CO-OP MINING COMPANY
ANNUAL REPORT 1991

Bear Canyon Mine
ACT/015/025

Trail Canyon Mine
ACT/015/021

Prepared by

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for

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Co-Op Mining Company
Annual Report for 1991
Bear Canyon and Trail Canyon Mines

SCOPE

The following document contains information pertaining to Co-Op Mining Companies Bear Canyon and Trail Canyon Mines. Bear Canyon Mine is an active mine, under current production. Coal mining production was terminated in 1981 at Trail Canyon Mine and the mine has undergone extensive reclamation. Trail Canyon Mine remains under the required bond liability period.

This report was compiled based on the "annual report information sheet" received from the Division of Oil Gas and Mining.

ANNUAL REPORT INFORMATION SHEET

COAL MINING AND RECLAMATION OPERATIONS FOR 1991

Permittee:	Co-Op Mining Company
Mine Name:	Bear Canyon Mine / Trail Canyon Mine
Mailing Address:	53 West Angelo Avenue Salt Lake City, Utah 84115
Company Representative:	Kimly C. Mangum, P.E., M.E.C.
Resident Agent:	Mr. Wendell Owen Co-Op Mining Co. P.O. Box 1245 Huntington, Utah 84528
Permit Number:	Bear Canyon Mine - ACT/015/025 Trail Canyon Mine - ACT/015/021
MSHA ID Number:	Bear Canyon Mine - MSHA #42-00081-0
Date of Initial Permanent Program Permit:	Bear Canyon Mine - Nov. 1, 1985 Trail Canyon Mine - May 30, 1989
Date of Permit Renewal:	Bear Canyon Mine - May 20, 1991 Trail Canyon Mine - May 30, 1989
Quantity of Coal Mined (tonnage) 1991:	432,140 tons

Updated Mine Sequence Maps are attached.

WATER MONITORING

All water monitoring data for 1991 has been submitted to the Division quarterly. Copies of the 1991 water monitoring matrix showing monitoring point locations and monitoring frequencies for the Bear Canyon and Trail Canyon Mines can be found in Tables 1 and 2. Copies of the summary pages for the year are included in Appendix A and as database files (enclosed).

Co-Op Mining Company began discharging water from the mine in April, 1991. See Co-Op Mining Company permit number UTG040006, Utah General Permit for Coal Mining, covering 5 discharge points, issued by the Bureau of Water Pollution Control, Utah Department of Health, 8 May 1989. A copy of the permit can be found as Appendix 7-B in the Bear Canyon Mine PAP. The discharge is approved at discharge point 004. The water monitoring summary pages for the UPDES are included in Appendix A and as database files (enclosed).

Copies of the 1991 Mine Water Surveys can also be found in Appendix A of this report. New water was encountered during the fourth quarter of 1991, and is shown on Plate 7-10A as SBC-10. Monitoring of this water began in January of 1992.

Bear Canyon Water Monitoring Matrix 1991

Location	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Upper Bear Creek BC-1		oper.			oper.	field	field	oper.	field	oper.		
Lower Bear Creek BC-2		oper.			oper.	field	field	oper.	field	oper.		
Rt Fork Bear Cr. BC-3		oper.			oper.	field	field	oper.	field	oper.		
Portal Well SBC-2		(3)										
Creek Well SBC-3		oper.			oper.			oper.		oper.		
Huntington Spr. (4) SBC-4		base.				base.	base.	base.	base.	base.	base.	base.
Birch Spring (4) SBC-5		base.				base.	base.	base.	base.	base.	base.	base.
Co-Op Dev Spring SBC-6		oper.			oper.			oper.		oper.		
1st N. Bleeder #42 SBC-9		base.			base.			base.		base.		

Notes:

1. Taken from Table 7.1-6 of the PAP. See Tables 7.1-7 and 7.2-5 of the PAP for listing of water quality monitoring parameters.
2. oper. = operational, base. = baseline
3. SBC-2 caved in, lost, and discontinued in 1991.
4. SBC-4 and SBC-5 shall also be tested for oil and grease.

Trail Canyon Water Monitoring Matrix 1991

Location	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Upper Trail Cr. UT-1					oper.					oper.		
Lower Trail Cr. LT-2					oper.					oper.		
Portal Spring PS-1					oper.					oper.		
Trail Canyon Spring TS-1					oper.					oper.		
Co-Op Spring CS-1					oper.					oper.		
Ball Park Spring BP-1					oper.					oper.		
Birch Spring SBC-5	base.					base.	base.	base.	base.	base.	base.	base.
Sed. Pond Inlet SP-1					oper.					oper.		
\Culvert TCC-6 Outlet CO-1				See	Note	#4						
Sealed Mine Entries and Access				See	Note	#5						

Notes:

1. Taken from Table 7.2-7 of the PAP. See Tables 7.2-5 and 7.2-6 of the PAP for listing of water quality monitoring parameters.
2. oper. = operational, base. = baseline
3. Baseline parameters to be taken in **1993** at all locations.
4. Sampling will occur during storm events or spring runoff at outlet to culvert TCC-6 when flows occur and tested for oper.
5. Unplanned discharges will be sampled on a quarterly basis until bond release.

CLIMATOLOGICAL DATA

During 1991, rain gauges were installed at the Bear Canyon and Trail Canyon mines. Monitoring began in August for Bear Canyon and in November for Trail Canyon. The rain gauge monitoring data is summarized in Appendix B and as database files (enclosed).

SUBSIDENCE MONITORING

Subsidence monitoring was performed in 1991 using the professional services of Blackhawk Engineering. The results of the survey are found in Appendix C. Monitoring locations are located on Plate 3-3.

VEGETATION MONITORING

Vegetation monitoring was performed in 1991 using the professional services of Mt. Nebo Scientific Research & Consulting. The results of the survey are found in Appendix D.

Bear Canyon Mine

Following monitoring evaluation by Mt. Nebo Scientific additional interim revegetation work was conducted on the following areas; Outslope Bank of Upper Storage Pad, Downcast Pile below Upper Storage Pile, Area near Portal No. 1, Area Near Hiawatha Portal, and downslope of Portal Access Road above the Hiawatha Portal. These areas are listed as BTCA areas in Appendix 7-K of the PAP. Work consisted of supplemental seeding, handwork to entail carving some "seed catches" or microfurrows and some placement of erosion control matting.

Trail Canyon Mine

Portions of the Lower pad were revegetated in the fall of 1991. These areas were disturbed by heavy storm events and during subsequent drainage structure improvements and modifications. Reclamation work is documented in Appendix 3-G of the PAP.

ANNUAL IMPOUNDMENT INSPECTION

Copies of the Annual Sediment Pond Inspection Reports are attached with this report in Appendix E.

RAPTOR SURVEY

PacifiCorp included the Bear Canyon Mine and Trail Canyon Mine for areas in a raptor survey conducted in 1991. Results of the survey are included in Appendix F.

PERMIT STIPULATION STATUS

There are no open stipulations from the latest permit renewals.

APPENDIX A
WATER MONITORING DATA

BEAR CANYON MINE
1991

WATER MONITORING DATA

WATER MONITORING REPORT

Property: Co-op
Station: BC-1
Location: Upper Bear Creek
Type: Stream
Frequency: Quarterly - Field: June, July Sept.

Field Measurements	Date Sampled 02/28/91	05/28/91	06/17/91	07/29/91	08/08/91	09/13/91	10/17/91
Sampled By:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.
Flow (gpm)	29	18	29	13.7	30	42	27.6
pH	8	8.1	7.9	8.1	7.9	8.1	8.1
Sp. Cond. (ohms)	2640	910	700	790	580	540	640
Temp (C)	1	8	8	8	12	10	8
Diss. O. (ppm)	9	8	8	9	9	9	8

Lab Measurements							
Analyzed by:	IML	IML			IML		IML
TDS	1730	494			404		504
TSS	34	1950			500		9
O & G	<5	LOST			<5		<5
Al CaCO3	277	310			270		189
Hd CaCO3	1360	431			457		376
Ac CaCO3	0	0			0		0
HCO3	313	378			329		230
CO3	12.3	0			0		0
Cl	24.5	4.87			5.17		3.42
SO4	1120	183			218		198
Ca	256	77			62.9		55.4
Mg	175	72.7			72.9		58
K	10.4	5.07			5.32		4.8
Na	23.6	8.4			10.1		9.3
Cat/An	1.83	0.82			1.92		0.31
Fe	0.29	98.9			5.63		0.18
Mn	N/D	1.13			N/D		N/D

WATER MONITORING REPORT

Property: Co-op
Station: BC-2
Location: Lower Bear Creek
Type: Stream
Frequency: Quarterly - Field: June, July Sept.

Field Measurements	Date Sampled 02/28/91	05/28/91	06/17/91	07/29/91	08/08/91	09/13/91	10/17/91
Sampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.
low (gpm)	41	37	59.8	129	28	190	216
pH	8.2	8.1	8	8	8	8	7.9
Sp. Cond. (ohms)	1940	910	800	490	640	610	469
emp (C)	1	9	8	6	14	10	6
Diss. O. (ppm)	9	9	8	9	9	9	9

Lab Measurements							
nalyzed by:	IML	IML			IML		IML
DS	1810	442			424		494
TSS	31	622			400		5
& G	<5	<5			<5		<5
CaCO3	267	477			280		207
Hd CaCO3	1380	430			400		242
c CaCO3	0	0			0		0
	301	582			342		253
CO3	12.2	0			0		0
	24.5	4.97			5.17		2.59
O4	11.1	3.09			130		48.2
Ca	267	73			61.9		51
g	172	60.3			59.8		27.9
	10.2	5.19			3.68		1.7
Na	23.3	9.7			7.2		4.1
at/An	0.59	3.13			0.24		1.53
Fe	0.4	9.87			5.54		0.06
Mn	N/D	0.07			N/D		N/D

WATER MONITORING REPORT

Property: Co-op
Station: BC-3
Location: Right Fork Creek
Type: Stream
Frequency: Quarterly - Field: June, July Sept.

