Incoming

Thomas Gast
1275 Hightower Road
Wheatland WY 82201
307.322.1986

March 12, 2008

Mr. Lynn Kunzler
Mining Program
Utah Division of Oil Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114

Re: Chief Consolidated Mining Company; Tintic Operations Combined Permit M/049/062

Dear Mr. Kunzler,

Per our recent discussions, enclosed please find two copies of the revised pages to permit File Number M/049/062 along with the solids and vegetation appendix. Sherman Young, Chief's attorney in Provo continues to work on bringing current all three business registrations.

Thanks to you and your group in returning Chief's permits to good standing.

Sincerely,

Tom

Thomas E. Gast

MAR 14 2008
DIV. OF OIL, GAS & MINING

The acreage based on the current Reclamation Contract is:

| Facility | Permit ac. | Bonded Disturbance | Actual Disturbance |
|---|---|---|---|
| Apex No. 2 | 5.3 | 5.3 | 3.2 |
| Burgin Complex | 71.9 | 40.5 | 40.5 |
| Dry Stack Pile | 59.5 | 10.0 | 5.0 |
| Zuma Clay Pit | 69.0 | 8.0 | 6.5 |
| Trixie Mine | 25.3 | 10.1 | 10.1 |
| | | | |
| **Totals** | **231.0** | **73.9** | **65.3** |

Soils were not stockpiled during the pre-law development of the Burgin No. 2 area. No new disturbance is proposed in this area. Therefore, no soil materials are available for reclamation.

**Table 2.2 Burgin No. 2 Facilities List**

1. Headframe 30x50x90
2. Hoist Building 30x60x20
3. Engineering and Administration Offices 36x40x10 plus 80x80x12
4. Mechanical Shop 36x140x20
5. Crushing Plant 16x20x30
6. Ore Storage Bins (2) 750 tons each
7. Concentrator (Mill) 50x160x30
8. Thickeners (2) 36' diameter
9. Sample preparation Building 18x30x9
10. Assay Building 30x100x9
11. Small Storage Building 30x50x12
12. Substation

## 2.3 Apex No. 2 Area Operating Plan

Work on the Apex No. 2 shaft was begun in 1923 and it was sunk to a depth of 900 feet in 1924. The shaft was deepened to the 1,100 level in 1932. The property was leased to Kennecott in 1956 and then Sunshine Mining Company in 1980. In 1982 the property was permitted by Sunshine and in 1984 the Apex was included in permit M/049/009. Sunshine deepened the shaft to the 1,300 level and connected the level to the Burgin 1050 level. Since that time, underground exploration has intermittently been conducted utilizing the Apex No. 2 shaft for access.

The Apex No. 2 area has been well maintained since the time of Sunshine's exploration activities. Surface facilities at the site include the fenced two compartment shaft and small surface structures. These are listed in Table 2.3 and no new surface facilities are planned here. The Apex No. 2 shaft is approximately 6 foot by 9 foot and the shaft may be increased to 8 foot by 10 feet to allow ore production from above the water table. Additionally it will provide secondary access to the Burgin Mine during production as well as provide access for exploration of the adjacent Eureka Standard property in the future. The existing development rock disposal area is about 3.2 acres and the planned development work will add about 20,000 cubic yards to the waste rock dump expanding the disturbed area 5.3 acres within the permit boundary of 5.3 acres. Testing by Sunshine showed that the development rock does not contain potentially deleterious material. No new roads are proposed here. The Apex No. 2 area, including possible dump addition is shown on Figure 2.3.

It is planned that up to 175,000 tons of ore will be mined each year. Mining will be conducted by conventional underground methods (drill, blast and muck). The ore will be

bench 25 feet high covering 0.75 acres. Over a seven year life, a maximum of 5 acres of additional disturbance would result from mining the Zuma clay resource.

Current disturbance in the Zuma area is 6.5 acres within the permit boundary of 69 acres (figure 2.5). Exploration may disturb 1.5 acres and 8.0 acres is bonded. The open pit area may be expanded by 5.0 acres into the area of previous disturbance within the permit area depending upon the success of exploration and development. Existing roads would be maintained to place the Zuma in production. Pit configuration and overburden placement will be engineered following successful completion of the exploration program.

Soils were not stockpiled during the pre-law development of the Zuma clay pit and there are currently no soils in stockpile at Zuma. Based on Sunshine's exploration, the majority of the clay resource would be mined from within the existing disturbed area and no soils are available from this area. However, any suitable soils will be salvaged from any expansion into areas not previously disturbed. To begin soil salvage operations, trees will be removed from the expansion area and wind-rowed away from active operations areas. This wind-rowed material will serve as a wildlife habitat enhancement measure. Available soil will then be salvaged using a bulldozer/loader/truck operation. The salvaged soil will be stockpiled in an area, cleared of all trash and debris, adjacent to operations in an area where the soil will not be disturbed until it is recovered for reclamation activities.

Following stockpiling, fertilizer will be broadcast over the surface of the stockpile at rates based on the analyses of similar samples taken in 1995. The surface will then be roughened to incorporate the fertilizer into the seedbed and prepare the surface for seeding. The seed mixture will be broadcast over the surface of the stockpile and the seedbed roughened a second time to cover the seed.

## 2.6 Trixie Mine Operating Plan

The Trixie ore center, located in the southern section of the East Tintic District about 3 miles southwest of Eureka (figure 1), was the most recent discovery of a concealed gold deposit in the Tintic district. As described by Mogensen, Morris, and Smith (in Morris and Lovering, 1979, p.182-188), lead-silver ore was cut in several diamond core holes drilled in the Trixie area in 1954 - 1956 to evaluate a geochemical and hydrothermal alteration anomaly overlying a concealed geologic target similar to other mineralized areas in the district. The Trixie shaft was sunk in 1968 - 1969, and shortly after its completion to the 750 level, gold ore was encountered in a steeply dipping fissure west of the shaft. The mine began sustained production in 1970. Through July 1985, the Trixie produced approximately 600,000 tons of ore, containing about 113,000 oz of gold and 3,980,000 oz of silver along with significant quantities of copper, and minor but mostly unrecovered quantities of lead and zinc.

From August 1985 to November 1987, operations were suspended; but production resumed in December 1987 and by February 1988, a production level of 1,500 tons per month had been achieved. The mine was in production from then through 1993 when it was placed on standby. Chief Gold geologists discovered a new resource on a previously

# Soils and Vegetation Data Appendix

**LARGE MINING PERMIT**
**CHIEF CONSOLIDATED MINING COMPANY**
**TINTIC OPERATIONS**
**EAST TINTIC DISTRICT, UTAH COUNTY**
**File No. M/049/062**

APPENDIX V

American Chemical & Research Laboratories

1780 WEST 2300 SOUTH • SALT LAKE CITY, UTAH 84119
(801) 974-0900

ENVIRONMENTAL SERVICES • ANALYTICAL & AGRICULTURE CHEMISTS

May 20, 1982

Mr. Carl Johnson
Sunshine Mining Company
Eureka, Utah 84628

As per your request on May 3, 1982, American Chemical and Research Laboratories ran four vegetation transects to determine the under base coverage percentages in selected areas at your Burgin Mine area near Eureka, Utah. The Pinon, Juniper, Sage over-story was not included in these density determinations.

The locations of the four transects are shown on the map included in Appendix "A". Table I is a summary of the test results obtained in each of these transects. The average of the four density determinations was 9.71%.

Brief terrain descriptions are included with each of the plant identification and respective cover percentages included herewith as Table II through V.

Samples were collected and densities measured on May 4, 1982.

Table I

| Trahsect | Transect Length (ft.) | Underbase Cover (in.) | Percent Cover |
|---|---|---|---|
| A | 300 | 181.5 | 5.04 |
| B | 300 | 356.5 | 9.90 |
| C | 300 | 671.5 | 18.65 |
| D | 300 | 189.0 | 5.25 |

## Table II

### Transect A

(East facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking (1-8) | Percent Total Cov |
|---|---|---|---|---|---|---|
| 1. | Arabis | Holboellii | Hormen. Forb Brassicaceae | 1.24 | 2 | 24.53 |
| 2. | Agropyron | Spicatum | (Pursh) Scribn. Grass Poaceae | 0.12 | 5-6 | 2.33 |
| 3. | Descurania | Sophia | (L.) Webb. Forb Brassicaceae | 2.59 | 1 | 51.40 |
| 4. | Streptanthus | Cordauts | Natt. Forb Brassicaceae | 0.49 | 3 | 9.64 |
| 5. | Phlox | Longifolia | Natt. Forb Polemoniaceae | 0.31 | 4 | 6.24 |
| 6. | Bromus | Tectorum | L. Grass Poaceae | 0.12 | 5-6 | 2.33 |
| 7. | Poa | Secunda | Presl Grass Poaceae | 0.03 | 9 | 0.58 |
| 8. | Conringia | Orientalis | (L.) Dumort Forb Brassicaceae | 0.09 | 7 | 1.75 |
| 9. | Microsteris | Gracilis | (Hook) Greene Forb Polemoniaceae | 0.05 | 8 | 1.17 |
| | | | Totals | 5.04 | — | 99.96 |

* Typical desert foothill slope. (@30°∠) Rock composition extr. acidic, angular, unworn material from pebble to cobble stone in size (Latite) Insufficient cover to maintain surface soil or eliminate rivualte washing pattern.

