

BEAVER CREEK COAL

NO 9 MINE

1987 ANNUAL REPORT

BEAVER CREEK COAL COMPANY

1987 ANNUAL REPORT

TRAIL MOUNTAIN NO. 9 MINE

BEAVER CREEK Coal Company

Post Office Box 1378
Price, Utah 84501
Telephone 801 637-5050



March 31, 1988

Mr. Lowell Braxton
Administrator
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

MAR 31 1988

**DIVISION OF OIL
GAS & MINING
PRICE, UTAH**

RE: 1987 Annual Report
Trail Mountain No.9 Mine
ACT/015/009
Emery County, Utah

Dear Mr. Braxton:

Enclosed is the Annual Report for Coal Mining and Reclamation Operations for 1987 for the Trail Mountain No.9 Mine.

If you have any questions or need any further information, please let me know.

Respectfully,

Dan W. Guy,
Manager, Permitting & Compliance

DWG/cr

cc: Johnny Coffey
File 4-P-5-1-1

BEAVER CREEK COAL COMPANY
1987 ANNUAL REPORT
TRAIL MOUNTAIN NO.9 MINE

[Revised January 1988]

COAL MINING AND RECLAMATION OPERATIONS FOR 1987
(Authority UMC 784)

(Must be submitted to the Division by March 31, 1988)

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
3 Triad Center, Suite 350
355 West North Temple
Salt Lake City, UT 84180-1203
(801) 538-5340

Operator: Beaver Creek Coal Company
Mine Name: Trail Mountain No.9 Mine
Mailing Address: P.O. Box 1378, Price, Utah 84501
Company Representative: Dan W. Guy
Permit Number: ACT/015/009
Date of Most Recent Permanent Program Permit: 2/19/85 (Tract II 4/30/87)
Quantity of Coal Mined (tonnage) 1987: 330,684 Tons

Attach Updated Mine Sequence Map. (Included)

All monitoring activities during the report period must be submitted with this report (including, but not limited to):

- A. Summarized Water Monitoring Data (Included)
- B. Precipitation or Other Climatological Data (Included)
- C. Subsidence Monitoring Report (Included)
- D. Vegetation Data (test plots) or Revegetation Success Monitoring (includes interim and final) (Included)
- E. Permit Stipulation Status (Included)

CERTIFICATES OF INSURANCE

Revised November, 1987.

CERTIFICATE OF LIABILITY INSURANCE

Issued to:
State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
--oo00oo--

THIS IS TO CERTIFY THAT:

Insurance Company of North America

(Name of Insurance Company)

1600 Arch Street, Philadelphia, PA 19101

(Home Office Address of Insurance Company)

HAS ISSUED TO:

BEAVER CREEK COAL CO.

(Name of Permit Applicant)

TRAIL MOUNTAIN No.9 MINE

(Mine Name)

ACT/015/009

(Permit Number)

CERTIFICATE OF INSURANCE:

HDO GO 969065-7

(Policy Number)

1-1-88

(Effective Date)

UNDER THE FOLLOWING TERMS AND CONDITIONS:

As Per UMC/SMC Part 800.60 Terms and Conditions for Liability Insurance;

- A. The Division shall require the applicant to submit as part of its permit application a certificate issued by an insurance company authorized to do business in the state of Utah certifying that the applicant has a public liability insurance policy in force for the surface coal mining and reclamation operations for which the permit is sought. Such policy shall provide for personal injury and property damage protection in an amount adequate to compensate any persons injured or property damaged as a result of the surface coal mining and reclamation operations, including the use of explosives and who are entitled to compensation under the applicable provisions of state law. Minimum insurance coverage for bodily injury and property damage shall be \$300,000 for each occurrence and \$500,000 aggregate.
- B. The policy shall be maintained in full force during the life of the permit or any renewal thereof, including the liability period necessary to complete all reclamation operations under this chapter.

Page 2.
CERTIFICATE OF LIABILITY INSURANCE

C. The policy shall include a rider requiring that the insurer notify the Division whenever substantive changes are made in the policy including any termination or failure to renew.

IN ACCORDANCE WITH THE ABOVE TERMS AND CONDITIONS, and the Utah Code Annotated 40-10-1 et seq., the Insurance Company hereby attests to the fact that coverage for said Permit Applicant is in accordance with the requirements of the State of Utah and agrees to notify the Division of Oil, Gas and Mining in writing of any substantive change, including cancellation, failure to renew, or other material change. No change shall be effective until at least thirty (30) days after such notice is received by the Division.

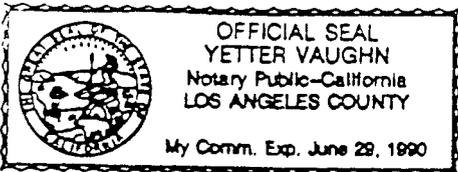
UNDERWRITING AGENT:

| | |
|---|---|
| <u>M. J. Morehouse</u> (Agent's Name) | <u>213-739-4630</u> (Phone) |
| <u>Insurance Company of North America</u> (Company Name) | |
| <u>3333 Wilshire Blvd</u> (Mailing Address) | <u>Los Angeles, CA 90010</u> (City, State, Zip Code) |

The undersigned affirms that the above information is true and complete to the best of his or her knowledge and belief, and that he or she is an authorized representative of the above-named insurance company.

1-27-88 M. J. Morehouse - Account Manager
(Date, Signature and Title of Authorized Agent of Insurance Company)

Signed and sworn before me by M. J. MOREHOUSE
(Name)
this 27th day of January, 1988



Yetter Vaughn
(Signature)

June 29, 1990
(Date)

My Commission Expires:

Beaver Creek Coal Company
Trail Mountain No. 9 Mine

APPENDIX 2-4
RECLAMATION PERFORMANCE BOND
FOR
TRAIL MOUNTAIN NO.9 MINE

2/1/88

Bond Number U63 05 13
 Permit Number ACT/015/009
 Mine Name Beaver Creek No. 9 Mine

STATE OF UTAH
 DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF OIL, GAS AND MINING
 355 West North Temple
 3 Triad Center, Suite 350
 Salt Lake City, Utah 84160-1203
 (801) 538-5340

THE MINED LANDS RECLAMATION ACT

BOND

The undersigned Beaver Creek Coal Company
 as principal, and United Pacific Insurance Company as
 surety, hereby jointly and severally bind ourselves, our heirs, administrators,
 executors, successors and assigns unto the State of Utah, Division of Oil, Gas
 and Mining, and the U. S. Department of the Interior, Office of Surface Mining
 in the penal sum of Four Hundred Sixty-Three Thousand Seven Hundred Eleven
dollars (\$ 463,711.00). Such sum shall be payable to
 one, but not both, of the above-named agencies.

The principal estimated in the Mining and Reclamation Plan filed with the
 Division of Oil, Gas and Mining on the 3rd day of March
19 81, that 1414.77 acres of land will be disturbed
 by this mining operation in the State of Utah. A description of the disturbed
 land is attached hereto as Exhibit "A."

When the Division has determined that the principal has satisfactorily
 reclaimed the above-mentioned lands affected by mining in accordance with the
 approved Mining and Reclamation Plan and has faithfully performed all
 requirements of the Mined Land Reclamation Act, and complied with the Rules
 and Regulations adopted in accordance therewith, then this obligation shall be
 void; otherwise it shall remain in full force and effect until the reclamation
 is completed as outlined in the approved Mining and Reclamation Plan.

If the approved plan provides for reclamation of the land affected on a
 piecemeal or cyclic basis, and the land is reclaimed in accordance with such
 plan, then this bond may be reduced periodically.

In the converse, if the plan provides for a gradual increase in the area
 of the land affected or increased reclamation work, then this bond may
 accordingly be increased with the written approval of the surety company.

The Division shall only accept the bond of a surety company if the bond is
 noncancellable by the surety at any time for any reason including, but not
 limited to nonpayment of premium or bankruptcy of the permittee during the
 period of liability.

NOTE: Where one signs by virtue of Power of Attorney for a surety company, such Power of Attorney must be filed with this bond. If the principal is a corporation, the bond shall be executed by its duly authorized officer.

Beaver Creek Coal Company
Principal (Company)

LEGAL
ea

By Charles B. Smith
Company Officer - Position
Charles B. Smith, Vice President

Date: September 22, 1987

United Pacific Insurance Company
Surety (Company)

By James M. Kade
Surety Company Officer - Position
James M. Kade, Attorney-in-Fact

DATE: September 21, 1987

APPROVED AS TO FORM:

By _____
Assistant Attorney General

Beaver Creek No. 9 Mine

Exhibit A

Affected Area (Permit Area)

Township 17 South, Range 6 East, SLB&M

Section 25: S1/2 NW1/4, W1/2 SW1/4, W1/2 E1/2 SW1/4, SW1/4
SE1/4, E1/2 E1/2 SW1/4

Begin at point of SW Corner of NW1/4 SE1/4, thence North
160 Rods, thence East 44 Rods to center of Cottonwood
Creek, Southward along creek to a point 76 Rods east of the
beginning, thence west 76 Rods to the Point of Beginning.

Section 26: SE1/4 NE1/4, E1/2 SW1/4 NE1/4, E1/2 SE1/4,
E1/2 W1/2 SE1/4

Section 35: N1/2 NE1/4, SE1/4 NE1/4, E1/2 SW1/4 NE1/4,
E1/2 SE1/4, E1/2 W1/2 SE1/4

Section 36: All

Disturbed Area:

Township 17 South, Range 6 East, SLB&M

Section 25: 8.8 acres in the SW1/4 NE1/4

Signed, sealed, and dated this 21st day of September 1987.

United Pacific Insurance Company

By: James M. Kaede
James M. Kaede, Attorney-in-Fact

UNITED PACIFIC INSURANCE COMPANY

HOME OFFICE, FEDERAL WAY, WASHINGTON

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, That the UNITED PACIFIC INSURANCE COMPANY, a corporation duly organized under the laws of the State of Washington, does hereby make, constitute and appoint **JAMES M. Keefe of Denver, Colorado**

its true and lawful Attorney-in-Fact, to make, execute, seal and deliver for and on its behalf, and as its act and deed any and all bonds and undertakings of Suretyship,

and to bind the UNITED PACIFIC INSURANCE COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writings obligatory in the nature thereof were signed by an Executive Officer of the UNITED PACIFIC INSURANCE COMPANY and sealed and attested by one other of such officers, and hereby ratifies and confirms all that its said Attorney-in-Fact may do in pursuance hereof.

This Power of Attorney is granted under and by authority of Article VII of the By-Laws of UNITED PACIFIC INSURANCE COMPANY which became effective September 7, 1978, which provisions are now in full force and effect, reading as follows:

ARTICLE VII - EXECUTION OF BONDS AND UNDERTAKINGS

1. The Board of Directors, the President, the Chairman of the Board, any Senior Vice President, any Vice President or Assistant Vice President or other officer designated by the Board of Directors shall have power and authority to (a) appoint Attorneys-in-Fact and to authorize them to execute on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and (b) to remove any such Attorney-in-Fact at any time and revoke the power and authority given to him.

2. Attorneys-in-Fact shall have power and authority, subject to the terms and limitations of the power of attorney issued to them, to execute and deliver on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof. The corporate seal is not necessary for the validity of any bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof.

3. Attorneys-in-Fact shall have power and authority to execute affidavits required to be attached to bonds, recognizances, contracts of indemnity or other conditional or obligatory undertakings and they shall also have power and authority to certify the financial statements of the Company and to copies of the By-Laws of the Company or any article or section thereof.

is power of attorney is signed and sealed by facsimile under and by authority of the following Resolution adopted by the Board of Directors of UNITED PACIFIC INSURANCE COMPANY at a meeting held on the 5th day of June, 1978, at which a quorum was present, and said Resolution has not been amended or repealed:

"Resolved, that the signatures of such directors and officers and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached."

IN WITNESS WHEREOF, the UNITED PACIFIC INSURANCE COMPANY has caused these presents to be signed by its Vice President, and its corporate seal to be hereto affixed, this 30th day of April 1985.

UNITED PACIFIC INSURANCE COMPANY

Vice President



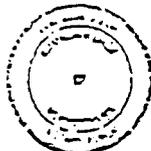
STATE OF Pennsylvania }
COUNTY OF Philadelphia }

On this 30th day of April, 1985 personally appeared Raymond MacNeil

to me known to be the Vice President of the UNITED PACIFIC INSURANCE COMPANY, and acknowledged that he executed and attested the foregoing instrument and affixed the seal of said corporation thereto, and that Article VII, Section 2, and 3 of the By-Laws of said Company, and the Resolution, set forth therein, are still in full force.

My Commission Expires:

September 28, 1987



Notary Public in and for State of Pennsylvania

Residing at Philadelphia

I, J. A. Dally, Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by said UNITED PACIFIC INSURANCE COMPANY, which is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company this 21st day of Sept 1987



UNITED PACIFIC INSURANCE COMPANY

HOME OFFICE, FEDERAL WAY, WASHINGTON

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, That the UNITED PACIFIC INSURANCE COMPANY, a corporation duly organized under the laws of the State of Washington, does hereby make, constitute and appoint **James M. Kade of Denver, Colorado**

its true and lawful Attorney-in-Fact, to make, execute, seal and deliver for and on its behalf, and as its act and deed any and all bonds and undertakings of Suretyship,

and to bind the UNITED PACIFIC INSURANCE COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writings obligatory in the nature thereof were signed by an Executive Officer of the UNITED PACIFIC INSURANCE COMPANY and sealed and attested by one other of such officers, and hereby ratifies and confirms all that its said Attorney-in-Fact may do in pursuance hereof.

This Power of Attorney is granted under and by authority of Article VII of the By-Laws of UNITED PACIFIC INSURANCE COMPANY which became effective September 7, 1978, which provisions are now in full force and effect, reading as follows:

ARTICLE VII - EXECUTION OF BONDS AND UNDERTAKINGS

1. The Board of Directors, the President, the Chairman of the Board, any Senior Vice President, any Vice President or Assistant Vice President or other officer designated by the Board of Directors shall have power and authority to (a) appoint Attorney-in-Fact and to authorize them to execute on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and (b) to remove any such Attorney-in-Fact at any time and revoke the power and authority given to him.

2. Attorneys-in-Fact shall have power and authority, subject to the terms and limitations of the power of attorney issued to them, to execute and deliver on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof. The corporate seal is not necessary for the validity of any bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof.

3. Attorneys-in-Fact shall have power and authority to execute affidavits required to be attached to bonds, recognizances, contracts of indemnity or other conditional or obligatory undertakings and they shall also have power and authority to certify the financial statements of the Company and to copies of the By-Laws of the Company or any article or section thereof.

is power of attorney is signed and sealed by facsimile under and by authority of the following Resolution adopted by the Board of Directors of UNITED PACIFIC INSURANCE COMPANY at a meeting held on the 5th day of June, 1979, at which a quorum was present, and said Resolution has not been amended or repealed:

"Resolved, that the signatures of such directors and officers and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached."

IN WITNESS WHEREOF, the UNITED PACIFIC INSURANCE COMPANY has caused these presents to be signed by its Vice President, and its corporate seal to be hereto affixed, this 30th day of April, 1985.

UNITED PACIFIC INSURANCE COMPANY

Vice President



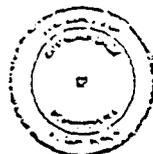
STATE OF Pennsylvania
COUNTY OF Philadelphia } ss.

On this 30th day of April, 1985 personally appeared Raymond MacNeill

to me known to be the Vice-President of the UNITED PACIFIC INSURANCE COMPANY, and acknowledged that he executed and attested the foregoing instrument and affixed the seal of said corporation thereto, and that Article VII, Section 2, and 3 of the By-Laws of said Company, and the Resolution, set forth therein, are still in full force.

My Commission Expires:

September 28, 1987



[Signature]
Notary Public in and for State of Pennsylvania
Residing at Philadelphia

I, J. A. Dally, Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by said UNITED PACIFIC INSURANCE COMPANY, which is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company this 21st day of September, 1987.



Assistant Secretary

1987

WATER MONITORING DATA

Jim

Jim



**MOUNTAIN
STATES
ANALYTICAL**

CERTIFICATE OF ANALYSIS

CLIENT:
Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1399
DATE REC'D: 3-06-87
DATE SAMPLED: 3-05-87

ATTN: Allen Childs

SAMPLE ID: SW-1

| | | |
|---------------------------|-------|-----------------------|
| Acidity | 0 | mg/lCaCO ₃ |
| ↳ Alkalinity, Bicarbonate | 342 | mg/HCO ₃ |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| ✓ Chloride | 11.7 | mg/l |
| Hardness, Total | 285 | mg/lCaCO ₃ |
| Solids, Total Dissolved | 348 | mg/l |
| Solids, Total Suspended | 560.0 | mg/l |
| ↳ Sulfate | 25 | mg/l |
| Settleable Solids | <0.1 | mg/l |
| 7 Calcium | 56.0 | mg/l |
| Iron | 0.11 | mg/l |
| ↳ Magnesium | 35.3 | mg/l |
| Manganese | <0.01 | mg/l |
| Potassium | 2.8 | mg/l |
| ↳ Sodium | 15.6 | mg/l |
| Diss. Iron | <0.05 | mg/l |
| Total Cations | 6.45 | meq/l |
| Total Anions | 6.46 | meq/l |

oil & grease?