Field Measurements	Date Sampled 02/28/91	05/28/91	06/17/91	07/29/91	08/08/91	09/13/91	10/17/91
Sampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.
Flow (gpm)	DRY	DRY	DRY	DRY	DRY	DRY	DRY
pH							
Sp. Cond. (ohms)							
Temp (C)							
Diss. O. (ppm)							

WATER MONITORING REPORT

Property: Co-op
Station: SBC-3
Location: Rt. Fork Well
Type: Well
Frequency: Quarterly

Field Measurements	Date Sampled 02/28/91	05/28/91	08/26/91	10/17/91
ampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.
Depth (FS)	18.4	23	22.6	23.5
H	7.9	8.3	8.6	7.7
. Cond. (ohms)	27000	3300	3000	3100
Temp (C)	3	8	5	7

Lab Measurements				
nalyzed by:	IML	IML	IML	IML
DS (mg/L)	2120	2360	2580	2700
TSS (mg/L)	704	290	338	140
& G (mg/L)	5.0	LOST	N/R	N/R
CaCO3	410	466	472	461
Hd CaCO3	1590	1800	1950	1970
CaCO3	0	0	0	0
CO3	501	569	575	563
CO3	0	0	0	0
	49	53.2	51.9	52.4
04	1270	1400	1570	1600
Ca	221	237	260	61.2
g	252	295	315	443
K	15.4	16.1	16	17.6
Na	65.7	71.2	83.5	79
t/An	1.49	0.66	0.78	0.72
Fe	8.25	4.45	4.73	7.49
Mn	0.41	0.27	0.31	0.35

WATER MONITORING REPORT

Property: Co-op
Station: SBC-4
Location: Huntington Springs
Type: Spring
Frequency: Feb, May, July - Dec

Field Measurements	Date Sampled 02/28/91	05/28/91	07/29/91	08/08/91	09/13/91	10/25/91	11/26/91	12/27/91
ampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	CT&E	CT&E	CT&E
Flow (gpm)	130	119	119	113	114	114	121	122
pH	8.3	7.9	7.9	8	7.9	7.7	7.0	6.7
p. Cond. (ohms)	800	360	460	300	340	N/S	510	610
Temp (C)	2	8	9	10	8	10	8	9.5

Lab Measurements								
nalyzed by:	IML	IML	IML	IML	IML	CT&E	CT&E	CT&E
DS mg/L)	512	396	382	366	376	326	349	343
TSS mg/L)	11	<1.0	24	<1	<1	<1	N/S	1
& G (mg/L)	N/A	N/A	5.7	<5.0	<5.0	3.6	1.8	1.7
l CaCO3	291	304	300	300	288	265	307	269
Hd CaCO3	442	364	347	346	340	291	347	301
c CaCO3	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
CO3	338	371	365	360	351	323	378	328
CO3	8.1	0	0	2.7	0	0	0	0
l	12.3	4.46	3.85	4.06	3	10	15	10
O4	160	75.3	58	57	50.4	39	44	38
Ca	94.5	86.3	82.7	87.3	85.8	74.3	90.1	67.1
g	50.1	36.2	34.2	31.2	30.5	25.6	29.6	32.4
K	2.63	1.46	1.55	1.43	0.78	N/D	3.45	4.52
Na	6.3	4.9	5	5.3	5.06	3.88	3.75	4.68
at/An	1.86	1.87	0.8	0.86	1.05	2.37	1.03	1
Al	0.22	N/D	N/D	N/D	N/D	0.5	N/D	N/D
As	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
a	0.18	N/D	0.19	0.16	N/D	0.14	N/D	N/D
B	0.08	0.01	0.04	N/D	0.02	0.02	0.09	0.01
Cd	N/D	N/D	N/D	N/D	N/D	0.005	N/D	N/D
r	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Cu	0.01	0.02	0.01	N/D	0.01	N/D	N/D	N/D
Fl	1.19	0.18	N/S	0.19	0.16	0.06	0.06	0.2
b	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D

WATER MONITORING REPORT

Property: Co-op
Station: SBC-4
Location: Huntington Springs
Type: Spring
Frequency: Feb, May, July - Dec

Lab Measurements Analyzed by:	IML	IML	IML	IML	IML	CT&E	CT&E	CT&E
Hg	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Mo	N/D	N/D	0.02	N/D	N/D	0.16	N/D	N/D
Ni	N/D	N/D	N/D	N/D	N/D	N/D	N/D	0.02
NH3	0.27	0.05	0.33	0.04	0.08	N/D	0.63	0.13
NO2	0.25	0.6	0.19	0.27	<0.02	<0.01	N/D	N/D
NO3	<0.04	<0.04	<0.02	<0.02	<0.02	<0.01	N/D	N/D
P	N/D	0.14	N/D	N/D	0.1	0.02	0.03	0.01
Se	N/D	N/D	N/D	N/D	N/D	0.007	N/D	N/D
H2S	0.08	0.38	N/D	N/D	N/D	N/D	12.5	3
Zn	0.04	0.06	0.02	N/D	0.11	0.07	N/D	0.05
Fe	0.3	0.21	0.27	N/D	0.08	0.36	N/D	N/D
Mn	N/D	N/D	N/D	N/D	N/D	0.04	N/D	N/D

WATER MONITORING REPORT

Property: Co-op
Station: SBC-5
Location: Birch Springs
Type: Spring
Frequency: Mar, June-Dec

Field Measurements	Date Sampled 03/01/91	06/17/91	07/29/91	08/08/91	09/27/91	10/28/91	11/26/91	12/27/91
Sampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	CT&E	CT&E	CT&E	CT&E
Flow (gpm)	33	33	36	33	29	29	29	29
pH	7.9	7.9	7.9	7.8	7.7	6.9	6.9	6.8
Sp. Cond. (ohms)	680	640	690	390	700	N/S	610	700
Temp (C)	2	6	6	10	N/S	11	11	10

Lab Measurements								
Analyzed by:	IML	IML	IML	IML	CT&E	CT&E	CT&E	CT&E
TDS mg/L)	484	500	508	480	473	465	487	482
TSS mg/L)	1	3	<1	1	<1	<1	N/S	1
O & G (mg/L)	<5.0	N/A	<5.0	<5.0	1.5	N/S	0.6	0.8
Al CaCO3	308	328	325	325	<1	330	290	302
Hd CaCO3	426	442	436	441	462	499	447	366
Nc CaCO3	N/S	N/S	N/S	N/S	<1	N/S	N/S	N/S
HCO3	376	400	397	397	366	402	353	368
CO3	0	0	0	0	N/S	N/S	N/S	N/D
Cl	8.17	6.64	6.59	5.78	15	10	20	25
SO4	129	123	124	121	140	140	140	90
Ca	101	101	99	101	106.3	117.8	108.5	82
Mg	42.5	46.5	46	45.8	47.8	49.8	42.7	39.26
K	2.09	2.64	2.28	2.2	0.3	0.95	4.37	4.19
Na	6.1	7	7.1	7	6.34	6.96	5.59	5.68
Cat/An	1.33	0.53	0.94	0.03	1.66	3.26	0.71	0.9
Al	N/D	N/D	0.2	N/D	0.21	0.5	N/D	N/D
As	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Ba	0.1	0.13	0.13	0.11	N/D	0.07	N/D	N/D
B	0.1	0.02	0.07	N/D	0.06	0.12	0.16	0.11
Cd	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Cr	N/D	N/D	N/D	N/D	0.06	N/D	N/D	N/D
Cu	N/D	N/D	0.01	N/D	0.047	N/D	N/D	N/D
Fl	0.65	0.17	N/S	0.16	0.06	0.05	0.05	0.17
Pb	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D

WATER MONITORING REPORT

Property: Co-op
Station: SBC-5
Location: Birch Springs
Type: Spring
Frequency: Mar, June-Dec

Lab Measurements								
Analyzed by:	IML	IML	IML	IML	CT&E	CT&E	CT&E	CT&E
Hg	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Mo	N/D	N/D	0.02	N/D	N/D	N/D	N/D	N/D
Ni	N/D	N/D	N/D	N/D	0.29	N/D	N/D	0.02
NH3	0.13	0.12	0.3	0.03	0.19	N/S	0.4	0.09
NO3	<0.04	<0.01	0.02	<0.02	N/D	N/D	N/D	N/D
[illegible]	N/D	N/D	N/D	N/D	0.06	0.02	0.03	N/D
Se	N/D	N/D	N/D	N/D	N/D	0.003	N/D	N/D
H2S	<0.01	N/S	0.1	<0.1	3	5.5	N/D	5.5
Zn	N/D	N/D	0.01	0.01	N/D	0.05	0.02	N/D
Fe	0.1	0.12	0.25	N/D	N/D	N/D	N/D	N/D
Mn	N/D	0.02	0.02	N/D	N/D	N/D	N/D	N/D

WATER MONITORING REPORT

Property:	Co-op
Station:	SBC-6
Location:	Co-Op Development Spring
Type:	Spring
Frequency:	Quarterly

Field Measurements	Date Sampled 02/28/91	05/28/91	08/26/91	10/28/91
Sampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.
Flow (gpm)	Dry	Dry	Dry	Dry
pH				
Sp. Cond. (ohms)				
Temp (C)				
Lab Measurements				
Analyzed by:	N/A	N/A	N/A	N/A

WATER MONITORING REPORT

Property:	Co-op
Station:	SBC-9
Location:	Mine Sump #3
Type:	Sump
Frequency:	Quarterly, Aug

Field Measurements	Date Sampled 02/28/91	05/28/91	07/29/91	08/08/91	10/17/91
Sampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.
Flow (gpm)	81	118	140	112	120
pH	8	7.9	7.9	7.8	7.9
Sp. Cond. (ohms)	800	400	410	300	511
Temp (C)	3	6	6	7	7

Lab Measurements					
Analyzed by:	IML	IML	IML	IML	IML
TDS (mg/L)	478	334	312	340	338
TSS (mg/L)	N/S	2	N/D	N/D	N/D
O & G (mg/L)	N/S	N/S	N/S	LOST	N/S
Al CaCO3	282	289	290	292	221
Cl CaCO3	426	321	315	311	251
Ac CaCO3	N/S	N/S	N/S	N/S	N/S
HCO3	344	353	354	356	270
CO3	0	0	0	0	0
Cl	10.2	3.35	1.62	4.16	2.59
SO4	151	38.3	31.5	30.5	33.4
[illegible]	94.5	76.2	74.1	78	64.1
MKg	46.3	31.8	31.5	28.3	22.2
K	2.36	1.45	1.64	1.61	1.4
[illegible]	6.1	3.9	4	3.7	3.4
Cat/An	1.32	0.47	0.07	1.29	0.1
Al	N/D	N/D	N/D	N/D	0.1
[illegible]	N/D	N/D	N/D	N/D	N/D
Ba	0.18	N/D	0.16	0.15	0.13
[illegible]	0.11	0.02	0.15	N/D	0.05
[illegible]	N/D	N/D	N/D	N/D	N/D
Cr	N/D	N/D	N/D	N/D	N/D
[illegible]	0.01	0.02	0.07	0.01	0.06
[illegible]	0.55	0.17	0.17	0.18	0.12
Pb	N/D	N/D	N/D	N/D	N/D
[illegible]	N/D	N/D	N/D	N/D	N/D
[illegible]	N/D	N/D	N/D	N/D	N/D

WATER MONITORING REPORT

Property: Co-op
Station: SBC-9
Location: Mine Sump #3
Type: Sump
Frequency: Quarterly, Aug

Lab Measurements

Analyzed by:	IML	IML	IML	IML	IML
Ni	N/D	N/D	0.02	0.25	0.01
H3	0.07	0.05	0.22	0.04	0.15
NO2	0.22	0.15	N/D	N/D	N/D
O3	N/D	N/D	N/D	N/D	N/D
	N/D	0.11	0.8	N/D	N/D
Se	N/D	N/D	N/D	N/D	N/D
2S	N/D	N/S	N/D	N/D	0.04
n	0.05	0.06	0.42	0.22	0.22
Fe	0.02	0.21	0.08	0.55	N/D
n	N/D	N/D	N/D	N/D	N/D

WATER MONITORING REPORT

Property: Co-op
Station: NPDES
Location: Mine Discharge
Type: Permit UTG040006 (004)
Frequency: Monthly

Field Measurements	Date Sampled 4/18/91	5/28/91	6/17/91	7/29/91	8/08/91	9/13/91	10/17/91	11/29/91	12/27/9
ampled by:	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	E.I.S.	CT&E
Flow (gpm)	60	62	61.5	62	61.2	63.2	60	79.5	194
H	7.81	8	8	8.1	8	8	7.9	7.9	7.3
p. Cond.	842	600	540	640	440	410	483	450	510
Temp (C)	N/R	9	9	6	11	9	7	7	6