Table III

Transect B

(North facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking 1-17 | Percent Total Cov. |
|---|---|---|---|---|---|---|
| .. | Bromus | Tectorium | L. Grass Poaceae | 4.72 | 1 | 47.69 |
| .. | Microsteris | Gracilis | (Hook) Greene Forb Polemoniaceae | 0.79 | 4 | 7.99 |
| .. | Descurania | Sophia | (L) Webb Forb Brassicaceae | 0.80 | 3 | 8.00 |
| .. | Conringia | Orientalis | (L) Dumort Forb Brassicaceae | 0.08 | 11-12-13 | 0.84 |
| .. | Chrysothamnus | Viscidiflorus | (Hook) Nutt. Shrub Asteraceae | 0.17 | 7 | 1.68 |
| .. | ? | Allium | Forb liliaceae | 0.21 | 6 | 2.10 |
| .. | Streptanthus | Cordatus | Nutt. Forb Brassicaceae | 0.07 | 14-15 | 0.70 |
| .. | Phlox | Longifolia | Nutt. Forb Polemoniaceae | 0.07 | 14-15 | 0.70 |
| .. | ? | Allium | Forb Liliaceae | 0.01 | 17 | 0.14 |
| .. | Apiaceae | Unbel. | - probable ident.- | 0.14 | 8-9 | 1.40 |
| .. | Cryptantha | Humilis | (gray) Pays. Forb Boraginaceae | 0.08 | 11-12-13 | 0.84 |
| .. | Lithophragma | Glabrum | Natt. Forb Saxifbagaceae | 0.14 | 8.9 | 1.40 |
| .. | Cymopterus | Longifors | Wats. Forb Apiaceae. | 0.44 | 5 | 4.49 |
| .. | Poa | Secunda | Presl Grass Poaceae | 0.11 | 10 | 1.12 |
| .. | Phlox | Austromontana | Cov. Forb Polemoniaceae | 0.08 | 11-12-13 | 0.84 |
| .. | Agropyron | Spicatum | (Pursh) Scribn. Grass Poaceae | 1.93 | 2 | 19.50 |
| .. | Arabis | Holboellii | Hornem Forb Brassicaceae | 0.06 | 16 | 0.56 |
| | | | Totals | 9.90 | — | 99.99 |

Latite slope of @ 45°∠ with some small ledges intermittant.

Table IV

Transect C

(North-East facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking 1-14 | Percent Total Cove |
|---|---|---|---|---|---|---|
| .. | Senecio | Multilobatus | T. & C. Forb Asteraceae | 3.04 | 2 | 16.31 |
| . | Strreptanthus | Cordatus | Nutt. Forb Brassicaceae | 0.44 | 10 | 2.38 |
| :. | Agropyron | Spicatum | (Prush) Scribn. Grass Poaceae. | 0.58 | 7 | 3.13 |
| .. | Conringia | Orientalis | L. Dumort Forb Brassicaceae | 0.46 | 9 | 2.46 |
| ;. | Bromus | Tectorum | L. Grass Poaceae. | 7.47 | 1 | 40.06 |
| ;. | Chrysothamnus | Viscidiflorus | (Hook.) Nutt. Shrub asteraceae | 0.72 | 6 | 3.87 |
| '. | Gutierrefia | Sarothrae | (Pursh) Britt. & Rusby Shrub Asteraceae | 1.64 | 4 | 8.79 |
| ;. | ? | Allium | ? Forb Liliaceae | 1.04 | 5 | 5.59 |
| ). | Phlox | Austromontana | Cov. Forb Polemoniaceae | 0.47 | 8 | 2.53 |
| ).. | Taraxacum | Officinale | Weber Forb Asteraceae | 0.08 | 12 | 0.45 |
| 1. | Achillea | Millefolium | L. Forb Asteraceae | 0.03 | 13 | 0.15 |
| 2. | Purshia | Tridentata | (Pursh) DC Shrub Rosaceae | 2.50 | 3 | 13.40 |
| 3. | Draba | Cuneifolia | Nutt. Forb Brassicaceae | 0.18 | 11 | 0.89 |
| | | | Totals | 18.65 | - | 100.01 |

* Flat to rolling hills - includes alleuvial fan area SW of head frame and North of rail.

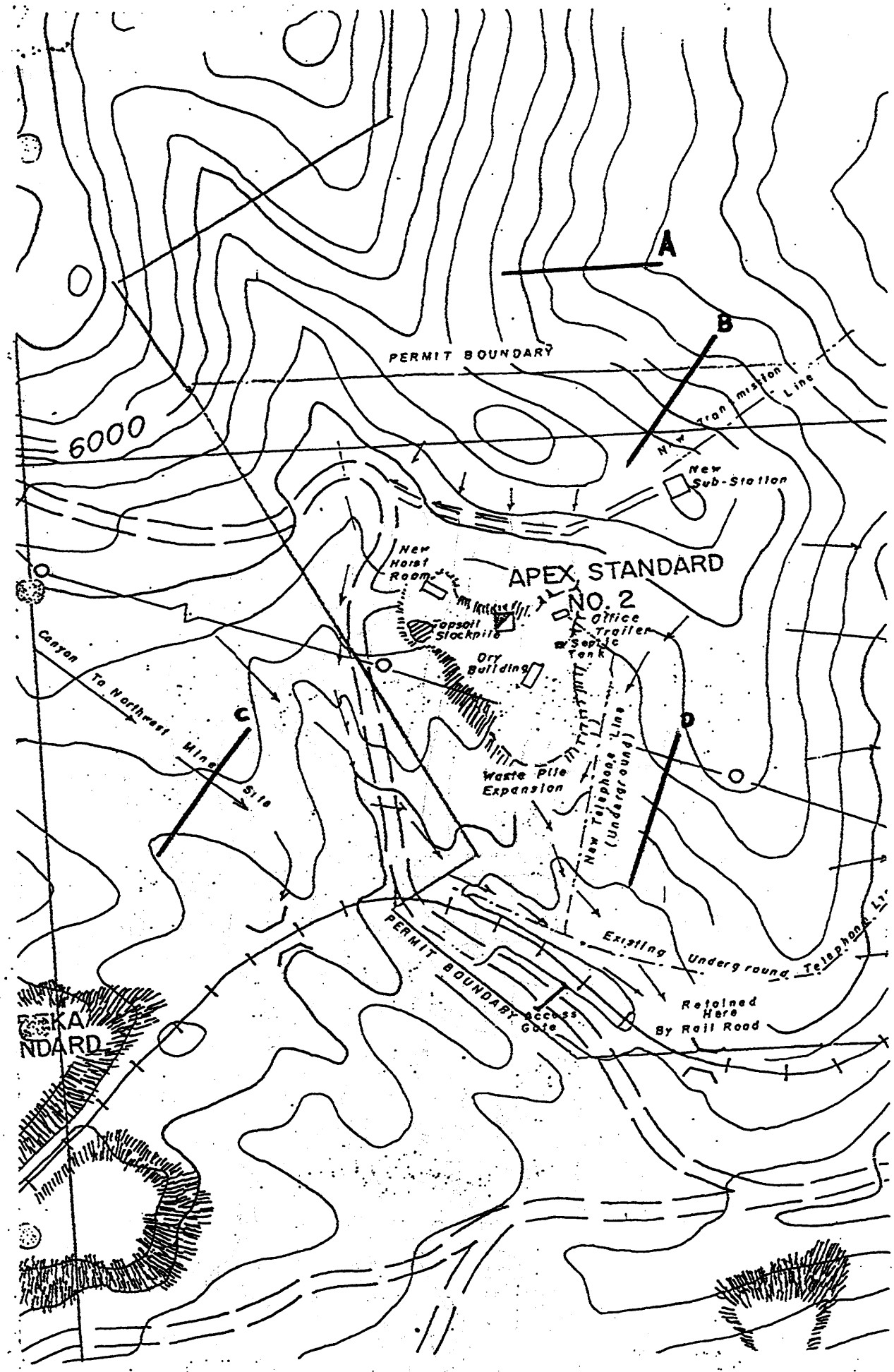
## Table V

## Transect D

(South facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking 1-18 | Percent Total Cov |
|---|---|---|---|---|---|---|
| 1. | Senecio | Multilobatus | T. & C. Forb Asteraceae | 1.46 | 2 | 27.78 |
| 2. | Stereptanthus | Cordatus | Nutt. Forb Brassicaceae | 1.86 | 1 | 35.45 |
| 3. | Conringia | Orientalis | L. Dumont Forb Brassicaceae | 0.03 | 11-12-13 | 0.53 |
| 4. | Bromus | Tectorum | L. Grass Poaceae | 0.17 | 6 | 3.18 |
| 5. | Gutierrefia | Sarothrae | (Pursh) Britt. & Rusbyslrab Asteraceae | 0.88 | 3 | 16.93 |
| 6. | ? | Allium | ? Forb Liliaceae | 0.07 | 9 | 1.32 |
| 7. | Phlox | Austromontana | Cov. Forb Polemoniaceae | 0.11 | 7 | 2.12 |
| 8. | Draba | Cuneifolia | Nutt. Forb Brassicaceae | 0.21 | 5 | 3.97 |
| 9. | Microsteris | Gracilis | (Hook) Greene Forb Polemoniaceae | 0.03 | 11-12-13 | 0.53 |
| 10. | Achillea | Millefolium | L. Forb Asteraceae | 0.08 | 8 | 1.59 |
| 11. | Apiaceae | Unbel | Probable Identification | 0.06 | 10 | 1.06 |
| 12. | Castilleja | Chromosa | A. Nels Forb Scrophulariaceae | 0.03 | 11-12-13 | 0.53 |
| 13. | ? | Astragalus | Forb Fabaceae | 0.26 | 4 | 5.03 |
| | | | Totals | 5.25 | | 100.02 |

[illegible] NW of road and SE of office trailer [illegible]alus slope with rock from 2" pebble to [illegible]


A
B
C
D
PERMIT BOUNDARY
6000
New Transmission Line
New Sub-Station
New Horse Room
APEX STANDARD
NO. 2
Office Trailer
Septic Tank
Topsoil Stockpile
Dry Building
Canyon To Northwest Mine Site
Waste Pile Expansion
New Telephone Line (Underground)
Existing Underground Telephone Line
Retained Here By Rail Road
PERMIT BOUNDARY
Access Gate
EUREKA
STANDARD

APPENDIX VII

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Norman H. Bangerter, Governor
Dee C. Hansen, Executive Director
Dianne R. Nielson, Ph.D., Division Director

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

January 21, 1986

Mr. Glenn M. Mellor
Sunshine Mining Company
P. O. Box 250
Eureka, Utah 84628

Dear Mr. Mellor:

Re: Vegetation Test Plots, Sunshine Mining Company, ACT/049/009, Utah County, Utah

The Division has reviewed your final report dated November 4, 1985 regarding the test plots which you have had at the Apex Mine.