Supervisor David D. Dancy
Reviewed and approved 3-17-87

Respectfully submitted [Signature]



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

JOB NO: 1633
DATE REC'D: 4-23-87
DATE SAMPLED:
TIME SAMPLED:

ATTN: Allen Childs

SAMPLE: SW-1

Table with 3 columns: Parameter, Value, and Unit. Includes rows for Acidity, Alkalinity, Chloride, Hardness, Solids, Sulfate, Calcium, Iron, Magnesium, Manganese, Potassium, Sodium, Total Cations, and Total Anions.

Handwritten note: 'oil & grease' circled with a question mark.

Supervisor: [Signature]
Reviewed and Approved: 4-28-87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2749
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: SW-1

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Hardness, Solids, Sulfate, Total Cations, and Total Anions.

Handwritten circled number 046

Supervisor [Signature]
Reviewed and approved: 20/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2970
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: SW-1

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Bicarbonate, Carbonate), Chloride, Hardness, Solids (Dissolved, Suspended), Sulfate, Total Settleable Solids, Total Cations, and Total Anions. Includes handwritten '0.49' in a circle next to Diss. Iron.

Supervisor [Signature]
Reviewed and approved: 10/14/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 4140
DATE REC'D: 01/05/88
DATE SAMPLED: 12/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: SW-1

| <u>ANALYSIS</u> | <u>RESULT</u> <u>AS RECEIVED</u> | <u>METALS:</u> | <u>RESULT</u> <u>AS RECEIVED</u> |
|-------------------------|-------------------------------------|----------------|-------------------------------------|
| Acidity | 0 mg/lCaCO ₃ | Calcium | 60.0 mg/l |
| Alkalinity, Bicarbonate | 336 mg/lHCO ₃ | Iron | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Iron Diss. | <0.05 mg/l |
| Chloride | 15.9 mg/l | Magnesium | 37.7 mg/l |
| Hardness, Total | 305 mg/lCaCO ₃ | Manganese | <0.01 mg/l |
| Solids, Total Dissolved | 324 mg/l | Potassium | 3.1 mg/l |
| Solids, Total Suspended | 11.0 mg/l | Sodium | 15.1 mg/l |
| Sulfate | 40.0 mg/l | | |
| Settleable Solids | <0.1 ml/l | | |
| Total Anions | 6.78 meq/l | | |
| Total Cations | 6.82 meq/l | | |

File in grease

Supervisor *D. Davis*
Reviewed and approved: 01/18/88

Respectfully submitted,
W. Moellmer
William O. Moellmer, Ph.D.
Technical Manager

CERTIFICATE OF ANALYSIS

CLIENT:
Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1400
DATE REC'D: 3-06-87
DATE SAMPLED: 3-05-87

ATTN: Allen Childs

SAMPLE ID: SW-2

| | | |
|-------------------------|-------|-----------------------|
| Acidity | 0 | mg/lCaCO ₃ |
| Alkalinity, Bicarbonate | 290 | mg/HCO ₃ |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| Chloride | 12.7 | mg/l |
| Hardness, Total | 280 | mg/lCaCO ₃ |
| Solids, Total Dissolved | 348 | mg/l |
| Solids, Total Suspended | 550.0 | mg/l |
| Sulfate | 55 | mg/l |
| Settleable Solids | <0.1 | mg/l |
| Calcium | 52.0 | mg/l |
| Iron | <0.05 | mg/l |
| Magnesium | 36.5 | mg/l |
| Manganese | <0.01 | mg/l |
| Potassium | 3.0 | mg/l |
| Sodium | 16.4 | mg/l |
| Diss. Iron | <0.05 | mg/l |
| Total Cations | 6.39 | meq/l |
| Total Anions | 6.27 | meq/l |

Supervisor David G. Young
Reviewed and approved 3-17-87

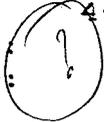
Respectfully submitted David G. Young



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

JOB NO: 1634
DATE REC'D: 4-23-87
DATE SAMPLED: 
TIME SAMPLED:

ATTN: Allen Childs

SAMPLE: SW-2

| | | |
|-------------------------|-------|-----------------------|
| Acidity | 0 | mg/lCaCO ₃ |
| Alkalinity, Bicarbonate | 302 | mg/HCO ₃ |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| Chloride | 14.0 | mg/l |
| Hardness, Total | 285 | mg/lCaCO ₃ |
| Solids, Total Dissolved | 340 | mg/l |
| Solids, Total Suspended | 32.0 | mg/l |
| Settleable Solids | <0.10 | ml/l |
| Sulfate | 58 | mg/l |
| Calcium | 52.0 | mg/l |
| Iron | <0.05 | mg/l |
| Diss. Iron | <0.05 | mg/l |
| Magnesium | 37.7 | mg/l |
| Manganese | <0.01 | mg/l |
| Potassium | 2.3 | mg/l |
| Sodium | 16.8 | mg/l |
| Total Cations | 6.49 | mg/l |
| Total Anions | 6.57 | mg/l |

Supervisor: *Darrell Ramsey*
Reviewed and Approved: 4-28-87

Respectfully submitted,



Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2750
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: SW-2

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Bicarbonate, Carbonate), Chloride, Hardness, Solids (Dissolved, Suspended, Setttable), Sulfate, Total Cations, Total Anions, Calcium, Iron, Magnesium, Manganese, Potassium, Sodium, and Diss. Iron.

Supervisor [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2971
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: SW-2

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|------------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Calcium | 44.0 mg/l |
| Alkalinity, Bicarbonate | 273 mg/lHCO3 | Iron | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Magnesium | 36.5 mg/l |
| Chloride | 10.3 mg/l | Manganese | <0.01 mg/l |
| Hardness, Total | 260 mg/lCaCO3 | Potassium | 1.7 mg/l |
| Solids, Total Dissolved | 372 mg/l | Sodium | 13.8 mg/l |
| Solids, Total Suspended | 8.0 mg/l | Diss. Iron | <0.05 mg/l |
| Sulfate | 19.5 mg/l | | |
| Total Settleable Solids | <0.1 mg/l | | |
| Total Cations | 5.84 meq/l | | |
| Total Anions | 5.18 meq/l | | |

Supervisor *Darrell Ramsey*
Reviewed and approved: 10/14/87

Respectfully submitted,

Ray A. Sim, Director



**MOUNTAIN
STATES
ANALYTICAL**

ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 4141
DATE REC'D: 01/05/88
DATE SAMPLED: 12/31/87
TIME SAMPLED:

SAMPLE ID: SW-2

| <u>ANALYSIS</u> | <u>RESULT</u> <u>AS RECEIVED</u> | <u>METALS:</u> | <u>RESULT</u> <u>AS RECEIVED</u> |
|-------------------------|-------------------------------------|----------------|-------------------------------------|
| Acidity | 0 mg/lCaCO ₃ | Calcium | 58.0 mg/l |
| Alkalinity, Bicarbonate | 320 mg/lHCO ₃ | Iron | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Iron Diss. | <0.05 mg/l |
| Chloride | 15.9 mg/l | Magnesium | 36.5 mg/l |
| Hardness, Total | 295 mg/lCaCO ₃ | Manganese | <0.01 mg/l |
| Solids, Total Dissolved | 316 mg/l | Potassium | 3.1 mg/l |
| Solids, Total Suspended | 156.0 mg/l | Sodium | 15.0 mg/l |
| Sulfate | 41.6 mg/l | | |
| Settleable Solids | <0.1 ml/l | | |
| Total Anions | 6.56 meq/l | | |
| Total Cations | 6.62 meq/l | | |

Supervisor David Phang
Reviewed and approved: 01/18/88

Respectfully submitted,

William O. Moellmer, Ph.D.
Technical Manager



MOUNTAIN
STATES
ANALYTICAL

CERTIFICATE OF ANALYSIS

CLIENT:
Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1401
DATE REC'D: 3-06-87
DATE SAMPLED: 3-05-87

ATTN: Allen Childs

SAMPLE ID: SW-3

| | | |
|-------------------------|-------|-----------------------|
| Acidity | 0 | mg/lCaCO ₃ |
| Alkalinity, Bicarbonate | 302 | mg/HCO ₃ |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| Chloride | 12.4 | mg/l |
| Hardness, Total | 285 | mg/lCaCO ₃ |
| Solids, Total Dissolved | 340 | mg/l |
| Solids, Total Suspended | 140.0 | mg/l |
| Sulfate | 55 | mg/l |
| Settleable Solids | <0.1 | mg/l |
| Calcium | 54.0 | mg/l |
| Iron | 0.05 | mg/l |
| Magnesium | 36.5 | mg/l |
| Manganese | <0.01 | mg/l |
| Potassium | 2.8 | mg/l |
| Sodium | 16.1 | mg/l |
| Diss. Iron | <0.05 | mg/l |
| Total Cations | 6.47 | meq/l |
| Total Anions | 6.46 | meq/l |

Supervisor David Dunning
Reviewed and approved 3-17-87

Respectfully submitted [Signature]



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

JOB NO: 1635
DATE REC'D: 4-23-87
DATE SAMPLED: 1
TIME SAMPLED: 10

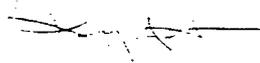
ATTN: Allen Childs

SAMPLE: SW-3

| | | |
|-------------------------|-------|-----------------------|
| Acidity | 0 | mg/lCaCo ₃ |
| Alkalinity, Bicarbonate | 298 | mg/HCO ₃ |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| Chloride | 14.7 | mg/l |
| Hardness, Total | 285 | mg/lCaCO ₃ |
| Solids, Total Dissolved | 344 | mg/l |
| Solids, Total Suspended | 44.0 | mg/l |
| Settleable Solids | <0.10 | ml/l |
| Sulfate | 58 | mg/l |
| Calcium | 52.0 | mg/l |
| Iron | <0.05 | mg/l |
| Diss. Iron | <0.05 | mg/l |
| Magnesium | 37.7 | mg/l |
| Manganese | <0.01 | mg/l |
| Potassium | 2.3 | mg/l |
| Sodium | 17.1 | mg/l |
| Total Cations | 6.49 | mg/l |
| Total Anions | 6.57 | mg/l |

Supervisor: Daniel D. Danney
Reviewed and Approved: 4-28-87

Respectfully submitted,


Ray A. Sim, Director



**MOUNTAIN
STATES
ANALYTICAL**

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2751
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: SW-3

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|------------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Calcium | 36.0 mg/l |
| Alkalinity, Bicarbonate | 256 mg/lHCO3 | Iron | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Magnesium | 37.7 mg/l |
| Chloride | 11.8 mg/l | Manganese | <0.01 mg/l |
| Hardness, Total | 245 mg/lCaCO3 | Potassium | 1.7 mg/l |
| Solids, Total Dissolved | 312 mg/l | Sodium | 14.5 mg/l |
| Solids, Total Suspended | 8.0 mg/l | Diss. Iron | <0.05 mg/l |
| Sulfate | 40.0 mg/l | | |
| Total Settleable Solids | <0.1 mg/l | | |
| Total Cations | 5.57 meq/l | | |
| Total Anions | 5.23 meq/l | | |

Supervisor *David Danney*
Reviewed and approved: 10/05/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2972
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: SW-3

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|------------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Calcium | 42.0 mg/l |
| Alkalinity, Bicarbonate | 261 mg/lHCO3 | Iron | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Magnesium | 35.3 mg/l |
| Chloride | 10.3 mg/l | Manganese | <0.01 mg/l |
| Hardness, Total | 250 mg/lCaCO3 | Potassium | 1.7 mg/l |
| Solids, Total Dissolved | 328 mg/l | Sodium | 13.9 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Diss. Iron | <0.05 mg/l |
| Sulfate | 22.0 mg/l | | |
| Total Settleable Solids | <0.1 mg/l | | |
| Total Cations | 5.64 meq/l | | |
| Total Anions | 5.03 meq/l | | |

Supervisor Daniel Danwing
Reviewed and approved: 10/14/87

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ray A. Sim".

Ray A. Sim, Director



**MOUNTAIN
STATES
ANALYTICAL**

ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 4142

DATE REC'D: 01/05/88

DATE SAMPLED: 12/31/87

TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: SW-3

| <u>ANALYSIS</u> | <u>RESULT AS RECEIVED</u> | <u>METALS:</u> | <u>RESULT AS RECEIVED</u> |
|-------------------------|-------------------------------|----------------|-------------------------------|
| Acidity | 0 mg/lCaCO ₃ | Calcium | 54.0 mg/l |
| Alkalinity, Bicarbonate | 315 mg/lHCO ₃ | Iron | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Iron Diss. | <0.05 mg/l |
| Chloride | 16.5 mg/l | Magnesium | 38.9 mg/l |
| Hardness, Total | 295 mg/lCaCO ₃ | Manganese | <0.01 mg/l |
| Solids, Total Dissolved | 292 mg/l | Potassium | 3.1 mg/l |
| Solids, Total Suspended | 42.0 mg/l | Sodium | 15.1 mg/l |
| Sulfate | 45.3 mg/l | | |
| Settleable Solids | <0.1 ml/l | | |
| Total Anions | 6.57 meq/l | | |
| Total Cations | 6.62 meq/l | | |

Supervisor David L. [Signature]
Reviewed and approved: 01/18/88

Respectfully submitted,

William O. Moellmer, Ph.D.
Technical Manager

CERTIFICATE OF ANALYSIS

CLIENT:

Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1398
DATE REC'D: 3-06-87
DATE SAMPLED: 3-05-87

ATTN: Allen Childs

SAMPLE ID: UG-1

| | | |
|---------------------------|-------|-----------------------|
| ✓ Alkalinity, Bicarbonate | 318 | mg/HCO ₃ |
| ✓ Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| ✓ Chloride | 4.2 | mg/l |
| ✓ Hardness, Total | 130 | mg/lCaCO ₃ |
| ✓ Solids, Total Dissolved | 288 | mg/l |
| ✓ Sulfate | 8 | mg/l |
| ✓ Calcium | 28.0 | mg/l |
| ✓ Diss Iron | <0.05 | mg/l |
| ✓ Magnesium | 14.6 | mg/l |
| ✓ Manganese | <0.01 | mg/l |
| ✓ Potassium | 8.7 | mg/l |
| ✓ Sodium | 62.8 | mg/l |
| Total Cations | 5.55 | meq/l |
| Total Anions | 5.51 | meq/l |

Supervisor David D. Warner
Reviewed and approved 3-17-87

Respectfully submitted 



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

JOB NO: 1632
DATE REC'D: 4-23-87
DATE SAMPLED: 
TIME SAMPLED:

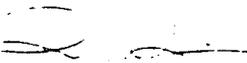
ATTN: Allen Childs

SAMPLE: UG-1

| | | |
|-------------------------|-------|-----------------------|
| Alkalinity, Bicarbonate | 306 | mg/HCO ₃ |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ |
| Chloride | 4.0 | mg/l |
| Hardness, Total | 125 | mg/lCaCO ₃ |
| Solids, Total Dissolved | 300 | mg/l |
| Sulfate | 4 | mg/l |
| Calcium | 28.0 | mg/l |
| Magnesium | 13.4 | mg/l |
| Manganese | <0.01 | mg/l |
| Potassium | 8.9 | mg/l |
| Sodium | 55.4 | mg/l |
| Diss. Iron | <0.05 | mg/l |
| Total Cations | 5.13 | mg/l |
| Total Anions | 5.22 | mg/l |

Supervisor: David D. Dumas
Reviewed and Approved: 4-28-87

Respectfully submitted,


Ray A. Sim, Director



**MOUNTAIN
STATES
ANALYTICAL**

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2290
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: UG-1

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|---------------------------------------|-------------------------|-----------------------|
| Alkalinity, Bicarbonate | 289 [✓] mg/lHCO ₃ | Calcium [✓] | 26.0 mg/l |
| Alkalinity, Carbonate | 0 [✓] mg/lCaCO ₃ | Diss. Iron [✓] | <0.05 mg/l |
| Chloride | 3.1 [✓] mg/l | Magnesium [✓] | 15.8 mg/l |
| Hardness, Total | 130 mg/lCaCO ₃ | Manganese [✓] | <0.01 mg/l |
| Solids, Total Dissolved | 316 [✓] mg/l | Potassium [✓] | 7.8 mg/l |
| Sulfate | 14.0 [✓] mg/l | Sodium [✓] | 57.6 mg/l |
| Total Cations | 5.29 meq/l | | |
| Total Anions | 5.13 meq/l | | |

Supervisor: David Denny
Reviewed and approved: 7/23/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2754
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: UG-1

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Alkalinity, Chloride, Hardness, Solids, Sulfate, Total Cations, Total Anions, Calcium, Diss. Iron, Magnesium, Manganese, Potassium, Sodium.