Lab Measurements									
nalyzed by:	IML	IML	IML	IML	IML	IML	IML	IML	CT&E
issolved S.	464	360	364	300	362	482	336	LOST	298
Suspended S.	46	39	16	3	<1	<1	1	LOST	2
ettleable S.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
il & Grease	3.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	LOST	1.1
Iron (Fe)	0.19	0.2	0.09	0.09	0.23	0.07	0	LOST	0.03

TRAIL CANYON MINE
1991
WATER MONITORING DATA

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	UT-1
Location:	Upper Trail Creek
Type:	Stream
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/17/91
ampled By:	E.I.S.	E.I.S.
Flow (gpm)	Dry	Dry
H		
p. Cond. (ohms)		
Temp (C)		
iss. O. (ppm)		

Lab Measurements		
nalyzed by:	N/A	N/A

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	LT-1
Location:	Lower Trail Creek
Type:	Stream
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/17/91
ampled By:	E.I.S.	E.I.S.
Flow (gpm)	9	84
H	8.2	7.8
. Cond. (ohms)	910	890
Temp (C)	8	2
ss. O. (ppm)	9	9

Lab Measurements		
nalyzed by:	IML	IML
Settleable Solids	N/R	N/R
uspended Solids	<1	1
ssolved Solids	478	474
Hardness (CaCO3)	401	395
idity (CaCO3)	N/R	N/R
arbonate (CO3)	0	0
Bicarbonate (HCO3)	367	434
lcium (Ca)	66	73.6
hloride (Cl)	22	18.2
ron (Fe)	0.12	0.13
agnesium (Mg)	57.4	51.5
Manganese (Mn)	N/D	N/D
otassium (K)	4.42	4.97
dium (Na)	18.1	18.8
Sulfate (SO4)	92.2	77
il & Grease	<5.0	<5.0
tions	8.91	8.85
Anions	8.56	9.23

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	PS-1
Location:	Portal Spring
Type:	Spring
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/17/91
ampled by:	E.I.S.	E.I.S.
Flow (gpm)	Dry	Dry
H		
. Cond. (ohms)		
Temp (C)		
Lab Measurements		
nalyzed by:	N/A	N/A

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	TS-1
Location:	Trail Canyon Spring
Type:	Spring
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/17/91
ampled by:	E.I.S.	E.I.S.
Flow (gpm)	3.2	22
H	7.9	8.1
p. Cond. (ohms)	749	800
Temp (C)	8	7

Lab Measurements		
nalyzed by:	IML	IML
DS (mg/L)	414	490
Hardness (CaCO3)	362	416
arbonate (CO3)	0	0
icarbonate (HCO3)	360	438
Calcium (Ca)	68.3	96.9
hloride (Cl)	15	11.6
ron (Fe)	0.29	0.05
Magnesium (Mg)	46.6	42.5
anganese (Mn)	N/D	N/D
Potassium (K)	3.26	2.71
Sodium (Na)	15.3	11
ulfate (SO4)	88.5	78.7
Cations	7.99	8.88
Anions	8.16	9.14
il & Grease	N/A	N/A

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	CS-1
Location:	Co-Op Spring
Type:	Spring
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/17/91
ampled by:	E.I.S.	E.I.S.
Flow (gpm)	15	17
H	8.1	7.6
p. Cond. (ohms)	410	602
Temp (C)	9	6

Lab Measurements		
nalyzed by:	IML	IML
DS (mg/L)	342	418
Hardness (CaCO3)	309	309
arbonate (CO3)	0	0
icarbonate (HCO3)	316	323
Calcium (Ca)	83.2	75.5
hloride (Cl)	5.47	3.73
ron (Fe)	0.72	N/D
Magnesium (Mg)	24.6	29.5
anganese (Mn)	N/D	N/D
otassium (K)	2.58	2.4
Sodium (Na)	5.1	4.6
ulfate (SO4)	65.8	60.5
ations	6.47	6.45
Anions	6.71	6.66
il & Grease	N/A	N/A

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	BP-1
Location:	Ball Park Spring
Type:	Spring
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/17/91
ampled by:	E.I.S.	E.I.S.
Flow (gpm)	<0.1	0.75
H	8	7.9
p. Cond. (ohms)	790	797
Temp (C)	10	8

Lab Measurements		
nalyzed by:	IML	IML
DS (mg/L)	406	496
Hardness (CaCO3)	370	428
arbonate (CO3)	0	0
icarbonate (HCO3)	398	475
Calcium (Ca)	72.8	92.7
hloride (Cl)	10.8	11.2
ron (Fe)	0.15	0.97
Magnesium (Mg)	45.8	47.9
anganese (Mn)	N/D	0.06
otassium (K)	2.76	4.85
Sodium (Na)	10.8	11.2
ulfate (SO4)	67.5	55.6
Cations	7.94	9.18
Anions	8.24	9.26
il & Grease	N/A	N/A

See Bear Canyon Mine, 1991, Water Monitoring Data for sampling from SBC-5, Birch Spring.

WATER MONITORING REPORT

Property:	Co-op Mining Company
Station:	SP-1
Location:	Sed Pond Inlet
Type:	Discharge
Frequency:	Bi-Annual

Field Measurements	Date Sampled 05/28/91	10/27/91
ampled By:	E.I.S.	M.E.C.
Flow (gpm)	Dry	Dry
H		
. Cond. (ohms)		
Temp (C)		
ss. O. (ppm)		
Lab Measurements		
nalyzed by:	N/A	N/A

No discharges were observed at monitoring point CO-1, Culvert TCC-6 Outlet, during 1991.

No discharges were observed at monitoring point Sealed Mine Entries and Access during 1991.

APPENDIX B
CLIMATOLOGICAL DATA

Precipitation - Bear Canyon

DATE	Gauge Reading	Precip.	DATE	Gauge Reading	Precip.
8/14/91	0.12	rain	11/02/91	0.00	
8/15/91	0.00		.	.	no precip.
8/16/91	0.00		.	.	during this
8/17/91	0.00		.	.	period
8/18/91	0.06	rain	11/12/91	0.00	
8/19/91	0.00		11/13/91	0.04	snow
8/20/91	0.00		11/14/91	0.11	melt
8/21/91	0.01	rain	11/15/91	0.24	melt
8/22/91	0.03	rain	11/16/91	0.21	melt
8/23/91	0.10	rain	11/17/91	0.10	melt
8/24/91	0.02	rain	11/18/91	0.10	melt
8/25/91	0.18	rain	11/19/91	0.00	
8/26/91	0.04	rain	11/20/91	0.00	
8/27/91	0.08	rain	11/21/91	0.00	lt. now
8/28/91	0.00		11/22/91	0.00	
8/29/91	0.00		11/23/91	0.00	
8/30/91	0.00		11/24/91	0.00	
8/31/91	0.18	rain	11/25/91	0.00	
9/01/91	0.22	rain	11/26/91	0.00	
9/02/91	0.00		11/27/91	0.00	
9/03/91	0.00		11/28/91	0.00	
9/04/91	0.00		11/29/91	0.00	lt. snow
9/05/91	0.98	rain	11/30/91	0.00	
9/06/91	0.70	rain	12/01/91	0.00	
9/07/91	0.04	rain	12/02/91	0.00	lt. snow
9/08/91	0.07	rain	12/03/91	0.00	lt. snow
9/09/91	0.02	rain	12/04/91	0.00	
9/10/91	0.36	rain	.	.	no precip.
9/11/91	0.00		.	.	during this
9/12/91	0.05	rain	.	.	period
9/13/91	0.21	rain	12/17/91	0.00	
9/14/91	0.00		12/18/91	0.00	snow
.	.	no precip.	12/19/91	0.00	snow
.	.	during this	12/20/91	0.02	melt
.	.	period	12/21/91	0.02	melt
10/25/91	0.00		12/22/91	0.02	melt
10/26/91	0.07		12/23/91	0.02	melt
10/27/91	0.04		12/24/91	0.00	
10/28/91	0.07		12/25/91	0.00	
10/29/91	0.10		12/26/91	0.00	
10/30/91	0.46		12/27/91	0.00	
10/31/91	0.00		12/28/91	0.00	lt. snow
11/01/91	0.05	rain	12/29/91	0.00	snow
			12/30/91	0.02	melt
			12/31/91	0.04	melt

Precipitation - Trail Canyon

DATE	Gauge Reading	Precip.	DATE	Gauge Reading	Precip.
11/01/91	0.00		12/01/91	0	
11/02/91	0.13	rain	12/02/91	0	
11/03/91	0.19	rain & snow	12/03/91	0.01	snow
11/04/91	0.19	rain & snow	12/04/91	0	
11/05/91	0.07	rain & snow	12/05/91	0	
11/06/91	0.00		12/06/91	0	
11/07/91	0.00		12/07/91	0	
11/08/91	0.00		12/08/91	0	
11/09/91	0.00		12/09/91	0	
11/10/91	0.00		12/10/91	0	
11/11/91	0.00		12/11/91	0	
11/12/91	0.00		12/12/91	0	
11/13/91	0.00		12/13/91	0	
11/14/91	0.08	snow melt	12/14/91	0.04	snow
11/15/91	0.14	snow melt	12/15/91	0.03	snow
11/16/91	0.12	snow melt	12/16/91	0	
11/17/91	0.17	snow melt	12/17/91	0	
11/18/91	0.12	snow melt	12/18/91	0	
11/19/91	0.00		12/19/91	0	snow
11/20/91	0.00		12/20/91	0.03	snow melt
11/21/91	0.00		12/21/91	0.04	snow melt
11/22/91	0.00		12/22/91	0.04	snow melt
11/23/91	0.00		12/23/91	0.04	snow melt
11/24/91	0.00		12/24/91	0.03	snow melt
11/25/91	0.00		12/25/91	0.01	snow melt
11/26/91	0.00		12/26/91	0	
11/27/91	0.00		12/27/91	0	
11/28/91	0.00		12/28/91	0	
11/29/91	0.00		12/29/91	0.01	snow
11/30/91	0.00		12/30/91	0.03	melt
			12/31/91	0.04	melt

APPENDIX C
SUBSIDENCE MONITORING

CO-OP MINING COMPANY
SUBSIDENCE MONITORING
TRAIL AND BEAR CANYON MINES

STATION	LOCATION	ELEVATION 7/19/87	11/4/90	9/22/91	CHANGE Last	Acc.
SMS-1	Trail/Bear	9188.57	9188.37	9188.34	-0.03	-0.23
SMS-2	Bear Cyn.	8542.60	8542.43	8542.29	-0.14	-0.31
SMS-3	Trail Cyn.	8769.06	8768.99	8768.95	-0.04	-0.11
SMS-4	Trail Cyn.	8410.00	8410.19	8410.14	-0.05	+0.14
CON-5	Bear Cyn.	9379.91	9379.91	9379.91	-	-
CON-6	Bear Cyn.	-	-	9491.62	-	-
SMS-7	Bear Cyn.	-	-	9398.78	-	-
SMS-8	McCadden	-	-	9065.70	-	-
SMS-9	Bear Cyn.	-	-	9348.91	-	-
SMS-10	Bear Cyn.	-	-	9331.62	-	-

Notes: (1) CON-6 and SMS-7 through SMS-10 established 9/22/91.
(2) The area was walked between all stations. No visible movement, cracks or other subsidence effects were noted during the survey, other than those shown on Plate 3-3.

