

AFFIDAVIT OF PUBLICATION

STATE OF UTAH)

ss.

County of Carbon,)

I, Ken Larson, on oath, say that I am the Publisher of the Sun Advocate, a twice-weekly newspaper of general circulation, published at Price, State a true copy of which is hereto attached, was published in the full issue of such newspaper for 4 (Four) consecutive issues, and that the first publication was on the 27th day of March, 2003, and that the last publication of such notice was in the issue of such newspaper dated the 17th day of April, 2003.

Ken G. Larson

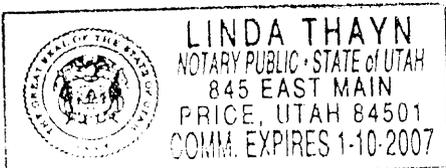
Ken G Larson - Publisher

Subscribed and sworn to before me this 17th day of April, 2003.

Linda Thayne

Notary Public My commission expires January 10, 2007 Residing at Price, Utah

Publication fee, \$ 355.52



PUBLIC NOTICE

**APPLICATION FOR PHASE III BOND RELEASE
WILLOW CREEK MINE
PLATEAU MINING CORPORATION
PERMIT C/007/038, APPROVED 04/24/96
CARBON COUNTY, UTAH**

Notice is hereby given that Plateau Mining Corporation, P.O. Box 30, 847 Northwest Highway 191, Helper, Utah 84526, a subsidiary of RAG American Coal Company, 999 Corporate Blvd., Linthicum Heights, MD 21090, has filed an application with the Utah Department of Natural Resources, Division of Oil, Gas and Mining for a Phase III bond release to Permit C/007/038. The Phase III bond release is on land owned by C-Canyon, L.C. and approved for recreational use under the provisions of the Utah Coal Mining and Reclamation Act pursuant to R645-301-880 and R645-301-413.300 of the Utah Coal Program Regulations. The portion of the permit area that is affected is located in Carbon County, Utah as follows:

Township 12 South, Range 9 East
Section 28: Portions of N/2SW/4;
Section 29: Portions of N/2SE/4;
A tract or parcel of land comprising 7.51 acres more or less

The permit area is shown on the Kyune U.S. Geological Survey 7.5-minute map.

Written comments, objections and requests for information conferences on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Closing date for submission of such comments, objections and requests for public hearing or information conference on this proposal must be submitted by May 17, 2003.

Published in the Sun Advocate March 27, April 3, 10 and 17, 2003.

**Plateau Mining Corporation
Willow Creek Mine
Crandall Canyon Leach Field Area
C/007/038**

**Phase III Bond Release on 7.51 acres of disturbed lands associated with approved Post
Mining Land Use Change.**

I hereby certify to the best of my information and belief that all applicable reclamation activities have been accomplished in accordance with the requirements of the Act, the regulatory program, and the approved reclamation plan.

Johnny Pappas
Print Name

[Signature] - Sr. Env. Engineer - 4/24/03
Sign Name, Position, Date

Subscribed and sworn to before me this 24th day of April, 2003

Wilma Howa
Notary Public

My Commission Expires: Sept 05, 2004 }

Attest: State of Utah } ss:

County of Carbon

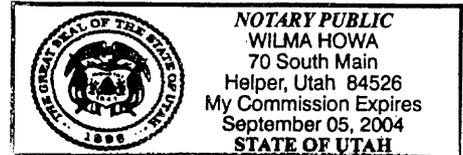


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- | | | |
|----|--|------------|
| 4. | Seeding and final mulching
(to occur after September 15). This stage may occur immediately following initial mulch incorporation, when the soils are most conducive to seeding. | Week 16-20 |
|----|--|------------|

Phase III Reclamation

- | | | |
|----|---------------------------------|----------------------------|
| 5. | Vegetation and water monitoring | For 10 years after seeding |
| 6. | Reclamation monitoring | Until bond release |
| 7. | Diversion maintenance | 2-10 years |

3.7-5(7) Reclamation Costs

The reclamation bond amount calculated for Crandall Canyon is presented in Exhibit 19, Appendix 3-2.

3.7-6 Bond Release

Phase III bond release was authorized for the Crandall Canyon leach field area as shown on Exhibits 3.7-7A and 3.7-7B and supported by information in Appendix 3.7V and Appendix 3.7W.

**PLATEAU
MINING
CORPORATION**

Willow Creek Mine
847 NW Hwy 191
Helper, Utah 84526
(435) 472-0482
Fax: (435) 472-0486

An affiliate of **RAG**

March 6, 2003

Mr. Mark Mackiewicz
Bureau of Land Management
125 South 600 West
Price, Utah 84501

Re: Phase III Bond Release, C-Canyon, L.C., Recreational Postmining Land Use, Willow Creek Mine, C/007/038, Carbon County, Utah

Dear Mr. Mackiewicz:

In accordance with the requirements of R645-301-880.120, Plateau Mining Corporation (PMC) is notifying the surface landowners and local governmental body within and adjacent to the Crandall Canyon portion of the Willow Creek Mine of its intention to seek phase III bond release on those disturbed lands approved for recreational use. The land is owned by C-Canyon L.C. and described on the attached public notice.

The phase III bond release is for 7.51 acres of permitted disturbed lands within the approved and achieved post mining land use change boundary.

Comments from the legal or equitable owner of record of the surface areas to be affected and from the Federal, Utah and local government agencies should be mailed to: Plateau Mining Corporation, Attention: Johnny Pappas, P.O. Box 30, 847 NW Highway 191, Helper, Utah 84526.

If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

Enclosure

Env: Crandall Canyon-Phase III Bond Release
Chrono: JP030302.LTR

Public Notice

**Application for Phase III Bond Release
Willow Creek Mine
Plateau Mining Corporation
Permit C/007/038, Approved 04/24/96
Carbon County, Utah**

Notice is hereby given that Plateau Mining Corporation, P.O. Box 30, 847 Northwest Highway 191, Helper, Utah 84526, a subsidiary of RAG American Coal Company, 999 Corporate Blvd., Linthicum Heights, MD 21090, has filed an application with the Utah Department of Natural Resources, Division of Oil, Gas and Mining for a Phase III bond release to Permit C/007/038. The Phase III bond release is on land owned by C-Canyon, L.C. and approved for recreational use under the provisions of the Utah Coal Mining and Reclamation Act pursuant to R645-301-880 and R645-301-413.300 of the Utah Coal Program Regulations. The portion of the permit area that is affected is located in Carbon County, Utah as follows:

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Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
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Salt Lake City, Utah 84114-5801

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Published in the Sun Advocate - March 27, April 3, 10, and 17

**PLATEAU
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Willow Creek Mine
847 NW Hwy 191
Helper, Utah 84526
(435) 472-0482
Fax: (435) 472-0486

An affiliate of



March 6, 2003

Mr. William D. Krompel
Commissioner
120 East Main Street
Price, Utah 84501

Re: Phase III Bond Release, C-Canyon, L.C., Recreational Postmining Land Use, Willow Creek Mine, C/007/038, Carbon County, Utah

Dear Mr. Krompel:

In accordance with the requirements of R645-301-880.120, Plateau Mining Corporation (PMC) is notifying the surface landowners and local governmental body within and adjacent to the Crandall Canyon portion of the Willow Creek Mine of its intention to seek phase III bond release on those disturbed lands approved for recreational use. The land is owned by C-Canyon L.C. and described on the attached public notice.

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If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Pappas', written in a cursive style.

Johnny Pappas
Sr. Environmental Engineer

Enclosure

Env: Crandall Canyon-Phase III Bond Release
Chrono: JP030303.LTR

**PLATEAU
MINING
CORPORATION**

Willow Creek Mine
847 NW Hwy 191
Helper, Utah 84526
(435) 472-0482
Fax: (435) 472-0486

An affiliate of **RAG**

March 6, 2003

Mr. Gary Harwood
Helper City
P.O. Box 221
Helper, Utah 84526

Re: Phase III Bond Release, C-Canyon, L.C., Recreational Postmining Land Use, Willow Creek Mine, C/007/038, Carbon County, Utah

Dear Mr. Harwood:

In accordance with the requirements of R645-301-880.120, Plateau Mining Corporation (PMC) is notifying the surface landowners and local governmental body within and adjacent to the Crandall Canyon portion of the Willow Creek Mine of its intention to seek phase III bond release on those disturbed lands approved for recreational use. The land is owned by C-Canyon L.C. and described on the attached public notice.

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If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

Enclosure

Env: Crandall Canyon-Phase III Bond Release
Chrono: JP030306.LTR

**PLATEAU
MINING
CORPORATION**

Willow Creek Mine
847 NW Hwy 191
Helper, Utah 84526
(435) 472-0482
Fax: (435) 472-0486

An affiliate of **RAG**

March 6, 2003

Mr. Dave Levanger
Carbon County Planning and Zoning Commission
120 East Main Street
Price, Utah 84501

Re: **Phase III Bond Release, C-Canyon, L.C., Recreational Postmining Land Use, Willow Creek Mine, C/007/038, Carbon County, Utah**

Dear Mr. Levanger:

In accordance with the requirements of R645-301-880.120, Plateau Mining Corporation (PMC) is notifying the surface landowners and local governmental body within and adjacent to the Crandall Canyon portion of the Willow Creek Mine of its intention to seek phase III bond release on those disturbed lands approved for recreational use. The land is owned by C-Canyon L.C. and described on the attached public notice.

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If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

Enclosure

Env: Crandall Canyon-Phase III Bond Release
Chrono: JP030307.LTR

**PLATEAU
MINING
CORPORATION**

Willow Creek Mine
847 NW Hwy 191
Helper, Utah 84526
(435) 472-0482
Fax: (435) 472-0486

An affiliate of **RAG**

March 6, 2003

Mr. Roger Wheeler
Director Land Management
700 Morrison Road
Gahanna, Ohio 43230-6642

Re: Phase III Bond Release, C-Canyon, L.C., Recreational Postmining Land Use, Willow Creek Mine, C/007/038, Carbon County, Utah

Dear Mr. Wheeler:

In accordance with the requirements of R645-301-880.120, Plateau Mining Corporation (PMC) is notifying the surface landowners and local governmental body within and adjacent to the Crandall Canyon portion of the Willow Creek Mine of its intention to seek phase III bond release on those disturbed lands approved for recreational use. The land is owned by C-Canyon L.C. and described on the attached public notice.

