of the small size and inability to support a quality fishery under moderate fishing pressures without stocking of additional fish. Fish surveys by Utah Division of Wildlife Resources in 1968, 1971, 1977, and 1979 all found cutthroat trout resulting from in-stream reproduction as there has been no stocking of trout in the stream since 1967. Fish are mostly small in size. The size distribution of fish measured at one station on August 25, 1971, was: 0-3.5", 21 fish; 3.5-4.5", 15 fish; 4.5-6.5", 18 fish; 6.5-8.5", 3 fish. Similar size distributions were observed during 1977 and 1979. A summary of "Age-Growth of Cutthroat Trout Taken in Eccles Creek from Two Sections" appears in Table 322.200n UDWR field collections records, August 25, 1971).

Eccles Creek habitat and fisheries resources as measured by UDWR personnel on August 25, 1971, are summarized in Tables 322.200o and 322.200p. On August 20-21, 1979, UDWR personnel surveyed Eccles Creek to determine: 1) number of cutthroat trout compared to previous surveys; 2) reproductive success; and 3) range of fish in the drainage.

TABLE 322.200n
AGE-GROWTH OF CUTTHROAT TROUT TAKEN IN ECCLES CREEK FROM TWO SECTIONS (UDWR FIELD RECORDS, 8/25/71).

AGE CLASS	MEAN SIZE (mm)	RANGE (mm)	MEAN WEIGHT (gms)	RANGE (gms)	NO.	%
0	56	45-67	7.5	5-10	2	3
1	118	78-175	27.3	10-60	68	79
2	198	180-228	95.0	75-125	15	17
3	257		170.0		1	1
				Total	86	100

Comments:
1. Possibly some 1+ are 2+ fish 2. 0+ age class were not recovered due to size 3. No non-game species were collected

TABLE 322.200o
STREAM SURVEY OF ECCLES CREEK 1 1/2 MILES ABOVE THE CONFLUENCE WITH MUD CREEK, 25 AUGUST 1971.

UTAH STATE DIVISION OF FISH AND GAME

Date: August 25, 1971 Collection No: 1-2-1 Investigator:
Catalog No. II.K.20.b(4) Stream: Eccles Creek
Tributary to: Mud Creek Drainage: Green River
Report no. 1 of 2 reports
Location of station: 1-1/2 miles up from confluence of Mud Creek
Length of Station: 528′ Elevation of Station: 8100′

Temperature	Discharge	Bottom Type
Time: 2:00 P.M.	Velocity fps: 1.8	Boulders: 0%
Air: 62	Volume cfs: 3.6	Rubble 33%
Water: 54	Maximum: No record	Gravel 48%
Time:	Date:	Sand 0%
Air	Minimum	Silt 19%
Water	Date: No record	^Other %

Average Channel: 6.6
Average width of stream 5.8 ft. Area of station: 3062.4 sq. ft.
Pools: No. per 1/10 mile 10 Ave. (w) 6.9′ Ave. (1) 8.3 Ave (d) 1.34
Bank cover composition: Willow (Ab) Grass (Ab) Sedge (c) Equisetum (S)
% bank stabilization: RB 88% LB 76% stream shaded: RB 34% LB 43%
Pollution (types, sources, amounts, etc.) None

	Aquatic	
Turbidity: None	Vegetation: Good	Bottom fauna: Good
pH 8.2	Absent:	Absent
Phenol Alk.	Sparse X	Common: X
D.O 8.0	Abundant	Abundant
CO.2 3.4	Major Types:	Major Types: Trichoptera (c)
	Fil Green Algae	Tendipedidae(s)
		Coleoptera (Sp)
		Ephemeroptera (c)

Remarks: Pools: Cover = 59%, Rating = B-. Pools are good in this area with sufficient cover. Spawning habitat and food are suitable. Volume of water is the only limiting factor.

TABLE 322.200p
STREAM SURVEY OF ECCLES CREEK 0.3 MILES ABOVE THE CONFLUENCE WITH MUD CREEK, 25 AUGUST 1971.

UTAH STATE DIVISION OF FISH AND GAME		
Date: August 25, 1971	Collection No: 1-2-1	Investigator:
Catalog No. II.K.20.b(4)		Stream: Eccles Creek
Tributary to: Mud Creek		Drainage: Green River
Report no. 2 of 2 reports		
Location of station: 0.3 miles up from confluence of Mud Creek		
Length of Station: 528′		Elevation of Station: 8100′
Temperature	Discharge	Bottom Type
Time: 3:30 P.M.	Velocity fps: 1.8	Boulders: 0%
Air: 65 F	Volume cfs: 3.6	Rubble 33%
Water: 54 F	Maximum: No record	Gravel 48%
Time:	Date:	Sand 0%
Air	Minimum	Silt 19%
Water	Date: No record	^Other %
Average Channel: 6.6		
Average width of stream 5.8 ft.	Area of station: 3062.4 sq. ft.	
Pools: No. per 1/10 mile 20 Ave. (w) 7.5′ Ave. (1) 10 Ave (d) .07		
Bank cover composition: Grass (Ab) Sedge (c) Equisetum (S)		
% bank stabilization: RB 74% LB 80%		stream shaded: RB 34% LB 43%
Pollution (types, sources, amounts, etc.) None		
Turbidity: None	Aquatic Vegetation: Good	Bottom fauna: Good
pH 8.2	Absent:	Absent
Phenol Alk.	Sparse X	Common: X
D.O 8.0	Abundant	Abundant
CO.2 3.4 (a)	Major Types:	Major Types: Epheneroptera (c)
	Fil Green Algae	Tendipedidae(s)
		Coleoptera (Sp)
		Trichoptera (c)
		Simuliidae (c)
		Plecop (s)

Remarks: Pools: Cover = 15%, Rating = C. Pools are lacking in this segment and the ones that are there do not appear very good. This area is good for spawning and excellent in food,

Cutthroat trout in August, 1979, were found at EC05 and EC03 in similar densities as during previous surveys. Size distributions were also similar indicating continuing reproductive success of cutthroat trout in Eccles Creek.

In the area of the coal handling facilities near the mouth of the canyon, cutthroat trout are present, are reproducing, and are dependent upon being able to traverse the stream channel upstream to spawn and downstream to gain access to Scofield Reservior. Mr. John Livesay, of the Price Office, UDWR reported (personal communication) that in Scofield Reservior, approximately 25% of the fish sampled in 1979 were cutthroat trout, although all fish plants since poisoning in 1977 have been rainbow trout. The likely source of cutthroat trout in Scofield

Reservior would be the 3-6 small tributary streams, like Eccles Creek, that have naturally reproducing populations.

Mud Creek

Mud Creek, from Eccles Creek downstream, has been under agricultural use and coal handling impacts for many years. Stream banks are approximately 60% stable with riparian vegetation consisting mostly of willows. Substrates are mostly cleaned of fine materials each spring but by fall sediment build-up is apparent in low-gradient stream reaches.

Cutthroat trout apparently migrate from Scofield Reservior, up Mud Creek to Eccles Creek during the yearly spawning runs. It is not known if these trout spawn in Mud Creek, but the present opinion is that Mud Creek is more important as a migratory route and as a source of food for the reservior fishes than as spawning habitat.

Birds (White, 1980)

Ornithological investigations have been accomplished over several time periods in the Scofield coal mining region. Specifically, these periods have been: December 1, April 7-8, April 25-26, May 17-18, June 13-14, and July 26-29. During these periods a record has been maintained on threatened or endangered species, raptors seen and nests located, occurrences of species of high Federal interest, and migratory birds in general. The obvious time period where observations are missing are during the major autumn migration periods, September through October. This may represent a critical block of time. For example, the peak of raptor migration, as seen along the Wasatch Front 60 miles north of Scofield, revealed a total of 308 migration raptors recorded between September 9 and October 4 with the peak around mid to late September (Mosher, et al, 1978). Prior to the drawing of any final conclusions, that autumn time period will be examined. The nature of the raptor fauna correlated with the earlier findings (Jones, 1979) on the Manti-LaSal National Forest to the south of the Scofield area.

Materials and Methods

The survey method consisted entirely of visual observations. A one kilometer strip along Whisky Canyon and Eccles Canyon, mine portals and other disturbance areas were walked. All birds were noted and old nests were marked where appropriate on USGS topographic maps.

Raptor Surveys

No particularly unique nor innovative methods are used to survey for raptors except when examining cliffs for nests. There one must look at each specific ledge or pothole for the presence of fecal "whitewash" matter. The one kilometer area was systematically walked and likely nesting areas were thoroughly searched or otherwise examined with binoculars. Several hours were spent sitting quitely at selected locations listening for courtship or other calls of accipiter or buteo. Regions where several hours of careful observation and listening were spent were the confluences of Whisky and Eccles Canyon and around the mine portals.

Species of High Federal Interest

Any habitat peculiar to the three woodpeckers and one bluebird of high Federal interest was given special attention. Habitat characteristics of these species are generally lacking in the Valley Camp of Utah, Inc. area. The elevation is generally either too high or of a different floral type.

RESULTS

Raptors

In addition to the Bald Eagle that migrates near Scofield, but which we did not record, we found nine species of diurnal raptors and one owl. Two active nests were found in Eccles Canyon, one of the Goshawk and one of the Cooper's Hawk. The Cooper's Hawk is also aspecies of high Federal interest. These two species can generally tolerate considerable human impact (Hennessy, 1978). The Golden Eagle was seen on every survey period, but no active nest was found. It is also a species of high Federal interest.

Rare and Endangered Species

The Bald Eagle is seen in migration in the Scofield area, but none has been recorded within the one kilometer around the disturbed area. The Peregrine Falcon has been seen once during the winter of 1976 (L. Dalton, personal communication) but its occurrence there must be considered rare. It did not nest, as far as is known, within 25 miles of the Mine Permit Area.

Species of High Federal Interest

The three woodpecker species that have been identified for special attention, Williamson's Sapsucker, Lewis' Woodpecker, and Pileated Woodpecker, have not been observed within the mine permit area to date. These three species present special problems with regard to Eccles Canyon. The habitat within the canyon along the mine route is more typical of Yellow-bellied Sapsucker habitat than the coniferous forest type more typically used by Williamson's Sapsucker. Although Lewis' Woodpecker may occur in Eccles Canyon during migration, it normally breeds in riparian cottonwood or yellow pine stands or habitat not typical of Eccles Canyon. The Pileated Woodpecker usually occurs in mature hardwood or conifer stands and may occur anywhere in Utah although it is certainly of sporadic and rare occurrence (Behle and Perry, 1975).

The Western Bluebird is normally a species of yellow pine forests in Utah and may be common where it does occur. It appears, however,to have limited distribution and none have been identified to date in the Eccles Canyon area although it occurs further south.

The Prairie Falcon has not been seen in the immediate vicinity of the mining property nor are there records for this location (L. Dalton, personal communication).

Migratory Non-Game Species

To date 49 species have been identified from our surveys. All are common species typical of the area. Twenty-five of the species were passerines and four were woodpeckers.

The information that follows concerning Amphibians, Reptiles, and Mammals has been obtained from the State of Utah, Division of Wildlife Resources, Southeastern Regional Office, Price, Utah.

Amphibians

Six species of amphibians, all of which are protected, are known to inhabit the area in which the Mine Permit Area is located. It is probable that all of these species inhabit the project area. Only the Tiger Salamander has been determined to be of high interest to the State of Utah.

The Tiger Salamander is a yearlong resident of the project area. The substantial value use area for the adult form is represented by any moist underground site or any similar habitat such as inside rotten logs, cellars, or animal burrows. Such sites can be found within any wildlife habitat extending from the cold desert through the submontane and into the montane ecological association. The larval form, often referred to as a Mud-Puppy, is a gilled animal that must remain in water within the above described ecological associations. It is interesting to note that the larva may fail to transform into an adult, even after the second season, and it can breed in the larva condition.

Once the larva is transformed into the adult form the animal is primarily terrestrial. Salamanders do migrate to water in the spring for breeding and may remain there during much of the summer. Such an intensive use area would be ranked as being of high-priority value to the animal. In September the newly transformed animals leave the water to find suitable places to spend the winter.

The Tiger Salamander breeds from March through June and is sexually mature after one year. The male deposits a small tent-shaped structure containing a myriad of sperm on the pool bottom. During courtship the female picks up this structure in her cloaca. The eggs are then fertilized internally before or just at the time they are laid. The eggs, singly or in small clusters, adhere to submerged vegetation. After 10 to 12 days the eggs hatch. A critical period for maintenance of the population is when breeding salamanders eggs, or larve are inhabiting a water.

Post-embryonic development of salamander larva progresses at a pace somewhat controlled by water temperature. In some cold waters the larva may not transform into an adult and drying up of a pool may hasten the transformation.

Migration to or from water usually occurs at night, during or just after a rain storm. When inhabiting terrestrial sites the Tiger Salamander is most active at night, particularly on rainy nights from March through September.

Larva, when small feed on aquatic invertebrates and become predacious to the point of cannibalism when they are larger. Food items for adults include insects, earthworms, and occasionally small vertebrates.

No amphibians have abundances that are so low as to have caused the animal to be federally listed as a threatened or endangered species.

Reptiles

Eighteen species of reptiles, all of which are protected, are known to inhabit the area in which the Mine Permit Area is located. It is probable that 16 of these species inhabit the project area. Only two species of the reptiles inhabiting the project area have been determined to be of high interest to the State of Utah.

The Utah Milk Snake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the cold deseret through the submontane and into the montane ecological associations. Although its use area spans a multitude of habitats, the animal is extremely secretive, mostly nocturnal and is often found inside or under rotten logs, stumps, boards, rocks, or within other hiding places. At night they can be found in the open where they hunt for small rodents, lizards, and other small snakes. Occasionally, the Milk Snake will take small birds or bird eggs.

The Milk Snake may live beyond 20 years and it becomes sexually mature during its third spring season. After mating, which occurs during spring or early summer when they are leaving the den, female milk snakes produce clutches which average 7 eggs. The eggs are secreted in a moist warm environment and then abandoned. Incubation last 65 to 85 days. The site where an individual snake has deposited its clutch of eggs is of critical value to maintenance of the species.

The Utah Mountain Kingsnake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the submontane into the montane ecological association. Little is known concerning this animal except that it frequents areas of dense vegetation and that it is often found near water. Its life history and food habits parallel that described for the Utah Milk Snake.

To date snake dens, which are protected and of critical value to snake populations, have not been identified on or adjacent to the project area. If a den is discovered it will be reported to UDWR.

No reptiles have relative abundances that are so low as to have caused the animal to be federally listed as a threatened or endangered species.

Mammals

Eighty-four species of mammals, of which 27% are protected, are known to inhabit the project area. It is probable that 54 of these species inhabit the project area. Nineteen species of the mammals inhabiting the project area have been determined to be of high interest to the State of Utah.

The Dwarf Shrew is a yearlong resident of the area in which the project is located. This animal's substantial valued use area is characterized as open grass covered areas of any wildlife habitat in the submontane and montane ecological associations. Since this shrew has a relative

abundance determined to be limited, its use areas should be ranked as being of high-priority value to the animal.

The Western Big-Eared Bat is a yearlong resident of the area in which the project is located. This animal roosts and hibernates within caves, mine tunnels, or suitable buildings located in the pinion-juniper, shrubland and low elevation spruce-fir habitats of the submontane and montane ecological association. Such areas represent this bats substantial valued use area.

The Snowshoe Hare is a yearlong resident of the area in which the project is located. Its relative abundance has been determined to belimited, since its substantial valued use area is restricted to the spruce-fir and nearby aspen and riparian habitats of the montane ecological association. Such areas are ranked as being of high-priority value to the animal during its breeding season which spans the period between early April and mid-August.

The Cottontail Rabbit is a yearlong resident of the area in which the project is located. The entire project area represents a substantial valued use area for cottontails. Their young are born between April and July. This is a crucial period for maintenance of the cottontail population.

The Northern Flying Squirrel is a yearlong resident of the area in which the project is located. Currently, its relative abundance is unknown. Its substantial valued use area is restricted to spruce-fir or other mixed conifer habitats of the montane ecological association. This specie is the only nocturnal squirrel in Utah. The flying squirrel may build its nest within an old woodpecker hole or it may build an outside nest of leaves, twigs, and bark. Mating occurs twice each year-February through March and June through July. Two to six young are born after a gestation period of 40 days. These periods are of crucial value to maintenance of their populations. Flying squirrels have been known to den together in groups of up to 20 during the winter.

Beaver are yearlong inhabitants of the area in which the project islocated. Their substantial valued use area is restricted to riparian and adjacent aspen habitats located within 100 meters of the riparian zone. The ecological associations range from the cold deseret through the montane zones. These animals construct a conically shaped lodge in which a family group lives throughout the year. The lodge is of critical value to maintenance of the beaver population. One litter of kits is produced each year. They are born between late April and early July after a gestation period of 128 days. Kits and yearlings coinhabit the lodge with the adult pair. When they reach 2 years of age they are forced to leave. Females can breed at 2.5 years of age. Due to the animals dependance upon flowing water and the associated riparian vegetation, the riparian wildlife habitat is ranked as being of critical value to beaver populations.

The Red Fox is a yearlong inhabitant of the area in which the project is located. The substantial valued use area for the red fox would include all wildlife habitats form the cold desert through the montane ecological associations. Almost nothing is known of their population dynamics.

Without doubt a crucial period for this specie is when they are caring for young in the den. Dens are a critical use area.

The Gray Wolf is a historic inhabitant of the area in which the project is located. Currently its relative abundance is so low that the animal is listed as endangered with extinction. The wolf's

substantial valued use area would be represented by any remote habitat in any ecological association.

Black Bear are inhabitants of the area in which the project is located. Their substantial valued use area is represented by all natural wildlife habitats extending from the submontane into the montane ecological associations. These animals go into semi-hibernation during winter. During this crucial period, which may last from December through March, the animal secrets itself in a den in order to conserve body energy. The young are born in the den during January or February. Dens represent a critical valued use area for bears.

Many of the members of the family mustelidae are known to inhabit the area in which the project is located. They are all protected and classified as furbearers. The include the Short-tailed and Long-tailed weasels, mink, wolverine, Black-footed ferret, marten, badger, Striped and Spotted skunks and the River otter. Additionally, raccoon and muskrat, although not furbearers, are also inhabitants of the area. All of these species are of high interest due to their value in the fur market.

The substantial valued use area for Short-tailed and Long-tailed weasels, mink, River otter, muskrat, and raccoons is the riparian habitat. Weasels, which are inhabitants of the project site, do make some use of other habitats that are proximate to riparian zones. Muskrats and raccoons are restricted to riparian habitats of the cold desert and submontane ecological associations. They are not found in the project area. The Long-tailed weasel can be found from the cold desert into the montane ecological associations. The Short-tailed weasel, River otter, and mink populations extend their use from the submontane into the montane ecological associations. The river otter is not known to inhabit the environs of the project area, but mink are present.

The substantial valued use area for Marten and Wolverine is the montane ecological association. Both species could be found in the projectarea.

The Black-footed ferret is a species primarily dependant upon prairie dogs as a prey source. Currently, the ferret's relative abundance is so low that the animal is endangered with extinction. Utah lies on the western edge of the Black-footed ferret's range. However, the project area does not provide habitat for prairie dogs so ferrets would also be absent.

The substantial valued use area for badgers and skunks span all wildlife habitats other than dense forests. Skunks show some affinity for habitats proximate to water. Skunks and badgers are dependant upon a suitable prey source.

A crucial period for maintenance of all furbearers, raccoons and muskrats is when they have young in a nest, den or lodge. Such sites are critical for reproductive success.

Bobcat, Canada lynx, and cougar are known to inhabit the project area. For all of these species a crucial period for maintenance of their population is when the female has her young secreted at a den site. Such sites are of critical value when being utilized. It is also crucial to their survival that a female accompanied by young not be killed or harassed.

The substantial valued use area for bobcats extends from the cold desert through the submontane and into the montane ecological associations. The bobcat is normally associated

with precipitous terrain, but has been observed in every wildlife habitat within the above mentioned ecological associations. Their primary prey source is represented by small animals and birds. Occasionally bobcats kill the young of big game animals.

The substantial valued use area for the Canada lynx is restricted to the montane ecological association. Normally, this cat would only be expected to utilize riparian and forested wildlife habitats. The lynx is similar in predation habits to the bobcat.

The substantial valued use area for the cougar extends from the submontane into the montane ecological associations. Due to the dependancy of the cougar upon mule deer as a prey source, a ranking of the cougar's seasonal distribution parallels that of the deer.

Mule deer are inhabitants of the area in which the project is located. Their substantial valued use area spans all wildlife habitats extending from the cold desert through the montane ecological associations. In some situations deer show migrations in response to winter conditions. There are, however, habitats where deer reside yearlong.