While the test plots to date have not provided sufficient vegetation to meet revegetation success standards, the Division will not require additional test plots until such time that it can evaluate the effectiveness of recent reclamation of several abandoned mine sites in the Tintic area (approximately 2-3 years from now).

As always, should you have any questions, please don't hesitate to call.

Sincerely,

Susan C. Linner

Susan C. Linner
Reclamation Biologist/
Permit Supervisor

LK:jvb
cc: Lynn Kunzler
0092R-24

SUNSHINE MINING COMPANY
EUREKA OPERATIONS

P.O. Box 250
EUREKA, UTAH 84628
[801] 433-6854

T.B. HANNIFIN, JR.
*General Manager*

November 4, 1985

Ms. Susan C. Linner
Reclamation Biologist/Permit Supervisor
State Of Utah - Natural Resources
Oil Gas & Mining
355 West North Temple
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

Dear Ms. Linner:

Please find enclosed the final report regarding the test plot program located at the Apex Shaft Site. The report and field examination were completed by Joseph M. Jarvis, Biologist/Principal, JBR Consultants Group.

If you require any further information regarding this revegatation study, please advise.

Very truly yours,

Glenn M Mellor

Glenn M. Mellor
Senior Geologist

GMM/lrl

cc: T. B. Hannifin, Jr.
Files

jbr CONSULTANTS GROUP
GEOLOGY ENGINEERING ENVIRONMENT HYDROLOGY

# Burgin Mine Test Plots

## Introduction

In 1981, a test plot program was devised in conjunction with the Division of Oil, Gas and Mining to deal with revegetation of waste rock at the Apex Shaft. Sufficient topsoil was not available to cover all the old and new waste rock areas associated with this development shaft of the Burgin Mine complex. Thus the attempt to seed directly into waste rock piles to create a vegetative cover. The complete test plot program is available in the 1982 Notice of Intent for the Apex Shaft of the Burgin Mine.

The soil treatment was initiated in April, 1982 by liming the acid waste rock site with calcium carbonate ($CaCO_3$). After a six day wait the seeding was begun under the following program:

1. Plots 100 ft2

   A,B,C and D on the acid waste rock

   E,F,G, and H on the neutral waste rock

   I,J,K and L on the soil storage pile

2. Seed Mixture applied at one (1) ounce per plot

| Common Name | Scientific Name | lbs/A |
|---|---|---|
| crested wheatgrass | Agropyron cristoratum | 5 |
| Indian ricegrass | Oryzopsis hymenoides | 5 |
| Russian wildrye | Elymus junceus | 5 |
| yellow sweetclover | Melilotus officinalis | 5 |
| | Total | 20 |

3. Fertilization with diammonium phosphate 18-45-0 at 6 ounces per plot

4. Mulch was Conweb Hydro Mulch Fiber of one bale for six plots

5. Test plot preparation:

   Acid Waste Rock
   A. seed and lime
   B. seed, lime and fertilize
   C. seed, lime and mulch
   D. seed, lime, fertilize and mulch

2556 East Oak Creek Circle Sandy, Utah 84092 801-943-4144

Neutral Waste Rock
E. seed only
F. seed and fertilize
G. seed and mulch
H. seed, fertilize and mulch

Topsoil Pile
I. seed only
J. seed and fertilize
K. seed and mulch
L. seed, fertilize and mulch

6. Results from August, 1985 field work using 3 random quadrats per plot:

| Plot | % Total Ground Cover | # Species Seed Mix | # Plants Seed Mix | # Plants 100 ft2 |
|---|---|---|---|---|
| A | 15 | 3 | 24 | 348 |
| B | 5 | 2 | 8 | 116 |
| C | 5 | 2 | 33 | 478 |
| D | 7 | 2 | 20 | 290 |
| Mean | 8 | 2 | 21 | 308 |

# Species: crested wheatgrass - 70
Indian ricegrass - 1
yellow sweetclover - 14

| | | | | |
|---|---|---|---|---|
| E | 1 | 1 | 2 | 29 |
| F | 12* | 1 | 25 | 362 |
| G | 1 | 1 | 4 | 58 |
| H | 6* | 1 | 7 | 101 |
| Mean | 5 | 1 | 9 | 137 |

# Species: crested wheatgrass - 38
* fertilized

| | | | | |
|---|---|---|---|---|
| I | 12 | 2 | 11 | 159 |
| J | 25* | 2 | 15 | 217 |
| K | 13 | 2 | 21 | 304 |
| L | 26* | 2 | 12 | 174 |
| Mean | 19 | 2 | 15 | 213 |

# Species: crested wheatgrass - 45
Russian wildrye - 3
yellow sweetclover - 11
* fertilized

The seeding trials occured during a period of above normal precipitation and plant growth consequently the results were achieved under ideal conditions. The seeded cover on the waste rock plots were small thin plants of which only the crested wheatgrass had reached maturity. The fertilization of plots on the neutral waste rock area produced the only difference in groundcover attributable to the affects of treatment. This effect also appeared in the topsoil plots. Plots J and L (fertilized topsoil) were the only plots to achieve the revegetation requirement of Rule M-10 (70% of 25% native groundcover or diversity of stand). Certainly the groundcover on the waste rock sites was not sufficient to have any positive effects on surface stabilization or erosion. Any use of the stored topsoil fro revegetation will require fertilization for best growth potential.

Joseph M. Jarvis
Biologist/Principal
JBR Consultants Group

# Soils data from the Dry Stack Tailings Disposal Area

'homas E Gast[illegible] ironmental Management Services CO.
301 Research [illegible]evard Suite 103
ort Collins CO 80526

Colorado State University
Soil, Water and Plant Testing Laborator
Natural & Environmental Sciences Bldg - A319
Fort Collins, CO 80523

(970) 491-5061 FAX: 491-2930

)ATE RECEIVED: 08-23-1999
)ATE REPORTED: 09-27-1999

BILLING:

# RESEARCH SOIL ANALYSIS

| Lab # | Sample ID # | paste pH | paste EC mmhos/cm | meq/L Ca | meq/L Mg | meq/L Na | meq/L K | SAR | $NaHCO_3$ mg/kg P | Total % N | mg/kg $NO_3$-N | mg/kg K | Total % S | meq/L Alkalinity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R1529 | TP-4 0-4" | 7.6 | 0.7 | 6.1 | 1.4 | 0.5 | 0.3 | 0.3 | 3.2 | 0.136 | 7.52 | 250 | | 4.94 |
| R1530 | TP-4 6-12" | 7.7 | 0.4 | 3.2 | 0.8 | 0.4 | 0.4 | 0.3 | 1.2 | 0.091 | 3.25 | 231 | | 3.06 |
| R1531 | TP-4 12-18" | 7.8 | 0.5 | 3.5 | 1.2 | 0.4 | 0.3 | 0.3 | 0.4 | 0.064 | 3.83 | 196 | <0.01 | 3.12 |
| R1532 | TP-4 18-24" | 7.8 | 0.4 | 2.8 | 1.4 | 0.4 | 0.3 | 0.3 | 1.4 | 0.061 | 3.36 | 188 | <0.01 | 2.65 |
| R1533 | TP-14 0-4" | 6.5 | 0.4 | 4.1 | 0.8 | 0.3 | 0.2 | 0.2 | 2.2 | 0.078 | 2.86 | 148 | | 3.84 |
| R1534 | TP-14 6-12" | 7.6 | 0.5 | 4.6 | 1.1 | 0.5 | 0.3 | 0.3 | 1.5 | 0.107 | 3.09 | 233 | | 3.98 |
| R1535 | TP-14 12-18" | 7.7 | 0.5 | 4.0 | 1.0 | 0.4 | 0.3 | 0.3 | 0.8 | 0.083 | 3.79 | 204 | <0.01 | 3.49 |
| R1536 | TP-14 18-24" | 7.8 | 0.4 | 3.5 | 0.9 | 0.3 | 0.2 | 0.2 | 0.3 | 0.070 | 3.63 | 183 | <0.01 | 2.75 |

| Lab # | Sample ID # | % $CaCO_3$ equiv. | % TOC | % Saturation | mg/L $HCO_3$ | Texture Estimate | Soil Color | AWC $cmcm^{-1}$ | By Volume % Gravel | Bar 1/3 %$H_2O$ | Bar 15 %$H_2O$ | A:B * Potential | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R1529 | TP-4 0-4" | 3.70 | 1.11 | 31.2 | 301.2 | Sandy Clay Loam | 5YR 5/2 | 0.013 | 33.8 | 15.4 | 8.1 | | |
| R1530 | TP-4 6-12" | 12.2 | 1.71 | 42.0 | 186.7 | Sandy Clay | 10YR 8/2 | 0.157 | 13.5 | 23.2 | 11.1 | | |
| R1531 | TP-4 12-18" | 16.3 | 0.50 | 42.6 | 190.6 | Sandy Clay | 7.5YR 8/3 | 0.152 | 19.1 | 24.6 | 12.9 | 163 | Subsoil |
| R1532 | TP-4 18-24" | 20.9 | 0.49 | 46.6 | 161.5 | Sandy Clay | 7.5YR 8/2 | 0.080 | 3.30 | 11.3 | 5.1 | 209 | |
| R1533 | TP-14 0-4" | 2.02 | 0.82 | 32.6 | 234.4 | Sandy Clay | 7.5YR 4/1 | 0.124 | 20.4 | 18.8 | 9.3 | | |
| R1534 | TP-14 6-12" | 2.22 | 0.77 | 37.0 | 242.6 | Sandy Clay Loam | 7.5YR 5\2 | 0.152 | 20.0 | 22.9 | 11.2 | | |
| R1535 | TP-14 12-18" | 17.7 | 0.44 | 41.7 | 213.0 | Sandy Clay | 7.5YR 7/2 | 0.157 | 10.6 | 24.1 | 12.0 | 177 | Subsoil |
| R1536 | TP-14 18-24" | 24.4 | 0.40 | 44.3 | 167.6 | Clay | 7.5YR 7/2 | 0.185 | 8.80 | 27.0 | 12.8 | 244 | |

