Table III-5. Seeding mixture for Mountain Brush vegetation type, Sunnyside, Utah.

Common Name		Scientific Name	Seedlings/Acre*	Drilled (#PLS/A)(2)	Broadcast (#PLS/A)(3)
Forb:	Arrowleaf balsamroot	*Balsamorhiza sagittata*		3.50	5.25
	Cicer milkvetch	*Astragalus cicer*		3.00	4.50
	Louisiana sage	*Artemisia ludoviciana*		1.75	2.60
	Purple prairie clover	*Petalostemon purpureum*		1.30	2.00
	Rocky Mountain penstemon	*Penstemon strictus*		.66	1.00
Grass:	Bluebunch wheatgrass	*Agropyron spicatum*		1.60	2.50
	Blue grama	*Bouteloua gracilis*		.30	.60
	Indian ricegrass	*Oryzopsis hymenoides*		1.00	1.50
	Kentucky bluegrass	*Poa pratensis*		.20	.30
	Salina wildrye	*Elymus salina*		3.00	4.50
Shrub:	Curleaf mountain mahogany	*Cercocarpus ledifolius*	100 + 100	4.00	6.00
	Oregon grape	*Mahonia repens*	20 + 20		
	Serviceberry	*Amelanchier alnifolia*	100 + 100		
	Skunkbush sumac	*Rhus trilobata*	20 + 20	20.00	30.00
	True mountain mahogany	*Cercocarpus montanus*	100 + 100	6.00	7.75
	Woods rose	*Rosa woodsii*	20 + 20	4.50	6.75

* ½ seedlings to be planted the first year and ½ seedlings the second year

Table III-6. Seeding mixture for Pinyon-Juniper vegetation type, Sunnyside, Utah.

Common Name		Scientific Name	Seedlings/Acre*	Drilled (#PLS/A)(2)	Broadcast (#PLS/A)(3)
Forb:	Cicer milkvetch	*Astragalus cicer*		1.10	2.20
	Evening primrose	*Oenothera lamarckiana*		.20	.40
	Globemallow	*Sphaeralcea coccinea*		.33	.66
	Rocky Mountain penstemon	*Penstemon strictus*		.33	.66
Grass:	Blue grama	*Bouteloua gracilis*		.80	1.20
	Galleta	*Hilaria jamesii*		3.50	5.25
	Indian ricegrass	*Oryzopsis hymenoides*		2.50	3.50
	Salina wildrye	*Elymus salina*		3.00	4.50
Shrub:	Black sage	*Artemisia nova*	50 + 50	.33	.66
	Green Mormon tea	*Ephedra viridis*	50 + 50	16.00	24.00
	Rubber rabbitbrush	*Chrysothamnus nauseosus*	50 + 50	.25	.40
Tree:	Pinyon pine	*Pinus edulis*	100 + 100		
	Utah juniper	*Juniperus osteosperma*	100 + 100		

* ½ seedlings to be planted the first year and ½ seedlings the second year

Table III-7. Seeding mixture for Pinyon-Juniper/Grass vegetation type, Sunnyside, Utah.

Common Name		Scientific Name	Seedlings/Acre*	Drilled (#PLS/A)(2)	Broadcast (#PLS/A)(3)
Forb:	Cicer milkvetch	*Astragalus cicer*		1.00	1.50
	Evening primrose	*Oenothera lamarckiana*		.25	.33
	Globemallow	*Sphaeralcea coccinea*		.33	.50
	Palmer penstemon	*Penstemon palmeri*		.33	.50
Grass:	Blue grama	*Bouteloua gracilis*		1.00	1.50
	Galleta	*Hilaria jamesii*		3.50	5.25
	Indian ricegrass	*Oryzopsis hymenoides*		2.50	3.50
	Salina wildrye	*Elymus salina*		1.50	2.00
Shrub:	Black sage	*Artemisia nova*		.50	.75
	Green Mormon tea	*Ephedra viridis*		16.00	24.00
	Rubber rabbitbrush	*Chrysothamnus nauseosus*		.25	.50
	True mountain mahogany	*Cercocarpus montanus*	20 + 20	7.00	10.50
Tree:	Pinyon pine	*Pinus edulis*	125 + 125		
	Utah juniper	*Juniperus osteosperma*	125 + 125		

* ½ seedlings to be planted the first year and ½ seedlings the second year

Table III-8. Seeding mixture for Riparian vegetation type, Sunnyside, Utah.

Common Name		Scientific Name	Cuttings/Acre*	Drilled (#PLS/A)(2)	Broadcast (#PLS/A)(3)
Forb:	Louisiana sage	*Artemisia ludoviciana*		.10	.15
	Sweetpea vine	*Lathyrus latifolius*		21.50	32.25
	Western yarrow	*Achillea millefolium*		.05	.08
Grass:	Basin wildrye	*Elymus cinereus*		2.50	3.50
	Kentucky bluegrass	*Poa pratensis*		.10	.15
	Redtop	*Agrostis alba*		.10	.15
	Streambank wheatgrass	*Agropyron riparium*		2.25	3.50
	Western wheatgrass	*Agropyron smithii*		3.50	5.25
Shrubs & Trees:	Blue elderberry	*Sambucus cerula*		1.00	1.50
	Cottonwood	*Populus fremontii*	125 + 125		
	Rose	*Rosa woodsii*		4.00	6.00
	Sagebrush	*Artemisia tridentata wyomingensis*		.25	.50
	Willow	*Salix*	125 + 125		

* ½ seedlings to be planted the first year and ½ seedlings the second year

Table III-9. Seeding mixture for Sagebrush-Grass vegetation type, Sunnyside, Utah.

Common Name		Scientific Name	Drilled (#PLS/A)(2)	Broadcast (#PLS/A)(3)
Forb:	Globemallow	*Sphaeralcea coccinea*	.40	.60
	Louisiana sage	*Artemisia ludoviciana*	.05	.08
	Purple prairie clover	*Petalostemon purpureum*	.66	1.00
Grass:	Bluebunch wheatgrass	*Agropyron spicatum*	2.50	4.00
	Greatbasin wildrye	*Elymus cinereus*	1.25	1.80
	Indian ricegrass	*Oryzopsis hymenoides*	.75	1.25
	Needle and thread	*Stipa comata*	1.50	2.50
	Salina wildrye	*Elymus salina*	4.00	6.00
	Western wheatgrass	*Agropyron smithii*	3.00	4.25
Shrub:	Big sagebrush	*Artemisia tridentata wyomingensis*	.20	.30
	Rose	*Rosa woodsii*	8.50	8.50
	Serviceberry	*Amelanchier alnifolia*	8.50	12.75
	Winterfat	*Eurotia lanata*	2.50	3.75

Table III-10. Revegetation schedule in weeks in each month.

Operation	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Place Topsoil	anytime							
P-fertilization	2,3,4	1,2						
Disk	2,3,4	1,2						
Seed	3,4	1,2						1,2,3,4
Mulch	3,4	2,3						1,2,3,4
N-fertilization*							3,4	1,2
Transplant							1,2,3,4	1,2,3,4

*nitrogen fertilizer to be applied at beginning of second growing season following planting if necessary.