Supervisor [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2973
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: UG-1

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|------------|-----------------------|
| Alkalinity, Bicarbonate | 288 mg/lHCO3' | Calcium | 28.0 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Diss. Iron | <0.05 mg/l |
| Chloride | 3.0 mg/l | Magnesium | 14.6 mg/l |
| Hardness, Total | 130 mg/lCaCO3 | Manganese | <0.01 mg/l |
| Solids, Total Dissolved | 304 mg/l | -Potassium | 6.6 mg/l |
| Sulfate | 10.3 mg/l | Sodium | 56.0 mg/l |
| Total Cations | 5.20 meq/l | | |
| Total Anions | 5.03 meq/l | | |

Supervisor *Daniel Darrow*
Reviewed and approved: *10/14/87*

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ray A. Sim".

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 4143

DATE REC'D: 01/05/88

DATE SAMPLED: 12/31/87

TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: UG-1

| <u>ANALYSIS</u> | <u>RESULT</u> <u>AS RECEIVED</u> | <u>METALS:</u> | <u>RESULT</u> <u>AS RECEIVED</u> |
|-------------------------|-------------------------------------|----------------|-------------------------------------|
| Alkalinity, Bicarbonate | 265 mg/lHCO ₃ | Calcium | 18.0 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Iron | <0.05 mg/l |
| Chloride | 5.2 mg/l | Magnesium | 17.0 mg/l |
| Hardness, Total | 115 mg/lCaCO ₃ | Manganese | <0.01 mg/l |
| Solids, Total Dissolved | 228 mg/l | Potassium | 9.5 mg/l |
| Sulfate | 18.6 mg/l | Sodium | 55.3 mg/l |
| Total Anions | 4.88 meq/l | | |
| Total Cations | 4.94 meq/l | | |

Supervisor David Shouse
Reviewed and approved: 01/18/88

Respectfully submitted,

William O. Moellmer, Ph.D.
Technical Manager



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 307
Orangeville, Utah 84537

JOB NO: 1636
DATE REC'D: 4-23-87
DATE SAMPLED: Unknown

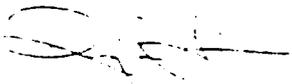
ATTN: Allen Childs

SAMPLE: T-18

| | | | | | |
|-------------------------|-------|-----------------------|-----------|--------|------|
| Acidity | 0 | mg/lCaCO ₃ | Aluminum | <0.05 | mg/l |
| Alkalinity, Total | 255 | mg/lCaCO ₃ | Arsenic | <0.002 | mg/l |
| Alkalinity, Bicarbonate | 311 | mg/HCO ₃ | Barium | <0.1 | mg/l |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ | Boron | <0.20 | mg/l |
| Chloride | 8.2 | mg/l | Cadmium | <0.002 | mg/l |
| Conductivity | 680 | umhos/cm | Calcium | 64.0 | mg/l |
| Fluoride | 0.29 | mg/lCaCO ₃ | Chromium | <0.05 | mg/l |
| Nitrogen, Nitrate | <0.05 | mg/l | Copper | <0.03 | mg/l |
| pH | 8.02 | Units | Iron | <0.05 | mg/l |
| Phosphorus, Ortho | <0.05 | mg/l | Lead | <0.05 | mg/l |
| Phosphorus, Total | <0.05 | mg/l | Magnesium | 38.9 | mg/l |
| Solids, Total Dissolved | 388 | mg/l | Manganese | <0.01 | mg/l |
| Solids, Total Suspended | <5.0 | mg/l | Mercury | <0.50 | ug/l |
| Sulfate | 100 | mg/l | Nickel | <0.05 | mg/l |
| Turbidity | 1.0 | NTU | Potassium | 4.5 | mg/l |
| Total Cations | 7.38 | meq/l | Selenium | <0.005 | mg/l |
| Total Anions | 7.42 | meq/l | Sodium | 19.9 | mg/l |
| | | | Vanadium | <0.2 | mg/l |
| | | | Zinc | <0.01 | mg/l |

Supervisor: Darrel Darnay
Reviewed and Approved: 5-8-87

Respectfully submitted,


Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2570
DATE REC'D: 8-21-87
DATE SAMPLED: 8-17-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-18

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 246 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 300 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 8.1 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 700 umhos/cm | Calcium | 68.0 mg/l |
| Fluoride | 0.31 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.75 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 37.7 mg/l |
| Solids, Total Dissolved | 424 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 100.6 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 1.0 mg/l | Potassium | 4.0 mg/l |
| Total Cations | 7.48 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 7.25 meq/l | Sodium | 21.5 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Danney
Reviewed and approved: 8/08/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2755
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-18

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2964
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-18

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/22/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 4275
 DATE REC'D: 01/18/88
 DATE SAMPLED: 12/31/87
 TIME SAMPLED:

ATTN: Mr. Allen Childs
 P.O. Box 370
 Orangeville, Utah 84537

SAMPLE ID: TM-18

| <u>ANALYSIS</u> | <u>RESULT</u> <u>AS RECEIVED</u> | <u>METALS:</u> | <u>RESULT</u> <u>AS RECEIVED</u> |
|-------------------------|-------------------------------------|----------------|-------------------------------------|
| Acidity | 0 mg/lCaCO ₃ | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 241 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 294 mg/lHCO ₃ | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Boron | <0.20 mg/l |
| Chloride | 10.1 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 620 umhos/cm | Calcium | 64.0 mg/l |
| Fluoride | 0.34 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.55 mg/l | Iron | 0.06 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 38.9 mg/l |
| Solids, Total Dissolved | 420 mg/l | Manganese | 0.01 mg/l |
| Sulfate | 96.0 mg/l | Mercury | <0.50 ug/l |
| Sulfide | <0.10 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 23 NTU | Potassium | 5.6 mg/l |
| | | Selenium | <0.005 mg/l |
| | | Sodium | 20.1 mg/l |
| Total Anions | 7.40 meq/l | Vanadium | <0.20 mg/l |
| Total Cations | 7.11 meq/l | Zinc | <0.01 mg/l |
| | | Molybdenum | <0.10 mg/l |

Supervisor David H. [Signature]
 Reviewed and approved: 01/28/88

Respectfully submitted,

 William O. Moellmer, Ph.D.
 Technical manager

CERTIFICATE OF ANALYSIS

CLIENT:

Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1402

DATE REC'D: 3-06-87

DATE SAMPLED: 3-05-87

ATTN: Allen Childs

SAMPLE ID: TM-1

| | | | | | |
|-------------------------|-------|-----------------------|------------|--------|------|
| Alkalinity, Bicarbonate | 751 | mg/HCO ₃ | Aluminum | <0.05 | mg/l |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ | Arsenic | <0.002 | mg/l |
| Chloride | 103.0 | mg/l | Barium | <0.10 | mg/l |
| Fluoride | 10.40 | mg/l | Boron | 0.57 | mg/l |
| Hardness, Total | 30 | mg/lCaCO ₃ | Cadmium | <0.002 | mg/l |
| Nitrogen, Ammonia | <0.50 | mg/l | Calcium | 6.0 | mg/l |
| Nitrogen, Nitrate | <0.05 | mg/l | Chromium | <0.05 | mg/l |
| Nitrogen, Nitrite | <0.05 | mg/l | Copper | <0.03 | mg/l |
| Phosphorus, Total | <0.05 | mg/l | Iron | 3.74 | mg/l |
| Solids, Total Dissolved | 896 | mg/l | Lead | 0.23 | mg/l |
| Sulfate | 50 | mg/l | Magnesium | 3.6 | mg/l |
| Sulfide | <0.10 | mg/l | Manganese | 0.03 | mg/l |
| | | | Mercury | <0.50 | ug/l |
| Total Cations | 16.34 | meq/l | Nickel | <0.05 | mg/l |
| Total Anions | 16.29 | meq/l | Potassium | 3.9 | mg/l |
| | | | Selenium | <0.005 | mg/l |
| | | | Sodium | 359.8 | mg/l |
| | | | Zinc | 2.09 | mg/l |
| | | | Diss. Iron | <0.05 | mg/l |
| | | | Molybdenum | <0.10 | mg/l |

HNO₃/HCl digestion used for
trace metals.

Supervisor *[Signature]*
Reviewed and approved 3-18-87

Respectfully submitted *[Signature]*



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 307
Orangeville, Utah 84537

JOB NO: 1637
DATE REC'D: 4-23-87
DATE SAMPLED: Unknown

ATTN: Allen Childs

SAMPLE: TM-1

Table with 2 columns of chemical parameters and their concentrations. Left column includes Alkalinity, Chloride, Hardness, etc. Right column includes Aluminum, Arsenic, Barium, etc.

Supervisor: [Signature]
Reviewed and Approved: 5-8-87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2291
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-1

| CHEMICAL: | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-------------|-----------------------|
| Alkalinity, Bicarbonate | 699 mg/lHCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Carbonate | 24 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Chloride | 119.0 mg/l | Barium | <0.10 mg/l |
| Fluoride | 11.78 mg/l | Boron | 0.68 mg/l |
| Hardness, Total | 30 mg/lCaCO3 | Cadmium | <0.002 mg/l |
| Nitrogen, Ammonia | <0.50 mg/l | Calcium | 6.4 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrite | <0.05 mg/l | Copper | <0.03 mg/l |
| Phosphorus, Total | 0.32 mg/l | Iron (Diss) | <0.05 mg/l |
| Solids, Total Dissolved | 876 mg/l | Lead | <0.05 mg/l |
| Sulfate | 20.0 mg/l | Magnesium | 3.4 mg/l |
| Sulfide | <0.1 mg/l | Manganese | <0.01 mg/l |
| | | Mercury | <0.50 ug/l |
| | | Nickel | <0.05 mg/l |
| Total Cations | 15.68 meq/l | Potassium | 2.5 mg/l |
| Total Anions | 15.74 meq/l | Selenium | <0.005 mg/l |
| | | Sodium | 345.6 mg/l |
| | | Zinc | 0.01 mg/l |
| | | Molybdenum | <0.20 mg/l |

Supervisor: David Danney
Reviewed and approved: 08/05/87

Respectfully submitted,
Ray A. Sim
Ray A. Sim, Director



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2752
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-1

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|--------------------------|------------|-----------------------|
| Alkalintiy, Bicarbonate | 727 mg/lHCO ₃ | Aluminum | <0.05 mg/l |
| Alkalinity, Carbonate | 16 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Chloride | 113.2 mg/l | Barium | <0.01 mg/l |
| Fluoride | 10.20 mg/l | Boron | 0.50 mg/l |
| Hardness, Total | 30 mg/lCaCO ₃ | Cadmium | <0.002 mg/l |
| Nitrogen, Ammonia | <0.50 mg/l | Calcium | 6.4 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrite | <0.05 mg/l | Copper | <0.03 mg/l |
| Phosphorus, Total | <0.05 mg/l | Diss. Iron | <0.05 mg/l |
| Solids, Total Dissolved | 856 mg/l | Lead | <0.05 mg/l |
| Sulfate | 61.0 mg/l | Magnesium | 3.4 mg/l |
| Sulfide | <0.10 mg/l | Manganese | <0.01 mg/l |
| Total Cations | 16.50 meq/l | Mercury | <0.50 ug/l |
| Total Anions | 16.40 meq/l | Nickel | <0.05 mg/l |
| | | Potassium | 2.6 mg/l |
| | | Selenium | <0.005 mg/l |
| | | Sodium | 364.2 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: Dave Perry
Reviewed and approved: 10/05/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2968
DATE REC'D: 10/05/87
DATE SAMPLED: 9-30-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-1

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|--------------------------|------------|-----------------------|
| Alkalinity, Bicarbonate | 731 mg/HCO ₃ | Aluminum | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Chloride | 118.0 mg/l | Barium | <0.10 mg/l |
| Fluoride | 10.20 mg/l | Boron | 0.62 mg/l |
| Hardness Total | 25 mg/lCaCO ₃ | Cadmium | <0.002 mg/l |
| Nitrogen, Ammonia | <0.50 mg/l | Calcium | 4.0 mg/l |
| Nitrogen, Nitrate | 0.09 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrite | 0.06 mg/l | Copper | <0.03 mg/l |
| Phosphorus, Total | <0.05 mg/l | Diss. Iron | <0.05 mg/l |
| Solids, Total Dissolved | 864 mg/l | Lead | <0.05 mg/l |
| Sulfate | 40.0 mg/l | Magnesium | 3.7 mg/l |
| Sulfide | <0.10 mg/l | Manganese | <0.01 mg/l |
| Total Cations | 16.20 meq/l | Mercury | <0.50 ug/l |
| Total Anions | 16.17 meq/l | Nickel | <0.05 mg/l |
| | | Potassium | 1.8 mg/l |
| | | Selenium | <0.005 mg/l |
| | | Sodium | 360.0 mg/l |
| | | Zinc | <0.01 mg/l |
| | | Molybdenum | <0.10 mg/l |

Supervisor: *Dave Marney*
Reviewed and approved: 10/23/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 4138

DATE REC'D: 01/05/88

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

DATE SAMPLED: 12/29/87

TIME SAMPLED:

SAMPLE ID: TM-1

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Alkalinity, Chloride, Fluoride, Hardness, Nitrogen, Phosphorus, Solids, Sulfate, Sulfide, Total Anions, Total Cations, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron Diss., Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Zinc, Molybdenum.

Supervisor [Signature]
Reviewed and approved: 01/18/88

Respectfully submitted,

[Signature]
William O. Moellmer, Ph.D.
Technical manager



**MOUNTAIN
STATES
ANALYTICAL**

CERTIFICATE OF ANALYSIS

CLIENT:
Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1403
DATE REC'D: 3-06-87
DATE SAMPLED: 3-05-87

ATTN: Allen Childs

SAMPLE ID: TM-2

| | | | | | |
|-------------------------|-------|-----------------------|------------|--------|------|
| Alkalinity, Bicarbonate | 311 | mg/HCO ₃ | Aluminum | <0.05 | mg/l |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ | Arsenic | <0.002 | mg/l |
| Chloride | 11.9 | mg/l | Barium | <0.10 | mg/l |
| Fluoride | 0.41 | mg/l | Boron | 0.33 | mg/l |
| Hardness, Total | 220 | mg/lCaCO ₃ | Cadmium | <0.002 | mg/l |
| Nitrogen, Ammonia | <0.50 | mg/l | Calcium | 42.0 | mg/l |
| Nitrogen, Nitrate | 0.33 | mg/l | Chromium | <0.05 | mg/l |
| Nitrogen, Nitrite | <0.05 | mg/l | Copper | 0.04 | mg/l |
| Phosphorus, Total | <0.05 | mg/l | Iron | 19.00 | mg/l |
| Solids, Total Dissolved | 364 | mg/l | Lead | <0.05 | mg/l |
| Sulfate | 70 | mg/l | Magnesium | 28.0 | mg/l |
| Sulfide | <0.10 | mg/l | Manganese | 0.16 | mg/l |
| | | | Mercury | <0.50 | ug/l |
| Total Cations | 6.93 | meq/l | Nickel | <0.05 | mg/l |
| Total Anions | 6.90 | meq/l | Potassium | 6.0 | mg/l |
| | | | Selenium | <0.005 | mg/l |
| | | | Sodium | 54.6 | mg/l |
| | | | Zinc | 0.17 | mg/l |
| | | | Diss. Iron | <0.05 | mg/l |
| | | | Molybdenum | <0.10 | mg/l |

HNO₃/HCl digestion used for trace metals.