Migration of Mule deer from summer range to winter range is initiated during late October. The annual disturbance of the fall hunting season, coupled with changing weather conditions are the initial stimulants.

The project site only represents summer range for mule deer. Winter ranges are at least 9 miles from the project site.

Deer begin their migration back to summer range during mid-May and remain there throuhout October.

Mule deer fawn during the month of June. The continum of wildlife habitats extending from the pinion-juniper through the shrubland and into the aspen type probably represents the fawning area. All riparian areas are of critical value for fawning and maintenance of the deer population. To date no specific areas showing annual use for fawning are known. It is probable that such areas exist. They would be ranked as being of crucial value to deer.

Moose are inhabitants of the area in which the project is located.

Their substantial valued use area spans all wildlife habitats in themontane ecological association except the Alpine zone. In some situations moose show migrations in response to winter conditions. All riparian habitats associated with the project have at one time or another supported moose.

Migration of moose from summer range to winter range is initiated during late November. Portions of the project area represents winter range for the Southeastern Utah moose herd, Scofield and Huntington drainages. To date, only riparian habitats on the project area have been identified as winter range. Winter ranges for moose that are characterized as riparian habitats are ranked as being of critical value, where as the remainder of the winter ranges are ranked as being of high-priority value to the animal. Winter ranges are usually inhabited by moose between December and May of each year. During winters with severe conditions the higher elevation portion of the winter range may become unavailable to moose due to snow depth.

Moose begin the migration back to summer range during mid-May and remain there throughout November. The entire project area represents summer range. Summer ranges on the project area support animals of the Scofield and Huntington drainages of the Southeastern Utah moose herd.

Those summer ranges are ranked as being of high-priority value. Moose calve during late May and June. Calving takes place in the riparian or adjacent forest habitats. To date no specific areas used for annual calving are known. It is probable that such areas exist. Rocky Mountain elk are inhabitants of the area in which the project is located. Their substantial valued use area spans all wildlife habitats extending from the submontane through the montane ecological associations. Elk do not show as strong a migration as Mule deer do in response to winter conditions, but they do migrate to wintering areas.

Migration of elk from summer range to winter range is initiated during late October. The project site represents only summer range for the Manti elk herd. Winter ranges for these elk are at least 8 miles from the project site. Migration back to summer ranges begin during mid-May.

Elk calve during June. The prefered calving areas are aspen forests with lush understory vegetation. All riparian areas on the summer range are of critical value for calving and maintenance of the elk population. No specific areas used for annual calving are known to exist in the project area.

Currently, there are no other known high interest wildlife species or their habitat use areas in or adjacent to the project area.

323. MAPS AND AERIAL PHOTOGRAPHS.

Maps of vegetative types were made by using a mosaic of aerial photographs. Community types were outlined on the photomosaics. Accuracy was assured by correlation of actual communities as inspected on the ground to those discernible on the photographs.

323.100. THRU 323.400.

Refer to Vegetation Map 323.100.

MAP 323.100

330. OPERATION PLAN.

AQUATIC RESOURCE MONITORING PLAN.

Eccles Creek. Available data on Eccles Creek include fish survey results (UDWR, 1968-1979); macroinvertebrate survey results (Winget, 1979); water quantity and quality survey results (Hansen Associates, 1979-1980); and stream habitat observations (Winget, 1979). Yearly monitoring of stations EC03, EC04 and EC05 will commence the spring of 1981. Macroinvertebrate samples and habitat measurements will be taken spring and fall, as required. Information on fish surveys will be obtained from UDWR. Regular water quality and quantity

monitoring will be continued as required. Intensity and duration of sampling will be dependent upon success of sedimentation control measures.

MUD CREEK

No surface disturbance of Mud Creek is anticipated. Sedimentation from upstream land use is one of the potential threats to Mud Creek. Sediment samples will be taken at a frequency and duration depending upon success of sediment control upstream. Aquatic macroinvertebrate samples will be taken in conjunction with the sediment samples in the spring, summer, and fall of each year as required by effects of surface disturbance activities.

JAMES CANYON CREEK

Cutthroat trout have been observed in high number in James Canyon Creek during the spring spawning time. James Canyon Creek is an important part of the fisheries resource of Electric Lake. The stream will probably not be impacted by the Belina Project. If the stream is impacted a monitoring and protection plan will be initiated.

SLAUGHTERHOUSE, BOARDINGHOUSE, FINN, WHISKY, LONG, ~~AND MUD CREEKS~~

These streams are all intermittent, at least during low precipitation years. As such they are not considered as important parts of the fishery resources of Mud Creek or Scofield Reservoir (personal communication, Mr. John Livesay, UDWR, Price Office, November 7, 1979). Since these streams will not be directly impacted by the Belina Project, a monitoring or protection plan will not be necessary.

AVIFAUNA AND RAPTOR PLAN

Ornithological investigations have been accomplished over several time periods in the Scofield, Skyline, and Valley Camp of Utah, Inc. coal mining areas. Specifically, these periods have been: December 1, April 7-8, April 25-26, May 17-18, June 13-14, and July 26-29. During these periods a record has been maintained on threatened or endangered species, raptors and raptor nests, occurrences of species of high

Federal interest, and migratory birds. The obvious time period where observations are missing is during the major autumn migration period of September-October. This may represent a critical time. For example, the peak raptor migration along the Wasatch Front, 60 miles north of Scofield, revealed a total of 308 migration raptors recorded between September 9 and October 4 with the peak number around mid to late September (Mosher, et al. 1978).

No part of the Mine Permit Area has shown evidence of being inhabited by the endangered Northern Bald Eagle which occurs in the Scofield area during the migration season between November 15 and March 15 each year. Currently no roost trees have been observed. Two active nests were found in Eccles Canyon, one of the Goshawk and the other of the Cooper's Hawk (White, 1980). The Cooper's Hawk is a species of high federal interest. These two species can generally tolerate considerable human impact. The Golden Eagle, also of high federal interest, has been seen in the Mine Permit Area, but no nests were found.

In order to minimize disturbance to the Bald Eagle and other endangered or important species all personnel associated with the mining operation will be made aware of the birds' annual presence and value to society. These people will also be instructed not to disturb Bald Eagles or other endangered or important raptors. If a roost tree is located it will be immediately reported to the UDWR and the USFWS. Roost trees and a suitable buffer zone will be protected from human disturbance during the winter period.

Design and construction of all electric power lines and other transmission facilities will be in accordance with guidelines set forth in "Environmental Criteria for Electric Transmission System" published by the USDI and USDA in 1970 and/or the REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

In 1982 Mr. Ron Joseph of the United States Department of the Interior, Fish and Wildlife Service, 1311 Federal Building, 125 South State Street, S.L.C., Utah, conducted a power distribution line survey of the permit area and found no threat to the Bald or Golden eagle. Mr. Joseph stated previous Fish and Wildlife Service (FWS) surveys have not shown a problem with powerlines in coniferous cover primarily because trees themselves offer much better perch sites than crossarms of power poles. Mr. Joseph also stated that, on close examination, the powerlines did not reveal any use by raptors. This may be verified in the Fish and Wildlife Service survey report to Mr. Cleon Feight, Director of the Utah Division of Oil, Gas and Mining, Dated November 10, 1982.

HIGH INTEREST WILDLIFE AND HIGH VALUE HABITATS

Mule deer and elk inhabit high priority and crucial-critical winter ranges between November 1 and May 15 each year. These areas will be protected from exploration activities during the inhabited periods. Disturbances on high priority deer winter ranges will be kept to a minimum.

Big game on winter ranges are sensitive to disturbances. Therefore, all personnel associated with the mine will be instructed on the annual presence and value of this big game. Efforts will be made to avoid any unnecessary disturbance by man.

If the mining operation installs structures which present barriers to wildlife's daily movements, suitable passage structures will be installed.

WILDLIFE PROTECTION PLAN.

1. All roads under the applicant's control, and within the Mine Permit Area, will have posted speed limits.

2. The access road along Whisky Canyon will be posted with warning signs indicating possible animal crossing areas.

3. Design and construction of power transmission and distribution lines will be in accordance with guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA [1970]) and REA Bulletin 61-10.

4. Consideration of possible restriction of animal movement will be incorporated into the design and installation of all structures within the Mine Permit Area.

5. All hazards associated with the mine will be fenced or covered to minimize danger to wildlife.

6. Disturbances to big game on high priority winter range will be kept to a minimum.

7. Wildlife habitat will be enhanced at the time of reclamation (using the best technology currently available) through restoration of habitat features and selection of reclamation materials that will improve the quality and or quanity of forage and or cover.

8. All riparian habitat disturbed by the applicant during mining will be reclaimed to pre-mining status.

9. The presence of any threatened or endangered plant or animal within the Mine Permit Area will be reported to the appropriate regulatory agency.

10. Adequate precautions will be taken to keep coal out of stream channels.

11. Personnel associated with the mine will be informed of the values of the wildlife resource associated with the Mine Permit Area and adjacent area.

12. All mine personnel will be instructed through annual training on the importance of fish and wildlife protection.

Smaller areas of riparian habitat are found in Whisky Canyon, South Fork of Eccles Canyon, and minor drainages associated with these canyons. These areas will not be disturbed by the applicant's operations. The portal site in Whisky Canyon was developed under the 211 Program and affected the riparian habitat in that area. Stream disturbance related to surface activities should not occur within the Mine Permit Area and, as a result, impact on fish should be minimized. Mitigation measures will include a Surface Water Monitoring Program, as well as activities proposed by the applicant and approved by the proper authority.

The total area of the permit is considered summer range for elk, deer, and moose. There is no winter range use with the exception of the riparian habitat areas used by moose, as well as for spring calving.

Valley Camp has infrared aerial photography from the forest service subsidence monitoring endeavor in the late seventies and early eighties. This infrared photography should suffice for the forest service needs presently and should additional infrared be needed, the bond release aerial photography comittment could include it.

A survey for raptor nests in the areas providing a nesting habitat will be conducted in the early spring of 1993 with the assistance from DWR and the Division.

The 1993 survey will cover the area immediately above the newly projected mining plan directly north of the O'Connor mine, this area will include a specified radius encompassing proposed mining for one year.

Additional surveys will depend upon future mining time frames. When mining is reactivated, Valley Camp will with the assistance of DWR, during the winter do an aerial survey of all the permit area which contains raptor nesting habitat.

331.

Refer to 341.100 and 341.200

332. SUBSIDENCE.

333.0 THRU 333.300.

A survey (for presubsidence) within or adjacent to the Valley Camp of Utah, Inc. Mine Permit Area conducted ~~by~~ for Valley Camp Utah, Inc. by Endangered Plant Species through Vaughn Hansen Associates, demonstrates that areas for agricultural or silvicultural production of food and fiber and grazing lands are of such low production that they can be classified as non-renewable resource lands. The statement regarding food and fiber has been taken from the presubsidence survey report prepared by EPS, Inc. in 1980. This report was approved in the 1984 TA by OSM.

Aquifers and areas for the recharge of aquifers and other underground waters will suffer minimal adverse impacts from the mining activities. Should subsidence occur the subsidence cracks will likely seal rapidly preventing the deep percolation of water and subsequent loss of springs and other water sources (Hansen, 1980).

Refer to 222 thru 223 Soil Survey and 322 Vegetation Information. This survey was conducted by Vaughan Hansen & Associates. The information referenced above was approved by the Division for insertion as the "Renewable Resource Survey" requirements by Mr. Lynn Kunzler.

The Subsidence Base Map, shows survey monument information, gas line locations, power lines and other information. The determination of the types of lands that exist within and adjacent to the Mine Permit Area were determined by use of Federal Government land use maps and private consultants. The productivity levels of this land are discussed in 200. and 300. Refer also to Soil Map 222.100 and Vegetation Map 323.100.

The only structures which could be damaged if subsidence occurs are gas pipelines. These structures will be protected by limiting extraction directly under the pipelines and within an area including a 35 degree angle of draw from the lowest coal seam to be mined. Such a label actually applied to the agricultural portion of the definition of a "Renewable Resource", and not to aquifers and areas for the recharge of aquifers or silvicultural production. Material damage or diminution of value of aquifers is discussed in the Vaughn Hansen Associates Report.

The forest land is classed as a renewable resource, and as such, will be afforded maximum subsidence protection in order to ensure future productivity.

Should material damage be incurred to the Mountain States Resources (now doing business as Questar Pipeline Company) natural gas pipelines, despite the approved subsidence damage prevention measures, the applicant will repair the damage to the pipelines caused by subsidence from the applicant's mining activities or compensate the owner of the pipeline for such damage.

Any area roads which are materially damaged by subsidence will be repaired and re-graded to restore them to pre-subsidence usefullness. A buffer zone of at least 150 feet is left around natural gas wells in the Mine Permit Area. Subsidence should not cause damage to the wells.

Belina No. 1 Mine Map E1-0002 (Map 521.100.) and Belina No.2 Mine Map D2-0060, (Map 521.100.) indicate mining plan consideration of subsidence protection for surface structures. The plan calls for an angle-of-draw of 35 degrees. If the monitoring study indicates a different angle-of-draw, the plans will be modified. Also included as part of the Subsidence Plan is approval from the MMS for using a 35 degree angle-of-draw for limited extraction. ~~It is anticipated that the true draw angle will be determined when actual subsidence data become available.~~ Influenced by faults within area of subsidence

The Subsidence Control plan is presented in Appendix 724.600. Associated subsidence mapping is identified as the Belina No. 1 Mine Map E1-0002 (Map 521.100), the Belina No.2 Mine Map D2-0060, (Map 521.100), and Subsidence Base Maps 728.100a and 728.100b.
~~In 1988 Valley Camp committed to performing an aerial survey each year to monitor subsidence. During 1988 both the aerial survey and the pedestrian survey were completed. The aerial survey may eliminate the pedestrian survey in following years.~~

340. RECLAMATION PLAN.

341. THRU 341.250 REVEGETATION.

SCOPE

The Reclamation Plan is divided into four areas: the Valcam Loadout Facility, General Office Area, Belina Haul Road, and the Belina Mine Site. See Engineering 540., for the Reclamation Schedule 542.100.

The Reclamation Plan is to establish a permanent, effective and diverse vegetative cover, capable of self-regeneration and plant succession for use as rangeland and wildlife habitat. A prompt vegetative cover will be established which, through time, will allow vegetative cover, woody plant density and productivity to recover to levels equal to the cover, density, and productivity of reference areas.

The following procedures are designed to revegetate and control erosion. ~~This should to a large degree, satisfy the committments made in the permit, while also satsifying OSM regulations as pertaining to wildlife concerns and final reclamation for those areas which will be utilized after mining operations are concluded. The areas in question are along and adjacent to the Belina Haul Road and the Belina Mine Site, and will be of a permanent nature.~~

~~The Valcam Loadout Facility will be reclaimed in a manner similar to the portal area reclamation. A minimum of regrading will be done to minimize additional adverse impact of the environment.~~

The General Office Area will be retained for a field office for Kanawa Hocking Coal & Coke Company~~educational and or recreational purposes~~.

~~The actual ground involved comprises approximately 16 acres of disturbed land, primarily road disturbance and deck areas.~~The ~~actual~~reclamation procedures will involve a four phase program using the BTCA; (1) earthwork: To prepare a stable site with a proper seedbed which will ~~be stable enough for a period of time to and~~ allow vegetation to become established, (2) grass & forb planting; ~~the entire area supplement revegetation and control run off until stabilization is complete~~, (3) seedling planting: to plant seedlings to further stabilize the soil and to provide necessary wildlife, hydrological and aesthetic committments are detailed in the mine permit, and (4) riparian zone planting: to enhance and reestablish a riparian zone in conjunction to Whisky Creek.

METHODOLOGY

PHASE NO. 1 EARTH MOVING

The pad areas and associated cuts can be brought back to a reasonable configuration by implementation of heavy equipment.~~ The areas where coal has been stacked or handled will be cleaned as much as possible by front end loaders and any recoverable coal will be transported to the preparation plant. The remaining material, estimated to be approximately one foot thick, will be loaded into haul trucks.~~ After the coal handling areas have had the recoverable coal removed, the remaining ~~This~~ bed material will be intermingled in a base lift near ~~placed by the barrier seals in~~ the mine portals.~~ and in by the portal entrance. When disposal is complete, a second seal will be constructed out by the material. In this manner the The material will be buried and sealed from contact with air and water.~~

~~The Belina portal entrance areas will then be graded, stabilized., and covered with VSM topsoil.~~ All fill shall be machine compacted. Terraced fill shall be in lifts and compacted to assure integrity and stability of the embankment~~ and prohibit failure~~.

PHASE NO. 2 PLANTING

Upon completion of recontouring~~grading~~, and with the concurence of the Division of Wildlife Resources, UDOGM, and Valley Camp, all downed trees, brush, etc., adjacent to the disturbed area shall be placed upon the recontoured surface. These and other wildlife habitat enhancement measures which may be proposed at a later date will be completed using the best technology currently available. This material will form a near-natural appearance and enhance the microclimate on each site.

All work done along the perimeter of the pad will take into consideration existing vegetation, and all efforts will be made to minimize disturbance and utilize existing vegetation. When there is no alternative other than disturbance, the ~~an~~ effort will ~~can~~ be made to relocate earth and maintain existing vegetation in place, while attempting to relocate the vegetation as clumps on the area to be reclaimed. When the desired contour of a mountain park with a meandering

~~PHASE NO. 2~~ HYDROSEEDING ~~AND MULCHING~~

The ~~entire~~ areas of disturbance (where appropriate) will be hydroseeded then mulched during the ~~late~~ Fall following the complete abandonment and earth work (October through November).

Hydroseeding and mulching will be carried out in conjunction with the earth work of Phase One. Methodology for the hydroseeding and mulching operation is to apply the seed then mulching, using a wood fiber to all disturbed areas, at a minimum rate of 2000 lbs/ac. of wood fiber and using approximately 60 lbs. of tac per ton of mulch.

Hydromulching/Fertilization

In conjunction with the seeding effort, the entire area of disturbance will be fertilized and hydromulched using the best technology currently available for erosion control. The rate of application of the mulch and clean, bright, crimped, dry straw is:

2,000 to 3,000 lbs/acre (each)

When the straw is applied it will be walked in with a Crawler. The following various types and approximate amounts of fertilizer will be applied prior to seeding and mulching. Fertilizer may be applied in either granular or liquid form:

30 lbs. N/acre
100 lbs. P20/acre
100 lbs. K20/acre

Soils analysis at the time of final reclamation will determine the actual rates to be applied.

Recommended revegetation practices for the Mine Permit Area are as follows:

Tillage practices on level ground and on slopes flatter than 10h:1v include leveling, disking, and harrowing. Slopes ~~of 10h:1v up to~~ 3h:1v or less, will be mulched using straw or other inert organic material. Slopes steeper than 3h:1v will require a hydro-mulch and/or pinned hemp matting and will be treated to basin listing.

Plantings on slopes less than 10h:1v will be accomplished by broadcast methods. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and buried by raking or other acceptable methods. Mulch will be applied over the seed. It is elected to revegetate areas with slopes greater than 1.5h:1v without the topsoil. Such areas will be treated to handset plantings in basins filled with topsoil and with hydroseeding and mulch in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate. Hydroseeding may be substituted for the above methods of seeding where practical. In specific cases, other methods of revegetation may be suitable and could be used, if approved.

Nitrate nitrogen is low in quantity for soil types in the Mine Permit Area. The most important fertilizer to add is nitrogen (Welsh, 1980). Soil tests will be taken in areas to be revegetated and fertilizer added, as required.

stream (approved channel design) is obtained, the parent material will be tested to determine its desirability as a growth media. ~~(ref. to Mt. Nebo Scientific test plots). In the event it can be supplemented with additional approved treatment, all efforts will be made to utilize existing inplace materials (Vegetation Supporting Materials).~~

Valley Camp is of the opinion 2.5:1 slopes or steeper should not be ripped as it would not provide a firm seedbed as well as making those slopes subject to surface failure. ~~Upon completion of the recontouring, and~~ Prior to revegetation, all areas with a slope 3:1 or less to be revegetated ~~will~~may be ripped to a minimum depth of 14" and treated ~~as deemed~~if necessary ~~by the soil testing~~. As mentioned in the Soils text, maximizing roughness of the surface will be paramount.

All revegetation stock will be harvested from the adjacent area to assure aclamation of the varieties and certified as to the PLS specifications. When seeds and/or shrubs and wood stock can not be gathered locally, like seeds or vegetation will be purchased from a certified supplier.

proper storage – warrant by supplier

PLANTING PROCEDURES

Earthwork

A stable firm seedbed will be established to assure stability for the immediate root zone for both the receiving seed.

