ENERGY WEST MINING COMPANY

Department of Oil, Gas & Mining
1997 Annual Report

- 1997 VEGETATION MONITORING REPORT
  - ***DEER CREEK MINE ACT/015/018***
  - ***DES-BEE-DOVE MINES ACT/015/017***
  - ***COTTONWOOD/WILBERG MINES ACT/015/019***
  - ***TRAIL MOUNTAIN MINE ACT/015/009***

PACIFICORP

ENERGY WEST Mining Co.

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PACIFICORP/ENERGY WEST
VEGETATION MONITORING
1997

VOLUME I

VEGETATION MONITORING REPORTS FOR THE
COTTONWOOD MINE, DES-BEE-DOVE, DEER CREEK
MINE, & COTTONWOOD CANYON AREAS

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VEGETATION MONITORING
1997

INTRODUCTION

The following document addresses the results of vegetation monitoring of seeded areas and revegetation test plots results for 1997. The following is a list of areas monitored and reported within this document.

Cottonwood Mine Area
Old Fan Road
Reference Area
4th East Road
Storage Yard Slope
Parking Lot Slope
Road/Silo Pad Slope
Tipple Area Slopes
Sediment Pond Banks
Waste Rock (Old) Cell 1
Waste Rock (Old) Cell 2
Waste Rock (Old) Cell 3
Waste Rock (Old) Cell 4
Waste Rock (Old) Cell 5
Waste Rock (Old) Cell 6
Waste Rock (Old) Cell 7
Waste Rock (Old) Berm 1
Waste Rock (Old) Berm 2
Waste Rock (Old) Berm 3
Waste Rock (Old) Berm 4
CTW Soil Piles (A,B,C) '94
CTW Reference Area
Waste Rock (New) Road Slopes
Waste Rock (New) Topsoil Stockpiles
Waste Rock (New) Subsoil Stockpiles
Waste Rock (New) Sediment Pond Banks
Refuse Berm 1991
Refuse Berm 1994
Refuse Berm 1996
Ninth East Road Breakout
Test Plots '88

Des-Bee-Dove Area
Beehive Yard Slope
Beehive Road Berm
Deseret Road Berm
Portal Road Berm
Bathhouse Road Berm
Tipple Slope
Sediment Storage Slope
Sediment Pond Banks
Haul Road Bench
Beehive Substation Slope
Sediment Pond Area
Bathhouse Slope
Material Yard Slope
Test Plots '89
Test Plots '92

Deer Creek
C2 Conveyor (IU 132-190) '93
Riparian Areas
Sediment Pond Dam
Temp. Sediment Basin
Roadside Areas
Gate Areas Slope
Fan Road Slopes
Refuse Pile and Berm
Rock Slide and Berm
Water Plant Slope
Pipeline
Deer Canyon
Waste Rock Access Road Slopes
Phase I Berm
Phase I Diversion
Rilda Facilities Area
Topsoil Pile '95

Trail Mountain Mine
Sediment Pond Outslope

Cottonwood Canyon
Soil Piles
Fan Portal Reclaimed Slope
Reference Area

METHODS

Vegetation monitoring was conducted on revegetated sites and test plots for PACIFICORP (ENERGY WEST) in the growing season of 1997. Quantitative and/or qualitative data were taken on each site, depending on the monitoring schedule. In other words, quantitative data sampling was not scheduled this year on some sites. Each data sheet will briefly describe the sample parameters specific to that site.

QUALITATIVE DATA

Qualitative data were recorded on all sites. A qualitative data sheet for each site is included in this report and provides the following information: site name, general area, sample date, observers, slope, exposure, acreage, animal disturbance, erosion damage, cover, dominant plant species observed, and other pertinent notes.

When quantitative data were recorded, results are shown on these data sheets or reference to where the data is located.

Site Name

The site name that is given correlates with PACIFICORP'S (ENERGY WEST'S) maps of the area

Area

The "Area" on the data sheets is a reference to the general mine or property areas for quick reference and general use.

Date

Sample dates are also provided. All sample dates are within the 1997 growing season.

Workers

Lists the names of the individuals who recorded the data.

Exposure

Exposure was recorded on each site. Often the site had several exposures differences. In those cases, "variable" was written for the exposure on the data sheet.

Animal Disturbance

Values were given to the relative use by animal species at each site. The values and a brief explanation are given below.

None - no animal use was observed.

Slight - only little animal use was observed by droppings, tracks, or cropped vegetation.

Moderate - a fair degree of use was observed, mostly by the cropped vegetation. Several inches of production still remained available for use by the animals.

Severe - animal use had taken nearly all of the available current year's production.

Erosion

Erosion of the area was also assessed by qualitative methods. Actual measurements, descriptive notes or values described below were given to each site.

None - (or negligible) no erosion was observed.

Slight - small erosion rills beginning, usually less than 2:1 (2 inches wide by 1 inches deep).

Moderate - erosional rills and gullies from 2:1 to 4:2.

Severe - erosional rills and gullies over to 4:2 were observed.

Cover

Cover differences or notes may be given on the data sheet or references to the quantitative data.

Dominant Plant Species Observed

Sometimes plant species that were observed, but were not encountered in the quadrats when sampling. Many of these species were recorded here. However, some of the species were also encountered in the quadrats. Therefore, for a list of all species on a given site, one should refer to both quantitative and qualitative data sheets.

Notes

Site-specific, pertinent notes about each area were also taken i.e. identification of special considerations, areas of differential growth patterns, etc. Notes on specific methodologies on each site were also described here.

Photographs

Color photographs were taken for each site and are included in this report for documentation.

QUANTITATIVE DATA

Cover and Composition

Cover estimates were made using ocular methods with randomly or regularly placed meter square

quadrats. Total living cover, litter, rock and bareground were recorded. Cover by species was also recorded. Raw data summations were included in this report. They provide all means and standard deviations. Species composition was also assessed from the quadrats. Sample sizes were often kept consistent each year. Because these data are presented to observe only trends for revegetation success and soil stabilization, no attempt was made to achieve sample adequacy for each individual site.

Woody Species Density

In some areas woody plant densities estimates were needed. Densities were recorded using the point-quarter distance method (Cottom and Curtis 1956), belt transects, or in some cases, counting the entire population of a given area. In the point-quarter method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual. In the belt transect method, sizes of transects varied with individual sites. In this method total counts of the woody species were conducted in each transect. They were then summed and averaged to calculate the number of individuals per acre.

Productivity

Total annual biomass was estimated by clipping, drying and weighing current annual productivity.

When there was enough space within the sample area, “double sampling” or relative ocular estimates were also made placing four quadrats near the "clipped" quadrat to increase accuracy of the productivity estimates. In other words, one quadrat was placed. From this sample, four more quadrat estimates were made relative to the first quadrat. Biomass from the first quadrat was clipped and weighed.

RESULTS

To be consistent with previous years, data sheets for qualitative and quantitative (including raw data) sampling are included in this report. This gives the reviewer an overall view of the revegetation success of each area. For results of the above parameters, refer to the site-specific data sheets.

COTTONWOOD MINE AREA

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Old Fan Road

AREA: Cottonwood Mine (1984)

DATE: August 1-3, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 13-15 deg.

EXPOSURE: Variable

AREA: .8 acres

ANIMAL USE/DISTURBANCE: Slight

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Artemisia tridentata
Atriplex confertifolia
Chrysothamnus nauseosus
Eriogonum corymbosum
Gutierrezia sarothrae

Aster chilensis
Circium sp.
Cynoglossum officinale
Lepidium montanum
Linum lewisii
Stanleya pinnata

Elymus spicatus
Elymus salinus
Elymus trachycaulus
Elymus junceus
Stipa hymenoides

NOTES:

1) We sampled only qualitative data in 1997.

2) Areas were the rock slides were seemed to be establishing vegetation on them quite well.

3) The does not seem to be more slides like we've seen previous years.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Reference Area

AREA: Cottonwood Mine Site

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 36 deg.

EXPOSURE: NE

ANIMAL USE/DISTURBANCE: Minimal

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Abies concolor
Amalanchier utahensis
Artemisia tridentata
Chrysothamnus depressus
Chrysothamnus nauseosus
Ephedra viridis
Eriogonum corymbosum
Gutierrezia sarothrae
Juniperus osteosperma
Pinus edulis
Pseudotsuga menziesii
Rosa woodsii
Symphoricarpos oreophilus

Hedysarum occidentale var. canone
Galium boreale
Leptodactylon watsonii

Elymus salinus
Stipa hymenoides

NOTES: 1) Just sampled for qualitative data in 1997.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: 4th East Road

AREA: Cottonwood Mine (1986)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 3 - 5 degrees

EXPOSURE: N

AREA: .1 acre

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (see quantitative data).

DOMINANT PLANT SPECIES OBSERVED:

Aster chilensis
Descurainia pinnata
Medicago sativa

Elymus lanceolatus

WOODY SPECIES DENSITY: no./Ac

	1995	1996	1997
Chrysothamnus nauseosus		21.78	
Eriogonum corymbosum		21.78	43.56
Gutierrezia sarothrae	43.56		
Pinus edulis		21.78	43.56
Symphoricarpos oreophilus			43.56
TOTAL	43.56	65.34	130.68

ANNUAL PRODUCTIVITY:	LBS/Ac (1997)
Herbaceous	782.75
Woody	0.00
Total	782.75

NOTES:

1) We sampled at regular at 20' intervals up entire road using a 200' tape.

2) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=8) with belt transects (5'X25').

4) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

5) I didn't sample production if number landed on trail.

ENERGY WEST-COTTONWOOD MINE
4th East Road (1986)
Acreage: .1
Slope: 3-5 deg
Exposure: N

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
FORBS						
Descurainia pinnata	0.00	10.00	15.00	0.00	0.00	0.00
Medicago sativa	25.00	15.00	25.00	15.00	45.00	40.00
GRASSES						
Elymus lanceolatus	35.00	25.00	25.00	35.00	25.00	20.00
COVER						
Total Living Cover	60.00	50.00	65.00	50.00	70.00	60.00
Litter	30.00	40.00	10.00	20.00	20.00	5.00
Bareground	5.00	5.00	5.00	10.00	5.00	30.00
Rock	5.00	5.00	20.00	20.00	5.00	5.00
% COMPOSITION						
Shrubs	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	41.67	50.00	61.54	30.00	64.29	66.67
Grasses	58.33	50.00	38.46	70.00	35.71	33.33

7.00	8.00	9.00	10.00	Mean	SDev	Freq		ENERGY 4th East Acreage: Slope: 3- Exposure: Sample D
								SHRUBS
								FORBS
5.00	0.00	0.00	0.00	3.00	5.10	30.00		Descurain
20.00	25.00	50.00	45.00	30.50	12.54	100.00		Medicago
								GRASSE
15.00	25.00	20.00	25.00	25.00	5.92	100.00		Elymus la
								COVER
40.00	50.00	70.00	70.00	58.50	10.01			Total Livi
40.00	30.00	20.00	20.00	23.50	10.97			Litter
10.00	10.00	5.00	5.00	9.00	7.35			Baregrou
10.00	10.00	5.00	5.00	9.00	5.83			Rock
								% COMP
0.00	0.00	0.00	0.00	0.00	0.00			Shrubs
62.50	50.00	71.43	64.29	56.24	12.31			Forbs
37.50	50.00	28.57	35.71	43.76	12.31			Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Storage Yard Slope

AREA: Cottonwood Mine (1988 Reveg. Area)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 30 - 40 deg.

EXPOSURE: S & E

AREA: 1.3 acres

ANIMAL USE/DISTURBANCE:

EROSION: Mostly moderate, but sever on a couple of place on the east end of the slope.

COVER: (see quantitative data).

DOMINANT PLANT SPECIES OBSERVED: (see quantitative data)

Chrysothamnus nauseosus

Aster chilensis
Kochia scoparia
Penstemon palmeri

Agropyron cristatum
Bromus tectorum
Elymus cinereus
Elymus spicatus
Elymus lanceolatus
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Atriplex confertifolia	39.89
Chrysothamnus nauseosus	1396.14
Eriogonum corymbosum	159.56
Total	1595.59

PRODUCTION:	1997 (lbs/ac)
Herbaceous	424.29
Woody	461.76
Total	886.05

NOTES:

1) Sampled regularly around area half the locations were on the SE and half on the E exposures.

2) Some sections on the E exposure a had little or no cover and supported mostly weedy species, whereas, the south face has a fair representation of native species.

3) Sampled cover (n=10) and frequency (n=10) by ocular methods.

4) Sampled density by pt. quarter methods (n=12).

5) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-COTTONWOOD MINE
Storage Yard Slope
1988 Reveg. Interim
Acreage: 1.3
Slope: S & E
Exposure: 30 - 40 deg

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex confertifolia	0.00	0.00	0.00	5.00	0.00	0.00
Chrysothamnus nauseosus	15.00	35.00	15.00	15.00	20.00	0.00
FORBS						
Aster chilensis	5.00	0.00	0.00	0.00	0.00	5.00
Kochia scoparia	0.00	0.00	0.00	0.00	0.00	0.00
Penstemon palmeri	5.00	5.00	15.00	5.00	5.00	0.00
GRASSES						
Agropyron cristatum	0.00	5.00	0.00	5.00	5.00	0.00
Bromus tectorum	0.00	0.00	10.00	0.00	0.00	0.00
Elymus lanceolatus	0.00	10.00	0.00	0.00	0.00	35.00
Elymus smithii	0.00	0.00	0.00	0.00	0.00	0.00
Elymus spicatus	0.00	0.00	15.00	0.00	0.00	0.00
Hordeum jubatum	0.00	0.00	0.00	0.00	0.00	10.00
Stipa hymenoides	15.00	0.00	0.00	0.00	20.00	0.00
COVER						
Total Living Cover	40.00	55.00	55.00	30.00	50.00	50.00
Litter	10.00	10.00	10.00	5.00	10.00	10.00
Bareground	10.00	20.00	15.00	40.00	20.00	10.00
Rock	40.00	15.00	20.00	25.00	20.00	30.00
% COMPOSITION						
Shrubs	37.50	63.64	27.27	66.67	40.00	0.00
Forbs	25.00	9.09	27.27	16.67	10.00	10.00
Grasses	37.50	27.27	45.45	16.67	50.00	90.00

ENERGY
Storage Y
1988 Rev
Acreage:
Slope: S
Exposure:

7.00	8.00	9.00	10.00	Mean	SDev	Freq		Sample D
								SHRUBS
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Atriplex c
10.00	0.00	0.00	20.00	13.00	10.54	70.00		Chrysotha
								FORBS
0.00	0.00	0.00	20.00	3.00	6.00	30.00		Aster chil
0.00	0.00	25.00	0.00	2.50	7.50	10.00		Kochia sc
0.00	0.00	0.00	0.00	3.50	4.50	50.00		Penstemo
								GRASSE
5.00	0.00	15.00	0.00	3.50	4.50	50.00		Agropyro
5.00	5.00	0.00	0.00	2.00	3.32	30.00		Bromus t
20.00	15.00	0.00	0.00	8.00	11.45	40.00		Elymus la
0.00	10.00	0.00	0.00	1.00	3.00	10.00		Elymus s
0.00	0.00	0.00	0.00	1.50	4.50	10.00		Elymus s
0.00	5.00	0.00	0.00	1.50	3.20	20.00		Hordeum
0.00	20.00	10.00	20.00	8.50	8.96	50.00		Stipa hym
								COVER
40.00	55.00	50.00	60.00	48.50	8.67			Total Livi
10.00	10.00	15.00	5.00	9.50	2.69			Litter
10.00	15.00	10.00	5.00	15.50	9.34			Baregrou
40.00	20.00	25.00	30.00	26.50	8.08			Rock
								% COMP
25.00	0.00	0.00	33.33	29.34	23.18			Shrubs
0.00	0.00	50.00	33.33	18.14	15.00			Forbs
75.00	100.00	50.00	33.33	52.52	25.97			Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Parking Lot Slope

AREA: Cottonwood Mine

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 26 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE:

EROSION: Slight to moderate

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum

Aster chilensis
Kochia scoparia
Chenopodium album
Medicago sativa
Grindelia squarrosa

Agropyron cristatum
Elymus cinereus
Elymus lanceolatus
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	597.40
Eriogonum corymbosum	746.75
Total	1344.15

PRODUCTION:	1997 (lbs/ac)
Herbaceous	248.64
Woody	369.64
Total	618.28

NOTES:

1) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=7) with belt transects (5'X25').

4) Sampled productivity [n=5(25)] by clipping, weighing and double sampling every other sample location.

ENERGY WEST-COTTONWOOD MINE
Parking Lot Slope
1988 Reveg Interim
Acreage:
Slope: 26 deg
Exposure: E

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Chrysothamnus nauseosus	30.00	0.00	0.00	0.00	0.00	0.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	0.00	0.00
Polygonum aviculare	0.00	0.00	0.00	5.00	0.00	0.00
FORBS						
Aster glaucodes	0.00	0.00	5.00	0.00	0.00	0.00
Grindelia squarrosa	0.00	25.00	0.00	0.00	0.00	0.00
Halogeton glomeratus	0.00	0.00	0.00	0.00	0.00	0.00
Kochia scoparia	0.00	0.00	10.00	5.00	45.00	15.00
GRASSES						
Stipa hymenoides	5.00	0.00	0.00	0.00	0.00	0.00
Elymus smithii	0.00	0.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	15.00	0.00	0.00	0.00	0.00	0.00
Hordeum jubatum	0.00	0.00	0.00	0.00	5.00	0.00
Agopyron cristatum	0.00	0.00	0.00	15.00	0.00	0.00
Elymus cinereus	0.00	0.00	5.00	0.00	0.00	0.00
COVER						
Total Living Cover	50.00	25.00	20.00	25.00	50.00	15.00
Litter	25.00	5.00	10.00	10.00	10.00	15.00
Bareground	15.00	5.00	15.00	5.00	10.00	25.00
Rock	10.00	65.00	55.00	60.00	30.00	45.00
% COMPOSITION						
Shrubs	60.00	0.00	0.00	20.00	0.00	0.00
Forbs	0.00	100.00	75.00	20.00	90.00	100.00
Grasses	40.00	0.00	25.00	60.00	10.00	0.00

ENERGY
Parking L
1988 Rev
Acreage:
Slope: 26
Exposure:

7.00	8.00	9.00	10.00	Mean	SDev	Freq		Sample D
								SHRUBS
5.00	3.00	5.00	10.00	5.30	8.82	50.00		Chrysotha
0.00	5.00	0.00	0.00	0.50	1.50	10.00		Eriogonu
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Polygonu
								FORBS
20.00	0.00	0.00	0.00	2.50	6.02	20.00		Aster glau
0.00	0.00	0.00	0.00	2.50	7.50	10.00		Grindelia
0.00	2.00	0.00	0.00	0.20	0.60	10.00		Halogeton
0.00	5.00	15.00	15.00	11.00	12.81	70.00		Kochia sc
								GRASSE
5.00	0.00	0.00	0.00	1.00	2.00	20.00		Stipa hym
5.00	0.00	0.00	0.00	0.50	1.50	10.00		Elymus s
0.00	0.00	0.00	0.00	1.50	4.50	10.00		Elymus la
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Hordeum
0.00	0.00	0.00	0.00	1.50	4.50	10.00		Agopyron
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Elymus ci
								COVER
35.00	15.00	20.00	25.00	28.00	12.29			Total Livi
5.00	5.00	5.00	5.00	9.50	6.10			Litter
15.00	25.00	30.00	10.00	15.50	8.20			Baregrou
45.00	55.00	45.00	60.00	47.00	15.68			Rock
								% COMP
14.29	53.33	25.00	40.00	21.26	21.80			Shrubs
57.14	46.67	75.00	60.00	62.38	31.43			Forbs
28.57	0.00	0.00	0.00	16.36	20.16			Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Road/Silo Pad Slope

AREA: Cottonwood Mine (1988 Reveg. Area)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 35 deg.

EXPOSURE: SE

ACREAGE: 1.4 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Moderate (see notes)

COVER: (see quantitative data).

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum

Aster glaucodes
Grindelia squarrosa
Kochia scoparia
Medicago sativa

Elymus lanceolatus
Elymus spicatus
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	1997.21
Eriogonum corymbosum	1331.47
Total	3328.68

PRODUCTION:	1997 (lbs/ac)
Herbaceous	472.04
Woody	392.63
Total	864.67

Site: Road/Silo Pad Slope

NOTES:

1) We took five samples below the test plot (cover n=10).

2) For density we used the point quarter method (n=5).

3) For production we "double" sampled [n=5(25)].

4) Area was active with mine activity and constantly under change. The plant growth is unstable.

ENERGY WEST-COTTONWOOD MINE
Road/Silo Pad Slope
1988 Reveg Interim
Acreage: 1.4
Slope: 35 deg
Exposure: SE

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex confertifolia	0.00	0.00	0.00	0.00	0.00	25.00
Chrysothamnus nauseosus	35.00	0.00	0.00	0.00	40.00	0.00
Eriogonum corymbosum	10.00	0.00	5.00	5.00	0.00	0.00
FORBS						
Aster glaucodes	0.00	30.00	25.00	45.00	5.00	0.00
Halogeton glomeratus	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
Machaeranthera canescens	0.00	0.00	5.00	0.00	0.00	0.00
Melilotus officinalis	0.00	0.00	0.00	5.00	0.00	0.00
Penstemon palmeri	0.00	5.00	0.00	0.00	0.00	0.00
GRASSES						
Elymus lanceolatus	0.00	0.00	0.00	0.00	15.00	0.00
Stipa hymenoides	0.00	0.00	5.00	10.00	0.00	0.00
COVER						
Total Living Cover	45.00	35.00	40.00	65.00	60.00	25.00
Litter	5.00	5.00	5.00	5.00	10.00	5.00
Bareground	10.00	10.00	10.00	15.00	15.00	15.00
Rock	40.00	50.00	45.00	15.00	15.00	55.00
% COMPOSITION						
Shrubs	100.00	0.00	12.50	7.69	66.67	100.00
Forbs	0.00	100.00	75.00	76.92	8.33	0.00
Grasses	0.00	0.00	12.50	15.38	25.00	0.00

ENERGY
Road/Silo
1988 Rev
Acreage:
Slope: 35
Exposure:

7.00	8.00	9.00	10.00	Mean	SDev	Freq		Sample D
								SHRUBS
0.00	0.00	0.00	0.00	2.50	7.50	10.00		Atriplex c
0.00	15.00	0.00	0.00	9.00	14.97	30.00		Chrysotha
0.00	0.00	0.00	0.00	2.00	3.32	30.00		Eriogonu
								FORBS
10.00	0.00	0.00	10.00	12.50	14.87	60.00		Aster glau
0.00	0.00	15.00	0.00	1.50	4.50	10.00		Halogeton
0.00	0.00	0.00	5.00	0.50	1.50	10.00		Kochia sc
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Machaera
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Melilotus
0.00	0.00	0.00	0.00	0.50	1.50	10.00		Penstemo
								GRASSE
0.00	0.00	0.00	0.00	1.50	4.50	10.00		Elymus la
0.00	0.00	0.00	0.00	1.50	3.20	20.00		Stipa hym
								COVER
10.00	15.00	15.00	15.00	32.50	18.74			Total Livi
5.00	5.00	5.00	10.00	6.00	2.00			Litter
5.00	10.00	35.00	35.00	16.00	9.95			Baregrou
80.00	70.00	45.00	40.00	45.50	19.55			Rock
								% COMP
0.00	100.00	0.00	0.00	38.69	44.38			Shrubs
100.00	0.00	100.00	100.00	56.03	44.97			Forbs
0.00	0.00	0.00	0.00	5.29	8.59			Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Tipple Area Slope

AREA: Cottonwood Mine (1988 Reveg. Area)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 35 deg.

EXPOSURE: Variable

AREA: .1 acre

ANIMAL USE/DISTURBANCE: none

EROSION: Moderate erosion was beginning in the sparely vegetated areas.

COVER: (see quantitative data).

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Atriplex gardneri
Eriogonum corymbosum
Chrysothamnus nauseosus

Aster glaucodes
Halogeton glomeratus
Kochia scoparia
Salsola pestifer

Elymus lanceolatus
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Atriplex confertifolia	535.92
Chrysothamnus nauseosus	1224.96
Eriogonum corymbosum	1307.53
Total	3062.41

PRODUCTION:	1997 (lbs/ac)
Herbaceous	113.50
Woody	280.12
Total	393.63

NOTES:

1) Sampled cover [n=10 (7 on N side of road and 3 on S side)] and frequency (n=10) by ocular methods.

2) Sampled density (n=10) with pt. quarter methods.

3) Sampled productivity [n=5(25); 4 on N side and 1 on S side] by clipping, weighing and double sampling.

4) Area was still active constantly changing and active and therefore, unstable for plant growth. It's a difficult place for desirable spp. to become established.

5) Like last year, cover by composition was greater than 50% weedy species in some areas, but others had more.

ENERGY WEST-COTTONWOOD MINE
Tipple Area Slope
1988 Reveg Interim
Acreage: .1
Slope: 35 deg
Exposure: variable

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex confertifolia	0.00	25.00	25.00	0.00	0.00	5.00
Chrysothamnus nauseosus	10.00	0.00	0.00	10.00	0.00	0.00
Eriogonum corymbosum	0.00	13.00	0.00	0.00	20.00	10.00
FORBS						
Aster glaucodes	0.00	0.00	0.00	0.00	0.00	0.00
Halogeton glomeratus	0.00	0.00	0.00	0.00	0.00	5.00
Kochia scoparia	0.00	2.00	10.00	0.00	0.00	0.00
Salsola pestifer	0.00	0.00	0.00	0.00	0.00	5.00
GRASSES						
Elymus lanceolatus	0.00	10.00	0.00	0.00	0.00	0.00
Stipa hymenoides	15.00	0.00	0.00	0.00	0.00	0.00
COVER						
Total Living Cover	25.00	50.00	35.00	10.00	20.00	25.00
Litter	10.00	10.00	25.00	25.00	5.00	10.00
Bareground	25.00	5.00	25.00	20.00	10.00	10.00
Rock	40.00	35.00	15.00	45.00	65.00	55.00
% COMPOSITION						
Shrubs	40.00	76.00	71.43	100.00	100.00	60.00
Forbs	0.00	4.00	28.57	0.00	0.00	40.00
Grasses	60.00	20.00	0.00	0.00	0.00	0.00

ENERGY
Tipple Ar
1988 Rev
Acreage:
Slope: 35
Exposure:

7.00	8.00	9.00	10.00	Mean	SDev	Freq		Sample D
								SHRUBS
0.00	5.00	0.00	0.00	6.00	9.70	40.00		Atriplex c
0.00	0.00	0.00	5.00	2.50	4.03	30.00		Chrysotha
5.00	0.00	0.00	0.00	4.80	6.81	40.00		Eriogonu
								FORBS
10.00	0.00	0.00	30.00	4.00	9.17	20.00		Aster glau
0.00	5.00	25.00	0.00	3.50	7.43	30.00		Halogeton
0.00	5.00	0.00	0.00	1.70	3.16	30.00		Kochia sc
0.00	0.00	5.00	0.00	1.00	2.00	20.00		Salsola p
								GRASSE
0.00	0.00	0.00	0.00	1.00	3.00	10.00		Elymus la
0.00	0.00	0.00	0.00	1.50	4.50	10.00		Stipa hym
								COVER
15.00	15.00	30.00	35.00	26.00	11.36			Total Livi
5.00	15.00	5.00	10.00	12.00	7.14			Litter
5.00	45.00	15.00	20.00	18.00	11.45			Baregrou
75.00	25.00	50.00	35.00	44.00	17.15			Rock
								% COMP
33.33	33.33	0.00	14.29	52.84	32.54			Shrubs
66.67	66.67	100.00	85.71	39.16	36.51			Forbs
0.00	0.00	0.00	0.00	8.00	18.33			Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Pond Banks

AREA: Cottonwood Mine (1988 Reveg. Area)

DATE: August 1-3, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 35 deg.

EXPOSURE: Variable

AREA: .9 acre

ANIMAL USE/DISTURBANCE:

EROSION: Slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Atriplex canescens
Chrysothamnus nauseosus

Aster chilensis
Convolvulus arvensis
Grindelia squarrosa
Halogeton glomeratus
Kochia scoparia
Machaeranthera canescens
Malcomia africana
Medicago sativa
Melilotus officinalis
Salsola pestifer

Agropyron cristatum
Bromus inermis
Elymus cinereus
Elymus lanceolatus
Elymus spicatus
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	487.87
Eriogonum corymbosum	92.93
Total	580.80

PRODUCTION:	1997 (lbs/ac)
Herbaceous	442.39
Woody	29.80
Total	472.19

NOTES:

1) We sampled on lower pond where we put one 200 ft transect and sampled with a random number every 20 ft.

2) Sampled cover (n=15) and frequency (n=15) by ocular methods.

3) Sampled density (n=15) with belt transects (5'X25'). Eleven densities were done on the lower pond and 4 on upper.

4) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

5) Production did not include weed species. We sample all the production on the lower pond.

6) Patchy vegetation growth patterns with some desirable and some weedy species. This is due to erosion control and fluctuating water levels in pond.

7) Regular maintenance of pond disturbs vegetation.

ENERGY WEST-COTTONWOOD MINE
Sediment Pond Banks
1988 Reveg Interim
Acreage: .9
Slope: 35 deg
Exposure: variable

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Chrysothamnus nauseosus	0.00	0.00	0.00	0.00	0.00	5.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	0.00	0.00
FORBS						
Aster chilensis	15.00	0.00	15.00	20.00	0.00	0.00
Convolvulus arvensis	0.00	0.00	0.00	0.00	0.00	0.00
Grindelia squarrosa	0.00	0.00	5.00	0.00	0.00	10.00
Halogeton glomeratus	5.00	0.00	0.00	0.00	5.00	0.00
Helianthus annuus	5.00	0.00	5.00	0.00	0.00	0.00
Kochia scoparia	10.00	0.00	0.00	0.00	0.00	0.00
Malcomia africana	0.00	0.00	0.00	5.00	10.00	0.00
Salsola pestifer	0.00	0.00	0.00	10.00	5.00	0.00
Sphaeralcea grossulariifolia	5.00	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
Elymus cinereus	0.00	25.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	5.00	60.00	25.00	0.00	0.00	35.00
Elymus smithii	0.00	0.00	5.00	0.00	0.00	0.00
Elymus spicatus	0.00	0.00	0.00	0.00	0.00	0.00
Sitanion hystrix	5.00	5.00	5.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00
COVER						
Total Living Cover	50.00	90.00	60.00	35.00	20.00	50.00
Litter	10.00	5.00	5.00	5.00	5.00	15.00
Bareground	10.00	4.00	5.00	10.00	5.00	20.00
Rock	30.00	1.00	30.00	50.00	70.00	15.00
% COMPOSITION						
Shrubs	0.00	0.00	0.00	0.00	0.00	10.00
Forbs	80.00	0.00	41.67	100.00	100.00	20.00
Grasses	20.00	0.00	58.33	0.00	0.00	70.00

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
0.00	0.00	0.00	10.00	0.00	25.00	0.00	0.00	0.00
5.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
0.00	0.00	0.00	0.00	0.00	0.00	45.00	5.00	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	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	25.00	25.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	40.00	45.00	0.00	10.00	0.00
0.00	0.00	0.00	10.00	15.00	0.00	0.00	10.00	20.00
5.00	65.00	0.00	0.00	10.00	0.00	0.00	5.00	5.00
0.00	0.00	5.00	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	0.00
0.00	0.00	10.00	10.00	0.00	0.00	0.00	10.00	10.00
30.00	70.00	50.00	55.00	65.00	70.00	45.00	45.00	65.00
10.00	10.00	15.00	10.00	20.00	10.00	5.00	10.00	5.00
35.00	10.00	15.00	15.00	10.00	10.00	45.00	10.00	25.00
25.00	10.00	20.00	20.00	5.00	10.00	5.00	35.00	5.00
16.67	0.00	20.00	18.18	0.00	35.71	0.00	0.00	0.00
66.67	0.00	0.00	0.00	0.00	0.00	100.00	22.22	46.15
16.67	100.00	80.00	81.82	100.00	64.29	0.00	77.78	53.85

ENERGY WEST-COTTONWOOD MINE
Sediment Pond Banks
1988 Reveg Interim
Acreage: .9
Slope: 35 deg
Exposure: variable
Sample Date: 6-10 Aug 97

Mean	SDev	Freq	
			SHRUBS
2.67	6.55	20.00	Chrysothamnus nauseosus
1.00	2.71	6.67	Eriogonum corymbosum
			FORBS
6.67	9.94	33.33	Aster chilensis
3.33	11.21	13.33	Convolvulus arvensis
1.33	2.87	20.00	Grindelia squarrosa
0.67	1.70	13.33	Halogeton glomeratus
0.67	1.70	13.33	Helianthus annuus
0.67	2.49	6.67	Kochia scoparia
1.00	2.71	13.33	Malcomia africana
1.00	2.71	13.33	Salsola pestifer
0.33	1.25	6.67	Sphaeralcea grossulariifolia
			GRASSES
3.33	8.50	13.33	Agropyron cristatum
8.00	15.03	26.67	Elymus cinereus
12.00	16.61	53.33	Elymus lanceolatus
6.33	15.97	40.00	Elymus smithii
0.33	1.25	6.67	Elymus spicatus
1.33	2.21	26.67	Sitanion hystrix
2.67	4.42	26.67	Stipa hymenoides
			COVER
53.33	17.09		Total Living Cover
9.33	4.42		Litter
15.27	11.24		Bareground
22.07	18.34		Rock
			% COMPOSITION
6.70	10.68		Shrubs
38.45	39.52		Forbs
48.18	36.82		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #1

AREA: Cottonwood Mine Old Waste Rock Area (1983 Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-1 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE: slight to moderate

EROSION: Negligible

COVER: qualitative data only for 1997

DOMINANT PLANT SPECIES OBSERVED:

Artemisia tridentata
Atriplex canescens
Cercocarpus ledifolius
Chrysothamnus nauseosus
Gutierrezia sarothrae
Lactuca serriola

Agropyron cristatum
Bromus tectorum
Elymus elymoides
Elymus lanceolatus
Elymus smithii
Poa pratensis
Stipa comata
Stipa hymenoides

WOODY SPECIES DENSITY:

	Individuals/Ac		
	1994	1995	1996
Artemisia tridentata	229.80		183.02
Atriplex canescens	804.29	1541.95	1342.18
Atriplex confertifolia	76.60		
Ceratoides lanata			61.01
Cercocarpus montanus	76.60		
Chrysothamnus nauseosus	153.20	626.42	305.04
Ephedra viridis			61.01
Gutierrezia sarothrae	957.48	2650.22	1708.22
Total	2297.97	4818.58	3660.48

Page 2
Cell #1

NOTES:

1) Sample qualitative data only.