REGISTERED PROFESSIONAL ENGINEER
No. 4548
IAN W. GUY
10/20/91
STATE OF UTAH

APPENDIX D
VEGETATION MONITORING

VEGETATION MONITORING

OF

TRAIL CANYON AND BEAR CANYON: 1991

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Fieldwork: Patrick Collins
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Report Date: February 1992
Fieldwork Date: September 1991

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VEGETATION MONITORING
OF
TRAIL CANYON AND BEAR CANYON: 1991

SCOPE

The following document contains information pertaining to 1991 vegetation monitoring for the CO-OP Mining Company. The purpose of the sampling was to monitor the current status of the revegetation effort in several areas of Bear and Trail Canyons. In some areas, only qualitative sampling was conducted, whereas in several other areas quantitative sampling was also implemented.

A survey was conducted for potential threatened & endangered plant species in portions of Bear Canyon.

This report was prepared in anticipation of a submittal to be supplied to the State of Utah, Division of Oil, Gas & Mining (DOGM).

INTRODUCTION

General Site Description

Trail Canyon, a branch of Huntington Canyon, is located west of the city of Huntington in Emery County, Utah. Several previously disturbed areas have been reclaimed and reseeded in an effort to provide permanent, self-perpetuating vegetative cover. Elevation of the reseeded areas in the canyon range from 6,925 ft to nearly 7,275 ft above sea level. Slopes that surround the canyon are primarily dominated by pinyon-juniper and mountain brush communities. Prior to disturbance and development, the canyon bottoms were probably comprised chiefly of sagebrush/grass and riparian communities.

The vegetation of the reclaimed areas in the canyon was monitored. The areas sampled were pads (flat areas), slopes and roads caused by disturbances of previous mining activities.

Bear Canyon is another branch of Huntington Canyon and lies east of Trail Canyon. Surrounding slope and bottomland native vegetation were similar to those described in Trail Canyon above. Bear Canyon maintains active mine facilities. Several areas have

been disturbed as a result of the mine activities and some of these areas have also been reclaimed and reseeded. Consequently, vegetation monitoring was also conducted in the growing season of 1991 to review the progress of plant establishment.

Methods and results of the study including suggestions in problem areas and photographs of each sample area were included in this report.

METHODS

Quantitative and/or qualitative data were taken on the reclaimed areas mentioned above. Sampling was accomplished September 11-13, 1991.

Transect Placement

Bi-directional random/regular placement of sampling plots were designed to provide unbiased accuracy of the data compiled. This was accomplished by establishing transect lines randomly placed on the areas to be sampled. These transect lines were placed over the entire study area to adequately represent the area as a whole. Regular points on the transect lines were then marked. From these marks, the sample points were determined by random distance numbers at right angles to the transect lines.

In Trail Canyon, there were two large, relatively flat areas that were called *Reclaimed Pads* on the data sheets and summary tables. Moreover, the reclaimed hillsides were called *Reclaimed Slopes*. Finally, we called the long assess road areas *Reclaimed Roads*. On the pads, slopes and roads, several transects were placed in each area. Quadrats were placed at predetermined regular intervals for the entire length of the road in an attempt

to have the entire area represented. Because there did not appear to be differential success between pads, slopes or roads, the data were combined to show the average success of the each area as a whole. In other words, the pads were treated as a whole (but separate from slopes and roads). It is possible at any time, however, to separate individual areas utilizing the raw data included in this report.

Cover and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on data sheets were: estimated precipitation, erosion slope, exposure, grazing use, animal disturbance and other appropriate notes.

Woody Species Density

Density of woody plant species were recorded using 300 ft^2 belt transects. In this method all woody species individuals were counted and recorded in each belt transect. Each transect was counted as 'one' sample location for sample adequacy formulas.

Sample Adequacy

Sampling adequacy for woody species density and cover was achieved using formulas from Snedocor and Cochran (1980), insuring that 80% of the samples were within 10% of the true mean for the reclaimed shrub communities of the area. The formula used is given below.

$$nmin = \left[\frac{1.28\ (s)}{x\ (.1)}\right]^2$$

where,

nmin = minimum adequate sample
s = standard deviation
x = sample mean
.1 = confidence interval

Photographs

Color photographs of each sample area were taken at the time of sampling and were submitted with this report.

Raw Data

As previously mentioned, many of the reclaimed types had more than one area in which the data were combined. The raw data were submitted with this report which would facilitate future separation of data and further statistical testing if desired.

RESULTS

TRAIL CANYON

Reclaimed Pad Areas

The average living cover for the Reclaimed Pads in Trail Canyon was estimated to be 41.25% (Table 1). Forbs were the dominant lifeform comprising 62.78% of the total living cover, followed by grasses and shrubs at 28.50% and 8.72%, respectfully (Table 1).

The dominant forb species was Yellow Sweetclover (*Melilotus officinalis*) with an abosolute cover of 9.50%. The dominant grass was Thickspike Wheatgrass (*Agropyron dasystachyum*) with 8.30% cover. Finally, the dominant shrub was Rubber Rabbitbrush (*Chrysothamnus nauseosus*) that was estimated at 2.30%. For a list of the cover by species, refer to Table 2.

Total woody species density was 3,981 individuals per acre. Again, the most common species by density was Rubber Rabbitbrush (Table 3).

Reclaimed Slope Areas

The Reclaimed Slope areas of the canyon also had good vegetative cover appearing to become established. The combined total living cover for these areas was 39.83% Bareground was almost as high, however, estimated at 32.87% (Table 1). Forbs again dominated these areas at 49.74% of the living cover, followed closely by the grasses at 43.79% (Table 4).

The dominant grasses were the same species as the Reclaimed Pad areas with the exception that Bluebunch Wheatgrass (*Agropyron spicatum*). Bluebunch wheatgrass was the dominate grass and was estimated at 8.57% cover (Table 5).

Estimated woody species density was 3,799 individuals per acre (Table 6).

Reclaimed Road Areas

Total living cover for the Reclaimed Road areas of Trail Canyon was significantly less that of the pads and slopes. The living cover was estimated at 27.97%. However, rock cover was significantly higher, while bareground was about the same as the

two other areas (Table 7). Forbs again dominated followed by grasses and shrub with relative covers of 45.86%, 39.09% and 15.05%, respectively (Table 7).

Yellow sweetclover was not as well represented in the Reclaimed Road areas as it was in the Reclaimed Pads and Slope areas. Most common forb species were Russian Thistle (*Salsola iberica*) and Summercypress (*Kochia scoparia*). These two weedy exotics were also common in the other areas sampled in Trail Canyon. For a list of cover by species, refer to Table 9.

Species diversity of woody plants was higher in the road areas as suggested by the density recordings. However, the number of individuals per acre was somewhat lower, estimated at 2,372 individual per acre (Table 9).

Reclaimed Spot-Seeded Area

Another area sampled was the Spot-Seeded Area near the mouth of Trail Canyon. This area had a mean cover of 35.00% and unlike the areas previously reported, was dominated by shrubs (Table 10). Rubber Rabbitbrush (14.20%), Thickspike Wheatgrass (8.73%) and Penstemon [*Penstemon pachyphyllus* (1.53%)] were the dominate species by lifeform (Table 11).

Woody species density was 6,643 individuals per acre and almost exclusively comprised of Rubber Rabbitbrush (Table 12).

BEAR CANYON

Qualitative Sampling

Several areas in Bear Canyon were also monitored. The monitoring schedule for 1991, however, was for qualitative data only. Therefore, qualitative data sheets were compiled in the field and transferred to the word processor for this report. A copy of each data sheet was included in this report. These data sheets list: site name, area, date of sampling, worker names, slope, exposure, animal disturbance, erosion, cover, dominant plant species observed, and assorted notes.

The following is a list of the areas sampled in Bear Canyon. The names correspond to the quantitative data sheets, photographs and field maps of each area.

Ball Park (Bear #1)

Topsoil Stockpile (Bear #2)

Washed Slope (Bear #3)

Test Plot (Bear #4)

East Roadside (Bear #5)

West Roadside (Bear #6)

PIB Slope (Bear #7)

Sensitive Plant Species

A sensitive plant species survey was conducted in the drainage of Bear Canyon between the "Ball Park" (Bear #1) and the mine office area. A sensitive species called Canyon Sweetvetch (*Hedysarum occidentale* var. *canone*) was located in several areas in the drainage. A map was marked in the field showing the population locations and was provided to CO-OP MINING COMPANY through MANGUM ENGINEERING CONSULTANTS.

To summarize the results, five (5) locations were marked identifying small populations of this plant species on the map. The population numbers generally ranged from 20 - 50 individuals, but one was between 50 and 100 individuals. However, there were also individual plants scattered occasionally between the marked populations in the drainage. A photograph of Canyon Sweetvetch was included in this report.

TABLE 1: Total cover and composition summary for the Reclaimed Pad Areas in Trail Canyon for the CO-OP Mine Study (1991).

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	41.25	16.42	20
Litter	7.35	3.86	20
Bareground	34.55	12.32	20
Rock	16.85	11.24	20
COMPOSITION			
Shrubs	8.72	9.15	20
Forbs	62.78	18.26	20
Grasses	28.50	16.68	20

TABLE 2: Species cover and frequency summary for the Reclaimed Pad Areas in Trail Canyon for the CO-OP Mine Study (1991).

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	0.40	1.16	20	15.00
Atriplex canescens	0.10	0.44	20	5.00
Chrysothamnus nauseosus	2.30	2.26	20	60.00
Pinus ponderosa	0.10	0.44	20	5.00
Purshia tridentata	0.05	0.22	20	5.00
FORBS				
Achillea millifolium	0.85	1.80	20	20.00
Aster chilensis	0.30	1.10	20	10.00
Grindelia squarrosa	0.90	1.84	20	20.00
Kochia scoparia	4.10	8.90	20	35.00
Linum lewsii	0.10	0.44	20	5.00
Medicago sativa	1.90	2.84	20	35.00
Melilotus officinalis	9.50	10.06	20	75.00
Penstemon pachyphyllus	0.20	0.51	20	15.00
Salsola iberica	5.75	7.03	20	65.00
Sanguisorba minor	1.80	2.34	20	40.00
GRASSES				
Agropyron dasystachyum	8.30	8.12	20	80.00
Agropyron cristatum	0.25	0.28	20	5.00
Agropyron spicatum	3.85	4.95	20	50.00
Bromus tectorum	0.15	0.01	20	5.00
Oryzopsis hymenoides	0.10	0.44	20	5.00
Poa secunda	0.25	1.09	20	5.00

TABLE 3: Woody species densities of the Reclaimed Pad Areas in Trail Canyon for the CO-OP Mine Study (1991).

	NUMBER/ACRE
Artemisia tridentata	490.05
Atriplex canescens	6.05
Chrysothamnus nauseosus	3472.70
Pinus ponderosa	12.10
TOTAL	3980.90

TABLE 4: Total cover and composition summary for the Reclaimed Slopes in Trail Canyon for the CO-OP Mine Study (1991).

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	39.83	11.29	30
Litter	5.87	3.44	30
Bareground	32.87	10.86	30
Rock	21.43	9.23	30
COMPOSITION			
Shrubs	6.47	6.77	30
Forbs	49.74	20.16	30
Grasses	43.79	19.42	30

TABLE 5: Species cover and frequency summary for the Reclaimed Slopes in Trail Canyon for the CO-OP Mine Study (1991).