Grass and Forbs

To assure proper seed coverage is accomplished, one or all of the following techniques will be utilized, hydroseeding, broadcasting, and drill seeding. Weather permitting, a pre-crop may be planted prior to the permanate seed mix to enhance soil stability for fall planting. The Cover crop will be applied at a rate of 20 lbs. per acre. The north facing slopes will not require a Cover Crop due to natural shade cover. #'s adjusted

Seedlings

Once sufficient vegetation cover is present to help minimize damage from wildlife/domestic animals grazing, the seedlings will be planted. the following spring use standard procedures ~~Plantings will be done by hand to a depth of 16 inches. Roots of the seedling will be arranged in as near natural position as possible paying special attention not to "J" the root tips.~~ UDOGM and Valley Camp have agreed that if additional planting of shrubs is needed so that reclaimed areas match shrub counts in reference areas, supplementary shrubs will be planted following the determination of revegetation suitability.

Riparian Zones

Riparian zones at all reclaimed channels shall be defined as that area within 5 feet of the reclaimed channel top width. Willow slips and clumps will be gathered in the ~~immediate~~ area. or near permit

shrubs & trees

~~The Belina Mine Portals. Some of the graded slopes in the portal area have been designed within the guidelines of geotechnical engineering practices by Golder Associates, and have been stabilized. To minimize additional impact on the environment, those north facing slopes which meet the Division's criteria and approval will be enhanced with shrubs and trees.~~

PERMANENT SEED MIXTURE

SPECIES	PLS LBS/AC
VALCOM LOADOUT FACILITY AREA	
GRASSES:	
Agropyron smithii - Western wheatgrass	4.0
Agropyron dasystachyum - Thickspike wheatgrass	4.0
Bromus marginatus - Mountain brome	5.0
Poa pratensis - Kentucky bluegrass	0.2
Total	14.2
FORBS:	
*linum lewisii - Blue flax	1.0
Melilotus officinalis - Yellow sweetclover	2.0
Medicago sativa - Ladak alfalfa	1.5
Penstemon strictus - 'Bandera' Rocky Mountain penstemon	0.5
Artemisia ludoviciana - Prairie sage	0.1
Total	5.1
SHRUBS AND TREES:	
Artemisia tridentata vaseyana - Mountain big sagebrush	0.1
Chrysothamnus nauseosus - Rubber rabbitbrush	0.5
Rosa Woodsii - Woods rose	1.0
Total	1.6
NOTE: Seed application is calculated for a broadcast application.	
Riparian areas within the Mine Permit Area (1.5 ac. max.) will have the following shrubs and trees supplemented to the regular mixtures:	
SPECIES:	**NO./ACRE**
Shrub - Mahonia repens - Creeping Oregon grape	300
Shrub - Rubus idaeus sachalinenis American red raspberry	300
Tree - Salix rigida - Willow (cuttings)	2,000
Symphoricarpos albus - Common snowberry	300
Total	2,900
(SOUTH-WEST FACING ASPECTS)	
GRASSES:	
Agropyron riparium - Streambank wheatgrass	3.0
Agropyron dasystachyum - Thickspike wheatgrass	3.0
Bromus marginatus - Mountain brome	4.0
Poa Canbyi - Canby bluegrass	0.5
Poa pratensis - Kentucky bluegrass	0.1
Total	11.6

SPECIES	PLS LBS/AC
FORBS:	
*linum lewisii - Blue flax	1.0
Achillia millefolium - Yarrow	0.2
Lupinus sericeus - Silky lupine	2.0
Melilotus officinalis - Yellow sweetclover	2.0
Penstemon strictus - 'Bandera' Rocky Mountain penstemon	0.8
Artemisia ludoviciana - Prairie Sage	0.1
Total	6.1
SHRUBS AND TREES:	
Amelanchier alnifolia - Serviceberry	2.0
Artemisia tridentata vaseyana - Mountain big sagebrush	0.2
Symphoricarpos oreophilus - Mountain snowberry	2.0
Chrysothamnus nauseosus - Rubber rabbitbrush	0.4
Rosa woodsii - Woods rose	1.0
Total	5.6
HANDSETS (Plants per acre)	
Populus tremuloides - Quaking aspen (Aspen will be placed on 5' to 6' centers in 1/4 - 1/2 acre clumps)	400
(NORTH-EAST FACING ASPECTS)	
GRASSES:	
Agropyron trachycaulm - Slender wheatgrass	3.0
Bromus marginatus - Mountain brome	5.0
Poa Pratensis - Kentucky bluegrass	.25
Agropyron Smithii - Western wheatgrass	4.0
Poa Canbyi - Canby bluegrass	.4
Total	12.65
FORBS:	
Archillia millefolium - Yarrow	0.2
Penstemon strictus - 'Bandera' Rocky Mountain penstemon	0.5
Osmorhiza occidentalis - Sweet anise	1.0
Melilotus officinalis - Yellow sweetclover	2.0
Lupinus sericeus - Silky lupine	2.0
Hedysarum boreale - Northern sweetvetch	1.0
Total	6.7
SHRUBS AND TREES:	
Prunus virginiana - Chokecherry	0.5
Symphoricarpos oreophilus - Mountain snowberry	2.0
Sambucus coerulea - Blue elderberry	1.0
Total	3.5
HANDSETS (Plants per acre)	
Abies Concolor - White fir	200
Picea englemanii - Engleman spruce	200
Picea pungens - Blue spurce	150
Total	550

Hydroseeding and mulching will be carried out in conjunction with the earth work of Phase One. Methodology for the hydroseeding and mulching operation is to apply the seed then mulching, using a wood fiber to all disturbed areas, at a minimum rate of 2000 lbs/ac. of wood fiber and using approximately 60 lbs. of tac per ton of mulch.

~~PHASE NO. 3 PLANTING~~

~~The planting of seedlings will be done the spring following the seeding effort.~~

~~PLANTING PROCEDURES~~

~~Planting will be done by hand to a depth of 16 inches. The roots of the seedling will be arranged in as near natural position as possible paying special attention not to "J" the root tips.~~

~~The Belina Mine Portals. Some of the graded slopes in the portal area have been designed within the guidelines of geotechnical engineering practices by Golder Associates, and have been stabilized. To minimize additional impact on the environment, those north facing slopes which meet the Division's criteria and approval will be enhanced with shrubs and trees.~~

~~In conjunction with the seeding effort, the entire area appropriate areas of disturbance will be fertilized and hydromulched using the best technology currently available for erosion control. The rate of application of the mulch is:~~

~~2,000 to 3,000 lbs/acre~~

~~The following various types and approximate amounts of fertilizer will be applied prior to seeding and mulching. Fertilizer may be applied in either granular or liquid form:~~

~~30 lbs. N/acre~~
~~100 lbs. P20/acre~~
~~100 lbs. K20/acre~~

~~Soils analysis at the time of final reclamation will determine the actual rates to be applied.~~

~~Recommended revegetation practices for the Mine Permit Area are as follows:~~

~~Tillage practices on level ground and on slopes flatter than 10h:1v include leveling, disking, and harrowing. Slopes of 10h:1v up to 3h:1v will be mulched using straw or other inert organic material. Slopes steeper than 3h:1v will require a hydro mulch and/or pinned hemp matting and will be treated to basin listing.~~

~~Plantings on slopes less than 10h:1v will be accomplished by broadcast methods. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and buried by raking or other acceptable methods. Mulch will be applied over the seed. It is elected to revegetate areas with slopes greater than 1.5h:1v without the topsoil. Such areas will be treated to handset plantings in basins filled with topsoil and with hydroseeding and mulch in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate. Hydroseeding may be substituted for the above methods of seeding where practical. In specific cases, other methods of revegetation may be suitable and could be used, if approved.~~

~~Nitrate nitrogen is low in quantity for soil types in the Mine Permit Area. The most important fertilizer to add is nitrogen (Welsh, 1980). Soil tests will be taken in areas to be revegetated and fertilizer added, as required.~~

MONITORING

Upon completion, the reclaimed area will be monitored to determine when release parameters are achieved. If the monitoring indicates inadequacies, the area will be supplemented with additional efforts.

The monitoring procedures will use approved methodologies.

Success of revegetation and stabilization of road slopes will be evaluated during the middle of each growing season, when cover and composition studies are most feasible. Erosion pins will be placed on slopes at the time of reseeding operations. A table of random numbers will be used to determine location. Statistically acceptable techniques will be used to determine percent cover and composition of disturbed area. Pins and revegetation analyses will be conducted annually for at least the first five years. Where success is apparent, as represented by achievement of 90% of the original cover during the five-year period, subsequent analyses will be at five year intervals until bond release. Any areas not achieving 90% of the original cover in the first five years should be re-evaluated and another attempt made to successfully vegetate those areas. Transplant survival will be monitored for the first three years. Statistically adequate data will be collected for cover, productivity and woody plant density for both reclaimed areas and vegetation reference areas during the last two years of the liability period.

Inasmuch as construction had begun at the portal area prior to initiation of contemporary OSM regulations, no attempt was made to determine the volume of topsoil available for storage from the portal and truck loadout areas.

The majority of the topsoil, at the mine portal sites, was removed prior to the creation of topsoiling requirements. A limited amount, however, was later removed from around the Belina Mine Site and stored in a stockpile near the portal site. If the stockpiled topsoil is to stored the material will be stabilized with seed during the first normal period favorable for planting and erosion control measures implemented, which will protect the pile from environmental degradation.

341.300. TEST PLOT STUDIES.

The following reports containing all information related to test plot studies are included within Appendix 341.300 submitted in 1993.

- "Cover and Productivity Analysis of Temporary Revegetation at the Valcam Loadout Facility and the Belina Mine Site Areas" prepared by Cedar Creek Associates, Inc.

- Annual 1988 through 1992 "Results of Vegetation Sampling and Test Plot Monitoring" and the 1992 summary prepared by Mt. Nebo Scientific Research and Consulting.

- UDOGM/VC Vegetative Sampling Cooperative Effort to measure sites that have received interim reclamation treatments to show revegetation feasibility of the types of slopes and soils that are proposed for final reclamation. The areas measured as part of this effort are shown on Map 231.300.

NOTE:

BECAUSE OF THE VOLUMINOUS NATURE OF THE CEDAR CREEK AND MT. NEBO REPORTS THEY ARE NOT INCLUDED HEREAFTER AS "STRUCK OUT TEXT" ALTHOUGH THEY HAVE BEEN MOVED FROM THIS PORTION OF THE PERMIT APPLICATION PACKAGE AND PLACED WITHIN APPENDIX 341.300.

342. THRU 342.400. FISH AND WILDLIFE.

See 330.

350. PERFORMANCE STANDARDS.

351. GENERAL REQUIREMENTS.

All coal mining and reclamation operations will be carried out according to plans provided under 330 thru 340..

352. CONTEMPORANEOUS RECLAMATION.

The revegetation on all disturbed land by the coal mining and reclamation operations will be done as contemporaneous as practicable.

353. THRU 353.300. REVEGETATION: GENERAL REQUIREMENTS.

The vegetative cover will be diverse, effective, and permanent, and comprised of species native to the area, or of introduced species where desirable and necessary to achieve the approved postmining land use and approved by the Division, being at least equal in extent of cover to the natural vegetation of the area and be capable of stabilizing the soil surface from erosion. The reestablished plant species will be compatible with the approved postmining land use and have the same seasonal characteristics of growth as the original vegetation. Also it will be capable of self-regeneration and plant succession and be compatible with the plant and animal species of the area and meet the requirements of applicable Utah and federal seed, poisonous and noxious plant and introduced species laws or regulations.

353.400.

N/A

354. THRU 355. REVEGETATION.

See 341.300.

356. REVEGETATION: STANDARDS FOR SUCCESS.

356.100.

Success of revegetation will be judged on the effectiveness of the vegetation for the approved postmining land use, the extent of cover compared to the extent of cover of the reference area or other approved success standard, and the general requirements of 353.

For details see monitoring section under 341.250.

356.300 THRU 356.400.

Adaquate siltation structures will be maintained until the site has been vegetated and stabilized and removal is authorized by the Division. When structures are removed the affected area will be revegated in accordance with the Reclamation Plan.

357. REVEGETATION: EXTENDED RESPONSIBILITY PERIOD.

357.100 THRU 357.300.

Since the precipitation is in excess of 26 inches annually, it is assumed that the five-year extended liability period will apply.

No husbandry practices are envisioned at this point in time.

358. PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENAL VALUES.

358.100. THRU 358.530.

Valley Camp will, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts on fish, wildlife, and related environmental values and will achieve enhancement of such resources where practicable. Refer to 330.

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Mid-Term Permit Review

Section R645-301-400 Land Use and Air Quality

Valley Camp of Utah, Inc.

February 1993

TABLE OF CONTENTS
R645-301-400. LAND USE AND AIR QUALITY.

SECTION	PAGE NO.
400. LAND USE AND AIR QUALITY	Page 400-1 of 5
410. LAND USE	Page 400-1 of 5
420. AIR QUALITY	Page 400-4 of 5
420. REFERENCES	Page 400-4 of 5
APPENDICES	

LIST OF MAPS

MAP NO.		REFERENCE PAGE
411.100	Premining Land Use	Page 400-1 of 5

R645-301-400. LAND USE AND AIR QUALITY.

410. LAND USE.

411. ENVIRONMENTAL DESCRIPTION.

SEE 320.

411.100. PREMINING LAND USE INFORMATION.

Eccles Canyon serves as the boundary between two livestock grazing allotments. The USDA Forest Service has range analysis maps for both areas. These maps were used to compile the premining land capability and the premining land use. See the Premining Land Use Map 411.100.

MAP 411.100

411.110. THRU 411.120.

The surrounding area is rich in mining history. For a number of years prior to the opening of the Utah No. 2 Mine in 1974 by Valley Camp of Utah, Inc., only limited mining activity had taken place in ~~the~~ that area. However, early commercial production of coal was initiated in the region during the latter part of the nineteenth century. The Pleasant Valley Coal Company, Utah Fuel Company and others began mining operations in the Scofield area first. Wagon roads and then a narrow guage railroad were utilized to transport the coal to more heavily populated Utah and Salt Lake Valleys.

The oldest mine in the district, Utah No. 1 Mine, is situated on properties now held by Valley Camp, just south of the Valcam Loadout Facility on the east side of Mud Creek about three miles south of Scofield, Utah. It was opened in 1878 and was originally called the Mud Creek Mine. The portals of the mine were at tipple level above the railroad. Conventional mining methods (drill, shoot, and load) and rail haulage were used, typical of most mines in this district. The principal operator at that time was Utah Fuel Company, a subsidiary of the Denver and Rio Grande Western Railroad. This mine had several periods of activity but the workings were not extensive. Doelling (1972) estimated 713,800 tons total production.

The Union Pacific Mine just east of Scofield was opened in 1844 in a coal seam that had a thickness in excess of 30 feet. The upper seam split to north, however both splits were mined. An upper seam with about 100 feet of separation was also mined to some extent. Mining was terminated after the lower seam caught fire and to date is still burning.

The Winter Quarters Mine, about one and one-half miles west of Scofield, Utah, developed into the largest mine in the district, producing nearly 11 million ton of coal. Speiker (1931), described the mine as having five openings, and eventually six openings. These operations were owned by the Utah Fuel Company (D&RGW). This mine was the site of a major disaster May 1, 1900, when more than 200 men were killed in a coal dust explosion.

Several other mines were opened in the vicinity of Scofield, but the only other mines of significance were the Kinney Mine to the Northeast, and later, the Colombine Mine near the same locality.

The Clear Creek Mines at Clear Creek, Utah were opened in 1899. The majority of the mining took place in the lower of two seams on the east side of the main valley. Extensive mining moved eastward until terminated by a major fault zone. A 1700′ rock tunnel was driven across the fault zone and mining continued to the outcrop in upper Bob Wright Canyon.

In Eccles Canyon on the south side of Eccles Creek within Coastal States Mine site disturbed area, there was a small mining operation in the Lower O'Connor seam. Nothing is known about this mine or the period of activity and production is assumed to have been limited.

The Bentley, Huntington Mine and Loucks Mines were the only significant producer, as 440,000 ton of coal was produced between 1895 and the early 1940's (Doelling, 1972). These mines are located within the southern projection of the Connelville Block.

An early wagon mine, the Black Diamond Mine, was operated in upper Finn Canyon west of Clear Creek, Utah. The period of activity and the production are not known for certain, but it was probably operated intermittently between 1923 and 1941.

Mining from the O'Connor Mines in Boardinghouse Canyon later broke into the Black Diamond Mine. These mines lie immediately to the east of the O'Connor fault. Both the Upper and Lower O'Connor seams were mined, with each seam having a thickness of nearly 18 feet at the outcrop. The coal was shipped to the Castlegate Prep Plant near Helper, Utah, where it was washed and sold.

In 1974 Valley Camp of Utah, Inc. opened the Utah No. 2 Mine, which was projected to produce between one-half to three-quarters of a million ton annually, however unexpected faulting caused the operation to cease. In 1976, Valley Camp opened the Belina No. 1 Mine and constructed the necessary support facilities near the head of Whisky Canyon. The projected production was also from one-half to three-quarters of a million ton annually.

The historic land use at the Belina Mine Site is rangeland.

The land use in the immediate vicinity of the Utah No. 2 Mine, at the Valcam Loadout Facility has been historically min~~inged~~.

Land use for the Belina Mine Site, Belina Haul Road and General Office areas were in fact only used for rangeland prior to Valley Camp's mining activities, while approximately 40% of the Valcam Loadout Facility was previously disturbed by the activities of Utah No. 1 Mine around the turn of the century, the remainder was rangeland.

The analysis of land capability and productivity is based on soil and vegetation studies, USDA information, and consultant work. The premining land use for the area affected by the surface facilities was capable of supporting shrub and brush rangeland and mixed forests. For specific information see Soils 200. and Biology 300.

411.130.

The land use classifications under local zoning laws for the Mine Permit Area are as follows:

CARBON COUNTY

All of the Mine Permit Area situated in Carbon County is zoned for Recreation, Forestry and Mining with the exception of the West half of the South West Quarter of Section 9, T13S, R7E SLB&M. This portion is zoned Critical Environmental (CE-1) back to RF&M is being prepared.

EMERY COUNTY

All of the Mine Permit Area situated in Emery County is zoned for Recreation, Forestry and Mining. However rezoning to Critical Environmental in certain sections, are being considered. When these changes are finalized, the changes will be noted in this permit.

411.140. THRU 411.145.

See Appendix 411.140~~. (AERC 1980)~~, also see the Pleasant Valley Mining District Map 521.111.

411.200. PREVIOUS MINING ACTIVITY.

There was no previous mining activity at the Belina Mine Site. Refer to 411.110. thru 411.120..

412. THRU 412.140. RECLAMATION PLAN.

~~For a general description see BIOLOGY R614-301-300.. For details see ENGINEERING R614-301-500..~~Prior to reclamation, Valley Camp, the land owner and other appropriate regulatory agencies will review the disturbed areas whereafter surface owner plans will be finalized as per the requirements of the regulations.

412.200. LAND OWNER OR SURFACE MANAGER COMMENTS.

~~Updated comments will be forthcoming.~~Information to be included within Appendix 412.200 to be submitted in the 1993 MRP.

412.300.

N/A

413. PERFORMANCE STANDARDS.

413.100. THRU 301.120.

See SOILS 200., BIOLOGY 300. and ENGINEERING 500..

413.200.

N/A

413.300.

N/A

420. AIR QUALITY.

The Air Pollution Control Plan at Valley Camp has been approved by the State of Utah, Bureau of Air Quality, letter of May 23, 1975, and May 7, 1980. The USEPA (May 29, 1980 Ref. 8AH-A) has determined that Valley Camp does not require a Point Source Discharge Permit. Therefore, no air quality monitoring plan is proposed. See Appendix 420.

Fugitive Dust Control Plan

1. Conveyor hood sections will be securely positioned when transporting coal and will be maintained in good condition.

2. Conveyor head, reclaim tunnel feeder, and vibration feeder discharge chutes will be totally enclosed.

3. Conveyor skirt boards will be properly positioned when transporting coal and will be replaced as needed.

4. Stacker tube dust flaps will be replaced as needed.

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Mid-Term Permit Review

Section R645-301-500 Engineering

Valley Camp of Utah, Inc.