2) Plot looks better each year.

3) Density values of previous years were shown.

4) Many shrubs are mature.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #2

AREA: Cottonwood Mine Old Waste Rock Area (1984 Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-1 deg.

EXPOSURE: E

AREA: ~ 1 acre

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Artemisia tridentata
Atriplex canescens
Gutierrezia sarothrae

Agropyron cristatum
Bromus tectorum
Bromus carinatus
Elymus cinereus
Elymus lanceolatus
Elymus spicatus
Elymus hispidus
Elymus smithii
Hilaria jamesii
Sitanion hystrix
Stipa hymenoides

DENSITY:

	Number/Acre			
	1994	1995	1996	1997
Artemisia tridentata			28.48	
Atriplex canescens	834.88	878.17	825.44	1460.84
Atriplex confertifolia	53.29	27.88	28.48	292.17
Chrysothamnus nauseosus	17.76	97.57	58.96	
Gutierrezia sarothrae	142.11	376.36	825.44	1753.01
Artemisia tridentata	17.76	27.88		
Total	1065.80	1393.92	1760.80	3506.02

PRODUCTION:	1997 (lbs/ac)
Herbaceous	290.47
Woody	657.45
Total	907.92

NOTES:

1) A more comprehensive study was also done later in the year for this cell called:

   COMPARISONS OF VEGETATION DATA
   OF SELECTIVE RECLAIMED CELLS AT THE
   COTTONWOOD OLD WASTE ROCK SITE
   1997

   The study compared specific areas in the cell that was thought to have salt problems. It was submitted to PACIFICORP (ENERGY WEST) in October 1997.

2) These data represent the sampling done within the dates shown above.

3) We sampled at regular/random intervals using three (3) 200' transect lines.

4) Sampled cover (n=15) and frequency (n=15) by ocular methods.

5) Sampled density (n=15) using pt. quarter method.

6) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-COTTONWOOD MINE
Cell #2
Old Waste Rock (Interim Reveg '84)
Acreage: ~ 1.0
Slope: 0-1 deg
Exposure: E

Sample Date: 29 July 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex canescens	0.00	5.00	0.00	10.00	30.00	20.00
Gutierrezia sarothrae	10.00	0.00	5.00	0.00	5.00	0.00
FORBS						
Halogeton glomeratus	0.00	0.00	0.00	5.00	0.00	0.00
Kochia scoparia	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES						
Agropyron cristatum	0.00	30.00	10.00	5.00	15.00	10.00
Bromus tectorum	0.00	0.00	0.00	0.00	0.00	10.00
Elymus lanceolatus	15.00	0.00	0.00	0.00	10.00	0.00
Elymus smithii	0.00	0.00	0.00	15.00	0.00	10.00
Elymus spicatus	10.00	5.00	35.00	5.00	0.00	0.00
Hordeum jubatum	0.00	0.00	0.00	0.00	0.00	0.00
Stipa comata	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00
COVER						
Total Living Cover	35.00	40.00	50.00	40.00	60.00	50.00
Litter	5.00	10.00	10.00	20.00	10.00	20.00
Bareground	5.00	10.00	10.00	15.00	20.00	10.00
Rock	55.00	40.00	30.00	25.00	10.00	20.00
% COMPOSITION						
Shrubs	28.57	12.50	10.00	25.00	58.33	40.00
Forbs	0.00	0.00	0.00	12.50	0.00	0.00
Grasses	71.43	87.50	90.00	62.50	41.67	60.00

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
85.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	15.00	5.00	5.00	0.00	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	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	35.00	15.00	0.00	10.00	0.00	20.00	10.00	35.00
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	15.00	10.00	10.00	10.00	0.00
0.00	0.00	0.00	0.00	5.00	25.00	0.00	5.00	0.00
10.00	0.00	0.00	0.00	0.00	0.00	10.00	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	5.00	0.00	0.00	0.00	0.00	0.00	10.00
0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	10.00
95.00	35.00	30.00	25.00	35.00	50.00	40.00	35.00	55.00
1.00	10.00	5.00	10.00	5.00	15.00	10.00	5.00	10.00
3.00	45.00	10.00	45.00	35.00	10.00	15.00	5.00	15.00
1.00	10.00	55.00	20.00	25.00	25.00	35.00	55.00	20.00
89.47	0.00	16.67	60.00	14.29	10.00	0.00	28.57	0.00
0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00
10.53	100.00	83.33	20.00	85.71	90.00	100.00	71.43	100.00

ENERGY WEST-COTTONWOOD MINE
Cell #2
Old Waste Rock (Interim Reveg '84)
Acreage: ~ 1.0
Slope: 0-1 deg
Exposure: E
Sample Date: 29 July 97

Mean	SDev	Freq	
			SHRUBS
10.00	21.83	33.33	Atriplex canescens
4.00	4.55	53.33	Gutierrezia sarothrae
			FORBS
0.33	1.25	6.67	Halogeton glomeratus
0.33	1.25	6.67	Kochia scoparia
			GRASSES
13.00	11.80	73.33	Agropyron cristatum
0.67	2.49	6.67	Bromus tectorum
5.00	5.77	46.67	Elymus lanceolatus
4.00	7.12	33.33	Elymus smithii
5.00	8.94	40.00	Elymus spicatus
0.33	1.25	6.67	Hordeum jubatum
1.00	2.71	13.33	Stipa comata
1.33	3.40	13.33	Stipa hymenoides
			COVER
45.00	16.33		Total Living Cover
9.73	5.20		Litter
16.87	13.27		Bareground
28.40	16.28		Rock
			% COMPOSITION
26.23	25.02		Shrubs
2.17	5.69		Forbs
71.61	27.32		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #3

AREA: Cottonwood Mine Old Waste Rock Area (1985 Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-1 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE: Slight

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens
Atriplex confertifolia
Chrysothamnus nauseosus
Ephedra viridis
Gutierrezia sarothrae

Sphaeralcea grossulariifolia

Agropyron cristatum
Bromus tectorum
Elymus hispidus
Elymus lanceolatus
Elymus smithii
Hilaria jamesii
Stipa hymenoides
Stipa comata

Page 2
Cell #3

DENSITY:

	1994	1995	1996	1997
Atriplex canescens	1137.23	1836.38	1548.88	2342.27
Chrysothamnus nauseosus	101.09	135.03	55.32	
Gutierrezia sarothrae	277.99	621.13	1659.52	6558.36
Atriplex confertifolia		54.01		321.30
Cercocarpus ledifolius		54.01		
Yucca harrmaniae			55.32	
Ephedra viridis				156.15
Totals	1516.31	2700.56	3319.03	9369.08

PRODUCTION:

	1997 (lbs/ac)
Herbaceous	192.57
Woody	8.44
Total	201.01

NOTES:

1) As previous years, density measurements were included for comparison.

2) Like 1993-96, there was more density of shrubs here than in Cell 2.

3) Also, this appeared the best cell when compared to Cells 1 & 2.

4) Condition: excellent.

5) Site had good diversity of grasses.

6) Two, 200 ft transects were randomly placed in the cell. Samples were taken randomly at right angles to the transect lines every 30 ft.

7) Sampled cover (n=15) and frequency (n=15) by ocular methods.

8) Sampled density (n=15)by pt. quarter methods

9) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-COTTONWOOD MINE
Cell #3
Old Waste Rock (Interim Reveg '85)
Slope: 0-1 deg
Exposure: E

Sample Date: 29 July 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex canescens	0.00	0.00	0.00	10.00	0.00	0.00
Atriplex confertifolia	0.00	0.00	0.00	10.00	35.00	0.00
Ephedra viridis	0.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	10.00	0.00	15.00	5.00	10.00	25.00
FORBS						
GRASSES						
Agropyron cristatum	0.00	0.00	0.00	5.00	5.00	0.00
Bromus tectorum	15.00	15.00	10.00	0.00	0.00	0.00
Elymus lanceolatus	0.00	0.00	0.00	10.00	0.00	0.00
Elymus smithii	25.00	5.00	0.00	10.00	5.00	0.00
Elymus spicatus	0.00	0.00	5.00	0.00	0.00	0.00
Hilaria jamesii	0.00	0.00	0.00	0.00	0.00	0.00
Stipa comata	0.00	10.00	15.00	15.00	0.00	10.00
Stipa hymenoides	0.00	20.00	10.00	0.00	5.00	15.00
COVER						
Total Living Cover	50.00	50.00	55.00	65.00	60.00	50.00
Litter	10.00	15.00	10.00	15.00	5.00	25.00
Bareground	15.00	5.00	10.00	5.00	5.00	5.00
Rock	25.00	30.00	25.00	15.00	30.00	20.00
% COMPOSITION						
Shrubs	20.00	0.00	27.27	38.46	75.00	50.00
Forbs	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	80.00	100.00	72.73	61.54	25.00	50.00

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	25.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	5.00	0.00	40.00	5.00	10.00	20.00	5.00	5.00

10.00	0.00	35.00	0.00	10.00	5.00	0.00	20.00	10.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50.00	0.00	5.00	0.00	0.00	0.00	5.00	5.00	0.00
0.00	10.00	5.00	0.00	10.00	10.00	0.00	5.00	10.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	20.00	0.00	15.00	15.00	20.00	20.00	0.00	10.00
0.00	20.00	0.00	0.00	30.00	0.00	0.00	0.00	0.00
70.00	60.00	50.00	55.00	70.00	45.00	45.00	50.00	65.00
10.00	10.00	5.00	20.00	15.00	5.00	10.00	10.00	10.00
10.00	5.00	35.00	10.00	10.00	25.00	30.00	5.00	5.00
10.00	25.00	10.00	15.00	5.00	25.00	15.00	35.00	20.00
14.29	8.33	10.00	72.73	7.14	22.22	44.44	40.00	46.15
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85.71	91.67	90.00	27.27	92.86	77.78	55.56	60.00	53.85

ENERGY WEST-COTTONWOOD MINE
Cell #3
Old Waste Rock (Interim Reveg '85)
Slope: 0-1 deg
Exposure: E
Sample Date: 29 July 97

Mean	SDev	Freq	
			SHRUBS
3.33	7.23	20.00	Atriplex canescens
3.00	8.91	13.33	Atriplex confertifolia
0.33	1.25	6.67	Ephedra viridis
11.00	10.20	86.67	Gutierrezia sarothrae
			FORBS
			GRASSES
6.67	9.43	53.33	Agropyron cristatum
2.67	5.44	20.00	Bromus tectorum
5.00	12.38	33.33	Elymus lanceolatus
6.33	6.45	66.67	Elymus smithii
0.67	1.70	13.33	Elymus spicatus
0.33	1.25	6.67	Hilaria jamesii
10.00	7.75	66.66	Stipa comata
6.67	9.60	40.00	Stipa hymenoides
			COVER
56.00	8.21		Total Living Cover
11.67	5.37		Litter
12.00	9.63		Bareground
20.33	8.26		Rock
			% COMPOSITION
31.74	22.44		Shrubs
0.00	0.00		Forbs
68.26	22.44		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #4

AREA: Cottonwood Mine Old Waste Rock Area ('86 Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0 - 1 deg

EXPOSURE: E

ANIMAL USE/DISTURBANCE:

EROSION: negligible

COVER: see quantitative data

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Cercocarpus ledifolius
Gutierrezia sarothrae

Lactuca serriola
Machaeranthera grindelioides

Agropyron cristatum
Bromus tectorum
Elymus spicatus
Elymus smithii
Elymus hispidus
Elymus lanceolatus
Hilaria jamesii
Stipa comata

WOODY SPECIES DENSITY:

	Number/Acre		
	1995	1996	1997
Atriplex canescens	43.56	116.16	92.93
Cercocarpus ledifolius	21.78		
Cercocarpus montanus			23.23
Chrysothamnus nauseosus	32.67	46.46	23.23
Gutierrezia sarothrae	21.78	92.93	1045.44
TOTAL	119.79	255.55	1184.83

PRODUCTION:	1997 (lbs/ac)
Herbaceous	192.57
Woody	8.44
Total	201.01

NOTES:

1) A more comprehensive study was also done later in the year for this cell called:

   COMPARISONS OF VEGETATION DATA
   OF SELECTIVE RECLAIMED CELLS AT THE
   COTTONWOOD OLD WASTE ROCK SITE
   1997

   The study was submitted to PACIFICORP (ENERGY WEST) in October 1997.

2) Put down one long transect, sampled with a random number at right angle every 25 ft.

3) These data represent the sampling done within the dates shown above.

4) Sampled cover (n=15) and frequency (n=15) by ocular methods.

5) Sampled density (n=15) using pt. quarter method.

6) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-COTTONWOOD MINE
Cell #4
Old Waste Rock (Interim Reveg '86)
Slope: 0-1 deg
Exposure: NE

Sample Date: 29 July 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex confertifolia	0.00	0.00	0.00	0.00	0.00	0.00
FORBS						
Machaerantheraa grindeloide	0.00	5.00	0.00	0.00	0.00	0.00
Sphaeralcea grossulariifolia	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES						
Agropyron cristatum	15.00	5.00	5.00	0.00	10.00	10.00
Bromus tectorum	0.00	25.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	0.00	10.00	20.00	45.00	10.00	0.00
Elymus smithii	0.00	0.00	10.00	0.00	15.00	25.00
Elymus spicatus	0.00	0.00	0.00	0.00	5.00	0.00
Hilaria jamesii	0.00	0.00	0.00	5.00	0.00	0.00
Stipa comata	0.00	5.00	15.00	0.00	0.00	0.00
Stipa hymenoides	10.00	0.00	0.00	0.00	5.00	10.00
COVER						
Total Living Cover	25.00	50.00	50.00	50.00	45.00	45.00
Litter	10.00	20.00	10.00	10.00	5.00	10.00
Bareground	40.00	10.00	10.00	10.00	15.00	15.00
Rock	25.00	20.00	30.00	30.00	35.00	30.00
% COMPOSITION						
Shrubs	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	0.00	10.00	0.00	0.00	0.00	0.00
Grasses	100.00	90.00	100.00	100.00	100.00	100.00

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
0.00	0.00	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	0.00	0.00	0.00
0.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00
10.00	35.00	10.00	0.00	0.00	10.00	5.00	30.00	35.00
0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	5.00
10.00	0.00	15.00	35.00	0.00	35.00	0.00	5.00	15.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	0.00	5.00	0.00	0.00	0.00	0.00	10.00	0.00
0.00	0.00	5.00	0.00	10.00	5.00	40.00	0.00	0.00
0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
40.00	35.00	45.00	45.00	70.00	50.00	45.00	50.00	55.00
15.00	15.00	10.00	20.00	15.00	10.00	15.00	25.00	15.00
15.00	30.00	25.00	5.00	5.00	10.00	5.00	5.00	5.00
30.00	20.00	20.00	30.00	10.00	30.00	35.00	20.00	25.00
0.00	0.00	22.22	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	11.11	0.00	0.00	0.00	10.00	0.00
100.00	100.00	77.78	88.89	100.00	100.00	100.00	90.00	100.00

ENERGY WEST-COTTONWOOD MINE
Cell #4
Old Waste Rock (Interim Reveg '86)
Slope: 0-1 deg
Exposure: NE
Sample Date: 29 July 97

Mean	SDev	Freq	
			SHRUBS
0.67	2.49	6.67	Atriplex confertifolia
			FORBS
0.33	1.25	6.67	Machaerantheraa grindeloides
0.67	1.70	13.33	Sphaeralcea grossulariifolia
			GRASSES
12.00	11.52	80.00	Agropyron cristatum
4.00	10.36	13.33	Bromus tectorum
6.33	11.76	40.00	Elymus lanceolatus
11.00	12.00	60.00	Elymus smithii
0.33	1.25	6.67	Elymus spicatus
2.67	5.44	26.67	Hilaria jamesii
5.33	10.24	40.00	Stipa comata
3.33	6.75	26.67	Stipa hymenoides
			COVER
46.67	9.43		Total Living Cover
13.67	4.99		Litter
13.67	10.08		Bareground
26.00	6.63		Rock
			% COMPOSITION
1.48	5.54		Shrubs
2.07	4.15		Forbs
96.44	6.47		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #5 '89 (Reseeded) 93

AREA: Cottonwood Mine Old Waste Rock Area (Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-1 deg

EXPOSURE: E

ANIMAL USE/DISTURBANCE: Used by deer and rabbits mostly

EROSION: Negligible

COVER: qualitative data only

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens

Kochia scoparia
Malcomia africana
Sisymbrium altissimum

Agropyron cristatum
Bromus tectorum
Elymus lanceolatus
Hordeum jubatum
Stipa comata

WOODY SPECIES DENSITY:

	Number/Acre	
	1995	1996
Atriplex canescens	609.84	627.26
Cercocarpus ledifolius	10.89	
Chrysothamnus nauseosus	10.89	
TOTAL	631.62	627.26

NOTES:

1) We only needed to do qualitative data this year during monitoring but a more comprehensive study was also done later in the year for this cell called:

COMPARISONS OF VEGETATION DATA
OF SELECTIVE RECLAIMED CELLS AT THE
COTTONWOOD OLD WASTE ROCK SITE
1997

The study was submitted to PACIFICORP (ENERGY WEST) in October 1997.

2) Site looked very good this year with the same species present.

3) Previous density data shown above for future comparisons.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #6 '89 (Reseeded) '93

AREA: Cottonwood Mine Waste Rock Area (Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-1 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE: Used intensively by deer and rabbits.

EROSION: Negligible

COVER: Qualitative data only this year

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens

Kochia scoparia
Malcomia africana
Sisymbrium altissimum
Halogeton glomeratus

Agropyron cristatum
Bromus tectorum
Elymus lanceolatus
Hordeum jubatum
Stipa comata
Stipa hymenoides

WOODY SPECIES DENSITY:

	Individuals/Acre	
	1995	1996
Atriplex canescens	500.94	627.26
Gutierrezia sarothrae	10.89	
TOTAL	511.83	627.26

NOTES:

1) We only needed to do qualitative data this year during monitoring.

2) Previous density data shown above for future comparisons.

3) Condition was fair, but not as good as Cell 5.

4) Lots of weeds were present, but there was also a good representation of grasses.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Cell #7 '92 Partial Cell #7 '93

AREA: Cottonwood Mine Old Waste Rock Area (Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0 - 2 deg

EXPOSURE: E

ANIMAL USE/DISTURBANCE: Slight

EROSION: Negligible

COVER: Qualitative data only this year.

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens
Ceratoides lanata
Gutierrezia sarothrae

Kochia scoparia
Malcomia africana
Sisymbrium altissimum

Agropyron cristatum
Bromus tectorum
Elymus lanceolatus
Hordeum jubatum
Stipa comata
Stipa hymenoides

WOODY SPECIES DENSITY:

	Individuals/Acre	
	1995	1996
Atriplex canescens	1591.94	2044.46
Artemisia tridentata	255.64	23.23
TOTAL	1847.58	2067.65

NOTES:

1) We only needed to do qualitative data this year during monitoring.

2) Previous density data shown above for future comparisons.

3) There was an excellent representation of grass species this year. Also there were a lot of shrub species that germinated this year or near the end of the last growing season.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Berm 1

AREA: Cottonwood Mine Old Waste Rock Area (1983 Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 1-20 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens
Chrysothamnus nauseosus
Gutierrezia sarothrae

Halogeton glomeratus
Malcomia africana
Salsola pestifer

Bromus tectorum
Elymus lanceolatus
Bromus tectorum
Agropyron cristatum
Elymus smithii
Poa secunda
Sitanion hystrix
Stipa hymenoides

DENSITY:

	Individuals/Acre		
	1994	1995	1996
Atriplex canescens	325.36	457.38	441.41
Chrysothamnus nauseosus	859.88	1132.56	1417.15
Ephedra viridis	139.44	43.56	23.23
Gutierrezia sarothrae	197.54	98.01	696.96
Purshia tridentata	11.62		
Chrysothamnus viscidiflorus		10.89	
Total	1533.84	1742.40	2578.75

NOTES:

1) Sampled qualitatively only this year

2) As mentioned previous years, poor shrub and perennial forb establishment. There were quite a few exotic weeds. The north end is worse for shrub cover and density.

3) 1994 through 1996 woody species density results were included for information.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Berm 2

AREA: Cottonwood Mine Old Waste Rock Area (1984 Interim Reveg)

DATE:

WORKERS: P. Collins, D. Collins

SLOPE: 0-20 deg.

EXPOSURE: E & N

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Atriplex canescens
Gutierrezia sarothrae

Bromus tectorum
Elymus lanceolatus
Agropyron cristatum
Elymus smithii
Stipa hymenoides

Page 2
Berm 2

DENSITY:

	Number/Acre			
	1994	1995	1996	1997
Artemisia tridentata			46.46	
Atriplex canescens	1917.30	3637.26	2990.88	4274.69
Atriplex confertifolia	406.70	304.94	348.48	232.32
Chrysothamnus nauseosus	34.86		23.23	
Ephedra viridis	11.62			
Brickellia microphylla		21.78		
Gutierrezia sarothrae	4241.30	1568.16	580.80	23.23
Total	6611.78	5532.12	3089.86	4530.24

PRODUCTION:

	1997 (lbs/ac)
Herbaceous	235.31
Woody	770.73
Total	1006.04

NOTES:

1) We sampled regularly every 10 after placing one 200 ft transects.

2) We sampled on the top and both sides of the berm.

3) Sampled cover (n=15) and frequency (n=15) by ocular methods.

4) Sampled density (n=15) using belt transects that were 5'x25'.

5) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

6) 1994, 1995, and 1996 woody species density results were included for comparisons with 1997.

7) It looked like the whole west side of Berm 2 had bee disturb (taken out) by a road to a new gas well.

8) We sampled around the north side of the berm and did not sample the west side.

9) The west side was mostly weedy species as a result of the disturbance.

10) The north side has a good stand of mature woody species, but low species diversity.

ENERGY WEST-COTTONWOOD MINE
Berm #2
Old Waste Rock (Interim Reveg '84)
Slope: 0-20 deg
Exposure: E & N

Sample Date: 29 July 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex canescens	25.00	65.00	0.00	15.00	45.00	45.00
Atriplex confertifolia	0.00	0.00	10.00	0.00	0.00	0.00
FORBS						
GRASSES						
Agropyron cristatum	15.00	20.00	20.00	10.00	25.00	10.00
Bromus tectorum	10.00	0.00	5.00	0.00	0.00	0.00
Elymus hispidus	0.00	0.00	0.00	0.00	10.00	0.00
Elymus lanceolatus	0.00	0.00	0.00	0.00	0.00	0.00
COVER						
Total Living Cover	50.00	85.00	35.00	25.00	80.00	55.00
Litter	20.00	5.00	10.00	10.00	5.00	10.00
Bareground	5.00	5.00	10.00	10.00	5.00	5.00
Rock	25.00	5.00	45.00	55.00	10.00	30.00
% COMPOSITION						
Shrubs	50.00	76.47	28.57	60.00	56.25	81.82
Forbs	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	50.00	23.53	71.43	40.00	43.75	18.18

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
25.00	0.00	40.00	20.00	55.00	45.00	20.00	50.00	10.00
0.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	25.00	25.00	35.00	5.00	25.00	30.00	15.00	15.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
0.00	0.00	0.00	0.00	10.00	10.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45.00	50.00	65.00	55.00	70.00	80.00	50.00	65.00	40.00
10.00	10.00	15.00	10.00	10.00	5.00	10.00	5.00	10.00
15.00	10.00	5.00	15.00	10.00	5.00	15.00	10.00	10.00
30.00	30.00	15.00	20.00	10.00	10.00	25.00	20.00	40.00
55.56	50.00	61.54	36.36	78.57	56.25	40.00	76.92	25.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44.44	50.00	38.46	63.64	21.43	43.75	60.00	23.08	75.00

ENERGY WEST-COTTONWOOD MINE
Berm #2
Old Waste Rock (Interim Reveg '84)
Slope: 0-20 deg
Exposure: E & N
Sample Date: 29 July 97

Mean	SDev	Freq	
			SHRUBS
30.67	19.48	86.67	Atriplex canescens
2.33	6.55	13.33	Atriplex confertifolia
			FORBS
			GRASSES
19.00	8.21	100.00	Agropyron cristatum
2.00	4.40	20.00	Bromus tectorum
2.00	4.00	20.00	Elymus hispidus
0.67	2.49	6.67	Elymus lanceolatus
			COVER
56.67	16.80		Total Living Cover
9.67	3.86		Litter
9.00	3.74		Bareground
24.67	13.72		Rock
			% COMPOSITION
55.55	17.33		Shrubs
0.00	0.00		Forbs
44.45	17.33		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Berm 3

AREA: Cottonwood Mine Old Waste Rock Area (1985 Interim Reveg)

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-20 deg.

EXPOSURE: NE & SW

ANIMAL USE/DISTURBANCE:

EROSION: Slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens
Gutierrezia sarothrae
Artemisia tridentata
Ephedra viridis

Halogeton glomeratus
Salsola pestifer
Sisymbrium altissimum

Agropyron cristatum
Bromus tectorum
Elymus smithii
Elymus lanceolatus
Poa pratensis
Stipa comata
Stipa hymenoides

DENSITY:

	Individuals/Acre			
	1994	1995	1996	1997
Artemisia tridentata			23.23	46.46
Atriplex canescens	3056.06	2384.91	1928.26	3856.82
Chrysothamnus nauseosus	11.62	10.89	23.23	23.23
Total	3067.68	2395.80	1974.72	3856.51

PRODUCTION:

	1997 (lbs/ac)
Herbaceous	473.83
Woody	1072.61
Total	1546.44

NOTES:

1) We sampled on top and sides of berm.

2) We put down two 200 ft transects for cover and sampled regularly every 25 ft.

3) Sampled cover (n=15) and frequency (n=15) by ocular methods.

4) Sampled density (n=15) with belt transects (5'X25').

5) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

6) Had good mature, shrub cover, but fair to good grass cover entire length of berm.

7) Not much species diversity.

8) 1994, 1994 & 1995 woody species density results were included for comparisons with this year.

9) All 4-winged were quite mature and produced very good seed crop.

ENERGY WEST-COTTONWOOD MINE
Berm #3
Old Waste Rock (Interim Reveg '85)
Slope: 0-20 deg
Exposure: NE & SW
Sample Date: 29 July 97

	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Atriplex canescens	10.00	40.00	35.00	20.00	50.00	35.00
Ephedra viridis	0.00	0.00	0.00	0.00	0.00	0.00
FORBS						
Lepidium montanum	0.00	0.00	0.00	0.00	0.00	5.00
GRASSES						
Agropyron cristatum	35.00	0.00	40.00	10.00	0.00	10.00
Bromus tectorum	0.00	0.00	0.00	0.00	10.00	0.00
Elymus lanceolatus	0.00	15.00	0.00	0.00	0.00	0.00
Elymus smithii	10.00	0.00	0.00	0.00	0.00	0.00
Elymus spicatus	0.00	0.00	0.00	0.00	5.00	0.00
Poa pratensis	10.00	0.00	0.00	0.00	0.00	0.00
Stipa comata	0.00	0.00	0.00	10.00	0.00	10.00
Stipa hymenoides	0.00	0.00	10.00	10.00	0.00	10.00
COVER						
Total Living Cover	65.00	55.00	85.00	50.00	65.00	70.00
Litter	10.00	25.00	5.00	25.00	10.00	20.00
Bareground	5.00	10.00	5.00	5.00	5.00	5.00
Rock	20.00	10.00	5.00	20.00	20.00	5.00
% COMPOSITION						
Shrubs	15.38	72.73	41.18	40.00	76.92	50.00
Forbs	0.00	0.00	0.00	0.00	0.00	7.14
Grasses	84.62	27.27	58.82	60.00	23.08	42.86

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
40.00	45.00	20.00	35.00	20.00	15.00	10.00	25.00	15.00
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	15.00	30.00	20.00	20.00	25.00	15.00	0.00	20.00
0.00	5.00	0.00	0.00	10.00	15.00	0.00	0.00	20.00
0.00	0.00	10.00	0.00	0.00	5.00	0.00	0.00	0.00
5.00	0.00	10.00	5.00	0.00	5.00	40.00	20.00	10.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	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	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
60.00	65.00	70.00	60.00	50.00	65.00	65.00	65.00	65.00
30.00	20.00	10.00	10.00	25.00	10.00	15.00	10.00	10.00
5.00	10.00	10.00	10.00	5.00	10.00	10.00	10.00	10.00
5.00	5.00	10.00	20.00	20.00	15.00	10.00	15.00	15.00
75.00	69.23	28.57	58.33	40.00	23.08	15.38	38.46	23.08
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	30.77	71.43	41.67	60.00	76.92	84.62	61.54	76.92

ENERGY WEST-COTTONWOOD MINE
Berm #3
Old Waste Rock (Interim Reveg '85)
Slope: 0-20 deg
Exposure: NE & SW
Sample Date: 29 July 97

Mean	SDev	Freq	
			SHRUBS
27.67	12.63	100.00	Atriplex canescens
0.33	1.25	6.67	Ephedra viridis
			FORBS
0.33	1.25	6.67	Lepidium montanum
			GRASSES
16.00	12.54	73.33	Agropyron cristatum
4.00	6.38	33.33	Bromus tectorum
2.00	4.40	20.00	Elymus lanceolatus
7.00	10.46	53.33	Elymus smithii
1.00	2.71	13.33	Elymus spicatus
0.67	2.49	6.67	Poa pratensis
1.67	3.50	20.00	Stipa comata
3.00	4.40	33.33	Stipa hymenoides
			COVER
63.67	8.26		Total Living Cover
15.67	7.50		Litter
7.67	2.49		Bareground
13.00	6.00		Rock
			% COMPOSITION
44.49	20.92		Shrubs
0.48	1.78		Forbs
55.03	21.12		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Berm 4

AREA: Cottonwood Mine Old Waste Rock Area ('86 Interim Reveg)

DATE: July 27 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 28 deg.

EXPOSURE: N E

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens
Chrysothamnus nauseosus
Gutierrezia sarothrae
Ephedra viridis

Sisymbrium altissimum

Agropyron cristatum
Bromus tectorum
Elymus lanceolatus
Elymus spicatus
Stipa hymenoides
Stipa comata

WOODY SPECIES DENSITY:

	Individuals/Acre		
	1995	1996	1997
Atriplex canescens	196.02	836.35	92.93
Cercocarpus montanus			23.23
Chrysothamnus nauseosus	87.12	139.39	394.94
Gutierrezia sarothrae			23.23
Ephedra viridis	21.78	23.23	348.48
TOTAL	304.92	998.98	882.82

PRODUCTION:

	1997 (lbs/ac)
Herbaceous	722.08
Woody	83.88
Total	805.96

NOTES:

1) The map showed east and south side of the Cell 7 to sample this year for the berm.

2) Used 150 ft transect and sample every 10 ft.

3) Sampled cover (n=15) and frequency (n=15) by ocular methods.

4) Sampled density (n=15) with belt transects (5'X25').

5) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-COTTONWOOD MINE
Berm #4
Old Waste Rock (Interim Reveg '86)
Slope: 28 deg
Exposure: NE

Sample Date: 29 July 97	1.00	2.00	3.00	4.00	5.00	6.00
SHRUBS						
Chrysothamnus nauseosus	0.00	5.00	0.00	0.00	0.00	0.00
Lepidium montanum	0.00	0.00	0.00	10.00	0.00	0.00
FORBS						
Machaeranthera grindelioide	0.00	5.00	5.00	0.00	0.00	0.00
Sphaeralcea grossulariifolia	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES						
Agropyron cristatum	35.00	20.00	30.00	10.00	5.00	30.00
Elymus lanceolatus	0.00	0.00	0.00	10.00	55.00	0.00
Elymus smithii	10.00	0.00	0.00	10.00	5.00	20.00
Elymus spicatus	0.00	25.00	0.00	0.00	0.00	0.00
Stipa comata	0.00	0.00	5.00	20.00	0.00	0.00
Stipa hymenoides	0.00	0.00	5.00	0.00	0.00	0.00
COVER						
Total Living Cover	45.00	55.00	45.00	60.00	65.00	50.00
Litter	10.00	5.00	20.00	10.00	5.00	10.00
Bareground	10.00	10.00	10.00	10.00	5.00	10.00
Rock	35.00	30.00	25.00	20.00	25.00	30.00
% COMPOSITION						
Shrubs	0.00	9.09	0.00	16.67	0.00	0.00
Forbs	0.00	9.09	11.11	0.00	0.00	0.00
Grasses	100.00	81.82	88.89	83.33	100.00	100.00

7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
0.00	0.00	35.00	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
10.00	30.00	15.00	5.00	20.00	30.00	0.00	20.00	25.00
0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00
0.00	0.00	20.00	40.00	20.00	0.00	10.00	5.00	15.00
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
55.00	5.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
70.00	40.00	70.00	45.00	40.00	35.00	40.00	35.00	40.00
10.00	10.00	10.00	10.00	5.00	15.00	10.00	10.00	15.00
5.00	25.00	5.00	10.00	10.00	10.00	15.00	15.00	15.00
15.00	25.00	15.00	35.00	45.00	40.00	35.00	40.00	30.00
0.00	0.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00
100.00	100.00	50.00	100.00	100.00	85.71	100.00	100.00	100.00

ENERGY WEST-COTTONWOOD MINE
Berm #4
Old Waste Rock (Interim Reveg '86)
Slope: 28 deg
Exposure: NE
Sample Date: 29 July 97

Mean	SDev	Freq	
			SHRUBS
2.67	8.73	13.33	Chrysothamnus nauseosus
0.67	2.49	6.67	Lepidium montanum
			FORBS
0.67	1.70	13.33	Machaerantheraa grindeloides
0.33	1.25	6.67	Sphaeralcea grossulariifolia
			GRASSES
19.00	10.68	93.33	Agropyron cristatum
6.33	15.11	20.00	Elymus lanceolatus
10.33	10.87	66.66	Elymus smithii
1.67	6.24	6.67	Elymus spicatus
2.33	5.12	26.67	Stipa comata
5.00	13.66	26.67	Stipa hymenoides
			COVER
49.00	11.72		Total Living Cover
10.33	3.86		Litter
11.00	4.90		Bareground
29.67	8.65		Rock
			% COMPOSITION
5.05	12.85		Shrubs
2.30	4.70		Forbs
92.65	13.23		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: CTW Soil Pile (ABC)'94

AREA: Cottonwood Mine

DATE: July 29 - August 1, 1997

WORKERS: P. Collins

SLOPE: 25 deg.