* Tons of $CaCO_3$ per 1000 tons of material calculated as 10(%$CaCO_3$)-31.25(%S)

# APPENDIX A

## Test Pit Logs

7/28/99 Burgin Tailings, cont. EJS

09:30 Onsite for field exploration

09:30 - 10:30 Dug out of 1st test pit; old backhoe broke down

11:30 - 13:30 studied test pit locations @ proposed dry stack tailings site

14:30 - 16:30 Dug 8 test pits

7/29/99 07:20 - 13:30 dug 20 test pits w/ bobcat track hoe, walkout

13:00 - 14:30 Lunch break

14:45 - 19:30 Logged test pits and collected soil and bedrock grab samples

- Test pit lithology logs recorded on pages 20 - 27



TEST PIT LOGS - Burgin Site

TP-1

0-0.5' Topsoil, SILT, sandy, gravelly, brn; calcareous; surface w/ gravel & cobbles (angular) quartz latite; 30% cover; root zone 10 + 1.0'; sli. moist
(sample)

0.5-2.5' SILT, f.g. sandy, calcareous; lt. brn to white, sli. moist to dry (caliche zone)
(sample)

2.5' + BEDROCK; mod. hard quartz latite

TD 2.6'

TP-2

0-0.5' Topsoil, SILT, sandy; root zone; brn, sli. moist

0.5-1.0' + BEDROCK; mod. weathered; mod. hard, quartz latite; white to gray
(sample)

TP-3

0-0.5 Topsoil, SILT, f.g. sandy; sli. calcareous, brn, sli. moist - dry; root zone; surface cover 30-40% gravel & cobbles (angular)
(no sample)

0.5-1.5' + BEDROCK; mod. weathered; mod. hard, quartz latite; white - gray
(no sample)

7/29/99

## TP-4

0-0.4' TOPSOIL, SILT, F.g. sandy, brn, root zone, sli. moist
(Agri sample)

0.4-3.0 SILT, sandy to SAND, silty; sand fract. variable from f.g to c.g., sli. moist calcareous; caliche zone 1.5'-2.0' lt. brn, max. depth of roots (juniper) to white

Agri samples 6"-12", 12"-18", 18"-24"

3.0+ BEDROCK, mod. weathered, mod. hard, quartz latite; gray

## TP-5

0.-0.3 TOPSOIL, SILT, sandy, gravelly; moist, calcareous, brn, root zone

0.3-5.0 SAND & GRAVEL (SW-GW), silty, calcareous, moist, lt. brn-tan-yl. brn.; roots scattered to 2'
(sample)

## TP-6 (no samples)

0-0.3 TOPSOIL, SILT, sandy; brn, root zone sli. moist

0.3-1.0 SILT, sandy (f.g.), calcareous; some roots; lt. brn; sli. moist

1.0-5.0 SAND, silty (f.g-c.g.) decomposed quartz latite medium; moist

5.0+ BEDROCK - Mod. weathered mod hard quartz latite; gray & white



## TP-7 (no samples)

0-0.3 TOPSOIL, SILT, sandy; some roots, brn, sli. moist

0.3-1.0+ BEDROCK, mod. weathered, mod. hard white to gray, iron staining on fractures

## TP-8 (no samples)

0-2" TOPSOIL, SAND, silty, brn, moist, root zone

2"-3.0 SAND (SW), silty, brn, sli. calcareous, sli. moist; scattered roots to 2'

3.0'-3.5'+ BEDROCK, fract. mod. weathered quartz latite

## TP-9 (no samples)

0.-4" TOPSOIL, SAND (SW), silty, moist; scattered gravel & cobbles on surface

4"-1'+ BEDROCK, highly weathered, mod. hard; white to lt. gray

## TP-10

(same as TP-9)

7/29/99

TP-11 (no sample)

0-3" TOPSOIL, SAND (SW) silty, sli. calcareous, brn, root zone; sli. moist

3"-1.5' SAND (SW), silty, calcareous, lt. brn to reddish brn, moist; root zone

1.5-2.0 BEDROCK - severly weathered, decomposed, friable, lt. reddish brn, moist, quartz latite

2.0-2.5 Quartz latite, mod. weathered, mod. hard, white to lt. gray

TP-12 (no samples)

0-3" TOPSOIL SILT, sandy, gravelly, w/ cobbles scattered on surface, calcareous, brn, sli. moist; root zone

3"-2' SILT, sandy; strongly calcareous (caliche); lt. whitish brn, root zone to 1', sli. moist to dry

2'+ BEDROCK, mod. weathered, mod. hard quartz latite

TP-13 (no samples)

0-3" TOPSOIL, SAND, silty, dk. brn, sli. moist, root zone

3"-8"+ BEDROCK, decomposed to highly weathered quartz latite, yl. brn to white



TP-14

0-1.0 TOPSOIL SAND, silty, dk. brn, root zone, moist; samples 0"-6", 6"-12"
Ag. sample

1.0-3.0 SILT, F.g. sandy, lt. brn to tan w/ white streaks, sli. moist, calcareous (Sample @ 12"-18" & 18"-24"

Note: old test pit @ 20' north has bedrock (quartz latite) @ about 4' from surface.

TP-15 - no samples

0-1.0' TOPSOIL SILT, sandy to SAND, silty, sli. calcareous, dk. brn, root zone sli. moist

1.0-2.0' SAND, (SW) silty, lt. brn, sli. (sample) calcareous, sli. moist

2-3' SILT, sandy, sli. calcareous, lt. brn, sli. moist

3-4.5' SAND, silty, (SW), sli. calcareous, lt. brn, sli. moist

4.5-5.0 SILT, sli. calcareous, lt. reddish
sample brn, moist

5-6' SAND (SW), sli. calcareous, sli.
sample moist, lt. brn.

6'-6.5'+ BEDROCK, mod. weathered; mod. hard, white to lt. gray

7/29/99

TP-16 (no samples)

0-1.5 TOPSOIL SILT, f.g. sandy, sli. calcareous root zone, dk. brn, sli. moist

1.5-3+ BEDROCK, mod. decomposed quartz latite, white to lt. gray w/ iron staining

TP-17 (dry channel - no sample)

0-5' SAND, loose, moist, gray brn. - to brn; thin bedded

TP-18

0-6" TOPSOIL SAND, silty, sli. calcareous dk. brn; root zone, sli. moist

6"-3' - SAND (SW) to SAND, silty, calcareous, (sample) brn, moist

3'-4'+ BEDROCK, mod weathered, mod. hard quartz latite, lt. gray to whitish gray

TP-19 (no samples)

0-0.5 TOPSOIL, SAND, silty, root zone, sli. calcareous, dk. brn, sli. moist

0.5-1.0 SAND (SW), silty, sli. calcareous, lt. brn, sli. moist

1.0-2.0 SILT, sandy, sli. calcareous, lt. brn, sli. moist

2.0-3.5 SAND (SW), silty, calcareous, sli. moist

3.5-4.0 SILT, calcareous, sli. moist, lt. brn.



TP-20 (Dry channel - no sample)

0-4 SAND, loose, moist, gray brn to brn, thin bedded

4-5'+ BEDROCK, irreg. knob, sli. weathered, hard, quartz latite.

NOTE: outcrop 10' upstream left bank.

@ RR culvert TP-21 (no sample)

0-5' SAND (SW) loose, silty, brn., moist, calcareous, (roots to ~2'

5-6' CLAY, sandy (CL), v. moist

6'+ BEDROCK, sli. weathered, hard, quartz latite.