Supervisor David Deane
Reviewed and approved 3-18-87

Respectfully submitted David Deane



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 307
Orangeville, Utah 84537

JOB NO: 1638
DATE REC'D: 4-23-87
DATE SAMPLED: Unknown

ATTN: Allen Childs

SAMPLE: TM-2

| | | | | | |
|-------------------------|-------|-----------------------|------------|--------|------|
| Alkalinity, Bicarbonate | 321 | mg/HCO ₃ | Aluminum | <0.05 | mg/l |
| Alkalinity, Carbonate | 0 | mg/lCaCO ₃ | Arsenic | <0.002 | mg/l |
| Chloride | 13.7 | mg/l | Barium | 0.30 | mg/l |
| Fluoride | 0.37 | mg/l | Boron | 0.30 | mg/l |
| Hardness, Total | 235 | mg/lCaCO ₃ | Cadmium | <0.002 | mg/l |
| Nitrogen, Ammonia | <0.50 | mg/l | Calcium | 44.0 | mg/l |
| Nitrogen, Nitrate | 0.10 | mg/l | Chromium | <0.05 | mg/l |
| Nitrogen, Nitrite | 0.07 | mg/l | Copper | <0.03 | mg/l |
| Phosphorus, Total | <0.05 | mg/l | Iron Diss | 0.08 | mg/l |
| Solids, Total Dissolved | 400 | mg/l | Lead | <0.05 | mg/l |
| Sulfate | 80 | mg/l | Magnesium | 30.4 | mg/l |
| Sulfide | <0.10 | mg/l | Manganese | 0.16 | mg/l |
| | | | Mercury | <0.50 | ug/l |
| | | | Nickel | <0.05 | mg/l |
| | | | Potassium | 6.8 | mg/l |
| Total Cations | 7.35 | meq/l | Selenium | <0.005 | mg/l |
| Total Anions | 7.32 | meq/l | Sodium | 57.0 | mg/l |
| | | | Zinc | 0.11 | mg/l |
| | | | Molybdenum | <0.10 | mg/l |

Supervisor: Daryl Danner
Reviewed and Approved: 5-5-87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2292
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-2

| CHEMICAL: | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-------------|-----------------------|
| Alkalinity, Bicarbonate | 326 mg/lHCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Chloride | 16.5 mg/l | Barium | <0.10 mg/l |
| Fluoride | 0.46 mg/l | Boron | 0.40 mg/l |
| Hardness, Total | 245 mg/lCaCO3 | Cadmium | <0.002 mg/l |
| Nitrogen, Ammonia | <0.50 mg/l | Calcium | 24.0 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrite | <0.05 mg/l | Copper | <0.03 mg/l |
| Phosphorus, Total | <0.05 mg/l | Iron (Diss) | <0.05 mg/l |
| Solids, Total Dissolved | 468 mg/l | Lead | <0.05 mg/l |
| Sulfate | 112.6 mg/l | Magnesium | 45.0 mg/l |
| Sulfide | <0.1 mg/l | Manganese | <0.01 mg/l |
| | | Mercury | <0.50 ug/l |
| | | Nickel | <0.05 mg/l |
| Total Cations | 8.19 meq/l | Potassium | 6.1 mg/l |
| Total Anions | 8.16 meq/l | Selenium | <0.005 mg/l |
| | | Sodium | 72.2 mg/l |
| | | Zinc | <0.01 mg/l |
| | | Molybdenum | <0.20 mg/l |

Supervisor: David Ramsey
Reviewed and approved: 08/05/87

Respectfully submitted,

Ray A. Sim, Director



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2753
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-2

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|---------------------------|------------|-----------------------|
| Alkalintiy, Bicarbonate | 334 mg/lHCO ₃ | Aluminum | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Chloride | 14.8 mg/l | Barium | <0.10 mg/l |
| Fluoride | 0.41 mg/l | Boron | <0.20 mg/l |
| Hardness, Total | 230 mg/lCaCO ₃ | Cadmium | <0.002 mg/l |
| Nitrogen, Ammonia | <0.50 mg/l | Calcium | 44.0 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrite | <0.05 mg/l | Copper | <0.03 mg/l |
| Phosphorus, Total | <0.05 mg/l | Diss. Iron | <0.05 mg/l |
| Solids, Total Dissolved | 444 mg/l | Lead | <0.05 mg/l |
| Sulfate | 75.0 mg/l | Magnesium | 29.2 mg/l |
| Sulfide | <0.10 mg/l | Manganese | 0.15 mg/l |
| Total Cations | 7.49 meq/l | Mercury | <0.50 ug/l |
| Total Anions | 7.46 meq/l | Nickel | <0.05 mg/l |
| | | Potassium | 5.5 mg/l |
| | | Selenium | <0.005 mg/l |
| | | Sodium | 63.2 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Hanney
Reviewed and approved: 10/05/87

Respectfully submitted,

Ray A. Sim, Director



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2969
DATE REC'D: 10/05/87
DATE SAMPLED: 9-30-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-2

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|---------------------------|------------|-----------------------|
| Alkalinity, Bicarbonate | 320 mg/HCO ₃ | Aluminum | <0.05 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Chloride | 11.4 mg/l | Barium | <0.10 mg/l |
| Fluoride | 0.40 mg/l | Boron | 0.21 mg/l |
| Hardness Total | 225 mg/lCaCO ₃ | Cadmium | <0.002 mg/l |
| Nitrogen, Ammonia | <0.50 mg/l | Calcium | 44.0 mg/l |
| Nitrogen, Nitrate | 0.32 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrite | <0.05 mg/l | Copper | <0.03 mg/l |
| Phosphorus, Total | <0.05 mg/l | Diss. Iron | <0.05 mg/l |
| Solids, Total Dissolved | 416 mg/l | Lead | <0.05 mg/l |
| Sulfate | 69.1 mg/l | Magnesium | 28.0 mg/l |
| Sulfide | <0.10 mg/l | Manganese | <0.01 mg/l |
| Total Cations | 7.07 meq/l | Mercury | <0.50 ug/l |
| Total Anions | 7.02 meq/l | Nickel | <0.05 mg/l |
| | | Potassium | 4.7 mg/l |
| | | Selenium | <0.005 mg/l |
| | | Sodium | 56.4 mg/l |
| | | Zinc | <0.01 mg/l |
| | | Molybdenum | <0.10 mg/l |

Supervisor: David D. [Signature]
Reviewed and approved: 10/23/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 4139

DATE REC'D: 01/05/88

DATE SAMPLED: 12/29/87

TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: TM-2

| <u>ANALYSIS</u> | <u>RESULT</u> <u>AS RECEIVED</u> | | <u>METALS:</u> | <u>RESULT</u> <u>AS RECEIVED</u> | |
|-------------------------|-------------------------------------|-----------------------|----------------|-------------------------------------|------|
| Alkalinity, Bicarbonate | 256 | mg/lHCO ₃ | Aluminum | <0.05 | mg/l |
| Alkalinity, Carbonate | 12 | mg/lCaCO ₃ | Arsenic | <0.002 | mg/l |
| Chloride | 12.1 | mg/l | Barium | <0.10 | mg/l |
| Fluoride | 0.34 | mg/l | Boron | 0.28 | mg/l |
| Hardness, Total | 190 | mg/lCaCO ₃ | Cadmium | <0.002 | mg/l |
| Nitrogen, Ammonia | <0.50 | mg/l | Calcium | 36.0 | mg/l |
| Nitrogen, Nitrate | 0.20 | mg/l | Chromium | <0.05 | mg/l |
| Nitrogen, Nitrite | <0.05 | mg/l | Copper | 0.07 | mg/l |
| Phosphorus, Total | <0.05 | mg/l | Iron Diss. | <0.05 | mg/l |
| Solids, Total Dissolved | 264 | mg/l | Lead | <0.05 | mg/l |
| Sulfate | 63.2 | mg/l | Magnesium | 24.3 | mg/l |
| Sulfide | <0.10 | mg/l | Manganese | 0.13 | mg/l |
| Total Anions | 6.06 | meq/l | Mercury | <0.50 | ug/l |
| Total Cations | 6.10 | meq/l | Nickel | <0.05 | mg/l |
| | | | Potassium | 6.1 | mg/l |
| | | | Selenium | <0.005 | mg/l |
| | | | Sodium | 49.5 | mg/l |
| | | | Zinc | 0.05 | mg/l |
| | | | Molybdenum | <0.10 | mg/l |

Supervisor *David Hanning*
Reviewed and approved: 01/18/88

Respectfully submitted,

William O. Moellmer, Ph.D.
Technical manager



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
 P.O. Box 370
 Orangeville, Utah 84537

LAB NO: 1995
 DATE REC'D: 6-09-87
 DATE SAMPLED: Unknown
 TIME SAMPLED: 6-3-87

ATTN: Mr. Allen Childs

SAMPLE ID: T-6

Nitrogen (NH₃) ? Nitrite
Molybdenum Sulfide
Harold's NOU

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|---------------------------|-----------|--------------------|
| Acidity | 0 mg/l | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 316 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 386 mg/lHCO ₃ | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Boron | <0.20 mg/l |
| Chloride | 52.3 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 960 umhos/cm | Calcium | 64.0 mg/l |
| Fluoride | 0.25 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.82 Units | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 55.9 mg/l |
| Solids, Total Dissolved | 516 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 140 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 1.0 NTU | Potassium | 1.0 mg/l |
| Total Cations | 10.52 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 10.72 meq/l | Sodium | 62.2 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: *D. J. [Signature]*
 Reviewed and approved: 06/18/87

Respectfully submitted,
[Signature]
 Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2293
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-6

Table with 4 columns: CHEMICAL, RESULT AS RECEIVED, METALS, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen (Nitrate), pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, Total Cations, Total Anions, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 08/07/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2679
DATE REC'D: 09/03/87
DATE SAMPLED: 8/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-6

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



**MOUNTAIN
STATES
ANALYTICAL**

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2959
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-6

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 327 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 399 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 56.1 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 910 umhos/cm | Calcium | 62.0 mg/l |
| Fluoride | 0.26 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.98 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 55.9 mg/l |
| Solids, Total Dissolved | 576 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 139 mg/l | Nickel | <0.05 mg/l |
| Turbidity | <1.0 mg/l | Potassium | 0.9 mg/l |
| Total Cations | 11.05 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 11.03 meq/l | Sodium | 76.6 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Danvers
Reviewed and approved: 10/22/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 3150
DATE REC'D: 10/22/87
DATE SAMPLED: 10/16/87
TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: T-6

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor [Signature]
Reviewed and approved: 11/10/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1993
DATE REC'D: 6-09-87
DATE SAMPLED: 6-03-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-10

Sample quantity not sufficient for "Total Chem"

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|----------------------------------|---------------------------|-----------|-----------------------|
| Acidity | 0 mg/l | Calcium | 54.0 mg/l |
| Alkalinity, Total | 262 mg/lCaCO ₃ | Magnesium | 47.4 mg/l |
| Alkalinity, Bicarbonate | 320 mg/lHCO ₃ | Potassium | 2.0 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Sodium | 37.8 mg/l |
| Chloride | 29.7 mg/l | | |
| Conductivity | 750 umhos/cm | | |
| Fluoride | 0.40 mg/l | | |
| pH | 7.33 Units | | |
| Solids, Total Dissolved Calc. | 428 mg/l | | |
| Sulfate | 100 mg/l | | |
| Turbidity | 6.0 NTU | | |
| Total Cations | 8.29 meq/l | | |
| Total Anions | 8.17 meq/l | | |

Supervisor: *Dail Perry*
Reviewed and approved: 06/18/87

Respectfully submitted,
Ray A. Sim
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
 P.O. Box 370
 Orangeville, Utah 84537

LAB NO: 2294
 DATE REC'D: 7-17-87
 DATE SAMPLED: 7-15-87
 TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-10

NH₃ Nitrite
7
Moody
submittal
7/15/87

| CHEMICAL: | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|--------------------|-----------|--------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 327 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 399 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 41.1 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 720 mg/l | Calcium | 54.0 mg/l |
| Fluoride | 0.28 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 8.04 Units | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 47.4 mg/l |
| Solids, Total Dissolved | 480 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | 10.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 24.4 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 7.8 NTU | Potassium | 1.3 mg/l |
| Total Cations | 8.24 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 8.22 meq/l | Sodium | 37.2 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: *Darrell Parry*
 Reviewed and approved: *08/05/87*

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2680
DATE REC'D: 09/03/87
DATE SAMPLED: 08/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-10

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2960
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-10

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 328 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 400 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 31.3 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 680 umhos/cm | Calcium | 54.0 mg/l |
| Fluoride | 0.26 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 8.18 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 47.4 mg/l |
| Solids, Total Dissolved | 404 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 30.0 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 2.5 mg/l | Potassium | 1.1 mg/l |
| Total Cations | 8.16 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 8.08 meq/l | Sodium | 35.3 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: Don P. Danvers
Reviewed and approved: 10/22/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 3151

DATE REC'D: 10/22/87

DATE SAMPLED: 10/16/87

TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: T-10

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor [Signature]
Reviewed and approved: 11/10/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1994
DATE REC'D: 6-09-87
DATE SAMPLED: 6-03-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14

Sample quantity not sufficient for "Total Chem"

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|---------------------------|-----------|-----------------------|
| Acidity | 0 mg/l | Calcium | 92.0 mg/l |
| Alkalinity, Total | 333 mg/lCaCO ₃ | Magnesium | 81.5 mg/l |
| Alkalinity, Bicarbonate | 406 mg/lHCO ₃ | Potassium | 3.6 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Sodium | 131.8 mg/l |
| Chloride | 44.7 mg/l | | |
| Conductivity | 1,520 umhos/cm | | |
| Fluoride | 0.41 mg/l | | |
| pH | 7.08 Units | | |
| Solids, Total Dissolved | 1,003 mg/l | | |
| Calc. | | | |
| Sulfate | 450 mg/l | | |
| Turbidity | 2.3 NTU | | |
| Total Cations | 17.12 meq/l | | |
| Total Anions | 17.30 meq/l | | |

Supervisor: *D. H. Perry*
Reviewed and approved: 06/18/87

Respectfully submitted,

Ray A. Sim
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2295
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14

NH3 Nitrite?
Molyb? Sulfate

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 08/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2682
DATE REC'D: 09/03/87
DATE SAMPLED: 08/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 407 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 497 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 58.2 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 1,820 umhos/cm | Calcium | 60.0 mg/l |
| Fluoride | 0.26 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 8.14 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 80.3 mg/l |
| Solids, Total Dissolved | 896 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 280.0 mg/l | Nickel | <0.05 mg/l |
| Turbidity | <1.0 mg/l | Potassium | 3.2 mg/l |
| Total Cations | 15.79 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 15.63 meq/l | Sodium | 140.5 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: Dan Danny
Reviewed and approved: 10/05/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2961
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 407 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 497 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 55.4 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 1,310 umhos/cm | Calcium | 68.0 mg/l |
| Fluoride | 0.29 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 8.12 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 86.3 mg/l |
| Solids, Total Dissolved | 920 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 320 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 1.8 mg/l | Potassium | 2.7 mg/l |
| Total Cations | 16.45 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 16.38 meq/l | Sodium | 135.4 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Danvers
Reviewed and approved: 10/22/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company
ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 3152
DATE REC'D: 10/22/87
DATE SAMPLED: 10/16/87
TIME SAMPLED:

SAMPLE ID: T-14

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor [Signature]
Reviewed and approved: 11/10/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1996
DATE REC'D: 6-09-87
DATE SAMPLED: 6-03-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14 A

Ammonia Nitrate
Mg & Sulfide

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor: [Signature]
Reviewed and approved: 06/18/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2296
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14 A

Table with 4 columns: CHEMICAL, RESULT AS RECEIVED, METALS, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen, Nitrate, pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 08/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2683
DATE REC'D: 09/03/87
DATE SAMPLED: 08/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14 A

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2962
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-14 A

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen, Nitrate, pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, Total Cations, Total Anions, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/22/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 3153
DATE REC'D: 10/22/87
DATE SAMPLED: 10/16/87
TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: T-14 A

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor [Signature]
Reviewed and approved: 11/10/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2297
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-15

Table with 4 columns: CHEMICAL, RESULT AS RECEIVED, METALS, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen (Nitrate), pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 08/07/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2684
DATE REC'D: 09/03/87
DATE SAMPLED: 08/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-15

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen, Nitrate, pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, Total Cations, Total Anions, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2963
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-15

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 335 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 409 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 56.3 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 710 umhos/cm | Calcium | 48.0 mg/l |
| Fluoride | 0.39 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 8.00 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 38.9 mg/l |
| Solids, Total Dissolved | 448 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | 12.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 58.7 mg/l | Nickel | <0.05 mg/l |
| Turbidity | <1.0 mg/l | Potassium | 1.0 mg/l |
| Total Cations | 9.54 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 9.52 meq/l | Sodium | 90.0 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Demery
Reviewed and approved: 10/22/87

Respectfully submitted,

Ray A. Sim, Director



**MOUNTAIN
STATES
ANALYTICAL**

ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 3154
DATE REC'D: 10/22/87
DATE SAMPLED: 10/16/87
TIME SAMPLED:

SAMPLE ID: T-15

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 333 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 406 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 59.0 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 810 umhos/cm | Calcium | 48.0 mg/l |
| Fluoride | 0.39 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.69 Units | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 36.5 mg/l |
| Solids, Total Dissolved | 516 mg/l | Manganese | 0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 58.6 mg/l | Nickel | <0.05 mg/l |
| Turbidity | <1.0 NTU | Potassium | 1.3 mg/l |
| | | Selenium | <0.005 mg/l |
| | | Sodium | 91.3 mg/l |
| Total Cations | 9.40 meq/l | Vanadium | <0.20 mg/l |
| Total Anions | 9.56 meq/l | Zinc | <0.01 mg/l |

Supervisor David Danney
Reviewed and approved: 11/10/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
 P.O. Box 370
 Orangeville, Utah 84537

LAB NO: 1997
 DATE REC'D: 6-09-87
 DATE SAMPLED: Unknown
 TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-21

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|---------------------------|-----------|-----------------------|
| Acidity | 0 mg/l | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 316 mg/lCaCO ₃ | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 385 mg/lHCO ₃ | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO ₃ | Boron | <0.20 mg/l |
| Chloride | 38.1 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 650 umhos/cm | Calcium | 56.0 mg/l |
| Fluoride | 0.25 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.57 Units | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 28.0 mg/l |
| Solids, Total Dissolved | 404 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 40 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 2.0 NTU | Potassium | 1.7 mg/l |
| Total Cations | 8.21 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 8.24 meq/l | Sodium | 70.5 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: *[Signature]*
 Reviewed and approved: 06/18/87