February 1993

TABLE OF CONTENTS
ENGINEERING. R645-301-500

SECTION		PAGE NO.
500.	ENGINEERING	Page 500-1 of 43
510.	INTRODUCTION	Page 500-1 of 43
520.	OPERATION PLAN	Page 500-7 of 43
530.	OPERATIONAL DESIGN CRITERIA AND PLANS	Page 500-30 of 43
540.	RECLAMATION PLAN	Page 500-35 of 43
550.	RECLAMATION DESIGN CRITERIA AND PLANS	Page 500-39 of 43
560.	PERFORMANCE STANDARDS	Page 500-43 of 43
	APPENDICIES	

LIST OF TABLES

TABLE NO.		PAGE NO.
525a.	SUBSIDENCE REFERENCE GUIDE	Page 500-20 of 43

LIST OF MAPS

MAP NO.		REFERENCE PAGE
521.111	Pleasant Valley Mining District	Page 500-7 of 43
521.122	Surface Features	Page 500-8 of 43
521.124	Valcam Loadout Facility - (Sheet 1 of 4)	Page 500-8 of 43
521.124	Valcam Loadout Facility - (Sheet 2 of 4)	Page 500-8 of 43
521.124	Valcam Loadout Facility - (Sheet 3 of 4)	Page 500-8 of 43
521.124	Valcam Loadout Facility - (Sheet 4 of 4)	Page 500-8 of 43
521.141	Belina No. 1 Mine	Page 500-9 of 43
521.141	Belina No. 2 Mine	Page 500-9 of 43
521.150	Valcam Loadout Facility - (Sheet 1 of 4)	Page 500-10 of 43
521.150	Belina Haul Road - Lower Section - (Sheet 2 of 4)	Page 500-10 of 43
521.150	Belina Haul Road - Upper Section - (Sheet 3 of 4)	Page 500-10 of 43

LIST OF MAPS - (Continued)

MAP NO.		REFERENCE PAGE
521.150	Belina Mine Site - (Sheet 4 of 4)	Page 500-10 of 43
526	Operational Map Index	Page 500-26 of 43
526.100	Valcam Loadout Facility - Sheet O-1	Page 500-26 of 43
526.100	Valcam Loadout Facility - Sheet O-2	Page 500-26 of 43
526.100	Valcam Loadout Facility - Sheet O-3	Page 500-26 of 43
526.100	General Office Area - Sheet O-4	Page 500-26 of 43
527.100	Belina Mine Site - Sheet O-12	Page 500-26 of 43
527.100	Belina Mine Site - Sheet O-13	Page 500-26 of 43
527.100	Belina Mine Site - Sheet O-14	Page 500-26 of 43
527.100	Belina Haul Road - Sheet O-5	Page 500-26 of 43
527.100	Belina Haul Road - Sheet O-6	Page 500-26 of 43
527.100	Belina Haul Road - Sheet O-7	Page 500-26 of 43
527.100	Belina Haul Road - Sheet O-8	Page 500-26 of 43
526.100	Belina Haul Road - Sheet O-9	Page 500-27 of 43
526.100	Belina Haul Road - Sheet O-10	Page 500-27 of 43
526.100	Belina Haul Road - Sheet O-11	Page 500-27 of 43
550	Valcam Loadout Facility - Sheet R-1	Page 500-39 of 43
550	Belina Haul Road - Sheet R-2	Page 500-39 of 43
550	Belina Haul Road - Sheet R-3	Page 500-39 of 43
550	Belina Mine Site - Sheet R-4	Page 500-39 of 43
550	Valcam Cross Sections - Sheet R-5	Page 500-39 of 43
550	Belina Haul Road Cross Sections - Sheet R-6	Page 500-39 of 43
550	Belina Mine Site Cross Sections - Sheet R-7	Page 500-39 of 43

R645-301-500. ENGINEERING.

510. INTRODUCTION.

The Engineering section of the Mine Permit Renewal Application is divided into the operation plan, reclamation plan, design criteria, and performance standards. All of the activities associated with the mining and reclamation operations are designed, located, constructed, maintained, and those considered reclaimed are in accordance with the operation and reclamation plan. All of the design criteria associated with the operation and reclamation plan have been met.

511. GENERAL REQUIREMENTS.

511.100. THROUGH 511.300.

This Mine Permit Renewal Application includes descriptions of the mining and reclamation operations with attendant maps, plans, and cross sections and its potential impacts to the environment as well as methods and calculations utilized to achieve compliance with design criteria and reclamation.

512. CERTIFICATIONS.

512.100. MAPS AND CROSS SECTIONS.

All maps and cross sections specified under 512.100 through 512.150 are prepared by, or under the direction of, and certified by a qualified, registered, professional engineer or land surveyor, with assistance from professionals of related fields. All maps and cross sections will be updated when necessary.

512.200. PLANS AND ENGINEERING DESIGN.

All plans and engineering designs for excess spoil, durable rock fills, coal mine waste, impoundments, primary roads and variances from approximate original contour will be certified by a qualified registered professional engineer. ~~See Hydrology R614-301-700.~~

512.210. EXCESS SPOIL.

The professional engineer experienced in the design of earth and rock fills will certify the design according to 535.100.

512.220. DURABLE ROCK FILLS.

The professional engineer experienced in the design of earth and rock fill will certify that the durable rock fill design will ensure the stability of the fill and meet design requirements according to 535.100 and 535.300.

512.230. COAL MINE WASTE.

The professional engineer experienced in the design of similar earth and waste structures will certify the design of the disposal facility according to 536.

512.240. IMPOUNDMENTS.

The professional engineer will use current, prudent, engineering practices and will be experienced in the design and construction of impoundments and certify the design of the impoundment according to 743.

512.250. PRIMARY ROADS.

The professional engineer will certify the design and construction or reconstruction of primary roads as meeting the requirements of 742.420.

512.260. VARIANCE FROM APPROXIMATE ORIGINAL CONTOUR.

The professional engineer will certify the design for the proposed variance from the approximate original contour, as described under 270, in conformance with professional standards established to assure the stability, drainage and configuration necessary for the intended use of the site.

513. COMPLIANCE MHSA REGULATIONS AND APPROVALS.

513.100. COAL PROCESSING WASTE DAMS OR EMBANKMENTS.

There are no coal processing waste dams or embankments constructed within the Mine Permit Area. Should coal processing waste dams or embankments become necessary compliance with MSHA, 30 CFR 77.216-1 and 77.216-2 will be met. (see 528.~~400~~ and 536.820).

513.200. IMPOUNDMENTS/SEDIMENT PONDS.

There are no impoundments/sediment ponds which meet the MSHA size or qualifying criteria within the Mine Permit Area. Should impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) become necessary compliance with the requirements of MSHA, 30 CFR 77.216. will be met. (see 533.600, 742.222, and 742.223).

513.300. DISPOSAL OF UNDERGROUND DEVELOPMENT WASTE
COAL PROCESSING WASTE, OR EXCESS SPOIL.

Should it become necessary to dispose underground development waste, coal processing waste, or excess spoil in the underground mine workings, it shall be accomplished in accordance MSHA and the Division (see 528.321)

513.400. REFUSE PILES.

There are no refuse piles associated with the Mine Permit Area. In the event construction of a refuse pile(s) is necessary, the requirements of MSHA, 30 CFR 77.214 and 77.215 will be met. (see 536.900).

513.500. SURFACE OPENINGS.

Each shaft, drift adit, tunnel, exploratory hole, entry or other opening to the surface from the underground will be capped, sealed, backfilled or otherwise properly managed consistent with MSHA, 30 CFR 75.1771 (ref. to 551).

513.600. DISCHARGES INTO AN UNDERGROUND MINE.

Currently there is no discharge into the underground mine openings, nor is any planned in the future at this point in time. The underground mine openings were graded near the portal mouth so as not to allow drainage from outby to flow into the mine.

There will be no discharge into the underground mine openings prior to approval by MSHA and the Division. (see 731.511.4).

513.700. SURFACE COAL MINING AND RECLAMATION ACTIVITIES. (TIMING AND SEQUENCE)

N/A

513.800. COAL MINE WASTE FIRES.

All fires (intentional or unintentional) are extinguished in accordance with MSHA Regulations by personal specifically trained in fighting coal mine fires. These people are trained according to an MSHA approved fire fighting plan.

Coal mine waste fires are extinguished in accordance with a plan approved by MSHA and the Division (see 528.220).

Coal stockpile fires are extinguished as quickly as possible, the hot spots are removed from the stockpile, spread out and cooled with water and the coal is promptly returned to the stockpile.

514. INSPECTIONS.

All engineering inspections will be conducted by a qualified registered professional engineer or other qualified professional specialist under the direction of the qualified engineer, except as described under 514.330.

514.100. THROUGH 514.114. EXCESS SPOIL INSPECTIONS.

Monitoring of all excess spoil fill will be conducted by the qualified registered professional engineer or specialist through out the duration of the project, which includes

foundation preparation, removal of organic material and topsoil, placement of underdrains, protective filter systems, final surface drainage systems, final grading and revegetation of the fill(s).

514.120. EXCESS SPOIL CERTIFIED REPORTS.

Certified reports will be provided to the Division by the qualified registered professional engineer promptly after each inspection of the fill(s) indicating proper construction and maintenance as designed and that it is in accordance to the approved plan and and R645-302 Rules. The report will include any structural instability, weakness, or hazardous condition.

514.130. EXCESS SPOIL DRAINAGE SYSTEM AND PROTECTIVE FILTERS CERTIFIED REPORTS.

514.131.

Certified reports will include color photographs during and after construction, prior to being covered with the spoil. This pertains to segmented construction as well.

514.132.

Excess durable rock spoil placed in single or multiple lifts where the underdrain system is constructed simultaneously with excess spoil placement by the natural segregation of dumped materials, in accordance with 535.300 and 745.300, color photographs will be taken of the underdrain as the underdrain system is being formed.

514.133.

Photographs will be of adequate size, scale, and number to depict the site features.

514.140. INSPECTION REPORTS.

Copies of all inspection reports will be kept at the General Office.

514.200. REFUSE PILES.

Valley Camp has not constructed any refuse piles. Should it become necessary to construct a refuse pile(s) a professional engineer or specialist experienced in the construction of similar earth and waste structures will inspect the refuse pile during construction.

514.210.

Regular inspections by the engineer or specialist will also be conducted during placement and compaction of coal mine waste materials. More frequent inspections will be conducted if a danger of harm exists to the public health and safety or the environment. Inspections will continue until the refuse pile has been finally graded and revegetated or until a later time as required by the Division.

514.220. THROUGH 514.224.

Such inspection will be made at least quarterly throughout construction and during the following critical construction periods of foundation preparation, including the removal of all organic material and topsoil, the placement of underdrains and protective filter systems, the installation of final surface drainage systems, and the final graded and revegetated facility.

514.230.

A qualified registered professional engineer will provide a certified report to the Division promptly after each inspection that the refuse pile has been constructed and maintained as designed and in accordance with the approved plan and R645 Rules. The report will include appearances of instability, structural weakness, and other hazardous conditions.

514.240.

A certified report on the drainage system and protective filters will include color photographs taken during and after construction, and before underdrains are covered with coal mine waste. If the underdrain system is constructed in phases, each phase will be certified separately. The photographs accompanying each certified report will be taken in adequate size and number with enough terrain or other physical features of the site shown to provide a relative scale to the photographs and to specifically and clearly identify the site.

514.250.

Copies of each inspection report will be retained at the General Office.

514.300. IMPOUNDMENTS.

514.310. THROUGH 514.313 CERTIFIED INSPECTIONS.

There ~~is~~ ~~are~~no impoundments which meet the MSHA requirements within the Mine Permit Area. Should it become necessary to construct such an impoundment the following will be complied with:

CERTIFIED INSPECTION

A professional engineer or specialist experienced in the construction of impoundments will inspect the construction of the impoundment and the engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or the other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedure and instrumentation and any other aspects of the structure affecting stability.

The professional engineer or specialist experienced in the construction of impoundments will also inspect such impoundment(s) at least yearly until removal of the structure or release of the performance bond.

Impoundments, not subject to MSHA, 30 CFR 77.216, will be examined at least quarterly by a qualified person designated by the operator for appearance of structural weakness and other hazardous conditions.

514.320. WEEKLY INSPECTIONS.

WEEKLY INSPECTION

Impoundments subject to MSHA, 30 CFR 77.216 will be examined in accordance with 30 CFR 77.216-3.

514.330. QUARTERLY INSPECTIONS.

QUARTERLY INSPECTION

Other impoundments, not subject to MSHA, 30 CFR 77.216 will be monitored quarterly by a qualified person designated by the operator for appearance of structural weakness and other hazardous conditions.

515. REPORTING AND EMERGENCY PROCEDURES.

515.100.

At any time a slide occurs which may have a potential adverse effect on public health, safety or the environment, Valley Camp will notify the Division as soon as possible and will comply with the remedial measures required to stabilized the slide.

515.200. IMPOUNDMENT HAZARDS.

If during an examination or inspection of an impoundment, there is a potential hazard discovered, the person(s) who have examined the impoundment will inform the Division of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented, the Division will be notified immediately.

515.300. TEMPORARY CESSATION.

515.310. THROUGH 515.311.

During a temporary cessation, provisions of the approved permit will be carried out. All mine portals will be maintained and the surface facilities will be secured where there is no current operations.

515.320.

Should a temporary cessation of coal mining and reclamation operations of ~~90~~30days or more occur, the division will be notified by registered letter, which will contain the following required information.

1. Exact number of surface acres,

2. Horizontal and vertical extent of subsurface strata in the Mine Permit Area prior to cessation,

3. Extent and kind of reclamation of surface area which will have been accomplished, and identification of the backfilling, regrading, revegetation, environmental monitoring, portal closures and water treatment activities taking place during temporary cessation.

520. OPERATION PLAN.

521. GENERAL.

This plan includes maps, cross sections, narratives, descriptions, and calculations indicating how the relevant requirements are met. Also the permit describes and identifies the lands subject to coal mining and reclamation operations over the estimated life of the operations.

521.100. CROSS SECTIONS AND MAPS.

Cross sections and maps show all relevant information required by the Division. See the Map index.

521.110. PREVIOUSLY MINED AREAS.

521.111.

Pleasant Valley Mining District Map 521.111 shows the approximate location and extent of known workings of active, inactive, or abandoned underground mines, including mine openings to the surface within the Mine Permit Area and adjacent areas. ~~These maps are prepared and certified according to R614-301-512.~~ The Pleasant Valley Mining District Map, is not intended to be certified, as only the larger mines are depicted to show general reference to the District.

Map 521.111

521.120. EXISTING SURFACE AND SUBSURFACE FACILITIES AND FEATURES MAPS.

521.121.

The maps show all buildings ~~and~~within 1000 feet of the Mine Permit Area, with identification of the current use of the buildings (see Maps 521.124 Sheets 1 through 4).

521.122.

Location of surface and subsurface man-made features within, passing through, or passing over the Mine Permit Area are depicted on Map 521.122.

Map 521.122

521.123.

All public roads located in or within 100 feet of the Mine Permit Area are shown on Permit Area Base Map 100.

521.124.

All pertinent features of this section are exhibited on ~~the following 100 scale m~~Maps 521.124 Sheet 1 through Sheet 4.

~~TITLE~~	~~DRAWING NO.~~	~~SHEET NO.~~
~~Valcam Loadout Facility~~	~~521.124.~~	~~Sheet 1~~
~~Belina Haul Road~~	~~521.124.~~	~~Sheet 2~~
~~Belina Haul Road~~	~~521.124.~~	~~Sheet 3~~
~~Belina Mine Site~~	~~521.124.~~	~~Sheet 4~~

Map 521.124 - (Sheet 1 of 4)
Map 521.124 - (Sheet 2 of 4)
Map 521.124 - (Sheet 3 of 4)
Map 521.124 - (Sheet 4 of 4)

521.125.

For the location of each sedimentation pond (001A through 004A) and the filter pond (005A), see 521.124.

521.130. LANDOWNERS AND RIGHT OF ENTRY AND PUBLIC INTEREST MAPS.

521.131.

All boundaries of lands and names of present owners of record of both surface and subsurface within the Mine Permit Area are shown on the Surface Ownership Map 112.500 and the Coal Ownership Map 112.600, respectively.

521.132.

The permit boundary is shown on all applicable maps.

521.133. THROUGH 521.133.2.

N/A

521.140. MINE MAPS AND PERMIT AREA MAPS.

521.141.

The boundaries of all areas affected over the estimated total life of the coal mining and reclamation operations, with size, sequence and timing of the mining of subareas for the lands to be affected. See maps 521.141a and 521.141b.

Map 521.141a
Map 521.141b

Within the Disturbed Area Boundary four types of disturbances exist and are shown on Sediment Control Facilities Maps 731.720a through 731.720d.

521.142. PLANNED SUBSIDENCE MINING METHODS.

~~The subsidence "Draw Angle" lines as well as the mine plan forecast exhibits past, present and future mining methods used to control and minimize subsidence related damage. See Maps R614-301-521.141.A and 521.141.B.~~

Mining conducted at Valley Camp is accomplished utilizing the "Room and Pillar" method of mining. No other mining methods have ever been used within any of the Valley Camp mines here in Utah, nor are they planned to be used in the immediate future. Should any change be made in methods used, UDOGM will be notified.

Subsidence "Projected Draw Angles" and "Mine Plan Projection Lines" are utilized by Valley Camp to plan mining activities in conformance with the regulations as they relate to the protection of surface features in that they prevent, control, or minimize subsidence and subsidence related damage. See Maps 728.100a and 728.100b.

521.143. DISPOSAL SITES.

The only disposal site(s) to date are garbage hoppers within the Mine Permit Area.

521.150. LAND SURFACE CONFIGURATION MAPS.

~~All design related contour maps are 1" = 50' with 5' contours or 1" = 100' with 5' contours. The 1" = 50' maps that are related to operations are be identified by Title, Regulation No., R614-301-5..... and with a Sheet No.. beginning with O for operations, for example, Sheet No. O-1 through....The reclamation maps are identified by Title, Regulation No. R614-301-5..... and with a Sheet No. beginning with R for reclamation, for example, Sheet No. R-1 through....~~

Maps 521.150 Sheet 1 through Sheet 4 show Valley Camp disturbed area boundaries within the Mine Permit Area.

Map 521.150 Sheet 1 of 4
Map 521.150 Sheet 2 of 4
Map 521.150 Sheet 3 of 4
Map 521.150 Sheet 4 of 4

521.151.

All design related contour maps show contours at least 100' above and below the coal outcrop where applicable.

521.152.

The maps showing previously mined areas have contour lines at least 100' beyond the limits of mining disturbances where applicable.

The "adjacent to" previously mined areas are shown on the mine maps, but are based on historic data and were not certified by the criteria of today's standards.

521.160. MAPS AND CROSS SECTIONS OF THE PROPOSED FEATURES FOR THE PROPOSED PERMIT AREA.

521.161. THROUGH 521.169.

At this point in time no new surface features are planned.

521.170. TRANSPORTATION FACILITIES MAPS.

The transportation facilities are shown on ~~the following m~~Maps 521.124 Sheet 1 through Sheet 4.

521.200. SIGNS AND MARKERS SPECIFICATIONS.

521.210. THROUGH 521.230.

Signs and markers are posted, maintained, and will be removed by Valley Camp and are uniform design that can be readily seen and read; durable; and conform to local laws and regulations.

521.240. THROUGH 521.244. MINE AND PERMIT I.D. SIGNS.

Identification signs are displayed at each point of access to the Mine Permit Area from public roads and display name, address, phone number, and UDOGM I.D. number of the permittee. ~~Also these s~~Signs will be maintained until after the release of all bonds for the Mine Permit Area.

521.250. PERIMETER MARKERS.

521.251.

All perimeter markers are clearly marked with orange markings on trees, orange or red painted "tee" posts.

521.260. BUFFER ZONE MARKERS.

521.261.

Buffer zone signs are located so as to prevent disturbance by the surface facility operations and meet the requirements of 731.600.

521.270. TOPSOIL MARKERS.

Topsoil signs are in place at the Belina Mine Site and at the Valcam Loadout Facility. The sign at Belina is 18" x 24" and reads;

BELINA MINE
TOPSOIL
STORAGE AREA
DO NOT DISTURB

~~The sign at Valcam is 18" x 24" and reads;~~

~~**VALCAM LOADOUT FACILITY**~~
~~**VEGETATION SUPPORTING MATERIAL**~~
~~**DO NOT DISTURB**~~

522. COAL RECOVERY.

Valley Camp of Utah, Inc. operates the Belina No. 1 Mine (currently idle), and the Belina No. 2 Mine, both of which are near the head of Whisky Canyon, approximately 4.5 miles south of Scofield, Utah. Mining is currently being conducted in accordance with the Permit approved February 10, 1977, and Utah Division of Oil, Gas, and Mining Permit ACT/007/001.