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If you have any questions or need additional information, please do not hesitate to contact me at (435)472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

Enclosure

Env: Crandall Canyon-Phase III Bond Release
Chrono: JP030305.LTR

**PLATEAU
MINING
CORPORATION**

Willow Creek Mine
847 NW Hwy 191
Helper, Utah 84526
(435) 472-0482
Fax: (435) 472-0486

An affiliate of



March 6, 2003

Mr. Reed Martineau
Snow, Christensen & Martineau
P.O. Box 45000
Salt Lake City, Utah 84145-5000

Re: **Phase III Bond Release, C-Canyon, L.C., Recreational Postmining Land Use, Willow Creek Mine, C/007/038, Carbon County, Utah**

Dear Mr. Martineau:

In accordance with the requirements of R645-301-880.120, Plateau Mining Corporation (PMC) is notifying the surface landowners and local governmental body within and adjacent to the Crandall Canyon portion of the Willow Creek Mine of its intention to seek phase III bond release on those disturbed lands approved for recreational use. The land is owned by C-Canyon L.C. and described on the attached public notice.

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Sincerely,

A handwritten signature in black ink, appearing to read 'J. Pappas', written in a cursive style.

Johnny Pappas
Sr. Environmental Engineer

Enclosure

Env: Crandall Canyon-Phase III Bond Release
Chrono: JP030304.LTR

APPENDIX 3.7W

**VEGETATION MONITORING AND PHASED BOND
RELEASE REVEGETATION INFORMATION**

**VEGETATION MONITORING
FOR PHASE III BOND RELEASE
FOR THE LEACH FIELD AREA
IN CRANDALL CANYON**

YEAR 2 STUDY
2002

Including a Two-Year Data Comparison: 2001-2002

FOR THE
PLATEAU MINING CORPORATION



Prepared by

MT. NEBO SCIENTIFIC, INC.

330 East 400 South, Suite 6

P.O. Box 337

Springville, Utah 84663

(801) 489-6937

Patrick Collins, Ph.D.

for

PLATEAU MINING CORPORATION

847 Northwest Highway 191

Helper, Utah 84526

Fieldwork: August 2002

Report: January 2003



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VEGETATION MONITORING
FOR PHASE III BOND RELEASE
FOR THE LEACH FIELD AREA
IN CRANDALL CANYON

Year 2

(Including a Two-Year Data Comparison: 2001-2002)

INTRODUCTION

Objectives for Monitoring

The Crandall Canyon area, located in Carbon County, Utah, has a history of coal mining and reclamation activities. Several areas previously disturbed by these mining activities have been reclaimed and reseeded with 'final' or 'contemporaneous' plant seed mixtures. One such area is called the "Leach Field Area". It is located near the end of a dirt road that begins from State Hwy. 6 and runs through the Plateau Mining Corporation's property. The study area will eventually be used for recreation and occupational uses. The Leach Field Area was seeded with the contemporaneous seed mixture, or a seed mixture that was not intended to duplicate or establish plant communities analogous to those adjacent undisturbed communities. There are special circumstances that have precluded Plateau Mining Corporation from seeding it with the final seed mix. The following statement taken from the Crandall Canyon Mining and Reclamation Plan explains these circumstances.

The approved premining land use designation for Crandall Canyon is undeveloped land. However, pursuant to negotiations for relocating the Barn Canyon powerline across private land, the landowner (C-Canyon, L.C.) requested and was given the opportunity to acquire the land shown on Map 1 (Agreement Document) for his authorization to install the powerline across his property. The new landowner is requesting a higher and better use of the land which requires portions of the M&RP be amended to facilitate his needs for unrestricted access to his land

during the operational, reclamation and post reclamation phases of the Mining and Reclamation Plan (Appendix 3.7V). The land owned by C-Canyon, L.C., falling within the disturbed area boundary (as shown on Map 1) will be reclaimed to a recreational postmining use. All other land with the disturbed area boundary will be reclaimed to its premining land use of undeveloped land. The primary road will remain for C-Canyon, L.C., to access its lands.

Therefore, at the request of the new landowner, the Leach Field Area in Crandall Canyon will be left in its present condition and an application for final bond release (Phase III Bond Release) will be sought. In doing so, approval was necessary to adjust the final reclamation standards of this area through the State of Utah, Division of Oil, Gas & Mining (DOGGM). During the approval process, it was also necessary for DOGM to obtain an allowance from the State of Utah, Division of Wildlife Resource (DWR) to have standards with no woody species density requirements. These approvals were obtained.

Two years of data is necessary for Phase III Bond Release. A report was also written for data collected in 2001. This earlier report was called:

VEGETATION MONITORING
FOR PHASE III BOND RELEASE
FOR THE LEACH FIELD AREA
IN CRANDALL CANYON

YEAR 1 STUDY
2001

The 2002 data in this document will be used as Year 2 as provides quantitative vegetation data for a Phase III (Final) Bond Release application.

Vegetation in the Leach Field Area was sampled in the growing season of 2002 as a means to monitor the success of revegetation activities accomplished by the Plateau Mining Corporation. A certain degree of success could determine whether or not Phase III Bond Release would be

possible. Phase III Bond Release applications are sought through DOGM.

A Reference Area, or an area previously chosen to represent a standard of success for the revegetation in Crandall Canyon, has also been sampled for comparisons. This area was located near Plateau Mining Corporation's Willow Creek current coal yard.

METHODS

Quantitative and qualitative data were taken from the vegetation of the Leach Field Area in Crandall Canyon and the Reference Area. In order for the data to be compared statistically, methodologies for sampling in 2002 were virtually identical to those employed in 2001. Sampling was conducted from July 24-25, 2002. Methodologies used for sampling were performed in accordance with the guidelines supplied by DOGM.

Transect and Quadrat Placement

Random/regular placement of sample quadrats were designed as an attempt to provide unbiased accuracy of the data compiled. This was accomplished by establishing one long transect line along the entire length of the Leach Field Area. At regular intervals along the transect line, random numbers were generated and used to measure distances at right angles from the line to determine sample locations. Whether these random numbers were odd or even determined which side of the transect line a given quadrat was placed. The random number selected would be high

enough to place quadrats to the lateral limits of the Leach Field Area and all areas in-between.

This insured that the sample quadrats were placed randomly over the entire study area in an attempt to adequately represent the site as a whole.

Cover, Frequency and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows "A Utah Flora", (Welsh et al. 1993).

Sample Size & Adequacy

Sampling adequacy was calculated using the formula given below.

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN = minimum adequate sample
t = appropriate confidence t-value
s = standard deviation
x = sample mean
d = desired change from mean

The values used for “t” and “d” insured that sample adequacy was met with 90% confidence within a 10% deviation from the true mean.

Diversity & Similarity Indices

There are several well-documented methods to measure diversity and similarities in plant communities. The “Motyka Index” is a modified form of the “Sorenson Index”, both similarity indices. This index was used on the data and the equation is shown below:

$$IS_{MO} = \left(\frac{2MW}{MA + MB} \right) \times 100$$

where,

MW = \sum of the smaller quantitative values of species of two communities,
MA = \sum of the quantitative values of all species in one community,
MB = \sum of the quantitative values of all species in another community.

Two diversity indices have been reported in this document for the Reclaimed and Reference Areas. MacArthur's Diversity Index is an effective diversity measurement and is computed using the following equation:

$$1/\sum pi^2$$

where,

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.

Another diversity measurement was provided that shows the average number of species encountered at each quadrat, providing another value for species diversity.

Photographs

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

Raw Data

The raw data for total cover, cover by species, frequency and composition were also submitted in the Appendix of this report which should facilitate future scrutiny of the data and further statistical testing if desired.

RESULTS

Reclaimed Leach Field Area

Total living cover of the reclaimed Leach Field Area in 2002 was estimated at 60.88%. Of that

living cover, 91.53% of it were grasses, 8.05% were forbs, and 0.42% were shrubs (Table 1).

The dominant grass species in descending order were: mountain brome (*Bromus carinatus*), crested wheatgrass (*Agropyron cristatum*) and Gt. Basin wildrye (*Elymus cinereus*). The dominant forb species was alfalfa (*Medicago sativa*). The only woody species present in the quadrats was viscid rabbitbrush (*Chrysothamnus viscidiflorus*). For 2002 cover and frequency values by species of the reclaimed Leach Field, refer to Table 2.

Reference Area

The Reference Area chosen to be used for standards of revegetation success had a total living cover of the 36.50% (Table 3). Grasses dominated the living cover comprising 65.28% of the composition. Shrubs comprised 23.11%, and forbs 11.60% of the living cover (Table 3). The dominant species for the Reference Area was the grass, Salina wildrye (*Elymus salinus*), followed by a shrub, big sagebrush (*Artemisia tridentata*). The dominant forb was Louisiana wormwood (*Artemisia ludoviciana*). For cover and frequency by species for this community, refer to Table 4.

Data Set Comparisons: 2001-2002

Comparisons were made between the 2001 and 2002 data of the reclaimed Leach Field Area in Crandall Canyon and its Reference Area near the Willow Creek coal yard in Price Canyon. To begin, statistical tests were implemented comparing the total living plant cover of the two areas.

In 2001 and

2002, a

“Student’s t-test”

analysis

suggested *that*

the vegetation of

the Leach Field

Area had a

statistically

significant

greater amount of total living cover than that of the Reference Area (Fig. 1).

Next, although the specific procedures to monitor final diversity standards were not explicitly outlined in Willow Creek’s Mining & Reclamation Plan (MRP) for the Leach Field Area in Crandall Canyon, the State of Utah requires final revegetation to be restored to cover that is “diverse, effective, and permanent”. Community or species diversity is therefore necessary to achieve Phase III Bond Release. The Motyka Index was recommended in Plateau Mining Corporation’s plans to be used to compare species diversity. Although this index is more of a ‘similarity index’ than a ‘diversity index’, it has been employed here to compare the data sets. The following parameters were assigned in Willow Creek’s plan as categories to be used for

FIG. 1. STUDENT’S T-TEST - A Two-Year Total Living Cover Comparison Between the Reclaimed Area at Crandall Canyon and its Reference Area (2001-2002).