EXPOSURE: south

ANIMAL USE/DISTURBANCE: slight

EROSION: slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens
Chrysothamnus nauseosus

Kochia scoparia
Bassia hyssopifolia
Malcomia africana
Melilotus officinalis
Halogeton glomeratus

Elymus smithii
Stipa hymenoides

WOODY SPECIES DENSITY:

	1997 (no./ac)
Gutierrezia sarothrae	23.23
Atriplex canescens	46.46
Atriplex gardneri	116.16
Total	185.86

NOTES: 1) Labeled the pile from north to south A-C [A = most north, B = middle, C = south (nearest main road)].

2) We took samples on all piles. More samples were put on larger piles. The data were then combined.

3) We sampled with transect lines randomly at regular tape marks.

4) Erosion control blanket covered ~ 100% of the piles.

5) Most desirable species were found on B pile.

6) Sampled cover (n=15) and frequency (n=15) by ocular methods.

7) Sampled density (n=15) with belt transects (5'X25').

ENERGY WEST-COTTONWOOD MINE
CTW Soil Piles (ABC) 1994
Old Waste Rock Site
Slope:
Exposure:

Sample Date: 29 July 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
TREES & SHRUBS								
Atriplex gardneri	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS								
Bassia hyssopifolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Halogeton glomeratus	20.00	0.00	15.00	25.00	15.00	10.00	25.00	40.00
Kochia scoparia	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Malcomia africana	0.00	5.00	10.00	0.00	0.00	0.00	0.00	0.00
Melilotus officinalis	0.00	7.00	5.00	5.00	0.00	0.00	0.00	0.00
GRASSES								
Hordeum jubatum	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	25.00	20.00	30.00	30.00	15.00	10.00	25.00	40.00
Erosion Control Mat	50.00	70.00	45.00	60.00	60.00	60.00	45.00	35.00
Bareground	1.00	2.00	5.00	5.00	10.00	10.00	10.00	5.00
Rock	24.00	8.00	20.00	5.00	15.00	20.00	20.00	20.00
% COMPOSITION								
Shrubs	8.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	80.00	85.00	100.00	100.00	100.00	100.00	100.00	100.00
Grasses	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

9.00	10.00	11.00	12.00	13.00	14.00	15.00	Mean	SDev	Freq
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.53	1.41	13.33
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.50	6.67
0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.33	1.25	6.67
45.00	50.00	25.00	35.00	35.00	30.00	40.00	27.33	13.40	93.33
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	1.25	6.67
0.00	0.00	0.00	0.00	0.00	0.00	5.00	1.33	2.87	20.00
0.00	0.00	0.00	5.00	0.00	0.00	0.00	1.47	2.47	26.67
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.75	6.67
45.00	50.00	25.00	40.00	35.00	35.00	50.00	31.67	11.64	
30.00	15.00	45.00	35.00	20.00	40.00	30.00	42.67	15.15	
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.53	2.53	
20.00	30.00	25.00	20.00	40.00	20.00	15.00	20.13	8.00	
0.00	0.00	0.00	0.00	0.00	0.00	10.00	2.20	4.59	
100.00	100.00	100.00	100.00	100.00	100.00	90.00	97.00	6.27	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	2.99	

ENERGY WEST-COTTONWOOD MINE
CTW Soil Piles (ABC) 1994
Old Waste Rock Site
Slope:
Exposure:
Sample Date: 29 July 97

--- --- --- ---

TREES & SHRUBS
Atriplex gardneri
Gutierrezia sarothrae

FORBS
Bassia hyssopifolia
Halogeton glomeratus
Kochia scoparia
Malcomia africana
Melilotus officinalis

GRASSES
Hordeum jubatum

--- --- ---

COVER
Total Living Cover
Erosion Control Mat
Bareground
Rock

--- --- ---

% COMPOSITION
Shrubs
Forbs
Grasses

--- --- ---

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: CTW Reference Area

AREA: Cottonwood Mine Old Waste Rock Area

DATE: July 29 - August 1, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 1 - 5 deg

EXPOSURE: E

ANIMAL USE/DISTURBANCE:

EROSION: Slight, natural

COVER: (qualitative data)

DOMINANT PLANT SPECIES OBSERVED:

Cercocarpus montanus
Ephedra viridis
Juniperus osteosperma
Opuntia polyacantha
Pinus edulis
Yucca harrmaniae

Lepidium montanum
Descurainia pinnata
Eriogonum bicolor
Euphorbia fendleri
Penstemon pachyphyllus
Cryptantha sp.

WOODY SPECIES DENSITY:

	Numbers/Acre		
	1994	1995	1996
Cercocarpus montanus	89.03	85.02	68.68
Ephedra viridis	168.17	233.79	196.23
Gutierrezia sarothrae	9.89	10.63	
Juniperus osteosperma	445.15	191.29	147.17
Opuntia polyacantha	89.03	63.76	68.68
Pinus edulis	326.44	435.71	284.53
Artemisia nova		10.63	
Yucca harrimaniae	59.35	42.51	19.62
TOTAL	1187.06	1062.70	784.91

NOTES:

1) Quantitative data only

2) I show the density of previous years' for comparisons in the future.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Road Slopes

AREA: Cottonwood Mine New Waste Rock Area (1990 Interim)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE: Slight

EROSION: Negligible

DOMINANT PLANT SPECIES OBSERVED:

Artemisia tridentata
Atriplex canescens
Atriplex confertifolia
Ceratoides lanata
Opuntia polyacantha

Halogeton glomeratus
Hedysarum boreale
Melilotus officinalis
Sisymbrium altissimum
Lepidium montanum
Medicago sativa
Penstemon palmeri

Agropyron cristatum
Elymus lanceolatus
Elymus cinereus
Elymus spicatus
Stipa hymenoides
Bromus tectorum

NOTES:
1) Most of the plant species were desirable and weeds were much less common this year.
2) We sampled on both sides of the road (quantitative data).
3) Penstemon and Gt. Basin wildrye were most common spp. in the road side drainages (wetter areas).
4) Good species diversity.
5) Site looked excellent (better each year).

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Topsoil Stockpiles

AREA: Cottonwood Mine New Waste Rock Area (1990 Interim)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE: Slight

EROSION: Slight

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:
Atriplex canescens
Atriplex confertifolia
Ceratoides lanata

Hedysarum boreale
Malcomia aficiana
Melilotus officinalis
Penstemon palmeri
Salsola pestifer

Elymus lanceolatus
Elymus cinereus
Elymus smithii
Elymus spicatus
Stipa hymenoides
Agropyron cristatum
Sitanion hystrix
Stipa hymenoides
Bromus tectorum

NOTES: 1) We sampled 3 piles for quantitative data. Both desirable and weedy species were present, but the weeds were a lot less common.

2) All areas had good representation of growth.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Subsoil Piles

AREA: Cottonwood Mine New Waste Rock Area (1990 Interim)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE:

EROSION: Slight to moderate on unmulched north end.

COVER: (qualitative data)

DOMINANT PLANT SPECIES OBSERVED:
Artemisia tridentata
Atriplex canescens
Atriplex confertifolia
Ceratoides lanata

Halogeton glomeratus
Salsola pestifer
Malcomia africana

Bromus tectorum
Elymus lanceolatus
Elymus cinereus
Stipa hymenoides
Sitanion hystrix
Elymus spicatus

NOTES:

1) Qualitative data this year.
1) Like last year, these piles if we list by total desirable cover, it would be south (worse) to north (best).
2) Sloped areas that were left unmulched had about 90% weed cover; sloped areas that were mulched had less than 50% weeds. The best results were the flatter tops with mulch. They comprised less than 25% weeds -- but in the depressions (gouges), there were nearly 100% desirable species.
3) The areas with erosion control mat has the best representation of shrub growth.
4) There was lots of Halogen on unmulched slopes.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Pond Banks

AREA: Cottonwood Mine New Waste Rock Area (1990 Interim)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE: slight

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:
Artemisia tridentata
Atriplex canescens
Atriplex confertifolia
Ceratoides lanata
Gutierrezia sarothrae

Malcomia africana
Medicago sativa
Penstemon palmeri

Hilaria jamesii
Elymus spicatus
Agropyron cristatum
Elymus lanceolatus
Elymus cinereus
Stipa hymenoides
Sitanion hystrix
Sporobolus airoides

NOTES:

1) This year less than 10% of the cover were weedy spp. It has improved each year.

2) Site looked good and about the same as 1996.

3) Sampled qualitatively only this year.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Refuse Berm '91 (Final) - New Waste Rock Site

AREA: Cottonwood Mine

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 28 deg.

EXPOSURE:

ANIMAL USE/DISTURBANCE: Slight

EROSION: slight

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Atriplex canescens
Ceratoides lanata

Halogeton glomeratus
Lepidium perforiatum
Lepidium montanum
Malcomia africana
Medicago sativa

Elymus lanceolatus
Sitanion hystrix
Stipa hymenoides

NOTES: 1) Most of the litter on the data was erosion control mat.

2) Sampled qualitative data this year only.

3) There was a spotty, but good representation of grasses and shrubs (mostly winterfat), but few forbs.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Refuse Berm '94 (Final) - New Waste Rock Site

AREA: Cottonwood Mine

DATE: August 12-16, 1997

WORKERS: P. Collins

SLOPE: 25 deg.

EXPOSURE: south

ANIMAL USE/DISTURBANCE: moderate

EROSION: slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Melilotus officinalis

Hordeum jubatum
Elymus cinereus

WOODY SPECIES DENSITY: 1997

	(no./ac)
Eriogonum corymbosum	571.31
Atriplex canescens	5141.74
Ceratoides lanata	13711.31
Atriplex gardneri	3427.83
Total	22852.19

NOTES:
1) Use one 200 ft transect. Sampled randomly at 20 ft intervals
2) Grasses had fair growth, but low diversity.
3) There were very few forbs (including weeds)
4) Sampled cover (n=10) and frequency (n=10) by ocular methods.
5) Lot of small, young shrub seedling, hence high density.
6) Sampled density (n=15) using the pt. quarter method.

ENERGY WEST-COTTONWOOD MINE
Refuse Berm '94 (Final)
Cottonwood Waste Rock Site 1991
Slope: 25 deg
Exposure: S

Sample Date: 12-16 Aug	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
TREES & SHRUBS								
Atriplex canescens	5.00	5.00	0.00	5.00	15.00	10.00	5.00	10.00
Atriplex gardneri	0.00	0.00	15.00	0.00	5.00	10.00	0.00	0.00
Ceratoides lanata	15.00	10.00	15.00	5.00	15.00	7.00	25.00	15.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
FORBS								
Machaeranthera canesce	0.00	3.00	0.00	0.00	0.00	0.00	0.00	5.00
Malcomia africana	3.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00
Medicago sativa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Salsola pestifer	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Elymus lanceolatus	5.00	5.00	5.00	5.00	5.00	0.00	5.00	5.00
Elymus smithii	5.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	35.00	30.00	35.00	20.00	40.00	27.00	40.00	35.00
Litter	10.00	15.00	10.00	55.00	15.00	10.00	10.00	15.00
Bareground	45.00	15.00	40.00	10.00	25.00	35.00	35.00	35.00
Rock	10.00	40.00	15.00	15.00	20.00	28.00	15.00	15.00
% COMPOSITION								
Shrubs	57.14	50.00	85.71	50.00	87.50	100.00	87.50	71.43
Forbs	14.29	26.67	0.00	25.00	0.00	0.00	0.00	14.29
Grasses	28.57	23.33	14.29	25.00	12.50	0.00	12.50	14.29

ENERGY WEST-COTTONWOOD MINE
Refuse Berm '94 (Final)
Cottonwood Waste Rock Site 1991
Slope: 25 deg
Exposure: S
Sample Date: 12-16 Aug 97

9.00	10.00	Mean	SDev	Freq	
					TREES & SHRUBS
10.00	10.00	7.50	4.03	90.00	Atriplex canescens
10.00	15.00	5.50	6.10	50.00	Atriplex gardneri
5.00	10.00	12.20	5.79	100.00	Ceratoides lanata
0.00	0.00	0.50	1.50	10.00	Eriogonum corymbosum
					FORBS
3.00	0.00	1.10	1.76	30.00	Machaeranthera canescens
0.00	0.00	1.30	2.05	30.00	Malcomia africana
2.00	0.00	0.20	0.60	10.00	Medicago sativa
0.00	0.00	0.20	0.60	10.00	Salsola pestifer
					GRASSES
10.00	5.00	5.00	2.24	100.00	Elymus lanceolatus
0.00	0.00	0.70	1.55	20.00	Elymus smithii
					COVER
40.00	40.00	34.20	6.38		Total Living Cover
25.00	10.00	17.50	13.28		Litter
20.00	25.00	28.50	10.74		Bareground
15.00	25.00	19.80	8.45		Rock
					% COMPOSITION
62.50	87.50	73.93	17.13		Shrubs
12.50	0.00	9.27	10.20		Forbs
25.00	12.50	16.80	8.16		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Refuse Berm (seeded 1996)

AREA: Cottonwood Mine New Waste Rock Area (1990 Interim)

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 28 deg.

EXPOSURE: S & E

ANIMAL USE/DISTURBANCE: No obvious disturbance

EROSION: Negligible

COVER: Approx. 20%

DOMINANT PLANT SPECIES OBSERVED:

Atriplex canescens

Halogeton glomeratus
Salsola pestifer

NOTES:

1) Qualitative data only, but not really necessary this year (called for no sampling).

2) Dominated by weeds, but the erosion control mat may be hiding the desirable species.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Ninth East Road Breakout

AREA: Cottonwood Mine (1988 Reveg. Area)

DATE: August 1-3, 1997

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE:

EROSION: Negligible, controlled well by plants

COVER: (qualitative data only).

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum

Aster chilensis
Melilotus officinalis
Medicago sativa
Circium sp.

Bromus inermis
Dactylis glomeratus
Elymus lanceolatus
Elymus spicatus
Agropyron cristatum
Stipa hymenoides

NOTES:

1) We sampled for qualitative data

2) The site looked better than ever when compared to previous years.

3) There was lots of forb cover, mostly Aster.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Test Plots '88

AREA: Cottonwood Mine

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 35 deg.

EXPOSURE: E (S)

ANIMAL USE/DISTURBANCE:

EROSION: Slight to moderate in some areas

COVER: Similar to what was reported in 1994-96, the upper plots (T1 - T4) seemed to have more weedy spp. in the upper 1/2 of the plot. This could be over-spill from road salt above it. The plots looked worse this year (more weeds and bare ground).

NOTES: 1) See reference drawing below.

ROAD

T1* Hydro Mulch	T2* Mulch Blanket	T3* Hay & Netting	T4* No Mulch
T5** Hydro Mulch	T6** Mulch Blanket	T7** Hay & Netting	T8** No Mulch

* Non-irrigated plots

** Irrigated plots

*** Plots are 20' x 20' with 5' between

T1-T8 (quad placement)

X X

X^P

X X^P

[P] Production sample locations in previous years.

PLANT SPECIES PLANTED:

Amalanchier alnifolia
Atriplex canescens
Chrysothamnus nauseosus
Ephedra viridis
Picea pungens
Pseudotsuga menziesii

Aster glaucodes
Linum lewisii
Melilotus officinalis
Sphaeralcea coccinea

Agropyron dasystachyum
Agropyron intermedium
Elymus smithii
Elymus spicatus
Oryzopsis hymenoides
Stipa comata

PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum
Atriplex confertifolia

Aster chilensis
Aster glaucodes
Chenopodium album
Grindelia squarrosa
Halogeton glomeratus
Kochia scoparia
Melilotus officinalis
Eriogonum sp.

Elymus cinereus
Elymus spicatus
Elymus lanceolatus

WOODY SPECIES DENSITY:

	1997
T1	(no./ac)
Chrysothamnus nauseosus	2613.60
Atriplex confertifolia	108.90
Eriogonum corymbosum	544.50
Ephedra viridis	108.90
Total	3375.90
T2	(no./ac)
Chrysothamnus nauseosus	544.50
Atriplex confertifolia	326.70
Eriogonum corymbosum	326.70
Ephedra viridis	--
Total	1197.90
T3	(no./ac)
Chrysothamnus nauseosus	544.50
Atriplex confertifolia	217.80
Eriogonum corymbosum	--
Ephedra viridis	--
Total	762.30
T4	(no./ac)
Chrysothamnus nauseosus	217.80
Atriplex confertifolia	108.90
Eriogonum corymbosum	108.90
Ephedra viridis	--
Total	435.60

T5	(no./ac)
Chrysothamnus nauseosus	2178.00
Atriplex confertifolia	217.80
Eriogonum corymbosum	326.70
Ephedra viridis	--
Total	2722.50

T6	(no./ac)
Chrysothamnus nauseosus	2069.10
Atriplex confertifolia	--
Eriogonum corymbosum	217.80
Ephedra viridis	--
Total	2287.90

T7	(no./ac)
Chrysothamnus nauseosus	653.40
Atriplex confertifolia	326.70
Eriogonum corymbosum	--
Ephedra viridis	--
Total	980.10

T8	(no./ac)
Chrysothamnus nauseosus	1197.90
Atriplex confertifolia	435.60
Eriogonum corymbosum	871.20
Ephedra viridis	--
Total	2504.70

T1

PRODUCTION:	1997
	(lbs/ac)
Herbaceous	1016.37
Woody	126.71
Total	1143.08

T2

PRODUCTION:	1997 (lbs/ac)
Herbaceous	563.78
Woody	616.96
Total	1180.73

T3

PRODUCTION:	1997 (lbs/ac)
Herbaceous	472.22
Woody	455.36
Total	927.58

T4

PRODUCTION:	1997 (lbs/ac)
Herbaceous	300.98
Woody	397.44
Total	698.43

T5

PRODUCTION:	1997 (lbs/ac)
Herbaceous	703.16
Woody	203.45
Total	906.61

T6

PRODUCTION:	1997 (lbs/ac)
Herbaceous	864.67
Woody	73.62
Total	938.29

T7

PRODUCTION:	1997 (lbs/ac)
Herbaceous	1807.87
Woody	165.97
Total	1973.84

T8

PRODUCTION:	1997 (lbs/ac)
Herbaceous	1027.97
Woody	0.00
Total	1027.97

METHODS:

1) For cover we sampled in the locations shown on the diagram to stay away from plot lines. Therefore, our sample size was (n=5/subplot and n=40/plot).

2) For density we counted the total number of woody species in each plot.

3) Sampled productivity [n=2(10)/plot; total=16(80)] by clipping, weighing and double sampling.

3) **The subplots really should be restaked to separate them for sampling more easily.**

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #1 (T1)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Chrysothamnus nauseosus	5.00	0.00	7.00	10.00	15.00	7.40
Ephedra viridis	0.00	0.00	0.00	0.00	5.00	1.00
Eriogonum corymbosum	0.00	0.00	5.00	0.00	0.00	1.00
FORBS						
Aster glaucodes	0.00	0.00	25.00	70.00	60.00	31.00
Grindelia squarrosa	0.00	0.00	3.00	0.00	0.00	0.60
Halogeton glomeratus	25.00	20.00	0.00	0.00	0.00	9.00
Kochia scoparia	5.00	5.00	0.00	0.00	0.00	2.00
GRASSES						
Elymus cinereus	0.00	0.00	0.00	10.00	0.00	2.00
COVER						
Total Living Cover	35.00	25.00	40.00	90.00	80.00	54.00
Litter	10.00	5.00	10.00	5.00	5.00	7.00
Bareground	45.00	60.00	25.00	3.00	10.00	28.60
Rock	10.00	10.00	25.00	2.00	5.00	10.40
% COMPOSITION						
Shrubs	14.29	0.00	30.00	11.11	25.00	16.08
Forbs	85.71	100.00	70.00	77.78	75.00	81.70
Grasses	0.00	0.00	0.00	11.11	0.00	2.22

ENERGY WEST-COTTONWOOD/WILBE
TEST PLOTS '88
Test Plot #1 (T1)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
5.00	80.00	Chrysothamnus nauseosus
2.00	20.00	Ephedra viridis
2.00	20.00	Eriogonum corymbosum
		FORBS
29.39	60.00	Aster glaucodes
1.20	20.00	Grindelia squarrosa
11.14	40.00	Halogeton glomeratus
2.45	40.00	Kochia scoparia
		GRASSES
4.00	20.00	Elymus cinereus
		COVER
25.96		Total Living Cover
2.45		Litter
21.30		Bareground
7.91		Rock
		% COMPOSITION
10.58		Shrubs
10.47		Forbs
4.44		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #2 (T2)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Chrysothamnus nauseosus	0.00	5.00	5.00	15.00	15.00	8.00
Eriogonum corymbosum	10.00	0.00	5.00	0.00	5.00	4.00
FORBS						
Aster glaucodes	15.00	0.00	60.00	0.00	20.00	19.00
Halogeton glomeratus	5.00	25.00	0.00	5.00	2.00	7.40
Kochia scoparia	10.00	0.00	0.00	5.00	3.00	3.60
GRASSES						
COVER						
Total Living Cover	40.00	30.00	70.00	25.00	45.00	42.00
Litter	5.00	10.00	10.00	10.00	5.00	8.00
Bareground	35.00	50.00	10.00	55.00	30.00	36.00
Rock	20.00	10.00	10.00	10.00	20.00	14.00
% COMPOSITION						
Shrubs	25.00	16.67	14.29	60.00	44.44	32.08
Forbs	75.00	83.33	85.71	40.00	55.56	67.92
Grasses	0.00	0.00	0.00	0.00	0.00	0.00

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #2 (T2)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
6.00	80.00	Chrysothamnus nauseosus
3.74	60.00	Eriogonum corymbosum
		FORBS
22.00	60.00	Aster glaucodes
9.00	80.00	Halogeton glomeratus
3.72	60.00	Kochia scoparia
		GRASSES
		COVER
15.68		Total Living Cover
2.45		Litter
15.94		Bareground
4.90		Rock
		% COMPOSITION
17.53		Shrubs
17.53		Forbs
0.00		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #3 (T3)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Chrysothamnus nauseosus	10.00	0.00	0.00	5.00	15.00	6.00
FORBS						
Aster glaucodes	20.00	0.00	45.00	25.00	10.00	20.00
Halogeton glomeratus	0.00	20.00	0.00	15.00	0.00	7.00
Kochia scoparia	10.00	20.00	5.00	10.00	35.00	16.00
GRASSES						
COVER						
Total Living Cover	40.00	40.00	50.00	55.00	60.00	49.00
Litter	10.00	25.00	40.00	10.00	10.00	19.00
Bareground	25.00	25.00	5.00	20.00	10.00	17.00
Rock	25.00	10.00	5.00	15.00	20.00	15.00
% COMPOSITION						
Shrubs	25.00	0.00	0.00	9.09	25.00	11.82
Forbs	75.00	100.00	100.00	90.91	75.00	88.18
Grasses	0.00	0.00	0.00	0.00	0.00	0.00

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #3 (T3)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
5.83	60.00	Chrysothamnus nauseosus
		FORBS
15.17	80.00	Aster glaucodes
8.72	40.00	Halogeton glomeratus
10.68	100.00	Kochia scoparia
		GRASSES
		COVER
8.00		Total Living Cover
12.00		Litter
8.12		Bareground
7.07		Rock
		% COMPOSITION
11.26		Shrubs
11.26		Forbs
0.00		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS'88
Test Plot #4 (T4)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Atriplex confertifolia	0.00	0.00	20.00	0.00	0.00	4.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	10.00	2.00
FORBS						
Aster glaucodes	0.00	0.00	10.00	20.00	5.00	7.00
Halogeton glomeratus	15.00	2.00	5.00	5.00	5.00	6.40
Kochia scoparia	10.00	3.00	5.00	5.00	5.00	5.60
GRASSES						
COVER						
Total Living Cover	25.00	5.00	40.00	30.00	25.00	25.00
Litter	15.00	15.00	15.00	25.00	10.00	16.00
Bareground	35.00	50.00	25.00	20.00	45.00	35.00
Rock	25.00	30.00	20.00	25.00	20.00	24.00
% COMPOSITION						
Shrubs	0.00	0.00	50.00	0.00	40.00	18.00
Forbs	100.00	100.00	50.00	100.00	60.00	82.00
Grasses	0.00	0.00	0.00	0.00	0.00	0.00

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS'88
Test Plot #4 (T4)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
8.00	20.00	Atriplex confertifolia
4.00	20.00	Eriogonum corymbosum
		FORBS
7.48	60.00	Aster glaucodes
4.45	100.00	Halogeton glomeratus
2.33	100.00	Kochia scoparia
		GRASSES
		COVER
11.40		Total Living Cover
4.90		Litter
11.40		Bareground
3.74		Rock
		% COMPOSITION
22.27		Shrubs
22.27		Forbs
0.00		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #5 (T5)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Chrysothamnus nauseosus	10.00	0.00	5.00	5.00	5.00	5.00
Erigonum corymbosum	0.00	5.00	15.00	10.00	5.00	7.00
FORBS						
Aster glaucodes	25.00	60.00	50.00	30.00	35.00	40.00
Kochia scoparia	5.00	0.00	0.00	0.00	0.00	1.00
Penstemon palmeri	0.00	0.00	0.00	10.00	5.00	3.00
GRASSES						
Elymus spicatus	0.00	5.00	0.00	0.00	5.00	2.00
COVER						
Total Living Cover	40.00	70.00	70.00	55.00	55.00	58.00
Litter	5.00	5.00	20.00	10.00	10.00	10.00
Bareground	30.00	20.00	5.00	5.00	25.00	17.00
Rock	25.00	5.00	5.00	30.00	10.00	15.00
% COMPOSITION						
Shrubs	25.00	7.14	28.57	27.27	18.18	21.23
Forbs	75.00	85.71	71.43	72.73	72.73	75.52
Grasses	0.00	7.14	0.00	0.00	9.09	3.25

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #5 (T5)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
3.16	80.00	Chrysothamnus nauseosus
5.10	80.00	Erigonum corymbosum
		FORBS
13.04	100.00	Aster glaucodes
2.00	20.00	Kochia scoparia
4.00	40.00	Penstemon palmeri
		GRASSES
2.45	40.00	Elymus spicatus
		COVER
11.22		Total Living Cover
5.48		Litter
10.30		Bareground
10.49		Rock
		% COMPOSITION
7.90		Shrubs
5.23		Forbs
4.02		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #6 (T6)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Chrysothamnus nauseosus	0.00	20.00	5.00	10.00	2.00	7.40
FORBS						
Aster glaucodes	60.00	25.00	40.00	45.00	33.00	40.60
GRASSES						
Elymus spicatus	0.00	0.00	0.00	0.00	5.00	1.00
Elymus lanceolatus	10.00	5.00	15.00	10.00	5.00	9.00
Elymus smithii	0.00	5.00	0.00	0.00	0.00	1.00
Hordeum jubatum	0.00	0.00	5.00	0.00	0.00	1.00
COVER						
Total Living Cover	70.00	55.00	65.00	65.00	45.00	60.00
Litter	5.00	10.00	15.00	5.00	10.00	9.00
Bareground	20.00	20.00	10.00	20.00	40.00	22.00
Rock	5.00	15.00	10.00	10.00	5.00	9.00
% COMPOSITION						
Shrubs	0.00	36.36	7.69	15.38	4.44	12.78
Forbs	85.71	45.45	61.54	69.23	73.33	67.05
Grasses	14.29	18.18	30.77	15.38	22.22	20.17

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #6 (T6)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
7.14	80.00	Chrysothamnus nauseosus
		FORBS
11.81	100.00	Aster glaucodes
		GRASSES
2.00	20.00	Elymus spicatus
3.74	100.00	Elymus lanceolatus
2.00	20.00	Elymus smithii
2.00	20.00	Hordeum jubatum
		COVER
8.94		Total Living Cover
3.74		Litter
9.80		Bareground
3.74		Rock
		% COMPOSITION
12.82		Shrubs
13.34		Forbs
5.97		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #7 (T7)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Atriplex confertifolia	0.00	0.00	0.00	5.00	0.00	1.00
Chrysothamnus nauseosus	0.00	5.00	0.00	0.00	5.00	2.00
FORBS						
Aster glaucodes	40.00	65.00	55.00	25.00	40.00	45.00
GRASSES						
Elymus spicatus	0.00	0.00	0.00	10.00	15.00	5.00
Elymus lanceolatus	25.00	0.00	5.00	10.00	0.00	8.00
Elymus cinereus	0.00	0.00	0.00	10.00	5.00	3.00
Elymus smithii	0.00	0.00	5.00	0.00	0.00	1.00
COVER						
Total Living Cover	65.00	70.00	65.00	60.00	65.00	65.00
Litter	10.00	20.00	5.00	10.00	10.00	11.00
Bareground	15.00	5.00	10.00	15.00	15.00	12.00
Rock	10.00	5.00	20.00	15.00	10.00	12.00
% COMPOSITION						
Shrubs	0.00	7.14	0.00	8.33	7.69	4.63
Forbs	61.54	92.86	84.62	41.67	61.54	68.44
Grasses	38.46	0.00	15.38	50.00	30.77	26.92

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #7 (T7)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
2.00	20.00	Atriplex confertifolia
2.45	40.00	Chrysothamnus nauseosus
		FORBS
13.78	100.00	Aster glaucodes
		GRASSES
6.32	40.00	Elymus spicatus
9.27	60.00	Elymus lanceolatus
4.00	40.00	Elymus cinereus
2.00	20.00	Elymus smithii
		COVER
3.16		Total Living Cover
4.90		Litter
4.00		Bareground
5.10		Rock
		% COMPOSITION
3.80		Shrubs
18.28		Forbs
17.54		Grasses

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #8 (T8)
Slope: 35 deg
Exposure: E(S)

Sample Date: 6-10 Aug 97	1.00	2.00	3.00	4.00	5.00	Mean
SHRUBS						
Chrysothamnus nauseosus	0.00	15.00	5.00	0.00	0.00	4.00
Eriogonum corymbosum	10.00	0.00	10.00	0.00	0.00	4.00
FORBS						
Aster glaucodes	25.00	40.00	25.00	60.00	40.00	38.00
Halogeton glomeratus	5.00	0.00	0.00	0.00	0.00	1.00
Kochia scoparia	5.00	0.00	0.00	0.00	0.00	1.00
GRASSES						
Elymus lanceolatus	0.00	0.00	0.00	0.00	5.00	1.00
Elymus smithii	0.00	10.00	0.00	0.00	5.00	3.00
Elymus spicatus	0.00	0.00	10.00	0.00	10.00	4.00
Hordeum jubatum	0.00	0.00	0.00	0.00	5.00	1.00
COVER						
Total Living Cover	45.00	65.00	50.00	60.00	65.00	57.00
Litter	5.00	5.00	10.00	25.00	10.00	11.00
Bareground	10.00	5.00	15.00	5.00	5.00	8.00
Rock	40.00	25.00	25.00	10.00	20.00	24.00
% COMPOSITION						
Shrubs	22.22	23.08	30.00	0.00	0.00	15.06
Forbs	77.78	61.54	50.00	100.00	61.54	70.17
Grasses	0.00	15.38	20.00	0.00	38.46	14.77

ENERGY WEST-COTTONWOOD MINE
TEST PLOTS '88
Test Plot #8 (T8)
Slope: 35 deg
Exposure: E(S)
Sample Date: 6-10 Aug 97

SDev	Freq	
		SHRUBS
5.83	40.00	Chrysothamnus nauseosus
4.90	40.00	Eriogonum corymbosum
		FORBS
12.88	100.00	Aster glaucodes
2.00	20.00	Halogeton glomeratus
2.00	20.00	Kochia scoparia
		GRASSES
2.00	20.00	Elymus lanceolatus
4.00	40.00	Elymus smithii
4.90	40.00	Elymus spicatus
2.00	20.00	Hordeum jubatum
		COVER
8.12		Total Living Cover
7.35		Litter
4.00		Bareground
9.70		Rock
		% COMPOSITION
12.59		Shrubs
17.34		Forbs
14.32		Grasses