Respectfully submitted,
[Signature]
 Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2298
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-21

| CHEMICAL: | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 312 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 381 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | 0.42 mg/l |
| Chloride | 42.9 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 710 mg/l | Calcium | 58.0 mg/l |
| Fluoride | 0.27 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.48 Units | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 26.8 mg/l |
| Solids, Total Dissolved | 416 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 33.2 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 2.2 NTU | Potassium | 1.7 mg/l |
| Total Cations | 8.17 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 8.15 meq/l | Sodium | 69.9 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: Darci Darnay
Reviewed and approved, 08/05/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2686
DATE REC'D: 09/03/87
DATE SAMPLED: 08/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-21

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: David Ramsey
Reviewed and approved: 10/05/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2965
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-21

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen, Nitrate, pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, Total Cations, Total Anions, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/22/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 3155
DATE REC'D: 10/22/87
DATE SAMPLED: 10/16/87
TIME SAMPLED:

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

SAMPLE ID: T-21

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor [Signature]
Reviewed and approved: 11/10/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 1998
DATE REC'D: 6-09-87
DATE SAMPLED: Unknown
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-22

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor: [Signature]
Reviewed and approved: 106/18/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2299
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-22

Table with 4 columns: CHEMICAL, RESULT AS RECEIVED, METALS, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen, Nitrate, pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved 08/05/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2687
DATE REC'D: 09/03/87
DATE SAMPLED: 08/27/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-22

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity (Total, Bicarbonate, Carbonate), Chloride, Conductivity, Fluoride, Nitrogen, Nitrate, pH, Phosphorus (Ortho, Total), Solids (Total Dissolved, Total Suspended), Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,

[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2966
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-22

| ANALYSIS | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 312 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 381 mg/lHCO3 | Barium | 0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 11.1 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 550 umhos/cm | Calcium | 60.0 mg/l |
| Fluoride | 0.26 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.84 mg/l | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 40.1 mg/l |
| Solids, Total Dissolved | 344 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | 12.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 25.0 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 1.8 mg/l | Potassium | 0.9 mg/l |
| Total Cations | 7.08 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 7.09 meq/l | Sodium | 17.6 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Danvers
Reviewed and approved: 10/22/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Beaver Creek Coal Company

LAB NO: 3156

DATE REC'D: 10/22/87

ATTN: Mr. Allen Childs
P.O. Box 370
Orangeville, Utah 84537

DATE SAMPLED: 10/16/87

TIME SAMPLED:

SAMPLE ID: T-22

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor [Signature]
Reviewed and approved: 11/10/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2226
DATE REC'D: 7-07-87
DATE SAMPLED: 6-30-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: TM-23

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Alkalinity, Chloride, Hardness, Nitrogen, Phosphorus, Solids, Sulfate, Sulfide, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron (Diss), Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Zinc, Molybdenum.

Supervisor: [Signature]
Reviewed and approved; 07/15/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



MOUNTAIN
STATES
ANALYTICAL

ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2300
DATE REC'D: 7-17-87
DATE SAMPLED: 7-15-87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-23

| CHEMICAL: | RESULT AS RECEIVED | METALS: | RESULT AS RECEIVED |
|-------------------------|-----------------------|-----------|-----------------------|
| Acidity | 0 mg/lCaCO3 | Aluminum | <0.05 mg/l |
| Alkalinity, Total | 288 mg/lCaCO3 | Arsenic | <0.002 mg/l |
| Alkalinity, Bicarbonate | 351 mg/lHCO3 | Barium | <0.10 mg/l |
| Alkalinity, Carbonate | 0 mg/lCaCO3 | Boron | <0.20 mg/l |
| Chloride | 15.5 mg/l | Cadmium | <0.002 mg/l |
| Conductivity | 670 mg/l | Calcium | 68.0 mg/l |
| Fluoride | 0.16 mg/l | Chromium | <0.05 mg/l |
| Nitrogen, Nitrate | <0.05 mg/l | Copper | <0.03 mg/l |
| pH | 7.49 Units | Iron | <0.05 mg/l |
| Phosphorus, Ortho | <0.05 mg/l | Lead | <0.05 mg/l |
| Phosphorus, Total | <0.05 mg/l | Magnesium | 41.3 mg/l |
| Solids, Total Dissolved | 396 mg/l | Manganese | <0.01 mg/l |
| Solids, Total Suspended | <5.0 mg/l | Mercury | <0.50 ug/l |
| Sulfate | 60.2 mg/l | Nickel | <0.05 mg/l |
| Turbidity | 3.2 NTU | Potassium | 1.7 mg/l |
| Total Cations | 7.49 meq/l | Selenium | <0.005 mg/l |
| Total Anions | 7.46 meq/l | Sodium | 15.3 mg/l |
| | | Vanadium | <0.20 mg/l |
| | | Zinc | <0.01 mg/l |

Supervisor: David Danney
Reviewed and approved: 08/05/87

Respectfully submitted,

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2756
DATE REC'D: 09/09/87
DATE SAMPLED: 08/31/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-23

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, Aluminum, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc.

Supervisor: [Signature]
Reviewed and approved: 10/05/87

Respectfully submitted,

[Signature]

Ray A. Sim, Director



ANALYTICAL REPORT

CLIENT: Trail Mountain Coal Company
P.O. Box 370
Orangeville, Utah 84537

LAB NO: 2967
DATE REC'D: 10/05/87
DATE SAMPLED: 09/25/87
TIME SAMPLED:

ATTN: Mr. Allen Childs

SAMPLE ID: T-23

Table with 4 columns: ANALYSIS, RESULT AS RECEIVED, METALS:, RESULT AS RECEIVED. Rows include Acidity, Alkalinity, Chloride, Conductivity, Fluoride, Nitrogen, pH, Phosphorus, Solids, Sulfate, Turbidity, and various metals like Aluminum, Arsenic, Barium, etc.

Supervisor: [Signature]
Reviewed and approved: 10/22/87

Respectfully submitted,
[Signature]
Ray A. Sim, Director

HYDROLOGICAL MONITORING--1987 FIELD MEASUREMENTS

| LOCATION | PH | TEMP °C | COND UMHOS | FLOW (CFS) | DIS. OZ |
|----------|-----|---------|---------------|------------|---------|
| SW-2 | | | | | |
| 1/25/87 | 9.1 | 2.8 | 344 | 9 | 11.2 |
| 2/20/87 | 9 | 4.7 | 365 | 8.5 | 10.9 |
| 3/5/87 | 8.8 | 6.7 | 398 | 8.5 | 11.5 |
| 4/20/87 | 7.8 | 12.3 | 487 | 8 | 10.9 |
| 5/29/87 | 8 | 15.8 | 430 | 8 | 10.2 |
| 6/30/87 | 8 | 16 | 430 | 8 | 10 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| SW-3 | | | | | |
| 1/25/87 | 9.2 | 2 | 327 | 9 | 11.8 |
| 2/20/87 | 9 | 3.5 | 347 | 8.5 | 11.4 |
| 3/5/87 | 8.8 | 7.4 | 398 | 8.5 | 11 |
| 4/20/87 | 8.2 | 12.1 | 476 | 8 | 11.6 |
| 5/29/87 | 8.9 | 18.2 | 440 | 8 | 10.1 |
| 6/30/87 | 9 | 18.5 | 450 | 8 | 10.2 |

HYDROLOGICAL MONITORING- 1987 FIELD MEASUREMENTS

| LOCATION | PH | TEMP °C | COND UMHOS | FLOW/GPM |
|----------|------|---------|---------------|----------|
| T-18 | | | | |
| 4/20/87 | 7.9 | 11.6 | 513 | 3 |
| 5/29/87 | 9.15 | 11.1 | 500 | 3 |
| T-6 | | | | |
| 6/3/87 | 7 | 8.5 | 650 | 4 |
| T-10 | | | | |
| 6/3/87 | 8.9 | 7.8 | 407 | 1 |

HYDROLOGICAL MONITORING-1987 FIELD MEASUREMENTS

| LOCATION | | PH | TEMP °C | COND UMHOS | FLOW/GPM | |
|----------|--|---------|---------|---------------|----------|--|
| T-16 | | | | | | |
| 6/3/87 | | NO FLOW | | | | |
| | | | | | | |
| | | | | | | |
| T-21 | | | | | | |
| 6/3/87 | | 7.13 | 5.1 | 475 | 1.43 | |
| | | | | | | |
| | | | | | | |
| T-22 | | | | | | |
| 6/3/87 | | 7.2 | 10 | 506 | 1.22 | |
| | | | | | | |
| | | | | | | |
| T-23 | | | | | | |
| 6/3/87 | | 7.2 | 7.1 | 480 | 12.6 | |

1987

PRECIPITATION DATA

MONTHLY PRECIPITATION LOG 1987 (SECOND QUARTER)

| MONTHLY PRECIPITATION LOG | | |
|-----------------------------|--------|--------------|
| MONTH | AMOUNT | YEAR TO DATE |
| * APRIL | | * |
| MAY | 3.32 | 3.32 |
| JUNE | 0.62 | 3.94 |
| JULY | 1.37 | 5.31 |
| AUGUST | 1.34 | 6.65 |
| SEPT | .67 | 7.32 |
| OCT | 1.07 | 8.39 |
| NOV | 2.14 | 10.53 |
| DEC | 1.32 | 11.85 |
| * RAIN GAUGE OUT OF SERVICE | | |

TRAIL MOUNTAIN COAL CO.
EST. EMISSIONS

1986 STOCKPILE DATA

ANNUAL THROUGHPUT = 300,000 T/Y

CONVEYING .05 lbs/TON = 7.5 TONS

LOAD-OUT .05 lbs/TON = 7.5 TONS

WIND EROSION .018 lbs/TON = 2.7 TONS

MAINTENANCE .02 lbs/TON = 3.0 TONS

TOTAL EMISSION
TONS PER YEAR 20.7 T/YR

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS

1987

SUBSIDENCE MONITORING REPORT

Subsidence Monitoring

Note: Subsidence monitoring at the Trail Mountain No.9 Mine has been conducted using an aerial survey under a Cooperative Agreement with the U.S. Forest Service. Due to problems the U.S.F.S. is having with digitizing maps and correlating data, no information is yet available for the 1986 - 1987 flights.

An on-site inspection was made of the permit area above the mining. No surface cracks, fractures or other visible subsidence effects were noted during the inspection.

1987
VEGETATION DATA

Veg Rpt
Start

SOILS AND VEGETATION TEST PLOT
MONITORING AT THE
TRAIL MOUNTAIN COAL MINE:

AN UPDATE

by
Patrick D. Collins, Ph.D.

MT. NEBO SCIENTIFIC
RESEARCH & CONSULTING

P.O. Box 337
Springville, Utah
84663

Brent

November 1987

Rick

TABLE OF CONTENTS

| | Page |
|--|-------------|
| RESULTS AND SUMMARY OF VEGETATION TEST PLOT MONITORING | 1 |
| INTRODUCTION | 1 |
| METHODS | 1 |
| RESULTS | 2 |
| Vegetation Tables | 3-17 |
| REVIEW AND UPDATE OF THE SOIL SAMPLING PROGRAM | 18 |
| INTRODUCTION | 19 |
| HISTORY AND RESULTS OF SOIL SAMPLING | 19 |
| Phase I | 19 |
| Phase II | 19 |
| Phase III | 20 |
| Phase IV | 21 |
| DISCUSSION | 22 |
| ADDITIONAL RESPONSES TO DOGM COMMENTS | 23 |
| SOIL MONITORING OF THE VEGETATIONAL TEST PLOTS | 25 |
| INTRODUCTION | 26 |
| METHODS | 26 |
| RESULTS | 26 |
| Soil Tables | 27-34 |
| APPENDIX 9 | 35 |
| MAP | (Enclosure) |

RESULTS AND SUMMARY OF VEGETATION TEST PLOT MONITORING AT THE TRAIL MOUNTAIN COAL MINE

by

Patrick D. Collins
November 1987

INTRODUCTION

Vegetation test plots were implemented between October 20 and November 7, 1984. Test plots were designed to test establishment of plant cover on the existing soils (spoils) on the Trail Mountain mine site. Vegetation test plot methods and design were described in the Mining & Reclamation Plan (MRP), Appendix 9 (pages 18 through 38). Information on soils and spoils of the mine site and those that were used for the reclamation test plots can also be located in the MRP, Chapter VIII (pages 8-1 through 8-15) and Appendix 9 (pages 15 through 17 and pages 39 through 44). Within these pages are explanations and justifications for the design of the test plots. A brief history and summary of previous soil sampling including results of more recent soil testing will also be submitted and accompany this report.

METHODS

Vegetation monitoring was accomplished on a yearly basis beginning in the growing season of 1985. Sampling has been accomplished in the same month (July) each year in an attempt to decrease between-year variation as much as possible for future statistical comparisons. To date, sampling has been accomplished in July for three consecutive years (1985, 1986 & 1987). Data summaries of these years are included in this report.

Quantitative and qualitative data were taken on each of the two areas called Species Mixture I & Species Mixture II. Bi-directional random placement of sampling plots were designed to provide unbiased accuracy of the data compiled. A randomized block design was implemented to insure adequate representation of the entire plot by placing regularly located points along one side of the plot. From these points, random numbers were generated to penetrate the test plot and locate the sampling points. Cover estimates were made using ocular methods with meter square quadrats. Species cover, total cover, composition and relative frequency were also assessed from the quadrats. Also recorded on data sheets were estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes.

Density of woody plant species were not recorded because, although shrubs were planted, each year their establishment and cover has been relatively insignificant. However, frequency values of the woody plants are included.

Sampling adequacy for cover was achieved each year using formulas from Snedecor and Cochran (1980), insuring that 90% of the samples were within 10% of the true mean of the test plots. All sample means, standard deviations, and sample sizes were included in this report to enable the reviewers to apply further statistical tests if desired.

RESULTS

All results from the 3 test plot sampling years are listed on Tables 1 - 15, however, some of the summarized results are noted below.

Total Cover

Total living cover for the Species Mixture I plot for the three years sampled went from 32.60% (1985) down to 28.00% (1986) then up again to 69.75% (1987). Similarly, Species Mixture II plot followed the pattern: from 38.57%, to 30.50%, then to 60.90% in those years, respectively. The probable reason for the decrease in cover between 1985 and 1986 was that just prior to the date of sampling, the plot was severely disturbed by livestock (a fence to exclude livestock was not constructed at that time). The Emery County Cattlemen's Association moved a large number of cattle from the lower valleys, past the mine area, to higher elevations. The cattle were often left unattended to graze at their own pace until they reached the higher range. Cattle were moving past the mine in 1986 from June 21 through June 29. Even more extensive damage was done on the weekend between those dates because few workers were nearby to divert the cattle from the mine area. Consequently, almost the entire year's biomass production (to date) was lost.

The plots were given nearly a month to recover prior to sampling. It appeared at that time that, although the plots were severely damaged, if adequate natural precipitation occurred, chances for plot recovery were good. Photographs of the plot before and after the damage are available.

A fence was then constructed to exclude the cattle in the following years. As can be noted, a sharp increase of cover occurred in 1987. Adequate moisture patterns and the exclusion of the cattle the following year probably allowed most the plant species to recover fully.

One can use the tables to note changes and patterns in plant species cover and relative frequencies. Composition changes in lifeform can also be noted from year to year. Most changes have been expected, and will continue to change as plant species compete and finally become a stable community.

TABLE 1: 1985 monitoring results for the vegetation test plots of the Trail Mountain Coal Mine, Utah. The table shows a plant species list and the plot it was found in. (Plot was sampled July 11, 1985).

| SCIENTIFIC NAME | COMMON NAME | SPECIES MIX | |
|--|----------------------|-------------|----|
| <u>Amelanchier utahensis</u> | Utah serviceberry | I | |
| <u>Chrysothamnus nauseosus</u> | Rubber rabbitbrush | | II |
| <u>Purshia tridentata</u> | Bitterbrush | I | |
| <u>Achillea millefolium</u> | Yarrow | I | |
| <u>Atriplex powellii</u> | Powell's saltbrush | I | II |
| <u>Descurainia pinnata</u> | Tanay mustard | I | |
| <u>Hedysarum boreale</u> | Northern sweetvetch | | II |
| <u>Lupinus argenteus</u> | Silk lupine | I | |
| <u>Malcomia africana</u> | African mustard | I | |
| <u>Melilotus officinalis</u> | Yellow sweet clover | I | |
| <u>Salsola kali</u> | Russian thistle | I | |
| <u>Sanguisorba minor</u> | Small burnet | | II |
| <u>Agropyron cristatum</u> | Western wheatgrass | I | |
| <u>Agropyron spicatum</u> | Bluebunch wheatgrass | | II |
| <u>Agropyron intermedium</u> var. <u>trichophorum</u> | Pubescent wheatgrass | | II |
| <u>Bromus carinatus</u> | Mountain brome | I | |
| <u>Bromus commutatus</u> | Hairy brome | | II |
| <u>Bromus tectorum</u> | Cheatgrass | I | II |
| <u>Hordeum jubatum</u> | Foxtail barley | I | |

(Data Sheet 1 of 5)

TABLE 2: 1985 SAMPLING RESULTS - MIXTURE I
 Total cover and composition of the revegetation test plots of the Trail Mountain Coal Mine. The table shows means, standard deviations and sample sizes.

| COVER - SPECIES MIXTURE I | | | |
|---------------------------|--------------|--------------------|---------------|
| TOTAL COVER | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE * |
| Total Living Cover | 32.60 | 10.32 | 25 |
| Litter | -- | -- | 25 |
| Erosion Mat | 67.40 | 10.32 | 25 |
| Rock | -- | -- | 25 |

| COMPOSITION - SPECIES MIXTURE I | | | |
|---------------------------------|--------------|--------------------|---------------|
| TOTAL COVER | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE * |
| Shrubs | 1.62 | 2.70 | 25 |
| Forbs | 7.81 | 5.87 | 25 |
| Grasses | 90.71 | 7.07 | 25 |

*Sample size insures 90% accuracy within 10% of the true mean.