	<u>\bar{x}</u>	<u>s</u>	<u>n</u>	<u>t</u>	<u>df</u>	<u>SL</u>
2001						
Reclaimed Area:	66.63	7.36	40			
Reference Area:	48.00	11.96	40			
t-test				8.390	78	p<.005
2002						
Reclaimed Area:	60.88	11.06	40			
Reference Area:	36.50	13.33	40			
t-test				8.902	78	p<.005
\bar{x} = mean s = standard deviation n = sample size t = Student's t-value df = degrees of freedom SL= Significance Level						

comparisons with the Motyka Index:

Non-Weedy Shrub Cover,
 Weedy Shrub Cover,
 Native Perennial Grass Cover,
 Introduced Perennial Grass Cover,
 Non-Weedy Forb & Grass Cover,
 Weedy Forb & Grass Cover.

FIG. 2. MOTYKA INDEX - A Two-Year Comparison Between the Reclaimed Area at Crandall Canyon and its Reference Area (2001-2002).

$$IS_{MO} = \left(\frac{2MW}{MA + MB} \right) \times 100$$

	$IS_{MO} =$
2001	65.384
2002	49.281

IS_{MO} = Motyka Index
 MW = \sum of the smaller quantitative values of species of two communities
 MA = \sum of the quantitative values of all species in the reclaimed area community
 MB = \sum of the quantitative values of all species in the reference area community.

When using the above categories and employing the Motyka Index, the similarity value between the two communities was determined to be 49.28% in 2002. For a comparison between 2001 and 2002, refer to Fig. 2.

MacArthur's Diversity Index, a well-documented index to show community diversity, was also employed to the data sets

of the reclaimed Leach Field Area and the Reference Area. This comparison suggested that the total diversity of the Leach Field Area was greater than that of the Reference Area for both 2001 and 2002 (Fig. 3).

Still another method of comparing

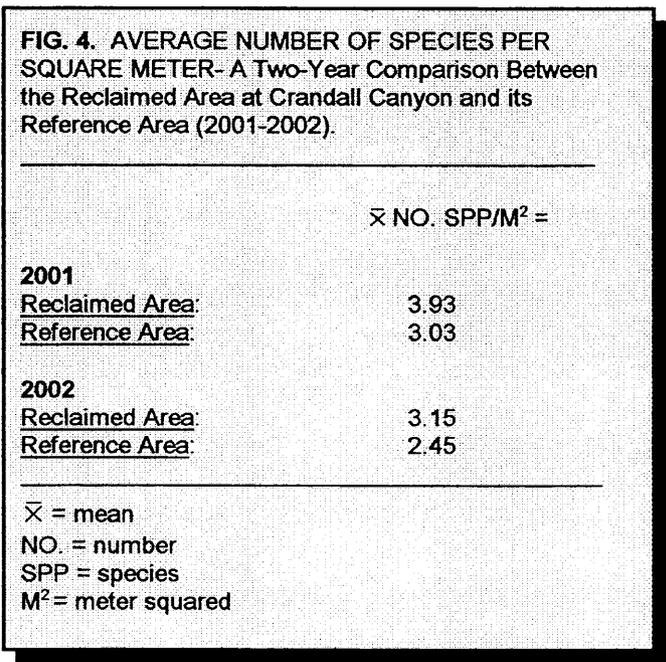
FIG. 3. MacARTHUR'S INDEX - A Two-Year Comparison Between the Reclaimed Area at Crandall Canyon and its Reference Area (2001-2002).

	$1/\sum p_i^2 =$
2001	
<u>Reclaimed Area:</u>	10.446
<u>Reference Area:</u>	4.755
2002	
<u>Reclaimed Area:</u>	6.577
<u>Reference Area:</u>	4.685

p_i = the proportion of sum frequency contributed by the i th species in the sample area of concern.

species diversity of the two areas is to simply calculate the mean number of species present in the sample quadrats. Two-year results from this method also suggested that the Leach Field Area was more diverse with respect to the number of species when compared to the Reference Area (Fig. 4).

As one will note, cover and diversity for both the reclaimed Leach Field Area and Reference Area



decreased in 2002 when compared to 2001. One probable explanation for this change is the drought conditions that continue in Utah. The year 2002 was the fourth year of lower-than-average precipitation along the Wasatch Plateau, the geographic providence in which the study areas are located.

DISCUSSION

Approval by the State of Utah for Phase III Bond Release is dependent on several factors. The results of quantitative sampling the vegetation in the Leach Field Area and the Reference Area, chosen to represent revegetation standards, enables investigators to compare several

parameters of these two areas. For example, total ground cover, lifeform composition, cover by species, and frequency have been reported in the tables. Statistical tests and other community analyses have been employed on the data sets as a means to define and clarify the findings.

One community similarity index, Motyka's Index, established a value to represent the similarity of the two communities with respect to specific parameters (non-weedy shrub cover, weedy shrub cover, native perennial grass cover, etc). Using these parameters the Motyka's Index suggested that these two areas are dissimilar. This, however, is not surprising because the reclaimed Leach Field Area was seeded with a mixture of plant species not meant to duplicate the communities of the native undisturbed plant communities of the adjacent areas. Furthermore, woody plant species were not seeded in this area as they may have compromised the functional aspects of the Leach Field. The established vegetation does, however, represent the desires of the new landowner who wishes to use the property "to facilitate his needs for unrestricted access to his land during the operational, reclamation and post reclamation phases of the Mining and Reclamation Plan" (see Introduction of this report). In other words, this landowner wants the Leach Field Area to retain the plant species that currently exist there.

To continue the discussion of the comparison between the Leach Field Area and the Reference Area, two diversity indices suggested that the Leach Field Area had greater diversity than the Reference Area in 2001 and 2002 (MacArthur's Diversity Index and Average Number of Species Present) .

The data analyses presented in this report suggest that the Leach Field Area had acceptable cover and diversity when compared to the native, undisturbed Reference Area. Although the species present in the Leach Field Area do not exactly duplicate the undisturbed Reference Area, they represent the preference of the current landowner. Therefore, the data sets summarized in this report (and the 2001 report mentioned in the Introduction of this report) could be used for the two years necessary for the Phase III Bond Release application through the State of Utah.

TABLE 1: Total cover and composition summary of the reclaimed areas in the Leach Field Area in Crandall Canyon.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	60.88	11.06	40
Litter	29.83	10.31	40
Bareground	6.33	3.30	40
Rock	2.98	2.60	40

COMPOSITION

Shrubs	0.42	2.60	40
Forbs	8.05	9.69	40
Grasses	91.53	10.39	40

TABLE 2: Species cover and frequency summary of the reclaimed areas in the Leach Field Area in Crandall Canyon.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
<i>Chrysothamnus viscidiflorus</i>	0.25	1.56	40	2.50
FORBS				
<i>Artemisia ludoviciana</i>	0.10	0.44	40	5.00
<i>Chenopodium sp.</i>	0.33	1.13	40	10.00
<i>Iva axillaris</i>	0.13	0.78	40	2.50
<i>Lappula occidentalis</i>	0.05	0.31	40	2.50
<i>Medicago sativa</i>	4.23	4.74	40	55.00
GRASSES				
<i>Agropyron cristatum</i>	14.63	13.76	40	72.50
<i>Bromus carinatus</i>	18.48	18.60	40	67.50
<i>Elymus cinereus</i>	10.88	20.64	40	30.00
<i>Elymus junceus</i>	3.25	13.11	40	7.50
<i>Elymus lanceolatus</i>	0.25	1.09	40	5.00
<i>Elymus smithii</i>	1.50	3.57	40	20.00
<i>Stipa comata</i>	5.83	12.97	40	25.00
<i>Stipa hymenoides</i>	1.00	3.00	40	10.00

TABLE 3: Total cover and composition summary of the Reference Area for Crandall Canyon (located in Price Canyon).

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	36.50	13.33	40
Litter	9.55	6.24	40
Bareground	9.20	7.33	40
Rock	44.75	18.47	40

COMPOSITION

Shrubs	23.11	35.02	40
Forbs	11.60	18.02	40
Grasses	65.28	33.55	40

TABLE 4: Species cover and frequency summary of the Reference Area for Crandall Canyon (located in Price Canyon).

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
<i>Artemisia tridentata</i>	5.75	9.04	40	35.00
<i>Atriplex canescens</i>	0.75	3.46	40	5.00
<i>Artemisia nova</i>	0.45	2.81	40	2.50
<i>Opuntia polyacantha</i>	0.13	0.78	40	2.50
FORBS				
<i>Artemisia ludoviciana</i>	3.88	6.25	40	35.00
<i>Machaeranthera grindelioides</i>	0.25	1.09	40	5.00
GRASSES				
<i>Bromus tectorum</i>	4.93	6.11	40	57.50
<i>Elymus salinus</i>	18.25	15.61	40	82.50
<i>Stipa comata</i>	1.00	3.00	40	12.50
<i>Stipa hymenoides</i>	0.75	3.96	40	5.00



Reclaimed Areas of the Leach Field in Crandall Canyon (1 of 2)



Reclaimed Areas of the Leach Field in Crandall Canyon (2 of 2)



Reference Area for Crandall Canyon (1 of 2)



Reference Area for Crandall Canyon (2 of 2)

APPENDIX

Raw Data
2002

PLATEAU MINING CORP

Crandall Canyon

Reclaimed Leach Field

Exposure: E

Slope: 12 deg

Sample Date: 24-25 July 02

	1.00	2.00	3.00	4.00	5.00	6.00	7.00
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TREES & SHRUBS

<i>Chrysothamnus viscidiflorus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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FORBS