Table II-14 Cont.

Drill Hole No.	Year Drilled	Location	Surface Elevation (ft)	LSS Coal Seam Elev (ft)	Total Depth (ft)	Inflow Water (gpm)	Casing	Remarks
32	1975	NW/SE Sec. 28-14-14	7170'*	6168'	1024'	0	Bot.Cem.	
33	1975	SE/SE Sec. 17-14-14	7389'	5774'	1661'	0	"	
34	1975	NW/NW Sec. 27-14-14	7400'	6058'	1470'	0	No rec.	
Patmos 3	1978	NE/SW Sec. 16-14-14	7474'	5697'	1811'	0	"	
Methane Borehole	1980	SW/Sw Sec. 17-14-14	7270'*	6050'	1220'	0	cased	
CH4-1	1980	NE/SW Sec. 17-14-14			338'	10	Full len. will be cemented	Horiz. Hole
CH4-2	1980	SE/SW Sec. 17-14-14			750'	15	"	"
CH4-3	1980	NW/SW Sec. 17-14-14			1680'	15	"	"
CH4-4	1980	NE/SW Sec. 17-14-14			1316'	15	"	"
CH4-5	1981	NE/SW Sec. 17-14-14			1048'	15	"	"
Manshaft	1971	SW/SW Sec. 17-14-14	7292'	6110'	1182	60	Unlined	
Twin Shafts	1969	SW/SW Sec. 17-14-14	7361'	6151'	1210'	100	"	
Pole Canyon Shaft	1972	SE/SE Sec. 20-14-14	7250'	6202'	1048'	50	"	
Whitmore Ret. Shaft	1952	SW/SE Sec. 20-14-14	7050'		773'	15		
Whitmore Int. Shaft	1952	SW/SE Sec. 20-14-14	7030'		731'	10		
No. 3 Ret. Shaft	1952	SW/SE Sec. 32-14-14				5	Concrete Lined	
No. 2 Canyon Shaft	1975	NE/SE Sec. 33-14-14	7288'	Unknown	1013'	10	Unlined	

*Estimated

TABLE III-14
KAISER STEEL CORPORATION
SUNNYSIDE MINES
DRILL HOLES & SHAFTS

Drill Hole No.	Year Drilled	Location	Surface Elevation (ft)	LSS Coal Seam Elev. (ft)	Total Depth (ft)	Inflow Water (gpm)	Casing	Remarks
1	1914	NE/NW Sec. 4-15-14						Underground
2	1914	NW/NW Sec. 4-15-14						"
3	1914	NW/SW Sec. 4-15-14						"
4	1914	NE/NW Sec. 4-15-14						"
5	1915	SE/SW Sec. 4-15-14						"
6	1915	SE/NW Sec. 33-14-14						"
7	1915	NW/NE Sec. 32-14-14						"
8	-	No Drill Hole Assigned			No Drill Hole Assigned			
9	1916	NW/SE Sec. 33-14-14	7130'*	6382'	770'	15	No record	
10	1917	NW/SE Sec. 33-14-14	7040'*	6267'	773'	10	"	
11	1917	NE/Se Sec. 33-14-14	7240'*	6248'	1030'	10	"	
12	1917	Lot 4 Sec. 3-15-14	7400'*	6412'	992'	10	"	
13	1918	NW/SE Sec. 29-14-14	6900'*	6392'	527'	20	"	
14	1918	NW/SW Sec. 29-14-14	7080'*	6581'	547'	20	"	
15		SE/SE Sec. 18-14-14	7340'*	6080'	1282'	20	"	
16	1953	SW/Sw Sec. 6-14-14	7620'*	5666'	1560'	0	"	
17	1953	NE/NE Sec. 18-14-14	7479	5959'	1560'	0	"	
18	1961	SW/SW Sec. 21-1414	7159'	6149'	1039'	20	"	
19	1961	SW/SW Sec. 28-14-14	1990'*	5355'	658'	0	"	
20	1961	SE/SW Sec. 28-14-14	7090'*	6210'	905'	0	"	
21	1961	SE/NW Sec. 20-14-14	7120'*	6150'	944'	20	"	
22	1966	NE/NW Sec. 3-15-14	7580'*	6116'	1476'	20	"	
23	1966	NE/NW Sec. 3-15-14	7440'*	6211'	1274'	10	"	
24	1966	SE/NW Sec. 34-14-14	7440'*	5952'	1515'	0	"	
25	1966	SW/NW Sec. 34-15-14	7350'*	6150'	1229'	25	"	
26	1966	NE/SW Sec. 3-15-14	7320'*	6290'	1047'	5	"	
27	1966	NE/SE Sec. 28-14-14	7220'*	6097'	1152'	0	"	
28	1973	NW/NE Sec. 17-14-14	7515'	5693'	1849'	0	No rec.	Lost 160' Casing
29	1973	SE/NE Sec. 18-14-14	7351'	5954'	1425'	0	Bot.Cem.	Lost 450' Casing
30	1974	NW/NE Sec. 20-14-14	7288'	5913'	1394'	0	"	
31	1974	NE/NW Sec. 7-14-14	7560'*	5866'	1715'	0	"	

Table III-15. Seed mixture for MOUNTAIN BRUSH in Whitmore Canyon at Sunnyside, Utah.

Species	% of Mix	Seeds/ Pound	Drill Rate #PLS/ft²	Drill Rate #PLS/acre	Broadcast Rate #PLS/ft²	Broadcast Rate #PLS/acre
GRASSES						
Agropyron spicatum/bluebunch wheatgrass	10	117,000	5.1	1.9	7.7	2.8
Bouteloua gracilis/blue grama	4	712,000	1.7	0.1	2.6	0.2
Elymus salina/Salina wildrye	45	379,500	22.0	2.6	33.0	3.9
Koeleria cristata/junegrass	15	400,000	7.4	0.8	11.1	1.2
Oryzopsis hymenoides/Indian ricegrass	4	235,000	2.0	0.4	3.0	0.6
Poa pratensis/Kentucky bluegrass	9	2,156,000	5.0	0.1	7.5	0.2
FORBS						
Achillea lanulosa/western yarrow	1	4,123,635	8.0	0.1	12.0	0.1
Artemisa ludoviciana/Louisiana sagebrush	1	2,770,000	6.0	0.1	0.9	0.1
Balsamorhiza sagittata/a. balsamroot	T	55,245	0.3	0.2	0.4	0.2
Castilleja chromosa/paintbrush	T	?	T	T	T	T
Gaillardia aristata/blanketflower	T	132,000	0.3	T	0.5	T
Gilia aggregata/skyrocket gilia	T	?	T	T	T	T
Hedysarum boreale/sweetvetch	1	33,585	0.5	0.7	0.8	1.0
Penstemon strictus/Rocky Mtn. penstemon	1	592,000	1.4	0.1	2.1	0.1
Petalostemon purpureum/p. prairieclover	1	293,000	0.7	0.1	1.1	0.1
Solidago candensis/Canada goldenrod	T	?	T	T	T	T
SHRUBS						
Amelanchier alnifolia/s. serviceberry	5	82,000	2.4	1.3	3.6	2.0
mountainmahogany						
Cercocarpus ledifolius/curlleaf mountainmahogany	T	51,900	0.2	0.2	0.3	0.2