The Valley Camp operation originated under the Coal Exploration and Mining Operations Rules, 30 CFR 211, which governed operations for the exploration, development, and production of coal from Federal lands in accordance with the requirements of the Mineral Leasing Act of 1920 and its amendments. In 1983 Valley Camp provided Minerals Management Service with a cross-reference index from the State regulations to the 30 CFR 211 regulations to aid in their review of the MRP. The BLM office for the Price River Resource Area approves all Valley Camp mining plans and modifications, as well as inspects the mine(s) to assure there are no detrimental effects on recoverable reserves and that Valley Camp satisfies the requirements of maximum economic recovery of the federal coal resource. Please refer to the 1984 OSM Technical Analysis, Chronology of Events, Date; February 10, 1997, Event USGS issues 211 permit for Belina #1 mine covering the existing Belina #1 mine (Upper O'Connor seam).

The Belina No. 1 Mine and the Belina No. 2 Mine are located in the Upper and Lower O'Connor Seams, respectively. Each seam ranges in thickness from 5 feet to 25 feet, with the average of each being approximately 16 feet. Also see 523. The Belina Mines are currently operating under an approved Mine Plan approved by the Bureau of Land Management. As part of the approval Valley Camp is required to maximize the use and conservation of the coal resource, using the best technology currently available as well as protect the integrity of the land.

The Belina Mines are surrounded by major faults and will have virtually no impact to adjacent coal reserves as outcrop entry into the coal seams are not readily available leaving shaft access as the only feasible entry into the coal seams.

523. MINING METHOD(S).

The Mine Plan calls for mining in the upper 12 feet of each coal seam. Approximately 2 feet of the upper-most coal are left in place to aid roof support. The next 10 feet (first mining) below is mined using a continuous miner. The remaining bottom coal is then extracted during the retreat (second mining) from each mining section.

Development mining techniques include a main entry system, a sub-main entry system developed off the mains, and room and pillar panels which are developed off the sub-mains. Components of each are described as follows:

a. Main Entry System-South-Composed of 5 entries (4 intakes and 1 neutral belt line), and 3 return entries on each side.

b. Main Entry System-West-Consists of 5 entries, 2 intakes, 2 returns and 1 neutral belt line.

c. Sub-main systems developed using 3 entries, 1 intake, 1 neutral belt line and 1 return.

d. Room and pillar entries consist of Multi-entries, intakes, returns, and 1 neutral belt line.

e. Room and pillar entries (bottom coal) Mid 1989, utilizes multi-intakes, 1 neutral belt line and multi-returns.

Room and pillar mining has been the only production method employed thus far.

For safety and recovery maximization, the Upper O'Connor coal seam will be mined first in a particular location. Other mining methods which would improve utilization of the resource by increasing recovery are presently being investigated.

At present, protection of the gas lines is provided by limiting pillar extraction under these lines. The size of the restricted area of mining is determined by a 35 degree angle-of-draw from the gas lines down to the seams. It is hoped that negotiations with the gas company and Federal and State agencies will result in the assumption of a steeper angle of draw, thus increasing the recovery while providing adequate support for the gas lines.

Non-recovery areas within the Mine Permit Area are only those areas remaining between mined out sections used for ventilation barriers, property line barriers, areas where the seams are so thin that mining is uneconomical, areas where adverse mining conditions jeopardize the safety of employees and areas within a 150 foot radius of all oil and gas wells located in the Mine Permit Area (State and Federal requirements).

The current Mine Plan is described as the "Double Lift" mining method. This method utilizes a Remote Control Continuous Miner developing seven entries incorporating 60'x 60'room (X-Cuts) centers. The double lift mining will leave 18' to 20' high pillars with cross-sectional dimensions of 40'x 40'.

For further details see the Ground Control Study For Double Lift Mining Panels; August 1989; Kenneth C. Ko & Associates report. Appendix 523 Labeled "Confidential". Copies are held at the Division office in Salt Lake City, Utah.

The current design production level is 450,000 tons per year for Belina No. 2 Mine, actual production rates are below the designed maximum capacity because of present market conditions.

The primary mining equipment includes:

Joy 12RC continuous miner	Joy 12CM continuous miners
Joy 10SC shuttle cars	ATS roof bolters
Long-Airdox feeder breakers	Mantrips

The coal is cut from the working face by a Joy 12CM or Joy RCCM miner. Joy 10SC shuttle cars transport the coal to a Long-Airdox feeder breaker, which reduces the coal to a size compatible for the belt conveyors transporting the coal to the surface stockpile, used by both mines.

A variety of loaders, ramcars, compressors, transformers, and other miscellaneous support equipment are also used underground.

Reserve calculations are based upon a five foot cutoff height due to economic and equipment constraints.

An underground reclaimer belt transports the coal from the outside stockpile to a 30 ton truck loading bin. The coal is then hauled to the Valcam Loadout Facility by a contract trucking company. The contractor utilizes bottom-dump trailers pulled in tandem, or one bottom dump trailer during inclement weather. Because of the moisture content of the product, coal dust emitted from haulage activities is not a problem. In the event coal dust does become a problem, the appropriate control measures will be taken.

Spillage is controlled by limiting the trucks to loads which will not spill over the tops of the trailers while cornering, and by instructing drivers to keep the trailer dump gates closed during return trips.

The Roof Control Plan has been approved by MSHA. Their approvals are based on specific site conditions, mining experience in the area, and geologic information available. The approved Roof Control Plan addresses size of underground openings, pillar size, roof support methods, cross-cut centers, and coal recovery methods.

The design and operation of the mines comply with accepted engineering practices, and with all regulatory requirements. Ventilation Plan, Roof control Plan, and all other MSHA required plans are on file with MSHA and in the Belina Mine Office.

523.100. SURFACE COAL MINING AND RECLAMATION (ACTIVITIES PROPOSED WITHIN 500 FEET OF AN UNDERGROUND MINE)

The Valcam Loadout Facility and the Utah No. 2 Mine (prelaw mine) now closed and sealed is in fact located within the 500 foot limitations of the old Utah No. 1, which is the oldest known mine in the Pleasant Valley Mining District. The General Office Area, Belina Haul Road, or the Belina Mines are not within the 500 foot limitations of any known abandoned underground coal mine(s).

523.200. SURFACE COAL MINING AND RECLAMATION ACTIVITIES. (CONDUCTED CLOSER THAN 500 FEET OF AN UNDERGROUND MINE.)

The Utah No. 2 Mine and the coal handling facilities (known as the Valcam Loadout Facility) are closer than 500 feet of the old Utah No. 1 Mine and are exhibited on an MSHA Approved mine map, however the old Utah No. 1 Mine maps can not be certified by todays standards.

In the event that new mining or new reclamation activities are proposed within 500 feet of the adjacent workings of the Utah No. 1 Mine, Valley Camp will seek approval from MSHA and the Division in accordance with the requirements of this section.

524. BLASTING AND EXPLOSIVES.

Valley Camp of Utah, Inc. will not routinely utilize surface blasting for underground coal mining activities. In accordance with the requirements of this section, a blasting plan will be provided to the Division and MSHA when required. Each blasting plan will contain a description of any system to be used to monitor compliance with the standards of 524.600 including the type, capability, and sensitivity of any blast-monitoring equipment and proposed procedures and within 500 feet of active underground mines require approval of MSHA. Blasts that use more than five pounds of explosive or blasting agent will be conducted according to the schedule provided under 542.400.

524.100. BLASTERS CERTIFICATION.

Valley Camp will, prior to conducting any surface blasting operations, ensure that all surface blasting operations incident to underground coal mining in Utah will be conducted under the direction of certified blaster. Certificates of blaster certification will be carried by blasters or will be on file at the Mine Permit Area during blasting operations. A blaster and at least one other person will be present at the firing of a blast.

Persons responsible for blasting operations at a blasting site will be familiar with the blasting plan and site-specific performance standards and give on-the-job training to persons who are not certified and are assigned to the blasting crew or assist in the use of explosives.

Valley Camp has no immediate plans necessitating the use of explosives, therefore no detailed blasting plans are present in the permit. In the event blasting is required to facilitate construction or demolition, a blast design will be submitted for all blasts conducted within 1,000 feet of any building used as a dwelling, public building, school, church, or community or institutional building outside the permit area or within 500 feet of an active or abandoned underground mine (MSHA). The blast design requiring more than five pounds of explosive or agent, will be submitted for Division and MSHA approval, prior to blasting. The blast design will contain sketches of the drill and delay patterns, decking, type and amount of explosives required per blast, critical dimensions, design factors utilized to protect the public, general location map of protected structures, and meet the applicable airblast, flyrock, and ground vibration standards in 524.600.

The blast design will be prepared using accepted standard design practices and signed by a certified blaster.

524.300. PREBLASTING SURVEY.

A preblasting survey will be conducted when more than five pounds of blasting agent or explosive per blast is to be used.

As part of the preblasting survey Valley Camp will:

I. Notify, in writing, all residents or owners of dwellings or other structures located within one-half mile of the blasting site in the Mine Permit Area how to request a preblasting survey at least 30 days before initiation of blasting.

II. Any resident or owner of a dwelling or structure within one-half mile of the blasting site in the Mine Permit Area who requests a preblasting survey in writing, directly to Valley Camp of Utah, Inc. or to the Division, will have a preblast survey conducted by Valley Camp of the dwelling or structure and promptly prepare a written report of the survey. An updated survey of any additions, modifications, or renovations will be performed by Valley Camp if requested by the resident or owner.

III. Valley Camp will determine the condition of the dwelling or structure and will document any preblasting damage and other physical factors that could reasonably be affected by the blasting. Structures such as pipelines, cables, transmission lines, and cisterns, wells, and other water systems warrant special attention; however, the assessment of these structures may be limited to surface conditions and other readily available data.

IV. A written report of the survey will be signed by the person who conducted the survey. Copies of the report will be promptly provided to the Division and to the person requesting the survey. If the person requesting the survey disagrees with the contents and/or recommendations contained therein, he or she may promptly submit to both Valley Camp and the Division a detailed description of the specific areas of disagreement.

V. Any surveys requested more than ten days before the planned initiation of blasting will be completed prior to blasting.

524.400.

All blasting will be conducted between sunrise and sunset unless nighttime blasting is approved by the Division which exhibits the public will be protected from adverse noise and other impacts. The residents and local governments within one-half mile of the blasting site will receive written notification of the proposed times and locations of the blasting operation. Notice of blasting schedule may be announced weekly, but in no case less than 24 hours prior to blasting.

Unscheduled blasts will be conducted only where public or operator health and safety so requires and for emergency blasting actions. When an unscheduled surface blast incidental to the coal mining and reclamation operation occurs, the use of audible signals, will notify residents within one-half mile of the blasting site and will be recorded in the blasting records of why the unscheduled blasting was required.

524.500. BLASTING AND WARNING SIGNS, ACCESS CONTROL.

Blasting signs will read "**BLASTING AREA**" and be conspicuously placed along the edge of any blasting area that comes within 100 feet of any public road Right-of-Way, and at the point

where any other road provides access to the blasting area. At all entrances to the Mine Permit Area from public roads or highways, signs conspicuously placed which read **"WARNING! EXPLOSIVES IN USE"**, which clearly list and describe the meaning of the audible blast warning and all-clear signals in use, and explain the identification of blasting areas where charged holes await firing at the blasting site in the Mine Permit Area.

Warning and all-clear signals of different character or pattern that are audible within a range of one-half mile from the point of the blast will be given. Each person who resides or works regulary within one-half mile of the blast site in Mine Permit Area will be notified of the meaning of the signals as required in the blasting notification.

Access within the blasting areas will be controlled to prevent presence of livestock or unauthorized persons during blasting and until an authorized representative of Valley Camp has reasonably determined that no unusual hazards, such as imminent slides or undetonated charges, exist; and, access to and travel within the blasting area can be safely resumed.

524.600. ADVERSE EFFECTS OF BLASTING.

Blasting will be conducted to prevent injury to persons, damage to public or private property outside the Mine Permit Area, adverse impacts on any underground mine, and change in the course, channel, or availability of surface or ground water outside the Mine Permit Area.

Airblast Limits. Airblast will not exceed the maximum limits listed below at the location of any dwelling, public building, school, church, or community or institutional building outside the Mine Permit Area, except for those structures and facilities owned by Valley Camp as approved by the Division. Maximum Airblast Limits are as follows:

Lower Frequency Limit of Measuring System, HZ (+ or - 3dB)	Maximum Level dB
0.1 Hz or lower-flat response*	134 peak
2 Hz or lower-flat response	133 peak
6 Hz or lower-flat response	129 peak
C-weighted - slow response*	105 peak dBC

* Only when approved by the Division.

Monitoring. Periodic monitoring will be conducted to ensure compliance with the airblast standards. The Division may require airblast measurements and specify locations at which such measurements are taken. Should such monitoring by required, the measuring systems used will have an upper-end flat frequency response of at least 200 Hz.

Flyrock. Flyrock traveling in the air or along the ground will not be cast from the blasting site - more than one-half the distance to the nearest dwelling or other occupied structure; beyond the area of blasting access control or beyond the Mine Permit Area Boundary.

Ground Vibration. In all blasting operations, except as otherwise authorized by the Division, the maximum ground vibration will not exceed the values approved by the Division. The maximum ground vibration for protected structures will be in accordance with the maximum peak-particle-velocity limits, the scaled-distance equation, the blasting-level chart, or by the Division. All other structures in the vicinity of the blasting area such as water towers, pipelines and other utilities, tunnels, dams, impoundments, and underground mines will be protected from damage by establishment of a maximum allowable limit on the ground vibration. These limits will be submitted by Valley Camp and approved by the division prior to blasting.

Maximum Peak-Particle Velocity. The maximum ground vibration will not exceed the following limits at the location of any dwelling, public building, school, church, or community or institutional building outside the Mine Permit Area in accordance with the following:

EXPLOSIVES

Distance (D) from Blast Site (ft)	Maximum allowable Particle Velocity (Vmax) for ground vibration (in/second)*	Scaled distance factor to be applied without seismic monitoring** (Ds)
0 to 300	1.25	50
301 to 5,000	1.00	55
5,001 and beyond	0.75	65

* Ground vibration will be measured as the particle velocity. Particle velocity will be recorded in three mutually perpendicular directions. The maximum allowable peak particle will apply to each of the three measurements.

** Applicable in the scaled-distance equation of 524.651 A seismographic record will be provided for each blast.

Scaled-distance equation. Valley Camp may use the scaled-distance equation, W=(d/Ds)**, to determine the allowable charge weight of explosives to be detonated in any eight-millisecond period, without seismic monitoring: where W=the maximum weight of explosives, in pounds: D=the distance, in feet, from the blasting site to the nearest protected structure: and Ds=the scaled-distance factor, which may initially be approved by the division using the values for scaled-distance factor.

The development of a modified scaled-distance factor, may be authorized by the Division on receipt of a written request by Valley Camp, supported by seismographic records of blasting at the mine site. The modified scaled-distance factor of the predicted ground vibration will not exceed the prescribed maximum allowable peak particle velocity at a 95-percent confidence level.

Blasting-Level-Chart. The ground-vibration limits may be used ~~as Figure 1, in Section 524.661~~ to determine the maximum allowable ground vibration. ~~If the Figure 1 limits are used, a~~A seismographic record including both particle velocity and vibration-frequency levels will be provided for each blast. The method for the analysis of the predominant frequency contained in the blasting records will be submitted by Valley Camp and approved by the Division prior to application of this alternative blasting criterion.

The maximum airblast and ground-vibration standards shown above will not apply at the following locations: At structures owned by Valley Camp and not leased to another person; and at structures owned by Valley Camp and leased to another person, if a written waiver by the lessee is submitted to the Division prior to blasting.

524.700 RECORDS OF BLASTING OPERATIONS.

Blasting records will be maintained at the General Office for at least three years and upon request, blasting records will be available for inspection by the Division or the public. Blasting records will contain a record, including: the name of mining company or other authorized contractor conducting the blast; location, date, and time of the blast; name, signature, and certification number of the blaster conducting the blast; his assistant's name, identification, direction, and distance, in feet, from the nearest blast hole to the nearest dwelling, public building, school, church, community or institutional building outside the Mine Permit Area, except those structures and facilities owned by Valley Camp; and, weather conditions, including those which may cause possible adverse blasting effects.

The record of the blast will include: The type of material blasted; sketches of the blast pattern including number of holes,burden, spacing, decks, and delay pattern; diameter and depth of holes; types of explosives used; total weight of explosives used per hole; the maximum weight of explosives detonated in an eight-millisecond period; initiation system; type and length of stemming; and. mats or other protection used.

If required, the record of seismographic and airblast information will include: type of instrument, sensitivity, and calibration signal or certification of annual calibration; exact location of instrument and the date, time, and distance from the blast; name of the person and firm taking the reading, name of the person and firm analyzing the seismographic record; the vibration and/or airblast level recorded; and, the reasons and conditions for each unscheduled blast.

524.800.

Valley Camp will comply with all appropriate Utah and federal laws and regulations in the use of explosives.

525. THROUGH 525.300. SUBSIDENCE. ~~CONTROL PLAN.~~

~~525.100. THROUGH 525.300.~~

It is the desire and intent of this section to summarize issues related to subsidence as required under the regulations. In order to accomplish this, the majority of subsidence issues as they pertain to control and monitoring are outlined and discussed within this section. Subsidence related issues dealing with the effects of subsidence are found within Section 728 along with the discussion of probable hydrologic consequences. Other minor references to subsidence found throughout the permit are discussed briefly at the point of reference, however, where possible, the major discussion dealing with the issue has been condensed within either Section 525 or within Appendix 724.600 ~~Section 728.~~ The following reference guide has been prepared to document which sections of the permit contain the specifics of subsidence.

TABLE 525a.
SUBSIDENCE REFERENCE GUIDE.

REFERENCED SECTION	SECTION CONTENT
222 through 223	Soils Presubsidence Survey
321	Vegetation Presubsidence Survey
322	Fish and Wildlife Presubsidence Survey
522 through 523	Coal Recovery and Mining Methods
525	Control, Monitoring, & Mitigation Plan
728	Probable Hydrologic Consequences

SUBSIDENCE CONTROL PLAN

The forest land is classed as a renewable resource, and as such, will be afforded ~~maximum~~ subsidence protection as outlined within this permit in order to ensure future productivity of the forest and at the same time maximize the use of the natural coal resources of the area as required under 522. Steps being taken by Valley Camp to maximize this resource while controlling the limits and effects of subsidence include the following:

- Valley Camp coal recovery operations currently utilize the "Room and Pillar" method of mining. This mining method has historically been the method showing the least amount of overall subsidence to surface features, and as discussed under regulation 525.210, Valley Camp has opted not to adopt other methods of mining at this point in time in lieu of the "Room and Pillar" method.

- Mining within the Valley Camp permit area is conducted in a manner to attempt to follow the overall mining projections shown on mining maps contained within the permit. The extent of mining is controlled by faulting and by the angle of draw from identified surface features such as existing gas lines, etc.. The approved MMS ~~Our~~ plan calls for an angle-of-draw of 35 degrees for limited extraction. If at any future time ~~the~~ monitoring ~~study~~ indicates a different angle-of-draw, ~~our~~ the plan will be modified. ~~The basis for the self healing characteristics can be found in the Vaughn Hansen Associates Report.~~

- As per the report entitled "Subsidence Potential over Two-Seam Developments" prepared in March 1991 by Kenneth C. Ko & Associates, Inc., Valley Camp has the intention of maintaining a standard overburden of at least 200 feet. This overburden was identified as the minimum amount required to protect against "Plug" type subsidence under full seam recovery.

- A buffer zone of at least 150 feet is left around natural gas wells located within the mine area. According to information obtained from consultants and our understanding of local angle of draw characteristics, subsidence should not ~~cause~~ damage ~~to~~ the wells.

The Subsidence Base Maps 728.100a and 728.100b~~525. which is currently being compiled,~~ shows angle of draw, survey monument information, gas line locations, power lines and other pertinent surface features related to subsidence.

~~The only structures which could be damaged if subsidence occurs are the gas pipelines. These structures will be protected by limiting extraction directly under the pipelines and within an area including a 35 degree angle of draw from the lowest coal seam to be mined. These buffer areas are shown on the Belina No. 1 and 2 mine maps.~~

~~Also included as part of the Subsidence Plan is approval from the MMS for using a 35 degree angle of draw for limited extraction. It is anticipated that the true draw angle will be determined when the actual subsidence data are available.~~

~~SUBSIDENCE MONITORING PLAN~~

In 1987, the Manti-Lasal National Forest USDA withdrew from the subsidence monitoring program, and in 1988 Valley Camp committed to conduct~~ing~~ annual aerial surveys ~~annually~~ in an effort to monitor subsidence. In response to that commitment, ~~During 1988 and 1989,~~ both the aerial survey and the pedestrian survey were completed during the summer of 1988 and 1989. The aerial surveys completed proved unable to produce data which could be utilized for the construction of a Subsidence Map because of heavy forestation which is characteristic of currently subsided areas. The pedestrian survey, in coordination with a differential level survey of subsided areas utilizing rebar monuments, has proved to be the most reliable source for the identification of surface disturbance. The pedestrian survey have been conducted annually since 1982 by Hansen, Allen & Luce, Inc. and the controlled survey has been completed by Bruce T. S. Ware. Data recorded as part of these surveys is documented on Maps 728.100a and 728.100b.