<i>Artemisia ludoviciana</i>	0.00	0.00	0.00	2.00	2.00	0.00	0.00
<i>Chenopodium sp.</i>	0.00	0.00	0.00	1.00	0.00	0.00	2.00
<i>Iva axillaris</i>	0.00	0.00	0.00	0.00	5.00	0.00	0.00
<i>Lappula occidentalis</i>	0.00	0.00	0.00	2.00	0.00	0.00	0.00
<i>Medicago sativa</i>	0.00	5.00	5.00	5.00	18.00	5.00	8.00

GRASSES

<i>Agropyron cristatum</i>	20.00	30.00	5.00	20.00	5.00	0.00	0.00
<i>Bromus carinatus</i>	10.00	10.00	45.00	35.00	20.00	55.00	50.00
<i>Elymus cinereus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Elymus junceus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Elymus lanceolatus</i>	5.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Elymus smithii</i>	5.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Stipa comata</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Stipa hymenoides</i>	0.00	0.00	10.00	0.00	0.00	10.00	10.00

COVER

Total Living Cover	40.00	45.00	65.00	65.00	50.00	70.00	70.00
Litter	55.00	50.00	30.00	30.00	45.00	25.00	20.00
Bareground	4.00	4.00	3.00	3.00	4.00	3.00	8.00
Rock	1.00	1.00	2.00	2.00	1.00	2.00	2.00

% COMPOSITION

Shrubs	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	0.00	11.11	7.69	15.38	50.00	7.14	14.29
Grasses	100.00	88.89	92.31	84.62	50.00	92.86	85.71

8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	1.00	10.00	0.00	0.00	10.00	5.00	5.00	5.00	5.00
25.00	10.00	15.00	10.00	15.00	25.00	10.00	10.00	20.00	20.00
35.00	54.00	45.00	30.00	10.00	40.00	45.00	30.00	25.00	25.00
0.00	0.00	0.00	0.00	25.00	0.00	0.00	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	15.00	5.00	5.00
0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75.00	65.00	80.00	45.00	50.00	75.00	60.00	75.00	55.00	55.00
23.00	25.00	15.00	40.00	45.00	20.00	35.00	20.00	35.00	40.00
1.00	5.00	3.00	10.00	4.00	4.00	4.00	4.00	8.00	4.00
1.00	5.00	2.00	5.00	1.00	1.00	1.00	1.00	2.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	1.54	12.50	0.00	0.00	13.33	8.33	6.67	9.09	9.09
80.00	98.46	87.50	100.00	100.00	86.67	91.67	93.33	90.91	90.91

18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00
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	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
5.00	7.00	0.00	0.00	10.00	0.00	10.00	10.00	0.00	0.00
30.00	15.00	25.00	30.00	40.00	0.00	40.00	15.00	0.00	10.00
0.00	40.00	10.00	20.00	10.00	0.00	15.00	5.00	0.00	10.00
15.00	0.00	0.00	0.00	0.00	55.00	0.00	20.00	0.00	45.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	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	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	8.00	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
55.00	70.00	40.00	50.00	65.00	65.00	65.00	60.00	60.00	70.00
35.00	25.00	45.00	35.00	30.00	30.00	25.00	25.00	20.00	20.00
9.00	4.00	10.00	10.00	4.00	4.00	8.00	10.00	10.00	9.00
1.00	1.00	5.00	5.00	1.00	1.00	2.00	5.00	10.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00
9.09	10.00	0.00	0.00	15.38	0.00	15.38	16.67	0.00	7.14
90.91	90.00	100.00	100.00	84.62	100.00	84.62	66.67	100.00	92.86

28.00	29.00	30.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	10.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
55.00	35.00	5.00	30.00	0.00	5.00	0.00	0.00	0.00	0.00
10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	80.00	0.00	30.00	0.00	25.00	0.00	0.00	10.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	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	5.00	0.00	0.00	15.00
0.00	0.00	0.00	0.00	35.00	50.00	35.00	0.00	35.00	40.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70.00	50.00	85.00	40.00	65.00	55.00	65.00	60.00	50.00	65.00
20.00	40.00	10.00	40.00	30.00	35.00	25.00	35.00	30.00	20.00
8.00	5.00	4.00	10.00	4.00	9.00	5.00	4.00	15.00	10.00
2.00	5.00	1.00	10.00	1.00	1.00	5.00	1.00	5.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.14	20.00	0.00	25.00	0.00	0.00	0.00	0.00	10.00	0.00
92.86	80.00	100.00	75.00	100.00	100.00	100.00	100.00	90.00	100.00

PLATEAU MINING CORP
 Crandall Canyon
 Reclaimed Leach Field
 Exposure: E
 Slope: 12 deg
 Sample Date: 24-25 July 02

38.00	39.00	40.00	Mean	SDev	Freq	
<hr/>						TREES & SHRUBS
0.00	0.00	0.00	0.25	1.56	2.50	<i>Chrysothamnus viscidiflorus</i>
<hr/>						FORBS
0.00	0.00	0.00	0.10	0.44	5.00	<i>Artemisia ludoviciana</i>
0.00	0.00	0.00	0.33	1.13	10.00	<i>Chenopodium sp.</i>
0.00	0.00	0.00	0.13	0.78	2.50	<i>Iva axillaris</i>
0.00	0.00	0.00	0.05	0.31	2.50	<i>Lappula occidentalis</i>
0.00	0.00	0.00	4.23	4.74	55.00	<i>Medicago sativa</i>
<hr/>						GRASSES
10.00	0.00	0.00	14.63	13.76	72.50	<i>Agropyron cristatum</i>
0.00	50.00	0.00	18.48	18.60	67.50	<i>Bromus carinatus</i>
40.00	0.00	75.00	10.88	20.64	30.00	<i>Elymus cinereus</i>
0.00	0.00	0.00	3.25	13.11	7.50	<i>Elymus junceus</i>
0.00	0.00	0.00	0.25	1.09	5.00	<i>Elymus lanceolatus</i>
0.00	0.00	0.00	1.50	3.57	20.00	<i>Elymus smithii</i>
0.00	5.00	0.00	5.83	12.97	25.00	<i>Stipa comata</i>
10.00	0.00	0.00	1.00	3.00	10.00	<i>Stipa hymenoides</i>
<hr/>						COVER
60.00	55.00	75.00	60.88	11.06		Total Living Cover
15.00	35.00	15.00	29.83	10.31		Litter
15.00	5.00	5.00	6.33	3.30		Bareground
10.00	5.00	5.00	2.98	2.60		Rock
<hr/>						% COMPOSITION
0.00	0.00	0.00	0.42	2.60		Shrubs
0.00	0.00	0.00	8.05	9.69		Forbs
100.00	100.00	100.00	91.53	10.39		Grasses

PLATEAU MINING CORP
 Crandall Canyon
 Reference Area (Near Coal Yard)
 Exposure: SW
 Slope: 33 deg
 Sample Date: 24-25 July 02

	1.00	2.00	3.00	4.00	5.00	6.00	7.00
TREES & SHRUBS							
<i>Artemisia tridentata</i>	0.00	0.00	0.00	5.00	0.00	25.00	25.00
<i>Atriplex canescens</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Artemisia nova</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Opuntia polyacantha</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Pinus edulis</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS							
<i>Artemisia ludoviciana</i>	0.00	5.00	10.00	0.00	0.00	0.00	0.00
<i>Machaeranthera grindelioides</i>	5.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES							
<i>Bromus tectorum</i>	25.00	5.00	10.00	10.00	15.00	0.00	0.00
<i>Elymus salinus</i>	0.00	0.00	10.00	5.00	50.00	25.00	5.00
<i>Stipa hymenoides</i>	0.00	25.00	0.00	5.00	0.00	0.00	0.00
<i>Stipa comata</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER							
Total Living Cover	30.00	35.00	30.00	25.00	65.00	50.00	30.00
Litter	5.00	20.00	20.00	20.00	20.00	10.00	5.00
Bareground	35.00	10.00	5.00	5.00	5.00	5.00	5.00
Rock	30.00	35.00	45.00	50.00	10.00	35.00	60.00
% COMPOSITION							
Shrubs	0.00	0.00	0.00	20.00	0.00	50.00	83.33
Forbs	16.67	14.29	33.33	0.00	0.00	0.00	0.00
Grasses	83.33	85.71	66.67	80.00	100.00	50.00	16.67

18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00
20.00	20.00	25.00	15.00	20.00	0.00	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	18.00	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	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	15.00	0.00	20.00	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
2.00	0.00	0.00	10.00	5.00	15.00	0.00	2.00	5.00	20.00
8.00	0.00	0.00	0.00	5.00	20.00	5.00	0.00	30.00	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	10.00	0.00	0.00	0.00	0.00	15.00	0.00
30.00	20.00	40.00	40.00	45.00	35.00	25.00	20.00	60.00	30.00
5.00	5.00	5.00	10.00	10.00	5.00	5.00	5.00	10.00	5.00
5.00	5.00	5.00	5.00	10.00	5.00	5.00	10.00	15.00	15.00
60.00	70.00	50.00	45.00	35.00	55.00	65.00	65.00	15.00	50.00
66.67	100.00	100.00	50.00	44.44	0.00	0.00	90.00	16.67	0.00
0.00	0.00	0.00	0.00	33.33	0.00	80.00	0.00	0.00	16.67
33.33	0.00	0.00	50.00	22.22	100.00	20.00	10.00	83.33	83.33

28.00	29.00	30.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00
0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	8.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	10.00	15.00	5.00	10.00	0.00	7.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	10.00	0.00	5.00	0.00	0.00	5.00	0.00	5.00
10.00	5.00	30.00	20.00	30.00	20.00	35.00	35.00	40.00	40.00
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	5.00	0.00	0.00
10.00	20.00	45.00	30.00	50.00	30.00	50.00	45.00	55.00	45.00
2.00	10.00	10.00	5.00	30.00	5.00	5.00	10.00	10.00	10.00
3.00	15.00	10.00	5.00	5.00	5.00	5.00	20.00	5.00	25.00
85.00	55.00	35.00	60.00	15.00	60.00	40.00	25.00	30.00	20.00
0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00	14.55	0.00
0.00	50.00	0.00	33.33	30.00	16.67	20.00	0.00	12.73	0.00
100.00	50.00	100.00	66.67	70.00	66.67	80.00	100.00	72.73	100.00