Note: outcrops (hills) to north & south

TP-22

0-2" TOPSOIL, SILT, sandy, dk. brn root zone, sli. moist

2"-3' SILT, some f.g. sandy, v. calcareous, sample almost hard pan caliche, tan, sli. moist; root zone to 2'

TP-23

0-3" TOPSOIL, SAND, silty, dk. brn, sli. moist, root zone

3"-2'+ BEDROCK, upper 6" decomposed, 6"+, weathered, firm, quartz latite white to tan w/ iron staining

(27) 7/29/99

0-4.5' **TP-22**

See TP-28; same except mod. weathered bedrock (quartz latite) @ 4.5'

**TP-23**

See TP-28, same 0-3'

sample 1'-2'

**TP-26**

0-4" TOPSOIL, SAND, silty, dk. brn., sli. moist, root zone

4"-2'+ BEDROCK, weathered, firm quartz latite; white to orange, iron stained

**TP-25**

0-3.5' SAND (SW), calcareous; caliche (sample) zone @ ≈ 3'-3.3', sli. moist, lt. brn to whitish brown, root zone to 1'+

3.5-4' SILT, calcareous, lt. brn., moist

**TP-24** (no sample)

0-3" TOPSOIL, SAND, silty, root z[illegible] dk. brn., [illegible] moist

3"-1.5'+ BEDROCK [illegible] hard, lt. gray [illegible]

END OF Test Pit Log

LEFT BLANK DELIBERATELY

The acreage based on the current Reclamation Contract is:

| **Facility** | **Permit ac.** | **Bonded Disturbance** | **Actual Disturbance** |
|---|---|---|---|
| Apex No. 2 | 5.3 | 5.3 | 3.2 |
| Burgin Complex | 71.9 | 40.5 | 40.5 |
| Dry Stack Pile | 59.5 | 10.0 | 5.0 |
| Zuma Clay Pit | 69.0 | 8.0 | 6.5 |
| Trixie Mine | 25.3 | 10.1 | 10.1 |
| | | | |
| **Totals** | **231.0** | **73.9** | **65.3** |

Soils were not stockpiled during the pre-law development of the Burgin No. 2 area. No new disturbance is proposed in this area. Therefore, no soil materials are available for reclamation.

**Table 2.2 Burgin No. 2 Facilities List**

1. Headframe 30x50x90
2. Hoist Building 30x60x20
3. Engineering and Administration Offices 36x40x10 plus 80x80x12
4. Mechanical Shop 36x140x20
5. Crushing Plant 16x20x30
6. Ore Storage Bins (2) 750 tons each
7. Concentrator (Mill) 50x160x30
8. Thickeners (2) 36' diameter
9. Sample preparation Building 18x30x9
10. Assay Building 30x100x9
11. Small Storage Building 30x50x12
12. Substation

## 2.3 Apex No. 2 Area Operating Plan

Work on the Apex No. 2 shaft was begun in 1923 and it was sunk to a depth of 900 feet in 1924. The shaft was deepened to the 1,100 level in 1932. The property was leased to Kennecott in 1956 and then Sunshine Mining Company in 1980. In 1982 the property was permitted by Sunshine and in 1984 the Apex was included in permit M/049/009. Sunshine deepened the shaft to the 1,300 level and connected the level to the Burgin 1050 level. Since that time, underground exploration has intermittently been conducted utilizing the Apex No. 2 shaft for access.

The Apex No. 2 area has been well maintained since the time of Sunshine's exploration activities. Surface facilities at the site include the fenced two compartment shaft and small surface structures. These are listed in Table 2.3 and no new surface facilities are planned here. The Apex No. 2 shaft is approximately 6 foot by 9 foot and the shaft may be increased to 8 foot by 10 feet to allow ore production from above the water table. Additionally it will provide secondary access to the Burgin Mine during production as well as provide access for exploration of the adjacent Eureka Standard property in the future. The existing development rock disposal area is about 3.2 acres and the planned development work will add about 20,000 cubic yards to the waste rock dump expanding the disturbed area 5.3 acres within the permit boundary of 5.3 acres. Testing by Sunshine showed that the development rock does not contain potentially deleterious material. No new roads are proposed here. The Apex No. 2 area, including possible dump addition is shown on Figure 2.3.

It is planned that up to 175,000 tons of ore will be mined each year. Mining will be conducted by conventional underground methods (drill, blast and muck). The ore will be

bench 25 feet high covering 0.75 acres. Over a seven year life, a maximum of 5 acres of additional disturbance would result from mining the Zuma clay resource.

Current disturbance in the Zuma area is 6.5 acres within the permit boundary of 69 acres (figure 2.5). Exploration may disturb 1.5 acres and 8.0 acres is bonded. The open pit area may be expanded by 5.0 acres into the area of previous disturbance within the permit area depending upon the success of exploration and development. Existing roads would be maintained to place the Zuma in production. Pit configuration and overburden placement will be engineered following successful completion of the exploration program.

Soils were not stockpiled during the pre-law development of the Zuma clay pit and there are currently no soils in stockpile at Zuma. Based on Sunshine's exploration, the majority of the clay resource would be mined from within the existing disturbed area and no soils are available from this area. However, any suitable soils will be salvaged from any expansion into areas not previously disturbed. To begin soil salvage operations, trees will be removed from the expansion area and wind-rowed away from active operations areas. This wind-rowed material will serve as a wildlife habitat enhancement measure. Available soil will then be salvaged using a bulldozer/loader/truck operation. The salvaged soil will be stockpiled in an area, cleared of all trash and debris, adjacent to operations in an area where the soil will not be disturbed until it is recovered for reclamation activities.

Following stockpiling, fertilizer will be broadcast over the surface of the stockpile at rates based on the analyses of similar samples taken in 1995. The surface will then be roughened to incorporate the fertilizer into the seedbed and prepare the surface for seeding. The seed mixture will be broadcast over the surface of the stockpile and the seedbed roughened a second time to cover the seed.

## 2.6 Trixie Mine Operating Plan

The Trixie ore center, located in the southern section of the East Tintic District about 3 miles southwest of Eureka (figure 1), was the most recent discovery of a concealed gold deposit in the Tintic district. As described by Mogensen, Morris, and Smith (in Morris and Lovering, 1979, p.182-188), lead-silver ore was cut in several diamond core holes drilled in the Trixie area in 1954 - 1956 to evaluate a geochemical and hydrothermal alteration anomaly overlying a concealed geologic target similar to other mineralized areas in the district. The Trixie shaft was sunk in 1968 - 1969, and shortly after its completion to the 750 level, gold ore was encountered in a steeply dipping fissure west of the shaft. The mine began sustained production in 1970. Through July 1985, the Trixie produced approximately 600,000 tons of ore, containing about 113,000 oz of gold and 3,980,000 oz of silver along with significant quantities of copper, and minor but mostly unrecovered quantities of lead and zinc.

From August 1985 to November 1987, operations were suspended; but production resumed in December 1987 and by February 1988, a production level of 1,500 tons per month had been achieved. The mine was in production from then through 1993 when it was placed on standby. Chief Gold geologists discovered a new resource on a previously

# Soils and Vegetation Data Appendix

**LARGE MINING PERMIT**
**CHIEF CONSOLIDATED MINING COMPANY**
**TINTIC OPERATIONS**
**EAST TINTIC DISTRICT, UTAH COUNTY**
**File No. M/049/062**

APPENDIX V

American Chemical & Research Laboratories

1780 WEST 2300 SOUTH • SALT LAKE CITY, UTAH 84119
(801) 974-0900

ENVIRONMENTAL SERVICES • ANALYTICAL & AGRICULTURE CHEMISTS

May 20, 1982

Mr. Carl Johnson
Sunshine Mining Company
Eureka, Utah 84628

As per your request on May 3, 1982, American Chemical and Research Laboratories ran four vegetation transects to determine the under base coverage percentages in selected areas at your Burgin Mine area near Eureka, Utah. The Pinon, Juniper, Sage over-story was not included in these density determinations.

The locations of the four transects are shown on the map included in Appendix "A". Table I is a summary of the test results obtained in each of these transects. The average of the four density determinations was 9.71%.

Brief terrain descriptions are included with each of the plant identification and respective cover percentages included herewith as Table II through V.

Samples were collected and densities measured on May 4, 1982.

Table I

| Transect | Transect Length (ft.) | Underbase Cover (in.) | Percent Cover |
|---|---|---|---|
| A | 300 | 181.5 | 5.04 |
| B | 300 | 356.5 | 9.90 |
| C | 300 | 671.5 | 18.65 |
| D | 300 | 189.0 | 5.25 |

## Table II

### Transect A

(East facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking (1-8) | Percent Total Cov |
|---|---|---|---|---|---|---|
| 1. | Arabis | Holboellii | Hormen. Forb Brassicaceae | 1.24 | 2 | 24.53 |
| 2. | Agropyron | Spicatum | (Pursh) Scribn. Grass Poaceae | 0.12 | 5-6 | 2.33 |
| 3. | Descurania | Sophia | (L.) Webb. Forb Brassicaceae | 2.59 | 1 | 51.40 |
| 4. | Streptanthus | Cordauts | Natt. Forb Brassicaceae | 0.49 | 3 | 9.64 |
| 5. | Phlox | Longifolia | Natt. Forb Polemoniaceae | 0.31 | 4 | 6.24 |
| 6. | Bromus | Tectorum | L. Grass Poaceae | 0.12 | 5-6 | 2.33 |
| 7. | Poa | Secunda | Presl Grass Poaceae | 0.03 | 9 | 0.58 |
| 8. | Conringia | Orientalis | (L.) Dumort Forb Brassicaceae | 0.09 | 7 | 1.75 |
| 9. | Microsteris | Gracilis | (Hook) Greene Forb Polemoniaceae | 0.05 | 8 | 1.17 |
| | | | Totals | 5.04 | — | 99.96 |

* Typical desert foothill slope. (@30°∠) Rock composition extr. acidic, angular, unworn material from pebble to cobble stone in size (Latite) Insufficient cover to maintain surface soil or eliminate rivualte washing pattern.