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
Artemisia tridentata	0.23	0.72	30	10.00
Chrysothamnus nauseosus	2.43	2.38	30	53.33
FORBS				
Achillea millefolium	0.57	1.52	30	13.33
Aster chilensis	0.07	0.36	30	3.33
Hedysarum boreale	0.20	0.91	30	6.67
Kochia scoparia	2.47	4.14	30	30.00
Melilotus officinalis	7.80	4.96	30	90.00
Penstemon pachyphyllus	0.20	0.48	30	16.67
Salsola iberica	7.43	8.64	30	63.33
Sanguisorba minor	0.97	1.62	30	33.33
GRASSES				
Agropron dasystachyum	7.30	5.91	30	83.33
Agropyron spicatum	8.57	6.38	30	86.67
Elymus cinereus	1.60	8.62	30	3.44

TABLE 6: Woody species densities of the Reclaimed Slopes in Trail Canyon for the CO-OP Mine Study (1991).

		NUMBER/ACRE
Artemisia tridentata		840.95
Chrysothamnus nauseosus		2958.45
	TOTAL	3799.40

TABLE 7: Total cover and composition summary for the Reclaimed Road in Trail Canyon for the CO-OP Mine Study (1991).

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	27.97	10.74	32
Litter	4.47	2.56	32
Bareground	31.22	13.45	32
Rock	36.34	11.82	32
COMPOSITION			
Shrubs	15.05	21.34	32
Forbs	45.86	29.59	32
Grasses	39.09	26.45	32

TABLE 8: Species cover and frequency summary for the Reclaimed Road in Trail Canyon for the CO-OP Mine Study (1991).

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
Artemisia tridentata	0.56	1.32	32	18.75
Artemisia filifolia	0.16	0.87	32	3.13
Chrysothamnus nauseosus	2.19	3.88	32	31.25
Eriogonum corymbosum	1.09	2.58	32	21.88
FORBS				
Achillea millifolium	0.16	0.87	32	3.13
Artemisia ludoviciana	0.16	0.87	32	3.13
Aster chilensis	1.59	4.32	32	15.63
Halogeton glomeratus	0.25	1.00	32	6.25
Hedysarum boreale	0.53	1.35	32	15.63
Kochia scoparia	2.66	6.58	32	21.88
Lappula occidentalis	0.06	0.35	32	3.13
Linum lewsii	1.00	2.12	32	21.88
Malcomia africa	0.22	0.93	32	6.25
Medicago sativa	0.69	1.65	32	21.88
Melilotus officinalis	0.69	1.55	32	6.25
Penstemon pachyphyllus	0.13	0.48	32	6.25
Salsola iberica	3.84	7.04	32	53.13
GRASSES				
Agropyron dasystachyum	3.25	4.80	32	40.63
Agropyron cristatum	0.78	4.35	32	3.13
Agropyron spicatum	3.06	5.02	32	40.63
Bromus tectorum	0.22	0.93	32	6.25
Hordeum jubatum	0.38	1.47	32	6.25
Oryzopsis hymenoides	0.22	0.93	32	6.25
Poa secunda	4.09	5.68	32	43.75

TABLE 9: Woody species densities of the Reclaimed Road in Trail Canyon for the CO-OP Mine Study (1991).

	NUMBER/ACRE
Artemisia tridentata	393.25
Artemisia filifolia	12.10
Chrysothamnus nauseosus	1712.15
Eriogonum corymbosum	242.00
Pinus ponderosa	12.10
TOTAL	2371.60

TABLE 10: Total cover and composition summary for the Spot Seeded Area (near Hwy. 30) in Trail Canyon for the CO-OP Mine Study (1991).

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	35.00	12.52	15
Litter	7.20	3.23	15
Bareground	40.00	17.70	15
Rock	17.80	13.16	15
COMPOSITION			
Shrubs	44.10	32.82	15
Forbs	13.02	15.80	15
Grasses	42.89	35.91	15

TABLE 11: Species cover and frequency summary for the Spot Seeded Area (near Hwy. 30) in Trail Canyon for the CO-OP Mine Study (1991).

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
Chrysothamnus nauseosus	14.20	14.09	32	73.33
Chrysothamnus viscidiflorus	0.47	1.75	32	6.67
FORBS				
Ambrosia acanthicarpa	0.33	1.25	32	6.67
Grindelia squarrosa	0.87	3.24	32	6.67
Medicago sativa	0.93	2.62	32	13.33
Penstemon pachyphyllus	1.53	2.63	32	33.33
Salsola iberica	0.20	0.75	32	6.67
GRASSES				
Agropyron dasystachyum	8.73	9.07	32	66.67
Agropyron cristatum	2.13	6.25	32	33.33
Agropyron spicatum	0.47	1.75	32	6.67
Bromus carinatus	3.00	9.97	32	13.33
Bromus tectorum	0.33	1.25	32	6.67
Elymus cinereus	0.33	1.25	32	6.67
Oryzopsis hymenoides	1.47	3.84	32	33.33

TABLE 12: Woody species densities of the Spot Seeded Area (near Hwy. 30) in Trail Canyon for the CO-OP Mine Study (1991).

		NUMBER/ACRE
Chrysothamnus nauseosus		6618.70
Populus angustifolia		24.20
	TOTAL	6642.90

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: Ball Park (Bear #1)

AREA: Bear Canyon

DATE: September 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: 0 deg.

EXPOSURE: Level

ANIMAL USE/DISTURBANCE: Slight

EROSION: None on field, but some slight erosion beginning on the surrounding slopes.

COVER: 95% - 100%

DOMINANT PLANT SPECIES OBSERVED:

Nearly all grass

NOTES: 1) Ball park was in "excellent" condition.

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: Topsoil Stockpile (Bear #2)

AREA: BEAR CANYON

DATE: Sepember 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE: Slight

EROSION: Minimal

COVER: ~ 65%

DOMINANT PLANT SPECIES OBSERVED:

Grindelia squarrosa
Medicago sativa
Penstemon sp.
Salsola iberica

Agropyron dasystachyum
Agropyron spicatum
Bromus carinatus
Elymus cinereus
Oryzopsis hymenoides

NOTES:

1) Condition was rated as "good".

2) There were some localized area with Salsola iberica as a dominate species, but otherwise the species diversity was good. Field map show exact locations.

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: Washed Slope (Bear #3)

AREA: BEAR CANYON

DATE: September 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: 35+ deg

EXPOSURE: East

ANIMAL USE/DISTURBANCE:

EROSION: Some severe erosion, especially in bottom half of the slope.

COVER: ~40%

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus

Salsola iberica
Machaeranthera canescens

Bromus carinatus
Elymus salinus

NOTES:

1) With the severe erosion, this slope may need some work. Possible suggestions include some hand work to fill in the rills and gullies. Some logs place perpendicular to the slope and contour furrows may also impede erosion. Subsequent seeding with sod-forming grass may also be advised.

2) A fair representation of grass species was observed on the slope. There were also some patches of weedy species.

3) Condition: "poor to fair"

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: Test Plot (Bear #4)

AREA: BEAR CANYON

DATE: September 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: 30 deg.

EXPOSURE: East

ANIMAL USE/DISTURBANCE: Slight

EROSION: Slight

COVER: ~ 60%

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus

Salsola iberica
Kochia scoparia

NOTES:

1) Almost none of the seeded species seemed to have become established.

2) Condition was "fair" only because there was some other shrubs in the area. Because of their age, I suspect these shrubs were there before the plot was seeded.

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: East Roadside (Bear #5)

AREA: BEAR CANYON

DATE: September 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: ~ 25 deg.

EXPOSURE: East

ANIMAL USE/DISTURBANCE: Slight

EROSION: Slight

COVER: ~40%

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum
Orzopsis hymenoides
Agropyron spicatum

NOTES:

1) Some areas had good cover with native species, while other areas were quite bare. Seeding in interspaces could be somewhat effective, but possibly not significant.

2) I would not recommend further disturbance in an effort to reseed though.

3) Condition: "fair"

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: West Roadside (Bear #6)

AREA: BEAR CANYON

DATE: September 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: ~ 50 deg.

EXPOSURE: East

ANIMAL USE/DISTURBANCE: None

EROSION: Moderate to Extensive

COVER: ~10%

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Rosa woodsii

Salsola iberica (dominant)

NOTES:

1) This was a very steep slope (almost highwall). Plant establishment would be nearly impossible unless some handwork was done.

2) Handwork could entail carving some "seed catches" in the slope i.e. semi circle seed pockets, contour microfurrows, etc.

3) Present condition "Poor".

CO-OP MINE AREA
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1991

SITE NAME: PIB Slope (Bear #7)

AREA: BEAR CANYON

DATE: September 12, 1991

WORKERS: P. Collins, D. Collins

SLOPE: ~ 35 - 45 deg.

EXPOSURE: East

ANIMAL USE/DISTURBANCE: Slight

EROSION: Extensive

COVER: ~40%

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus

Salsola iberica (dominant)

NOTES:

1) This is a steep and dangerous slope to work on, but it has rather extensive erosion. Reseeding recommended, but not before erosion repair work is implemented.

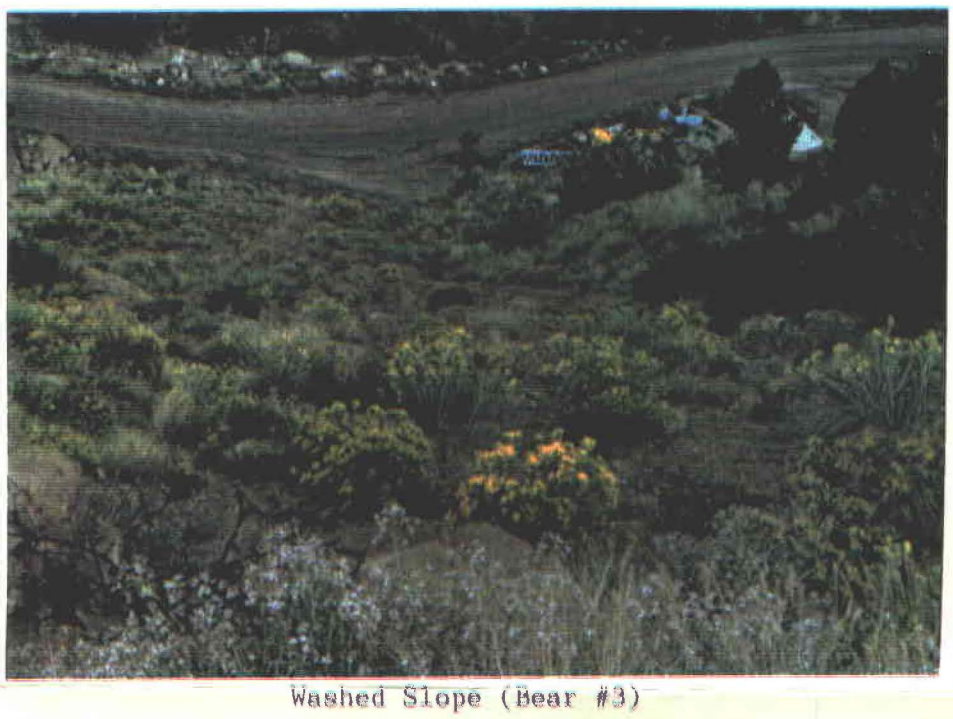
2) Repair work recommended would handwork to fill in rills and gullies (roping for support would be necessary for safety). Contour furrows would decrease erosion and provide "seed-catchs" to enhance vegetation establishment. Other "seed pockets" would also improve survival of seedlings.