PLATEAU MINING CORP
 Crandall Canyon
 Reference Area (Near Coal Yard)
 Exposure: SW
 Slope: 33 deg
 Sample Date: 24-25 July 02

38.00	39.00	40.00	Mean	SDev	Freq	
<hr/>						TREES & SHRUBS
7.00	0.00	10.00	5.75	9.04	35.00	<i>Artemisia tridentata</i>
0.00	0.00	0.00	0.75	3.46	5.00	<i>Atriplex canescens</i>
0.00	0.00	0.00	0.45	2.81	2.50	<i>Artemisia nova</i>
0.00	0.00	0.00	0.13	0.78	2.50	<i>Opuntia polyacantha</i>
0.00	0.00	0.00	0.38	2.34	2.5	<i>Pinus edulis</i>
 						FORBS
8.00	10.00	0.00	3.88	6.25	35.00	<i>Artemisia ludoviciana</i>
0.00	0.00	0.00	0.25	1.09	5.00	<i>Machaeranthera grindelioides</i>
 						GRASSES
5.00	10.00	0.00	4.93	6.11	57.50	<i>Bromus tectorum</i>
25.00	20.00	5.00	18.25	15.61	82.50	<i>Elymus salinus</i>
0.00	0.00	0.00	0.75	3.96	5.00	<i>Stipa hymenoides</i>
0.00	0.00	0.00	1.00	3.00	12.50	<i>Stipa comata</i>
<hr/>						COVER
45.00	40.00	15.00	36.50	13.33		Total Living Cover
15.00	25.00	5.00	9.55	6.24		Litter
15.00	5.00	5.00	9.20	7.33		Bareground
25.00	30.00	75.00	44.75	18.47		Rock
<hr/>						% COMPOSITION
15.56	0.00	66.67	23.11	35.02		Shrubs
17.78	25.00	0.00	11.60	18.02		Forbs
66.67	75.00	33.33	65.28	33.55		Grasses
<hr/>						

VEGETATION MONITORING
FOR PHASE III BOND RELEASE
FOR THE LEACH FIELD AREA
IN CRANDALL CANYON

YEAR 1 STUDY
2001

FOR THE
PLATEAU MINING CORPORATION



Prepared by

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Fieldwork: August 2001

Report: January 2002

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VEGETATION MONITORING FOR PHASE III BOND RELEASE FOR THE LEACH FIELD AREA IN CRANDALL CANYON

INTRODUCTION

Objectives for Monitoring

The Crandall Canyon area, located in Carbon County, Utah, has a history of coal mining and reclamation activities. Several areas previously disturbed by these mining activities have been reclaimed and reseeded with the 'final' and 'contemporaneous' plant seed mixtures. One such area is called the "Leach Field Area". It is located near the end of a dirt road that begins from State Hwy. 6, runs through the property and will remain for recreation and occupational uses.

The Leach Field was seeded with the contemporaneous seed mixture. There are special circumstances that have precluded Plateau Mining Corp. from seeding it with the final seed mix.

The following statement taken from the Crandall Canyon Mining and Reclamation Plan explains these circumstances.

The approved premining land use designation for Crandall Canyon is undeveloped land. However, pursuant to negotiations for relocating the Barn Canyon powerline across private land, the landowner (C-Canyon, L.C.) requested and was given the opportunity to acquire the land shown on Map 1 for his authorization to install the powerline across his property. The new landowner is requesting a higher and better use of the land which requires portions of the M&RP be amended to facilitate his needs for unrestricted access to his land during the operational, reclamation and post reclamation phases of the Mining and Reclamation Plan (Appendix 3.7V). The land owned by C-Canyon, L.C., falling within the disturbed area boundary (as shown on Map 1) will be reclaimed to a recreational postmining use. All other land with the disturbed area boundary will be reclaimed to its premining land use of undeveloped land. The primary road will remain for C-Canyon, L.C., to access its lands.

Therefore, at the request of the new landowner, the Leach Field Area in Crandall Canyon will be left in its present condition and an application for Final Bond Release will be sought. In doing so, approval was necessary to adjust the final reclamation standards of this area through the State of Utah, Division of Oil, Gas & Mining (DOGGM). During the approval process, it was necessary for DOGGM to obtain an allowance from the State of Utah, Division of Wildlife Resource (DWR) to have standards with no woody species density requirements. These approvals were obtained. This report will be used for Year 1 (of two years required) to provide quantitative vegetation data for a Phase III Bond Release application.

Vegetation in the Leach Field Area was sampled in the growing season of 2001 as a means to monitor the success of revegetation activities by the Plateau Mining Corp. A certain degree of success could determine whether or not Phase III Bond Release would be possible. As stated above, Phase III Bond Release applications are sought through DOGGM.

A Reference Area, or an area previously chosen to represent a standard of success for the revegetation in Crandall Canyon, has also been sampled for comparisons. This area was located near Plateau Mining Corp.'s current coal yard.

METHODS

Quantitative and qualitative data were taken from the vegetation of the Leach Field Area in Crandall Canyon and the Reference Area. Sampling was conducted in July 2001. Methodologies

used for sampling were performed in accordance with the guidelines supplied by DOGM.

Transect and Quadrat Placement

Random/regular placement of sample quadrats were designed as an attempt to provide unbiased accuracy of the data compiled. This was accomplished by establishing one long transect line along the entire length of the Leach Field Area. At regular intervals along the transect line, random numbers were generated and used to measure distances at right angles from the line to determine sample locations. Whether these random numbers were odd or even determined which side of the transect line a given quadrat was placed. The random number selected would be high enough to place quadrats to the lateral limits of the Leach Field Area and all areas in-between. This insured that the sample quadrats were placed randomly over the entire study area in an attempt to adequately represent the site as a whole.

Cover, Frequency and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows "A Utah Flora", (Welsh et al. 1993).

Sample Size & Adequacy

Sampling adequacy was calculated using the formula given below.

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

- nMIN* = minimum adequate sample
- t* = appropriate confidence t-value
- s* = standard deviation
- x* = sample mean
- d* = desired change from mean

The values used for “t” and “d” insured that sample adequacy was met with 90% confidence within a 10% deviation from the true mean.

Diversity & Similarity Indices

There are several well-documented methods to measure diversity and similarities in plant communities. The “Motyka Index” is a modified form of the “Sorenson Index”, both similarity indices. This index was used on the data and the equation is shown below:

$$IS_{MO} = \left(\frac{2MW}{MA+MB} \right) \times 100$$

where,

MW = \sum of the smaller quantitative values of species of two communities,
MA = \sum of the quantitative values of all species in one community,
MB = \sum of the quantitative values of all species in another community.

Two diversity indices have been reported in this document for the Reclaimed and Reference Areas. MacArthur's Diversity Index is an effective diversity measurement and is computed using the following equation:

$$1/\sum p_i^2$$

where,

p_i 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.

Another diversity measurement was provided that shows the average number of species encountered at each quadrat, providing a value for species diversity.

Photographs

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

Raw Data

The raw data for total cover, cover by species, frequency and composition were also submitted in the Appendix of this report which should facilitate future scrutiny of the data and further statistical testing if desired.

RESULTS

Reclaimed Leach Field Area

Sampling the reclaimed Leach Field Area revealed that the total living cover was 66.63%. Grasses were the dominant lifeform of this site comprising 72.15% of the total living cover followed by forbs at 27.43%, and shrubs at only 0.42% (Table 1). Even though most of the cover was comprised of grass species, one forb was the most common single species according to cover measurements. This species was alfalfa (*Medicago sativa*). A grass species, mountain brome (*Bromus carinatus*), was the next most common taxon by cover. This species, however, was present in more sample quadrats than any other species or in other words, it had the highest frequency at 62.50% (Table 2). Other important species included Gt. Basin wildrye (*Elymus cinereus*), bluebunch wheatgrass (*Elymus spicatus*), western wheatgrass (*Elymus smithii*), crested wheatgrass (*Agropyron cristatum*), and Sandberg's bluegrass (*Poa secunda*). For a list of all species present in the sample quadrats, refer to Table 2.

Reference Area

The Reference Area for the Crandall Canyon Leach Field Area was located near the Willow Creek coal yard in Price Canyon. The total living cover of the Reference Area was estimated at 48.00% (Table 3). Like the Leach Field Area data reported above, grasses were the most important lifeform comprising 79.44% of the total living cover. Forb and shrub lifeform composition proportions were nearly equal at just over 10% (Table 3).

The most common species in the Reference Area by quite a large margin was the native grass, Salina wildrye (*Elymus salinus*). This species had a mean cover of 26.02% and was present in 94.00% of the sample quadrats (Table 4). Species also common by cover and frequency were cheatgrass (*Bromus tectorum*), Louisiana sagewort (*Artemisia ludoviciana*), and big sagebrush (*Artemisia tridentata*).

Data Set Comparisons

Comparisons were made between the data of the revegetated Leach Field Area in Crandall Canyon and its Reference Area in Price Canyon. To begin, statistical tests were implemented comparing the total living plant cover of the two areas. A "Student's t-test" analysis suggested *that the vegetation of the Leach Field had a*

FIG. 1. STUDENT'S T TEST - A
Comparison Between the Leach Field Area at Crandall Canyon and its Reference Area.

Reclaimed Area: $\bar{x}=66.63$, $s=7.36$, $n=40$

Reference Area: $\bar{x}=48.00$, $s=11.96$, $n=40$

$t= 8.390$, $df= 788$, $SL= p< .005$

statistically significant greater amount of total living cover than that of the Reference Area (Fig. 1).

Next, although the specific procedures to monitor final diversity standards were not explicitly outlined in Willow Creek's Mining & Reclamation Plan (MRP) for the Leach Field Area in Crandall Canyon, the State of Utah requires final revegetation to be restored to cover that is "diverse, effective, and permanent". Community or species diversity is therefore necessary to be achieved for Phase III Bond Release. The Motyka Index has been recommended in Plateau Mining Corp. plans to be used to compare species diversity. Although this index is more of a 'similarity index' than a 'diversity index', it has been employed here to compare the data sets. The following parameters were assigned as categories to be used for comparisons with the Motyka Index:

Non-Weedy Shrub Cover,
Weedy Shrub Cover,
Native Perennial Grass Cover,
Introduced Perennial Grass Cover,
Non-Weedy Forb & Grass Cover,
Weedy Forb & Grass Cover.