COLOR
PHOTOGRAPHS

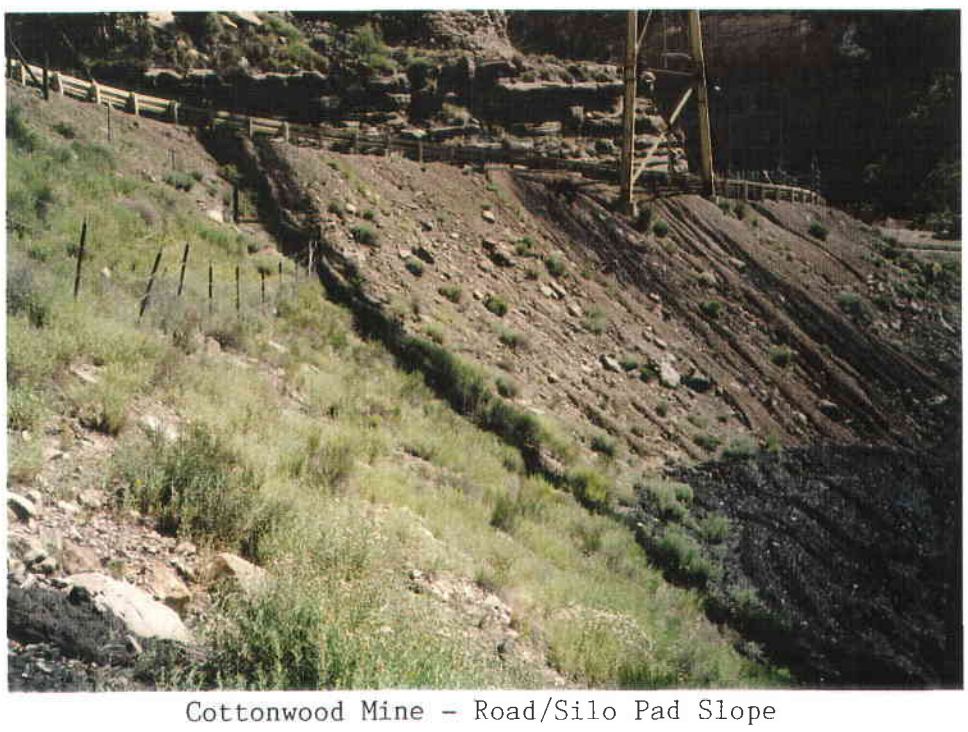
Cottonwood Mine - Old Fan Road

Cottonwood Mine - Reference Area

Cottonwood Mine - 4th East Road

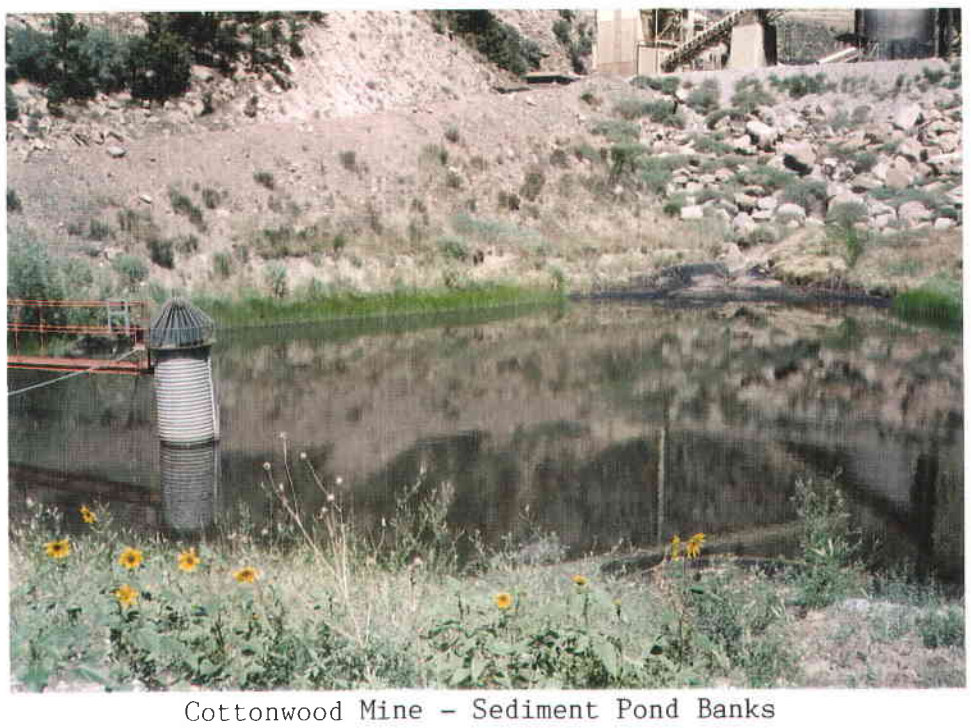
Cottonwood Mine - Storage Yard Slope

Cottonwood Mine - Parking Lot Slope



Cottonwood Mine - Road/Silo Pad Slope

Cottonwood Mine - Tipple Area Slope



Cottonwood Mine - Sediment Pond Banks

Cottonwood Mine - Old Waste Rock - Cell #1

Cottonwood Mine - Old Waste Rock - Cell #2

Cottonwood Mine - Old Waste Rock - Cell #3

Cottonwood Mine - Old Waste Rock - Cell #4

Cottonwood Mine - Old Waste Rock - Cell #5

Cottonwood Mine - Old Waste Rock - Cell #6

Cottonwood Mine - Old Waste Rock - Cell #7

Cottonwood Mine - Old Waste Rock - Berm #1

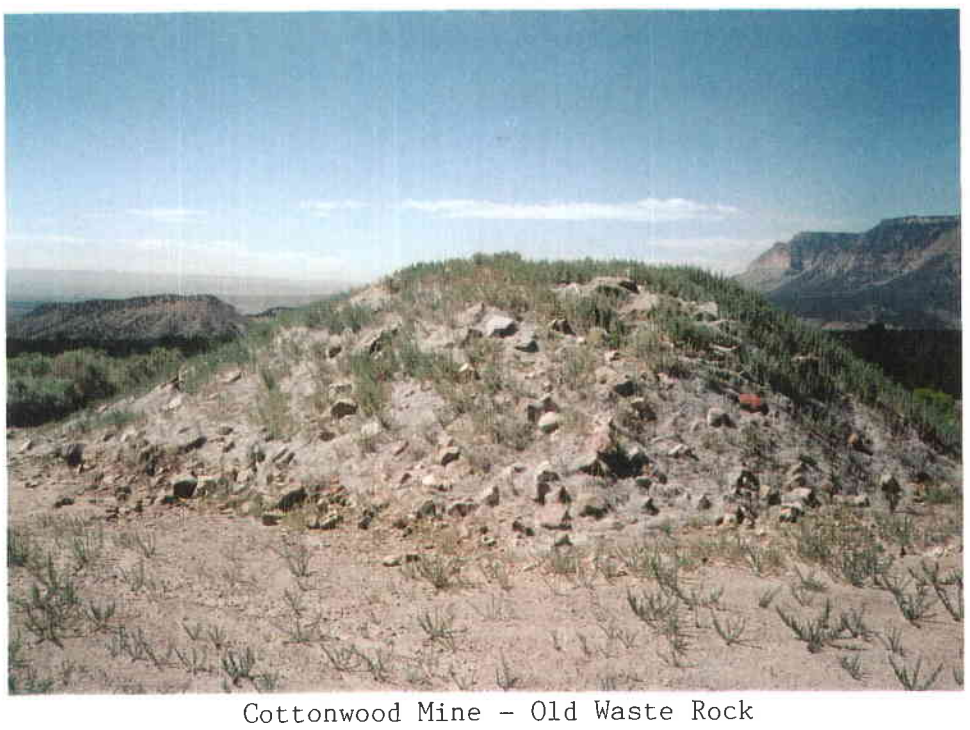
Cottonwood Mine - Old Waste Rock - Berm #2

Cottonwood Mine - Old Waste Rock - Berm #3

Cottonwood Mine - Old Waste Rock - Berm #4

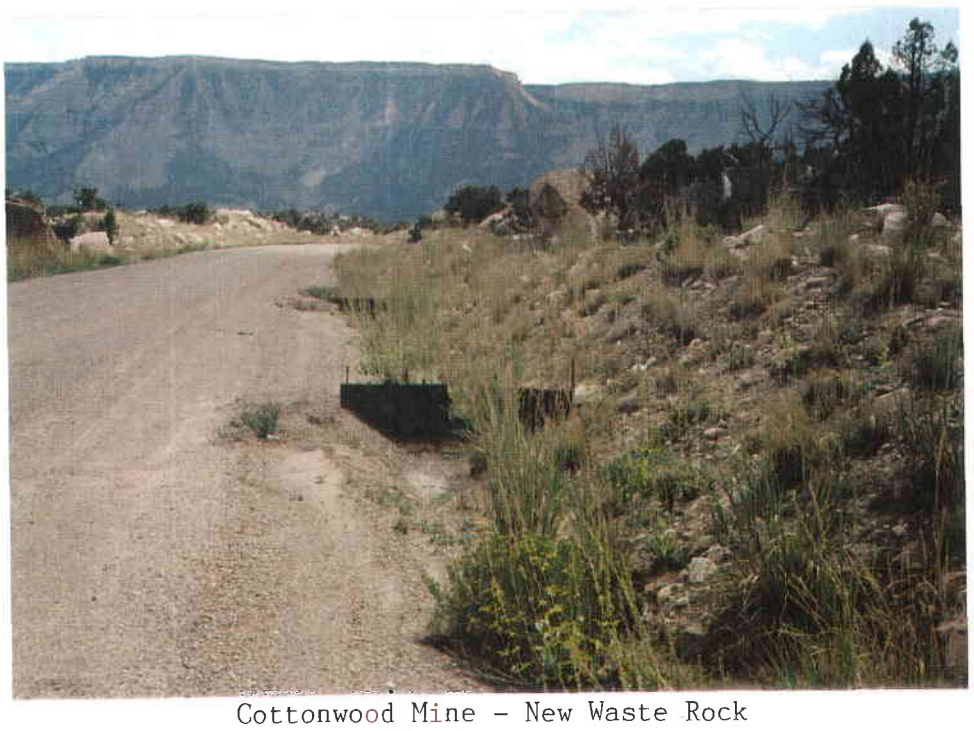
Cottonwood Mine - Old Waste Rock
CTW Soil Piles (A)

Cottonwood Mine - Old Waste Rock
CTW Soil Piles (B)

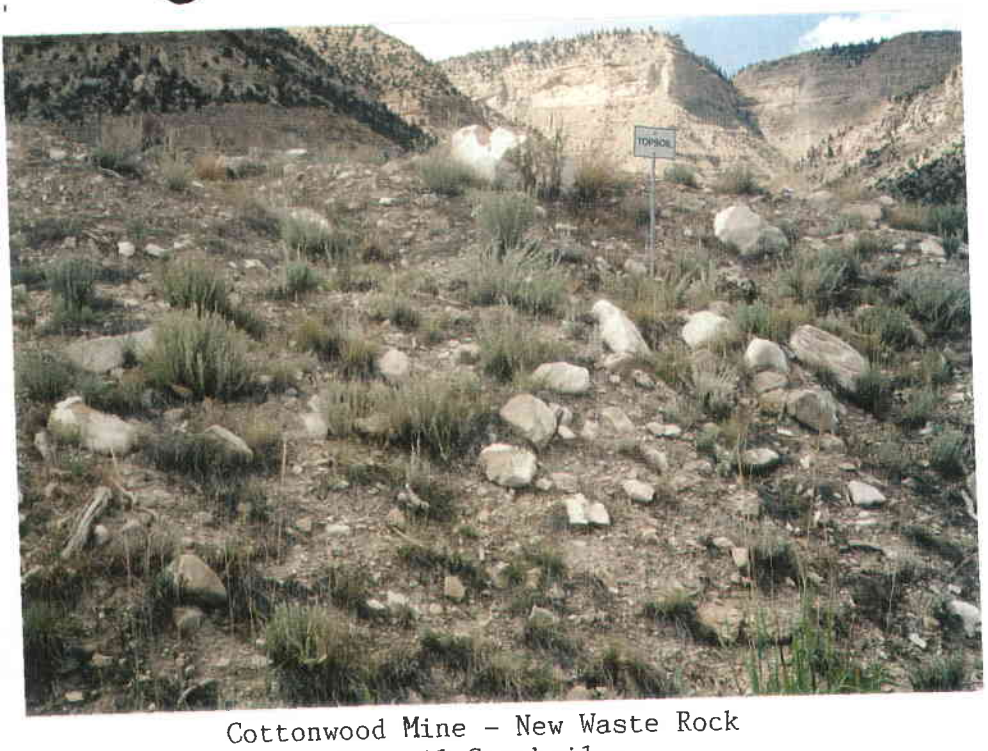


Cottonwood Mine - Old Waste Rock
CTW Soil Piles (C)

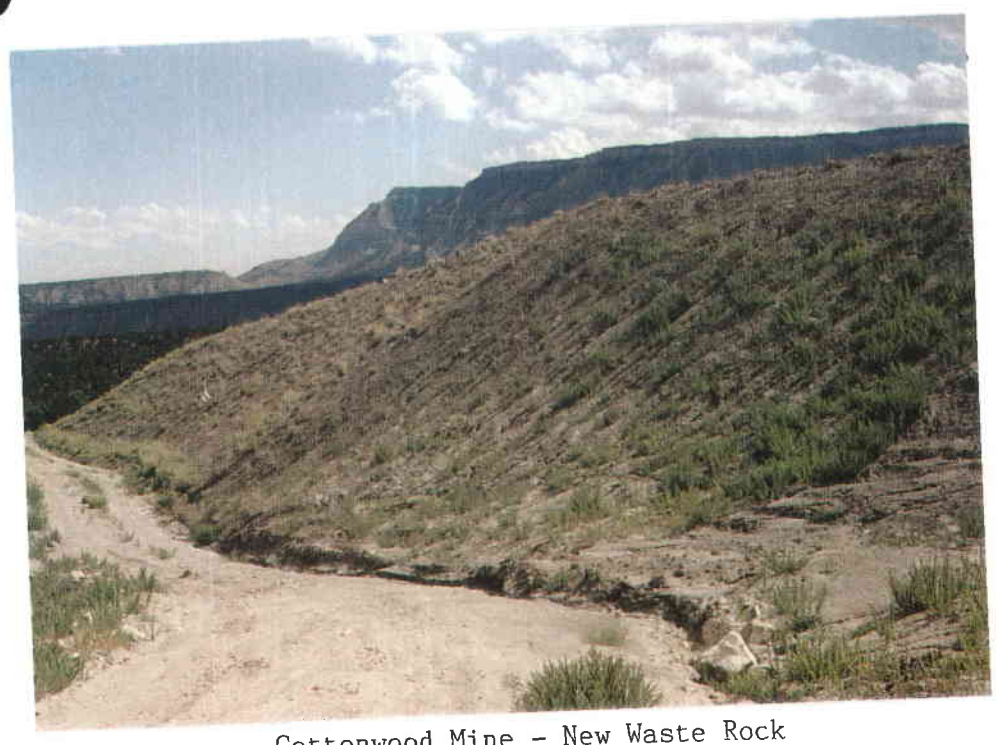
Cottonwood Mine - Old Waste Rock
CTW Reference Area



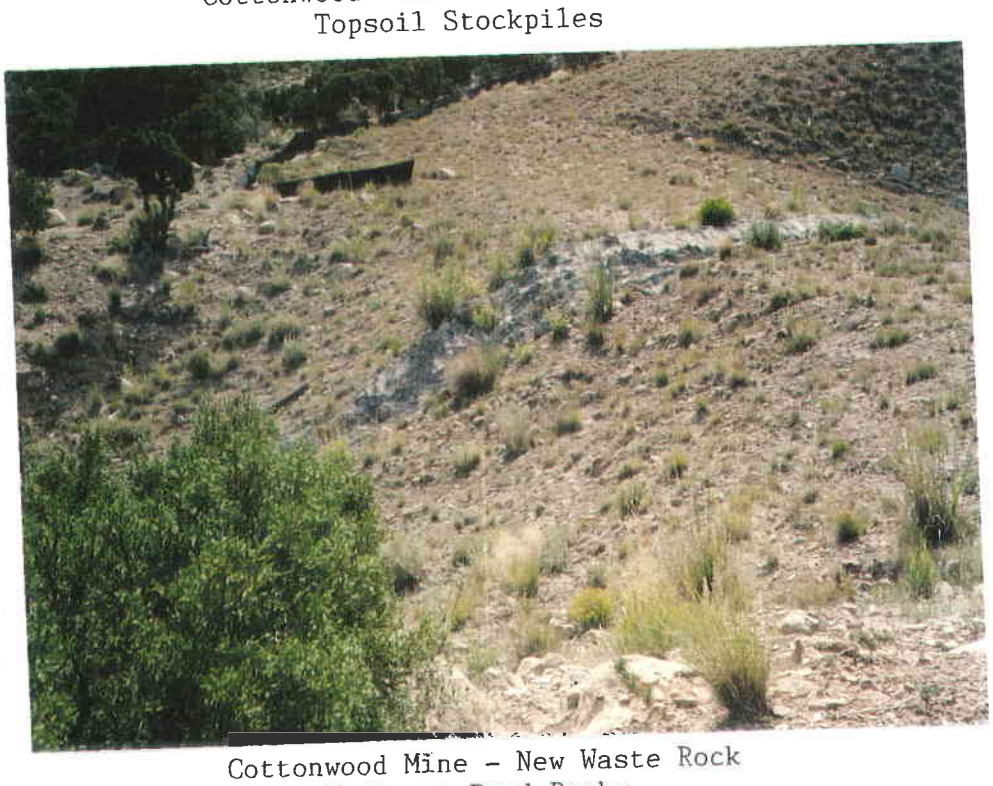
Cottonwood Mine - New Waste Rock
Road Slopes



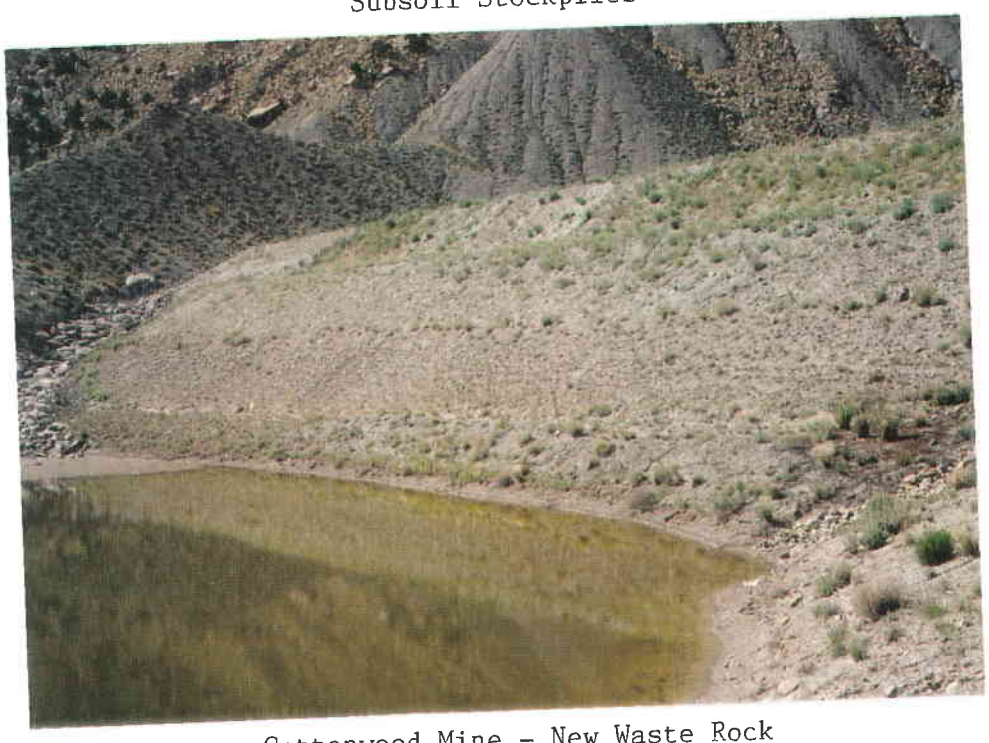
Cottonwood Mine - New Waste Rock
Topsoil Stockpiles



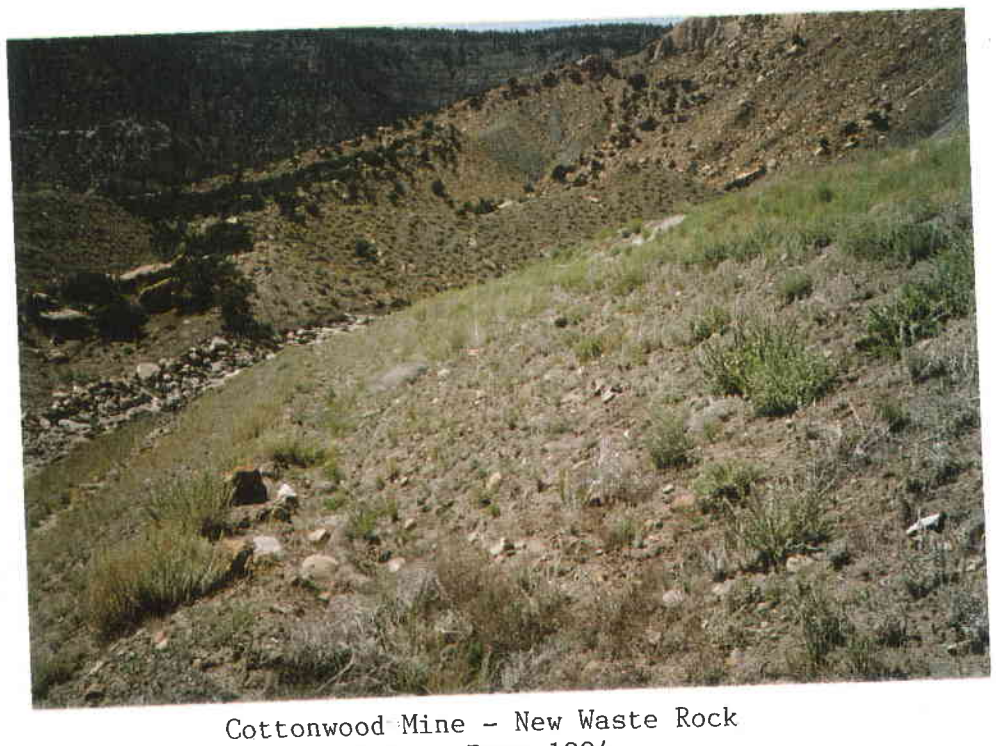
Cottonwood Mine - New Waste Rock
Subsoil Stockpiles



Cottonwood Mine - New Waste Rock
Sediment Pond Banks

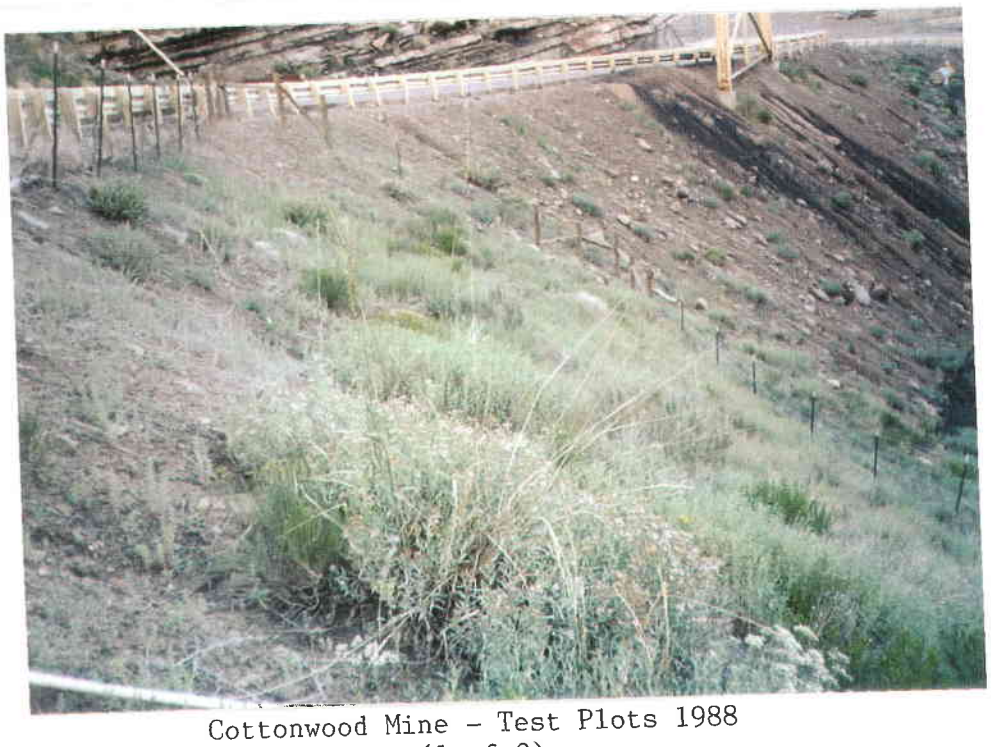


Cottonwood Mine - New Waste Rock
Refuse Berm 1991



Cottonwood Mine - New Waste Rock
Refuse Berm 1994

Cottonwood Mine - Ninth East Road Breakout



Cottonwood Mine - Test Plots 1988
(1 of 2)

Cottonwood Mine - Test Plots 1988
(2 of 2)

PACIFICORP/ENERGY WEST
VEGETATION MONITORING
1997

VOLUME II

VEGETATION MONITORING REPORTS FOR THE
COTTONWOOD MINE, DES-BEE-DOVE, DEER CREEK
MINE & COTTONWOOD CANYON AREAS

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Report Date
March 1998

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DES-BEE-DOVE AREA

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Beehive Yard Slope

AREA: Des-Bee-Dove (1988 Reveg. Area)

DATE: August 12 - 17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 20-50 deg.

EXPOSURE: SE

AREA: 1.6 acres

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Atriplex canescens
Atriplex confertifolia
Ceratoides lanata
Chrysothamnus nauseosus
Eriogonum corymbosum
Gutierrezia sarothrae

Halogeton glomeratus
Penstemon palmeri

Agropyron cristatum
Elymus lanceolatus
Elymus smithii
Elymus spicatus
Elymus cinereus
Stipa hymenoides

WOODY SPECIES DENSITY:*	1997 (no./ac)
Total	3000

PRODUCTION:*	1997 (lbs/ac)
Herbaceous	600.00
Woody	600.00
Total	1200.00

NOTES:

1) There was an area here that was seeded recently. It looked good. We didn't sample this area.

2) Like last year, this area seems to look better than it ever has. Good species diversity.

3)* Methods: As in 1993 - 1996, because the slope was so steep and dangerous to sample on, we estimated the cover, density and productivity from a distance (n=10).

4) Good density of woody species presently established.

5) The chain link fence covering the ground is still holding earth well.

ENERGY WEST-DES BEE DOVE
Beehive Yard Slope
1988 Reveg Area
Acreage: 1.6
Slope: 20 - 50 deg
Exposure: SE

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex canescens	0.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00
Atriplex confertifolia	10.00	5.00	5.00	5.00	10.00	5.00	0.00	10.00
Ceratoides lanata	0.00	5.00	5.00	5.00	0.00	5.00	0.00	0.00
Chrysothamnus nauseosus	0.00	5.00	10.00	5.00	0.00	5.00	15.00	10.00
Eriogonum corymbosum	5.00	0.00	0.00	5.00	10.00	5.00	0.00	5.00
Gutierrezia sarothrae	5.00	0.00	0.00	0.00	10.00	5.00	5.00	0.00
FORBS								
Aster glaucodes	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Penstemon palmeri	5.00	5.00	5.00	15.00	0.00	5.00	15.00	10.00
GRASSES								
Agropyron cristatum	0.00	5.00	0.00	0.00	0.00	5.00	5.00	0.00
Elymus cinereus	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	5.00	0.00	0.00	0.00	10.00	0.00	5.00	0.00
Elymus salinus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	5.00
Elymus smithii	0.00	5.00	0.00	0.00	5.00	0.00	5.00	5.00
Elymus spicatus	0.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	30.00	35.00	40.00	50.00	45.00	45.00	50.00	45.00
Litter	10.00	5.00	10.00	25.00	10.00	10.00	10.00	15.00
Bareground	20.00	10.00	20.00	20.00	10.00	30.00	25.00	10.00
Rock	40.00	50.00	30.00	5.00	35.00	15.00	15.00	30.00
% COMPOSITION								
Shrubs	66.67	57.14	50.00	40.00	66.67	66.67	40.00	55.56
Forbs	16.67	14.29	25.00	30.00	0.00	11.11	30.00	22.22
Grasses	16.67	28.57	25.00	30.00	33.33	22.22	30.00	22.22

ENERGY WEST-DES BEE DOVE
Beehive Yard Slope
1988 Reveg Area
Acreage: 1.6
Slope: 20 - 50 deg
Exposure: SE
Sample Date: 12-17 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	5.00	1.50	2.29	30.00	Atriplex canescens
10.00	10.00	7.00	3.32	90.00	Atriplex confertifolia
5.00	5.00	3.00	2.45	60.00	Ceratoides lanata
10.00	10.00	7.00	4.58	80.00	Chrysothamnus nauseosus
0.00	0.00	3.00	3.32	60.00	Eriogonum corymbosum
0.00	0.00	2.50	3.35	40.00	Gutierrezia sarothrae
					FORBS
0.00	0.00	0.50	1.50	10.00	Aster glaucodes
0.00	5.00	6.50	5.02	80.00	Penstemon palmeri
					GRASSES
0.00	0.00	1.50	2.29	30.00	Agropyron cristatum
0.00	0.00	0.50	1.50	10.00	Elymus cinereus
0.00	5.00	2.50	3.35	40.00	Elymus lanceolatus
5.00	10.00	2.50	3.35	40.00	Elymus salinus
5.00	10.00	3.50	3.20	60.00	Elymus smithii
0.00	5.00	1.50	2.29	30.00	Elymus spicatus
10.00	0.00	2.00	4.00	20.00	Stipa hymenoides
					COVER
45.00	65.00	45.00	8.94		Total Living Cover
25.00	5.00	12.50	6.80		Litter
25.00	5.00	17.50	7.83		Bareground
5.00	25.00	25.00	14.14		Rock
					% COMPOSITION
55.56	46.15	54.44	9.82		Shrubs
0.00	7.69	15.70	10.58		Forbs
44.44	46.15	29.86	8.98		Grasses

QUALITATIVE SAMPLING DATA SHEET AND QUANTITATIVE/QUALITATIVE NOTES 1997

SITE NAME: Beehive Road Berm

AREA: Des-Bee-Dove (1988 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 30 deg

AREA SIZE: .1 acre

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see quantitative data)

Atriplex confertifolia
Chrysothamnus nauseosus
Eriogonum corymbosum
Ephedra viridis

Halogeton glomeratus
Penstemon palmeri

Elymus cinereus
Elymus lanceolatus
Stipa hymenoides
Elymus spicatus

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	3963.96
Eriogonum corymbosum	87.12
Atriplex confertifolia	827.64
Total	4399.56

PRODUCTION:	1997 (lbs/ac)
Herbaceous	22.31
Woody	314.55
Total	336.86

NOTES:

1) We sampled at regular at 20' intervals along the berm using a 200' tape.

2) Sampled cover (n=8) and frequency (n=8) by ocular methods.

3) Sampled density (n=8) with belt transects (5'X25').

4) Sampled productivity [n=10] by clipping and weighing. There was no room for double sampling.

5) There was a better representation of desirable species this year. There were still some weedy species though.

6) The slope below the substation had little organic cover, but it was holding well with little erosion.

ENERGY WEST-DES BEE DOVE
Beehive Road Berm
1988 Reveg Area
Acreage: .1
Slope: 30 deg
Exposure: variable

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex confertifolia	10.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus nauseosus	10.00	25.00	0.00	10.00	10.00	5.00	20.00	10.00
FORBS								
Halogeton glomeratus	0.00	0.00	0.00	10.00	5.00	5.00	0.00	0.00
Salsola pestifer	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
GRASSES								
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Elymus lanceolatus	5.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00
Elymus salinus	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus spicatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
COVER								
Total Living Cover	30.00	30.00	10.00	25.00	20.00	15.00	20.00	15.00
Litter	5.00	5.00	5.00	5.00	5.00	10.00	5.00	10.00
Bareground	25.00	40.00	20.00	15.00	35.00	45.00	40.00	30.00
Rock	40.00	25.00	65.00	55.00	40.00	30.00	35.00	45.00
% COMPOSITION								
Shrubs	66.67	83.33	100.00	40.00	50.00	33.33	100.00	66.67
Forbs	0.00	0.00	0.00	40.00	50.00	33.33	0.00	0.00
Grasses	33.33	16.67	0.00	20.00	0.00	33.33	0.00	33.33

ENERGY WEST-DES BEE DOVE
Beehive Road Berm
1988 Reveg Area
Acreage: .1
Slope: 30 deg
Exposure: variable
Sample Date: 12-17 Aug 97

Mean	SDev	Freq	
			SHRUBS
2.50	4.33	25.00	Atriplex confertifolia
11.25	7.40	87.50	Chrysothamnus nauseosus
			FORBS
2.50	3.54	37.50	Halogeton glomeratus
0.63	1.65	12.50	Salsola pestifer
			GRASSES
0.63	1.65	12.50	Agropyron cristatum
1.88	2.42	37.50	Elymus lanceolatus
0.63	1.65	12.50	Elymus salinus
0.63	1.65	12.50	Elymus spicatus
			COVER
20.63	6.82		Total Living Cover
6.25	2.17		Litter
31.25	9.92		Bareground
41.88	12.23		Rock
			% COMPOSITION
67.50	23.96		Shrubs
15.42	20.34		Forbs
17.08	14.48		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Deseret Road Berm

AREA: Des-Bee-Dove (1988 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 6-10 deg.

EXPOSURE: E

AREA: .2 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Chrysothamnus nauseosus

Bassia hyssopifolia
Halogeton glomeratus
Kochia scoparia

Elymus cinereus
Elymus lanceolatus
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	418.20
Atriplex confertifolia	243.95
Total	662.15

PRODUCTION:	1997 (lbs/ac)
Herbaceous	76.74
Woody	119.57
Total	196.31

NOTES:

1) We sampled for cover and production at 25 ft lengths on a transect. We placed meter sq. quadrats at regular intervals along inside, top and outside of berm (nearest road).

2) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=8) with belt transects (5'X25').

4) Sampled productivity [n=10] by clipping and weighing There was not enough room for double sampling.

5) Much of the vegetation was disturbed due to roadside maintenance.

6) The site seemed to still be weedy, but there was not much change from last year.

7) As previous two years', most of the herbaceous spp. were weedy exotic species.

ENERGY WEST-DES BEE DOVE
Desert Road Berm
1988 Reveg Area
Acreage: .2
Slope: 6-10 deg
Exposure: E

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex confertifolia	0.00	10.00	0.00	0.00	0.00	20.00	0.00	0.00
Chrysothamnus nauseosus	0.00	0.00	0.00	25.00	0.00	5.00	7.00	0.00
FORBS								
Bassia hyssopifolia	0.00	0.00	15.00	0.00	0.00	0.00	0.00	0.00
Halogetum glomeratus	10.00	5.00	20.00	5.00	5.00	0.00	8.00	7.00
Kochia scoparia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Elymus cinereus	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
Elymus lanceolatus	0.00	0.00	0.00	0.00	10.00	5.00	0.00	0.00
Elymus salinus	3.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
Elymus smithii	2.00	0.00	0.00	0.00	10.00	5.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	15.00	15.00	35.00	35.00	45.00	35.00	15.00	15.00
Litter	5.00	5.00	5.00	10.00	10.00	5.00	10.00	5.00
Bareground	10.00	20.00	25.00	20.00	20.00	15.00	25.00	20.00
Rock	70.00	60.00	35.00	35.00	25.00	45.00	50.00	60.00
% COMPOSITION								
Shrubs	0.00	66.67	0.00	71.43	0.00	71.43	46.67	0.00
Forbs	66.67	33.33	100.00	14.29	11.11	0.00	53.33	46.67
Grasses	33.33	0.00	0.00	14.29	88.89	28.57	0.00	53.33

ENERGY WEST-DES BEE DOVE
Desert Road Berm
1988 Reveg Area
Acreage: .2
Slope: 6-10 deg
Exposure: E
Sample Date: 12-17 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	0.00	3.00	6.40	20.00	Atriplex confertifolia
0.00	10.00	4.70	7.60	40.00	Chrysothamnus nauseosus
					FORBS
0.00	0.00	1.50	4.50	10.00	Bassia hyssopifolia
15.00	10.00	8.50	5.39	90.00	Halogetum glomeratus
10.00	0.00	1.00	3.00	10.00	Kochia scoparia
					GRASSES
0.00	0.00	2.00	6.00	10.00	Elymus cinereus
0.00	0.00	1.50	3.20	20.00	Elymus lanceolatus
0.00	0.00	1.10	2.47	20.00	Elymus salinus
0.00	0.00	1.70	3.16	30.00	Elymus smithii
0.00	0.00	0.50	1.50	10.00	Stipa hymenoides
					COVER
25.00	20.00	25.50	10.59		Total Living Cover
10.00	10.00	7.50	2.50		Litter
25.00	45.00	22.50	8.73		Bareground
40.00	25.00	44.50	14.57		Rock
					% COMPOSITION
0.00	50.00	30.62	31.55		Shrubs
100.00	50.00	47.54	32.87		Forbs
0.00	0.00	21.84	28.47		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Portal Road Berm

AREA: Des-Bee-Dove (1988 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 30 deg.

EXPOSURE: SW

AREA: .1 acre

ANIMAL USE/DISTURBANCE: Slight

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:
Atriplex confertifolia
Chrysothamnus nauseosus
Eriogonum corymbosum

Bassia hyssopifolia
Halogeton glomeratus

Agropyron cristatum
Elymus salinus
Elymus spicatus
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	2588.72
Atriplex confertifolia	3036.76
Eriogonum corymbosum	149.35
Total	6621.14

PRODUCTION:	1997 (lbs/ac)
Herbaceous	53.54
Woody	585.12
Total	638.66

NOTES:

1) We sampled at regular at 20' intervals up entire road using a 140' tape.

2) Sampled cover (n=7) and frequency (n=7) by ocular methods.

3) Sampled density (n=7) with belt transects (5'X25').

4) Sampled productivity [n=7(35)] by clipping and weighing. There was no room for double sampling.

5) We took samples on inside, top, then on the outside of the berm.

6) As mentioned last year, the inside of the berm had been scraped for road maintenance. That's why it's so sparse and weedy.

7) Because of maintenance procedures, there were weeds inside the berm and desirable spp. on the top and outside.

ENERGY WEST-DES BEE DOVE
Portal Road Berm
1988 Reveg Area
Acreage: .1
Slope: 30 deg
Exposure: SW

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	Mean
SHRUBS								
Atriplex confertifolia	0.00	0.00	0.00	0.00	15.00	10.00	20.00	6.43
Chrysothamnus nauseosus	10.00	60.00	5.00	5.00	0.00	0.00	0.00	11.43
FORBS								
Halogeton glomeratus	0.00	0.00	5.00	3.00	5.00	0.00	0.00	1.86
GRASSES								
Agropyron cristatum	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
Elymus smithii	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.71
Stipa hymenoides	25.00	0.00	0.00	2.00	0.00	0.00	0.00	3.86
COVER								
Total Living Cover	40.00	60.00	10.00	10.00	25.00	10.00	20.00	25.00
Litter	10.00	10.00	5.00	5.00	5.00	2.00	5.00	6.00
Bareground	5.00	10.00	25.00	30.00	20.00	65.00	15.00	24.29
Rock	45.00	20.00	60.00	55.00	50.00	23.00	60.00	44.71
% COMPOSITION								
Shrubs	25.00	100.00	50.00	50.00	60.00	100.00	100.00	69.29
Forbs	0.00	0.00	50.00	30.00	20.00	0.00	0.00	14.29
Grasses	75.00	0.00	0.00	20.00	20.00	0.00	0.00	16.43

ENERGY WEST-DES BEE DOVE
Portal Road Berm
1988 Reveg Area
Acreage: .1
Slope: 30 deg
Exposure: SW
Sample Date: 12-17 Aug 97

SDev	Freq	
		SHRUBS
7.89	42.86	Atriplex confertifolia
20.13	57.14	Chrysothamnus nauseosus
		FORBS
2.23	42.86	Halogeton glomeratus
		GRASSES
1.75	14.29	Agropyron cristatum
1.75	14.29	Elymus smithii
8.66	28.57	Stipa hymenoides
		COVER
17.53		Total Living Cover
2.73		Litter
18.41		Bareground
15.51		Rock
		% COMPOSITION
28.34		Shrubs
18.41		Forbs
25.46		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Bathhouse Road Berm

AREA: Des-Bee-Dove (1988 Interim Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 30 deg.

EXPOSURE: SW

AREA: .1 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Chrysothamnus nauseosus

Penstemon palmeri
Kochia scoparia

Elymus cinereus
Elymus lanceolatus
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	3783.51
Atriplex confertifolia	199.32
Total	3982.64

PRODUCTION:	1997 (lbs/ac)
Herbaceous	124.93
Woody	638.55
Total	558.35

NOTES: 1) We sampled at regular at 20' intervals up entire road using a 200' tape.

2) Sampled cover (n=7) and frequency (n=7) by ocular methods.

3) Sampled density (n=7) with belt transects (5'X25').

4) Sampled productivity [n=5(35)] by clipping, weighing and double sampling.

ENERGY WEST-DES BEE DOVE
Bathhouse Road Berm
1988 Interim Reveg
Acreage: .1
Slope: 30 deg
Exposure: SW

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	Mean
SHRUBS								
Chrysothamnus nauseosus	25.00	0.00	0.00	0.00	35.00	30.00	5.00	13.57
FORBS								
Penstemon palmeri	0.00	0.00	20.00	0.00	0.00	0.00	0.00	2.86
GRASSES								
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.71
Elymus cinereus	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
Elymus lanceolatus	5.00	10.00	0.00	0.00	0.00	0.00	0.00	2.14
Elymus smithii	5.00	10.00	0.00	10.00	0.00	0.00	10.00	5.00
Poa pratensis	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.71
Stipa hymenoides	0.00	0.00	5.00	0.00	0.00	10.00	0.00	2.14
COVER								
Total Living Cover	40.00	20.00	30.00	10.00	35.00	45.00	15.00	27.86
Litter	10.00	5.00	5.00	10.00	10.00	10.00	10.00	8.57
Bareground	5.00	20.00	10.00	25.00	20.00	15.00	20.00	16.43
Rock	45.00	55.00	55.00	55.00	35.00	30.00	55.00	47.14
% COMPOSITION								
Shrubs	62.50	0.00	0.00	0.00	100.00	66.67	33.33	37.50
Forbs	0.00	0.00	66.67	0.00	0.00	0.00	0.00	9.52
Grasses	37.50	100.00	33.33	100.00	0.00	33.33	66.67	52.98

ENERGY WEST-DES BEE DO
Bathhouse Road Berm
1988 Interim Reveg
Acreage: .1
Slope: 30 deg
Exposure: SW
Sample Date: 12-17 Aug 97

SDev	Freq	
		SHRUBS
14.57	57.14	Chrysothamnus nauseosus
		FORBS
7.00	14.29	Penstemon palmeri
		GRASSES
1.75	14.29	Agropyron cristatum
1.75	14.29	Elymus cinereus
3.64	28.57	Elymus lanceolatus
4.63	57.14	Elymus smithii
1.75	14.29	Poa pratensis
3.64	28.57	Stipa hymenoides

	COVER
12.21	Total Living Cover
2.26	Litter
6.39	Bareground
9.95	Rock
	% COMPOSITION
37.07	Shrubs
23.33	Forbs
34.70	Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Tipple Slope

AREA: Des-Bee-Dove (1988 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 40-45 deg.

EXPOSURE: Variable

AREA: .4 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Slight considering how steep the slope is!

COVER: Because of dangerous slope, cover was estimated by nonconventional methods (see Notes*).

DOMINANT PLANT SPECIES OBSERVED:
Atriplex confertifolia
Chrysothamnus nauseosus
Eriogonum corymbosum

Halogeton glomeratus
Penstemon palmeri

Elymus cinereus
Elymus lanceolatus
Stipa hymenoides

WOODY SPECIES DENSITY:*	1997 (no./ac)
Total	2500

PRODUCTION:*	1997 (lbs/ac)
Herbaceous	300.00
Woody	300.00
Total	600.00

NOTES: 1) The slope's vegetation looked good.

2) Vegetation cover looked good in some areas with desirable species, while other areas were quite weedy.

3) *Methods: As previous years, for cover, density and productivity we had to estimate cover from a distance because the slope was much too steep to safely place quadrats.

4) Some coal fines were mixed in soils/spoils.

ENERGY WEST-DES BEE DOVE
Tipple Slope
1988 Reveg Area
Acreage: .4 acre
Slope: 40-45 deg
Exposure: variable
Sample Date: 12-17 Aug 97

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	Mean
SHRUBS								
Atriplex confertifolia	10.00	0.00	10.00	5.00	15.00	5.00	10.00	7.86
Chrysothamnus nauseosus	10.00	10.00	0.00	10.00	5.00	5.00	0.00	5.71
Gutierrezia sarothrae	0.00	0.00	10.00	0.00	5.00	5.00	0.00	2.86
FORBS								
GRASSES								
Elymus cinereus	0.00	0.00	0.00	5.00	5.00	5.00	0.00	2.14
Elymus lanceolatus	0.00	10.00	5.00	5.00	5.00	10.00	5.00	5.71
Elymus smithii	0.00	0.00	5.00	5.00	0.00	10.00	0.00	2.86
Stipa hymenoides	0.00	10.00	5.00	0.00	5.00	5.00	10.00	5.00
COVER								
Total Living Cover	20.00	30.00	35.00	30.00	40.00	45.00	25.00	32.14
Litter	5.00	10.00	5.00	10.00	10.00	10.00	5.00	7.86
Bareground	20.00	25.00	10.00	25.00	10.00	30.00	10.00	18.57
Rock	55.00	35.00	50.00	35.00	40.00	15.00	60.00	41.43
% COMPOSITION								
Shrubs	100.00	33.33	57.14	50.00	62.50	33.33	40.00	53.76
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	0.00	66.67	42.86	50.00	37.50	66.67	60.00	46.24

ENERGY WEST-DES BEE DO
Tipple Slope
1988 Reveg Area
Acreage: .4 acre
Slope: 40-45 deg
Exposure: variable
Sample Date: 12-17 Aug 97

SDev	Freq	
		SHRUBS
4.52	85.71	Atriplex confertifolia
4.16	71.43	Chrysothamnus nauseosus
3.64	42.86	Gutierrezia sarothrae
		FORBS
		GRASSES
2.47	42.86	Elymus cinereus
3.19	85.71	Elymus lanceolatus
3.64	42.86	Elymus smithii
3.78	71.43	Stipa hymenoides
		COVER
7.95		Total Living Cover
2.47		Litter
7.89		Bareground
14.07		Rock
		% COMPOSITION
21.59		Shrubs
0.00		Forbs
21.59		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Storage Slope

AREA: Des-Bee-Dove (1988 Interim Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 3 - 5 deg.

EXPOSURE: S SE

AREA: 4.4 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Like last year, there was some slight to moderate erosion in localized areas.

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Atriplex gardneri
Chrysothamnus nauseosus
Eriogonum corymbosum
Sarcobatus vermiculatus
Suaeda torreyana

Atriplex powellii
Halogeton glomeratus
Kochia scoparia
Malcomia africana
Suaeda calceoliformis

WOODY SPECIES DENSITY:	1997 (no./ac)
Atriplex gardneri	1988.95
Suaeda torreyana	795.58
Sarcobatus vermiculatus	159.12
Chrysothamnus nauseosus	159.12
Atriplex corrugata	79.56
Total	3182.33

PRODUCTION:	1997 (lbs/ac)
Herbaceous	64.75
Woody	1237.09
Total	1301.84

NOTES: 1) As last year, there was poor grass and forb cover this year. Some patchy areas had lot of weeds.

2) Methods: For cover we placed meter sq. quadrats at placed randomly over entire site (n=10).

3) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=10) using the pt. quarter method.

4) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

5) We didn't see any grasses this year.

ENERGY WEST-DES BEE DOVE
Sediment Storage Slope
1988 Interim Reveg
Acreage: 4.4 acre
Slope: 3 - 5 deg
Exposure: S,SE

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex gardneri	45.00	40.00	50.00	5.00	10.00	10.00	25.00	0.00
Sarcobatus vermiculatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.00
Suaeda torreyana	0.00	5.00	0.00	10.00	0.00	0.00	5.00	10.00
FORBS								
Atriplex powellii	0.00	0.00	5.00	15.00	0.00	5.00	5.00	0.00
Halogeton glomeratus	5.00	5.00	0.00	20.00	50.00	40.00	5.00	5.00
Malcomia africana	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
GRASSES								
COVER								
Total Living Cover	50.00	50.00	55.00	50.00	65.00	55.00	40.00	50.00
Litter	5.00	5.00	10.00	5.00	10.00	10.00	5.00	5.00
Bareground	40.00	40.00	25.00	40.00	20.00	30.00	45.00	40.00
Rock	5.00	5.00	10.00	5.00	5.00	5.00	10.00	5.00
% COMPOSITION								
Shrubs	90.00	90.00	90.91	30.00	15.38	18.18	75.00	90.00
Forbs	10.00	10.00	9.09	70.00	84.62	81.82	25.00	10.00
Grasses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ENERGY WEST-DES BEE DOVE
Sediment Storage Slope
1988 Interim Reveg
Acreage: 4.4 acre
Slope: 3 - 5 deg
Exposure: S,SE
Sample Date: 12-17 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
45.00	0.00	23.00	19.26	80.00	Atriplex gardneri
0.00	0.00	3.50	10.50	10.00	Sarcobatus vermiculatus
0.00	5.00	3.50	3.91	50.00	Suaeda torreyana
					FORBS
0.00	5.00	3.50	4.50	50.00	Atriplex powellii
0.00	15.00	14.50	16.50	80.00	Halogeton glomeratus
0.00	0.00	0.50	1.50	10.00	Malcomia africana
					GRASSES
					COVER
45.00	25.00	48.50	10.01		Total Living Cover
5.00	10.00	7.00	2.45		Litter
45.00	60.00	38.50	10.74		Bareground
5.00	5.00	6.00	2.00		Rock
					% COMPOSITION
100.00	20.00	61.95	34.18		Shrubs
0.00	80.00	38.05	34.18		Forbs
0.00	0.00	0.00	0.00		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Pond Banks

AREA: Des-Bee-Dove (1988 Interim Reveg Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 30 deg.

EXPOSURE: E & W

AREA: .9 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Atriplex gardneri
Chrysothamnus nauseosus

Malcomia africana
Machaeranthera canescens
Penstemon palmeri

Agropyron cristatum
Elymus lanceolatus
Elymus spicatus

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	3912.52
Atriplex gardneri	1214.23
Atriplex confertifolia	134.91
Gutierrezia sarothrae	134.91
Total	5396.57

PRODUCTION:	1997 (lbs/ac)
Herbaceous	111.90
Woody	582.69
Total	694.59

NOTES: 1) We sampled at regularly around the two banks.

2) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=10) using the pt. quarter method.

4) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-DES BEE DOVE
Sediment Pond Banks
1988 Interim Reveg
Acreage: .9 acre
Slope: 30 deg
Exposure: E & W

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex confertifolia	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Atriplex gardneri	15.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Chrysothamnus nauseosus	5.00	35.00	30.00	45.00	30.00	30.00	5.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
FORBS								
Astragalus cicer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machaeranthera canescens	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Penstemon palmeri	0.00	5.00	15.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Elymus lanceolatus	0.00	5.00	0.00	0.00	0.00	0.00	5.00	0.00
Elymus spicatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00
Hordeum jubatum	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
COVER								
Total Living Cover	30.00	45.00	45.00	45.00	45.00	40.00	25.00	20.00
Litter	5.00	20.00	20.00	15.00	10.00	10.00	10.00	20.00
Bareground	40.00	15.00	15.00	25.00	35.00	35.00	55.00	40.00
Rock	25.00	20.00	20.00	15.00	10.00	15.00	10.00	20.00
% COMPOSITION								
Shrubs	66.67	77.78	66.67	100.00	100.00	75.00	40.00	0.00
Forbs	16.67	11.11	33.33	0.00	0.00	0.00	20.00	0.00
Grasses	16.67	11.11	0.00	0.00	0.00	25.00	40.00	100.00

ENERGY WEST-DES BEE DO
Sediment Pond Banks
1988 Interim Reveg
Acreage: .9 acre
Slope: 30 deg
Exposure: E & W
Sample Date: 12-17 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	0.00	0.50	1.50	10.00	Atriplex confertifolia
0.00	3.00	2.30	4.54	30.00	Atriplex gardneri
30.00	0.00	21.00	15.78	80.00	Chrysothamnus nauseosus
0.00	0.00	1.00	3.00	10.00	Gutierrezia sarothrae
					FORBS
0.00	2.00	0.20	0.60	10.00	Astragalus cicer
0.00	0.00	1.00	2.00	20.00	Machaeranthera canescens
0.00	0.00	2.00	4.58	20.00	Penstemon palmeri
					GRASSES
0.00	0.00	1.00	2.00	20.00	Elymus lanceolatus
0.00	0.00	2.00	6.00	10.00	Elymus spicatus
0.00	0.00	1.00	2.00	20.00	Hordeum jubatum
0.00	0.00	1.00	3.00	10.00	Stipa hymenoides
					COVER
30.00	5.00	33.00	12.88		Total Living Cover
10.00	5.00	12.50	5.59		Litter
45.00	65.00	37.00	15.20		Bareground
15.00	25.00	17.50	5.12		Rock
					% COMPOSITION
100.00	60.00	68.61	29.48		Shrubs
0.00	40.00	12.11	14.30		Forbs
0.00	0.00	19.28	29.85		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Haul Road Bench

AREA: Des-Bee-Dove (1986 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 3 - 5 deg.

EXPOSURE: SW

ANIMAL USE/DISTURBANCE: Slight

EROSION: Slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex cuneata var. gardneri
Atriplex canescens
Atriplex confertifolia

Halogeton glomeratus
Kochia scoparia

Agropyron cristatum
Elymus cinereus
Elymus lanceolatus
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	985.68
Atriplex gardneri	2365.62
Atriplex confertifolia	98.57
Atriplex canescens	394.27
Ceratoides lanata	98.57
Total	3942.70

PRODUCTION:	1997 (lbs/ac)
Herbaceous	515.36
Woody	326.08
Total	940.70

NOTES:

1) Sampled cover (n=10) and frequency (n=10) by ocular methods.

2) Sampled density (n=10) using the pt. quarter method.

3) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

4) Quantitative Methods: We placed a point at regular intervals over the area. From these points we placed the quadrats in random locations.

5) Unlike 1994-96, most of the species are now desirable spp. as opposed to weedy.

6) There is some good shrub and grass establishment occurring.

7) The was standing water within the Contour rows so they seem to be adequately controlling erosion well.

ENERGY WEST-DES BEE DOVE
Haul Road Bench
1986 Reveg Area
Acreage:
Slope: 3-5 deg
Exposure: SW

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex gardneri	30.00	0.00	5.00	5.00	20.00	10.00	0.00	30.00
Chrysothamnus nauseosus	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS								
Halogeton glomeratus	0.00	0.00	20.00	0.00	20.00	0.00	20.00	0.00
Kochia scoparia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Elymus cinereus	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Elymus junceus	10.00	20.00	25.00	25.00	10.00	0.00	15.00	30.00
Elymus lanceolatus	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Sitanion hystrix	0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
COVER								
Total Living Cover	40.00	25.00	50.00	40.00	50.00	50.00	35.00	60.00
Litter	10.00	5.00	10.00	10.00	10.00	20.00	5.00	10.00
Bareground	10.00	20.00	20.00	25.00	15.00	15.00	50.00	20.00
Rock	40.00	50.00	20.00	25.00	25.00	15.00	10.00	10.00
% COMPOSITION								
Shrubs	75.00	20.00	10.00	12.50	40.00	20.00	0.00	50.00
Forbs	0.00	0.00	40.00	0.00	40.00	0.00	57.14	0.00
Grasses	25.00	80.00	50.00	87.50	20.00	80.00	42.86	50.00

ENERGY WEST-DES BEE DOVE
Haul Road Bench
1986 Reveg Area
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	0.00	10.00	11.62	60.00	Atriplex gardneri
10.00	0.00	1.50	3.20	20.00	Chrysothamnus nauseosus
					FORBS
20.00	0.00	8.00	9.80	40.00	Halogeton glomeratus
5.00	0.00	0.50	1.50	10.00	Kochia scoparia
					GRASSES
0.00	15.00	2.00	4.58	20.00	Elymus cinereus
0.00	10.00	14.50	9.86	80.00	Elymus junceus
0.00	0.00	0.50	1.50	10.00	Elymus lanceolatus
5.00	0.00	4.00	10.44	20.00	Sitanion hystrix
20.00	10.00	3.50	6.34	30.00	Stipa hymenoides
					COVER
60.00	35.00	44.50	10.83		Total Living Cover
10.00	10.00	10.00	3.87		Litter
25.00	40.00	24.00	11.58		Bareground
5.00	15.00	21.50	13.43		Rock
					% COMPOSITION
16.67	0.00	24.42	22.58		Shrubs
41.67	0.00	17.88	22.37		Forbs
41.67	100.00	57.70	26.00		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Beehive Substation Slope

AREA: Des-Bee-Dove (1986 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 35 deg.

EXPOSURE: S

AREA: .1 acre

ANIMAL USE/DISTURBANCE: Slight

EROSION: Slight erosion on some areas of the slope.

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Atriplex confertifolia
Chrysothamnus nauseosus

Agropyron cristatum
Elymus lanceolatus
Elymus salinus
Elymus cinereus
Elymus spicatus
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	5158.51
Atriplex confertifolia	224.28
Total	5882.79

PRODUCTION:	1997 (lbs/ac)
Herbaceous	124.33
Woody	489.15
Total	613.48

NOTES:

1) Sample over entire slope.

2) Sampled cover (n=6) and frequency (n=) by ocular methods.

3) Sampled density (n=6) with the pt. quarter method.

4) Sampled productivity [n=6(30)] by clipping, weighing and double sampling.

ENERGY WEST-DES BEE DOVE
Beehive Substation Slope
1986 Reveg Area
Acreage: .1
Slope: 35 deg
Exposure: S

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	Mean	SDev
SHRUBS								
Chrysothamnus nauseosus	0.00	35.00	25.00	10.00	20.00	30.00	20.00	11.90
FORBS								
GRASSES								
Agropyron cristatum	0.00	0.00	10.00	0.00	5.00	0.00	2.50	3.82
Elymus cinereus	0.00	0.00	0.00	0.00	10.00	0.00	1.67	3.73
Elymus smithii	0.00	0.00	0.00	10.00	0.00	0.00	1.67	3.73
Elymus smithii	0.00	0.00	0.00	0.00	0.00	15.00	2.50	5.59
Elymus spicatus	20.00	0.00	0.00	0.00	5.00	0.00	4.17	7.31
COVER								
Total Living Cover	20.00	35.00	35.00	20.00	40.00	45.00	32.50	9.46
Litter	10.00	10.00	10.00	10.00	15.00	15.00	11.67	2.36
Bareground	40.00	40.00	30.00	45.00	20.00	5.00	30.00	13.84
Rock	30.00	15.00	25.00	25.00	25.00	35.00	25.83	6.07
% COMPOSITION								
Shrubs	0.00	100.00	71.43	50.00	50.00	66.67	56.35	30.26
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	100.00	0.00	28.57	50.00	50.00	33.33	43.65	30.26

UP&L-DES BEE DOVE
Beehive Substation Slope
1986 Reveg Area
Acreage: .1
Slope: 35 deg
Exposure: S
Sample Date: 12-17 Aug 97

Freq	
	SHRUBS
83.33	Chrysothamnus nauseosus
	FORBS
	GRASSES
33.33	Agropyron cristatum
16.67	Elymus cinereus
16.67	Elymus hispidus
16.67	Elymus smithii
33.33	Elymus spicatus

	COVER
	Total Living Cover
	Litter
	Bareground
	Rock
	% COMPOSITION
	Shrubs
	Forbs
	Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Pond Area

AREA: Des-Bee-Dove (1985 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 0-10 deg.

EXPOSURE: S

AREA: .7 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (See quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quant. data sheet)

Atriplex canescens
Atriplex confertifolia
Chrysothamnus nauseosus
Chrysothamnus viscidiflorus
Gutierrezia sarothrae
Sarcobatus vermiculatus

Malcomia africana

Agropyron cristatum
Bromus tectorum
Elymus salinus
Elymus spicatus
Hilaria jamesii
Stipa hymenoides

WOODY SPECIES DENSITY:

	1997 (no./ac)
Chrysothamnus nauseosus	518.81
Atriplex canescens	4669.27
Sarcobatus vermiculatus	518.81
Atriplex confertifolia	2075.23
Gutierrezia sarothrae	12970.18
Total	20752.29

PRODUCTION:	1997 (lbs/ac)
Herbaceous	77.04
Woody	794.27
Total	871.31

NOTES:
1) We sampled at regularly around entire area.
2) Sampled cover (n=10) and frequency (n=10) by ocular methods.
3) Sampled density (n=10) using the pt. quarter method.
4) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.
5) Like the last few years, the area looked very good.

ENERGY WEST-DES BEE DOVE
Sediment Pond Area
1985 Reveg Area
Acreage: .7
Slope: 0-10 deg
Exposure: S

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex canescens	10.00	10.00	50.00	5.00	0.00	0.00	0.00	10.00
Atriplex confertifolia	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus nauseosus	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	30.00	25.00	0.00	20.00	10.00	30.00	45.00	20.00
Sarcobatus vermiculatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS								
GRASSES								
Agropyron cristatum	0.00	5.00	15.00	0.00	5.00	0.00	0.00	0.00
Bromus tectorum	0.00	15.00	0.00	5.00	5.00	0.00	0.00	10.00
Elymus lanceolatus	0.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00
Elymus salinus	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
Elymus spicatus	0.00	0.00	0.00	0.00	5.00	0.00	15.00	0.00
COVER								
Total Living Cover	45.00	55.00	80.00	35.00	25.00	40.00	60.00	50.00
Litter	10.00	20.00	10.00	15.00	5.00	10.00	10.00	10.00
Bareground	20.00	15.00	5.00	5.00	10.00	10.00	5.00	15.00
Rock	25.00	10.00	5.00	45.00	60.00	40.00	25.00	25.00
% COMPOSITION								
Shrubs	100.00	63.64	75.00	71.43	40.00	75.00	75.00	60.00
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	0.00	36.36	25.00	28.57	60.00	25.00	25.00	40.00

ENERGY WEST-DES BEE DOVE
Sediment Pond Area
1985 Reveg Area
Acreage: .7
Slope: 0-10 deg
Exposure: S
Sample Date: 12-17 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	10.00	9.50	14.22	60.00	Atriplex canescens
15.00	0.00	2.00	4.58	20.00	Atriplex confertifolia
0.00	0.00	1.00	3.00	10.00	Chrysothamnus nauseosus
15.00	15.00	21.00	11.79	90.00	Gutierrezia sarothrae
10.00	0.00	1.00	3.00	10.00	Sarcobatus vermiculatus
					FORBS
					GRASSES
0.00	5.00	3.00	4.58	40.00	Agropyron cristatum
10.00	5.00	5.00	5.00	60.00	Bromus tectorum
0.00	0.00	1.00	2.00	20.00	Elymus lanceolatus
0.00	15.00	3.50	5.50	30.00	Elymus salinus
0.00	0.00	2.00	4.58	20.00	Elymus spicatus
					COVER
50.00	50.00	49.00	14.11		Total Living Cover
10.00	10.00	11.00	3.74		Litter
10.00	25.00	12.00	6.40		Bareground
30.00	15.00	28.00	15.84		Rock
					% COMPOSITION
80.00	50.00	69.01	15.84		Shrubs
0.00	0.00	0.00	0.00		Forbs
20.00	50.00	30.99	15.84		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Bathhouse Slope

AREA: Des-Bee-Dove (1984 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 25 deg.

EXPOSURE: Variable

AREA: 2.3 acre

ANIMAL USE/DISTURBANCE: There is slight and moderate erosion in some areas (see photographs).

EROSION: Negligible

COVER: Qualitative data only

DOMINANT PLANT SPECIES OBSERVED:
Chrysothamnus nauseosus
Eriogonum corymbosum

Aster glaucodes
Kochia scoparia
Sisymbrium altissimum

Agropyron cristatum
Bromus tectorum
Elymus lanceolatus
Elymus smithii
Elymus salinus
Elymus spicatus
Elymus hispidus
Elymus cinereus
Poa pratensis
Stipa hymenoides

NOTES:
1) Only sampled qualitatively this year.
2) As before, this site was in "excellent" condition.
3) Vegetative cover remains good & diverse.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Materials Yard Slope

AREA: Des-Bee-Dove (1984 Reveg. Area)

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 20-25 deg.

EXPOSURE: SE

AREA: 1.1 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: There was some moderate erosion near the bottom of the slope.

COVER:

DOMINANT PLANT SPECIES OBSERVED:
Atriplex confertifolia
Atriplex gardneri
Chrysothamnus nauseosus

Aster chilensis
Medicago sativa
Halogeton glomeratus

Bromus tectorum
Elymus cinereus
Elymus lanceolatus
Elymus smithii
Elymus spicatus
Stipa hymenoides
Agropyron cristatum

NOTES: 1) Sampled for qualitative data only this year.

2) Site looked "excellent" again this year.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Test Plot (1989)

AREA: Des-Bee-Dove

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 26 deg.

EXPOSURE: S

AREA: .6 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Slight to Moderate

COVER: (see quantitative data)

PLANT SPECIES PLANTED:

Atriplex canescens
Atriplex corrugata
Atriplex confertifolia
Ceratoides lanata
Kochia prostrata

Linum lewisii
Melilotus officinalis
Sphaeralcea coccinea

Elymus lanceolatus
Elymus smithii
Elymus cinereus
Stipa hymenoides
Sporobolus airoides

PLANT SPECIES OBSERVED:

Sarcobatus vermiculatus
Suaeda torreyana
Atriplex canescens
Atriplex gardneri

Atriplex powellii
Bassia hyssopifolia
Kochia scoparia
Halogeton glomeratus

Elymus lanceolatus

NOTES: 1) Qualitative sampling only.

2) Vegetation was dominated by *Suaeda torreyana* and *Atriplex powellii* with more *Sarcobatus vermiculatus* starting to become established.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Test Plot (1992)

AREA: Des-Bee-Dove

DATE: August 12-17, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 3-5 deg.