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Table III-15. Seed mixture for MOUNTAIN BRUSH in Whitmore Canyon at Sunnyside, Utah (continued)

Species	% of Mix	Seeds/ Pound	Drill Rate #PLS/ft²	Drill Rate #PLS/acre	Broadcast Rate #PLS/ft²	Broadcast Rate #PLS/acre
C. montanus/true mountainmahogany	3	59,000	1.5	1.1	2.2	1.7
Poetentilla fruticosa/shrubby cinquefoil	T	?	T	T	T	T
Rhus trilobata/skunkbush sumac	T	20,300	0.1	0.5	0.2	0.5
Rosa woodsii/woods rose	T	50,000	0.2	0.2	0.3	0.2
Symphoricarpos orerphilos/whortleleaf snowberry	T	54065	0.2	0.2	0.3	0.2
TOTAL #PLS/acre			65.0	10.7	98.3	15.3

? = unknown

T = 0.5% of mix

Drill seeding rates were calculated by doubling the recommended range seeding rate of 25PLS/ft^2 (Vallentine, 1971).

Broadcast seeding rates were calculated by tripling the recommended range seeding rate of 25PLS/ft^2-(Vallentine, 1971).

Table III-16. Seed mixture for PINYON-JUNIPER in Whitmore Canyon at Sunnyside, Utah

Species	% of Mix	Seeds/ Pound	Drill Rate #PLS/ft^2	Drill Rate #PLS/acre	Broadcast Rate #PLS/ft^2	Broadcast Rate #PLS/acre
GRASSES						
Agropyron smithii/western wheatgrass	30	110,000	15.0	5.9	22.5	8.9
Bouteloua gracilis/blue grama	10	712,000	5.0	0.3	7.5	0.5
Elymus slaina/Salina wildrye	5	379,500	2.5	0.3	3.8	0.4
Hilaria jamesii/galleta	5	159,000	2.5	0.7	2.3	1.0
Oryzopsis hymenoides/Indian ricegrass	25	235,000	12.2	2.3	18.3	3.5
Sitanion hystrix/squirreltail	5	191,555	2.6	0.6	3.9	0.9
FORBS						
Gilia aggregata/skyrocket gilia	1	?	T	0.1	T	0.1
Hedysarum boreale/sweetvetch	2	33,585	1.0	1.3	1.5	1.9
Oenothera pallida/pale eveningprimrose	1	512,000	1.2	0.1	1.8	0.1
Penstemon bridgesii/Bridges penstemon	1	*600,000	1.4	0.1	2.1	0.1
P. palmeri/Palmer penstemon	1	610,000	1.4	0.1	2.1	0.1
Petalostemon purpureum/p. prairieclover	2	293,000	0.7	0.1	1.1	0.1
Spaeralcea coccinea/scarlet globemallow	2	?	T	0.1	T	0.1
SHRUBS						
Artemisia nova/black sagebrush	1	907,000	2.1	0.1	3.2	0.1
Cercocarpus ledifolius/curlleaf mountainmahogany	1	51,900	0.5	0.4	0.8	0.6
C. montanus/true mountainmahogany	5	59,000	2.4	1.8	3.6	2.8

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Table III-16. Seed mixture for PINYON-JUNIPER in Whitmore Canyon at Sunnyside, Utah (continued)

Species	% of Mix	Seeds/ Pound	Drill Rate #PLS/ft²	Drill Rate #PLS/acre	Broadcast Rate #PLS/ft²	Broadcast Rate #PLS/acre
Cowania mexicana/cliffrose	3	63,900	1.5	1.0	2.8	1.5
Ephedra viridis/green ephedra	T	24,995	0.2	0.4	0.3	0.7
TOTAL #PLS/acre			52.2	15.7	77.6	23.5

? = unknown

* = estimated

T = 0.5% of mix

Drill seeding rate is calculated by doubling the recommended range seeding rate of 25PLS/ft2 (Vallentine, 1971).

Broadcast seeding rate is calculated by tripling the recommended range seeding rate of 25PLS/ft^2 (Vallentine, 1971).

Table III-17. Seed mixture for PINYON-JUNIPER/GRASS in Whitmore Canyon at Sunnyside, Utah.

Species	% of Mix	Seeds/ Pound	Drill Rate #PLS/ft²	Drill Rate #PLS/acre	Broadcast Rate #PLS/ft²	Broadcast Rate #PLS/acre
GRASSES						
Agropyron smithii/western wheatgrass	15	110,000	7.6	3.0	11.4	4.5
Bouteloua gracilis/blue grama	5	712,000	3.3	0.2	5.0	0.2
Elymus salina/Salina wildrye	5	379,500	2.6	0.3	3.9	0.4
Hilaria jamesii/galleta	5	159,000	2.6	0.7	3.9	1.0
Oryzopsis hymenoides/Indian ricegrass	35	235,000	17.3	3.2	26.0	4.9
Sitanion hystrix/squirreltail	10	191,555	4.8	1.1	7.2	1.7
Stipa comata/needleandthread	10	115,000	5.0	1.9	7.5	2.8
FORBS						
Artemisia ludoviciana/Louisiana sagebrush	2	4,123,635	9.5	0.1	14.3	0.1
Gilia aggregata/skyrocket gilia	T	?	T	0.2	T	0.2
Hedysarum boreale/sweetvecht	3	33,585	1.5	1.9	2.3	2.9
Penstemon palmeri/Palmer penstemon	1	610,000	1.4	0.1	2.1	0.1
Petalostemon purpureum/p. prairieclover	1	293,000	0.7	0.1	1.1	0.1
Sphaeralcea coccinea/scarlet globemallow	T	?	T	0.1	T	0.1
SHRUBS						
Artemisia nova/black sage	T	907,000	T	T	T	T
Cercocarpus montanus/true mountainmahogany	2	59,000	0.9	0.7	1.4	1.1
Atriplex canescens/Fourwing saltbush	3	52,000	1.5	1.3	2.3	2.0
Eurotia lanata/winterfat	3	159,500	1.5	0.4	2.3	0.6
TOTAL #PLS/acre			60.2	14.0	90.7	20.7

? = unknown
T = 0.5% of mix
Drill seed rates were calculated by doubling the recomnmended range seeding rate of 25 PLS/ft2 (Vallentine, 1971).
Broadcast rates were claculated by tripling the recommended range seeding rate of 25 PLS/ft^2 (Vallentine, 1971).