~~With the 1990 differential level survey data gathered from the rebar network over East Mains of Belina No. 1 and 2 mines, (Bruce T. S. Ware- RLS) and the Pedestrian Survey (HAL, Inc.), a~~

~~Subsidence Map (R614-301-525.) will be generated and a new Subsidence Monitoring Plan will be derived with the assistance and approval of the Division.~~

~~The Subsidence Monitoring Plan will be included as an Appendices to the MRP upon approval.~~

As part of the monitoring plan the following conditions will be met by Valley Camp:

- One copy of the Subsidence Map and data will be submitted to the Division each year. The subsidence map and data will be part of the annual subsidence report which will be prepared and submitted to the Division within the first quarter of the following year.

- The Subsidence Monitoring Plan will continue for at least five years following reclamation of the mined area. Concurrence of all involved parties would be necessary for any additional annual monitoring for subsidence.

SUBSIDENCE MITIGATION PLAN

~~Aquifers and areas for the recharge of aquifers and other underground waters will suffer minimal adverse impacts from the mining activities. Should subsidence occur, the subsidence cracks will likely seal rapidly, preventing the deep percolation of water and subsequent loss of springs and other water sources (Hansen, 1980). See R614-301-700.~~

It is understood and expected that some subsidence will occur within the Valley Camp permit area as has occurred historically. Continued monitoring of subsidence as described in the preceding section will verify that subsidence is occurring as planned, and within the areas designated on Map 728.100a. Should monitoring discover that subsidence has occurred outside the angle of draw as designated on Map 728.100a, then the following steps to mitigation will be implemented.

- Should material damage be incurred ~~by~~to the ~~Mountain States Resources~~ natural gas pipelines located within the permit area, despite the approved subsidence damage prevention measures, ~~the applicant~~ will be either 1) to repair the damage to the pipelines caused by subsidence from the applicant's mining activities, or 2) to compensate the owner of the pipeline for such damage according to the value of the damaged section of the pipeline at the time that damages occurred.

- Any roads within the mine permit area ~~roads~~ which are materially damaged by subsidence will be repaired and re-graded to restore them to pre-subsidence usefulness.

- The operator will restore to the extent physically and economically feasible the original stream channels of intermittent and perennial streams within the permit area that may be disturbed by underground coal mining activities, including surface subsidence effects.

- Water resources impacted by subsidence will be mitigated according to the plan included within Section 728 including the following actions.

1. Private contractors living within the district could be retained to haul water to specific locations from applicant owned sources within Pleasant Valley.

2. The affected water right could be purchased by the applicant.

3. The applicant has two wells within the Mine Permit Area which could be utilized to supply supplemental amounts of water for both private or industrial use.

4. The applicant could initiate an exchange of water right with the State Engineer to exchange water owned by the applicant in Scofield Reservoir for water currently found at any one of the other 71 springs found within or adjacent to the Mine Permit Area for which water rights have not been filed. This option would in most cases be acceptable to the State Engineer if it could be shown that the spring upon which water is being filed is not critical to downstream rights between the spring and Scofield Reservoir.

~~A presubsidence survey within or adjacent to the Mine Permit Area conducted by Valley Camp of Utah, Inc. has demonstrated that areas for agricultural or silvicultural production of food and fiber and grazing lands are of such low production that they can be classified as non-renewable resource lands.~~

~~These land uses were determined by use of Federal Government land use maps and private consultants. Refer to R614-301-200. and R614-301-300., and to Soil Map (R614-301-223.100.) and Vegetation Map (R614-301-323.100.) respectfully.~~

~~Pursuant to applicant's presently approved Subsidence Control Plan, a cooperative agreement was reached with the Manti LaSal National Forest USDA to monitor subsidence on an annual basis by photogrammetry.~~

~~The basis for the "non-renewable resource land" label was the vegetative work cited elsewhere, when the quality of the rangeland was evaluated. Such a label actually applied to the agricultural portion of the definition of a "Renewable Resource", and not to aquifers and areas for the recharge of aquifers or silvicultural production. Material damage or diminution of value of aquifers are discussed in the Vaughn Hansen Associates Report (1980).~~

~~The basis for the self healing characteristics can be found in the Vaughn Hansen Associates Report.~~

526. MINE FACILITIES.

All structures are in compliance with the requirements of R645-301, and the designs and any modifications to the structures were accomplished with in a professional manner.

The mine structures and supporting facilities are shown on ~~the following 100 scale Reference m~~Maps 521.124 Sheet 1 through Sheet 4.

The mine structures and supporting facilities "As-built" details are shown on the Valley Camp disturbed area ~~following~~ 50 scale ~~design~~ contour base Maps. Maps used for reference to each Mine Permit Area are as shown below. A map index is shown on Map 526.

NUMBER	NAME	DESCRIPTION
	Location: Valcam Loadout Facility	
S-1	Valcam Wellhouse 1974	Wooden structure housing the well and pump and controls
S-1A	Storage Shed 1974	Wooden structure, metal siding and roof
S-1B	Storage Shed 1974	Wooden structure, metal siding and roof
S-2	Valcam Shop 1974	Wooden structure, metal siding and roof, and concrete floor
S-3	Valcam Shop 1974	High Voltage transformers and disconnects
S-4	Valcam Bathhouse/Office 1974	Adjoining Trailers
S-5	Western Coal Carriers Shop 1983	Metal building, concrete floor
S-6	Tin Shed 1974	Wooden structure
S-7	Oil Storage Shed 1974	Wooden structure
S-8	Water Tank 1974	Metal tank
S-9	Truck Scale 1983	Concrete housing, trailer
S-10	Truck Dump 1978	Concrete and steel structure
S-11	Conveyor 1975	Steel structure, concrete base
S-12	Transfer Building 1975	Steel structure, concrete floor
S-13	Valcam Firehouse 1975	Wooden structure
S-14	Conveyor 1975	Steel structure, concrete base
S-15	Crusher Building 1975	Steel structure, concrete floor, concrete footer
S-16	Conveyor 1975	Steel structure, concrete base
S-17	Stacking Tube 1975	Concrete cylinder
S-18	Reclaim Tunnel 1975	Concrete
S-19	Reclaim Conveyor 1975	Steel structure, concrete base

NUMBER	NAME	DESCRIPTION
S-20	Valcam Loadout Sub-Station 1975	High Voltage transformers, and disconnects.
S-21	Valcam Loadout 1975	Steel structure, concrete base
	Location: General Office Area	
S-22	Valley Camp Office 1976	Wooden structure, concrete floor
S-23	Office Firehouse 1976	Wooden structure
	Location: Belina Mine Site	
S-24	Oil Storage Shed 1983	Wooden structure
S-25	Wastewater Plant 1980	Metal structure, concrete stem walls, concrete floor, prefab concrete walls, concrete footers
S-26	Belina Wellhouse 1980	Wooden structure
S-27	Belina Mines Bathhouse/Office Complex 1980	Metal structure, concrete stem walls, concrete floor, prefab concrete walls
S-28	Belina Shop 1976	Metal structure, concrete floor, concrete footers
S-29	Garage (portable) 1989	Metal structure
S-30	Pumphouse 1976	Concrete block, concrete floor, concrete footers
S-31	Washbay 1986	Metal structure, concrete floor
S-32	Reclaim Belt and Truck Bin 1980	Steel structure, concrete base
S-33	Belina Truck Loadout 1980	Metal structure, concrete floor, concrete footers
S-34	Belina Loadout Sub-Station 1980	High Voltage transformers and disconnects, concrete retaining wall
S-35	Belina No. 1 Conveyor Gallery 1980	Steel structure, concrete base, concrete stem walls, concrete floor
S-36	Stacking Tube 1980	Steel structure
S-37	Reclaim Tunnel 1980	Concrete, concrete floor, aluminum
S-38	Belina No. 2 HAC 1990	Steel structure, concrete base
S-39	Belina No. 2 Conveyor 1980	Steel structure, concrete base

NUMBER	NAME	DESCRIPTION
S-40	Transfer Building 1980	Steel structure, concrete stem walls, concrete floor
S-41	Belina No. 1 Fan 1977	8 HU Jeffery Fan, prefab concrete, concrete footers, concrete floor
S-42	Belina No. 2 Fan 1980	8 HU Jeffery Fan, prefab concrete, concrete footers, concrete floor
S-43	Filter Pond 005A 1980	Concrete structure
S-44	Belina Mines Sub-station 1975	High Voltage transformers and disconnects

Valcam Loadout Facility

Map 526
Map 526.100 Sheet O-1
Map 526.100 Sheet O-2
Map 526.100 Sheet O-3

General Office Area

Map 526.100 Sheet O-4

Belina Haul Road

Map 527.100 Sheet O-5
Map 527.100 Sheet O-6
Map 527.100 Sheet O-7
Map 527.100 Sheet O-8
Map 527.100 Sheet O-9
Map 527.100 Sheet O-10
Map 527.100 Sheet O-11

Belina Mine Site

Map 526.100 Sheet O-12
Map 526.100 Sheet O-13
Map 526.100 Sheet O-14

The mine structures, surface facilities are depicted on the above mentioned maps. Nomenclature symbols for all constructed features is as follows:

1. C=culvert
2. D=ditch
3. S=structure

At this time only one modification has taking place, it being an upgrade to the truck/train loadout belt conveyor. No new disturbance to the present area was required, as the new drive unit is directly under the existing belt conveyor, where approximately 30 cu. yds. of concrete were placed to mount the drive unit. The old feeders have been replaced with cone feeders to enhance the live storage of the Valcam coal stockpile. This upgrade will allow Valley Camp to load a unit train in just under two hours, as stipulated in the new coal contract.

526.100. MINE STRUCTURES AND FACILITIES.

Those existing facilities traversing through the Mine Permit Area are Questar Pipeline Co. ~~Mt. Fuel~~ pipe lines and UP&L transmission lines which are depicted the Subsidence Base Map and the Valcam Loadout Facility Map. Those facilities that are within the 100 feet of a public road were subject to public comment during the initial permit approval process. No public road was or will be relocated in conjunction with mining and reclamation activities.

526.200. UTILITY INSTALLATION AND SUPPORT FACILITIES.

All utility installations associated with Valley Camp coal mining and reclamation operations will be conducted in a manner which minimizes damage, destruction, or disruption of services provided by oil, gas, and water wells; oil, gas, and coal-slurry pipelines, railroads; electric and telephone lines; and water and sewage lines which pass over, under, or through the Mine Permit Area, unless otherwise approved by the owner of those facilities and the Division.

526.220. THROUGH 526.222.

The support facilities are and will continue to be operated in accordance with a permit issued for the mine or coal preparation plant to which it is incident or from which its operation results.

The support facilities are located, maintained, and used in a manner that prevent or control erosion and siltation, water pollution, and damage to public or private property; and to the extent possible using the best technology currently available to minimize damage to fish, wildlife, and related environmental values; and minimize additional contributions of suspended solids to stream flow or runoff outside the Mine Permit Area.

526.300. WATER POLLUTION CONTROL FACILITIES.

There are three sedimentation ponds (001A, 002A, and 003A) at the Valcam Loadout Facility and one (004A) at the Belina Mine Site. All were constructed on parallel lifts and meet OSM requirements. Also at the Belina Mine Site is a concrete filter pond (005A). All sed-ponds are used to protect the quality of surface water run-off and the filter pond is used to insure the quality of the mine water discharge, all of which are maintained by the mine personnel. In addition to normal maintenance, any pond will be cleaned in which the sediment capacity is reduced by 60 percent. The sedimentation ponds within the Mine Permit Area will be removed and reclaimed at the end of the reclamation.

There are no overburden stockpiles in the Mine Permit Area. Earth material removed during the construction of the benches at the Belina No. 1 Mine pad was used to construct the Belina No. 2 Mine pad area.

526.400. AIR POLLUTION CONTROL FACILITIES.

An air quality permit see Appendix 400.

527. TRANSPORTATION FACILITIES.

527.100. THROUGH 527.240.

All roads in the Mine Permit Area have been classified as primary according to DOGM, however, the Truck/Train-Truck Dump Road (Primary Road No. 1) at the Valcam Loadout Facility and the Belina Haul Road (Primary Road No.1) are the only roads which are considered as improved road, both are overlayed with asphalt concrete and are shown on their respective area "As-Built" Maps 100 Sheets 1-4 respectively, also shown are all transportation facilities including rail, and conveyors.

The design and construction of roads within the permit area were made in such a manner as to protect the environment and minimize the impact on fish and wildlife by constructing fish ladders on Eccles Creek, improve haul roads with asphalt concrete, concrete ditch and culvert design, and by designing culverts drainages crossings with capacities match the immediate upstream and downstream conditions of the natural drainages.

Outlying roads are maintained annually, usually during late spring or early summer while there is still adequate moisture in the soils to promote compaction. The Belina Haul Road and the Truck\Train-Truck Dump Roads are maintained on an as needed basis. The concrete ditch is cleaned between major storms, chuckholes are repaired and Asphalt Concrete overlays are installed when the surface merits rehab.

Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible. The Morrison-Knudsen Report (Appendix 500) includes the geotechnical analysis of the Belina Haul Road. For specific reclamation work see 540.

528. HANDLING AND DISPOSAL OF COAL, OVERBURDEN, EXCESS SPOIL AND COAL MINE WASTE.

After coal is cut from the face, it is transported to the surface via a beltline, placed upon the raw coal storage pad at the Belina Mine Site where it is then loaded into bellydump (double) coal trucks and transported to the Valcam Loadout Facility coal storage pad. From that point it is either shipped by rubber or rail to the customer. See ~~Operation Map~~ Section 520. At the time final reclamation of the Mine Permit Area occurs, the coal and coal fines which are considered unsaleable (stockpile bases and short term coal storage area bases, roadways, etc.) after the marketable coal has been shipped, will be placed in a controlled manner to prevent combustion, ensure stability and movement and environmental degradation after reclamation.

528.200. OVERBURDEN.

During the actual faceup and mine pad construction, all outcrop coal was harvested and shipped to the customer. The only coal not harvested was incidental to exposing the coal seam itself. That coal which became intermingled with the down-cast "overburden" should not create a problem in the future as that material became a composite blend through the handling process of the site construction. This will be address more specifically in the Reclamation Plan.

528.300. SPOIL, COAL PROCESSING WASTE, MINE DEVELOPMENT WASTE, AND NON-COAL WASTE REMOVAL, HANDLING,STORAGE, TRANSPORTATION, AND DISPOSAL AREAS AND STRUCTURES.

Excess Spoil. As per the UDOGM definition, there are no Excess Spoil disposal areas within the Mine Permit Area. However, should it become necessary to create a waste disposal area, it will be accomplished in accordance with the requirements of the regulations, and other federal, state and local regulations.

Coal Mine Waste. There is no coal mine waste as per UDOGM definition. No coal mine waste will be disposed of except in an area approved by the Division. There are no coal processing facilities within the permit area and therefore no coal processing waste will be returned to the underground mine workings.

Refuse Piles. There is no large quantities of refuse materials generated within the Mine Permit Area as the only sources of refuse or coal waste materials are associated with the loadout and transportation facilities. This "refuse or waste" for the most part is fines which are returned to the raw coal pile at the Belina Mine Site or the coal pile at the Valcam Loadout Facility. There are no Refuse Piles as per UDOGM definition.

Any unsuitable materials encountered during reclamation will be placed in accordance with the Reclamation Plan which specifically addresses the regulations.

Burning and Burned Waste Utilization. All fires (intentional or unintentional) are extinguished in accordance with MSHA Regulations by personnel specifically trained in fighting fires. These people are trained according to an MSHA approved fire fighting plan.

Coal mine waste fires are extinguished in accordance with a plan approved by MSHA and the Division.

Coal stockpile fires are extinguished as quickly as possible, the hot spots are removed from the stockpile, spread out and cooled with water and the coal is promptly returned to the stockpile.

Non-coal Mine Waste. There are no Non-coal Mine Waste disposal site within the Mine Permit Area. The Non-coal Mine Waste is stored in metal hoppers prior to being transported to the Carbon County Landfill. The hoppers are covered while in transit. No Non-coal mine waste will be deposited in a refuse pile or impounding structure nor will there be an excavation for a non-coal mine waste disposal site closer than eight feet of any coal outcrop or coal storage area.

Underground Development Waste. There is no underground development waste sent out of the mines operated at Valley Camp of Utah, Inc..

529. MANAGEMENT OF MINE OPENINGS.

529.100. EXPOSED UNDERGROUND OPENINGS.

~~When approaching a suspected or known old workings (abandoned mine), MSHA has specific mandatory regulations which this operator is obligated to follow.~~When approaching a suspected or known old workings (abandoned mine), MSHA Statutory Provisions of the 30 CFR Chapter 1, Subpart R-Miscellaneous, 75.1701 Abandoned areas, adjacent mines; drilling of boreholes, will be followed.

529.200. TEMPORARY SEALING OF MINE OPENINGS.

~~Any mine opening which is temporarily inactive will be properly guarded so as to prevent access into the opening and posted to identify the hazardous nature of the opening. The devices will be periodically inspected and maintained in good operating condition by Valley Camp.~~Any mine opening which is temporarily inactive will be properly guarded as per MSHA Statutory Provisions of the 30 CFR Chapter 1, Subpart R-Miscellaneous, 75.1701 Abandoned areas, adjacent mines; drilling of boreholes, or sealing of mines.

530. OPERATIONAL DESIGN CRITERIA AND PLANS.

531. GENERAL.

The Mine Permit Renewal Application includes "As-Built" designs for all sediment ponds 001A-004A, the filter pond 005A, none of which are above any old or new mine workings. See Hydrology 733.130 and 742.221.

532. SEDIMENT CONTROL.

Sediment control measures are described in sections 732 and 742 of the permit.

532.100. DISTURBED AREA.

Incorporated within this section is the commitment to only disturbing the smallest practicable area at any one time during the operation and reclamation phases of the Mine Permit Area.

532.200. BACKFILL STABILIZATION.

The backfill operation will stabilize the material used to promote a reduction of the rate and volume of runoff in accordance with the requirements of the rules cited within this section. Regrading existing slopes will be such as to achieve stability, permanent features to enhance reclamation, regrading to achieve the approximate original contours, highwall elimination, minimize erosion and water pollution, spoil handling, and preparation of the final graded surfaces for replacement of the Vegetation-Supporting Material.

533. THROUGH 533.700. IMPOUNDMENTS, STABILITY, FOUNDATIONS, SLOPE AND EMBANKMENT PROTECTION, HIGHWALL LOCATION, MSHA AND NON-MSHA IMPOUNDMENTS.

For details see the following references in the permit: Impoundments - 733, Stability, Foundations, Slope and Embankment Protection, and Highway Location - 742.221, and MSHA and Non-MSHA Impoundments - 742.222.

534. ROADS.

534.100. LOCATION, DESIGN, CONSTRUCTION, MAINTENANCE AND RECLAMATION.

All roads are shown on Maps 521.124 Sheet 1 through Sheet 4.~~the following maps: (These 100 scale maps are for reference only).~~

The MK report Appendix 500 exhibits ~~the~~ non-compliance ~~of the~~ for the Belina Haul Road which constituted need for a Division ~~variance~~ "administration variance" (Final Approval Letter, March 14, 1989, originator Ms. Susan C. Linner, UDOGM, Reclamation Biologist/Permit Supervisor) requiring Visual Movement Indicators (VMI's). The VMI'S (installed October 1987) are located in the potentially "unstable" areas of the road, and are monitored during high precipitation cycles. There are 19 Visual Movement Indicator lines along the Belina Haul Road, these lines are mine roof bolts in line, driven to a supportive depth, approximately 25 feet apart, from the edge of the outslope to below the fill area of the outslope. The hub point of each line is shown on the Belina Haul Road Map 521.124., Sheet 2 and 3.

All roads within the Mine Permit Area are routinely inspected and maintained by a full time contractor. For the most part, the Belina Haul Road is traveled by the contractor on a daily basis, any abnormalities are reported to Valley Camp personnel and corrective actions taken. There has been no significant movement as can be verified by the asphalt concrete surface of the Belina Haul Road. Should significant movement occur, the Division will be notified immediately and a summary of the inspection and corrective measures taken will be included in the annual

report submitted to UDOGM. Signs are posted warning the employees and the public of the potential hazards of the road, along with the standard regulatory sign required on public roads.