Table III

Transect B

(North facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking 1-17 | Percent Total Cov |
|---|---|---|---|---|---|---|
| .. | Bromus | Tectorium | L. Grass Poaceae | 4.72 | 1 | 47.69 |
| :. | Microsteris | Gracilis | (Hook) Greene Forb Polemoniaceae | 0.79 | 4 | 7.99 |
| :. | Descurania | Sophia | (L) Webb Forb Brassicaceae | 0.80 | 3 | 8.00 |
| .. | Conringia | Orientalis | (L) Dumort Forb Brassicaceae | 0.08 | 11-12-13 | 0.84 |
| ;. | Chrysothamnus | Viscidiflorus | (Hook) Nutt. Shrub Asteraceae | 0.17 | 7 | 1.68 |
| ;. | ? | Allium | Forb liliaceae | 0.21 | 6 | 2.10 |
| '. | Streptanthus | Cordatus | Nutt. Forb Brassicaceae | 0.07 | 14-15 | 0.70 |
| 3. | Phlox | Longifolia | Nutt. Forb Polemoniaceae | 0.07 | 14-15 | 0.70 |
| 9. | ? | Allium | Forb Liliaceae | 0.01 | 17 | 0.14 |
| ). | Apiaceae | Unbel. | - probable ident.- | 0.14 | 8-9 | 1.40 |
| .. | Cryptantha | Humilis | (gray) Pays. Forb Boraginaceae | 0.08 | 11-12-13 | 0.84 |
| 2. | Lithophragma | Glabrum | Natt. Forb Saxifbagaceae | 0.14 | 8.9 | 1.40 |
| 3. | Cymopterus | Longifors | Wats. Forb Apiaceae. | 0.44 | 5 | 4.49 |
| :. | Poa | Secunda | Presl Grass Poaceae | 0.11 | 10 | 1.12 |
| 5. | Phlox | Austromontana | Cov. Forb Polemoniaceae | 0.08 | 11-12-13 | 0.84 |
| 5. | Agropyron | Spicatum | (Pursh) Scribn. Grass Poaceae | 1.93 | 2 | 19.50 |
| 7. | Arabis | Holboellii | Hornem Forb Brassicaceae | 0.06 | 16 | 0.56 |
| | | | Totals | 9.90 | - | 99.99 |

Latite slope of @ 45°∠ with some small ledges intermittant.

Table IV

Transect C

(North-East facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking 1-14 | Percent Total Cove |
|---|---|---|---|---|---|---|
| .. | Senecio | Multilobatus | T. & C. Forb Asteraceae | 3.04 | 2 | 16.31 |
| . | Strreptanthus | Cordatus | Nutt. Forb Brassicaceae | 0.44 | 10 | 2.38 |
| :. | Agropyron | Spicatum | (Prush) Scribn. Grass Poaceae. | 0.58 | 7 | 3.13 |
| .. | Conringia | Orientalis | L. Dumort Forb Brassicaceae | 0.46 | 9 | 2.46 |
| ;. | Bromus | Tectorum | L. Grass Poaceae. | 7.47 | 1 | 40.06 |
| ;. | Chrysothamnus | Viscidiflorus | (Hook.) Nutt. Shrub asteraceae | 0.72 | 6 | 3.87 |
| '. | Gutierrefia | Sarothrae | (Pursh) Britt. & Rusby Shrub Asteraceae | 1.64 | 4 | 8.79 |
| 3. | ? | Allium | ? Forb Liliaceae | 1.04 | 5 | 5.59 |
| 9. | Phlox | Austromontana | Cov. Forb Polemoniaceae | 0.47 | 8 | 2.53 |
| 0. | Taraxacum | Officinale | Weber Forb Asteraceae | 0.08 | 12 | 0.45 |
| 1. | Achillea | Millefolium | L. Forb Asteraceae | 0.03 | 13 | 0.15 |
| 2. | Purshia | Tridentata | (Pursh) DC Shrub Rosaceae | 2.50 | 3 | 13.40 |
| 3. | Draba | Cuneifolia | Nutt. Forb Brassicaceae | 0.18 | 11 | 0.89 |
| | | | Totals | 18.65 | - | 100.01 |

* Flat to rolling hills - includes alleuvial fan area SW of head frame and North of rail.

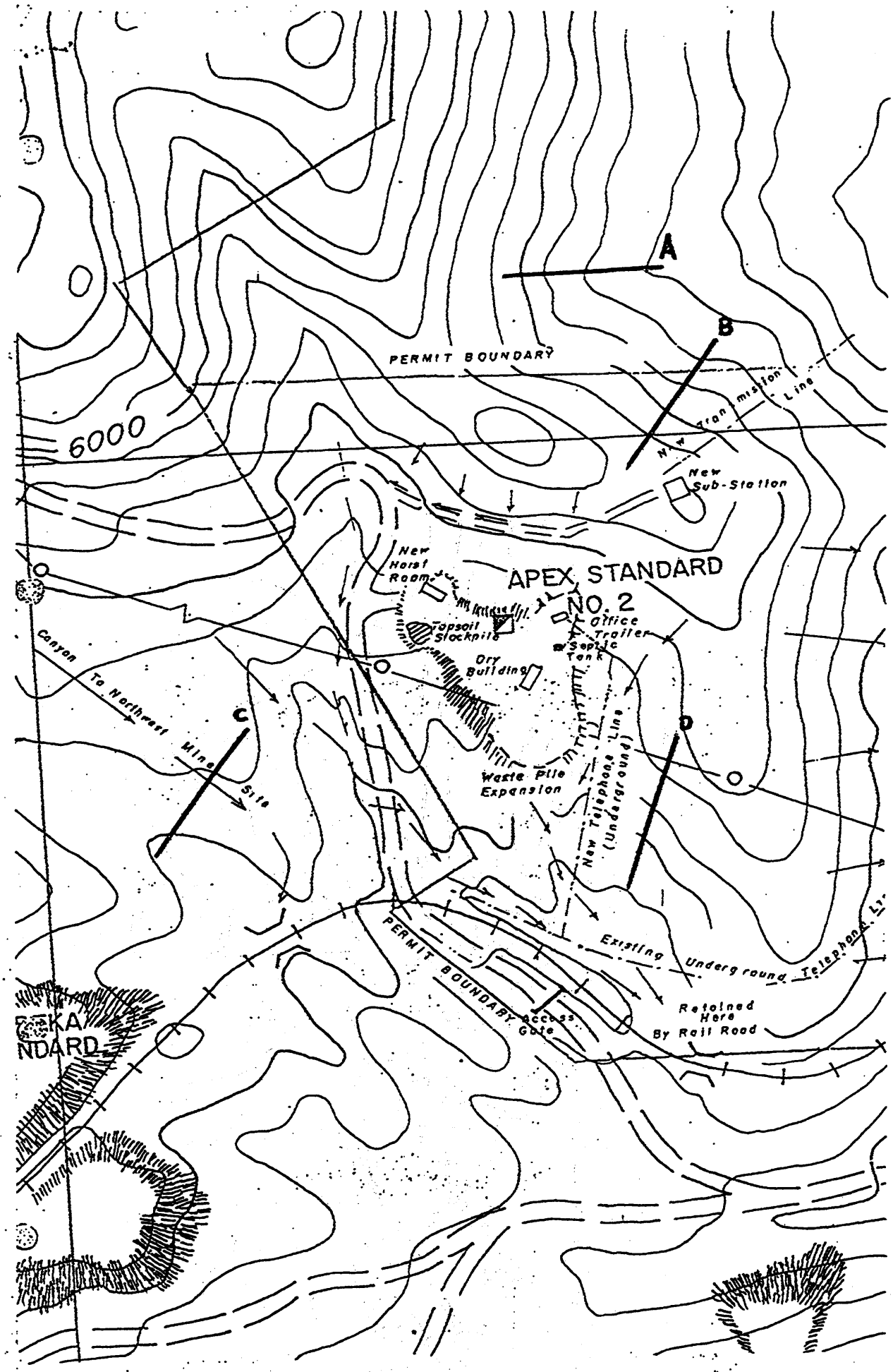
Table V

Transect D

(South facing slope)*

| | Genus | Species | Identification | Percent Cover | Density Ranking 1-18 | Percent Total Cov |
|---|---|---|---|---|---|---|
| 1. | Senecio | Multilobatus | T. & C. Forb Asteraceae | 1.46 | 2 | 27.78 |
| 2. | Stereptanthus | Cordatus | Nutt. Forb Brassicaceae | 1.86 | 1 | 35.45 |
| 3. | Conringia | Orientalis | L. Dumont Forb Brassicaceae | 0.03 | 11-12-13 | 0.53 |
| 4. | Bromus | Tectorum | L. Grass Poaceae | 0.17 | 6 | 3.18 |
| 5. | Gutierrefia | Sarothrae | (Pursh) Britt. & Rusbyslrab Asteraceae | 0.88 | 3 | 16.93 |
| 6. | ? | Allium | ? Forb Liliaceae | 0.07 | 9 | 1.32 |
| 7. | Phlox | Austromontana | Cov. Forb Polemoniaceae | 0.11 | 7 | 2.12 |
| 8. | Draba | Cuneifolia | Nutt. Forb Brassicaceae | 0.21 | 5 | 3.97 |
| 9. | Microsteris | Gracilis | (Hook) Greene Forb Polemoniaceae | 0.03 | 11-12-13 | 0.53 |
| 10. | Achillea | Millefolium | L. Forb Asteraceae | 0.08 | 8 | 1.59 |
| 11. | Apiaceae | Unbel | Probable Identification | 0.06 | 10 | 1.06 |
| 12. | Castilleja | Chromosa | A. Nels Forb Scrophulariaceae | 0.03 | 11-12-13 | 0.53 |
| 13. | ? | Astragalus | Forb Fabaceae | 0.26 | 4 | 5.03 |
| | | | Totals | 5.25 | | 100.02 |

[illegible] NW of road and SE of office trailer. [illegible]alus slope with rock from 2" pebble to [illegible]


A
B
C
D
PERMIT BOUNDARY
6000
New Transmission Line
New Sub-Station
New Hoist Room
APEX STANDARD
NO. 2
Office Trailer
Topsoil Stockpile
Septic Tank
Dry Building
Canyon To Northwest Mine Site
Waste Pile Expansion
New Telephone Line (Underground)
PERMIT BOUNDARY
Access Gate
Existing Underground Telephone Lr.
Retained Here By Rail Road

APPENDIX VII

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Norman H. Bangerter, Governor
Dee C. Hansen, Executive Director
Dianne R. Nielson, Ph.D., Division Director

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

January 21, 1986

Mr. Glenn M. Mellor
Sunshine Mining Company
P. O. Box 250
Eureka, Utah 84628

Dear Mr. Mellor:

Re: Vegetation Test Plots, Sunshine Mining Company, ACT/049/009, Utah County, Utah

The Division has reviewed your final report dated November 4, 1985 regarding the test plots which you have had at the Apex Mine.