Table III-18 Seed mixture for SAGEBRUSH-GRASS in Whitmore Canyon at Sunnyside, Utah

Species	% of Mix	Seeds/ Pound	Drill Rate #PLS/ft²	Drill Rate #PLS/acre	Broadcast Rate #PLS/ft²	Broadcast Rate #PLS/acre
GRASSES						
Agropyron smithii/western wheatgrass	15	110,000	7.6	3.0	11.4	5.9
A. spicatum/bluebunch wheatgrass	8	117,000	4.0	1.5	6.0	2.2
Bouteloua gracilis/blue grama	5	712,000	3.3	0.2	5.0	0.2
Oryzopsis hymenoides/Indian ricegrass	35	235,000	17.3	3.2	26.0	4.9
Sitanion hystrix/squirreltail	2	191,555	0.9	0.2	1.4	0.3
Sporobolus cryptandrus/sand dropseed	3	5,298,000	T	T	T	T
Stipa comata/needleandthread	10	115,000	5.0	1.9	7.5	2.8
FORBS						
Artemisa ludoviciana/Louisiana sagebrush	2	4,123,635	9.5	0.1	14.3	0.1
Balsamorphiza sagittata/a. balsmroot	T	55,245	0.3	0.2	0.5	0.2
Hedysarum boreale/sweetvetch	1	33,585	0.5	0.7	0.8	1.0
Penstemon palmeri/Palmer penstemon	1	610,000	1.4	0.1	2.1	0.1
Petalostemon purpureum/p. prairieclover	1	293,000	0.7	0.1	1.1	0.1
Solidago canadensis/Canada goldenrod	1	?	T	0.1	T	0.1
Sphaeralcea coccinea/scarlet globemallow	1		?			
SHRUBS						
Amelanchier alnifolia/s. berry	T	82,000	0.2	0.1	0.3	0.1
Artemisia tridentata wyomingensis/ big sagebrush	10	2,576,000	5.9	0.1	0.3	0.1

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Table III- 19 . Characteristics of species used in the seed mixtures for Sunnyside, Utah.[a,b]

	Typical Soils S	Typical Soils Si	Typical Soils C	Salinity Tolerance	Optimum Ppt.Zone (in.)	Establishment Potential Init.	Establishment Potential Final	Persis-tence	Erosion Control Potentl	Drought Resist-ance	Sources[c]
GRASSES											
Agropyron smithii	P	G	G	G	14-20	3	5	5	5	4	1,4,6,8,12
A. spicatum	F	G	G	F	12-20	3-4	4	4	4	Yes	1,6,7,8,12
Bouteloua gracilis	F	G	G	F	10-20	3	-	-	4	4	8,9,12
Elymus salina	-	-	-	--	---	2-3	4	5	5	-	5,6,8,15
Hilaria jamesii	Varied			F-G	10-18	2-3	-	-	5	4	2,8,9,11,14
Koeleria cristata	-	-	-	--	---	-	-	-	-	-	---
Oryzopsis hymenoides	G	G	F-P	F	8-16	2	4	4	3	4	2,6,7,8,12,13
Poa pratensis	P	F	F	P-F	---	3	4	5	5	2	6,7,12
Sitanion hystrix	-	-	-	--	---	3	3	3	3	-	6,12
Sporobolus cryptandrus	G	G	F	F	10-18	2-3	4	4	4	4	3,6,8,12
Stipa comata	-	-	-	--	10-16	-	-	-	-	4	3,8
FORBS											
Achillea lanulosa	Most soils			--	---	-	-	-	-	4	7,9,15
Artemisia ludoviciana	S or GR Loam			--	---	1	4-5	4	3	-	3,6

(Continued on Next Page)

Table III-19 . Characteristics of species used in the seed mixtures for Sunnyside, Utah. (Continued).

	Typical Soils S	Typical Soils Si	Typical Soils C	Salinity Tolerance	Optimum Ppt.Zone (in.)	Establishment Potential Init.	Establishment Potential Final	Persistence	Erosion Control Potentl	Drought Resistance	Sources[c]
Balsamorhiza sagittata	-	-	-	--	---	3	5	5	3	-	6
Castilleja chromosa	-	-	-	--	---	-	-	-	-	-	-
Gaillardia aristata	-	-	-	--	---	-	-	-	-	-	-
Gilia aggregata	-	-	-	--	---	-	-	-	-	-	-
Hedysarum boreale	Varied			P	---	4	3-5	5	4	3-4	2,6,15
Oenothera pallida	-	-	-	--	---	-	-	-	-	-	-
Penstemon bridgesii	-	-	-	--	---	-	-	-	-	-	-
P. palmeri	-	-	-	--	---	4	3	3	3	-	6
P. strictus	sandy loam			--	14-20	-	-	-	4	-	8,11,12
Petalostemon purpureum	-	-	-	--	15-20	-	-	-	-	-	12
Solidago canadensis	-	-	-	--	---	-	-	-	-	-	-
Sphaeralcea coccinea	Varied			F	---	-	-	-	3	4	2,3
SHRUBS											
Amelanchier alnifolia	P	G	G	P	14-20	3	3	4	4	3	6,8,12

(Continued on Next Page)

Table III- 19 . Characteristics of species used in the seed mixtures for Sunnyside, Utah. (Continued).

	Typical Soils S	Si	C	Salinity Tolerance	Optimum Ppt.Zone (in.)	Establishment Potential Init.	Final	Persis-tence	Erosion Control Potentl	Drought Resist-ance	Sources[c]
Artemisia nova	Rocky, shallow			P	10-18	3	5	5	4	-	2,6,8
A. tridentata	P	G	G	F	9-17	3	5	5	4	4	2,6,8,12
Cercocarpus ledifolius	F	G	G	F	10-18	2-3	3	4	3	4	6,8,9,10,12
C. montanus	F	G	G	P-F	12-20	3	2	4	4	3	2,6,8,10,12
Chrysothamnus nauseosus	Varied			F-G	10-18	3	2-4	4	5	3	2,3,5,6,8,11,15
Cowania mexicana	F	P	P	F	12-20	2-3	3	4	4	4	6,8,12
Ephedra viridis	G	-	-	G	8-14	4	4	5	4	5	2,6,8
Eurotia lanata	G	G	G	G	8-14	3-4	4	4	3	4	6,8,9,10,12
Potentilla fruticosa	P	G	G	-	16-20	-	-	-	-	-	8,11
Rhus trilobata	F	G	F	P	10-19	2	4	5	4	3-4	2,6,8,11
Rosa woodsii	F	G	F	-	15-20	3	4	5	4	-	6,11
Symphoricarpos oreophilos	-	-	-	-	---	3	5	5	5	-	6

[a] P = poor, F = fair, G = good.

[b] 1 = very poor, 2 = poor, 3 = fair, 4 = good, 5 = very good.

[c] 1 = Dewey, 1960; 2 = Institute for Land Rehabilitation Staff, 1979; 3 = Johnson and Nichols, 1970; 4 = Martin et al, 1976; 5 = McArthur et al, 1979; 6 = Plummer et al, 1968; 7 = Schiechtl, 1980; 8 = Thornburg, 1982; 9 = USDA Forest Service, 1937; 10 = USDA Forest Service 1974; 11 = U. S. Environmental Protection Agency, 1975; 12 = Vallentine, 1971; 13 = Verner, 1956; 14 = West, 1972; 15 = Wolfe and Abbott, 1982.