EXPOSURE: SW

ANIMAL USE/DISTURBANCE:

EROSION: Slight

COVER: (see quantitative data)

PLANT SPECIES OBSERVED

Ceratoides lanata

Atriplex powellii
Kochia scoparia
Malcomia africana
Melilotus officinalis
Bassia hyssopifolia
Halogeton glomeratus

Stipa hymenoides
Bromus tectorum
Elymus lanceolatus
Elymus smithii
Elymus trachycaulus
Elymus cinereus
Elymus salinus
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:
1994

Plot	*Plant Names*	*Mean No./Acre*
1.	*Ceratoides lanata*	
	Total	1763.14
2.	*Ceratoides lanata*	
	Total	3630.00
3.	*Ceratoides lanata*	
	Total	207.43
4.	*Ceratoides lanata*	
	Total	1244.57
5.	*Ceratoides lanata*	
	Total	829.72
6(8).	*Ceratoides lanata*	
	Total	207.43
7.	*Ceratoides lanata*	
	Total	0.00
8.	*Ceratoides lanata*	
	Total	103.71

1995

Plot	*Plant Names*	*Mean No./Acre*
1.	*Ceratoides lanata*	1348.23
	Atriplex canescens	311.13
	Total	1659.36
2.	*Ceratoides lanata*	3837.27
	Atriplex canescens	207.42
	Total	3630.00
3.	*Ceratoides lanata*	
	Total	414.84

4.	*Ceratoides lanata*	
	Total	2489.04
5.	*Ceratoides lanata*	829.68
	Atriplex canescens	207.42
	Total	1037.10
6(8).	*Ceratoides lanata*	414.84
	Atriplex canescens	207.42
	Total	622.26
7.	*Ceratoides lanata*	
	Total	0.00
8.	*Ceratoides lanata*	
	Total	414.84

1996

Plot	*Plant Names*	*Mean No./Acre*
1.	*Ceratoides lanata*	
	Total	1244.57
2.	*Ceratoides lanata*	
	Total	4252.28
3.	*Ceratoides lanata*	
	Total	622.28
4.	*Ceratoides lanata*	
	Total	3007.71
	Atriplex canescens	
	Total	207.43
5.	*Ceratoides lanata*	
	Total	553.15
	Atriplex canescens	
	Total	69.14
6(8).	*Ceratoides lanata*	
	Total	622.29

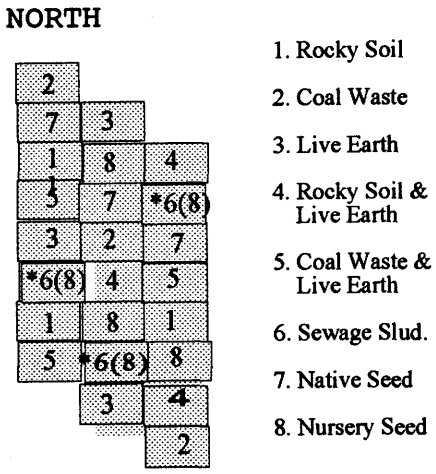
7.	*Ceratoides lanata*	
	Total	103.71
8.	*Ceratoides lanata*	
	Total	553.39
	Atriplex canescens	
	Total	88.90

1997

Plot	*Plant Names*	*Mean No./Acre*
	Ceratoides lanata	1659.43
	Chrysothamnus nauseosus	103.71
	Atriplex gardneri	--
	Atriplex canescens	207.43
	Total	1970.57
2.	*Ceratoides lanata*	4563.43
	Chrysothamnus nauseosus	--
	Atriplex gardneri	--
	Atriplex canescens	--
	Total	4563.43
3.	*Ceratoides lanata*	1037.14
	Chrysothamnus nauseosus	
	Atriplex gardneri	
	Atriplex canescens	
	Total	1037.14
4.	*Ceratoides lanata*	3630.00
	Chrysothamnus nauseosus	--
	Atriplex gardneri	103.71
	Atriplex canescens	207.43
	Total	3941.14
5.	*Ceratoides lanata*	1452.00
	Chrysothamnus nauseosus	--
	Atriplex gardneri	--
	Atriplex canescens	103.71
	Total	1555.71
6(8).	*Ceratoides lanata*	1244.57
	Chrysothamnus nauseosus	--
	Atriplex gardneri	--
	Atriplex canescens	--
	Total	1244.57

7.	*Ceratoides lanata*	311.14
	Chrysothamnus nauseosus	--
	Atriplex gardneri	--
	Atriplex canescens	--
	Total	311.14
8.	*Ceratoides lanata*	829.71
	Chrysothamnus nauseosus	--
	Atriplex gardneri	--
	Atriplex canescens	--
	Total	829.71

NOTES:
1) Plot looked good this year.
2) As all previous years, we did not look at treatments before sampling as an attempt to decrease bias.
3) For cover we put 3 quadrats (n=3, tot. n=72) in each 10' X 14' plot, side by side leaving the edges for a buffer. Therefore, nearly the entire plot was sampled.
4) For density we counted all within each plot.
5) Refer to the map for the order.
6) Most of the desirable plant species were becoming established in the contour depressions where moisture collects.
7) Density increase in each treatment without exception.
8) A task force team met on this plot this year. Summaries were made of the data and are available upon request.
9) 1994-96 density data were included for comparisons.



ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #1
Acreage:
Slope: 3-5 deg — 1-3 = 1A — 4-6 = 1B — 7-9 = 1C
Exposure: SW

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex canescens	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Chrysothamus nauseosus	0.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS								
Halogeton glomeratus	0.00	5.00	0.00	10.00	20.00	0.00	0.00	0.00
GRASSES								
Bromus tectorum	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	20.00	0.00	15.00	10.00	0.00	10.00	45.00	30.00
Elymus salinus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Elymus smithii	20.00	10.00	0.00	5.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
COVER								
Total Living Cover	40.00	25.00	20.00	25.00	25.00	25.00	45.00	30.00
Litter	10.00	5.00	25.00	5.00	10.00	20.00	5.00	5.00
Bareground	40.00	40.00	30.00	45.00	40.00	35.00	30.00	40.00
Rock	10.00	30.00	25.00	25.00	25.00	20.00	20.00	25.00
% COMPOSITION								
Shrubs	0.00	28.00	0.00	0.00	20.00	40.00	0.00	0.00
Forbs	0.00	20.00	0.00	40.00	80.00	0.00	0.00	0.00
Grasses	100.00	52.00	100.00	60.00	0.00	60.00	100.00	100.00

UP&L-DES BEE DOVE
TEST PLOT (1992)
Subplots #1
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
10.00	1.67	3.33	22.22	Atriplex canescens
0.00	1.11	3.14	11.11	Ceratoides lanata
0.00	0.78	2.20	11.11	Chrysothamus nauseosus
				FORBS
0.00	3.89	6.57	33.33	Halogeton glomeratus
				GRASSES
0.00	0.33	0.94	11.11	Bromus tectorum
25.00	17.22	13.77	77.78	Elymus lanceolatus
0.00	0.56	1.57	11.11	Elymus salinus
10.00	5.00	6.67	44.44	Elymus smithii
0.00	0.56	1.57	11.11	Stipa hymenoides
				COVER
45.00	31.11	9.06		Total Living Cover
20.00	11.67	7.45		Litter
15.00	35.00	8.50		Bareground
20.00	22.22	5.33		Rock
				% COMPOSITION
22.22	12.25	14.64		Shrubs
0.00	15.56	26.29		Forbs
77.78	72.20	31.69		Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #2
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

	1-3 = 2A			4-6 = 2B			7-9 = 2C	
	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Ceratoides lanata	3.00	0.00	5.00	0.00	5.00	5.00	0.00	30.00
FORBS								
Atriplex powellii	0.00	0.00	0.00	5.00	0.00	5.00	0.00	0.00
GRASSES								
Bromus tectorum	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Elymus cinereus	5.00	5.00	5.00	5.00	0.00	0.00	0.00	0.00
Elymus junceus	0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00
Elymus lanceolatus	22.00	20.00	25.00	20.00	25.00	15.00	35.00	15.00
Elymus smithii	25.00	0.00	5.00	5.00	0.00	5.00	10.00	0.00
COVER								
Total Living Cover	55.00	25.00	45.00	35.00	35.00	35.00	45.00	45.00
Litter	10.00	5.00	20.00	10.00	10.00	5.00	10.00	10.00
Bareground	5.00	5.00	5.00	45.00	10.00	10.00	10.00	10.00
Rock	30.00	65.00	30.00	10.00	45.00	50.00	35.00	35.00
% COMPOSITION								
Shrubs	5.45	0.00	11.11	0.00	14.29	14.29	0.00	66.67
Forbs	0.00	0.00	0.00	14.29	0.00	14.29	0.00	0.00
Grasses	94.55	100.00	88.89	85.71	85.71	71.43	100.00	33.33

ENERGY WEST-DES BEE DO
TEST PLOT (1992)
Subplots #2
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq		
					SHRUBS
15.00	7.00	9.24	66.67		Ceratoides lanata
					FORBS
0.00	1.11	2.08	22.22		Atriplex powellii
					GRASSES
0.00	0.56	1.57	11.11		Bromus tectorum
0.00	2.22	2.48	44.44		Elymus cinereus
0.00	1.11	2.08	22.22		Elymus junceus
15.00	21.33	6.13	100.00		Elymus lanceolatus
10.00	6.67	7.45	66.67		Elymus smithii
					COVER
40.00	40.00	8.16			Total Living Cover
5.00	9.44	4.37			Litter
5.00	11.67	12.02			Bareground
50.00	38.89	14.87			Rock
					% COMPOSITION
37.50	16.59	20.91			Shrubs
0.00	3.17	5.94			Forbs
62.50	80.24	20.31			Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #3
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

	1-3 = 3A			4-6 = 3B			7-9 = 3C	
	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex gardneri	0.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00
Ceratoides lanata	0.00	0.00	5.00	0.00	0.00	0.00	0.00	10.00
FORBS								
Halogeton glomeratus	5.00	30.00	15.00	0.00	5.00	0.00	0.00	0.00
GRASSES								
Elymus cinereus	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Elymus junceus	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Elymus lanceolatus	15.00	0.00	10.00	10.00	10.00	25.00	25.00	20.00
Elymus smithii	5.00	0.00	5.00	15.00	0.00	5.00	15.00	10.00
Elymus spicatus	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	25.00	35.00	40.00	25.00	25.00	35.00	40.00	40.00
Litter	10.00	5.00	5.00	5.00	10.00	25.00	10.00	10.00
Bareground	60.00	55.00	50.00	65.00	55.00	35.00	45.00	45.00
Rock	5.00	5.00	5.00	5.00	10.00	5.00	5.00	5.00
% COMPOSITION								
Shrubs	0.00	0.00	25.00	0.00	0.00	14.29	0.00	25.00
Forbs	20.00	85.71	37.50	0.00	20.00	0.00	0.00	0.00
Grasses	80.00	14.29	37.50	100.00	80.00	85.71	100.00	75.00

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #3
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
0.00	1.11	2.08	22.22	Atriplex gardneri
0.00	1.67	3.33	22.22	Ceratoides lanata
				FORBS
0.00	6.11	9.65	44.44	Halogeton glomeratus
				GRASSES
0.00	0.56	1.57	11.11	Elymus cinereus
0.00	0.56	1.57	11.11	Elymus junceus
30.00	16.11	9.06	88.89	Elymus lanceolatus
10.00	7.22	5.33	77.78	Elymus smithii
0.00	0.56	1.57	11.11	Elymus spicatus
				COVER
40.00	33.89	6.57		Total Living Cover
10.00	10.00	5.77		Litter
45.00	50.56	8.64		Bareground
5.00	5.56	1.57		Rock
				% COMPOSITION
0.00	7.14	10.51		Shrubs
0.00	18.13	27.07		Forbs
100.00	74.72	28.15		Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #4
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

	1-3 = 4A			4-6 = 4B			7-9 = 4C	
	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex canescens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00
Ceratoides lanata	0.00	5.00	0.00	0.00	0.00	0.00	0.00	25.00
FORBS								
Atriplex powellii	0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00
Halogeton glomeratus	0.00	15.00	20.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Elymus lanceolatus	35.00	10.00	15.00	35.00	0.00	0.00	45.00	8.00
Elymus smithii	20.00	0.00	0.00	5.00	35.00	40.00	0.00	0.00
COVER								
Total Living Cover	55.00	35.00	40.00	40.00	35.00	40.00	45.00	40.00
Litter	5.00	10.00	10.00	10.00	20.00	5.00	10.00	10.00
Bareground	30.00	35.00	30.00	40.00	25.00	35.00	20.00	25.00
Rock	10.00	20.00	20.00	10.00	20.00	20.00	25.00	25.00
% COMPOSITION								
Shrubs	0.00	14.29	0.00	0.00	0.00	0.00	0.00	80.00
Forbs	0.00	57.14	62.50	0.00	0.00	0.00	0.00	0.00
Grasses	100.00	28.57	37.50	100.00	100.00	100.00	100.00	20.00

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #4
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
0.00	0.78	2.20	11.11	Atriplex canescens
25.00	6.11	10.21	33.33	Ceratoides lanata
				FORBS
0.00	1.11	2.08	22.22	Atriplex powellii
0.00	3.89	7.37	22.22	Halogeton glomeratus
				GRASSES
15.00	18.11	15.41	77.78	Elymus lanceolatus
0.00	11.11	15.42	44.44	Elymus smithii
				COVER
40.00	41.11	5.67		Total Living Cover
10.00	10.00	4.08		Litter
35.00	30.56	5.98		Bareground
15.00	18.33	5.27		Rock
				% COMPOSITION
62.50	17.42	29.40		Shrubs
0.00	13.29	24.90		Forbs
37.50	69.29	34.68		Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #5
Acreage:
Slope: 3-5 deg — 1-3 = 5A — 4-6 = 5B — 7-9 = 5C
Exposure: SW

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Ceratoides lanata	0.00	5.00	0.00	0.00	20.00	5.00	0.00	0.00
FORBS								
GRASSES								
Elymus cinereus	20.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	15.00	5.00	30.00	20.00	0.00	20.00	35.00	35.00
Elymus smithii	15.00	5.00	5.00	0.00	0.00	5.00	20.00	5.00
Stipa hymenoides	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	50.00	20.00	45.00	20.00	20.00	30.00	55.00	40.00
Litter	15.00	5.00	10.00	5.00	10.00	5.00	5.00	5.00
Bareground	10.00	5.00	20.00	65.00	10.00	55.00	5.00	5.00
Rock	25.00	70.00	25.00	10.00	60.00	10.00	35.00	50.00
% COMPOSITION								
Shrubs	0.00	25.00	0.00	0.00	100.00	16.67	0.00	0.00
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	100.00	75.00	100.00	100.00	0.00	83.33	100.00	100.00

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #5
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
0.00	3.33	6.24	33.33	Ceratoides lanata
				FORBS
				GRASSES
0.00	3.33	6.67	22.22	Elymus cinereus
35.00	21.67	12.47	88.89	Elymus lanceolatus
0.00	6.11	6.57	66.67	Elymus smithii
0.00	0.56	1.57	11.11	Stipa hymenoides
				COVER
35.00	35.00	12.69		Total Living Cover
10.00	7.78	3.42		Litter
10.00	20.56	21.66		Bareground
45.00	36.67	20.00		Rock
				% COMPOSITION
0.00	15.74	31.04		Shrubs
0.00	0.00	0.00		Forbs
100.00	84.26	31.04		Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #6(8)
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

1-3 = 6(8)A 4-6 = 6(8)B 7-9 = 6(8)

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex gardneri	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00
Ceratoides lanata	0.00	15.00	7.00	0.00	0.00	3.00	0.00	0.00
FORBS								
Halogeton glomeratus	25.00	15.00	25.00	0.00	10.00	5.00	0.00	0.00
Sphaeralcea coccinea	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
GRASSES								
Elymus lanceolatus	0.00	0.00	5.00	25.00	10.00	5.00	30.00	35.00
Elymus smithii	0.00	0.00	0.00	10.00	0.00	5.00	10.00	0.00
COVER								
Total Living Cover	25.00	30.00	40.00	35.00	20.00	20.00	40.00	35.00
Litter	5.00	10.00	20.00	10.00	5.00	10.00	10.00	10.00
Bareground	65.00	55.00	30.00	45.00	65.00	65.00	45.00	45.00
Rock	5.00	5.00	10.00	10.00	10.00	5.00	5.00	10.00
% COMPOSITION								
Shrubs	0.00	50.00	25.00	0.00	0.00	15.00	0.00	0.00
Forbs	100.00	50.00	62.50	0.00	50.00	35.00	0.00	0.00
Grasses	0.00	0.00	12.50	100.00	50.00	50.00	100.00	100.00

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #6(8)
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
0.00	0.33	0.94	11.11	Atriplex gardneri
5.00	3.33	4.81	44.44	Ceratoides lanata
				FORBS
0.00	8.89	9.94	55.56	Halogeton glomeratus
0.00	0.22	0.63	11.11	Sphaeralcea coccinea
				GRASSES
30.00	15.56	13.43	77.78	Elymus lanceolatus
0.00	2.78	4.16	33.33	Elymus smithii
				COVER
35.00	31.11	7.37		Total Living Cover
5.00	9.44	4.37		Litter
55.00	52.22	11.33		Bareground
5.00	7.22	2.48		Rock
				% COMPOSITION
14.29	11.59	16.14		Shrubs
0.00	33.06	33.83		Forbs
85.71	55.36	40.72		Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #7
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

	1-3 = 7A			4-6 = 7B			7-9 = 7C	
	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
FORBS								
Atriplex powellii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Halogeton glomeratus	0.00	15.00	40.00	5.00	10.00	5.00	5.00	5.00
GRASSES								
Elymus lanceolatus	0.00	0.00	0.00	20.00	10.00	5.00	20.00	20.00
Elymus salinus	35.00	10.00	0.00	5.00	0.00	15.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
COVER								
Total Living Cover	35.00	25.00	40.00	30.00	20.00	25.00	25.00	35.00
Litter	10.00	25.00	20.00	10.00	20.00	10.00	5.00	10.00
Bareground	50.00	45.00	35.00	55.00	50.00	60.00	65.00	50.00
Rock	5.00	5.00	5.00	5.00	10.00	5.00	5.00	5.00
% COMPOSITION								
Shrubs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	0.00	60.00	100.00	16.67	50.00	20.00	20.00	28.57
Grasses	100.00	40.00	0.00	83.33	50.00	80.00	80.00	71.43

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #7
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
				FORBS
0.00	0.56	1.57	11.11	Atriplex powellii
5.00	10.00	11.30	88.89	Halogeton glomeratus
				GRASSES
10.00	9.44	8.31	66.67	Elymus lanceolatus
5.00	7.78	10.83	55.56	Elymus salinus
10.00	1.67	3.33	22.22	Stipa hymenoides
				COVER
30.00	29.44	5.98		Total Living Cover
20.00	14.44	6.43		Litter
45.00	50.56	8.31		Bareground
5.00	5.56	1.57		Rock
				% COMPOSITION
0.00	0.00	0.00		Shrubs
16.67	34.66	28.80		Forbs
83.33	65.34	28.80		Grasses

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #8
Acreage:
Slope: 3-5 deg — 1-3 = 8A — 4-6 = 8B — 7-9 = 8C
Exposure: SW

Sample Date: 12-17 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Atriplex gardneri	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS								
Atriplex powellii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Halogeton glomeratus	5.00	10.00	10.00	0.00	0.00	7.00	0.00	5.00
GRASSES								
Elymus cinereus	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Elymus lanceolatus	25.00	10.00	5.00	35.00	35.00	8.00	15.00	30.00
Elymus smithii	15.00	0.00	5.00	10.00	0.00	0.00	10.00	5.00
COVER								
Total Living Cover	45.00	20.00	25.00	45.00	35.00	15.00	35.00	40.00
Litter	5.00	5.00	5.00	10.00	10.00	10.00	5.00	20.00
Bareground	45.00	65.00	60.00	40.00	50.00	65.00	55.00	30.00
Rock	5.00	10.00	10.00	5.00	5.00	10.00	5.00	10.00
% COMPOSITION								
Shrubs	0.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00
Forbs	11.11	50.00	40.00	0.00	0.00	46.67	0.00	12.50
Grasses	88.89	50.00	40.00	100.00	100.00	53.33	100.00	87.50

ENERGY WEST-DES BEE DOVE
TEST PLOT (1992)
Subplots #8
Acreage:
Slope: 3-5 deg
Exposure: SW
Sample Date: 12-17 Aug 97

9.00	Mean	SDev	Freq	
				SHRUBS
0.00	0.56	1.57	11.11	Atriplex gardneri
8.00	0.89	2.51	11.11	Ceratoides lanata
				FORBS
5.00	0.56	1.57	11.11	Atriplex powellii
15.00	5.78	4.98	66.67	Halogeton glomeratus
				GRASSES
0.00	1.11	3.14	11.11	Elymus cinereus
0.00	18.11	12.64	88.89	Elymus lanceolatus
7.00	5.78	4.98	66.67	Elymus smithii
				COVER
35.00	32.78	10.03		Total Living Cover
5.00	8.33	4.71		Litter
55.00	51.67	11.06		Bareground
5.00	7.22	2.48		Rock
				% COMPOSITION
22.86	4.76	8.93		Shrubs
57.14	24.16	22.53		Forbs
20.00	71.08	28.73		Grasses

COLOR
PHOTOGRAPHS

Des Bee Dove - Beehive Yard Slope

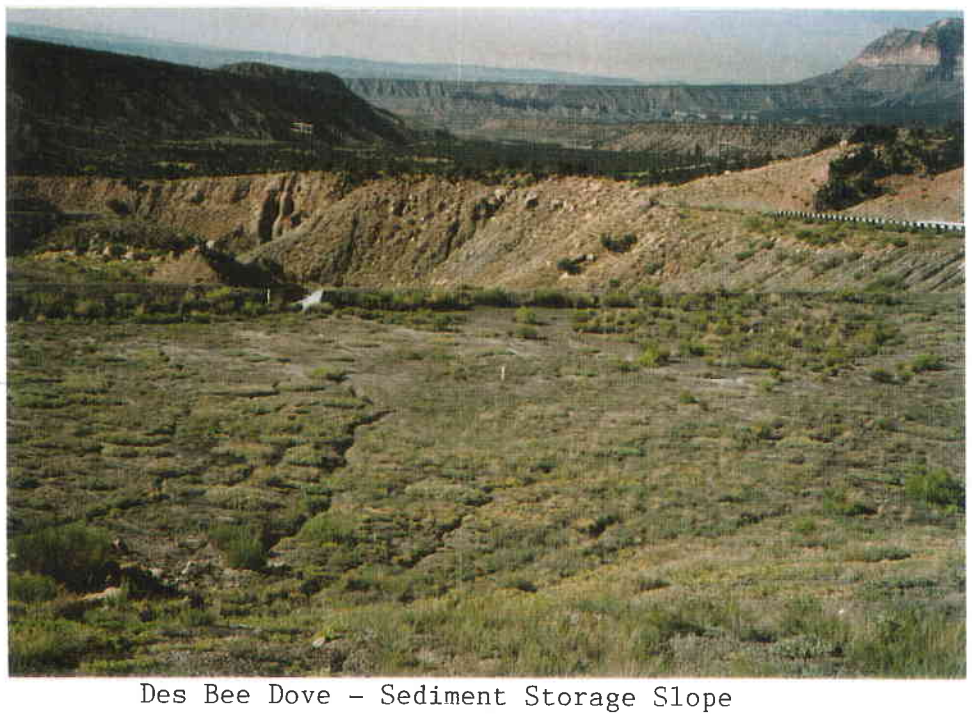
Des Bee Dove - Beehive Road Berm

Des Bee Dove - Deseret Road Berm

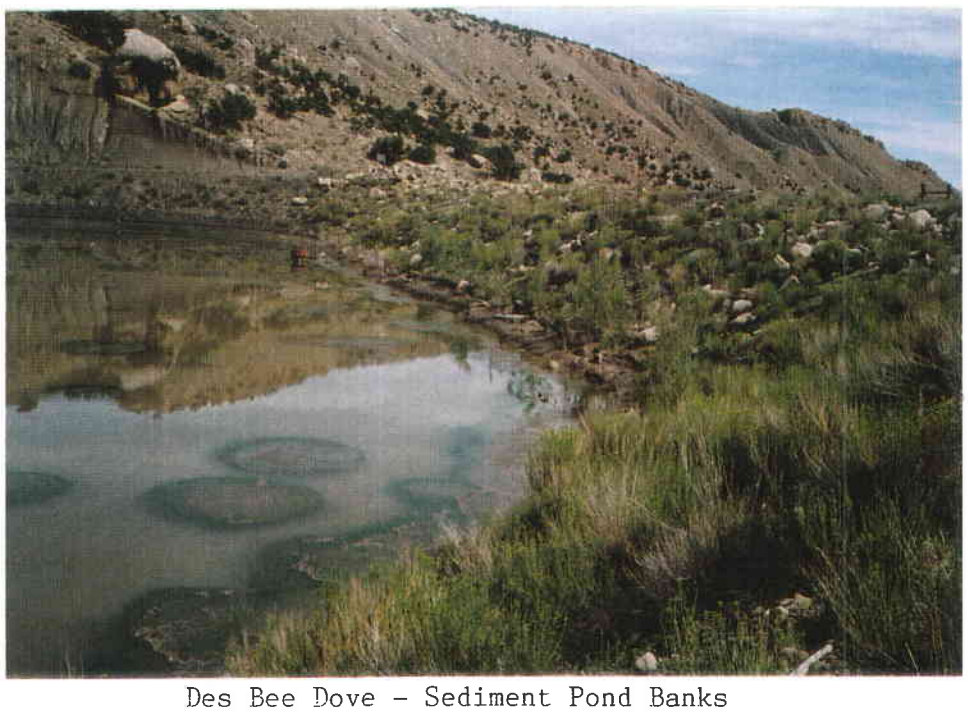
Des Bee Dove - Portal Road Berm

Des Bee Dove - Bathhouse Road Berm

Des Bee Dove - Tipple Slope

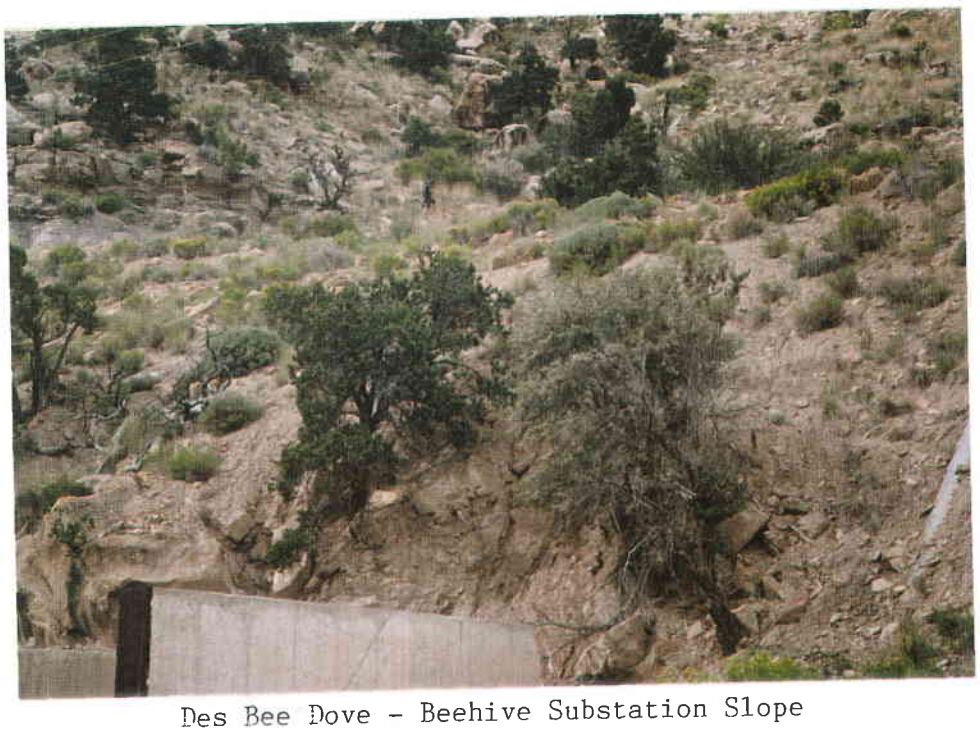


Des Bee Dove - Sediment Storage Slope



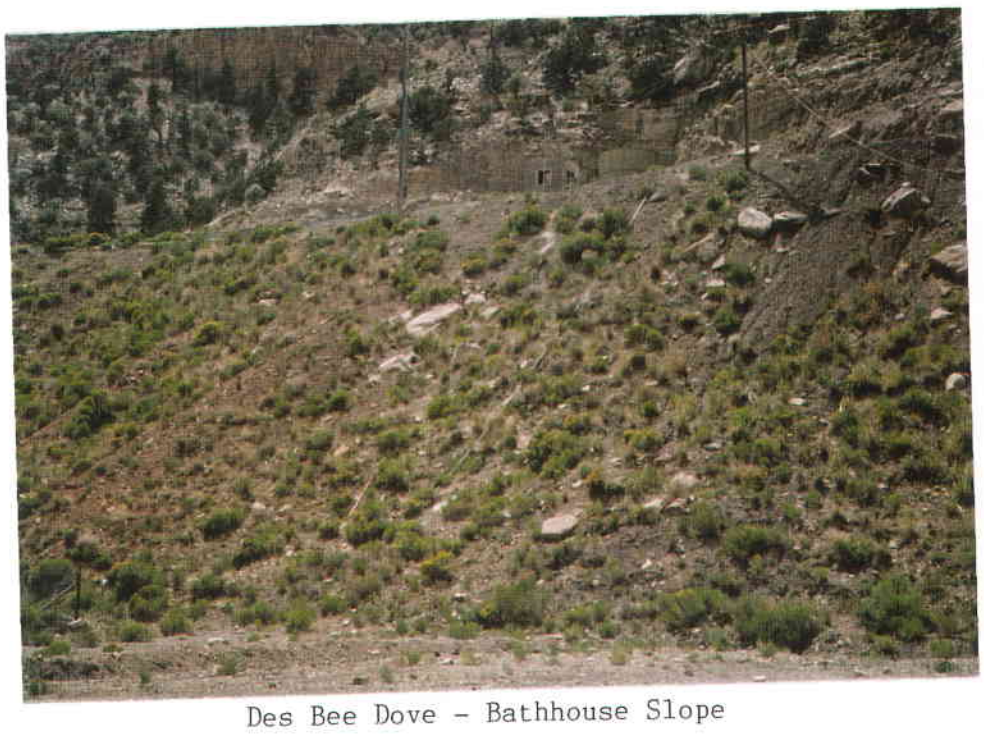
Des Bee Dove - Sediment Pond Banks

Des Bee Dove - Haul Road Bench



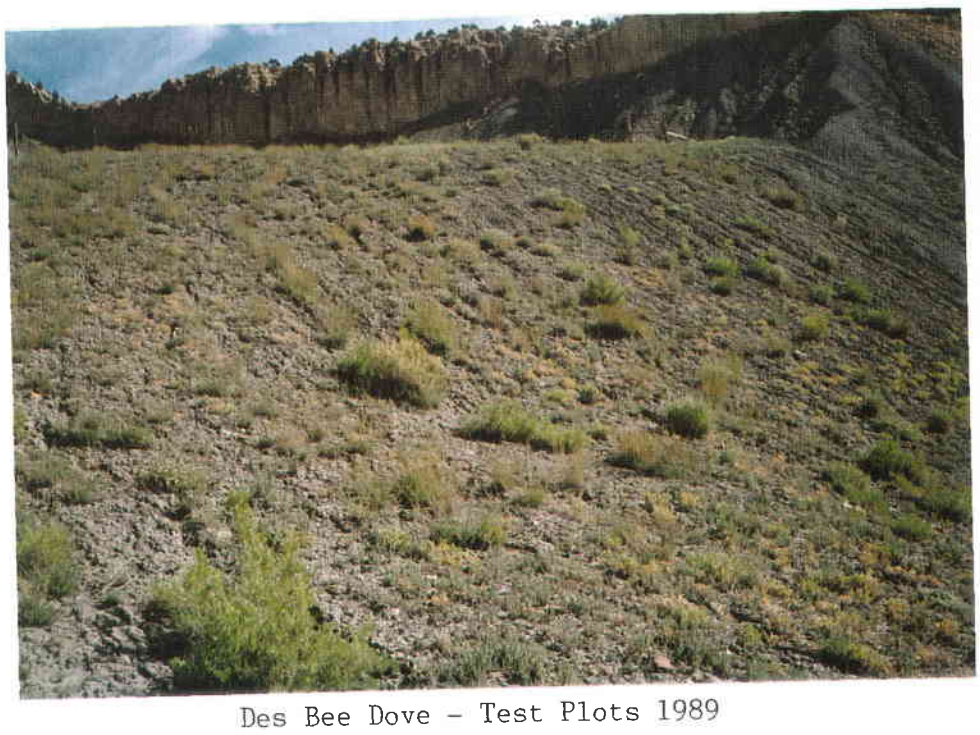
Des Bee Dove - Beehive Substation Slope

Des Bee Dove - Sediment Pond Area



Des Bee Dove - Bathhouse Slope

Des Bee Dove - Material Yard Slope



Des Bee Dove - Test Plots 1989

Des Bee Dove - Test Plots 1992

DEER CREEK AREA

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: C2 Conveyor (IU 132-190) '93

AREA: Deer Creek Mine Area

DATE: August 4-9, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 8 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible on flatter area, moderate on slopes

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see quantitative data)

WOODY SPECIES DENSITY:

	1997 (no./ac)
Chrysothamnus nauseosus	278.78
Gutierrezia sarothrae	487.87
Yucca harrimaniae	69.70
Juniperus osteosperma	348.48
Amalanchier utahensis	348.48
Eriogonum corymbosum	627.26
Total	975.74

NOTES: 1) A more comprehensive study was also done later in the year for this area called:

VEGETATION DATA
FOR SEDIMENT CONTROL

LOCATED NEAR THE
C2 CONVEYOR BELT TRANSFER AREA
AT THE DEER CREEK MINE

1997

2) The study looked at the possibility of the current plant cover as adequate to control erosion so the silt fence may be removed.

3) These data represent the sampling done within the dates shown above, not the subsequent study.

4) We sampled at randomly over the entire area top of cut slope and flat area.

5) Sampled cover (n=6) and frequency (n=) by ocular methods.

6) Sampled density (n=5) using belt transect the were 5 ft X 25 ft..