While the test plots to date have not provided sufficient vegetation to meet revegetation success standards, the Division will not require additional test plots until such time that it can evaluate the effectiveness of recent reclamation of several abandoned mine sites in the Tintic area (approximately 2-3 years from now).

As always, should you have any questions, please don't hesitate to call.

Sincerely,

Susan C. Linner

Susan C. Linner
Reclamation Biologist/
Permit Supervisor

LK:jvb
cc: Lynn Kunzler
0092R-24

SUNSHINE MINING COMPANY
EUREKA OPERATIONS

P.O. Box 250
EUREKA, UTAH 84628
[801] 433-6854

T.B. HANNIFIN, JR.
*General Manager*

November 4, 1985

Ms. Susan C. Linner
Reclamation Biologist/Permit Supervisor
State Of Utah - Natural Resources
Oil Gas & Mining
355 West North Temple
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

Dear Ms. Linner:

Please find enclosed the final report regarding the test plot program located at the Apex Shaft Site. The report and field examination were completed by Joseph M. Jarvis, Biologist/Principal, JBR Consultants Group.

If you require any further information regarding this revegatation study, please advise.

Very truly yours,

Glenn M Mellor

Glenn M. Mellor
Senior Geologist

GMM/lrl

cc: T. B. Hannifin, Jr.
Files

jbr CONSULTANTS GROUP
GEOLOGY ENGINEERING ENVIRONMENT HYDROLOGY

# Burgin Mine Test Plots

## Introduction

In 1981, a test plot program was devised in conjunction with the Division of Oil, Gas and Mining to deal with revegetation of waste rock at the Apex Shaft. Sufficient topsoil was not available to cover all the old and new waste rock areas associated with this development shaft of the Burgin Mine complex. Thus the attempt to seed directly into waste rock piles to create a vegetative cover. The complete test plot program is available in the 1982 Notice of Intent for the Apex Shaft of the Burgin Mine.

The soil treatment was initiated in April, 1982 by liming the acid waste rock site with calcium carbonate ($CaCO_3$). After a six day wait the seeding was begun under the following program:

1. Plots 100 ft2

   A,B,C and D on the acid waste rock

   E,F,G, and H on the neutral waste rock

   I,J,K and L on the soil storage pile

2. Seed Mixture applied at one (1) ounce per plot

| Common Name | Scientific Name | lbs/A |
|---|---|---|
| crested wheatgrass | Agropyron cristoratum | 5 |
| Indian ricegrass | Oryzopsis hymenoides | 5 |
| Russian wildrye | Elymus junceus | 5 |
| yellow sweetclover | Melilotus officinalis | 5 |
| | Total | 20 |

3. Fertilization with diammonium phosphate 18-45-0 at 6 ounces per plot

4. Mulch was Conweb Hydro Mulch Fiber of one bale for six plots

5. Test plot preparation:

   Acid Waste Rock
   A. seed and lime
   B. seed, lime and fertilize
   C. seed, lime and mulch
   D. seed, lime, fertilize and mulch

2556 East Oak Creek Circle Sandy, Utah 84092 801-943-4144

Neutral Waste Rock

E. seed only
F. seed and fertilize
G. seed and mulch
H. seed, fertilize and mulch

Topsoil Pile

I. seed only
J. seed and fertilize
K. seed and mulch
L. seed, fertilize and mulch

6. Results from August, 1985 field work using 3 random quadrats per plot:

| Plot | % Total Ground Cover | # Species Seed Mix | # Plants Seed Mix | # Plants 100 ft2 |
|---|---|---|---|---|
| A | 15 | 3 | 24 | 348 |
| B | 5 | 2 | 8 | 116 |
| C | 5 | 2 | 33 | 478 |
| D | 7 | 2 | 20 | 290 |
| Mean | 8 | 2 | 21 | 308 |

# Species: crested wheatgrass - 70
Indian ricegrass - 1
yellow sweetclover - 14

| | | | | |
|---|---|---|---|---|
| E | 1 | 1 | 2 | 29 |
| F | 12* | 1 | 25 | 362 |
| G | 1 | 1 | 4 | 58 |
| H | 6* | 1 | 7 | 101 |
| Mean | 5 | 1 | 9 | 137 |

# Species: crested wheatgrass - 38
* fertilized

| | | | | |
|---|---|---|---|---|
| I | 12 | 2 | 11 | 159 |
| J | 25* | 2 | 15 | 217 |
| K | 13 | 2 | 21 | 304 |
| L | 26* | 2 | 12 | 174 |
| Mean | 19 | 2 | 15 | 213 |

# Species: crested wheatgrass - 45
Russian wildrye - 3
yellow sweetclover - 11
* fertilized

The seeding trials occured during a period of above normal precipitation and plant growth consequently the results were achieved under ideal conditions. The seeded cover on the waste rock plots were small thin plants of which only the crested wheatgrass had reached maturity. The fertilization of plots on the neutral waste rock area produced the only difference in groundcover attributable to the affects of treatment. This effect also appeared in the topsoil plots. Plots J and L (fertilized topsoil) were the only plots to achieve the revegetation requirement of Rule M-10 (70% of 25% native groundcover or diversity of stand). Certainly the groundcover on the waste rock sites was not sufficient to have any positive effects on surface stabilization or erosion. Any use of the stored topsoil fro revegetation will require fertilization for best growth potential.

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# Soils data from the Dry Stack Tailings Disposal Area

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)ATE REPORTED: 09-27-1999

BILLING:

# RESEARCH SOIL ANALYSIS

| Lab # | Sample ID # | paste pH | paste EC mmhos/cm | meq/L Ca | meq/L Mg | meq/L Na | meq/L K | SAR | $NaHCO_3$ mg/kg P | Total % N | mg/kg $NO_3$-N | mg/kg K | Total % S | meq/L Alkalinity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R1529 | TP-4 0-4" | 7.6 | 0.7 | 6.1 | 1.4 | 0.5 | 0.3 | 0.3 | 3.2 | 0.136 | 7.52 | 250 | | 4.94 |
| R1530 | TP-4 6-12" | 7.7 | 0.4 | 3.2 | 0.8 | 0.4 | 0.4 | 0.3 | 1.2 | 0.091 | 3.25 | 231 | | 3.06 |
| R1531 | TP-4 12-18" | 7.8 | 0.5 | 3.5 | 1.2 | 0.4 | 0.3 | 0.3 | 0.4 | 0.064 | 3.83 | 196 | <0.01 | 3.12 |
| R1532 | TP-4 18-24" | 7.8 | 0.4 | 2.8 | 1.4 | 0.4 | 0.3 | 0.3 | 1.4 | 0.061 | 3.36 | 188 | <0.01 | 2.65 |
| R1533 | TP-14 0-4" | 6.5 | 0.4 | 4.1 | 0.8 | 0.3 | 0.2 | 0.2 | 2.2 | 0.078 | 2.86 | 148 | | 3.84 |
| R1534 | TP-14 6-12" | 7.6 | 0.5 | 4.6 | 1.1 | 0.5 | 0.3 | 0.3 | 1.5 | 0.107 | 3.09 | 233 | | 3.98 |
| R1535 | TP-14 12-18" | 7.7 | 0.5 | 4.0 | 1.0 | 0.4 | 0.3 | 0.3 | 0.8 | 0.083 | 3.79 | 204 | <0.01 | 3.49 |
| R1536 | TP-14 18-24" | 7.8 | 0.4 | 3.5 | 0.9 | 0.3 | 0.2 | 0.2 | 0.3 | 0.070 | 3.63 | 183 | <0.01 | 2.75 |

| Lab # | Sample ID # | % $CaCO_3$ equiv. | % TOC | % Saturation | mg/L $HCO_3$ | Texture Estimate | Soil Color | AWC $cmcm^{-1}$ | By Volume % Gravel | Bar 1/3 %$H_2O$ | Bar 15 %$H_2O$ | A:B Potential * | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R1529 | TP-4 0-4" | 3.70 | 1.11 | 31.2 | 301.2 | Sandy Clay Loam | 5YR 5/2 | 0.013 | 33.8 | 15.4 | 8.1 | | |
| R1530 | TP-4 6-12" | 12.2 | 1.71 | 42.0 | 186.7 | Sandy Clay | 10YR 8/2 | 0.157 | 13.5 | 23.2 | 11.1 | | |
| R1531 | TP-4 12-18" | 16.3 | 0.50 | 42.6 | 190.6 | Sandy Clay | 7.5YR 8/3 | 0.152 | 19.1 | 24.6 | 12.9 | 163 | Subsoil |
| R1532 | TP-4 18-24" | 20.9 | 0.49 | 46.6 | 161.5 | Sandy Clay | 7.5YR 8/2 | 0.080 | 3.30 | 11.3 | 5.1 | 209 | |
| R1533 | TP-14 0-4" | 2.02 | 0.82 | 32.6 | 234.4 | Sandy Clay | 7.5YR 4/1 | 0.124 | 20.4 | 18.8 | 9.3 | | |
| R1534 | TP-14 6-12" | 2.22 | 0.77 | 37.0 | 242.6 | Sandy Clay Loam | 7.5YR 5\2 | 0.152 | 20.0 | 22.9 | 11.2 | | |
| R1535 | TP-14 12-18" | 17.7 | 0.44 | 41.7 | 213.0 | Sandy Clay | 7.5YR 7/2 | 0.157 | 10.6 | 24.1 | 12.0 | 177 | Subsoil |
| R1536 | TP-14 18-24" | 24.4 | 0.40 | 44.3 | 167.6 | Clay | 7.5YR 7/2 | 0.185 | 8.80 | 27.0 | 12.8 | 244 | |