TABLE 3: 1985 SAMPLING RESULTS - SPECIES MIXTURE I
 Mean percent cover, standard deviation, sample size and relative frequency by species of the revegetation test plots of the Trail Mountain Coal Mine.

SPECIES MIXTURE I

| SPECIES | * MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE | RELATIVE FREQUENCY |
|------------------------------|--------------|--------------------|-------------|--------------------|
| <i>Aelanchier utahensis</i> | .32 | .56 | 25 | 28.00 |
| <i>Purshia tridentata</i> | .16 | .36 | 25 | 16.00 |
| <i>Achillea millefolium</i> | .24 | .52 | 25 | 20.00 |
| <i>Atriplex powellii</i> | .20 | .50 | 25 | 16.00 |
| <i>Descurainia pinnata</i> | .16 | .63 | 25 | 8.00 |
| <i>Lupinus argenteus</i> | .68 | .63 | 25 | 60.00 |
| <i>Malcomia africa</i> | T | T | 25 | 4.00 |
| <i>Melilotus officinalis</i> | .88 | .73 | 25 | 72.00 |
| <i>Agropyron cristatum</i> | .08 | .28 | 25 | 8.00 |
| <i>Bromus carinatus</i> | 29.80 | 10.77 | 25 | 100.00 |
| <i>Bromus tectorum</i> | T | T | 25 | 4.00 |
| <i>Hordeum jubatum</i> | T | T | 25 | 4.00 |

(Data Sheet 3 of 5)

TABLE 4: 1985 SAMPLING RESULTS - MIXTURE II

Total cover and composition of the revegetation test plots of the Trail Mountain Coal Mine. The table shows means, standard deviations and sample sizes.

| SPECIES MIXTURE II | | | |
|--------------------|--------------|--------------------|-------------|
| | * MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE |
| TOTAL COVER | | | |
| Total Living Cover | 38.57 | 10.62 | 25 |
| Litter | -- | -- | 25 |
| Erosion Mat | 61.19 | 10.36 | 25 |
| Rock | -- | -- | 25 |

| COMPOSITION - SPECIES MIXTURE II | | | |
|----------------------------------|-------|------|----|
| | | | |
| Shrubs | .19 | .87 | 25 |
| Forbs | 5.10 | 5.03 | 25 |
| Grasses | 94.71 | 5.06 | 25 |

*Sample size insures 90% accuracy within 10% of the true mean.

TABLE 5: 1985 SAMPLING RESULTS - SPECIES MIXTURE II

Mean percent cover, standard deviation, sample size and relative frequency by species of the revegetation test plots of the Trail Mountain Coal Mine.

SPECIES MIXTURE II

| SPECIES | X MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE | RELATIVE FREQUENCY |
|--|--------------|--------------------|-------------|--------------------|
| <i>Chrysothamnus nauseosus</i> | .05 | .22 | 21 | 4.00 |
| <i>Atriplex powellii</i> | .05 | .22 | 21 | 4.00 |
| <i>Hedysarum boreale</i> | 1.52 | 1.72 | 21 | 66.67 |
| <i>Sanquisorba minor</i> | .29 | .46 | 21 | 28.57 |
| <i>Agropyron spicatum</i> | .24 | .46 | 21 | 9.52 |
| <i>Agropyron intermedium</i> var. <i>trichophorum</i> | 31.67 | 9.96 | 21 | 100.00 |
| <i>Bromus commutatus</i> | .24 | 1.09 | 21 | 4.76 |
| <i>Bromus tectorum</i> | 5.00 | 3.46 | 21 | 95.24 |

(Data Sheet 5 of 5)

TABLE 6: 1986 monitoring results for the vegetation test plots of the Trail Mountain Coal Mine, Utah. The table shows a plant species list and the plot it was found in. (Plot was sampled July 28, 1986).

| SCIENTIFIC NAME | COMMON NAME | SPECIES MIX | |
|--|-------------------------|-------------|----|
| SHRUBS | | | |
| <u>Amalanchier utahensis</u> | Utah serviceberry | I | |
| <u>Atriplex confertifolia</u> | Shadscale | I | II |
| <u>Purshia tridentata</u> | Bitterbrush | I | |
| FORBS | | | |
| <u>Achillea millefolium</u> | Yarrow | I | |
| <u>Astragalus cicer</u> | Chickpea milkvetch | I | |
| <u>Atriplex powellii</u> | Powell's saltbrush | | II |
| <u>Iva axillaris</u> | Poverty sumpweed | I | II |
| <u>Lupinus argenteus</u> | Silk lupine | I | |
| <u>Malcoria africa</u> | African mustard | I | |
| <u>Melilotus officinalis</u> | Yellow sweet clover | I | II |
| <u>Penstemon palmeri</u> | Palmer penstemon | I | |
| <u>Sanguisorba minor</u> | Small burnet | | II |
| GRASSES | | | |
| <u>Agropyron trachycaulum</u> | Slender wheatgrass | I | |
| <u>Agropyron intermedium</u> var. <u>trichophorum</u> | Intermediate wheatgrass | | II |
| <u>Bromus carinatus</u> | Mountain brome | I | |
| <u>Bromus inermis</u> | Smooth brome | | II |
| <u>Oryzopsis hymenoides</u> | Indian ricegrass | I | |

(Data Sheet 1 of 5)

TABLE 7: 1986 SAMPLING RESULTS - SPECIES MIXTURE I

Total cover and composition of the revegetation test plots of the Trail Mountain Coal Mine. The table shows means, standard deviations and sample sizes.

COVER - SPECIES MIXTURE I

| | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE * |
|--------------------|--------------|--------------------|---------------|
| Total Living Cover | 28.00 | 5.32 | 25 |
| Litter | 9.56 | 7.61 | 25 |
| Erosion Mat | 41.80 | 18.53 | 25 |
| Rock | 8.84 | 7.16 | 25 |
| Bareground | 11.60 | 10.21 | 25 |

COMPOSITION - SPECIES MIXTURE I

| | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE * |
|---------|--------------|--------------------|---------------|
| Shrubs | 1.92 | 3.00 | 25 |
| Forbs | 22.76 | 20.88 | 25 |
| Grasses | 75.33 | 20.86 | 25 |

*Sample size insures 90% accuracy within 10% of the true mean.

(Data Sheet 2 of 5)

TABLE 8: 1986 SAMPLING RESULTS - SPECIES MIXTURE I

Mean percent cover, standard deviation, sample size and relative frequency by species of the revegetation test plots of the Trail Mountain Coal Mine.

SPECIES MIXTURE I

| SPECIES | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE | RELATIVE FREQUENCY |
|-------------------------------|--------------|--------------------|-------------|--------------------|
| <i>Amaelanchier utahensis</i> | .16 | .37 | 25 | 16.00 |
| <i>Atriplex confertifolia</i> | .12 | .44 | 25 | 8.00 |
| <i>Purshia tridentata</i> | .32 | .56 | 25 | 32.00 |
| <i>Achillea millefolium</i> | .52 | .51 | 25 | 36.00 |
| <i>Astragalus cicer</i> | .32 | .56 | 25 | 28.00 |
| <i>Iva axillaris</i> | .24 | 1.01 | 25 | 8.00 |
| <i>Lupinus argenteus</i> | .04 | .20 | 25 | 4.00 |
| <i>Malcomia africa</i> | .04 | .20 | 25 | 4.00 |
| <i>Melilotus officinalis</i> | 5.24 | 5.61 | 25 | 72.00 |
| <i>Penstemon palmeri</i> | .04 | .20 | 25 | 4.00 |
| <i>Agropyron trachycaulus</i> | 6.60 | 4.07 | 25 | 92.00 |
| <i>Bromus carinatus</i> | 13.92 | 6.82 | 25 | 100.00 |
| <i>Oryzopsis hymenoides</i> | .64 | 1.82 | 25 | 12.00 |

(Data Sheet 3 of 5)

TABLE 9: 1986 SAMPLING RESULTS - SPECIES MIXTURE II

Total cover and composition of the revegetation test plots of the Trail Mountain Coal Mine. The table shows means, standard deviations and sample sizes.

COVER SPECIES MIXTURE II

| | * MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE |
|--------------------|--------------|--------------------|-------------|
| Total Living Cover | 30.50 | 6.05 | 20 |
| Litter | 8.40 | 4.26 | 20 |
| Erosion Mat | 45.50 | 10.87 | 20 |
| Rock | 7.60 | 5.12 | 20 |
| Bareground | 7.00 | 4.32 | 20 |

COMPOSITION - SPECIES MIXTURE II

| | * MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE* |
|---------|--------------|--------------------|--------------|
| Shrubs | 0.74 | 2.62 | 20 |
| Forbs | 22.54 | 20.70 | 20 |
| Grasses | 76.72 | 20.80 | 20 |

*Sample size insures 90% accuracy within 10% of the true mean.

(Data Sheet 4 of 5)

TABLE 10: 1986 SAMPLING RESULTS - SPECIES MIXTURE II

Mean percent cover, standard deviation, sample size and relative frequency by species of the revegetation test plots of the Trail Mountain Coal Mine.

SPECIES MIXTURE II

| SPECIES | % MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE | RELATIVE FREQUENCY |
|-------------------------------|--------------|--------------------|-------------|--------------------|
| <i>Atriplex confertifolia</i> | .25 | .91 | 20 | 10.00 |
| <i>Atriplex powellii</i> | .05 | .22 | 20 | 5.00 |
| <i>Iva axillaris</i> | .05 | .22 | 20 | 5.00 |
| <i>Melilotus officinalis</i> | 5.30 | 5.08 | 20 | 65.00 |
| <i>Sanquisorba minor</i> | 1.20 | 1.74 | 20 | 35.00 |
| <i>Agropyron intermedium</i> | | | | |
| var. <i>trichophorum</i> | 23.20 | 8.87 | 20 | 100.00 |
| <i>Bromus inermis</i> | .50 | 1.54 | 20 | 10.00 |

(Data Sheet 5 of 5)

TABLE 11: 1987 monitoring results for the vegetation test plots of the Trail Mountain Coal Mine, Utah. The table shows a plant species list and the plot it was in. (Plot was sampled July 8, 1986).

| SCIENTIFIC NAME | COMMON NAME | SPECIES MIX | |
|-------------------------------|-------------------------|-------------|----|
| SHRUBS | | | |
| <u>Atriplex confertifolia</u> | Shadscale | I | |
| FORBS | | | |
| <u>Achillea millefolium</u> | Yarrow | I | |
| <u>Astragalus cicer</u> | Chickpea milkvetch | I | |
| <u>Meribium vulgare</u> | Common horehound | | II |
| <u>Melilotus officinalis</u> | Yellow sweet clover | I | |
| <u>Sanguisorba minor</u> | Small burnet | | II |
| GRASSES | | | |
| <u>Agropyron cristatum</u> | | | II |
| <u>Agropyron trachycaulum</u> | Slender wheatgrass | I | |
| <u>Agropyron intermedium</u> | | | II |
| var. <u>trichophorum</u> | Intermediate wheatgrass | | II |
| <u>Bromus carinatus</u> | Mountain brome | I | |
| <u>Bromus inermis</u> | Smooth brome | | II |
| <u>Bromus tectorum</u> | June grass | | II |
| <u>Dactylis glomerata</u> | Orchardgrass | | II |
| <u>Elymus cinereus</u> | Gt. Basin wildrye | I | |
| <u>Hordeum jubatum</u> | Foxtail | II | |
| <u>Oryzopsis hymenoides</u> | Indian ricegrass | I | |

(Data Sheet 1 of 5)

TABLE 12: 1987 SAMPLING RESULTS - SPECIES MIXTURE I

Total cover and composition of the revegetation test plots of the Trail Mountain Coal Mine. The table shows means, standard deviations and sample sizes.

COVER - SPECIES MIXTURE I

| | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE * |
|--------------------|-----------------|-----------------------|------------------|
| Total Living Cover | 69.75 | 10.06 | 20 |
| Erosion Mat | 12.55 | 8.82 | 20 |
| Bareground | 8.70 | 5.76 | 20 |
| Rock | 9.00 | 3.15 | 20 |

COMPOSITION - SPECIES MIXTURE I

| | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE * |
|---------|-----------------|-----------------------|------------------|
| Shrubs | 2.87 | 5.48 | 20 |
| Forbs | 4.98 | 8.15 | 20 |
| Grasses | 91.85 | 10.37 | 20 |

*Sample size insures 90% accuracy within 10% of the true mean.

(Data Sheet 2 of 5)

TABLE 13: 1987 SAMPLING RESULTS - SPECIES MIXTURE I

Mean percent cover, standard deviation, sample size and relative frequency by species of the revegetation test plots of the Trail Mountain Coal Mine.

SPECIES MIXTURE I

| SPECIES | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE | RELATIVE FREQUENCY |
|-------------------------------|--------------|--------------------|-------------|--------------------|
| <i>Atriplex confertifolia</i> | 2.05 | 4.07 | 20 | 15.00 |
| <i>Achillea millefolium</i> | 2.10 | 4.67 | 20 | 25.00 |
| <i>Astragalus cicer</i> | 0.45 | 1.36 | 20 | 8.00 |
| <i>Hedysarum boreale</i> | 0.65 | 1.60 | 20 | 15.00 |
| <i>Melilotus officinalis</i> | 0.05 | 0.22 | 20 | 5.00 |
| <i>Agropyron trachycaulum</i> | 19.50 | 9.73 | 20 | 95.00 |
| <i>Bromus carinatus</i> | 20.05 | 11.69 | 20 | 100.00 |
| <i>Elymus cinereus</i> | 18.05 | 16.35 | 20 | 65.00 |
| <i>Hordeum jubatum</i> | 4.75 | 4.41 | 20 | 65.00 |
| <i>Oryzopsis hymenoides</i> | 1.85 | 3.61 | 20 | 25.00 |

(Data Sheet 3 of 5)

TABLE 14: 1987 SAMPLING RESULTS - SPECIES MIXTURE II

Total cover and composition of the revegetation test plots of the Trail Mountain Coal Mine. The table shows means, standard deviations and sample sizes.

COVER SPECIES MIXTURE II

| | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE |
|--------------------|--------------|--------------------|-------------|
| Total Living Cover | 60.90 | 8.77 | 20 |
| Erosion Mat | 17.85 | 8.99 | 20 |
| Bareground | 9.50 | 4.62 | 20 |
| Rock | 11.50 | 5.09 | 20 |

COMPOSITION - SPECIES MIXTURE II

| | x MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE* |
|---------|--------------|--------------------|--------------|
| Shrubs | -- | -- | 20 |
| Forbs | 2.33 | 5.48 | 20 |
| Grasses | 97.43 | 5.58 | 20 |

*Sample size insures 90% accuracy within 10% of the true mean.

(Data Sheet 4 of 5)

TABLE 15: 1987 SAMPLING RESULTS - SPECIES MIXTURE II

Mean percent cover, standard deviation, sample size and relative frequency by species of the revegetation test plots of the Trail Mountain Coal Mine.

SPECIES MIXTURE II

| SPECIES | % MEAN COVER | STANDARD DEVIATION | SAMPLE SIZE | RELATIVE FREQUENCY |
|-----------------------|-----------------|-----------------------|----------------|-----------------------|
| Maribium vulgare | 1.00 | 4.36 | 20 | 5.00 |
| Sanquisorba minor | 1.31 | 3.10 | 20 | 15.00 |
| Agropyron cristatum | 0.26 | 1.09 | 20 | 5.00 |
| Agropyron intermedium | 44.31 | 19.05 | 20 | 100.00 |
| var. trichophorum | 9.19 | 10.87 | 20 | 50.00 |
| Bromus inermis | 0.05 | 0.22 | 20 | 5.00 |
| Bromus tectorum | 0.53 | 2.18 | 20 | 5.00 |
| Dactylis glomerata | 56.65 | | | |

(Data Sheet 5 of 5)

End Veg. Rpt

REVIEW AND UPDATE OF THE SOIL SAMPLING PROGRAM

REVIEW AND UPDATE OF THE SOIL SAMPLING PROGRAM AT THE TRAIL MOUNTAIN COAL MINE

by

Patrick D. Collins
November 1987

INTRODUCTION

The purpose of this report is to first, review the soil sampling program at the Trail Mountain Coal Mine in Emery County, Utah. Extensive soil sampling has been implemented in the past as baseline information and for future reclamation planning of the coal mine. It was discovered by D. Duce [Division of Oil, Gas & Mining (DOG M)] and P. Collins (Mt. Nebo Scientific), that pertinent information about the soils that were previously submitted by the Trail Mountain Coal Mine, has been misplaced from the files of DOGM. This report will attempt to include copies of this information when it is pertinent for review of the soil sampling program and reclamation research at the mine. As part of this report, a review of the reasoning for the monitoring program and reclamation test plots will also be included.