Refer back to 527 for a complete description of the roads within the Mine Permit Area. Also ~~R~~refer to Morrison-Knudsen Report found in Appendix 500.

If the Belina Haul Road were to be put back to the Original Contour, it would not be stable as described in the stability analysis found in the M-K Report. The Belina Haul Road was pioneered in 1975-76 and widened in 1977 has had two slides below the fill lines of the constructed toe, an earthquake and two years of +200 percent of normal precipitation. Valley Camp believes the Haul Road exhibits stability.

The Belina Haul Road will be reclaimed to a condition of stability commensurate with the surrounding slopes and should not be any more susceptible to failure than any other slopes within the adjacent area.

534.200.

The outlying roads within the Mine Permit Area are limited use roads, portions of which are roads which were built prior to the Valley Camp operation. Those roads include the Boardinghouse Canyon Road, the ~~Mt. Fuel~~Questar Pipeline Co. pipe line access roads and the O'Connor Mine Road. The Boardinghouse Canyon Road is an unimproved road which passes through K&H, Milton Oman, and Jack Otani properties and ties into a ~~Mt. Fuel~~Questar Pipeline Co./U.S. National Forest road near the O'Connor Mine. The ~~Mt. Fuel~~Questar Pipeline Co. pipe line access roads are on the top of most ridge lines within the Mine Permit Area and all these roads are unimproved. The O'Connor Road was recently reclaimed by AMR segment of UDOGM.

The roads which are within the disturbed areas of the Mine Permit Area are the Valcam Loadout Facility truck/train loop road, General Office Area Road and the Belina Haul Road. These roads are shown on the Operations Maps listed in this section. All roads will remain for the duration of the mining phase of this operation. These roads all meet the requirements of the Regulations. These road~~s are~~ surface is constructed of asphalt concrete~~,~~ and the culverts are CMP and were designed using ASTM standards, installed in accordance with UDOT Standard Specifications by General Coal Contractors, Helper, Utah and the placement was monitored by Centennial Engineering Inc., SLC, Utah, and having no failures as of December 1992, Valley Camp can only assume the culverts were designed and installed correctly.

The Belina Haul Road utilizes a concrete ditch with grated drop inlets and sediment traps. The primary use of these roads are for personnel access and the transportation of coal from the mine to the shipping point at the Valcam Loadout Facility. As shown on the Reclamation Maps, the railroad access road at the Valcam Loadout Facility will remain, the General Office Area Road will remain, while the Belina Haul Road will be reclaimed.

535. SPOIL.

535.100. DISPOSAL OF EXCESS SPOIL.

To date, there are no designated spoil disposal sites within the Mine Permit Area. Should it become necessary to construct a disposal site for Excess Spoil, the fill and appurtenant structures will be designed using current, prudent engineering practices and will meet any design criteria established by the Division.

535.110.

The Excess Spoil fill will met the requirements of 535.111 through 535.130.

536. COAL MINE WASTE.

~~There is no coal mine waste disposal site(s) within the Mine Permit Area to date, should it become necessary to construct one for the reclamation phase, it will be accomplished through the approval process.~~No coal mine waste (as Defined in R645-100-200) has been generated to necessitate a disposal site for coal mine waste. Should it become necessary to construct such a disposal site during the operation phase, it will be accomplished through the approval process.

536.100. DISPOSAL FACILITIES.

Should a disposal facility be needed during the reclamation phase, it will be designed using current prudent engineering practices and will meet design criteria established by the Division. Actual location for this type of facility will be done ~~just prior~~ during~~to~~ reclamation so to insure the most advantageous location can be utilized, with respect to AOC concerns, stability of existing foundations and or abutments, ~~no~~ weak zones or groundwater effects upon the facility. The estimated amount of material which may require disposal can be found in 800.

536.200. COAL MINE WASTE PLACEMENT.

If a waste disposal facility becomes necessary, MSHA regulations which are applicable will be complied with. Mass stability will be paramount in the concerns of this type of facility.

536.300. COAL MINE WASTE DISPOSED OF IN EXCESS SPOIL FILLS.

There are no new or existing spoil fills within the Mine Permit Area, consequently, no coal mine waste will be disposed on or in excess spoil fills.

536.400. NEW AND EXISTING IMPOUNDING STRUCTURES CONSTRUCTED OF COAL MINE WASTE OR INTENDED TO IMPOUND COAL MINE WASTE.

There are no new or existing impounding structures which are constructed of coal mine waste and coal mine waste will not be used for construction of impounding structures.

536.500. DISPOSAL OF COAL MINE WASTE IN SPECIAL AREAS.

No coal mine waste materials from activities located outside the Mine Permit Area will be disposed of in the Mine Permit Area.

UNDERGROUND DISPOSAL

Any underground disposal of coal mine waste returned to the underground will be done in accordance with a plan approved by MSHA and the Division.

536.600. UNDERGROUND DEVELOPMENT WASTE.

~~Coal mine waste~~ Should coal mine waste be generated, it will be placed in such a manner as to comply with the MSHA regulations and ensure mass stability, prevent mass movement during and after construction, prevent combustion and not create a public hazard.

536.700. COAL PROCESSING WASTE.

There is no coal processing waste generated by this mining and reclamation operation, consequently, there are no plans for returning coal processing waste to the underground workings.

536.800. COAL PROCESSING WASTE BANKS, DAMS AND EMBANKMENTS.

No coal processing waste banks, dams or embankments exist within the Mine Permit Area.

536.900. REFUSE PILES.

No ~~permanent~~ refuse piles exist within the Mine Permit Area.

537. REGRADED SLOPES.

All previously disturbed slopes ~~will be regraded and or stabilized by regrading will be completed~~ which require regrading will be accomplished in accordance with the requirements of this section, unless otherwise approved by the Division.

537.100. GEOTECHNICAL ANALYSIS.

Upon Division approval for alternative specifications or for steep cut slopes, the requirements for section will be met. Just prior to final reclamation all areas which may be problematic, will be reviewed and geotechnical analysis will done for those areas in question.

537.200. REGRADING OF SETTLED AND REVEGETATED FILLS TO ACHIEVE APPROXIMATE ORIGINAL CONTOUR.

Areas which might fall into this category are depicted on Map ~~R614-301-820.110.~~521.150 Sheets 1 through 4, showing the cuts and fills that ~~have~~ are revegetating naturally. ~~Roads~~ The Belina Haul Road ~~were~~ is comprised of ~~constructed with~~ inplace materials and ~~were~~ is for the most part, built on cut not ~~on~~ fill. Several ~~back~~slope areas on the Belina Haul Road have ~~Quaking Aspen~~ deciduous and conifer growing adjacent to the concrete lined ditch and shoulder of the road. All disturbed area will be evaluated before any reclamation begins to verify areas which redisturbance would be unrealistic.

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~~Spoil or underground development waste will not be located so as to be detrimental to the environment, health and safety of the public or the approved postmining land use.~~
There is no spoil or underground development waste associated with the Primary road system.

~~All areas will be revegetated in accordance with the regulations to control the surface runoff.~~

540. RECLAMATION PLAN.

541. GENERAL.

NOTE: The Reclamation Plan will be further updated when the operation maps (as built) and conceptual reclamation maps associated with this review are approved.

541.100. CESSATION OF OPERATIONS.

At such time that the mining activities are completed, Valley Camp will close, backfill or otherwise permanently reclaim all affected areas, in accordance with the R645 Rules and the approved Reclamation Plan ~~permit~~.

541.200.

N/A

541.300. REMOVAL OF EQUIPMENT, STRUCTURES AND FACILITIES.

All surface equipment, structures, or other facilities not required for continued underground mining activities and monitoring, unless approved by the Division as suitable for post mining land use, or environmental monitoring will be removed and the affected lands reclaimed ~~to support reclamation will be removed and the affected land reclaimed.~~

541.400. COMPLIANCE REQUIREMENTS.

This Reclamation plan for the Mine Permit Area, shows and explains how Valley Camp will comply with R645-301, and the environmental protection standards of the State Program.

542. NARRATIVES, MAPS AND PLANS.

542.100.

RECLAMATION SCHEDULE

At this time, it is planned to Reclaim the Valcam Loadout Facility (VLF), ~~General Office Area (GOA),~~ Belina Haul Road (BHR) and the Belina Mine Site (BMS).

Mass Balance (Cu. Yds.)

FACILITY	Cut	Fill
Valcam Loadout Facility	48,000	42,000
General Office Area	0	0
Belina Haul Road	68,000	78,000
Belina Mine Site	130,400	68,500
(Belina Mine Site)	130,400	130,400*

* Balance at Belina if overfill above the natural slope occurs in the bathhouse area. See cross-sections B2, B3 and B4 where the line is shown above the proposed dashed line.

Step 1 (Yr. 1)

VLF	GOA	BHR	BMS
Demolition	----	Demolition	Demolition

1. Remove all buildings and structures;
2. place rubble (concrete and coal contaminated material);
3. remove non-critical culverts, power poles, and etc.

Valcam Loadout Facility

Buildings and Structures (S-1 through S-21)

Removal of (43,549 sq ft) @ $5.00/sq ft/level	=	$218,000
Concrete Demolition of (1,800 cu yds) @ $5.00/	=	$ 9,000
Misc.(guardrail, power poles, culverts, etc.)	=	$ 25,000
Earthwork (48,000 Cu. Yds. Material) @ $7.00/	=	$336,000

General Office Area

The General Office will be retained for a ~~recreational or educational facility~~field office for the Kanawha Hocking Coal and Coke Company.

Belina Haul Road

Concrete Demolition of (925 cu yds) @ $2.00/ (this includes all drop inlets)	=	$ 2,000
Misc. (guardrail, culverts, etc.	=	$ 25,000
Earthwork (68,000 Cu. Yds. Material) @ $7.00/	=	$476,000

Belina Mine Site

Buildings and Structures (S-24 through S-44)

Removal of (47,600 sq ft) @ $5.00/sq ft/level	=	$238,000
Concrete Demolition of (1,700 cu yds) @ $5.00/	=	$ 8,500
Misc.(guardrail, power poles, culverts, etc.)	=	$ 25,000
Earthwork (130,400 Cu. Yds. Material) @ $7.00	=	$912,800

Step 2 (Yr. 1)

VLF	GOA	BHR	BMS
Grading	-----	Grading	Grading

1. Recontour to achieve Approximate Original Contour;
2. scarify and disc in preparation for revegetation phase.

Step 3 (Yr. 1)

VLF	GOA*	BHR	BMS
Revegetation	Revegetation	Revegetation	Revegetation

1. Seed, fertilize, and mulch.

* If the General Office Area requires any area(s) to be reseeded for erosion control it could be done during this phase.

Step 4 (Yr. 2)

VLF	GOA	BHR	BMS
Plant Seedlings	-----	Plant Seedlings	Plant Seedlings

1. Plant all seedlings. (With a years growth of the grasses and forbs, survival rate of the seedlings should increase by virtue of the greater selection of foliage available to browsing animals at the time of planting).
2. The immediate area around the seedling bed will be scalped of vegetation to prevent moisture competition with existing foliage.

542.200. BACKFILLING AND GRADING.

The plan for backfilling, soil stabilization, compacting and grading, includes contour maps and cross sections exhibiting the anticipated final surface configuration of the disturbed areas, in accordance with the applicable regulations. All maps are prepared and certified as described under 512.

542.300. THROUGH 542.500. FINAL SURFACE CONFIGURATION.

Prior to abandoning the Mine Permit Area or seeking bond release, an aerial survey will be done and used to generate final configuration contour maps (Certifiable "Certified as-built maps") to evidence all temporary facilities have been removed and reclaimed and all permanent structures are stable.

542.600. RECLAMATION OF ROADS.

Any road not to be retained for postmining land use or is no longer needed for mining and reclamation operations will be immediately closed to traffic, removing all culverts and revegetating the disturbed surfaces.

Should UDOT choose to relinquish their 150 ft. ROW at the Belina Haul Road approach at the time of reclamation, Valley Camp will reconstruct the channel beneath said approach. See 760, for the specifications and designs (100 year-6 hour event) for the proposed channel reconstruction of Eccles Canyon Creek at culvert C-21-48 near the entrance gate of the Belina Haul Road.

542.700. FINAL ABANDONMENT OF MINE OPENINGS AND DISPOSAL AREAS.

Mine Openings. All the mine openings ~~at the Belina Mine Site~~ will be sealed with a block stopping, at a depth on not less than 25 feet inby the portal mouth, or original faceup or in the case of the Belina No. 2 Manway, sufficient stable cover and outby from the stopping will be backed filled to the surface. The portal closure plan will utilize a french drain. The french drain design and installation will be accomplished using the most prudent engineering practices and technology available, at the time the portal closure takes place. All portals at the Valcam Loadout Facility have caved tight near the 25′ area and were considered dangerous and were barricaded (backfilled) as per MSHA instruction. The proposed cover depth over portals is depicted on the reclamation drawings 550, Sheets 1 through 4.

Disposal of Noncoal Mine Waste. Any noncoal waste material which is considered to be toxic or hazardous material will be disposed of in accordance with federal, state and local regulations.

542.741.

~~All~~Any noncoal mine waste materials ~~are~~ encountered during reclamation will be transported from the Mine Permit Area by licensed contractors and disposed of in an approved landfill ~~waste disposal areas~~.

542.742.

Final disposal of noncoal mine wastes will be at state-approved solid waste landfill ~~disposal areas~~.

542.800 RECLAMATION COST ESTIMATE.

550. RECLAMATION DESIGN CRITERIA AND PLANS.

Site specific reclamation plans are also included within this Reclamation Plan.

551. CASING AND SEALING OF UNDERGROUND OPENINGS.

Permanent closure measures are designed to prevent access to the mine workings by people, livestock, wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

Utah No. 2 Mine is located at the Valcam Loadout Facility ~~and lies~~ just east of the D&RGW railroad and north of the crusher building and is in the Upper O'Connor coal seam. The mine was officially closed September, 1989. All portals at the Valcam Loadout Facility have caved tight near the 25' area and were considered dangerous and were barricaded as per MSHA instruction. Portals 1 through 5 were removed and the openings were backfilled approximately 25' to 30' with the aid of heavy equipment. Portal 6 was backfilled, however, the portal headwall will remain to support the highwall until such time as reclamation is accomplished. At that time Portal 6 will be removed or be covered with at least four feet of compacted material and the highwall stabilized. Entry 7 has been sealed, but Portal 7 will remain until reclamation takes place as the beltline tailpiece for the crusher building is in the portal mouth.

~~For the Belina Mine Site Portals see, R614-301-542.700..~~

All mine openings at the Belina Mine Site will be sealed with a block stopping, at a depth on not less than 25 feet inby the portal mouth, or original faceup or in the case of the Belina No. 2 Manway, sufficient stable cover and outby from the stopping will be backed filled to the surface. The portal closure plan will utilize a french drain. The french drain design and installation will be accomplished using the most prudent engineering practices and technology available, at the time the portal closure takes place. The approximate depth of cover to be placed over the portals is depicted on the reclamation drawings 550, Sheets 1 through 4, and the actual depth verified by the Certified "As-Built" Postmining Land Use Reclamation maps generated from the aerial photography commitment.

Map 550 - Sheet R1
Map 550 - Sheet R2
Map 550 - Sheet R3
Map 550 - Sheet R4
Map 550 - Sheet R5
Map 550 - Sheet R6
Map 550 - Sheet R7

Mine closures will be accomplished in accordance with the requirements of the Division and consistent with MSHA, 30 CFR 75.1711.

552. PERMANENT FEATURES.

552.100. SMALL DEPRESSIONS.

Small depressions may be left on an as needed basis to retain moisture, minimize erosion, create and enhance wildlife habitat, or assist revegetation. The actual locations of small depressions will be decided upon during ~~at the time of the~~ final grading ~~takes place~~.

552.200. PERMANENT IMPOUNDMENTS.

There will be no permanent impoundments left within the Mine Permit Area.

553. BACKFILLING AND GRADING.

All material placed will be in a controlled manner.

553.100. DISTURBED AREAS.

VALCAM LOADOUT FACILITY

The Valcam Loadout Facility reclamation will stabilize the slopes, minimize erosion, water pollution and support the approved postmining land use.

The disturbed areas will be backfilled and graded to achieve the approximate original contours. There will be no highwalls within this area and all slopes will be as approved by the Division, with the exception of the recontoured backslopes ~~involved within~~involving the D&RGW Railroad right-of-way ~~to~~-which provided additional grade width for Coastal States Energy's spur track.

Culvert No. C-14-42 near the crusher building will be subjectively removed and the new channel will be established. See 760 and Valcam Permit Area Channel Reclamation (Map 760a). Valley Camp and the D&RGW Railroad will concur on the inlet/outlet locations of culverts effecting their grade regarding postmining land use and the Pleasant Valley Agreement. Culverts not required for ~~the~~ railroad right-of-way or access road will be removed during reclamation (see Map 550 Sheet R-1).

Map 550 Sheet R-1

~~The map which deals with this area is:~~

For vegetation see 340..

GENERAL OFFICE AREA

The General Office Area and area around it will be retained ~~for~~ as a field office for Kanawha Hocking Coal & Coke Co (See Map 550 Sheet R-1). ~~educational and or recreational purposes.~~

~~The map which deals with this area is as follows:~~

For vegetation see 340..

Belina Haul Road

The Belina Haul Road reclamation will achieve stability of the slopes, and minimize erosion and water pollution and to support the approved postmining land use.

All asphalt and concrete will be scarified and crushed with heavy equipment to a point its compatibility is satisfactory as fill against the toe of the backslope in the first lift placed during reclamation or hauled to an approved landfill.

All lifts will be overfilled, compacted and the loose material on the outslope incorporated in the next lift. This technique decreases the chance of superficial failures of the outslope and leaves the soil surface compatible for revegetation. Each lift will be keyed into the existing backslope where there is a potential for abnormal slippage, this will be determined at the time of reclamation.

Some large boulders will be left exposed along the route and any rocks to large to be used in the fill, with UDOGM approval could be placed at various locations along the reclaimed road for wildlife enhancement. Available logs (deadfall) can also be utilized for enhancement of the reclamation.

Where there are well traveled game trails crossing the Belina Haul Road, new trails will be placed on the fill slope in an effort to minimize erosion that could occur by the animals traversing the newly constructed areas and eventually creating trails.

The culverts will be removed and those drainages designed, reestablished and armored with an approved ~~riprap~~ media.

Culvert No. C-21-48 at the entrance gate in Eccles Canyon is to remain until the final phase of reclamation, at that time it will be removed and the channel reconstructed. This culvert lies within the UDOT Highway right-of-way. Valley Camp will advise UDOT of the intent to remove the culvert and will incorporate the State specifications to design and construct the cut slope within the right-of-way. However, if UDOT elects to retain this area for their own use, it will become their responsibility to reclaim when SR 264 becomes obsolete.

Culvert No. C-25-36 at the "Big Fill", which carries the drainage from the Bowl Area, will also be removed and the stream channel reconstructed (See Channel Reclamation 760) on the natural ground as much as possible. The majority of the fill is to be removed and utilized during reclamation.

The areas along the road which ~~are not~~ may not be able to be returned to the approximate original contour are so indicated on the Belina Haul Road 50 scale drawings, see Section 553.600 and Map 550 Sheets R-2 and R-3.

Map 550 Sheet R-2
Map 550 Sheet R-3

~~Maps which deal within this area are as follows:~~

Belina Mine Site

Disturbed areas will be backfilled and graded to achieve the approximate original contour to the extent possible. The postmining slopes will not exceed the angle of repose unless they meet the minimum long-term static safety factor of 1.3. Slopes are designed to minimize erosion and water pollution both on and off the site and support the approved postmining land use. The majority of fill material used to achieve the recontouring efforts at the Belina Mine Site will be obtained from the lower pad area and the 004A pond embankment and its foundation.

Final configuration of the postmining land is designed to stabilize the slopes, control erosion, conserve soil moisture and reestablish the area to conform with the surrounding land use.

The Whisky Creek rechannelization will have a stream bottom with a flood plane which is designed for high precipitation events. There will be different quadrant areas in the stream bottom allowing a mean gradient percent for velocity control through the Belina Mine Site disturbed area. For details see 760 Channel Reclamation.

The reclaimed watershed reaches have their flows directed so as to be de-energized before entering the stream channel. All outslopes are to be lined with silt fence which will be held in place with hardwood stakes or the equivalent and installed as per UDOGM recommendations. For the channel design See 760~~, and~~ Belina Permit Area Channel Reclamation (Map 760a), and Map 550 Sheet R-4.

~~The 50 scale Reclamation Maps which deal with this area are as follows:~~

For revegetation see 340.