* Tons of $CaCO_3$ per 1000 tons of material calculated as 10(%$CaCO_3$)-31.25(%S)

# APPENDIX A

## Test Pit Logs

7/28/99 Burgin Tailings, cont. EJS

09:30 Onsite for field exploration

09:30 - 10:30 Dug part of 1st test pit; old backhoe breakdown

11:30 - 13:30 staked test pit locations @ proposed dry stack tailings site

14:30 - 16:30 Dug 8 test pits

7/29/99 07:20 - 13:30 dug 20 test pits w/ bobcat track hoe, walked out

13:00 - 14:30 Lunch break

14:45 - 19:30 Logged test pits and collected soil and bedrock grab samples

- Test pit lithology logs recorded on pages 20 - 27



TEST PIT LOGS - Burgin Site

TP-1

0 - 0.5' Topsoil, SILT, sandy, gravelly, brn; calcareous; surface w/ gravel & cobbles (angular) quartz latite; 30% cover; root zone, 10 + 1.0'; sli. moist
(sample)

0.5 - 2.5' SILT, f.g. sandy, calcareous; lt. brn to white, sli. moist to dry (caliche zone)
(sample)

2.5+ BEDROCK, mod. hard quartz latite

TD 2.6'

TP-2

0 - 0.5' Topsoil, SILT, sandy; root zone; brn, sli. moist

0.5 - 1.0+ BEDROCK; mod. weathered; mod. hard, quartz latite; white to gray
(sample)

TP-3

0 - 0.5 Topsoil, SILT, f.g. sandy; sli. calcareous; brn, sli. moist - dry; root zone; surface cover 30 - 40 % gravel & cobbles (angular)
(no sample)

0.5 - 1.5+ BEDROCK; mod. weathered; mod. hard, quartz latite; white - gray
(no sample)

(21) 7/29/99

TP-4

0-0.4' TOPSOIL, SILT, F.g. sandy, brn, root zone, sli. moist
(Agri sample)

0.4-3.0 SILT, sandy to SAND, silty; sand fract. variable from f.g to c.g., sli. moist calcareous; caliche zone 1.5'-2.0' lt. brn, max. depth of roots (juniper) to white

April samples 6"-12", 12"-18", 18"-24"

3.0+ BEDROCK, mod. weathered, mod. hard, quartz latite; gray

TP-5

0.-0.3 TOPSOIL, SILT, sandy, gravelly; moist, calcareous, brn, root zone

0.3-5.0 SAND & GRAVEL (SW-GW), silty, calcareous, moist, lt. brn-tan-yl. brn.; roots scattered to 2'
(sample)

TP-6 (no samples)

0-0.3 TOPSOIL, SILT, sandy; brn, root zone sli. moist

0.3-1.0 SILT, sandy (F.g.), calcareous; some roots; lt. brn; sli. moist

1.0-5.0 SAND, silty (F.g.-c.g.) decomposed quartz latite residuum; moist

5.0+ BEDROCK - Mod. weathered mod hard quartz latite; gray & white

(22)

TP-7 (no samples)

0-0.3 TOPSOIL, SILT, sandy; some roots, brn, sli. moist.

0.3-1.0+ BEDROCK, mod. weathered, mod. hard white to gray, iron staining on fractures

TP-8 (no samples)

0-2" TOPSOIL, SAND, silty, brn, moist, root zone.

2"-3.0 SAND (SW), silty, brn, sli. calcareous, sli. moist; scattered roots to 2'

3.0'-3.5'+ BEDROCK, fract. mod. weathered quartz latite.

TP-9 (no samples)

0.-4" TOPSOIL, SAND (SW), silty, moist; scattered gravel & cobbles on surface

4"-1'+ BEDROCK, highly weathered, mod. hard; white to lt. gray

TP-10

(Same as TP-9)

7/29/99

TP-11 (no samples)

0-3" TOPSOIL, SAND (SW) silty, sli. calcareous, brn, root zone; sli. moist

3"-1.5' SAND (SW), silty, calcareous lt. brn to reddish brn, moist; root zone

1.5-2.0 BEDROCK - severly weathered, decomposed, friable, lt. reddish brn, moist, quartz latite

2.0-2.5 Quartz latite, mod. weathered, mod. hard, white to lt. gray

TP-12 (no samples)

0-3" TOPSOIL SILT, sandy, gravelly, w/ cobbles scattered on surface, calcareous brn, sli. moist; root zone

3"-2' SILT, sandy; strongly calcareous (caliche); lt. whitish brn, root zone to 1', sli. moist to dry

2'+ BEDROCK, mod. weathered, mod. hard quartz latite

TP-13 (no samples)

0-3" TOPSOIL, SAND, silty, dk. brn, sli. moist, root zone

3"-8"+ BEDROCK, decomposed to highly weathered quartz latite, yl. brn to white



TP-14 → to SILT, sandy (F.g.)

0-1.0 TOPSOIL SAND, silty, dk. brn, root zone, moist; samples 0"-6"; 6"-12"
Agr. sample

1.0-3.0 SILT, F.g. sandy, lt. brn to tan w/ white streaks, sli. moist, calcareous (samples @ 12"-18" & 18"-24"

Note: old test pit ≈ 20' north has bedrock (quartz latite) @ about 4' from surface.

TP-15 - no samples

0-1.0' TOPSOL SILT, sandy to SAND, silty, sli. calcareous, dk. brn, root zone sli. moist

1.0'-2.0' SAND, (SW) silty, lt. brn, sli. calcareous, sli. moist
(sample)

2-3' SILT, sandy, sli. calcareous, lt. brn, sli. moist

3-4.5' SAND, silty, (SW), sli. calcareous, lt. brn, sli. moist

4.5-5.0 SILT, sli. calcareous, lt. reddish brn, moist
sample

5'-6' SAND (SW), sli. calcareous, sli. moist, lt. brn.
sample

6'-6.5'+ BEDROCK, mod. weathered; mod. hard, white to lt. gray

7/29/99

TP-16 (no samples)

0-1.5 TOPSOIL SILT, f.g. sandy, sli. calcareous root zone, dk. brn, sli. moist

1.5-3.1+ BEDROCK, mod. decomposed, quartz latite, white to lt. gray w/ iron staining

TP-17 (dry channel - no sample)

0-5' SAND, loose, moist, gray brn. - to brn; thin bedded

TP-18

0-6" TOPSOIL SAND, silty, sli. calcareous, dk. brn; root zone, sli. moist

6"-3' - SAND (SW) to SAND, silty, calcareous, (sample) brn, moist

3'-4'+ BEDROCK, mod weathered, mod. hard quartz latite, lt. gray to whitish gray

TP-19 (no sample)

0-0.5 TOPSOIL, SAND, silty, root zone, sli. calcareous, dk. brn, sli. moist

0.5-1.0 SAND (SW), silty, sli. calcareous, lt. brn, sli. moist

1.0-2.0 SILT, sandy, sli. calcareous, lt. brn, sli. moist

2.0-3.5 SAND (SW), silty, calcareous, sli. moist

3.5-4.0 SILT, calcareous, sli. moist, lt. brn.



TP-20 (Dry channel - no sample)

0-4 SAND, loose, moist, gray brn to brn, thin bedded

4-5'+ BEDROCK, irreg. knob, sli. weathered, hard, quartz latite.

NOTE: outcrop 10' upstream left bank.

@ RR culvert TP-21 (no samples)

0-5' SAND (SW) loose, silty, brn., moist; calcareous, (roots to ~2'

5-6' CLAY, sandy (CL), v. moist

6'+ BEDROCK, sli. weathered, hard, quartz latite.

Note: outcrops (hills) to north & south

TP-22

0-2" TOPSOIL, SILT, sandy, dk. brn root zone, sli. moist

2"-3' SILT, some f.g. sandy, v. calcareous, sample almost hard pan caliche., tan, sli. moist; root zone to 2'

TP-23

0-8" TOPSOIL, SAND, silty, dk. brn, sli. moist, root zone

8"-2'+ BEDROCK, upper 6" decomposed, 6"+, weathered, firm, quartz latite white to tan w/ iron staining

(27) 7/29/99

0-4.5' **TP-22**

See TP-28; same, except mod. weathered bedrock (quartz latite) @ 4.5'

**TP-23**

See TP-28, same 0-3'

sample 1'-2'

**TP-26**

0-4" TOPSOIL, SAND, silty, dk. brn., sli. moist, root zone

4"-2'+ BEDROCK, weathered, from quartz latite; white to orange, iron stained

**TP-25**

0-3.5' SAND (SW), calcareous; caliche

(sample) zone @ ≈ 3'-3.3', sli. moist, lt. brn to whitish brown, root zone to 1'+

3.5-4' SILT, calcareous, lt. brn., moist

**TP-24** (no sample)

0-3" TOPSOIL, SAND, silty, root z[illegible] dk. brn., [illegible] moist

3"-1.5'+ BEDROCK [illegible] hard, lt. gray [illegible]

END OF Test Pit Log

LEFT [illegible] INK DELIBERATELY