When using the above categories and employing the Motyka Index, the similarity value between the two communities was determined to be 65.38% (Fig. 2).

MacArthur's Diversity Index, a well-documented index to show community diversity, was also employed to the data sets of the

FIG. 2. MOTYKA INDEX - A
Comparison Between the Leach Field Area at Crandall Canyon and its Reference Area

$$IS_{MO} = \left(\frac{2MW}{MA + MB} \right) \times 100 = 65.384$$

FIG. 3. MacARTHUR'S INDEX - A Comparison Between the Leach Field Area at Crandall Canyon and its Reference Area.

$$1/\sum p_i^2 =$$

Reclaimed Area: 10.446

Reference Area: 4.755

revegetated Leach Field Area and the natural Reference Area. This comparison suggested that the total diversity of the Leach Field Area was greater than that of the Reference Area by quite a wide margin (Fig. 3).

Still another method of comparing species diversity of the two areas is to simply calculate the mean number of species present in the sample quadrats. Results from this method also suggested that the Leach Field Area was more diverse with respect to the number of species when compared to the Reference Area (Fig. 4).

FIG. 4. AVERAGE NUMBER OF SPECIES PER SQUARE METER- A Comparison Between the Leach Field Area at Crandall Canyon and its Reference Area.

$$\bar{x} \text{ NO. SPP/M}^2 =$$

Reclaimed Area: 3.93

Reference Area: 3.03

DISCUSSION

Approval by the State of Utah for Phase III Bond Release is dependent on several factors. The results of quantitative sampling the vegetation in the Leach Field Area and the Reference Area chosen to represent revegetation standards enables investigators to compare several parameters of these two areas. For example, total ground cover, lifeform composition, cover by species, and frequency have been reported in the tables. Statistical tests and other community analyses have been employed on the data sets as a means to define and clarify the findings.

One community similarity index, Motyka's Index, established a value to represent the similarity of the two communities with respect to specific parameters (non-weedy shrub cover, weedy shrub cover, native perennial grass cover, etc). Using these parameters the Motyka's Index suggested that these two areas are only marginally similar. This, however, is not surprising because the reclaimed Leach Field Area was seeded with a mixture of plant species not meant to duplicate the communities of the native undisturbed plant communities in the. Furthermore, woody plant species were not seeded in this area as they may have compromised the functional aspects of the Leach Field Area. The established vegetation does, however, represent the desires of the new landowner who wishes to use the property "to facilitate his needs for unrestricted access to his land during the operational, reclamation and post reclamation phases of the Mining and Reclamation Plan" (see INTRODUCTION above). In other words, this landowner wants the Leach Field Area to retain the plant species that currently exist there.

To continue the discussion of the comparison between the Leach Field Area and the Reference Area, two diversity indices suggested that the Leach Field Area had greater diversity than the Reference Area (MacArthur's Diversity Index and Average Number of Species Present) .

The data analyses presented in this report suggest that the Leach Field Area had excellent cover and diversity when compared to the native, undisturbed Reference Area. Although the species present in the Leach Field Area do not duplicate exactly the undisturbed Reference Area, they represent the preference of the current landowner and therefore the data sets in this report could be used for Year 1 of the Phase III Bond Release application through the State of Utah.

TABLE 1: Total cover and composition summary of the revegetated areas in the Leach Field Area in Crandall Canyon.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	66.63	7.36	40
Litter	25.53	7.27	40
Bareground	5.08	4.01	40
Rock	2.78	3.84	40

COMPOSITION

Shrubs	0.42	2.60	40
Forbs	27.43	25.08	40
Grasses	72.15	24.75	40

TABLE 2: Species cover and frequency summary of the revegetated areas in the Leach Field Area in Crandall Canyon.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
<i>Rosa woodsii</i>	0.25	1.56	40	2.50
FORBS				
<i>Artemisia ludoviciana</i>	0.13	0.78	40	2.50
<i>Aster foliaceus</i>	0.13	0.78	40	2.50
<i>Cirsium</i> sp.	0.63	2.00	40	10.00
<i>Cleome serrulata</i>	0.13	0.78	40	2.50
<i>Cynoglossum officinale</i>	0.13	0.78	40	2.50
<i>Iva axillaris</i>	0.75	2.11	40	12.50
<i>Lappula occidentalis</i>	0.13	0.78	40	2.50
<i>Medicago sativa</i>	16.25	20.12	40	52.50
<i>Sisymbrium altissimum</i>	0.38	1.32	40	7.50
<i>Tragopogon dubius</i>	0.13	0.78	40	2.50
<i>Verbascum thapsus</i>	0.38	1.32	40	7.50
GRASSES				
<i>Agropyron cristatum</i>	5.50	13.31	40	27.50
<i>Bromus carinatus</i>	12.63	15.17	40	62.50
<i>Elymus cinereus</i>	9.00	17.90	40	30.00
<i>Elymus junceus</i>	0.13	0.78	40	2.50
<i>Elymus lanceolatus</i>	2.25	4.87	40	25.00
<i>Elymus smithii</i>	6.13	8.62	40	47.50
<i>Elymus spicatus</i>	6.25	12.69	40	22.50
<i>Poa fendleriana</i>	0.63	2.00	40	10.00
<i>Poa secunda</i>	4.50	6.96	40	35.00
<i>Stipa comata</i>	0.13	0.78	40	2.50
<i>Stipa hymenoides</i>	0.13	0.78	40	2.50

TABLE 3: Total cover and composition summary of the Reference Area for Crandall Canyon (located in Price Canyon).

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	48.00	11.96	50
Litter	7.72	3.72	50
Bareground	8.02	6.77	50
Rock	36.26	13.21	50

COMPOSITION

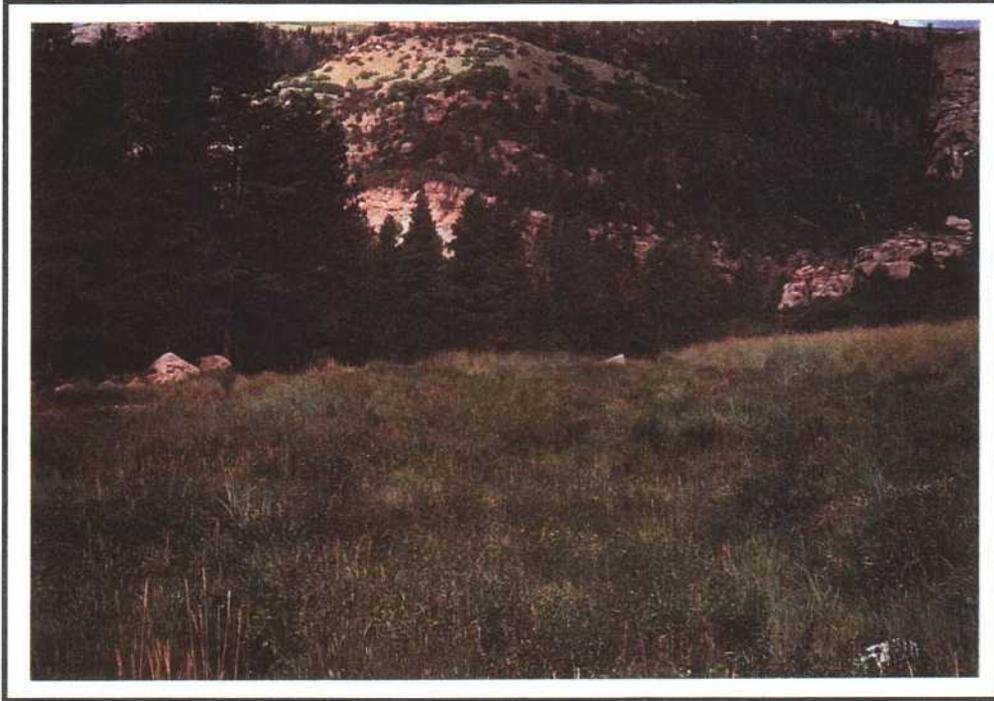
Shrubs	10.37	21.48	50
Forbs	10.19	12.29	50
Grasses	79.44	22.73	50

TABLE 4: Species cover and frequency summary of the Reference Area for Crandall Canyon (located in Price Canyon).