3) Condition: "Poor"

COLOR PHOTOGRAPHS OF THE REVEGETATION MONITORING SITES IN BEAR CANYON (SEPT. 1991)

Ball Park (Bear #1)

Topsoil Stockpile (Bear #2)



Washed Slope (Bear #3)

Test Plot (Bear #4)

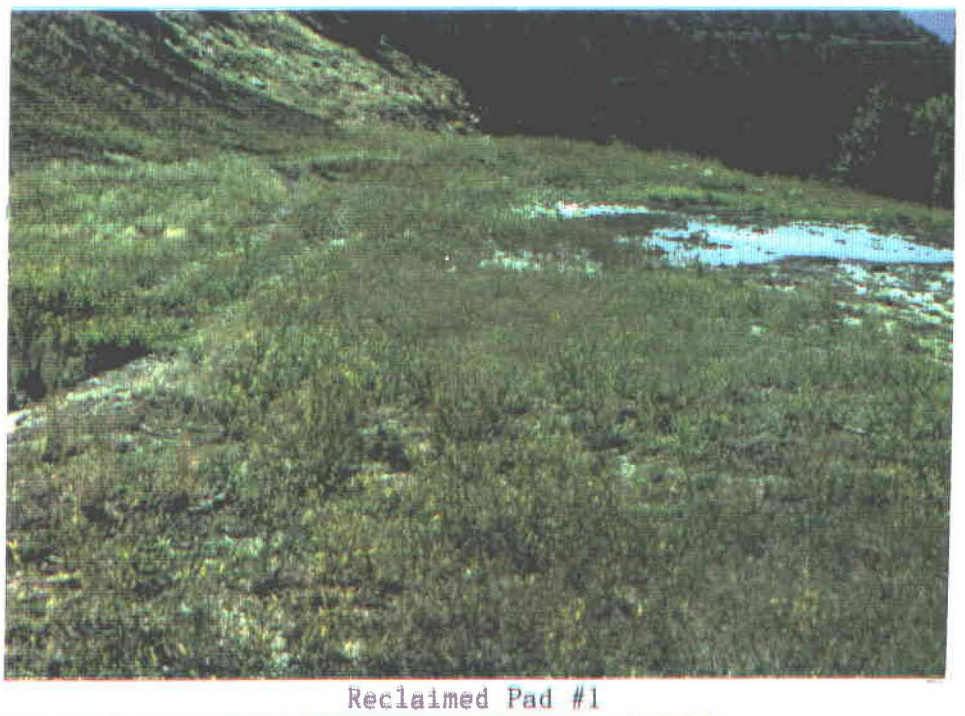
East Roadside (Bear #5)

West Roadside (Bear #6)

PIB Slope (Bear #7)

Canyon Sweetvetch
(*Hedysarum occidentale* var. *canone*)

COLOR PHOTOGRAPHS OF THE REVEGETATION MONITORING SITES IN TRAIL CANYON (SEPT. 1991)



Reclaimed Pad #1

Reclaimed Pad #2

Reclaimed Slope #1

Reclaimed Slope #2

Reclaimed Slope #3

Reclaimed Road (a)

Reclaimed Road (b)

Reclaimed Spot-Seeded Area

APPENDIX: RAW DATA

CO-OP
TRAIL CANYON: SLOPES
PJ Reclaimed Slopes
Slope: 25-30 deg
Exposure: W

SLOPE 1 =1 thru 10

Sample Date: 11 Sept 1991	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
SHRUBS										
Chrysothamnus nauseosus	5.00	3.00	3.00	0.00	0.00	2.00	0.00	0.00	0.00	5.00
Artemisia tridentata	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS										
Achillea millefolium	5.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Sanguisorba minor	3.00	0.00	3.00	0.00	0.00	1.00	2.00	0.00	0.00	5.00
Aster chilensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
Penstemon pachyphyllus	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	2.00
Salsola iberica	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	5.00
Melilotus officinalis	7.00	7.00	5.00	15.00	0.00	13.00	13.00	19.00	14.00	3.00
Kochia scoparia	0.00	12.00	12.00	0.00	0.00	7.00	0.00	0.00	3.00	0.00
Hedysarum boreale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
GRASSES										
Agropyron spicatum	7.00	10.00	8.00	10.00	0.00	10.00	5.00	5.00	5.00	5.00
Agropyron dasystachyum	5.00	3.00	7.00	15.00	5.00	10.00	5.00	5.00	2.00	3.00
Elymus cinereus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER										
Total Living Cover	35.00	35.00	40.00	40.00	5.00	45.00	25.00	35.00	25.00	35.00
Litter	3.00	15.00	10.00	10.00	10.00	5.00	3.00	5.00	2.00	2.00
Bareground	42.00	35.00	35.00	25.00	45.00	35.00	15.00	40.00	38.00	50.00
Rock	20.00	15.00	15.00	25.00	40.00	15.00	57.00	20.00	35.00	13.00
% COMPOSITION										
Shrubs	20.00	8.57	7.50	0.00	0.00	4.44	0.00	0.00	0.00	14.29
Forbs	45.71	54.29	55.00	37.50	0.00	51.11	60.00	71.43	72.00	62.86
Grasses	34.29	37.14	37.50	62.50	100.00	44.44	40.00	28.57	28.00	22.86

SLOPE 2 = 11 thru 20

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00	5.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	5.00	10.00	20.00	15.00	25.00	5.00	5.00	0.00	0.00
10.00	9.00	10.00	3.00	5.00	0.00	2.00	10.00	17.00	10.00
0.00	0.00	0.00	10.00	10.00	0.00	0.00	0.00	0.00	0.00
0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	8.00	5.00	0.00	5.00	0.00	5.00	10.00	18.00	20.00
5.00	7.00	10.00	7.00	5.00	5.00	8.00	0.00	0.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45.00	40.00	40.00	40.00	40.00	30.00	25.00	30.00	40.00	50.00
15.00	10.00	10.00	2.00	5.00	5.00	5.00	5.00	5.00	5.00
15.00	25.00	35.00	45.00	35.00	45.00	55.00	45.00	35.00	15.00
25.00	25.00	15.00	13.00	20.00	20.00	15.00	20.00	20.00	30.00
0.00	12.50	0.00	0.00	0.00	0.00	20.00	16.67	12.50	0.00
66.67	50.00	62.50	82.50	75.00	83.33	28.00	50.00	42.50	20.00
33.33	37.50	37.50	17.50	25.00	16.67	52.00	33.33	45.00	80.00

SLOPE 3 = 21 thru 30

21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
5.00	5.00	0.00	5.00	5.00	5.00	5.00	5.00	0.00	0.00
0.00	2.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	10.00	35.00	5.00	7.00	15.00	10.00	5.00	0.00	14.00
0.00	10.00	5.00	10.00	10.00	5.00	10.00	5.00	5.00	2.00
5.00	0.00	0.00	0.00	0.00	0.00	5.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	10.00	5.00	10.00	15.00	15.00	7.00	30.00	0.00	14.00
23.00	11.00	5.00	15.00	15.00	15.00	8.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.00	0.00
50.00	55.00	50.00	45.00	55.00	55.00	45.00	55.00	55.00	30.00
5.00	5.00	5.00	5.00	5.00	5.00	2.00	5.00	5.00	2.00
30.00	15.00	25.00	35.00	20.00	20.00	33.00	30.00	25.00	43.00
15.00	25.00	20.00	15.00	20.00	20.00	20.00	10.00	15.00	25.00
10.00	12.73	0.00	11.11	14.55	9.09	11.11	9.09	0.00	0.00
34.00	49.09	80.00	33.33	30.91	36.36	55.56	36.36	12.73	53.33
56.00	38.18	20.00	55.56	54.55	54.55	33.33	54.55	87.27	46.67

CO-OP
TRAIL CANYON: SLOPES
PJ Reclaimed Slopes
Slope: 25-30 deg
Exposure: W
Sample Date: 11 Sept 1991

Mean	SDev	Freq	
			SHRUBS
2.43	2.38	53.33	Chrysothamnus nauseosus
0.23	0.72	10.00	Artemisia tridentata
			FORBS
0.57	1.52	13.33	Achillea millefolium
0.97	1.62	33.33	Sanguisorba minor
0.07	0.36	3.33	Aster chilensis
0.20	0.48	16.67	Penstemon pachyphyllus
7.43	8.64	63.33	Salsola iberica
7.80	4.96	90.00	Melilotus officinalis
2.47	4.14	30.00	Kochia scoparia
0.20	0.91	6.67	Hedysarum boreale
			GRASSES
8.57	6.38	96.67	Agropyron spicatum
7.30	5.91	83.33	Agropyron dasystachyum
1.60	8.62	3.33	Elymus cinereus

		COVER
39.83	11.29	Total Living Cover
5.87	3.44	Litter
32.87	10.86	Bareground
21.43	9.23	Rock
		% COMPOSITION
6.47	6.77	Shrubs
49.74	20.16	Forbs
43.79	19.42	Grasses

CO-OP MINE 1991

CO-OP
TRAIL CANYON: PADS
PJ Reclaimed
Slope: 0-2 deg
Exposure:
Sample Date: 11 Sept 1991

PAD 1 = 1 thru 13

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
SHRUBS										
Pinus ponderosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atriplex canescens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Artemisia tridentata	1.00	0.00	0.00	5.00	0.00	0.00	0.00	2.00	0.00	0.00
Purshia tridentata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus nauseosus	5.00	5.00	0.00	7.00	2.00	0.00	5.00	0.00	0.00	0.00
FORBS										
Aster chilensis	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Kochia scoparia	5.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.00
Sanguisorba minor	5.00	0.00	5.00	5.00	5.00	5.00	0.00	0.00	3.00	0.00
Achillea millefolium	5.00	0.00	5.00	5.00	0.00	2.00	0.00	0.00	0.00	0.00
Salsola iberica	0.00	2.00	0.00	0.00	22.00	5.00	10.00	5.00	5.00	5.00
Melilotus officinalis	5.00	12.00	45.00	5.00	5.00	7.00	15.00	17.00	21.00	2.00
Medicago sativa	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	5.00	0.00
Penstemon pachyphyllus	2.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Linum lewsii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grindelia squarrosa	5.00	0.00	5.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
GRASSES										
Agropyron dasystachyum	7.00	13.00	15.00	7.00	5.00	20.00	20.00	16.00	21.00	7.00
Agropyron spicatum	15.00	5.00	0.00	10.00	5.00	0.00	15.00	0.00	0.00	0.00
Oryzopsis hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Poa secunda	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus tectorum	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER										
Total Living Cover	55.00	55.00	75.00	50.00	45.00	40.00	65.00	45.00	55.00	40.00
Litter	2.00	5.00	5.00	5.00	5.00	5.00	5.00	15.00	10.00	5.00
Bareground	25.00	35.00	19.00	30.00	40.00	45.00	25.00	25.00	15.00	10.00
Rock	18.00	5.00	1.00	15.00	10.00	10.00	5.00	15.00	20.00	45.00
% COMPOSITION										
Shrubs	10.91	9.09	0.00	24.00	4.44	0.00	7.69	4.44	0.00	0.00
Forbs	49.09	43.64	80.00	42.00	73.33	50.00	38.46	60.00	61.82	82.50
Grasses	40.00	47.27	20.00	34.00	22.22	50.00	53.85	35.56	38.18	17.50