Table III-20 . Chemical analyses of coal refuse.

Refuse Type	Texture	pH	Salts	Lime	ppm NO_3-N	ppm P	ppm K	ppm Zm	ppm Fc	ppm Mn	ppm Cu	ppm Se	ppm As	meg Mg	mg/l B	Sar
	Parameter															
Fresh Refuse		7.6	2.0	L	1	1	71	.5	12.4	1.5	1.0	1.98	5.38	5	.4	5.1
Fresh Refuse		7.6	3.1	L	1	1	60	.5	13.0	1.4	1.0	2.2	6.38	11.7	.5	4.0
Fresh Refuse		7.4	3.3	L	1	1	76	.5	12.2	1.3	1.0	2.24	4.68	9.3	.5	6.6
Refuse Plots (1980)																
No Topsoil (0-6")		6.1	3.4	L	2	6	25	5.9	178	14.8	2.2	2.6	.93	17.2	11	.2
No Topsoil (6")		6.8	3.0	L	2	11	27	10.3	2450	9	3	2.68	1.0	12	.1	.3
2"/Refuse (0-6")		7.8	1.8	H	24	5	115	1.1	11.6	3.9	1.7	.27	.84	6.8	.2	.4
2"/Refuse (6")		6.1	3.2	L	1	21	12	5.5	315	26	1.8	2.25	.84	16.0	.1	.3
6"/Refuse (0-6")		7.8	1.8	H	32	4	117	.3	11	3	1.6	.33	1.0	7.3	.2	.5
6"/Refuse (6")		7.3	3.6	H	8	12	60	4.5	100	4.4	1.5	1.39	.91	24.8	.1	.3
Old Refuse		2.8	26.9	L	1	5	10	16	423	62.6	2	4.08	17.3	4962	16	1.6
Old Refuse on Dam		2.1	9.8	L	2	3	10	1.9	543	3.3	2.6	3.02	4.75	20.1	16	6.4
Old Refuse on Dam		2.2	17.9	L	2	6	10	10.8	448	22	3.2	2.8	6.50	137.3	16.0	.1
Old Refuse on Dam		3.7	35.9	L	1	1	10	33	101	139	3.0	2.9	9.55	14145	1.7	.1

Table III-21

Subsidence Net Survey Results

Point	Datum Elevation 05-13-82	Elevation 08-23-83		Orig. Approx. Depth to Coal
S-1	7166.16	7165.63	-0.53*+	1050
S-2	7190.68	7190.42	-0.26*+	1100
S-3	7204.86	7204.77	-0.09*	1140
S-4	7223.65	7223.60	-0.05*	1190
S-5	7250.72	7250.64	-0.08*	1250

*NOTE: ± 10 feet is the limit of accuracy in the survey

+NOTE: The longwall has mined under the survey point.

CHAPTER III

ROAD CULVERT SPECIFICATIONS

Table III-22

Number	Diameter	Length	Slope	Amount
RC 1-1	24"	60'	3%	1
RC 1-2	16"	80'	3%	1
RC 1-3	36"	80'	5%	1
RC 1-4	12"	40'	5%	1
RC 2-1	24"	40'	5%	1
RC 2-2	18"	40'	5%	1
RC 2-3	24"	40'	3%	1
RC 2-4	36"	20'	3%	1
RC 2-5	48"	40'	2%	1
RC 3-1	36"	25'	5%	1
RC 3-2	36"	25'	5%	1
RC 3-3	36"	25'	5%	1
RC 3-4	36'	25'	5%	1
RC 3-5	36"	30'	5%	1
RC 3-6	36"	40'	5%	1
RC 7-1	84"	60'	5%	1
RC 7-2	48"	40'	5%	1
RC 7-3	48"	20'	5%	4
RC 7-4	18"	40'	5%	1
RC 8-1	60"	60'	5%	1
RC 10-1	36"	50'	1%	1
RC 10-2	24"	100'	15%	1
RC 10-3	24"	80'	3%	1
RC 10-4	144"	150"	10%	1

Table III-23. Schedule of parameters for water quality analyses.

Parameter	Schedule* A	B	C
Acidity, as CaCO3		X	X
Alkalinity, as CaCO3		X	X
Ammonia			X
Antimony			X
Arsenic		X	X
Beryllium			X
Bicarbonate			X
BOD	X	X	X
Boron			X
Cadmium			X
Calcium			X
Carbonate			X
Chloride		X	X
Chromium			X
Conductivity			X
Copper		X	X
Cyanide			X
Fluoride			X
Gross alpha			X
Hardness			X
Iron	X	X	X
Lead			X
Magnesium			X
Manganese	X	X	X
Mercury			X
Nickle			X
Nitrate, NO_3-N		X	X
Nitrite			X
Oil and grease	X	X	X
Organic nitrogen			X
pH	X		X
Phenol			X
Phosphate			X
Potassium			X
Selenium		X	X
Silver		X	X
Sodium			X
Sulfate	X	X	X
Sulfide			X
Thallium			X
Total dissolved solids	X		X
Total suspended solids	X		X
Turbidity			X
Zinc			X

* A- monthly, B-quarterly, C-semi-annually

Table III-24 . Identification and Size of disturbed areas.

Area Number	Proposed Vegetation Type	Area to be Reclaimed	Acres
1.	Sagebrush grass	Main complex including offices, shop warehouse, changehouse, parking lot, prep plant, present No. 3 mine fan, unit train loadout, industrial water tanks, mine portals and substations.	62.95
2.	Sagebrush grass	No. 2 mine fan, substations, portals and road.	2.58
3.	Sagebrush grass	No. 1 mine Whitemore Canyon shafts and fan, substations.	3.89
4.	Sagebrush grass	Storage yard - Number two Canyon, fan and portal.	17.67
5.	Sagebrush grass	No. 2 Mine Water Canyon portals and road.	7.13
6.	Sagebrush grass	Test plot, camp, manshaft pond road, methane vent, sediment pond and discharge pond.	8.49
	Sagebrush	TOTAL ACRES	102.71
7.	Pinyon-juniper/ grass	Refuse disposal areas including coarse refuse, industrial waste, borrow areas, slurry ponds, and Sunnydale Mines area.	122.64
8.	Pinyon-juniper	No. 1 Mine Outcrop fan, substations, portals and roads.	8.20
9.	Mountain brush	Upper changehouse, twin shaft fan, manshaft and hoist house. Pole Canyon Shaft.	5.19
		Areas To Be Contemporaneously Reclaimed	
10.	Pinyon-juniper	Slaughter Canyon storage, portal and road.	5.88
		TOTAL ACRES	244.62

Table III-25 Equipment Ownership and Operating Costs (1983).