ENERGY WEST-DEER CREEK
C 2 Conveyor
(I U 132-190) 1993
Acreage:
Slope: 8 deg
Exposure: E

Sample Date: 4-9 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	Mean	SDev
SHRUBS								
Amalanchier utahensis	10.00	5.00	0.00	0.00	0.00	0.00	2.50	3.82
Chrysothamnus nauseosus	0.00	0.00	0.00	0.00	0.00	5.00	0.83	1.86
Eriogonum corymbosum	0.00	5.00	0.00	0.00	5.00	0.00	1.67	2.36
Gutierrezia sarothrae	10.00	0.00	0.00	0.00	0.00	0.00	1.67	3.73
Juniperus ostersperma	0.00	0.00	5.00	0.00	0.00	0.00	0.83	1.86
FORBS								
Artemisia ludoviciana	0.00	0.00	0.00	5.00	0.00	0.00	0.83	1.86
Aster chilensis	0.00	0.00	0.00	0.00	0.00	5.00	0.83	1.86
Aster glaucodes	0.00	0.00	0.00	0.00	5.00	0.00	0.83	1.86
Machaeranthera canescens	5.00	0.00	0.00	0.00	0.00	0.00	0.83	1.86
Penstemon palmeri	5.00	0.00	0.00	0.00	0.00	0.00	0.83	1.86
GRASSES								
Elymus spicatus	0.00	10.00	5.00	0.00	0.00	0.00	2.50	3.82
Stipa comata	0.00	5.00	10.00	0.00	20.00	0.00	5.83	7.31
Stipa hymenoides	5.00	15.00	20.00	45.00	15.00	25.00	20.83	12.39
COVER								
Total Living Cover	35.00	40.00	40.00	50.00	45.00	35.00	40.83	5.34
Litter	5.00	5.00	40.00	40.00	20.00	5.00	19.17	15.66
Bareground	10.00	20.00	10.00	5.00	5.00	10.00	10.00	5.00
Rock	50.00	35.00	10.00	5.00	30.00	50.00	30.00	17.56
% COMPOSITION								
Shrubs	57.14	25.00	12.50	0.00	11.11	14.29	20.01	18.13
Forbs	28.57	0.00	0.00	10.00	11.11	14.29	10.66	9.68
Grasses	14.29	75.00	87.50	90.00	77.78	71.43	69.33	25.48

ENERGY WEST-DEER CREE
C 2 Conveyor
(I U 132-190) 1993
Acreage:
Slope: 8 deg
Exposure: E
Sample Date: 4-9 Aug 97

Freq	
	SHRUBS
33.33	Amalanchier utahensis
16.67	Chrysothamnus nauseosus
13.33	Eriogonum corymbosum
16.67	Gutierrezia sarothrae
16.67	Juniperus ostersperma
	FORBS
16.67	Artemisia ludoviciana
16.67	Aster chilensis
16.67	Aster glaucodes
16.67	Machaeranthera canescens
16.67	Penstemon palmeri
	GRASSES
33.33	Elymus spicatus
50.00	Stipa comata
100.00	Stipa hymenoides

	COVER
	Total Living Cover
	Litter
	Bareground
	Rock
	% COMPOSITION
	Shrubs
	Forbs
	Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Riparian Areas

AREA: Deer Creek Mine Area

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 1 to 5 deg.

EXPOSURE: Variable

AREA: < .5 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Mahonia repens
Artemisia tridentata
Clematis sp.
Rosa woodsii
Prunus virginiana
Chrysothamnus nauseosus
Sambucus caerulea

Grindelia squarrosa
Medicago sativa
Circium sp.
Machaeranthera canescens

Agropyron cristatum
Elymus elongatus
Elymus cinereus
Elymus hispidus
Elymus spicatus
Stipa hymenoides
Poa pratensis

NOTES: 1) Qualitative data this year.

2) The south area is across from the transfer site.

3) Both areas were < 10% weeds this year.

4) To locate, there is an opening just north of the riparian area (.4 mi. from coal storage road turn off) on the west side of the road.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Pond Dam

AREA: Deer Creek Mine Area

DATE: August 4-9, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 1 - 25 deg.

EXPOSURE: Variable

AREA: < 2 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum

Aster foliaceous
Grindelia squarrosa
Kochia scoparia
Halogeton glomeratus
Penstemon palmeri

Elymus smithii
Elymus cinereus
Elymus lanceolatus
Hordeum jubatum
Stipa hymenoides

NOTES: 1) Qualitative data

2) Pond has been disturbed by modifications to it. Like 1996, it does not appear to have been reseeded.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Temp. Sediment Basin

AREA: Deer Creek Mine Area

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 1-2 deg.

EXPOSURE: Variable

AREA: < 1 acre.

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:

Cercocarpus ledifolius
Populus angustifolia

Aster chilensis
Grindelia squarrosa
Medicago sativa
Melilotus officinalis
Penstemon palmeri

Elymus cinereus
Stipa hymenoides
Elymus spicatus
Elymus smithii
Elymus lanceolatus

NOTES: 1) Good representation of desirable and less weedy spp. The site appears to be improving over time

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Roadside Area

AREA: Deer Creek (1990 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 5 deg.

EXPOSURE: NE

AREA: < 1 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Nearly negligible, but one small area is eroding (see photograph).

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:

Aster chilensis
Grindelia squarrosa
Brickellia microphylla
Eriogonum corymbosum
Chrysothamnus nauseosus

Grindelia squarrosa
Medicago sativa

Bromus japonicus
Elymus junceus
Elymus spicatus
Elymus smithii
Elymus lanceolatus
Elymus cinereus
Hordeum jubatum
Stipa hymenoides

NOTES: 1) Sampled west side of the road for qualitative data.

2) Mostly desirable species again this year.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Gate Area Slope

AREA: Deer Creek (1990 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 15 deg.

EXPOSURE: E

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Some erosion this, but considering the angle of the slope, it's not bad.

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:
Chrysothamnus nauseosus

Aster chilensis
Astragalus cicer
Grindelia squarrosa
Medicago sativa

Elymus cinereus
Elymus lanceolatus
Elymus spicatus
Elymus smithii
Stipa hymenoides

NOTES: 1) Qualitative data only. Site looks in excellent condition.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Fan Road Slopes

AREA: Deer Creek (1989 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins, D. Collins

SLOPE: Variable

EXPOSURE: Variable

AREA: 1.1 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (qualitative only this year)

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus

Aster chilensis
Melilotus officinalis
Salsola pestifer

Agropyron cristatum
Bromus tectorum
Elymus lanceolatus
Elymus smithii
Elymus spicatus
Elymus cinereus
Hordeum jubatum
Sitanion hystrix
Stipa hymenoides

NOTES: 1) Area and species diversity looked good. Similar species observed as noted last year.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Refuse Pile & Berm

AREA: Deer Creek (1988 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 27 deg.

EXPOSURE: NE 300 deg.

AREA: 4.0 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible in most areas, but moderate in the areas with sparse vegetation.

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Chrysothamnus viscidiflorus
Eriogonum corymbosum

Aster chilensis
Halogeton glomeratus
Iva axillaris
Kochia scoparia
Machaeranthera canescens
Medicago sativa
Melilotus officinalis
Penstemon palmeri
Salsola pestifer

Agropyron cristatum
Bromus inermis
Elymus lanceolatus
Elymus smithii
Elymus spicatus
Elymus cinereus
Hordeum jubatum
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	1583.61
Eriogonum corymbosum	1339.98
Total	2923.59

PRODUCTION:	1997 (lbs/ac)
Herbaceous	323.84
Woody	278.53
Total	602.37

NOTES:

1) We sampled whole area randomly. The first 3 samples were on the lower berm and the remainder were on the pile itself.

2) Sampled cover (n=12) and frequency (n=12) by ocular methods.

3) Sampled density (n=13) using to pt. quarter method.

4) Sampled productivity [n=12(60)] by clipping, weighing and double sampling.

5) Like previous years, patchy areas of weeds and some of desirable species.

ENERGY WEST-DEER CREEK
Refuse Pile & Berm
1988 Reveg Area
Acreage: 4.0 acres
Slope: 27 deg
Exposure: NE (300 deg)
Sample Date: 4-9 Aug 97

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Chrysothamnus nauseosus	15.00	10.00	10.00	0.00	0.00	10.00	0.00	5.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	10.00	5.00	25.00	10.00
FORBS								
Aster chilensis	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Aster foliaceus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Malcomia africana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Penstemon palmeri	0.00	0.00	0.00	0.00	15.00	10.00	0.00	15.00
GRASSES								
Agropyron cristatum	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus inermis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus tectorum	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus cinereus	0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	25.00	5.00	10.00	10.00	5.00	0.00	0.00	0.00
Elymus smithii	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Elymus spicatus	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
Hordeum jubatum	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	5.00	10.00	0.00	0.00	0.00	5.00	0.00	0.00
COVER								
Total Living Cover	45.00	45.00	40.00	40.00	30.00	35.00	25.00	35.00
Litter	10.00	30.00	15.00	5.00	5.00	5.00	5.00	5.00
Bareground	15.00	10.00	15.00	5.00	10.00	5.00	10.00	10.00
Rock	30.00	15.00	30.00	50.00	55.00	55.00	60.00	50.00
% COMPOSITION								
Shrubs	33.33	22.22	25.00	0.00	33.33	42.86	100.00	42.86
Forbs	0.00	0.00	0.00	0.00	50.00	42.86	0.00	57.14
Grasses	66.67	77.78	75.00	100.00	16.67	14.29	0.00	0.00

ENERGY WEST-DEER CREE
Refuse Pile & Berm
1988 Reveg Area
Acreage: 4.0 acres
Slope: 27 deg
Exposure: NE (300 deg)
Sample Date: 4-9 Aug 97

9.00	10.00	11.00	12.00	Mean	SDev	Freq	
							SHRUBS
20.00	20.00	35.00	0.00	10.42	10.30	66.67	Chrysothamnus nauseosus
10.00	0.00	5.00	0.00	5.42	7.20	50.00	Eriogonum corymbosum
							FORBS
0.00	0.00	0.00	0.00	0.42	1.38	8.33	Aster chilensis
0.00	0.00	0.00	25.00	2.50	6.92	16.67	Aster foliaceus
0.00	0.00	0.00	10.00	0.83	2.76	8.33	Malcomia africana
0.00	5.00	0.00	5.00	4.17	5.71	41.67	Penstemon palmeri
							GRASSES
0.00	0.00	0.00	0.00	0.83	2.76	8.33	Agropyron cristatum
0.00	5.00	0.00	0.00	0.42	1.38	8.33	Bromus inermis
0.00	0.00	0.00	0.00	0.42	1.38	8.33	Bromus tectorum
0.00	0.00	0.00	0.00	1.25	2.98	16.67	Elymus cinereus
20.00	0.00	0.00	0.00	6.25	8.20	50.00	Elymus lanceolatus
0.00	10.00	0.00	0.00	1.67	3.73	16.67	Elymus smithii
0.00	0.00	0.00	0.00	2.08	6.91	8.33	Elymus spicatus
0.00	0.00	0.00	5.00	0.83	1.86	16.67	Hordeum jubatum
0.00	0.00	0.00	0.00	1.67	3.12	25.00	Stipa hymenoides
							COVER
50.00	40.00	40.00	45.00	39.17	6.72		Total Living Cover
10.00	10.00	10.00	10.00	10.00	6.77		Litter
20.00	20.00	20.00	10.00	12.50	5.20		Bareground
20.00	30.00	30.00	35.00	38.33	14.34		Rock
							% COMPOSITION
60.00	50.00	100.00	0.00	42.47	30.92		Shrubs
0.00	12.50	0.00	88.89	20.95	29.43		Forbs
40.00	37.50	0.00	11.11	36.58	33.75		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Rock Slide and Berm

AREA: Deer Creek

DATE: August 4-9, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 53+ deg.

EXPOSURE: W

AREA: .5 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: Cover was estimated by nonconventional methods because of steep and dangerous slopes (see quant. data).

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Eriogonum corymbosum

Aster chilensis
Halogeton glomeratus
Malcomia africana

Agropyron cristatum
Elymus smithii
Elymus lanceolatus
Elymus cinereus
Elymus spicatus

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	147.24
Eriogonum corymbosum	116.16
Total	253.40

PRODUCTION:	1997 (lbs/ac)
Herbaceous	328.56
Woody	213.87
Total	542.43

NOTES:

1) Methods: As mentioned above, for cover, (because of dangerously steep slopes) we had to make estimations by viewing from a distance

2) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=6) with belt transects (5'X25').

4) Sampled productivity [n=5(25)] by clipping, weighing and double sampling.

5) Samples 1-5 was on the berm, 6-10 were on the slide(n=10).

6) Due to dangerous nature of the slide area we could not record production or woody species density on it, but we did do production on the berm.

7) The vegetative cover is sparse where erosion repair work has been implemented.

8) The steep slide area appears to have constant erosion problems.

ENERGY WEST-DEER CREEK
Rock Slide and Berm
1988 Reveg Area
Acreage: .5 deg
Slope: 53+ deg
Exposure: W

Sample Date: 4-9 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Eriogonum corymbosum	0.00	10.00	15.00	0.00	10.00	0.00	0.00	0.00
FORBS								
Aster foliaceus	0.00	0.00	0.00	0.00	5.00	5.00	5.00	0.00
GRASSES								
Elymus cinereus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Elymus lanceolatus	70.00	5.00	0.00	25.00	10.00	0.00	0.00	0.00
Elymus salinus	0.00	35.00	15.00	20.00	0.00	10.00	0.00	10.00
Elymus spicatus	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
Total Living Cover	70.00	50.00	35.00	45.00	35.00	15.00	5.00	10.00
Litter	20.00	10.00	5.00	10.00	5.00	5.00	2.00	5.00
Bareground	5.00	5.00	35.00	20.00	25.00	70.00	85.00	60.00
Rock	5.00	35.00	25.00	25.00	35.00	10.00	8.00	25.00
% COMPOSITION								
Shrubs	0.00	20.00	42.86	0.00	28.57	0.00	0.00	0.00
Forbs	0.00	0.00	0.00	0.00	14.29	33.33	100.00	0.00
Grasses	100.00	80.00	57.14	100.00	57.14	66.67	0.00	100.00

ENERGY WEST-DEER CREE
Rock Slide Berm
1988 Reveg Area
Acreage: .5 deg
Slope: 53+ deg
Exposure: W
Sample Date: 4-9 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	0.00	3.50	5.50	30.00	Eriogonum corymbosum
					FORBS
25.00	5.00	4.50	7.23	50.00	Aster foliaceus
					GRASSES
0.00	0.00	0.50	1.50	10.00	Elymus cinereus
0.00	5.00	11.50	20.86	50.00	Elymus lanceolatus
0.00	0.00	9.00	11.14	50.00	Elymus salinus
0.00	0.00	1.00	3.00	10.00	Elymus spicatus
25.00	10.00	30.00	19.87		Total Living Cover
5.00	5.00	7.20	4.85		Litter
45.00	55.00	40.50	25.83		Bareground
25.00	30.00	22.30	10.33		Rock
					% COMPOSITION
0.00	0.00	9.14	14.89		Shrubs
100.00	50.00	29.76	38.67		Forbs
0.00	50.00	61.10	35.42		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Water Plant Slope

AREA: Deer Creek (1988 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 38 deg.

EXPOSURE: NE, 320

ANIMAL USE/DISTURBANCE:

EROSION: Slight

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Artemisia tridentata
Chrysothamnus nauseosus
Eriogonum corymbosum

Aster chilensis
Halogeton glomeratus
Machaeranthera canescens
Medicago sativa
Melilotus officinalis
Penstemon palmeri

Agropyron cristatum
Elymus cinereus
Elymus lanceolatus
Elymus spicatus
Elymus hymenoides
Sitanion hystrix
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	414.71
Rosa woodsii	13.41
Eriogonum corymbosum	107.28
Total	3328.68

PRODUCTION:	1997 (lbs/ac)
Herbaceous	372.38
Woody	47.56
Total	419.94

NOTES:

1) We sampled randomly on slopes.

2) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=10) using the pt. quarter methods.

4) Sampled productivity [n=10(50)] by clipping, weighing and double sampling.

ENERGY WEST-DEER CREEK
Water Plant Slope
1988 Reveg Area
Acreage:
Slope: 38 deg
Exposure: NE (320 deg)
Sample Date: 4-9 Aug 97

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Chrysothamnus nauseosus	0.00	0.00	0.00	10.00	5.00	0.00	0.00	0.00
FORBS								
Melilotus officinalis	10.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00
Aster foliaceus	35.00	20.00	5.00	15.00	15.00	25.00	10.00	25.00
Halogeton glomeratus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Agropyron cristatum	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus inermis	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Elymus cinereus	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Elymus lanceolatus	10.00	20.00	45.00	0.00	0.00	0.00	5.00	25.00
Elymus smithii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus spicatus	0.00	5.00	0.00	0.00	5.00	10.00	20.00	0.00
Hilaria jamesii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	65.00	45.00	60.00	25.00	30.00	35.00	50.00	50.00
Litter	5.00	10.00	5.00	5.00	5.00	35.00	10.00	10.00
Bareground	5.00	20.00	5.00	45.00	35.00	10.00	25.00	15.00
Rock	25.00	25.00	30.00	25.00	30.00	20.00	15.00	25.00
% COMPOSITION								
Shrubs	0.00	0.00	0.00	40.00	16.67	0.00	0.00	0.00
Forbs	69.23	44.44	16.67	60.00	66.67	71.43	30.00	50.00
Grasses	30.77	55.56	83.33	0.00	16.67	28.57	70.00	50.00

ENERGY WEST-DEER CREE
Water Plant Slope
1988 Reveg Area
Acreage:
Slope: 38 deg
Exposure: NE (320 deg)
Sample Date: 4-9 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
0.00	0.00	1.50	3.20	20.00	Chrysothamnus nauseosus
					FORBS
5.00	0.00	2.50	3.35	40.00	Melilotus officinalis
25.00	10.00	18.50	8.67	100.00	Aster foliaceus
0.00	0.00	0.50	1.50	10.00	Halogeton glomeratus
					GRASSES
0.00	0.00	1.00	3.00	10.00	Agropyron cristatum
0.00	0.00	0.50	1.50	10.00	Bromus inermis
0.00	0.00	1.00	3.00	10.00	Elymus cinereus
0.00	10.00	11.50	13.97	60.00	Elymus lanceolatus
0.00	5.00	0.50	1.50	10.00	Elymus smithii
35.00	10.00	8.50	10.74	60.00	Elymus spicatus
0.00	5.00	0.50	1.50	10.00	Hilaria jamesii
0.00	5.00	0.50	1.50	10.00	Stipa hymenoides
					COVER
65.00	45.00	47.00	13.27		Total Living Cover
10.00	5.00	10.00	8.66		Litter
15.00	30.00	20.50	12.54		Bareground
10.00	20.00	22.50	6.02		Rock
					% COMPOSITION
0.00	0.00	5.67	12.48		Shrubs
46.15	22.22	47.68	18.66		Forbs
53.85	77.78	46.65	25.80		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Pipeline

AREA: Deer Creek (1986 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 5 - 30 deg.

EXPOSURE: Variable

AREA: 3.5 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED: (see also quantitative data)

Artemisia tridentata
Chrysothamnus nauseosus
Eriogonum corymbosum
Gutierrezia sarothrae
Juniperus osteosperma
Pinus edulis
Populus angustifolia
Salix sp.

Artemisia dracunculus
Aster chilensis
Aster foliaceous
Castilleja sp.
Grindelia squarrosa
Halogeton glomeratus
Kochia scoparia
Machaeranthera canescens
Malcomia africana
Medicago sativa
Melilotus officinalis
Penstemon palmeri
Salsola pestifer

Elymus cinereus
Bromus tectorum
Elymus lanceolatus
Elymus spicatus
Agropyron cristatum
Elymus hispidus
Bromus tectorum
Elymus cinereus
Stipa hymenoides
Hordeum jubatum

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	1314.66
Gutierrezia sarothrae	39.84
Juniperus osteosperma	119.51
Brickellia microphylla	199.19
Rhus trilobata	39.84
Pseudotsuga menziesii	39.84
Eriogonum corymbosum	318.71
Total	2071.59

PRODUCTION:	1997 (lbs/ac)
Herbaceous	389.24
Woody	383.40
Total	772.64

NOTES:
1) We sampled at regular intervals over the length of the pipeline at approx. every .10 mile.

2) Sampled cover (n=13) and frequency (n=13) by ocular methods.

3) Sampled density (n=13) using the pt quarter method.

4) Sampled productivity [n=13(65)] by clipping, weighing and double sampling.

5) Previous years the weed comprised approx 20% or so. This year they appeared to be only about 10%.

6) The wasn't as much of the pipeline area "colored" on the maps that EW supplied for the areas to sample, but we sampled what we had in previous years.

7) We sampled to the top near the facilities area again this year.

ENERGY WEST-DEER CREEK
Pipeline
1986 Reveg Site
Acreage: 3.5 acres
Slope: 5-30 deg
Exposure: variable

Sample Date: 4-9 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Brickellia mocrophylla	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus nauseosus	30.00	20.00	0.00	0.00	45.00	45.00	20.00	10.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS								
Aster foliaceus	0.00	0.00	0.00	0.00	0.00	0.00	5.00	30.00
Castilleja sp.	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00
Grindelia squarrosa	0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00
Medicago sativa	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Tragopogon dubius	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Bromus inermis	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
Bromus tectorum	0.00	40.00	0.00	0.00	0.00	0.00	0.00	5.00
Elymus cinereus	0.00	0.00	10.00	10.00	0.00	0.00	0.00	0.00
Elymus hispidus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus junceus	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Elymus lanceolatus	0.00	0.00	10.00	30.00	0.00	0.00	25.00	0.00
Elymus smithii	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Hordeum jubatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sitanion hystrix	10.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
Stipa hymenoides	0.00	0.00	10.00	10.00	0.00	0.00	0.00	10.00
COVER								
Total Living Cover	40.00	80.00	50.00	60.00	60.00	55.00	70.00	60.00
Litter	25.00	5.00	20.00	10.00	10.00	15.00	15.00	10.00
Bareground	25.00	5.00	25.00	10.00	20.00	15.00	5.00	10.00
Rock	10.00	10.00	5.00	20.00	10.00	15.00	10.00	20.00
% COMPOSITION								
Shrubs	75.00	25.00	20.00	0.00	75.00	81.82	28.57	16.67
Forbs	0.00	25.00	20.00	0.00	8.33	9.09	7.14	50.00
Grasses	25.00	50.00	60.00	100.00	16.67	9.09	64.29	33.33

ENERGY WEST-DE
Pipeline
1986 Reveg Site
Acreage: 3.5 acres
Slope: 5-30 deg
Exposure: variable
Sample Date: 4-9 Au

9.00	10.00	11.00	12.00	13.00	Mean	SDev	Freq	
								SHRUBS
0.00	0.00	0.00	0.00	0.00	0.77	2.66	7.69	Brickellia mocrophyll
0.00	0.00	0.00	10.00	0.00	13.85	16.31	53.85	Chrysothamnus nau
0.00	0.00	65.00	20.00	0.00	6.54	17.69	15.38	Eriogonum corymbo
								FORBS
0.00	0.00	0.00	30.00	45.00	8.46	14.99	30.77	Aster foliaceus
0.00	0.00	0.00	0.00	0.00	1.54	5.33	7.69	Castilleja sp.
0.00	0.00	0.00	0.00	0.00	0.77	1.80	15.38	Grindelia squarrosa
0.00	0.00	0.00	0.00	0.00	0.77	2.66	7.69	Medicago sativa
0.00	0.00	0.00	0.00	5.00	0.38	1.33	7.69	Tragopogon dubius
								GRASSES
0.00	0.00	0.00	0.00	0.00	1.15	4.00	7.69	Bromus inermis
0.00	0.00	0.00	0.00	0.00	3.46	10.63	15.38	Bromus tectorum
0.00	20.00	0.00	0.00	0.00	3.08	6.06	23.08	Elymus cinereus
0.00	0.00	0.00	0.00	10.00	0.77	2.66	7.69	Elymus hispidus
0.00	0.00	0.00	0.00	0.00	0.38	1.33	7.69	Elymus junceus
10.00	35.00	0.00	0.00	0.00	8.46	12.46	38.46	Elymus lanceolatus
0.00	10.00	0.00	0.00	0.00	1.54	3.61	15.38	Elymus smithii
0.00	0.00	0.00	0.00	5.00	0.38	1.33	7.69	Hordeum jubatum
0.00	0.00	0.00	0.00	0.00	2.31	3.17	38.46	Sitanion hystrix
25.00	0.00	0.00	0.00	5.00	4.62	7.20	38.46	Stipa hymenoides
								COVER
35.00	65.00	65.00	60.00	70.00	59.23	11.74		Total Living Cover
10.00	10.00	10.00	10.00	10.00	12.31	5.04		Litter
10.00	5.00	5.00	10.00	5.00	11.54	7.17		Bareground
45.00	20.00	20.00	20.00	15.00	16.92	9.51		Rock
								% COMPOSITION
0.00	0.00	100.00	50.00	0.00	36.31	34.44		Shrubs
0.00	0.00	0.00	50.00	71.43	18.54	22.98		Forbs
100.00	100.00	0.00	0.00	28.57	45.15	35.78		Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Deer Canyon

AREA: Deer Creek (1986 Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 15-20 deg.

EXPOSURE: E

AREA: .1 acre

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (see quantitative data)

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Cercocarpus ledifolius

Aster chilensis
Machaeranthera canescens
Medicago sativa
Melilotus officinalis
Penstemon palmeri

Agropyron cristatum
Dactylis glomeratus
Elymus cinereus
Elymus spicatus
Elymus lanceolatus
Elymus cinereus
Elymus smithii
Poa pratensis
Stipa hymenoides

WOODY SPECIES DENSITY:	1997 (no./ac)
Chrysothamnus nauseosus	2684.28
Eriogonum corymbosum	116.71
Total	2800.99

PRODUCTION:	1997 (lbs/ac)
Herbaceous	520.82
Woody	146.64
Total	667.46

NOTES: 1) We sampled randomly over entire area.

2) Sampled cover (n=6) and frequency (n=6) by ocular methods.

3) Sampled density (n=6) by pt. quarter methods.

4) Sampled productivity [n=6(30)] by clipping, weighing and double sampling.

ENERGY WEST-DEER CREEK
Deer Canyon
1986 Reveg Area
Acreage: .1
Slope: 15-20 deg
Exposure: E

Sample Date: 4-9 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	Mean	SDev
SHRUBS								
Chrysothamnus nauseosus	10.00	0.00	0.00	15.00	15.00	5.00	7.50	6.29
Cercocarpus ledifolius	0.00	0.00	0.00	0.00	5.00	0.00	0.83	1.86
FORBS								
Aster foliaceus	5.00	10.00	5.00	10.00	0.00	15.00	7.50	4.79
Circium sp.	0.00	0.00	0.00	0.00	5.00	0.00	0.83	1.86
Machaeranthera canescens	0.00	5.00	5.00	5.00	5.00	0.00	3.33	2.36
Penstemon palmeri	0.00	0.00	5.00	0.00	0.00	0.00	0.83	1.86
GRASSES								
Elymus cinereus	0.00	30.00	10.00	10.00	5.00	0.00	9.17	10.17
Elymus lanceolatus	20.00	0.00	35.00	20.00	15.00	25.00	19.17	10.57
Elymus smithii	5.00	0.00	5.00	0.00	10.00	0.00	3.33	3.73
Elymus spicatus	10.00	10.00	0.00	5.00	0.00	0.00	4.17	4.49
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	15.00	2.50	5.59
COVER								
Total Living Cover	50.00	55.00	65.00	65.00	60.00	60.00	59.17	5.34
Litter	10.00	15.00	10.00	5.00	10.00	10.00	10.00	2.89
Bareground	20.00	15.00	15.00	10.00	10.00	10.00	13.33	3.73
Rock	20.00	15.00	10.00	20.00	20.00	20.00	17.50	3.82
% COMPOSITION								
Shrubs	20.00	0.00	0.00	23.08	33.33	8.33	14.12	12.36
Forbs	10.00	27.27	23.08	23.08	16.67	25.00	20.85	5.83
Grasses	70.00	72.73	76.92	53.85	50.00	66.67	65.03	9.82

ENERGY WEST-DEER CREE
Deer Canyon
1986 Reveg Area
Acreage: .1
Slope: 15-20 deg
Exposure: E
Sample Date: 4-9 Aug 97

Freq	
	SHRUBS
66.67	Chrysothamnus nauseosus
16.67	Cercocarpus ledifolius
	FORBS
83.33	Aster foliaceus
16.67	Circium sp.
66.67	Machaeranthera canescens
16.67	Penstemon palmeri
	GRASSES
	Elymus cinereus
	Elymus lanceolatus
	Elymus smithii
	Elymus spicatus
	Stipa hymenoides
	COVER
	Total Living Cover
	Litter
	Bareground
	Rock
	% COMPOSITION
	Shrubs
	Forbs
	Grasses

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Access Road Slopes

AREA: Deer Creek Waste Rock Site (1989 Interim Reveg. Area)

DATE: August 4-9, 1997

WORKERS: P. Collins

SLOPE: 20 - 25 deg.

EXPOSURE: Variable

AREA: Part of 5 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: An appreciable amount of moderate erosion on the cut slopes. Only a few on the fill slopes. All due do recent very heavy rain storms in the area.

COVER: (qualitative data)

DOMINANT PLANT SPECIES OBSERVED:

Fill Slopes	Cut Slopes
Artemisia tridentata	
Atriplex confertifolia	*Atriplex confertifolia*
Atriplex canescens	*Atriplex gardneri*
Ceratoides lanata	*Chrysothamnus nauseosus*
Chrysothamnus nauseosus	
Sarcobatus vermiculatus	
Machaeranthera canescens	
Medicago sativa	*Halogeton glomeratus*
Penstemon palmeri	
Elymus cinereus	
Elymus lanceolatus	*Elymus lanceolatus*
Elymus smithii	
Sporobolus airoides	
Stipa hymenoides	

NOTES: 1) Method: Qualitative sampling only in 1997

2) The cut slopes had about 50:50 weeds to desirable species.

3) The fill slope had >90% desirable species.

4) Therefore, the fill slopes looked much better than the cut slopes (from a vegetation stand point). Or, the fill slopes looked "good", whereas, the cut slope looked "poor".

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Phase I Berm

AREA: Deer Creek Waste Rock Site (1989 Final Reveg. Area)

DATE: August 8, 1997

WORKERS: P. Collins

SLOPE: 0 - 20 deg.

EXPOSURE: Variable

AREA: 4 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: Negligible

COVER: (qualitative data)

DOMINANT PLANT SPECIES OBSERVED:
Artemisia tridentata
Atriplex gardneri
Atriplex canescens
Atriplex confertifolia
Chrysothamnus nauseosus
Sarcobatus vermiculatus

Circium sp.
Machaeranthera canescens
Halogeton glomeratus
Kochia scoparia
Malcomia africana
Medicago sativa
Salsola pestifer
Sphaeralcea grossulariifolia

Agropyron cristatum
Elymus lanceolatus
Stipa hymenoides

NOTES: 1) Desirable species become taller, more mature, and seem to be more dominant than the weeds.

2) Methods: Qualitative sampling only this year.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Phase I Diversion

AREA: Deer Creek Waste Rock Site (1989 Final Reveg. Area)

DATE: August 8, 1997

WORKERS: P. Collins

SLOPE: 5 deg.

EXPOSURE: Variable

AREA: Part of 5 acres

ANIMAL USE/DISTURBANCE: Negligible

EROSION: (see notes below)

COVER: (see qualitative data)

DOMINANT PLANT SPECIES OBSERVED: (see quantitative data)

Atriplex gardneri
Atriplex confertifolia
Artemisia tridentata
Gutierrezia sarothrae
Sarcobatus vermiculatus

Penstemon palmeri

Agropyron cristatum
Sporobolus airoides
Elymus lanceolatus
Elymus cinereus
Stipa hymenoides

NOTES: 1) Methods: Qualitative data only in 1997.

2) Silt fence repaired and looked effective.

3) Recent heavy rains obvious at this location. The diversion seems to be working well. As expected there was some erosion down the center of it.

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Topsoil Pile

AREA: Rilda Canyon

DATE: August 8, 1997

WORKERS: P. Collins, D. Collins

SLOPE/EXPOSURE: Steep Slope - 47 deg./SE
Road cuts - 28 deg./E
Topsoil - 30 deg./E

ANIMAL USE/DISTURBANCE: Slight

EROSION: None observed

COVER: Approx. 15%-20%

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus

Circium sp.
Melilotus officinalis
Cynoglossum officinale
Penstemon palmeri

Stipa hymenoides
Poa pratensis
Elymus smithii
Elymus spicatus

WOODY SPECIES DENSITY:	1997 (no./ac)
Total	0.00

NOTES: 1) We sampled using a 100' tape up the side slope the to the top of the pile.

2) Sampled cover (n=10) and frequency (n=10) by ocular methods.

3) Sampled density (n=8) with belt transects (5'X25').

4) Was seeded in the Fall of 1995.

5) About 50% of the erosion control mat remained, the rest was decomposed.

6) From a distance it appeared the entire pile was growing nothing but yellow sweetclover, but on further examination there were lots of grasses under it.

7) Did not observe any woody species on the pile.

ENERGY WEST -RILDA CANYON
Top Soil Piles 1995
Exposure: E
Slope: 30 deg.