PAD 2 = 14 thru 20

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00	2.00	2.00	5.00	0.00	3.00	5.00	0.00	3.00	2.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.00	2.00	5.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00	6.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	23.00	0.00	18.00	5.00	0.00	7.00	3.00	5.00
0.00	15.00	5.00	13.00	10.00	3.00	5.00	0.00	0.00	5.00
0.00	0.00	5.00	0.00	0.00	10.00	0.00	3.00	5.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	15.00	0.00	5.00	2.00	0.00	0.00	5.00	0.00	3.00
0.00	7.00	0.00	10.00	3.00	2.00	5.00	0.00	0.00	0.00
0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
40.00	55.00	40.00	40.00	35.00	25.00	15.00	15.00	15.00	20.00
10.00	5.00	5.00	5.00	10.00	10.00	5.00	15.00	15.00	5.00
48.00	39.00	30.00	40.00	30.00	40.00	55.00	35.00	50.00	55.00
2.00	1.00	25.00	15.00	25.00	25.00	25.00	35.00	20.00	20.00
5.00	3.64	5.00	12.50	5.71	12.00	33.33	0.00	26.67	10.00
82.50	56.36	95.00	32.50	80.00	80.00	33.33	66.67	73.33	75.00
12.50	40.00	0.00	55.00	14.29	8.00	33.33	33.33	0.00	15.00

CO-OP
TRAIL CANYON: PADS
PJ Reclaimed
Slope: 0-2 deg
Exposure:
Sample Date: 11 Sept 1991

Mean	SDev	Freq %	
			SHRUBS
0.10	0.44	5.00	Pinus ponderosa
0.10	0.44	5.00	Atriplex canescens
0.40	1.16	15.00	Artemisia tridentata
0.05	0.22	5.00	Purshia tridentata
2.30	2.26	60.00	Chrysothamnus nauseosus
			FORBS
0.30	1.10	10.00	Aster chilensis
4.10	8.90	35.00	Kochia scoparia
1.80	2.34	40.00	Sanguisorba minor
0.85	1.80	30.00	Achillea millefolium
5.75	7.03	65.00	Salsola iberica
9.50	10.06	75.00	Melilotus officinalis
1.90	2.84	35.00	Medicago sativa
0.20	0.51	15.00	Penstemon pachyphyllus
0.10	0.44	5.00	Linum lewsii
0.90	1.84	20.00	Grindelia squarrosa
			GRASSES
8.30	8.12	90.00	Agropyron dasystachyum
3.85	4.95	50.00	Agropyron spicatum
0.10	0.44	5.00	Oryzopsis hymenoides
0.25	1.09	5.00	Poa secunda
0.15	0.01	5.00	Bromus tectorum
0.25	0.28	5.00	Agropyron cristatum

		COVER
41.25	16.42	Total Living Cover
7.35	3.86	Litter
34.55	12.32	Bareground
16.85	11.24	Rock

		% COMPOSITION
8.72	9.15	Shrubs
62.78	18.26	Forbs
28.50	16.68	Grasses

CO-OP
RECLAIMED ROAD
PJ Reclaimed Road
Slope:
Exposure:

Sample Date: 11 Sept 1991	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
SHRUBS										
Artemisia tridentata	2.00	5.00	0.00	0.00	0.00	5.00	2.00	0.00	0.00	0.00
Artemisia filifolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Chrysothamnus nauseosus	0.00	0.00	3.00	7.00	0.00	3.00	3.00	15.00	5.00	0.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	0.00	0.00	6.00	2.00	5.00	0.00
FORBS										
Lappula occidentalis	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
Hedysarum boreale	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00
Penstemon pachyphyllus	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
Kochia scoparia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Artemisia ludoviciana	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Halogeton glomeratus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Melilotus officinalis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linum lewsii	8.00	0.00	0.00	6.00	4.00	5.00	5.00	0.00	1.00	0.00
Medicago sativa	5.00	5.00	0.00	5.00	1.00	0.00	0.00	0.00	5.00	1.00
Malcomia africa	0.00	0.00	5.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Salsola iberica	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00
Achillea millefolium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aster chilensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES										
Hordeum jubatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Agropyron cristatum	0.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron spicatum	5.00	0.00	0.00	0.00	0.00	6.00	5.00	2.00	0.00	0.00
Agropyron dasystachyum	0.00	10.00	0.00	0.00	0.00	6.00	5.00	0.00	3.00	7.00
Poa secunda	5.00	10.00	12.00	10.00	2.00	5.00	6.00	0.00	0.00	22.00
Oryzopsis hymenoides	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus tectorum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER										
Total Living Cover	25.00	65.00	25.00	30.00	10.00	30.00	40.00	25.00	25.00	35.00
Litter	3.00	5.00	5.00	2.00	2.00	5.00	5.00	2.00	5.00	5.00
Bareground	47.00	5.00	30.00	43.00	53.00	25.00	25.00	33.00	35.00	20.00
Rock	25.00	25.00	40.00	25.00	35.00	40.00	30.00	40.00	35.00	40.00
% COMPOSITION										
Shrubs	8.00	7.69	12.00	23.33	0.00	26.67	27.50	88.00	40.00	0.00
Forbs	52.00	15.38	40.00	43.33	80.00	16.67	32.50	4.00	48.00	2.86
Grasses	40.00	76.92	48.00	33.33	20.00	56.67	40.00	8.00	12.00	97.14

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	11.00	8.00	0.00	0.00	0.00
0.00	9.00	10.00	0.00	0.00	0.00	0.00	0.00	2.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	2.00	0.00	25.00	3.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00
2.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	4.00	2.00	24.00	3.00	2.00	2.00	0.00	0.00	12.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2.00	13.00	1.00	5.00	0.00	0.00	0.00	8.00	0.00
8.00	0.00	0.00	0.00	15.00	5.00	0.00	0.00	2.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	13.00	7.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
15.00	15.00	25.00	25.00	25.00	20.00	30.00	35.00	15.00	15.00
2.00	2.00	2.00	2.00	2.00	5.00	2.00	5.00	5.00	15.00
10.00	25.00	38.00	43.00	50.00	20.00	35.00	35.00	55.00	45.00
73.00	58.00	35.00	30.00	23.00	55.00	33.00	25.00	25.00	25.00
0.00	60.00	40.00	0.00	0.00	55.00	33.33	0.00	13.33	6.67
46.67	26.67	8.00	96.00	20.00	20.00	23.33	80.00	20.00	80.00
53.33	13.33	52.00	4.00	80.00	25.00	43.33	20.00	66.67	13.33

21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
15.00	10.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	5.00	5.00	0.00	0.00	0.00	3.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	5.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	13.00	16.00	5.00	0.00	2.00	15.00
0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	7.00	0.00	15.00	0.00	20.00	0.00
0.00	5.00	8.00	15.00	0.00	0.00	0.00	15.00	0.00	0.00
9.00	5.00	0.00	15.00	0.00	0.00	0.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40.00	25.00	35.00	50.00	35.00	25.00	25.00	35.00	25.00	20.00
2.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	10.00
7.00	15.00	35.00	10.00	10.00	35.00	30.00	30.00	35.00	45.00
51.00	55.00	25.00	35.00	50.00	35.00	40.00	30.00	35.00	25.00
0.00	0.00	5.71	20.00	14.29	0.00	0.00	0.00	0.00	0.00
42.50	60.00	71.43	20.00	65.71	64.00	40.00	28.57	20.00	100.00
57.50	40.00	22.86	60.00	20.00	36.00	60.00	71.43	80.00	0.00

CO-OP
RECLAIMED ROAD
PJ Reclaimed Road
Slope:
Exposure:
Sample Date: 11 Sept 1991

31.00	32.00	Mean	SDev	Freq	
					SHRUBS
0.00	0.00	0.56	1.32	18.75	Artemisia tridentata
0.00	0.00	0.16	0.87	3.13	Artemisia filifolia
0.00	0.00	2.19	3.88	31.25	Chrysothamnus nauseosus
0.00	0.00	1.09	2.58	21.88	Eriogonum corymbosum
					FORBS
0.00	0.00	0.06	0.35	3.13	Lappula occidentalis
0.00	0.00	0.53	1.35	15.63	Hedysarum boreale
0.00	0.00	0.13	0.48	6.25	Penstemon pachyphyllus
5.00	0.00	2.66	6.58	21.88	Kochia scoparia
0.00	0.00	0.16	0.87	3.13	Artemisia ludoviciana
0.00	0.00	0.25	1.00	6.25	Halogeton glomeratus
0.00	0.00	0.69	1.55	6.25	Melilotus officinalis
0.00	0.00	1.00	2.12	21.88	Linum lewsii
0.00	0.00	0.69	1.65	21.88	Medicago sativa
0.00	0.00	0.22	0.93	6.25	Malcomia africa
15.00	30.00	3.84	7.04	53.13	Salsola iberica
0.00	0.00	0.16	0.87	3.13	Achillea millefolium
0.00	0.00	1.59	4.32	15.63	Aster chilensis
					GRASSES
0.00	0.00	0.38	1.47	6.25	Hordeum jubatum
0.00	0.00	0.78	4.35	3.13	Agropyron cristatum
0.00	0.00	3.06	5.02	46.63	Agropyron spicatum
0.00	0.00	3.25	4.80	40.63	Agropyron dasystachyum
0.00	0.00	4.09	5.68	43.75	Poa secunda
0.00	0.00	0.22	0.93	6.25	Oryzopsis hymenoides
0.00	0.00	0.22	0.93	6.25	Bromus tectorum
					COVER
20.00	30.00	27.97	10.74		Total Living Cover
5.00	5.00	4.47	2.56		Litter
35.00	40.00	31.22	13.45		Bareground
40.00	25.00	36.34	11.82		Rock
					% COMPOSITION
0.00	0.00	15.05	21.34		Shrubs
100.00	100.00	45.86	29.59		Forbs
0.00	0.00	39.09	26.45		Grasses

CO-OP
TRAIL CANYON:
PJ Spot Seed Area (near hwy 30)
Slope: 2-3 deg
Exposure: S

Sample Date: 12 Sept 1991	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
SHRUBS										
Chrysothamnus nauseosus	0.00	18.00	0.00	15.00	0.00	45.00	15.00	19.00	45.00	5.00
Chrysothamnus viscidiflor	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS										
Grindelia squarrosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ambrosia acanthicarpa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Salsola iberica	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00
Penstemon pachyphyllus	1.00	2.00	0.00	0.00	0.00	0.00	7.00	6.00	0.00	0.00
Medicago sativa	4.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES										
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Bromus tectorum	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Bromus carinatus	0.00	0.00	0.00	0.00	40.00	0.00	0.00	0.00	5.00	0.00
Agropyron dasystachyum	26.00	5.00	28.00	0.00	10.00	10.00	0.00	0.00	0.00	20.00
Agropyron spicatum	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus cinereus	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oryzopsis hymenoides	2.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
COVER										
Total Living Cover	45.00	35.00	35.00	15.00	55.00	60.00	25.00	25.00	50.00	30.00
Litter	10.00	10.00	5.00	10.00	15.00	5.00	5.00	3.00	5.00	5.00
Bareground	35.00	35.00	30.00	70.00	25.00	5.00	40.00	40.00	30.00	15.00
Rock	10.00	20.00	30.00	5.00	5.00	30.00	30.00	32.00	15.00	50.00
% COMPOSITION										
Shrubs	15.56	51.43	0.00	100.00	0.00	75.00	60.00	76.00	90.00	16.67
Forbs	11.11	34.29	0.00	0.00	0.00	0.00	40.00	24.00	0.00	0.00
Grasses	73.33	14.29	100.00	0.00	100.00	25.00	0.00	0.00	10.00	83.33