Equipment	Total operating cost per hour
D9 L dozer	$104.19
992 loader	190.89
5 ton flatbed	18.30
10 ton forklift	42.91
Motor grader	16.94
4000 gallon water truck	14.95
Backhoe, 3/4 yd , Case	13.60
35 ton end-dump	53.15
10 ton crane	29.47
300 amp welder	5.45
1/2 ton 4 x 4 pickup	8.95
Scraper	134.97
Hydroseeder, 2500 gallon	19.50
Drill/imprinter w/tractor	14.00
Hay blower, Reinco w/flatbed	18.90
Farm tractor/disc	14.00
Crimper w/tractor	13.75
600 cfm compressor	26.37
Impact breaker w/accessories	6.44

Table III-26 Typical sequential steps for reclamation and vegetation

No.	Step	Equipment Needed	Men Needed	Hrs/ Acre	Man Hrs/A
1.	Removal of buidling or facility (optional=+)	Special contractor	-	-	-
	Removal of foundations (optional=+)	Special contractor	-	-	-
2.	Sealing entries	Truck	4	-	88 Man hr/portal
3.	Ripping				
4.	Grading	Dozer or motorgrader	1	6.2	6.2
5.	Borrow material replacement	Dozer, scraper (2)	3	2	2
6.	Finishing and disking, if necessary ++	Motorgrader, farm w/fertilizer spreader and disc	1	0.5	0.5
	P_2O_5 fertilization		2	0.5	1.0
7.	Soil testing		See estimate		
8.	N fertilization	Farm tractor, fertilizer spreader	1	0.5	0.5
9.	Revegetation:	Farm tractor w/drill dozer w/imprinter	2	0.5	1.0
	seeding	hydroseeder	2	0.5	1.0
	spread hay	flatbed w/hay blower	4	0.5	2.0
	tack hay	flatbed w/hydroseeder farm tractor w/crimper	1	0.25	0.25
10.	Monitoring		See estimate		

\+ Step only necessary if building is present.

++ Do not want to disc unless absolutely necessary because topsoil is thin and mixing w/lesser quality subsoil is undesirable.

Table III-27 Estimated direct reclamation cost per acre

STEP	$COST/ACRE	$COST/ACRE**
Regrading	$791.59	$ 791.59
Ripping*	7.94	11.84
Borrow and topsoil redistribution*	678.08	1,550.20
Finishing	21.65	21.65
Soil Testing*	30.13	45.05
Revegetation	916.14	916.14
Phosphorus fertilization	27.95	27.95
Nitrogen fertilization	18.95	18.95
TOTAL	$2,492.43	$3,383.37

*Cost of ripping and redistribution of borrow material and topsoil was divided by the total disturbed acreage.

**Estimated of each step of reclamation per acre on areas where it is actually performed.

CHAPTER III-28 Estimated Cost of Dismantling and Removing Facilities

Facility	Building Material	Size ($ft.^3$)	Cost/ Unit	Cost ($)
Preparation Plant	Steel	706,000	0.15	$119,415.02
Blending Bin	Concrete	250,000	0.21	52,500.00
Milkshed	Block	5,600	0.16	896.00
Main Office	Brick	30,000	0.16	4,800.00
Shop	Block	474,000	0.16	75,000.00
Main Bathhouse	Block	178,000	0.16	28,560.00
Training Building	Block	60,000	0.16	9,600.00
Warehouse	Block	90,000	0.16	18,900.00
Engineering Office	Wood	25,900	0.16	4,144.00
Manshaft Changhouse	Steel	179,000	0.15	26,850.00
Stockpile Tower & Conveyor	Steel	550,000	0.15	82,500.00
Head Frame	Steel	32,000	0.15	5,120.00
Hoist Houses (2)	Steel	7,000	0.16	1,120.00
Materials Track		5,250'		2,625.00
Power Lines		5 miles		13,254.70
Water Tanks				1,520.00
Fans (5)				2,520.00
Mine Substation (4)				2,000.00
Parking Lot Removal				4,405.49

Table III-29 Estimated cost per acre for reseeding

Item	Weighted cost/acre for veg. type PJ/grass 122.64A	PJ 14.08A	Mt. Brush 5.19A	Sage-grass 102.71A	weighted $cost/acre
Labor	119.50	119.50	119.50	119.50	119.50
Equipment	26.75	28.95	28.95	26.20	26.69
Phosphorus appl.	31.47**	18.95	18.95	18.95	25.22
Nitrogen appl.	18.95	18.95	18.95	18.95	18.95
Seed	230.67	305.91	305.66	158.44	206.26
(% of steep slopes)	(20)	(36)	(100)	(0)	
Soil supplements*	310.43	316.43	342.43	302.43	308.10
SUBTOTAL	737.57	808.69	834.44	644.47	704.72
Plus 30% materials handling, loading and traveling					
TOTAL	$958.84	$1,051.30	$1,084.77	$837.81	$916.14

*40lb of tackifier was added on the steep slopes.

**Includes increased cost of discing fertilizer applied to area borrow material was applied.

CHAPTER III

Table III-30 Soil supplements for revegetating

Material	Unit Cost	Quantity/Acre	Cost/Acre
Native Hay	$95/T	2T	190.00
Tackifer	0.9/lb*	80lb	72.80
Wood Fiber	$220/T	300lb	33.00
P-205	$175/T	30lb	2.63
Ammonium Nitrate	$200/T	40lb	4.00
			$302.43

*Steep slopes requrie additional 40lb of tackifer

Table III-31 Seed costs for sagebrush-grass type

Seed	Unit Cost PLS#3	Drill Rate	Drill Cost/Acre	Broadcast Rate	Broadcast Cost/Acre
GRASSES					
Agropyron smithii	3.95	3.0	11.85	5.9	23.31
Agropyron spicatum	7.95	1.5	11.93	2.2	17.49
Bouteloua gracilis	9.00	0.2	1.80	0.2	1.80
Oryzopsis hymenoides	10.50	3.2	33.60	4.9	51.45
Sitanion hystrix	16.00	0.2	3.20	0.3	4.80
Sporobolus cryptandrus	2.45	0.0	0.25	0.1	0.25
Stipa comata	12.00	1.9	22.80	2.8	33.60
FORBS AND SHRUBS					
Artemisa ludoviciana	19.00	0.1	1.90	0.1	1.90
Balsamorhiza sagittata	11.50	0.2	2.30	0.3	2.30
Hedysarum boreale	30.00	0.7	21.00	1.0	30.00
Penstemon palmeri	29.00	0.1	2.90	0.1	2.90
Petalostermom purpureum	35.00	0.1	3.50	0.1	3.50
Solidago canadensis	25.00	0.1	2.50	0.1	2.50
Sphaeralcea concinna	35.00	0.1	3.50	0.1	3.50
Amelanchier alnifolia	35.00	0.1	3.50	0.1	3.50
Artemisia tridentata	6.50	0.1	0.65	0.1	0.65
Chrysothamnus nauseosus	5.95	0.1	0.60	0.1	0.60
Eurotia lanata	8.00	0.3	2.40	0.4	3.20
Symphoricarpos oreophilus	30.00	0.2	6.00	0.2	6.00
			138.18		193.25

Estimated 61% of area drilled
Estimated 39% of area broadcast
Weighed cost of seed/acre = $158.44
Total Acres - 102.71 Total cost of Seed = $16,273.10

Area to be broadcast does not imply only steep slopes, but also areas where size or shape maked hydroseeding more economical.