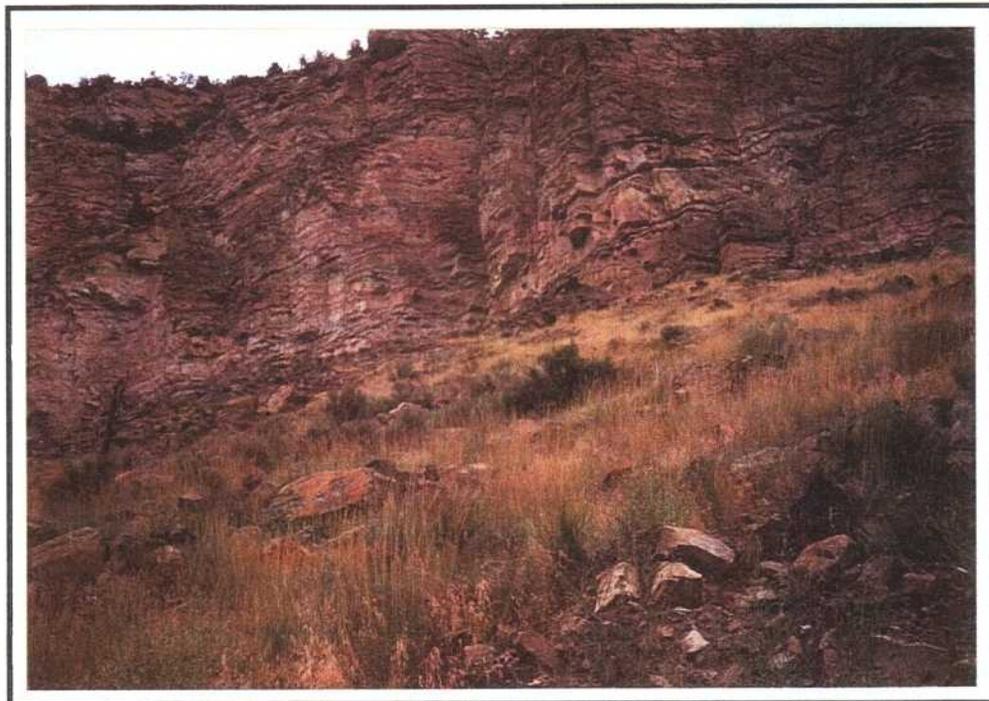
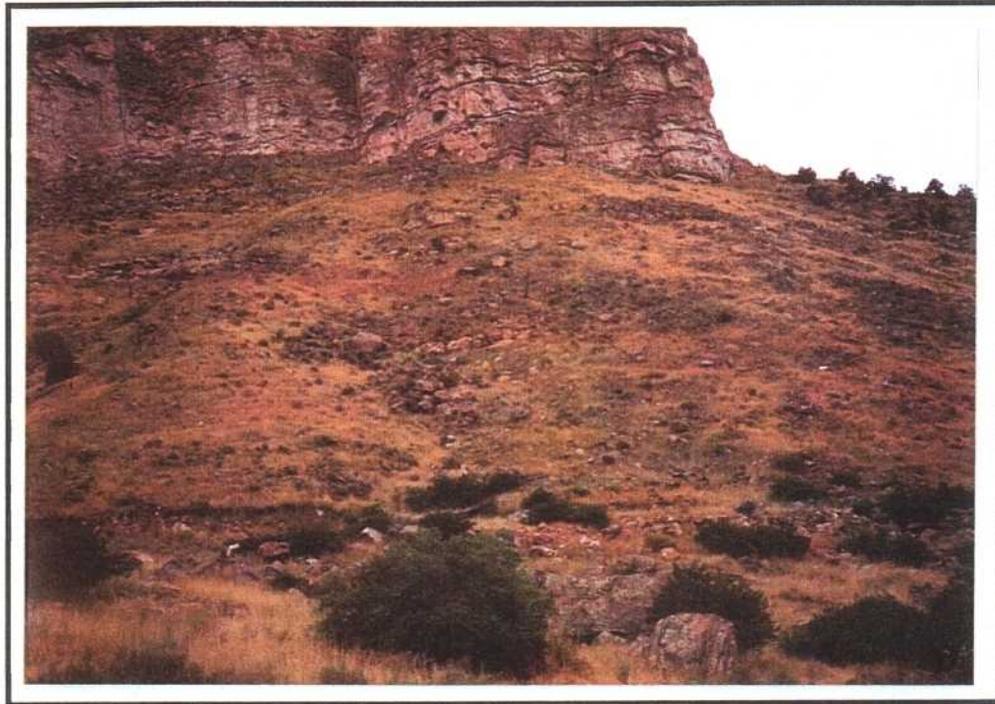
SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
<i>Artemisia tridentata</i>	3.30	8.34	50	20.00
<i>Atriplex canescens</i>	1.10	5.22	50	6.00
<i>Ephedra viridis</i>	0.30	1.55	50	4.00
<i>Gutierrezia sarothrae</i>	0.40	2.20	50	4.00
<i>Opuntia polyacantha</i>	0.10	0.70	50	2.00
FORBS				
<i>Artemisia ludoviciana</i>	4.44	5.36	50	50.00
<i>Chenopodium sp.</i>	0.10	0.70	50	2.00
<i>Penstemon sp.</i>	0.20	0.98	50	4.00
GRASSES				
<i>Bromus tectorum</i>	8.50	8.08	50	66.00
<i>Elymus salinus</i>	26.02	13.51	50	94.00
<i>Elymus spicatus</i>	0.60	4.20	50	2.00
<i>Hilaria jamesii</i>	1.34	3.63	50	14.00
<i>Poa secunda</i>	0.40	2.80	50	2.00
<i>Stipa comata</i>	1.20	4.19	50	10.00

COLOR PHOTOGRAPHS

Revegetated Areas of the Leach Field in Crandall Canyon



Reference Area for Crandall Canyon



APPENDIX

Raw Data

PLATEAU MINING CORP

Crandall Canyon

Reclaimed Leach Field

Exposure: E

Slope: 12 deg

Sample Date: 25 July 01

1.00 2.00 3.00 4.00 5.00 6.00

TREES & SHRUBS

Rosa woodsii 0.00 0.00 0.00 0.00 0.00 0.00

FORBS

Artemisia ludoviciana 0.00 0.00 0.00 0.00 0.00 0.00

Aster foliaceus 0.00 0.00 0.00 0.00 0.00 0.00

Cirsium 0.00 0.00 0.00 0.00 0.00 0.00

Cleome serrulata 0.00 0.00 0.00 0.00 0.00 0.00

Cynoglossum officinale 0.00 0.00 0.00 5.00 0.00 0.00

Iva axillaris 5.00 5.00 0.00 10.00 0.00 0.00

Lappula occidentalis 0.00 0.00 0.00 0.00 0.00 0.00

Medicago sativa 40.00 65.00 55.00 0.00 30.00 20.00

Sisymbrium altissimum 0.00 0.00 0.00 0.00 0.00 0.00

Tragopogon dubius 0.00 0.00 0.00 0.00 0.00 0.00

Verbascum thapsus 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

Bromus carinatus 15.00 10.00 20.00 5.00 40.00 15.00

Elymus cinereus 5.00 0.00 0.00 0.00 0.00 0.00

Elymus junceus 0.00 0.00 0.00 0.00 0.00 0.00

Elymus lanceolatus 5.00 0.00 5.00 0.00 0.00 0.00

Elymus smithii 0.00 5.00 0.00 35.00 5.00 25.00

Elymus spicatus 0.00 0.00 0.00 0.00 0.00 0.00

Poa fendleriana 0.00 0.00 5.00 10.00 0.00 0.00

Poa secunda 0.00 0.00 0.00 0.00 0.00 0.00

Stipa comata 0.00 0.00 0.00 5.00 0.00 0.00

Stipa hymenoides 0.00 0.00 0.00 0.00 0.00 0.00

COVER

Total Living Cover 70.00 85.00 85.00 70.00 75.00 65.00

Litter 25.00 10.00 10.00 10.00 20.00 30.00

Bareground 4.00 4.00 4.00 5.00 4.00 4.00

Rock 1.00 1.00 1.00 15.00 1.00 1.00

% COMPOSITION

Shrubs 0.00 0.00 0.00 0.00 0.00 0.00

Forbs 64.29 82.35 64.71 21.43 40.00 30.77

Grasses 35.71 17.65 35.29 78.57 60.00 69.23

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	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
35.00	15.00	55.00	55.00	0.00	10.00	15.00	40.00	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	5.00	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
20.00	25.00	0.00	5.00	15.00	55.00	35.00	20.00	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	10.00	0.00	10.00	0.00	0.00	5.00	10.00
5.00	10.00	0.00	15.00	25.00	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	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	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65.00	55.00	70.00	75.00	60.00	65.00	65.00	65.00	60.00
30.00	40.00	25.00	20.00	30.00	33.00	35.00	30.00	35.00
5.00	5.00	5.00	5.00	10.00	2.00	0.00	1.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53.85	27.27	78.57	73.33	8.33	15.38	30.77	61.54	25.00
46.15	72.73	21.43	26.67	91.67	84.62	69.23	38.46	75.00

16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
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	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	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
45.00	30.00	0.00	0.00	10.00	30.00	50.00	20.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	35.00	10.00	35.00	0.00
10.00	30.00	50.00	15.00	40.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	5.00	10.00	0.00	0.00	0.00	0.00
15.00	10.00	15.00	5.00	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	0.00
0.00	0.00	0.00	25.00	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
75.00	70.00	65.00	60.00	60.00	65.00	70.00	65.00	55.00
25.00	28.00	30.00	30.00	20.00	20.00	30.00	30.00	30.00
0.00	2.00	5.00	9.00	10.00	10.00	0.00	5.00	10.00
0.00	0.00	0.00	1.00	10.00	5.00	0.00	0.00	5.00
0.00	0.00	0.00	16.67	0.00	0.00	0.00	0.00	0.00
60.00	42.86	0.00	0.00	16.67	46.15	71.43	30.77	9.09
40.00	57.14	100.00	83.33	83.33	53.85	28.57	69.23	90.91

25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	33.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
5.00	10.00	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	0.00	0.00	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	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
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	5.00	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	65.00	0.00	5.00	0.00	0.00
5.00	0.00	5.00	0.00	0.00	5.00	20.00	0.00	0.00
0.00	5.00	0.00	10.00	5.00	60.00	0.00	50.00	25.00
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	20.00	0.00	0.00	0.00	5.00	0.00	0.00
45.00	30.00	0.00	25.00	0.00	10.00	0.00	20.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
0.00	15.00	20.00	20.00	0.00	0.00	15.00	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
65.00	60.00	60.00	60.00	70.00	75.00	60.00	80.00	60.00
25.00	25.00	20.00	25.00	20.00	25.00	35.00	20.00	35.00
5.00	10.00	10.00	10.00	5.00	0.00	4.00	0.00	4.00
5.00	5.00	10.00	5.00	5.00	0.00	1.00	0.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.08	16.67	16.67	8.33	0.00	0.00	25.00	6.25	8.33
76.92	83.33	83.33	91.67	100.00	100.00	75.00	93.75	91.67