553.200. SPOIL AND WASTE.

All spoil and waste materials will be placed in the most suitable locations within the affected area(s) to ensure stability and or to prevent leaching, actual locations will be determined at the time of reclamation.

553.250. REFUSE PILES.

No permanent disposal structures for refuse will be constructed within the permit area. The requirements of this section of the regulations are not considered applicable to this plan.

553.300. EXPOSED COAL SEAMS, ACID-AND TOXIC-FORMING MATERIALS.

Exposed coal seams, acid-and toxic-forming materials and combustible materials exposed, used, or produced during mining will be adequately covered with nontoxic and noncombustible materials, or treated, will be placed in suitable fill areas with four feet of cover material to control the impact on surface and ground water in accordance with the regulations, to prevent sustained combustion, and to minimize adverse effects of plant growth and the approved postmining land use. These areas will be determined just prior to reclamation so as to select the most effective areas to ensure environmental security.

553.400. THROUGH 553.420. CUT-AND-FILL TERRACES.

Valley Camp does not entend on utilizing cut-and-fill terraces in conjunction with the reclamation of the site.

553.500. PREVIOUSLY MINED AREAS.

This law is not applicable to the Valley Camp mining operation.

~~The remining operations within the Mine Permit Area are depicted on the Reclamation drawings, 550, Sheets 1 through 4, respectfully. The Belina Haul Road was constructed prior to the regulations. Calculations indicate a deficit of reasonably available backfill materials to achieve the AOC along the road. The highwall will be eliminated to the extent technically practical in accordance with the following criteria:~~

~~1. All spoil generated by the remining operation and any other reasonably available spoil shall be used to backfill the area. Reasonably available spoil in the immediate vicinity of the remining operation shall be included.~~

~~2. The backfill will be graded to a slope which is compatible with the approved Postmining Land Use and which provides adequate drainage and long term stability.~~

~~3. Remaining highwalls will be stable as they are rock formations.~~

~~4. No spoil will be regraded if it will cause instability to the outslope or increase the hazard to the public health and safety or to the environment.~~

553.600. APPROXIMATE ORIGINAL CONTOUR.

Areas which Valley Camp is requesting UDOGM "Variance Approval" are shown ~~the following m~~on Maps 550 Sheets R-2 through R-4.

553.900. SETTLED AND REVEGETATED FILLS.

Settled and revegetated fills are indicated on the above mentioned Maps 550, Sheets 1 through 4 and are also shown on the cross-sections of their respective locations. Those areas of concern will be contemporaneously reclaimed.

560. PERFORMANCE STANDARDS.

Valley Camp will conduct their coal mining and reclamation operations in accordance with the approved permit and the requirements of 510 through 553.

Mid-Term Permit Review

Section R645-301-600 Geology

Valley Camp of Utah, Inc.

February 1993

TABLE OF CONTENTS
GEOLOGY. R645-301-600

SECTION		PAGE NO.
600.	GEOLOGY	Page 600-1 of 21
610.	INTRODUCTION	Page 600-1 of 21
620.	ENVIRONMENTAL DESCRIPTION	Page 600-1 of 21
630.	OPERATION PLAN	Page 600-18 of 21
640.	PERFORMANCE STANDARDS	Page 600-20 of 21
	REFERENCES	
	APPENDICIES	

LIST OF TABLES

TABLE NO.		PAGE NO.
622a	LIST OF GEOLOGIC MAPS	Page 600-3 of 21
622.100a	LIST OF EXPLORATION DRILL HOLES	Page 600-3 of 21
622.400a	LOCAL GAS WELL DATA	Page 600-6 of 21
623.100a	GEOCHEMICAL RESULTS FROM SOIL SAMPLES (ppm)	Page 600-8 of 21
624.340a	SUMMARY OF MINING TEST STRESS MEASUREMENT DATA	Page 600-17 of 21

LIST OF MAPS

MAP NO.		REFERENCE PAGE
621a	General Geologic Map	Page 600-2 of 21
622.100a	Drill Hole and Gas Well Locations with Coal Seam Data	Page 600-2 of 21
622.200a	Geologic Cross Sections, Coal Outcrop and Forest Service Subsidence Monitoring Location Map	Page 600-5 of 21
622.200b	Isopach Map of the Upper O'Connor Coal Seam	Page 600-5 of 21
622.200c	Isopach Map from the Bottom of the Upper O'Connor to the top of the Lower O'Connor	Page 600-5 of 21

LIST OF MAPS - (Continued)

MAP NO.		REFERENCE PAGE
622.200d	Isopach Map of the Lower O'Connor Coal Seam	Page 600-5 of 21
622.200e	Isopach Map from the Top of the Upper O'Connor Coal Seam to the Surface	Page 600-5 of 21
622.200f	Stratagraphic Geologic Cross Section A-A'	Page 600-5 of 21
622.200g	Stratagraphic Geologic Cross Section B-B'	Page 600-5 of 21
622.200h	Stratagraphic Geologic Cross Section C-C'	Page 600-5 of 21
622.200i	Stratagraphic Geologic Cross Section D-D'	Page 600-5 of 21
622.200j	Geologic/Hydrologic Cross Section M-M'	Page 600-5 of 21
622.200k	Geologic/Hydrologic Cross Section N-N'	Page 600-5 of 21
622.200l	Geologic/Hydrologic Cross Section O-O'	Page 600-5 of 21
622.200m	Geologic/Hydrologic Cross Section P-P'	Page 600-5 of 21

CERTIFICATION STATEMENT

I hereby certify that Geologic Section R645-301-600 was prepared by me or under my direct supervision by a geologist, and that I am a duly registered professional engineer in the State of Utah. The majority of data and conclusions contained herein have been reproduced based upon information available from the applicant. Information, data, conclusions, and statements thus received from the applicant, or generated as part of this permit submittal, as contained within this section, to the best of my knowledge are true and correct.

R645-301-600. GEOLOGY.

610. INTRODUCTION.

A description of the geology and other related information is presented below for the Mine Permit Area.

611. thru 612. GENERAL REQUIREMENTS.

A description of the geology within and adjacent to the Mine Permit Area is presented within Sections 621 through 627 and the proposed operation within the mine area is presented in Section 630. All maps, plans and cross sections required by 622 have been certified and are presented in their appropriate section.

620. ENVIRONMENTAL DESCRIPTION.

The Mine Permit Area is located on the northern end of the Wasatch Plateau to the south and southwest of the town of Scofield in central Utah. The Geology Map 621a shows the location of the Mine Permit Area with respect to the town of Scofield. The Mine Permit Area lies in a rugged mountainous region characteristic of elevation ranges between approximately 7,800 feet and 10,200 feet above sea level. The Mine Permit Area is within the Wasatch Plateau coal field as well as partially within the Clear Creek gas field.

621. ENVIRONMENTAL REQUIREMENTS.

The Mine Permit area lies in the northern end of the Wasatch Plateau, on the west flank of the Clear Creek Anticline (Doelling, 1972). As such, the dip of the strata is generally towards the west, ranging from about four to eight percent (two to five degrees).

With the exception of local alluvial deposits, all of the units exposed on and immediately adjacent to the Mine Permit Area are Cretaceous members of the Mesaverde Group. The Star Point Sandstone, which is exposed at the surface in the east canyons, is approximately 1000 feet thick and nearly devoid of shale (Doelling, 1972). This yellow-gray (salt and pepper) beach sandstone is massive and medium-grained (Spieker, 1931).

Immediately overlying the Star Point Sandstone is the Blackhawk Formation, an interbedded formation of sandstones and shales which is Utah's chief coal producer. The sands in this 1500-foot thick member are fine to medium grained and cemented by either calcite or silica with some iron discoloration. Sandstones of the Blackhawk Formation are more irregular than the sandstones of the Star Point. They also tend to be generally discontinuous in nature, local in extent, and have locally high clay contents (Spieker, 1931; Doelling, 1972). An exception to this is the Aberdeen Sandstone, a coarse-grained, light-colored sand with a thickness of 20 to 90 feet, which can be traced throughout the region (Spieker, 1931).

Spieker (1931) had identified three types of shale in the Blackhawk Formation, all continental in origin. The three types identified are, a common clay shale which is soft and granular, a carbonaceous shale, and a smoke-gray shale usually associated with local coal. As was the case with the sandstones, the shales are irregularly bedded (Spieker, 1931).

Most of the faults in the Mine Permit Area have a northerly trend. The faults within the Blackhawk Formation occur basically as zones (Doelling, 1972) with individual slips usually being clean, sharp displacements with little gouge. Both major fault zones in the Mine Permit Area are downdropped to the west and tend to die out to the north (U.S. Geological Survey, 1979). However, some smaller faults have the opposite displacement and create local horsts and grabens. The Connelville Fault forms the western boundary of the Belina Permit Area with a drop which varies from 190 feet at the western central permit boundary to 75 feet near Eccles Canyon (U.S. Geological Survey, 1979). The other major fault in the area, the O'Connor Fault, extends through the center of the Belina Permit area and has a drop of about 350 feet (U.S. Geological Survey, 1979). The Pleasant Valley Fault generally runs parallel to Mud Creek and lies toward the western boundary of the Valcam Loadout Facility. General Geologic Map 621a is inserted to illustrate local geology.

MAP 621a

The dominant soils in the area are loamy and are moderately deep (20 to 40 inches) with thin, dark surface horizons (high in organic matter), medium-textured (loamy) surface layers, and moderately fine-textured (clay loam) subsoils. Coarse fragment contents tend to be high (35 to 50 percent). A small portion of the area also consists of gravelly and stony colluvial slopes, rock outcrops, and very shallow soils.

622. CROSS SECTIONS, MAPS AND PLANS.

The maps, plans and cross sections needed to clarify the geologic data required are presented within the appropriate section and were compiled utilizing the best information available. A summary of geologic mapping included within the permit is shown in Table 622a.

622.100. TEST BORINGS AND CORE SAMPLINGS.

The locations and elevations of all drill holes in the Mine Permit Area are shown on Map 622.100a and summarized in Table 622.100a. Drill hole logs are available for those holes identified by a "*" in the table. Selected drill hole log information has been provided as part of this permit renewal according to the request made by UDOGM during a meeting held on October 24, 1989. Logs selected for inclusion (as requested by UDOGM and agreed by the applicant) in this mine permit include 73-24-1, 74-6-1, 75-6-1, 75-24-4, 75-25-3, 75-30-3, and 75-36-1. Copies of these well logs are identified ~~as Figures 622.100a through 622.100g and are found~~ in Appendix 622.100 (marked confidential). The applicant considers all information related to these well logs to be confidential, and therefore has submitted this appendix separately from the remaining appendices of the mine permit.

MAP 622.100a

TABLE 622a
LIST OF GEOLOGIC MAPS

MAP	COMMENTS
621a	General Geologic Map.
622.100a	Map showing location and elevation of drill holes and Coal Seam thickness and depth, and Gas Well Locations.
622.200a	Geologic Cross Sections, Coal Outcrop and Subsidence Monitoring Location Map.
622.200b	Isopach Map of the Upper O'Connor Coal Seam.
622.200c	Isopach Map from the bottom of the Upper O'Connor to the top of the Lower O'Connor.
622.200d	Isopach Map of the Lower O'Connor Coal Seam.
622.200e	Isopach Map from the top of the Upper O'Connor Coal Seam to the surface.
622.200f	Stratigraphic Geologic cross section A-A'
622.200g	Stratigraphic Geologic cross section B-B'
622.200h	Stratigraphic Geologic cross section C-C'
622.200i	Stratigraphic Geologic cross section D-D'
622.200j	Geologic/Hydrologic cross section M-M'
622.200k	Geologic/Hydrologic cross section N-N'
622.200l	Geologic/Hydrologic cross section O-O'
622.200m	Geologic/Hydrologic cross section P-P'

TABLE 622.100a
LIST OF EXPLORATION DRILL HOLES

DRILL HOLE NO.	LOCATION (SLBM)	ELEVATION
EC-1	T13S,R6E SWNW Sec. 25	9076
EC-2	T13S,R6E NESW Sec. 24	8790
EC-3	T13S,R6E SENW Sec. 24	8763
EC-4	T13S,R6E NESW Sec. 24	8854
EC-5	T13S,R6E NESW Sec. 24	8857
EC-6	T13S,R6E SESW Sec. 24	8862.4

DRILL HOLE NO.	LOCATION (SLBM)	ELEVATION
EC-7	T13S,R6E SESW Sec. 24	8904
73-19-1	T13S,R7E SWSW Sec. 19	9367.7
73-24-1**	T13S,R6E NENE Sec. 24	9255
73-30-1	T13S,R7E NWSW Sec. 30	9476
73-31-1	T13S,R7E SWNW Sec. 31	9276
73-31-4	T13S,R7E SWSW Sec. 30	9195
74-1-1	T14S,R6E NENE Sec. 1	9824
74-1-2	T14S,R6E NENE Sec. 1	9810+
74-1-3*	T14S,R6E NESE Sec. 1	8989
74-6-1**	T14S,R7E SWSW Sec. 6	9710
74-25-1	T13S,R6E SWSW Sec. 25	9561
74-36-1	T13S,R6E SWSW Sec. 36	9873
74-36-2*	T13S,R6E SENW Sec. 36	9676
75-6-1**	T14S,R7E NENW Sec. 6	9918.6
75-7-1	T14S,R7E SWSW Sec. 7	9770
75-7-2*	T14S,R7E SWSW Sec. 7	9823
75-24-4**	T13S,R6E SESE Sec. 24	9432.7
75-25-2*	T13S,R6E NENE Sec. 25	9379.4
75-25-3**	T13S,R6E SWSE Sec. 25	9897
75-30-1	T13S,R7E NWNW Sec. 30	9240
75-30-2	T13S,R7E NWNW Sec. 30	9214
75-30-3**	T13S,R7E NWNW Sec. 30	9179
75-31-1	T13S,R7E SWNW Sec. 31	9423.1
75-31-2	T13S,R6E SENE Sec. 36	9195
75-31-5	T13S,R7E SWSW Sec. 31	9730
75-36-1**	T13S,R6E SWSW Sec. 36	9872.3
75-36-2*	T13S,R6E NESW Sec. 36	9939.5
75-36-3	T13S,R6E SESE Sec. 36	9896.2

DRILL HOLE NO.	LOCATION (SLBM)	ELEVATION
76-24-1*	T13S,R6E SESW Sec. 24	8862.4
76-25-1*	T13S,R6E SWSW Sec. 25	9561
76-25-2	T13S,R6E NESW Sec. 25	9506
76-36-1	T13S,R6E NWNW Sec. 36	9582

* Drill holes for which log information is available.
** Drill holes for which log information is provided in Appendix 622.100 (marked confidential).
\+ Approximate Elevation.

622.200. NATURE, DEPTH AND THICKNESS OF STRATUM.

Information relating to the size, shape, thickness, depth and other information relating to the coal seams is contained on Maps 622.100a, and 622.200a through 622.200m. Additional information is presented through geologic logs to be discussed in Section 624.310. Section 624.100 contains a detailed stratigraphic description of a representative geologic section.

Map 622.200a
Map 622.200b
Map 622.200c
Map 622.200d
Map 622.200e
Map 622.200f
Map 622.200g
Map 622.200h
Map 622.200i
Map 622.200j
Map 622.200k
Map 622.200l
Map 622.200m

622.300. COAL STRIKE, DIP AND CROP LINES.

The outcrop zone of the coal is depicted on Geologic Cross Section Map 622.200a and is based on the best information available. The strike and dip differs in different parts of the Mine Permit Area. However, the typical dip within the mine is 2.1 degrees in approximately a 225 degree direction. Additional information can be found by reviewing the coal contours shown on the Belina No. 1 and No. 2 Mine Progress Maps as well as through a review of the geologic cross sections presented in section 622.200.

622.400. GAS AND OIL WELLS.

There are four gas wells, part of the Clear Creek gas field located within the Mine Permit Area. These four wells are all operated by Cordillera Corp. and only the most northern well, in Section 19, is currently producing. The other three are shut in at the present time. Well locations and depths are shown on Map 622.100a and summarized in Table 622.400a.

TABLE 622.400a
LOCAL GAS WELL DATA

LOCATION (SLBM)	DEPTH (ft)	STATUS	COMMENT
T13S, R7E, Sec. 19 NENW	4390	producing	producing from the Ferron
T13S, R7E, Sec. 30 SWSW	5820	shut-in	gas from the Ferron
T13S, R7E, Sec. 31 SWSW	9225	shut-in	gas from the Ferron
T14S, R7E, Sec. 6 SWSW	6222	shut-in	gas from the Ferron

623. ADDITIONAL GEOLOGIC INFORMATION.

The general geology of the Mine Permit Area is summarized in 621 and a more detailed stratigraphic description is given in 624.100. Additional information requested by this section is given within the applicable section to follow.

623.100. POTENTIALLY ACID OR TOXIC FORMING STRATA.

The rocks contained in the Blackhawk Formation, within which all units involved in the mining activity are a part, are made up of interbedded sandstone, sandy shale, shale and coal. Data available at this time do not suggest that there are any chemical problems with any of these rock types which would be potentially acid or toxic forming.

There have been no data assembled for the rock units above, between and below the coal seams at the Belina Mines. However, there has been limited soil sampling work completed in the Belina Mine Area, as well as more extensive sampling and testing within the adjacent Coastal States Energy Mines (located to the west of the Belina Mines on the west side of the Connelville fault). The sample results from the Belina Mines give a good indication of the general chemical makeup of the strata as far as the analysis was done. The soil material which was sampled and analyzed was generated during the facing-up of the coal seams in preparation for mining. This material, therefore, is made up of the strata above, below, and between the coal seams so the soil samples discussed herein should be representative of these strata. A selected summary of data collected is presented in Table 623.100a, and sampling locations and original data sheets are included as Appendix 623.100a. ~~Also included in the appendix is a~~ letter dated September 16, 1986 from James S. Leatherwood (a reclamation soils specialist) indicating the suitability of the

Belina ~~and Valcam~~ pad materials as a topsoil substitute can be found in Appendix 221. In his letter, Mr. Leatherwood also indicated that material located at the Valcam Loadout Facility would also serve as a topsoil substitute (Vegetation-Supporting Material) if needed.

Appendix 623.100a contains the results of analysis of two sets of samples. The first set of samples was taken from bore holes BP-1 and BP-2 and were analyzed by MIDECO in early 1983. These results show unusually high concentrations of boron and copper. The second set was taken from test holes No.1, No.2, and No.5. These samples were analyzed by Ford Chemical Laboratory in late 1983 and show normal low concentrations of boron and copper. The reason for the abnormally high concentrations reported for the first set of samples is not known and can probably not be determined because MIDECO is no longer in business.

Information gleaned from the Coastal States Energy Permit Application (applicable to the area west of Valley Camp of Utah's operation) indicates that 1) the lithology of the strata immediately below the minable coals vary from drill hole to drill hole, 2) that the clay content varies from nearly 100% in pure claystones to less than 5% in sandstones, and 3) a slight alkalinity and low sulfur content exists in the roof strata. For more information the reader is referred to the Coastal States Energy Permit Application on file with the regulatory agency.

The soil sample work discussed above indicates that the molybdenum levels are below 0.185 ppm, selenium levels are below 0.025 ppm, acid-base potentials range from 10.3 to 55.5, and that pH of the soil samples range from 7.2 to 8.8 with one exception where the pH reached a low of 5.5. Additional information can be gleaned from the data presented in Appendix 623.100a.

Normal mining operations at Valley Camp result in coal being left on the roof and the floor of mine openings because the equipment used cannot extract the full thickness of the coal seam. As a result the rocks above and below the coal seam are not extracted and brought to the surface. This eliminates the possibility of contamination at the surface by this material. Since these strata remain inplace within the mine there is no more than the normal natural effect on the environment by these strata so the geochemical characteristics of the strata are irrelevant to the protection of the environment at the mine site. Also since the roof and floor rocks are not exposed during mining, Valley Camp has not generally been in a position to obtain current or on-going samples of these strata.

In order to better document the acid and or toxic forming potential of coal at the Belina Mines, the applicant agrees to collect a sample of coal which is shipped from the Valcam Loadout Facility biannually and have it analyzed for acid-toxic forming potential. A copy of the results of these analyses will be forwarded along with a cover letter to UDOGM within 30 days of receipt by the applicant. During October, 1992, a composite sample of coal was taken and analyzed, the results of which are reported in Appendix 623.100b. According to Division Guidelines (Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April, 1988) the coal is classified as "Good". Results from future sampling which are forwarded to UDOGM are to be inserted by the agency into Appendix 623.100b. Should it be determined that acid-toxic forming materials exist, the applicant agrees to investigate further the location of the material, and to comply with the appropriate State and Federal requirements.