Another objective of this report is to update the reviewer on data that has been recorded from the soils and vegetation since the Mining and Reclamation Plan (MRP) submittal. Additional soil/spoil analyses and vegetation sampling of the test plots has been accomplished at the mine site on a regular basis as a monitoring program.

HISTORY AND RESULTS OF SOIL SAMPLING

To date, a total of 92 soil/spoil samples have been analyzed for chemical and physical characteristics on the relatively small disturbance area (approximately 8.8 acres) of the Trail Mountain Coal Mine.

Phase I

In 1981, two soil pits were dug and 13 samples taken at regular intervals in native plant communities on the mine permit area to a depth of 5 ft. or bedrock (whichever came first). These samples were taken as one method to describe and classify the soils of the area (study done by VAUGHN HANSEN ASSOCIATES). Results from the study are described in Chapter VIII of MRP. EC values of these soils were also used in some of the statistical analyses described in the MRP and later in this report. The location of these soil pits are shown as numbers 36 and 37 of the enclosed map.

Phase II

Soil/spoil sampling was continued in 1983 by MT. NEBO SCIENTIFIC. At this time four more soil pits were dug and sampled at regular intervals to depths of 12 - 15 ft. on the disturbed areas of the Trail Mountain Coal Mine. Additional composite sampling was accomplished on native soils and disturbed spoils outside the soil pits. A total of 25 samples were taken and analyzed during Phase II. These samples were shown as numbers 1 - 25 on

the map in Appendix 9 of the MRP (copy of this map is included in this report). These numbers also correspond to the numbers on Table 6 of Appendix 9 (copy also included) which are the lab results from the soils/spoils.

Results from the soil analyses indicated that there were some high SAR and EC values in an area adjacent to a sedimentation pond and where winter road salt was stored. These two factors (road salt and sedimentation) probably contributed to the high sodium in this area (Appendix 9, p. 17-A, MRP). It was stated at that time that the soils/spoils of that area would "not be used as the topsoil substitute, but will be used as fill and buried to a depth of 4 feet".

Lab analysis results also indicated that there were EC values that were higher than 8 mmho/cm (Appendix 9, p. 17-A, MRP). The mean EC value for the remainder of the spoil material (all spoils outside the road salt and sedimentation pond area in Phase II) was only 8.3 mmhos/cm. EC values greater than 8 was the general criterion used by the regulatory authority to classify the soils as "poor". It is presently our opinion (and was at that time) that: "there are several plant species that can tolerate these EC values, some of which were on the original tables of plant species for revegetation" (Appendix 9, p. 17-A, MRP). We also stated at that time that it was "our opinion that when these spoils are replaced to the proposed reclaimed slope, soil compaction will be greatly relieved in the mechanical process. Furthermore, water infiltration and soluble salt leaching will then occur" (Appendix 9, p. 17-B, MRP). This should reduce EC values significantly.

We then committed to yet another phase of the soil sampling program to further document EC, SAR, pH and texture of the mine disturbance areas for reclamation planning (Appendix 9, p. 17-B, MRP).

Phase III

An additional soil sampling plan was designed by MT. NEBO SCIENTIFIC (P. Collins) and DOGM (E. Hooper, T. Portle). Four additional soil pits were sampled in 1984 at regular intervals to a depth of 10 ft. Additional surface and subsurface samples were also collected at that time to determine the extent of the salinity at the mine area (Appendix 9, p. 17-D, MRP). Thirty-eight (38) native and disturbed soils were sampled and analyzed for chemical and physical characteristics in Phase III. Locations on the map and the results on Table 6 were numbered 26 - 34 (some locations had multiple samples varying in depth, see Table 6). A key to classify which soil samples were native soils and which were disturbed (spoils) was included in the MRP, pages 17-F, 17-G and 17-H. The sample numbers that were included also correspond to Table 6 of the MRP.

When results from the soils analyses were compiled, all existing EC data were summarized. The native soil values were compared statistically with the mine spoils. Although the mean EC value of the native soils was 7.60 mmhos/cm and the mean value of the mine spoils was 10.18 mmhos/cm, the difference was not statistically significant (Appendix 9, p. 17-E, MRP). A few very high EC values of the spoils increased the mean substantially. Since there were only a few with the high values, the deviation

allowed for no significant difference between groups. This analysis was run on all available soil data at that time. If the high EC values of the salt storage and sedimentation pond areas were deleted from the analyses, mean EC values would have been even less significant. (Theoretically, we may have been justified to delete these values because we committed to burying these spoils to a depth of 4 ft. at the time of final reclamation, Appendix 9, p. 17-B, 17-C, MRP). Raw data from the statistical analyses were given in Appendix 9, pp. 17-F, 17-G, and 17-H.

Further considerations of the results for the soil sampling of Phase III also suggest that the salinity will not be a problem for future revegetation of the Trail Mountain Coal Mine. Listed below are summaries of EC values from the soils analyzed in 1983 and 1984. Phase III summary is based on disturbed soils (spoils) only, and therefore excludes the native or undisturbed soils sampled at the same time.

MINE AREA EC VALUES (mmhos/cm)

| | Phase II (1983) | Phase III (1984) |
|--------------------------------------|--------------------|---------------------|
| Combined Soils (top and subsoils) | | |
| Mean EC | 10.80 | 8.95 |
| St.Dev. | 8.84 | 2.65 |
| N | 25.00 | 22.00 |

As can be noted from that data above, additional sampling indicated lower mean EC values. The Phase II mean EC value was 10.80, whereas, Phase III mean value was 8.95, which falls within the Office of Surface Mining (OSM) guidelines of "eight, plus or minus one mmho/cm".

Phase IV

Six (6) topsoil and 10 subsoil samples were analyzed for comparisons in 1987 on the vegetation test plots. The soils used in the vegetation test plots were compared from the 1983 and 1987 data. When data of the test plots from the two years of combined soils, topsoil, and subsoil are compared, all EC values of 1987 were significantly less than 1983. The data are summarized below.

TEST PLOT SOILS EC VALUES

| | 1983 | 1987 |
|--------------------------------------|------|------|
| Combined Soils (top and subsoils) | | |
| Mean EC | 6.41 | 2.36 |
| St.Dev. | 1.29 | 1.05 |
| N | 6 | 16 |
| Topsoil | | |
| Mean EC | 6.70 | 1.25 |
| St.Dev. | 2.12 | 0.14 |
| N | 2 | 6 |

Combined Subsoil
(all depths)

| | | |
|---------|------|------|
| Mean EC | 6.19 | 3.67 |
| St.Dev. | 1.13 | 1.93 |
| N | 4 | 4 |

Subsoil (18"-20")

| | | |
|---------|------|------|
| Mean EC | 4.95 | 2.61 |
| St.Dev. | -- | 1.14 |
| N | 1 | 6 |

DISCUSSION

The data of Phase IV suggests that one of our original hypothesis may be valid: that when compaction of the spoils is relieved and water infiltration is enhanced, the soluble salts will leach to depths where they will not significantly influence successful revegetation. However, even if this hypothesis was incorrect, the plant species chosen for revegetation should establish successfully. To date, revegetation of the test plots has been very encouraging. For more information, about specific plot data, refer to Tables 1 - 15.

Vegetation Test Plots

Vegetation test plots were designed and implemented following Phase II and Phase III of the soil sampling program. The test plots at the Trail Mountain Mine were designed to address one main hypothesis: that existing soils/spoils of the mine area will provide a suitable medium for plant establishment at final reclamation. Final test plot designs including soils, plot sizes, plant species selection, methods, site preparations, seeding methods, sampling methods, plot monitoring and so forth were described in Appendix 9, p. 18-27, MRP. Results of the yearly monitoring program are included in this report on the aforementioned tables.

Test plot design and justifications were cited throughout the MRP based on experience in the area and results of the soil/spoil sampling and analyses. Several points and justifications should be reemphasized at this time concerning these vegetation test plots.

1) There was much concern about the EC values of the soils/spoils at the mine area from the OSM. As noted above under Phase III, however, there was no difference statistically between EC values of native soils when compared to the disturbed spoils of the mine area. Therefore, salinity should not be required as a major variable for testing at the mine site.

2) Furthermore, because there was concern about the salinity of the spoils by OSM, and because all native undisturbed soils in the area are somewhat saline, we designed the test plots and reclamation techniques of the mine area with methods that should alleviate most soluble salt problems (i.e. testing the spoils material, using adapted and salt tolerant plant species, relieving compaction to increase water infiltration and salt leaching).

3) As noted above, 1987 soil samples of the vegetation test plots indicated a significant decrease in salinity when compared to the values of 1983.

These preliminary results suggests that the original theoretical methods to decrease salinity may be valid for final reclamation.

4) It was also stated that if the test plots fail to show adequate success, the saline areas will be covered to a depth of at least 4 ft. by nonsaline spoil, followed by additional soil analyzed for verification (Appendix 9, p. 17-B, 17-C, MRP).

5) It was stated in Appendix 9, p. 17-B, MRP, that "if analyses (additional Phase III soil sampling) show that the salinity is not widespread, test plots and reclamation procedures will be completed as previously planned. If, however, soil analyses indicate salinity is more widespread, these soils will be used on the vegetation test plots". (Note: our additional soil/spoil samples indicated no significant difference in soil salinity when compared to native soils). After the soil sampling and analyses were completed from Phase III and statistical testing was performed, we stated "since the soil data suggests that mining activity has not significantly increased salinity, the reclamation plan and revegetation test plots will be implemented as previously outlined" (Appendix 9, p. 17-E, MRP). Furthermore, as stated above under Phase III above, the mean EC value was less, when more spoil samples were analyzed.

ADDITIONAL RESPONSES TO DOGM COMMENTS

UMC 817.21-.26 (DD)

It was stated recently by DOGM that "in order to fully address the implications of the sampling program, soil analysis of the test plot area must be undertaken as well. This will allow correlation of test plot revegetation success with soil chemical and physical characteristics, and validate test plot results with the reasoning behind OSM Condition #1. Please submit a sampling program and data collected to date on test plot, including a summary of any conclusions of findings".

The sampling program, theory, philosophy, results and reasoning behind the design of the vegetation test plots were described in detail above and in the MRP submitted to the regulatory agencies. Subsequent to the implementation of the test plots, OSM sent some Special Conditions. Special Condition No. 1C stated that in the proposed test plots, "the surface six inches shall have a uniform EC value of eight, plus or minus one mmho/cm, and the underlying 18 inches shall have a uniform EC value of 16, plus or minus two mmhos/cm". After reviewing the considerable amount of soil data, we found this design would not appropriately represent the conditions at the Trail Mountain Coal Mine. Firstly, when data from Phase I, II & III are examined, 87% of the spoils and 93% of the native soils analyzed had EC values less than 16 (plus or minus 2). Furthermore, if the sedimentation pond and road salt storage spoils are deleted (we have committed to burying these spoils), 94% of the soils have values less than 16 (plus or minus 2). Aside from these values not representing the soil conditions at the mine site, it would make it extremely impractical to locate and place spoils with these values in a test plot situation. It is our opinion that the methods implemented in the vegetation test plots at the Trail Mountain Mine is focused to address the most important and relevant question for successful future reclamation: Are the soils/spoils at the mine site adequate for

successful reclamation?

UNC 817.116 Revegetation: Standards for Success (K:TM)

This sections states that "page 3-40 and Appendix 9, page 23, indicate that revegetation areas will be monitored annually by quantitatively sampling cover, density and production. There is no indication of where this data will be reported. This schedule includes more intensive sampling that seem necessary and, in terms of productivity, may be hazardous to the health of the revegetation".

The division (DOGM) then recommends the following schedule that is acceptable to the Trail Mountain Mine. The revised schedule for monitoring final revegetation will be a qualitative evaluation each year and quantitative sampling in years 2, 3, 5, 9 and 10 of the liability period which begins when revegetation, including maintenance activities, are completed. The monitoring data will be submitted in the form of an annual report to DOGM by April 1 the following year.

SOIL MONITORING OF THE VEGETATIONAL TEST PLOTS

1987

SOIL MONITORING OF THE VEGETATIONAL TEST PLOTS AT THE TRAIL MOUNTAIN COAL MINE - 1987

INTRODUCTION

In 1983, samples were analyzed, taken the spoils to be used for the vegetation test plots at the Trail Mountain Coal Mine. These samples were taken prior to implementation of the test plots to enable researchers to monitor soil chemistry subsequent to their relocation. It is our contention that once spoils are placed on the reclaimed slopes, soil compaction will be relieved, enhancing both precipitation infiltration and leaching of soluble salts to levels that will not affect vegetation establishment.

Sampling of the same spoils, once they have been placed on a slope for the vegetation test plots, enables researchers to monitor EC values as well as other chemical and physical characteristics of the spoils through time.

Results for the 1983 soil analyses were listed on Table 6, Appendix 9, of the MRP. Soil sample locations were also shown on the map in Appendix 9. Sample numbers for the spoils that correspond to the lab results and the map are: 1 - 5, and 23. Copies of Appendix 9 of the MRP that were submitted previously to DOGM, including tables and map, are included in this report to facilitate references.

METHODS

Soil samples were taken on the vegetation test plot in August and September of 1987. A total of 16 topsoil and subsoil samples were taken and analyzed for physical and chemical characteristics at the soils laboratory at Brigham Young University.

Topsoils of the test plots were analyzed for the following characteristics: 1) nitrogen, 2) phosphorus, 3) potassium, 4) organic matter, 5) sodium absorption ratio (Ca, Mg, Na), 6) pH, 7) EC, 8) cation exchange capacity, 9) texture (% sand, silt, clay), 10) % moisture, and 11) carbonates. Subsoil analyses were limited to 1) pH, 2) texture (% sand, silt, clay), 3) EC, and 4) sodium absorption ratio.

The samples were taken (at a depth of 6 inches) by stratified random methods, insuring adequate representation of the entire test plots. The six topsoil samples were composite samples (each samples was taken by mixing soils from three locations). Six subsoil samples were taken at depth of 18 inches. Because it was necessary for the mine to disturb a small portion of the test plot by drilling, we were also able to take subsoil samples at regular intervals to a depth of 8 ft.

RESULTS

Results of all soil analyses for 1987 are given on the following pages. Because the previous soil sampling results are also included in this report, cross-referencing can easily be done.