Sample Date: 8 Aug 97	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
FORBS								
Melilotus officinalis	25.00	40.00	45.00	45.00	35.00	10.00	20.00	35.00
GRASSES								
Elymus cinereus	0.00	0.00	0.00	0.00	10.00	5.00	0.00	5.00
Elymus lanceolatus	10.00	0.00	5.00	0.00	0.00	20.00	20.00	25.00
Elymus smithii	0.00	0.00	0.00	0.00	0.00	5.00	5.00	5.00
COVER								
Total Living Cover	35.00	40.00	50.00	45.00	45.00	40.00	45.00	70.00
Litter	15.00	25.00	25.00	25.00	25.00	15.00	25.00	20.00
Bareground	40.00	25.00	10.00	10.00	5.00	15.00	25.00	5.00
Rock	10.00	10.00	15.00	20.00	25.00	30.00	5.00	5.00
% COMPOSITION								
Shrubs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	71.43	100.00	90.00	100.00	77.78	25.00	44.44	50.00
Grasses	28.57	0.00	10.00	0.00	22.22	75.00	55.56	50.00

ENERGY WEST -RILDA CANYON
Top Soil Piles 1995
Exposure: E
Slope: 30 deg.
Sample Date: 8 Aug 97

9.00	10.00	Mean	SDev	Freq	
					SHRUBS
					FORBS
45.00	30.00	33.00	11.22	100.00	Melilotus officinalis
					GRASSES
0.00	0.00	2.00	3.32	30.00	Elymus cinereus
0.00	20.00	10.00	9.75	60.00	Elymus lanceolatus
5.00	0.00	2.00	2.45	40.00	Elymus smithii
					COVER
50.00	50.00	47.00	9.00		Total Living Cover
25.00	20.00	22.00	4.00		Litter
20.00	25.00	18.00	10.54		Bareground
5.00	5.00	13.00	8.72		Rock
					% COMPOSITION
0.00	0.00	0.00	0.00		Shrubs
90.00	60.00	70.87	24.15		Forbs
10.00	40.00	29.13	24.15		Grasses

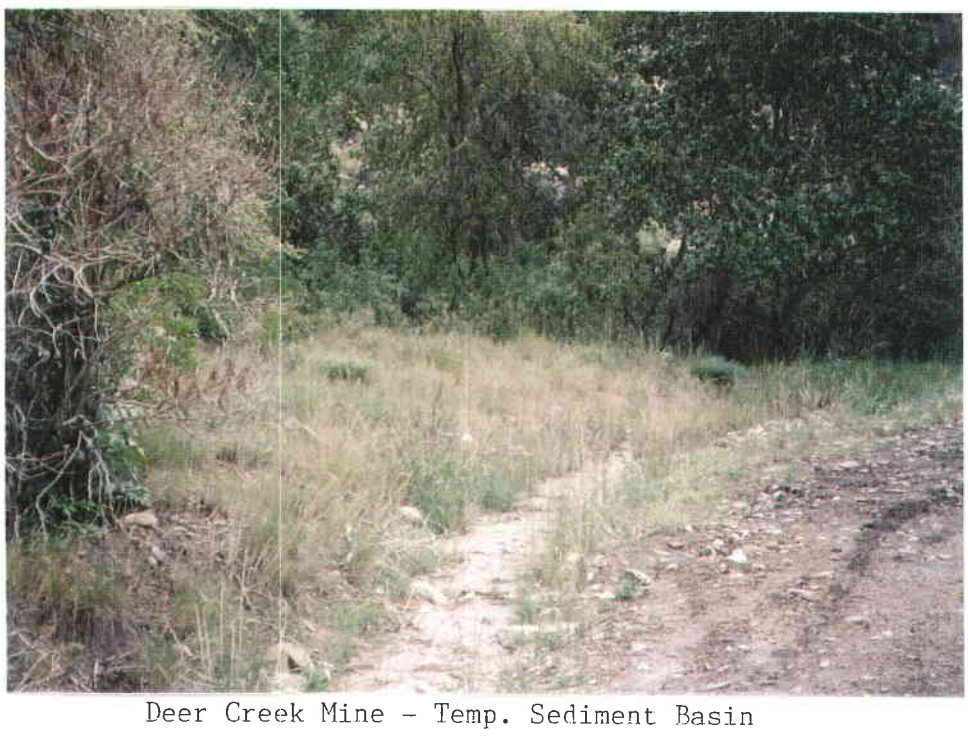
COLOR
PHOTOGRAPHS

Deer Creek Mine - C2 Conveyor 1993

Deer Creek Mine - Riparian Areas (North)

Deer Creek Mine - Riparian Areas (South)

Deer Creek Mine - Sediment Pond Dam



Deer Creek Mine - Temp. Sediment Basin

Deer Creek Mine - Roadside Areas

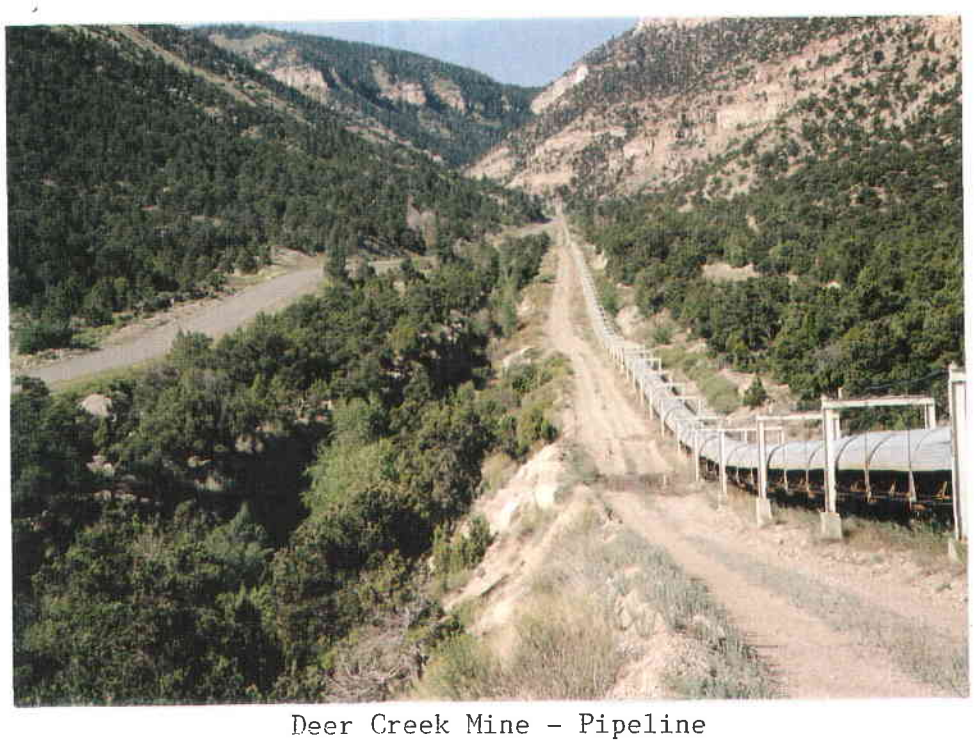
Deer Creek Mine - Gate Areas Slope

Deer Creek Mine - Fan Road Slopes

Deer Creek Mine - Refuse Pile and Berm

Deer Creek Mine - Rock Slide and Berm

Deer Creek Mine - Water Plant Slope

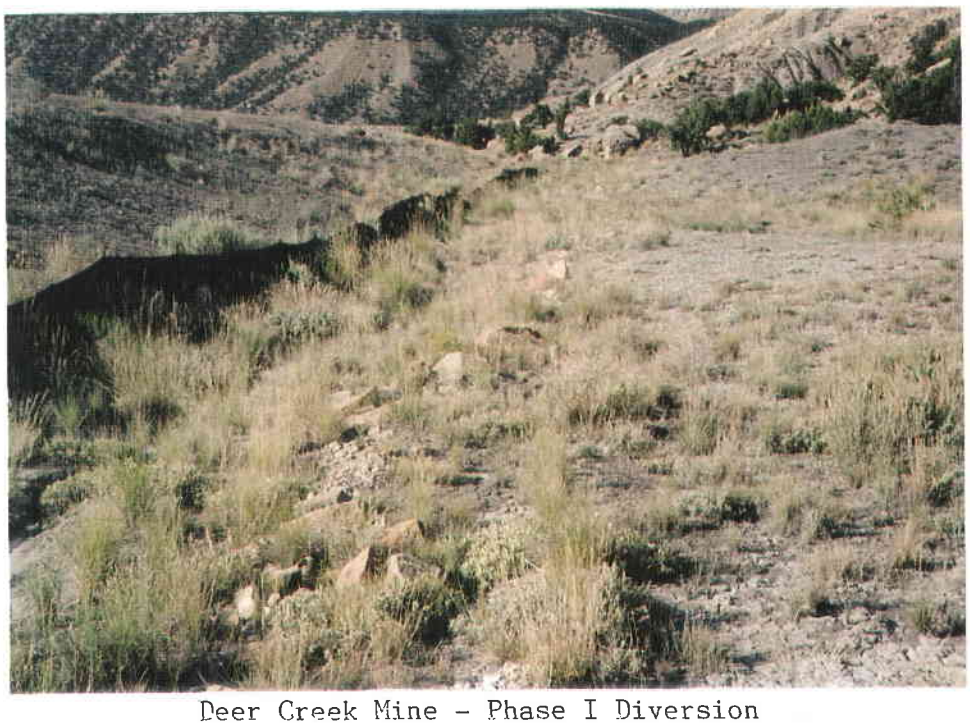


Deer Creek Mine - Pipeline

Deer Creek Mine - Deer Canyon

Deer Creek Mine - Waste Rock Access Road Slopes

Deer Creek Mine - Phase I Berm



Deer Creek Mine - Phase I Diversion

TRAIL MOUNTAIN MINE AREA

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Sediment Pond Outslopes

AREA: Trail Mtn. Mine/Cottonwood Fan Portal Area

DATE: August 6-10, 1998

WORKERS: P. Collins, D. Collins

SLOPE: 25 deg.

EXPOSURE: E & S

ANIMAL USE/DISTURBANCE:

EROSION: Negligible

COVER: (qualitative data only)

DOMINANT PLANT SPECIES OBSERVED:

Chrysothamnus nauseosus
Artemisia tridentata

Aster foliaceus

Elymus cinereus
Elymus junceus

NOTES:

1) Qualitative data

2) Cover was variable by species. Some areas were mostly grasses, others were forbs.

3) Like last year, the north end was mostly weedy species.

4) Crested wheatgrass was the dominant grass by far but more Russian wildrye is becoming established.

5) Aster was the most common forb.

COLOR
PHOTOGRAPHS

Trail Mountain Mine - Sediment Pond Outslope

COTTONWOOD CANYON AREA

PACIFICORP (ENERGY WEST)
QUALITATIVE SAMPLING DATA SHEET AND
QUANTITATIVE/QUALITATIVE NOTES
1997

SITE NAME: Soil Piles

AREA: Cottonwood Fan Portal Area

DATE: August 6-10, 1997

WORKERS: P. Collins, D. Collins

SLOPE: 35 deg.

EXPOSURE: Variable

ANIMAL USE/DISTURBANCE:

EROSION: Slight

COVER: approx. 35-40%

DOMINANT PLANT SPECIES OBSERVED:

Artemisia tridentata
Atriplex canescens
Atriplex confertifolia
Brickellia scabra
Chrysothamnus nauseosus

Aster foliaceous
Halogeton glomeratus
Medicago sativa

Agropyron cristatum
Elymus cinereus
Elymus spicatus
Elymus lanceolatus
Elymus smithii

NOTES: 1) Qualitative sampling only.

2) Vegetation looked very similar to 1996.

COLOR
PHOTOGRAPHS

Cottonwood Canyon - Soil Piles

REVEGETATION MONITORING AT THE COTTONWOOD CANYON FAN PORTAL AREA 1997

RECLAIMED SLOPES & PINYON-JUNIPER REFERENCE AREA

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Report Date:
March 1998

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REVEGETATION MONITORING AT THE COTTONWOOD CANYON FAN PORTAL AREA

1997

SCOPE

The following document contains quantitative data in an area that is operated by Energy West Mining Company and called the COTTONWOOD FAN PORTAL AREA. The purpose of this report is to show results from monitoring the vegetation of the reclaimed slopes and compare it with the Pinyon-Juniper Reference area.

Studies were performed in accordance with the guidelines supplied by the State of Utah, Division of Oil, Gas and Mining (DOGM).

INTRODUCTION

Quantitative and qualitative data were recorded within the Cottonwood Canyon Fan Portal study areas. Following consultations with DOGM and Energy West Mining Company a decision was made to record vegetation data similar to that which would need to be taken prior to future bond release applications without necessarily attempting to meet the rigors of final statistical confidence and sample adequacy required at that time. The 1997 sample year was meant to give both the

METHODS

Sampling was accomplished between August 6-10, 1997. Sampling methods were consistent in 1997 when compared to previous sample years. This should simplify comparisons between years. The methods used for the study have been summarized below.

Cover and Composition

Bi-directional random/regular placement of sampling plots were designed to provide a degree of unbiased accuracy of the data compiled. This was accomplished by establishing transect lines that were 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.

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, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows Welsh et al."A Utah Flora" (1993).

Woody Species Density

Density of woody plant species were recorded using the point quarter distance method (Cottom and Curtis 1956). In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Productivity

Total annual biomass was estimated by clipping, drying and weighing current annual productivity. Relative ocular estimates were also made placing four quadrats near the "clipped" quadrat to increase accuracy of the productivity estimates. In other words, one quadrat was placed. From this sample, four more quadrat estimates were made relative to the first quadrat. Biomass from the first quadrat was clipped and weighed.

Diversity

There are several good methods to assess diversity in plant communities. One diversity index has been reported in this document for the reclaimed slopes and reference areas (MacArthur's diversity index).

MacArthur's diversity index is an effective diversity measurement and is computed using the

equation $1/\sum pi^2$ (MacArthur and Wilson 1976, *The Theory of Island Biogeography,* Princeton: Princeton University Press). In this equation *pi* is the proportion of sum frequency contributed by the *i*th species in the sample area of concern. The proportional contribution of each species is then squared and the values for all species in the sample areas are summed. This index integrates the number of species and the degree to which frequency of occurrence was equitably distributed among those species. In other words, this index provides greater weight to those species that are present more often (with greater frequency) than those that are merely "present" in one or two quadrats.

Sample Adequacy

Sampling adequacy for cover, and woody species density was attempted using formulas from Snedocor and Cochran (1980), with a target confidence of 80% of the samples being within 10% of the true mean for the shrub communities of the area. All sample means, standard deviations, and sample sizes were included in this report to enable the reviewers to apply further statistical tests if desired.

RESULTS

The Reclaimed Slopes

The total living cover of the reclaimed slopes at the Cottonwood Fan Portal area was estimated to be 49.00% (Table 1A). No overstory cover was encountered in the sample quadrats. Grasses

and shrubs made up nearly equal proportions of the living cover, whereas, forbs were much less common (Table 1B). The most common plant species on the slope was Salina wildrye *(Elymus salinus*) which had 14.12% cover and was present in 84.00% of the quadrats. Big sagebrush (*Artemisia tridentata*) and fourwing saltbush (*Atriplex canescens*) followed in importance with 11.12% and 8.88% cover, respectively (Table 2A). The species diversity value used was MacArthur's index and was calculated using frequencies to be 7.35 (Table 2B).

The total woody species density of the reclaimed slopes was estimated to be 3,404.34 individuals per acre with the most common species by far as big sagebrush. Rubber rabbitbrush (*Chrysothamnus nauseosus*), Mormon tea (*Ephedra viridis*), and fourwing saltbush were also common in the density samples (Table 3A).

Total annual biomass production was estimated to be 1,570.29 pounds per acre where 922.99 pounds were comprised of woody species and 647.30 pounds were from herbaceous plants (Table 3B).

<u>The Reference Area</u>

The understory cover of the Pinyon-Juniper Reference Area was estimate at 37.40% and the overstory cover was 8.80%. The total combined living cover was therefore 46.20% (Table 4A). Understory composition shows the grasses dominate the reference area comprising 68.64% of the understory cover followed by woody species at 24.28% and forb at 7.08% (Table 4B).

Most common understory species by a wide margin was Salina wildrye (Table 5A). This species was found in 100% of the sample quadrats. Several woody species were present in the understory samples. Although none was abundant, the most common were Oregon grape (*Mahonia repens*), Utah serviceberry (*Amalanchier utahensis*), pinyon pine and Mormon tea.

The most common overstory species was pinyon pine *(Pinus edulis*), followed by Utah serviceberry and Utah Juniper (*Juniperus ostersperma*). The diversity index for this community was calculated at 5.15 (Table 5B).

Woody species density of the reference area was estimated at 1,081.47 individuals per acre (Table 6A). Pinyon pine had the greatest density at 313.63 plants per acre, but was followed closely by Oregon grape, rubber rabbitbrush and Mormon tea.

Biomass production was estimated, clipped, dried and weighed for the results. Total annual production was 491.71 pound per acre, of which 364.08 pounds were herbaceous plants and 127.62 pounds were from shrubs and trees (Table 6B)..

DISCUSSION

Comparisons were made between the reclaimed slopes and the reference area that was chosen to represent the standard for final revegetation success. When Student's t statistical analyses were used to compare the areas (Table 7) results suggested no statistically significant difference for total living cover (total living cover included overstory and understory cover summed).

However, when woody species density and total annual production were compared results suggested that the reclaimed slopes had significantly greater density and productivity than the reference area (Table 7). Additionally, the total diversity of the reclaimed slopes was also greater than the reference area (Table 7).

Although the reclaimed slopes are not yet developed into a Pinyon-Juniper woodland community, results from ecological sampling and subsequent statistical analyses show that they are more dense, productive and diverse when compared to the Pinyon-Juniper Reference Area. Furthermore, although total living covers were not significantly different, if the total living understory covers would have been compared, the reclaimed slopes would have again been greater than the reference area.

The scope of this study was intended to provide *preliminary* results and indications as to whether or not the Cottonwood Canyon Portal Area Reclaimed Slopes have been reclaimed to a level that would be favorably compared to the Pinyon-Juniper Reference Area. Sample adequacy was attempted for this study, but the scope did not warrant achieving this goal with all parameters if it entailed a significant increase in costs for field and laboratory analysis. The fact is, some parameters did not meet the rigors of sample adequacy in all cases. However, results from this report suggest that the reclaimed slopes have been revegetated adequately when compared to the standard for final revegetation success.

TABLE 1: Total cover (A) and composition (B) summary for the Reclaimed Slopes of the Cottonwood Canyon Fan Portal Area (1997). The table shows the mean percent cover and composition with standard deviations and sample sizes.

A. TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZES
Total Living Cover	**49.00**	14.00	25
Litter	14.92	8.23	25
Bareground	13.64	8.48	25
Rock	22.44	12.59	25
	100.00		
B. COMPOSITION			
Trees/Shrubs	43.59	27.08	25
Forbs	5.21	18.25	25
Grasses	51.20	27.16	25

TABLE 2: Species cover and frequency summary (A) and total diversity (B) for the Reclaimed Slopes of the Cottonwood Canyon Fan Portal Area (1997). The table shows the mean percent cover, standard deviation, sample size and relative frequency by species.

A.
COVER & FREQUENCY

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	11.12	14.82	25	64.00
Atriplex canescens	8.88	16.12	25	28.00
Chrysothamnus nauseosus	2.68	6.63	25	20.00
Gutierrezia sarothrae	0.40	1.96	25	4.00
Pinus edulis	0.20	0.98	25	4.00
FORBS				
Aster foliaceus	3.20	11.82	25	16.00
GRASSES				
Agropyron cristatum	1.00	2.83	25	12.00
Bromus inermis	0.60	2.15	25	8.00
Elymus cinereus	14.12	10.63	25	84.00
Elymus lanceolatus	0.80	1.83	25	16.00
Elymus spicatus	1.20	2.56	25	20.00
Elymus junceus	3.60	5.75	25	36.00
Elymus smithii	1.40	2.64	25	24.00

B.
DIVERSITY

MacArthur's Diversity Index $= 1/\Sigma P_i^2 =$ **7.35**

TABLE 3: Woody species density (A) and productivity (B) of the Reclaimed Slopes of the Cottonwood Canyon Fan Portal Area (1997).

A. DENSITY	NUMBER/ACRE*
Artemisia tridentata	2144.74
Atriplex confertifolia	68.09
Atriplex canescens	306.39
Chrysothamnus nauseosus	680.87
Ephedra viridis	344.04
Gutierrezia sarothrae	136.17
Pinus edulis	34.04
TOTAL	**3404.34**

B. PRODUCTION	POUNDS/ACRE	
	$\bar{x}$	S
Herbaceous	647.30	414.80
Woody	922.99	934.75
TOTAL	**1570.29**	877.75

TABLE 4: Total cover (A) and composition (B) summary for the Pinyon-Juniper Reference Area of the Cottonwood Canyon Fan Portal Area (1997). The table shows the mean percent cover and composition with standard deviations and sample sizes.

A. TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZES
Overstory Cover	8.80	14.99	25
Understory Cover	37.40	11.50	25
Litter	12.40	8.26	25
Bareground	16.16	12.06	25
Rock	25.24	13.53	25
	100.00		
Overstory +Understory	**46.20**	14.78	25
B. UNDERSTORY COMPOSITION			
Trees/Shrubs	24.28	24.60	25
Forbs	7.08	7.90	25
Grasses	68.64	21.86	25

TABLE 5: Species cover and frequency summary (A) and total species diversity (B) for the Pinyon-Juniper Reference Area of the Cottonwood Canyon Fan Portal Area (1997). The table shows the mean percent cover, standard deviation, sample size and relative frequency by species.

A.
COVER & FREQUENCY

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
OVERSTORY				
Amalanchier utahensis	1.40	6.86	25	4.00
Juniperus osterosperma	0.40	1.96	25	4.00
Pinus edulis	7.00	14.14	25	32.00
UNDERSTORY				
Amalanchier utahensis	1.20	5.88	25	4.00
Atriplex confertifolia	0.60	2.94	25	4.00
Chrysothamnus nauseosus	0.72	2.46	25	8.00
Ephedra viridis	1.40	5.20	25	8.00
Juniperus ostersperma	0.20	0.98	25	4.00
Mahonia repens	2.44	4.79	25	28.00
Pinus edulis	2.00	5.10	25	16.00
FORBS				
Cryptantha sp.	0.76	1.66	25	20.00
Galium bifolium	0.20	0.98	25	4.00
Lepidium montanum	0.60	1.62	25	12.00
Machaeranthera canescens	0.20	0.98	25	4.00
Senecio sp.	0.08	0.39	25	4.00
Stanleya pinnata	0.68	1.87	25	12.00
GRASSES				
Elymus salinus	23.32	10.98	25	100.00
Stipa hymenoides	3.00	5.66	25	28.00

B.
DIVERSITY

MacArthur's Diversity Index $= 1/\Sigma P_i^2 =$ **5.15**

TABLE 6: Woody species density (A) and productivity (B) of the Pinyon-Juniper Reference Area of the Cottonwood Canyon Fan Portal Area (1997).

A. DENSITY	NUMBER/ACRE*
Amalanchier utahensis	32.44
Atriplex confertifolia	64.89
Chrysothamnus nauseosus	183.85
Ephedra viridis	129.78
Juniperus osteosperma	75.70
Mahonia repens	281.18
Pinus edulis	313.63
TOTAL	**1081.47**

B. PRODUCTION	POUNDS/ACRE	
	$\bar{x}$	S
Herbaceous	364.08	146.20
Woody	127.62	176.02
TOTAL	**491.71**	181.57

TABLE 7: Statistical summary sheet for the Reclaimed Slope and the Pinyon-Juniper Reference Area at the Cottonwood Canyon Fan Portal Area (1997).

RECLAIMED SLOPE			
Living Cover	$\bar{x}$=49.00	s=14.00	n=25
Density	$\bar{x}$=3404.34	s=1804.50	n=25
Production	$\bar{x}$=1570.29	s=877.75	n=25(125)**
Diversity	$1/\Sigma P_i^2 = 7.35$		
REFERENCE AREA			
Living Cover*	$\bar{x}$=46.20	s=14.78	n=25
Density	$\bar{x}$=1081.47	s=681.84	n=25
Production	$\bar{x}$=491.71	s=181.57	n=25(125)**
Diversity	$1/\Sigma P_i^2 = 5.15$		

STATISTICAL ANALYSES			
Living Cover	t=0.688	df=48	SL=NS
Density	t=6.021	df=48	SL=p<.005
Production	t=6.017	df=48	SL=p<.005

$\bar{x}$= sample mean, s = sample standard deviation, n = sample size, NS = nonsignificant,
t = Student's t-value, df = degrees of freedom, SL = significance level,
ΣP_i^2 = the summation of P_i squared when P_i is the proportion of sum frequency contributed by the *i*th species in the sample area of concern.

* represents understory and overstory cover combined,
** number in parenthesis is sample number with double sampling employed.

COLOR
PHOTOGRAPHS

Cottonwood Canyon - Reference Area (1 of 2)

Cottonwood Canyon - Reference Area (2 of 2)

Cottonwood Canyon - Fan Portal Reclaimed Slope (1 of 2)

Cottonwood Canyon - Fan Portal Reclaimed Slope (2 of 2)

Raw Data

ENERGY WEST-COTTONWOOD FAN PORTAL
Reclaimed Slope
Exposure: W
Slope: 35 deg.

Sample Date: 6-10 Aug 9	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
SHRUBS								
Artemisia tridentata	0.00	5.00	5.00	10.00	0.00	5.00	0.00	3.00
Atriplex canescens	45.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
Chrysothamnus nauseosu	0.00	0.00	0.00	25.00	5.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Pinus edulis	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
FORBS								
Aster foliaceus	10.00	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	5.00	0.00	0.00
Bromus inermis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Elymus cinereus	15.00	30.00	20.00	0.00	35.00	35.00	0.00	15.00
Elymus junceus	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
Elymus lanceolatus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Elymus smithii	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00
Elymus spicatus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
COVER								
Total Living Cover	70.00	35.00	40.00	35.00	40.00	45.00	35.00	30.00
Litter	28.00	10.00	20.00	5.00	10.00	10.00	10.00	10.00
Bareground	1.00	25.00	20.00	15.00	20.00	20.00	20.00	25.00
Rock	1.00	30.00	20.00	45.00	30.00	25.00	35.00	35.00
% COMPOSITION								
Shrubs	64.29	14.29	25.00	100.00	12.50	11.11	28.57	16.67
Forbs	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	21.43	85.71	75.00	0.00	87.50	88.89	71.43	83.33

9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
0.00	50.00	35.00	5.00	30.00	0.00	40.00	10.00	0.00	40.00
0.00	0.00	0.00	45.00	0.00	40.00	0.00	30.00	15.00	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	10.00	0.00	0.00	10.00	0.00
0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
30.00	10.00	10.00	10.00	15.00	10.00	10.00	15.00	25.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	10.00	15.00	0.00	15.00
0.00	5.00	0.00	5.00	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	0.00
0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35.00	70.00	50.00	65.00	60.00	60.00	60.00	70.00	50.00	55.00
25.00	5.00	25.00	20.00	20.00	10.00	10.00	10.00	35.00	10.00
20.00	20.00	5.00	5.00	5.00	10.00	10.00	15.00	5.00	15.00
20.00	5.00	20.00	10.00	15.00	20.00	20.00	5.00	10.00	20.00
0.00	71.43	70.00	76.92	50.00	66.67	66.67	57.14	30.00	72.73
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	28.57	30.00	23.08	50.00	33.33	33.33	42.86	70.00	27.27

19.00	20.00	21.00	22.00	23.00	24.00	25.00	Mean	SDev	Freq
15.00	10.00	0.00	5.00	0.00	10.00	0.00	11.12	14.82	64.00
0.00	40.00	0.00	0.00	0.00	0.00	0.00	8.68	16.12	28.00
0.00	0.00	0.00	0.00	20.00	2.00	15.00	2.68	6.63	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	1.96	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.98	4.00
0.00	0.00	60.00	5.00	5.00	0.00	0.00	3.20	11.82	16.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.83	12.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	2.15	8.00
15.00	15.00	0.00	25.00	5.00	3.00	5.00	14.12	10.63	84.00
10.00	0.00	0.00	5.00	5.00	0.00	5.00	3.60	5.75	36.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.80	1.83	16.00
0.00	0.00	0.00	0.00	10.00	5.00	5.00	1.40	2.65	24.00
0.00	0.00	5.00	0.00	0.00	10.00	0.00	1.20	2.56	20.00
40.00	70.00	65.00	40.00	45.00	30.00	30.00	49.00	14.00	
5.00	15.00	5.00	15.00	10.00	25.00	25.00	14.92	8.23	
5.00	5.00	5.00	20.00	10.00	5.00	35.00	13.64	8.48	
50.00	10.00	25.00	25.00	35.00	40.00	10.00	22.44	12.59	
37.50	71.43	0.00	12.50	44.44	40.00	50.00	43.59	27.08	
0.00	0.00	92.31	12.50	11.11	0.00	0.00	5.21	18.25	
62.50	28.57	7.69	75.00	44.44	60.00	50.00	51.20	27.16	

ENERGY WEST-COTTONWOOD FAN PORTAL
Reclaimed Slope
Exposure: W
Slope: 35 deg.
Sample Date: 6-10 Aug 97

SHRUBS
Artemisia tridentata
Atriplex canescens
Chrysothamnus nauseosus
Gutierrezia sarothrae
Pinus edulis

FORBS
Aster foliaceus

GRASSES
Agropyron cristatum
Bromus inermis
Elymus cinereus
Elymus junceus
Elymus lanceolatus
Elymus smithii
Elymus spicatus

COVER
Total Living Cover
Litter
Bareground
Rock

% COMPOSITION
Shrubs
Forbs
Grasses

ENERGY WEST-COTTONWOOD FAN PORTAL
Reference Area
Exposure: W
Slope: 33 deg.

Sample Date: 6-10 Aug 9	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
OVERSTORY								
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Juniperus ostersperma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinus edulis	0.00	15.00	5.00	0.00	0.00	0.00	0.00	0.00
SHRUBS								
Juniperus ostersperma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ephedra viridis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinus edulis	0.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00
Atriplex confertifolia	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
Mahonia repens	0.00	0.00	0.00	0.00	0.00	0.00	8.00	10.00
Chrysothamnus nauseosu	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
FORBS								
Cryptantha sp	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
Galium bifolium	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Lepidium montanum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machaeranthera canesce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Senecio sp.	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
Stanleya pinnata	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
GRASSES								
Elymus salinus	25.00	35.00	35.00	28.00	35.00	45.00	30.00	10.00
Stipa hymenoides	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
COVER								
Overstory	0.00	15.00	5.00	0.00	0.00	0.00	0.00	0.00
Understory	25.00	50.00	45.00	50.00	45.00	45.00	40.00	25.00
Litter	10.00	15.00	5.00	20.00	15.00	10.00	15.00	5.00
Bareground	10.00	10.00	10.00	5.00	25.00	15.00	5.00	25.00
Rock	55.00	10.00	35.00	25.00	15.00	30.00	40.00	45.00
% COMPOSITION								
Shrubs	0.00	30.00	0.00	30.00	22.22	0.00	20.00	40.00
Forbs	0.00	0.00	22.22	4.00	0.00	0.00	5.00	20.00
Grasses	100.00	70.00	77.78	66.00	77.78	100.00	75.00	40.00

9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
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	0.00	30.00	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	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	5.00	20.00	3.00	0.00	0.00
0.00	8.00	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	2.00	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	5.00	0.00	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	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	20.00	10.00	15.00	5.00	30.00	40.00	20.00	30.00	30.00
0.00	10.00	0.00	5.00	0.00	5.00	0.00	0.00	20.00	0.00
0.00	5.00	25.00	10.00	35.00	0.00	0.00	0.00	0.00	10.00
25.00	45.00	30.00	35.00	35.00	45.00	60.00	25.00	55.00	35.00
5.00	5.00	5.00	10.00	10.00	15.00	35.00	10.00	5.00	30.00
40.00	15.00	5.00	20.00	15.00	25.00	4.00	45.00	10.00	5.00
30.00	30.00	35.00	25.00	5.00	15.00	1.00	20.00	30.00	20.00
0.00	17.78	66.67	28.57	85.71	11.11	33.33	12.00	0.00	0.00
20.00	15.56	0.00	14.29	0.00	11.11	0.00	8.00	9.09	14.29
80.00	66.67	33.33	57.14	14.29	77.78	66.67	80.00	90.91	85.71

19.00	20.00	21.00	22.00	23.00	24.00	25.00	Mean	SDev	Freq
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	6.86	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	1.96	4.00
60.00	0.00	0.00	35.00	0.00	20.00	0.00	7.00	14.14	32.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.98	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	5.88	4.00
0.00	0.00	0.00	0.00	0.00	25.00	10.00	1.40	5.20	8.00
5.00	0.00	0.00	20.00	0.00	0.00	0.00	2.00	5.10	16.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	2.94	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44	4.79	28.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	2.46	8.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	1.66	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.98	4.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.60	1.62	12.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.98	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.39	4.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.68	1.87	12.00
5.00	10.00	25.00	15.00	35.00	15.00	15.00	23.32	10.98	100.00
0.00	15.00	0.00	0.00	15.00	0.00	0.00	3.00	5.66	28.00
60.00	0.00	0.00	35.00	0.00	20.00	0.00	8.80	14.99	
10.00	30.00	30.00	35.00	50.00	40.00	25.00	37.40	11.50	
15.00	10.00	30.00	5.00	10.00	10.00	5.00	12.40	8.26	
5.00	10.00	20.00	10.00	5.00	20.00	45.00	16.16	12.06	
10.00	50.00	20.00	15.00	35.00	10.00	25.00	25.24	13.53	
50.00	0.00	0.00	57.14	0.00	62.50	40.00	24.28	24.60	
0.00	16.67	16.67	0.00	0.00	0.00	0.00	7.08	7.90	
50.00	83.33	83.33	42.86	100.00	37.50	60.00	68.64	21.86	

ENERGY WEST-COTTONWOOD FAN PORTAL
Reference Area
Exposure: W
Slope: 33 deg.
Sample Date: 6-10 Aug 97

OVERSTORY
Amalanchier utahensis
Juniperus ostersperma
Pinus edulis

SHRUBS
Juniperus ostersperma
Amalanchier utahensis
Ephedra viridis
Pinus edulis
Atriplex confertifolia
Mahonia repens
Chrysothamnus nauseosus

FORBS
Cryptantha sp
Galium bifolium
Lepidium montanum
Machaeranthera canescens
Senecio sp.
Stanleya pinnata

GRASSES
Elymus salinus
Stipa hymenoides

COVER
Overstory
Understory
Litter
Bareground
Rock

% COMPOSITION
Shrubs
Forbs
Grasses