CO-OP
TRAIL CANYON
PJ Spot Seed Area (near hwy 30)
Slope: 2-3 deg
Exposure: S
Sample Date: 12 Sept 1991

11.00	12.00	13.00	14.00	15.00	Mean	SDev	Freq	
								SHRUBS
10.00	15.00	0.00	5.00	21.00	14.20	14.09	73.33	Chrysothamnus nauseosus
0.00	0.00	0.00	0.00	0.00	0.47	1.75	6.67	Chrysothamnus viscidiflorus
								FORBS
0.00	0.00	13.00	0.00	0.00	0.87	3.24	6.67	Grindelia squarrosa
5.00	0.00	0.00	0.00	0.00	0.33	1.25	6.67	Ambrosia acanthicarpa
0.00	0.00	0.00	0.00	0.00	0.20	0.75	6.67	Salsola iberica
0.00	0.00	0.00	0.00	7.00	1.53	2.63	33.33	Penstemon pachyphyllus
0.00	0.00	0.00	0.00	0.00	0.93	2.62	13.33	Medicago sativa
								GRASSES
0.00	0.00	2.00	25.00	0.00	2.13	6.25	33.33	Agropyron cristatum
0.00	0.00	0.00	0.00	0.00	0.33	1.25	6.67	Bromus tectorum
0.00	0.00	0.00	0.00	0.00	3.00	9.97	13.33	Bromus carinatus
5.00	10.00	0.00	5.00	12.00	8.73	9.07	66.67	Agropyron dasystachyum
0.00	0.00	0.00	0.00	0.00	0.47	1.75	6.67	Agropyron spicatum
0.00	0.00	0.00	0.00	0.00	0.33	1.25	6.67	Elymus cinereus
0.00	0.00	15.00	0.00	0.00	1.47	3.84	33.33	Oryzopsis hymenoides
								COVER
20.00	25.00	30.00	35.00	40.00	35.00	12.52		Total Living Cover
5.00	5.00	10.00	5.00	10.00	7.20	3.23		Litter
65.00	60.00	55.00	55.00	40.00	40.00	17.70		Bareground
10.00	10.00	5.00	5.00	10.00	17.80	13.16		Rock
								% COMPOSITION
50.00	60.00	0.00	14.29	52.50	44.10	32.82		Shrubs
25.00	0.00	43.33	0.00	17.50	13.02	15.80		Forbs
25.00	40.00	56.67	85.71	30.00	42.89	35.91		Grasses

APPENDIX E
IMPOUNDMENT INSPECTION

1991 ANNUAL POND INSPECTION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/025
Mine Name: Bear Canyon Mine

Pond Identification: Sediment Pond "A"
Inspection Date: 27 December 1991

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Potential Safety Hazards:**	No safety hazards noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	
	Present Water Depth =	10 in.±
	Present Sediment Level =	7083 ft
	Sediment Cleanout Level =	7086 ft (60 percent cleanout level)
	Comments:	Pond frozen.
(5)	**Recommendations/Comments**	Pond capacity is adequate based on sediment level and "As-built measurements.

I do hearby certify that the above information is a true and accurate representation of the pond at this time.

name

12/27/91
date

REGISTERED PROFESSIONAL ENGINEER
No. 7900
KIMLY C. MANGUM
STATE OF UTAH

1991 ANNUAL POND INSPECTION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/025
Mine Name: Bear Canyon Mine

Pond Identification: Sediment Pond "B"
Inspection Date: 27 December 1991

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Potential Safety Hazards:**	No safety hazards noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	
	Present Water Depth =	6 in.±
	Present Sediment Level =	7062.3 ft
	Sediment Cleanout Level =	7062.9 ft (60 percent cleanout level)
	Comments:	Pond frozen.
(5)	**Recommendations/Comments**	Pond capacity is adequate based on sediment level and "As-built measurements.

I do hearby certify that the above information is a true and accurate representation of the pond at this time.

name

12/28/91
date

REGISTERED PROFESSIONAL ENGINEER
No. 7900
KIMLY C. MANCUM
STATE OF UTAH

1991 ANNUAL POND INSPECTION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/021
Mine Name: Trail Canyon Mine

Pond Identification: Trail Canyon Sediment Pond
Inspection Date: 27 December 1991

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Potential Safety Hazards:**	No safety hazards noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	
	Present Water Depth =	Dry
	Present Sediment Level =	91.5 ft
	Sediment Cleanout Level =	93.0 ft (60 percent cleanout level)
	Comments:	
(5)	**Recommendations/Comments**	Pond capacity is adequate based on sediment level and "As-built measurements.

I do hearby certify that the above information is a true and accurate representation of the pond at this time.

name

12/27/91
date

REGISTERED PROFESSIONAL ENGINEER
No. 7900
KEMLY C. MANGUM
STATE OF UTAH

APPENDIX F
RAPTOR SURVEY

PACIFICORP
ELECTRIC OPERATIONS

ONE UTAH CENTER

201 SOUTH MAIN • SUITE 2100 • SALT LAKE CITY, UTAH 84140-0021 • (801) 220-2000

December 5, 1991

Mr. Wendell Owen
CO-OP Mine
PO Box 1245
Huntington, Utah 84528

Dear Mr. Owen:

Enclosed please find information regarding the 1991 aerial raptor nest survey conducted at your mine. The survey was completed in cooperation with Mr. Bill Bates, Utah Division of Wildlife Resources Southeastern Region Nongame Manager.

Using a Bell 206 Jet Ranger helicopter, the escarpments were examined for golden eagle and other raptor nests. The area surveyed included Trail Canyon, Bear Creek Canyon, Left Fork of Fish Creek and Huntington Canyon between Fish Creek and Trail Canyon. Three (3) known golden eagle territories were inventoried with the following results:

NEST STATUS

ACTIVE	INACTIVE	TENDED	TOTAL OBSERVED
1	13	1	15

An incubating adult was observed at the active nest. Additionally, six (6) previously documented nests were not found during the survey. The locations of the nests are indicated on the attached 8 1/2" x 11" portion of the U.S.G.S. 7.5 minute Hiawatha Quadrangle.

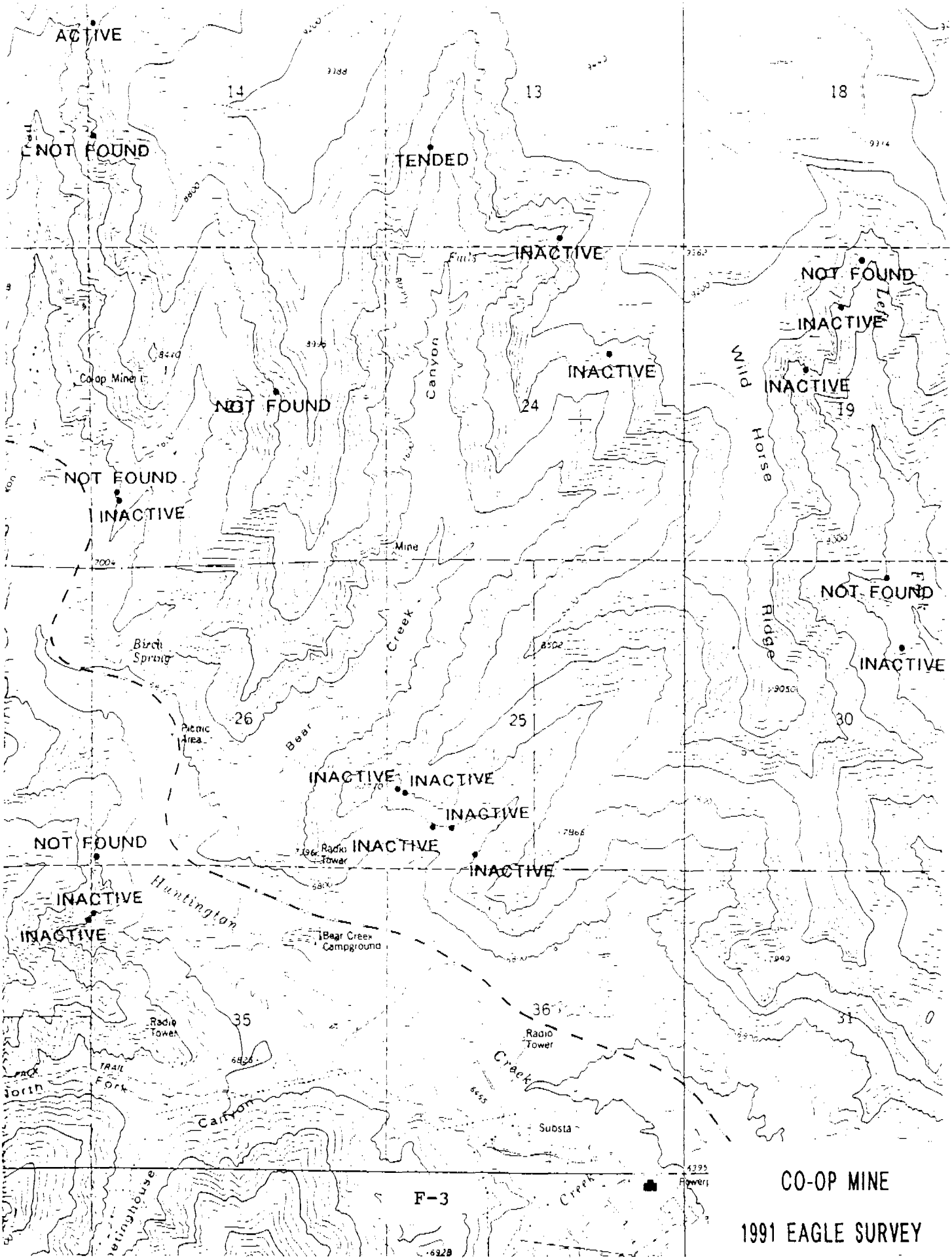
Accompanying this information is an invoice for the costs associated with the survey. Please submit payment as stated on the invoice. For your reference, I have also attached a copy of the agreement regarding this project.

Please accept my apology for the delay in the submittal of this information. If you have questions, please contact Val Payne at 653-2312.

Sincerely,

Val Payne for

J. Blake Webster
Permitting Administrator


ACTIVE
NOT FOUND
TENDED
INACTIVE
NOT FOUND
INACTIVE
INACTIVE
INACTIVE
NOT FOUND
INACTIVE
NOT FOUND
INACTIVE
NOT FOUND
INACTIVE
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NOT FOUND
INACTIVE
INACTIVE
14
13
18
24
19
26
25
30
35
36
31
Canyon
Wild
Horse
Ridge
Mine
Creek
Bear
Birch Spring
Picnic Area
Radio Tower
Huntington
Bear Creek Campground
Radio Tower
Radio Tower
Creek
Canyon
Substa
Creek
F-3
CO-OP MINE
1991 EAGLE SURVEY

MAPS