34.00	35.00	36.00	37.00	38.00	39.00	40.00	Mean	SDev
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	1.56
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.63	2.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.75	2.11
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	5.00	0.00	0.00	0.00	0.00	0.00	16.25	20.12
0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.38	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.38	1.32
0.00	10.00	10.00	35.00	0.00	0.00	0.00	5.50	13.31
0.00	0.00	0.00	5.00	0.00	0.00	5.00	12.63	15.17
15.00	0.00	35.00	0.00	40.00	0.00	60.00	9.00	17.90
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	0.00	0.00	0.00	0.00	25.00	0.00	2.25	4.87
5.00	0.00	15.00	0.00	15.00	0.00	0.00	6.13	8.62
45.00	30.00	0.00	0.00	0.00	25.00	0.00	6.25	12.69
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.63	2.00
0.00	15.00	10.00	10.00	10.00	10.00	0.00	4.50	6.96
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.78
65.00	65.00	70.00	55.00	70.00	60.00	75.00	66.63	7.36
25.00	35.00	25.00	25.00	20.00	10.00	25.00	25.53	7.27
5.00	0.00	3.00	8.00	5.00	20.00	0.00	5.08	4.01
5.00	0.00	2.00	12.00	5.00	10.00	0.00	2.78	3.84
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	2.60
0.00	15.38	0.00	9.09	7.14	0.00	6.67	27.43	25.08
100.00	84.62	100.00	90.91	92.86	100.00	93.33	72.15	24.75

PLATEAU MINING CORP

Crandall Canyon

Reclaimed Leach Field

Exposure: E

Slope: 12 deg

Sample Date: 25 July 01

Freq	
<hr/>	
	TREES & SHRUBS
2.50	<i>Rosa woodsii</i>
	FORBS
2.50	<i>Artemisia ludoviciana</i>
2.50	<i>Aster foliaceus</i>
10.00	<i>Cirsium</i>
2.50	<i>Cleome serrulata</i>
2.50	<i>Cynoglossum officinale</i>
12.50	<i>Iva axillaris</i>
2.50	<i>Lappula occidentalis</i>
52.50	<i>Medicago sativa</i>
7.50	<i>Sisymbrium altissimum</i>
2.50	<i>Tragopogon dubius</i>
7.50	<i>Verbascum thapsus</i>
	GRASSES
27.50	<i>Agropyron cristatum</i>
62.50	<i>Bromus carinatus</i>
30.00	<i>Elymus cinereus</i>
2.50	<i>Elymus junceus</i>
25.00	<i>Elymus lanceolatus</i>
47.50	<i>Elymus smithii</i>
22.50	<i>Elymus spicatus</i>
10.00	<i>Poa fendleriana</i>
35.00	<i>Poa secunda</i>
2.50	<i>Stipa comata</i>
2.50	<i>Stipa hymenoides</i>
<hr/>	
	COVER
	Total Living Cover
	Litter
	Bareground
	Rock
<hr/>	
	% COMPOSITION
	Shrubs
	Forbs
	Grasses
<hr/>	

PLATEAU MINING CORP

Crandall Canyon

Reference Area (Near Coal Yard)

Exposure: SW

Slope: 33 deg

Sample Date: 26 July 01

	1.00	2.00	3.00	4.00	5.00	6.00
TREES & SHRUBS						
<i>Atriplex canescens</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Artemisia tridentata</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ephedra viridis</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Gutierrezia sarothrae</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Opuntia polyacantha</i>	0.00	0.00	0.00	0.00	0.00	0.00
FORBS						
<i>Artemisia ludoviciana</i>	10.00	0.00	0.00	7.00	10.00	10.00
<i>Penstemon sp.</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Chenopodium sp.</i>	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES						
<i>Bromus tectorum</i>	10.00	10.00	5.00	0.00	15.00	5.00
<i>Elymus salinus</i>	30.00	30.00	40.00	28.00	15.00	40.00
<i>Elymus spicatus</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hilaria jamesii</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Poa secunda</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>Stipa comata</i>	0.00	0.00	0.00	0.00	10.00	0.00
COVER						
Total Living Cover	50.00	40.00	45.00	35.00	50.00	55.00
Litter	10.00	10.00	5.00	5.00	15.00	5.00
Bareground	5.00	15.00	5.00	10.00	5.00	5.00
Rock	35.00	35.00	45.00	50.00	30.00	35.00
% COMPOSITION						
Shrubs	0.00	0.00	0.00	0.00	0.00	0.00
Forbs	20.00	0.00	0.00	20.00	20.00	18.18
Grasses	80.00	100.00	100.00	80.00	80.00	81.82

	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	10.00	35.00
	0.00	0.00	5.00	40.00	0.00	0.00	0.00	0.00	20.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	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	15.00	0.00	0.00	10.00	0.00	5.00	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

	10.00	15.00	10.00	0.00	15.00	0.00	20.00	10.00	5.00
	15.00	5.00	35.00	5.00	30.00	25.00	0.00	15.00	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	15.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00
	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00

	35.00	40.00	60.00	45.00	55.00	25.00	60.00	35.00	70.00
	5.00	10.00	10.00	1.00	5.00	2.00	5.00	9.00	4.00
	20.00	15.00	15.00	4.00	1.00	3.00	20.00	1.00	1.00
	40.00	35.00	15.00	50.00	39.00	70.00	15.00	55.00	25.00

	0.00	0.00	8.33	88.89	0.00	0.00	0.00	28.57	78.57
	28.57	37.50	8.33	0.00	18.18	0.00	8.33	0.00	0.00
	71.43	62.50	83.33	11.11	81.82	100.00	91.67	71.43	21.43

16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	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	0.00	0.00
0.00	5.00	5.00	5.00	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
15.00	10.00	0.00	25.00	20.00	30.00	20.00	15.00	10.00
10.00	50.00	25.00	15.00	40.00	20.00	20.00	40.00	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	10.00	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	0.00	0.00
50.00	65.00	30.00	55.00	60.00	70.00	40.00	60.00	40.00
5.00	9.00	5.00	10.00	10.00	10.00	5.00	5.00	5.00
10.00	1.00	5.00	5.00	10.00	5.00	5.00	10.00	10.00
35.00	25.00	60.00	30.00	20.00	15.00	50.00	25.00	45.00
50.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00
0.00	7.69	16.67	9.09	0.00	0.00	0.00	8.33	0.00
50.00	92.31	83.33	90.91	100.00	85.71	100.00	91.67	100.00

25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	33.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	30.00	0.00	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
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	10.00
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

0.00	0.00	20.00	0.00	20.00	20.00	5.00	0.00	15.00
25.00	35.00	20.00	25.00	35.00	0.00	45.00	5.00	25.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	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	0.00	0.00	0.00

30.00	35.00	40.00	25.00	70.00	55.00	50.00	35.00	50.00
15.00	5.00	5.00	10.00	10.00	5.00	5.00	5.00	10.00
30.00	25.00	5.00	15.00	5.00	20.00	5.00	5.00	5.00
25.00	35.00	50.00	50.00	15.00	20.00	40.00	55.00	35.00

0.00	0.00	0.00	0.00	0.00	54.55	0.00	28.57	0.00
16.67	0.00	0.00	0.00	0.00	0.00	0.00	57.14	20.00
83.33	100.00	100.00	100.00	100.00	45.45	100.00	14.29	80.00

34.00	35.00	36.00	37.00	38.00	39.00	40.00	41.00	42.00
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	10.00	5.00	0.00	15.00	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	5.00	0.00	0.00	0.00	15.00	0.00
0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	5.00	5.00	0.00	0.00	0.00	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
5.00	20.00	0.00	5.00	10.00	0.00	0.00	0.00	0.00
55.00	25.00	30.00	8.00	35.00	35.00	35.00	15.00	25.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
0.00	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65.00	50.00	40.00	35.00	55.00	40.00	35.00	50.00	60.00
19.00	10.00	10.00	5.00	15.00	5.00	5.00	5.00	5.00
1.00	5.00	10.00	20.00	10.00	5.00	5.00	15.00	5.00
15.00	35.00	40.00	40.00	20.00	50.00	55.00	30.00	30.00
0.00	0.00	12.50	28.57	18.18	12.50	0.00	70.00	0.00
7.69	0.00	12.50	14.29	0.00	0.00	0.00	0.00	8.33
92.31	100.00	75.00	57.14	81.82	87.50	100.00	30.00	91.67

43.00	44.00	45.00	46.00	47.00	48.00	49.00	50.00	Mean
0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	1.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
15.00	10.00	0.00	5.00	15.00	10.00	10.00	15.00	4.44
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
0.00	5.00	5.00	10.00	10.00	0.00	0.00	0.00	8.50
35.00	40.00	30.00	45.00	40.00	0.00	20.00	40.00	26.02
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
0.00	0.00	0.00	0.00	0.00	20.00	20.00	0.00	1.20
50.00	55.00	35.00	60.00	65.00	40.00	50.00	55.00	48.00
4.00	5.00	10.00	15.00	9.00	9.00	10.00	10.00	7.72
1.00	1.00	5.00	5.00	1.00	1.00	5.00	5.00	8.02
45.00	39.00	50.00	20.00	25.00	50.00	35.00	30.00	36.26
0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	10.37
30.00	18.18	0.00	8.33	23.08	25.00	20.00	27.27	10.19
70.00	81.82	100.00	91.67	76.92	50.00	80.00	72.73	79.44

PLATEAU MINING CORP
 Crandall Canyon
 Reference Area (Near Coal Yard)
 Exposure: SW
 Slope: 33 deg
 Sample Date: 26 July 01

SDev	Freq	
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TREES & SHRUBS		
5.22	6.00	<i>Atriplex canescens</i>
8.34	20.00	<i>Artemisia tridentata</i>
1.55	4.00	<i>Ephedra viridis</i>
2.20	4.00	<i>Gutierrezia sarothrae</i>
0.70	2.00	<i>Opuntia polyacantha</i>
FORBS		
5.36	50.00	<i>Artemisia ludoviciana</i>
0.98	4.00	<i>Penstemon sp.</i>
0.70	2.00	<i>Chenopodium sp.</i>
GRASSES		
8.08	66.00	<i>Bromus tectorum</i>
13.51	94.00	<i>Elymus salinus</i>
4.20	2.00	<i>Elymus spicatus</i>
3.63	14.00	<i>Hilaria jamesii</i>
2.80	2.00	<i>Poa secunda</i>
4.19	10.00	<i>Stipa comata</i>
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COVER		
11.96		Total Living Cover
3.72		Litter
6.77		Bareground
13.21		Rock
<hr/>		
% COMPOSITION		
21.48		Shrubs
12.29		Forbs
22.73		Grasses
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Map(s) is kept with this application located in the Public Information Center of our Salt Lake City office.