Table III-32 Seed costs for pinyon-juniper begetation type

Seed	Unit Cost PLS#3	Drill Rate	Drill Cost/Acre	Broadcast Rate	Broadcast Cost/Acre
GRASSES					
Agropyron smithii	3.95	5.9	23.31	8.9	35.16
Bouteloua gracilis	9.00	0.3	2.70	0.5	4.50
Elymis salina	13.00	0.3	3.90	0.4	5.20
Hilaria jamesii	12.00	0.7	8.40	1.0	12.00
Oryzopsis hymenoides	10.50	2.3	24.15	3.5	36.75
Sitanion hystrix	16.00	0.6	9.60	0.9	14.40
FORBS AND SHRUBS					
Gilia aggregata	21.00	0.1	2.10	0.1	2.10
Hedysarum boreale	30.00	1.3	39.00	1.9	57.00
Oenothera pallida	52.50	0.1	5.25	0.1	5.25
Penstemon bridgesii	25.00	0.1	2.50	0.1	2.50
Penstemon palmeria	29.00	0.1	2.90	0.1	2.90
Petalostemon prupurem	35.00	0.1	3.50	0.2	7.00
Sphaeralcea concinna	35.00	0.1	3.50	0.1	3.50
Artemisia nova	5.00	0.1	0.50	0.1	0.50
Cercocarpul ledifolius	24.00	0.4	9.60	0.6	14.40
Cercocarpus montanus	29.00	1.8	52.50	2.8	81.20
Cowania mexicana	12.50	1.0	12.50	1.5	18.75
Ephedra viridis	4.00	0.4	1.60	0.7	2.80
TOTAL			207.21		305.91

Estimated 100% of area will be broadcast.
Total Acres = 14.08 Seed Cost/Acre = $305.91
Total Seed Cost = $4,307.21

Area to be broadcast does not imply it is all steep slopes, only that size and shape dictates use of hydroseeder.

Table III-33 Seed costs for mountain brush vegetation type

Seed	Unit Cost PLS#3	Drill Rate	Drill Cost/Acre	Broadcast Rate	Broadcast Cost/Acre
GRASSES					
Agropyron smithii	3.95	1.9	7.51	2.8	11.06
Bouteloua gracilis	9.00	0.6	0.90	0.2	1.80
Elymus salina	13.00	2.6	33.80	3.9	50.70
Koeleria cristata	48.75	0.8	39.00	1.2	58.50
Oryzopsis hymenoides	10.50	0.4	4.20	0.6	6.30
Poa pratensis	1.50	0.1	0.15	0.2	0.30
FORBS AND SHRUBS					
Achillea lanulosa	19.00	0.1	1.90	0.1	1.90
Artemisia ludoviciana	19.00	0.1	1.90	0.1	1.90
Balsamorphiza sagittata	11.50	0.2	2.30	0.2	2.30
Castilleja chromosa	25.00	0.1	2.50	0.1	2.50
Gaillardia aristata	45.00	0.1	4.50	0.1	4.50
Gilia aggregata	21.00	0.1	2.10	0.1	2.10
Hedysarum boreale	30.00	0.7	21.00	1.0	30.00
Penstemon strictus	20.00	0.1	2.00	0.1	2.00
Petalostemon purpureum	35.00	0.1	3.50	0.1	3.50
Solidago canadensis	25.00	0.1	2.50	0.1	50.00
Amelanchier alnifolia	25.00	1.3	32.50	2.0	2.50
Cercocarpus ledifolius	24.00	0.2	4.80	0.2	4.80
Cercocarpus montanus	29.00	1.1	31.90	1.7	49.30
Potentilla fruticosa	25.00	0.1	2.50	0.1	2.50
Rhus trilobata	18.00	0.5	9.00	0.5	9.00
Rosa woodsii	11.00	0.2	2.20	0.2	2.20
Symphoricarpos oreophilus	30.00	0.2	6.00	0.2	6.00
TOTAL			218.66		305.66

Estimated 100% of area will be broadcast
Total Acres = 5.9 Seet Cost/Acre = $305.66
Total Seed Cost = $1,803.39

Table III-34 Seed costs for pinyon-juniper/grass vegetation type

Seed	Unit Cost PLS#3	Drill Rate	Drill Cost/Acre	Broadcast Rate	Broadcast Cost/Acre
GRASSES					
Agropyron smithii	3.95	3.0	11.85	4.5	17.78
Boyteloua gracilis	9.00	0.2	1.80	0.2	1.80
Elymus salina	13.00	0.3	3.90	0.4	5.20
Hilaria jamesii	12.00	0.7	8.40	1.0	12.00
Oryzopsis hymenoides	10.50	3.2	33.60	4.9	51.45
Sitamion hystrix	16.00	1.1	17.60	1.7	27.20
Stipa comata	12.00	1.9	22.80	2.8	33.60
FORBS AND SHRUBS					
Artemisia ludoviciana	19.00	0.1	1.90	0.1	1.90
Gilia aggregata	21.00	0.2	4.20	0.2	4.20
Hedysarum boreale	30.00	1.9	57.0	2.9	87.0
Penstemon palmeri	29.00	0.1	2.90	0.1	2.90
Petalostemom purpureum	35.00	0.1	3.50	0.1	3.50
Sphaeralcea concinna	35.00	0.1	3.50	0.1	3.50
Artemisia nova	5.00	0.1	0.50	0.1	0.50
Atriplex canescens	4.00	1.3	5.20	2.0	8.00
Cercocarpus montanus	29.00	0.7	20.30	1.1	31.90
Eurotia lanata	8.00	0.4	3.20	0.6	4.80
TOTAL			202.15		297.23

Estimate 30% of area will be broadcast
Estimate 70% of area will be drilled
Weighed Average Cost/Acre - $230.67
Total Acres = 122.64 Total Seed Cost = $28,289.86

Area to be broadcast does not imply all steep slopes, includes areas where size and shape dictate use of hydroseeder.

Table III-35 Total estimated monitoring expenditures

Monitoring Item	Manpower	Cost
Annual Inspection (2da/yr)	40 days	$ 4,000
*Sampling Discharge Ponds	4 days	400
Lab Costs		2,400
Biannual Sampling of Reference Areas & Revegetated Areas Prior to Responsibily Period (5 years of sampling)	75 days	7,500
Final Vegetation Survey Reclaimed Success Standard (Reference Areas 4 Years)	60 days	6,000
TOTAL Monitoring Costs		$40,300

*Ponds are limited discharge ponds that will be sampled only following 10-year storm event. Assumed will have to sample all ponds at least three times before and during responsibility period.

Table III-36
Total performance bond forecast in current dollars for the five year permit term and life of the mine (LOM)

No.	Area & Vegetation Type	Acres	Removal of Facilities & Buildings	Sealing Entries $	Ripping, Replacement, Regrading & Finishing	Soil Testing	Revegetation	TOTAL	TOTAL/ ACRE
1	Sagebrush grass main complet including offices, shop, warehouse, parking lot, prep. plant, present No. 3 Mine fan, unit train, industrial water tanks, mine portals and substations.	62.95	424,280.19	2 portals 6,155.60 1 shaft 513.00 Total 6,668.60	920.83	46.10	837.81	544,557.17	8,650.63
2	Sagebrush grass No. 2 mine fan substations, portals and road.	2.58	1,000	5 portals 15,389.00	825.08	46.10	837.81	20,798.19	8,061.32
3	Sagebrush grass No. 1 mine Whitmore Canyon portals and road	3.89	1,000	2 shafts 2,802.00	825.08	46.10	837.81	35,176.65	3,686.37
4	Sagebrush grass Storage yard, No. 2 Canyon fan and portal	17.67	500	1 portal 3,077.80 1 shaft 1,401.00 Total 4,478.80	825.08	46.10	837.81	35,176.65	1,990.76
5	Sagebrush grass No. 2 Mine Water Canyon portals and road	7.13	-	5 portals 15,389.00	825.08	46.10	837.81	27,527.10	3,867.34
	Sagebrush grass Test plot, camp, manshaft pond road, methane vent. sediment pond and discharge	8.49	-	-	825.08	46.10	833.81	14,509.32	1,708.99

No.	Area & Vegetation Type	Acres	Removal of Facilities & Buildings	Sealing Entries $	Ripping, Replacement, Regrading & Finishing	Soil Testing	Revegetation	TOTAL	TOTAL/ ACRE
7	Pinyon-juniper/grass Refuse disposal areas including coarse refuse, industrial waste borrow areas, slurry ponds and Sunnyside Mines area	11.64	-	-	1,865.45	46.10	958.84	350,024.63	2,870.39
8	Pinyon-juniper No. 1 Mine outcrop fan, substations, portals and roads	8.2	1,000	5 portals 15,389.00	825.08/A	46.10	1,051.30	32,153.34	3,921.14
9	Mountain brush Upper changehouse, twin shaft fan, manshaft, hoist house and Pole Canyon shaft	5.19	27,910	4 shafts 2,052.00	825.08/a	46.10	1,084.77	40,113.38	7,728.98
				AREAS TO BE	CONTEMPORANEOUSLY RE	CLAIMED			
10	Pinyon-juniper Slaughter Canyon Storage, portal and road	5.88	-	-	825.08/A	46.10	1,051.30	11,304.18	1,922.48
	TOTAL COSTS	244.62	455,690.19	62,168.40	1,371.30/A	46.10	916.14		4,450.52
	Equipment set-up and demobilization							14,000.00	

 Table III-36 (cont.)

Total performance bond forecast

*Total cost of reclamation (excluding facilities Removal and Sealing of Entries)	$584,830.55	
Field supervisor of reclamation at 3½% of $584,830.55		20,469.07
Project management and overhead at 3½% of $605,299.62		21,185.49
Monitoring		40,300.00
Profit and additional contigency (15% of $666,818.11)		100,002.72
TOTAL BOND (Including revegetation costs, facilities removal and sealing entries)		1,284,699.42
Bond pro-rated/acre (244.62 acres)		5,251.82
Adjusted TOTAL BOND for five year term (assuming 1% annual increase. Industrial Commodities Index)		1,297,546.42
Adjusted Bond pro-rated/acre (244.62 acres)		5,304.33

TABLE III-49

INTERIM seed mixture for Sunnyside Mines, Sunnyside, Utah

Species	% of Mix	Seeding Rate Drill	Seeding Rate Broadcast
Agropyron riparium var sodar / Sodar streambank wheatgrass	35	5.3	7.7
Agropyron spicatum var secar / Secar bluebunch wheatgrass	30	4.5	6.6
Elymus cinereus / Great Basin wildrye	20	4.5	6.6
Melilotus minor / Yellow sweetclover	5	0.7	1.1
Sanguisorba minor / Small burnett	5	0.7	1.1
Medicago sativa / Alfalfa	5	0.7	1.1

NOTE: Seeding rates are: Drill - 15 lb. PLS per acre
Broadcast - 22 lb. PLS per acre
Per L. P. Braxton letter to
M. P. Holmes on 11-17-86

TABLE III-50

SUNNYSIDE COAL COMPANY
ACT/007/007
BEST TECHNOLOGY CURRENTLY AVAILABLE
SEDIMENT CONTROL METHODS
FOR SMALL PERMIT AREAS

INCORPORATED
EFFECTIVE:
AUG 14 1993
UTAH DIVISION OIL, GAS AND MINING

Plate III-33 No.	Affected Area	(BTCA) Yes/No	Drawing Number	Area (Acres)	Calculated **Runoff (Acre Feet)	Treatment Utilized	Comments
1 of 12	*Manshaft Substation Area, General Area	Yes	A4-0213	0.13	0.003	Silt Fence/or Straw Bales	
1 of 12	Manshaft Substation Area, East Field	Yes	A4-0213	1.29	0.010	Vegetative Filter	
1 of 12	Manshaft Substation Area, West Field	Yes	A4-0213	1.19	0.004	Vegetative Filter	
2 of 12	*Whitmore Area	Yes	A5-0109	6.19	0.027	Silt Fence/or Straw Bales	
3 of 12	Whitmore Test Plot	Yes	A4-0265	0.12	0.001	Vegetative Filter	
4 of 12	*Pole Canyon Shaft Area	Yes	A5-0108	0.41	0.005	Silt Fence/or Straw Bales	
5 of 12	Safety Training Field	Yes	A4-0264	2.17	0.060	Vegetative Filter	
5 of 12	Rock Dust Bulk Tank	Yes	A4-0264	0.06	0.022	Veg Filter, Silt Fence	Temporary Silt Fence 4/30/93,NOV 93-32-3-8
6 of 12	*#2 Canyon Fan	Yes	A5-0106	0.50	0.011	Silt Fence/or Straw Bales	Scheduled for Reclamation in 1993.
7 of 12	*Fan Canyon Area	Yes	A5-0110	0.95	0.080	Silt Fence/or Straw Bales	Scheduled for Reclamation in 1993.
8 of 12	*Water Canyon Area	Yes	A5-0107	4.72	0.860	Silt Fence/or Straw Bales	Being Reclaimed 1990-1991. Finish 1993.
9 of 12	*Outcrop Fan Area	Yes	A5-0111	2.78	0.180	Silt Fence/or Straw Bales	Rock gabian is also in place.
10 of 12	Roadside Substation	Yes	A4-0263	0.38	0.009	Silt Fence/Straw Bales/Veg F	
11 of 12	Twin Shafts Mine Water Pond Topsoil Pile BTCA	Yes	A5-0276	0.07	0.001	Veg Filter/Silt Fence	
12 of 12	--- AVAILABLE FOR FUTURE USE ---						

Total BTCA Area = 20.96
Total Disturbed Area = 286.98
Total Permit Area = 14,475
% Disturbed Area utilizing BTCA = 7.30% For 10-Year 24-Hour event.
% Permit Area utilizing BTCA = 0.14%
Total BTCA Runoff in Acre Feet = 1.27

* Originally Permitted as Small Area Exemptions.
**Calculated Runoff is for Total Drainage, not just BTCA Acreage