Brigham Young University
 Department of Agronomy & Horticulture
 Soil Analysis Data

Submitted By :: Mt. Webo Scientific - Patrick Collins
 Address : 1230 N. 270 E.
 CSZ : Springville, Utah 84663

Date : 10-16-1987
 Sample Description : soil

| Customer Sample ID | PH | %Sand | %Clay | %Silt | Ec x 10 ³ |
|--------------------|------|-------|-------|-------|----------------------|
| 1 Pit MI #7,2' | 7.90 | 34.72 | 26.56 | 36.72 | 2.75 |
| 2 Pit, MI #8,4' | 8.30 | 34.00 | 29.28 | 36.72 | 2.90 |
| 3 Pit, MI #9,6' | 8.40 | 38.00 | 25.28 | 36.72 | 2.48 |
| 4 Pit, MI #10,8' | 8.10 | 22.72 | 34.56 | 42.72 | 6.55 |

NOTES

Pit = Soil pit sample
 MI = Mixture I
 MII = Mixture II
 #7 = Field sample number
 2' = Sample depth (2 ft.)
 Top = Topsoil sample (6 in. depth)
 67 = 1967
 Sub = Subsoil sample (18 in. depth)

Brigham Young University
 Department of Agronomy & Horticulture
 Soil Analysis Data

Submitted By :: Mt. Nebo Scientific - Patrick Collins
 Address :1230 N. 270 E.
 CSZ :Springville,Utah 84663

Date :10-16-1987
 Sample Description :soil

| Customer Sample ID | PPM Ca | PPM Mg | PPM Na | SAR |
|--------------------|--------|--------|--------|------|
| 1 Pit M1 #7,2' | 140.48 | 255.44 | 232.00 | 2.69 |
| 2 Pit, M1 #8,4' | 91.84 | 133.12 | 400.00 | 6.21 |
| 3 Pit, M1 #9,6' | 112.00 | 204.80 | 176.00 | 2.27 |
| 4 Pit, M1 #10,8' | 448.80 | 614.40 | 528.00 | 3.78 |

Brigham Young University
 Department of Agronomy & Horticulture
 Soil Analysis Data

Submitted By :Mt. Nebo Scientific - Patrick Collins
 Address :1230 N. 270 E.
 CS? :Springville, Utah 84663

Date :09-15-1987
 Sample Description :soil

| Customer Sample ID | PPM P | PPM NO3-N | PPM K-AV | ZOM | PPM Ca |
|--------------------|--------|-----------|----------|------|--------|
| Top MI #1 B7 | 47.20 | 1.99 | 160.00 | 4.45 | 147.20 |
| Top MI #2 B7 | 18.68 | 2.83 | 147.20 | 3.45 | 116.16 |
| Top MI #3 B7 | 14.63 | 1.23 | 144.00 | 2.99 | 102.72 |
| Top MI1 #1 B7 | 141.7E | 0.69 | 131.20 | 2.83 | 124.32 |
| Top MI1 #2 B7 | 17.47 | 1.44 | 112.00 | 3.96 | 94.56 |
| Top MI1 #3 B7 | 308.07 | 2.27 | 195.20 | 3.88 | 148.08 |

Brigham Young University
 Department of Agronomy & Horticulture
 Soil Analysis Data

Submitted By :Mt. Nebo Scientific - Patrick Collins
 Address :1230 N. 270 E.
 CSZ :Springville, Utah 84663

Date :09-15-1987
 Sample Description :soil

| Customer Sample ID | PPK Mg | PPK Na | PH | Ec x 10 ³ | CEC meq/100g |
|--------------------|--------|--------|-----|----------------------|--------------|
| Top M1 #1 B7 | 115.20 | 42.40 | 7.7 | 1.26 | 14.27 |
| Top M1 #2 B7 | 84.4E | 35.04 | 7.8 | 1.14 | 13.92 |
| Top M1 #3 B7 | 97.28 | 71.04 | 7.7 | 1.34 | 13.44 |
| Top M11 #1 B7 | 116.08 | 44.48 | 7.8 | 1.32 | 13.75 |
| Top M11 #2 B7 | 69.12 | 52.16 | 7.9 | 1.03 | 13.70 |
| Top M11 #3 B7 | 112.64 | 41.12 | 7.6 | 1.40 | 14.75 |

Brigham Young University
 Department of Agronomy & Horticulture
 Soil Analysis Data

Submitted By :Mt. Nebo Scientific - Patrick Collins
 Address :1230 N. 270 E.
 CS2 :Springville, Utah 84663

Date :09-15-1987
 Sample Description :soil

| Customer Sample ID | SAR | %Sand | %Silt | %Clay | TK |
|--------------------|------|-------|-------|-------|------|
| Top M1 #1 B7 | 0.63 | 37.28 | 37.44 | 25.28 | 0.11 |
| Top M1 #2 B7 | 0.60 | 38.00 | 34.72 | 27.28 | 0.11 |
| Top M1 #3 B7 | 1.19 | 39.28 | 35.44 | 25.28 | 0.11 |
| Top M11 #1 B7 | 0.70 | 38.56 | 35.44 | 26.00 | 0.07 |
| Top M11 #2 B7 | 0.99 | 43.28 | 31.44 | 25.28 | 0.11 |
| Top M11 #3 B7 | 0.62 | 36.56 | 35.44 | 28.00 | 0.10 |

Brigham Young University
Department of Agronomy & Horticulture
Soil Analysis Data

Submitted By :Mt. Nebo Scientific - Patrick Collins
Address :1230 N. 270 E.
CSZ :Springville, Utah 84663

Date :09-15-1987
Sample Description :soil

| Customer Sample ID | %Moisture | %CaCO3 | Texture |
|--------------------|-----------|--------|-----------|
| Top M1 #1 B7 | 33.91 | 52.39 | Loam |
| Top M1 #2 B7 | 31.64 | 52.67 | Clay Loam |
| Top M1 #3 B7 | 32.46 | 54.28 | Loam |
| Top M11 #1 B7 | 32.20 | 51.87 | Loam |
| Top M11 #2 B7 | 32.35 | 49.92 | Loam |
| Top M11 #3 B7 | 35.29 | 54.62 | Loam |

Brigham Young University
Department of Agronomy & Horticulture
Soil Analysis Data

Submitted By :Mt. Nebo Scientific - Patrick Collins
Address :1230 N. 270 E.
CS1 :Springville, Utah 84663

Date :09-15-1987

Sample Description :Soil

| Customer Sample ID | PH | Ec x 10 ³ | PPM Ca | PPM Mg | PPM Na |
|--------------------|-----|----------------------|--------|--------|--------|
| Sub M1 #4 B7 | 7.9 | 3.02 | 146.24 | 238.08 | 256.88 |
| Sub M1 #5 B7 | 7.4 | 2.45 | 173.76 | 207.36 | 143.36 |
| Sub M1 #6 B7 | 8.3 | 1.49 | 111.84 | 79.36 | 145.92 |
| Sub M11 #4 B7 | 7.7 | 3.52 | 113.76 | 225.28 | 362.08 |
| Sub M11 #5 B7 | 7.8 | 1.13 | 71.04 | 71.68 | 89.76 |
| Sub M11 #6 B7 | 7.6 | 4.05 | 150.08 | 302.08 | 427.52 |

Brigham Young University
 Department of Agronomy & Horticulture
 Soil Analysis Data

Submitted By :Mt. Nebo Scientific - Patrick Collins
 Address :1230 N. 270 E.
 CSZ :Springville, Utah 84663

Date :09-15-1987
 Sample Description :Soil

| Customer Sample ID | SAR | %Sand | %Silt | %Clay | Texture |
|--------------------|------|-------|-------|-------|-----------|
| Sub M1 #4 B7 | 2.96 | 32.56 | 40.16 | 27.28 | Clay Loam |
| Sub M1 #5 B7 | 1.73 | 34.56 | 39.44 | 26.00 | Loam |
| Sub M1 #6 B7 | 2.57 | 48.56 | 31.44 | 20.00 | Loam |
| Sub M11 #4 B7 | 4.55 | 32.56 | 39.44 | 28.00 | Clay Loam |
| Sub M11 #5 B7 | 1.79 | 38.56 | 35.44 | 26.00 | Loam |
| Sub M11 #6 B7 | 4.60 | 36.00 | 36.72 | 27.28 | Clay Loam |

1987

PERMIT/ STIPULATION STATUS



355 W. North Temple • 3 Triod Center • Suite 350 • Salt Lake City, UT 84160-1203 • 801-538-5340

RECEIVED

NOV 30 1987

ATTORNEY GENERALS OFFICE

November 23, 1987

Mr. Richard Pick, President
Beaver Creek Coal Company
P. O. Box 1378
Price, Utah 84501

Dear Mr. Pick:

Re: Approval for Permit Transfer, Trail Mountain Mine, ACT/015/009,
Folder #2 and #4, Emery County, Utah

The Division has found that Beaver Creek Coal Company has met all requirements for a permit transfer as required under UMC 788.18. Therefore, in accordance with the attached Findings, the request for transfer of the permit for the Trail Mountain Mine (to be known as Trail Mountain No. 9 Mine) is hereby approved.

As you are aware, Beaver Creek Coal Company is responsible for all prior commitments relating to this operation as made by previous owners. Please contact me or Lowell Braxton if we can be of further assistance.

Best regards,

Dianne R. Nielson
Director

JJW/djh
Attachments
cc: P. Rutledge, DSM
R. Hagen, OSMRE
D. Guy, BCCC
L. Braxton
J. Whitehead

0800R/41

FINDINGS

Trail Mountain #9 Mine
Beaver Creek Coal Company
ACT/015/009
Emery County, Utah

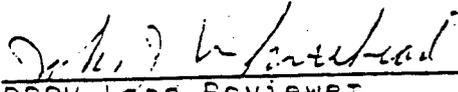
November 13, 1987

The applicant for transfer of permit rights, Beaver Creek Coal Company, has committed to continue to conduct the operations involved in full compliance with the terms and conditions of the original permit issued to Trail Mountain Coal Company (UMC 788.18[c][3]). Therefore, findings 2 through 6, and 10 through 16 of the original Decision Document (attached) are still pertinent.

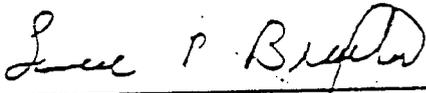
The following findings specifically apply to the application for transfer of permit rights.

1. The State of Utah has determined that the application for transfer of permit rights is accurate and complete, and complies with the requirements of UMC 788.18[a] and [b].
2. The applicant has obtained a performance bond equivalent to the bonding requirements of the original permit, in the amount of \$463,711.00 (UMC 788.18[c][2]).
3. The applicant has the legal right to enter and begin underground coal mining activities pursuant to the Sale Agreement between Arch Minerals Corporation and Atlantic Richfield Corporation.
4. The Division has assessed the applicant's compliance with Section 510[c] of the Surface Mining Control and Reclamation Act. It has been found that all AML fees have been paid and all outstanding Cessation Orders, civil penalties and violations have been resolved (Memo from Joe Helfrich, November 4, 1987).

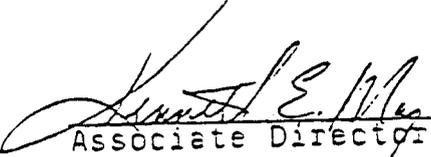
5. Procedures for public participation have complied with requirements of the Act and the Utah State Program. Notice was published as required by UMC 788.18[b][1].



DOGM Lead Reviewer



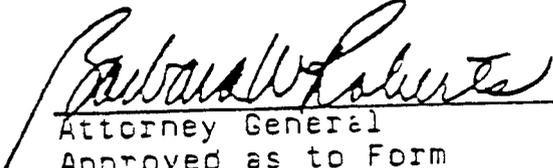
Administrator, Mineral Resource
Development and Reclamation Program



Associate Director, Mining



Director



Attorney General
Approved as to Form

0800R/42-43

FINDINGS DOCUMENT

Trail Mountain Coal Company
Tract 2 Lease
Trail Mountain Mine
ACT/015/009-1, Emery County, Utah

April 3, 1987 :

1. The plan and the permit application are accurate and complete and all requirements of the Surface Mining Control and Reclamation Act (the "Act"), and the approved Utah State Program have been complied with (UMC 786.19(a)).
2. The applicant proposes acceptable practices for the reclamation of disturbed lands. These practices have been shown to be effective in the short-term; there are no long-term reclamation records utilizing native species in the western United States. Nevertheless, the regulatory authority has determined that reclamation, as required by the Act, can be feasibly accomplished under the Mining and Reclamation Plan (MRP) (UMC 786.19(b)).
3. The assessment of the probable cumulative impacts of all anticipated coal mining activities in the general area on the hydrologic balance has been made by the regulatory authority. The reclamation plan proposed under the application has been designed to prevent damage to the hydrologic balance in the permit area (UMC 786.19(c) and UCA 40-10-11(2)(c)). (See Cumulative Hydrologic Impact Analysis (CHIA) compiled by OSM in April 1984 and the updated synopsis attached to this Findings Document.)
4. The proposed permit area for the Tract 2 lease is:
 - A. not included within an area designated unsuitable for underground coal mining operations;
 - B. not within an area under study for designated lands unsuitable for underground coal mining operations;
 - C. not on any lands subject to the prohibitions or limitations of 30 CFR 761.11(a) (national parks, etc.), 761.11(f) (public buildings, etc.) and 761.11(g) (cemeteries);
 - D. not within 100 feet of the outside right-of-way line of a public road (UMC 761.11);
 - E. not within 300 feet of any occupied dwelling (UMC 786.19(d)). (See MRP Section 782.16.).

5. The regulatory authority's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800) (UMC 786.19(e)). (See attached letter from State Historic Preservation Officer (SHPO) dated February 13, 1987.)
6. The applicant has the legal right to enter and complete reclamation activities in the permit area through federal coal lease U-49332 (UMC 786.19(f)).
7. The applicant has shown that prior violations of applicable laws and regulations have been corrected (UMC 785.19(g)). (Memo of March 3, 1987 from Joe Helfrich, Division of Oil, Gas and Mining (DOGM), Inspection and Enforcement section.)
8. Neither Trail Mountain Coal Company nor its parent company, Diamond Shamrock, are delinquent in payment of fees for the Abandoned Mine Reclamation Fund (UMC 786.19(h)) (communication, Valerie Coleman, OSM, Washington, D. C., March 26, 1987).
9. The applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration and with such resulting in irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (UMC 786.19(i)) (communication, Valerie Coleman, OSM, Washington, D. C., March 26, 1987).
10. Underground coal mining and reclamation operations to be performed under the permit will not be inconsistent with other operations anticipated to be performed in areas adjacent to the proposed permit area (UMC 786.19(j)).
11. A detailed analysis of the proposed bond has been made. The bond estimate is \$463,711.00 in 1989 dollars. The regulatory authority has made appropriate adjustments to reflect costs which would be incurred by the state, if it was required to contract the final reclamation activities for the mine site. The bond shall be posted (UMC 786.19(k)) with the regulatory authority prior to final permit issuance.
12. No lands designated as prime farmlands or alluvial valley floors occur on the permit area (UMC 786.19(l)).
13. The proposed postmining land-use of the permit area has been approved by the regulatory authority (UMC 786.19(n)). (See TA, Section UMC 817.133.)

- 14. The regulatory authority has made all specific approvals required by the Act, and the approved State Program (UMC 786.19(n)).
- 15. The proposed operation will not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (UMC 785.19(o)).
- 16. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with (UMC 786.11-.15).

Prior to the permit taking effect, the applicant must agree to comply with the special stipulations in the permit and post the performance bond for reclamation activities.

John W. Hirsch 4-3-87
 DOGM Lead Reviewer

Lowell Beardsley ^{UMB}
 Administrator, Mineral Resource
 Development and Reclamation Program

Lowell E. Mc 4/3/87
 Associate Director, Mining

Danuel Dufson 4-3-87
 Director

AFFIDAVIT OF PUBLICATION

STATE OF UTAH
County of Emery,

ss.

I, Dan Stockburoer on oath, say that I am

the General Manager of The Emery County Progress,

a weekly newspaper of general circulation, published at Castle Dale,

State and County aforesaid, and that a certain notice, a true copy

of which is hereto attached, was published in the full issue of

such newspaper for One (1)

consecutive issues, and that the first publication was on the

29th day of September 1987 and that the

last publication of such notice was in the issue of such newspaper

dated the _____ day of _____, 19 _____

Dan Stockburoer

Subscribed and sworn to before me this
29th day of September 1987

Henry J. Baker
Notary Public.

My Commission expires MY COMMISSION EXPIRES OCTOBER 22 1990

Residing at Price, Utah

Publication fee, \$ 14.40

PUBLIC NOTICE

Beaver Creek Coal Company has applied for approval of the transfer of the Mining and Reclamation Permit for the Trail Mountain Mine from Trail Mountain Coal Company to Beaver Creek Coal Company.

The applicant is: Beaver Creek Coal Company, P.O. Box 1372, Price, Utah 84501.

The original permittee is: Trail Mountain Coal Company, P.O. Box 550, Orangeville, Utah 84537.

The permit(s) for which transfer is being sought are: Utah # ACI/015/009 (Federal FUT-0017) and Utah # ACI/015/009-1. These are Mining and Reclamation Permits for the Trail Mountain Mine, which is located in the Cottonwood Canyon area of Emery County, Utah in Sections 25, 26, 35 and 36, T. 17 S., R. 6 E., S. 1 B & M.

Written comments on this application for transfer may be addressed to: Utah Division of Oil, Gas and Mining, 335 West North Temple, 3 Triad Center, Suite 350, Salt Lake City, Utah 84180-1203.

Published in the Emery County Progress September 29, 1987.

RECORDED
NOV 02 1987

DIVISION OF
OIL, GAS & MINING

AFFIDAVIT OF PUBLICATION

C.C. J. Whitford

OCT 5

BEAVER CREEK
COUNTY

STATE OF UTAH }
County of Carbon, } ss.

I, Dan Stockburger on oath, say that I am
the General Manager of The Sun-Advocate,
a weekly newspaper of general circulation, published at Price,
State and County aforesaid, and that a certain notice, a true copy
of which is hereto attached, was published in the full issue of
such newspaper for One (1)
consecutive issues, and that the first publication was on the
29th day of September, 19 87 and that the
last publication of such notice was in the issue of such newspaper
dated the _____ day of _____, 19 _____.

Dan Stockburger

Subscribed and sworn to before me this
29th day of September, 19 87

Lilly G. Baker
Notary Public.

PUBLIC NOTICE
Beaver Creek Coal Company has applied for approval of the transfer of the Mining and Reclamation Permit for the Trail Mountain Mine from Trail Mountain Coal Company to Beaver Creek Coal Company.

The applicant is: Beaver Creek Coal Company, P.O. Box 1378, Price, Utah 84501.

The original permittee is: Trail Mountain Coal Company, P.O. Box 550, Orangerville, Utah 84537.

The permit(s) for which transfer is being sought are Utah # ACT/015/009 (Federal #DT-0017) and Utah # ACT/015/009-1. These are Mining and Reclamation Permits for the Trail Mountain Mine, which is located in the Cottonwood Canyon area of Emery County, Utah in Sections 25, 26, 35 and 36, T. 17 S., R. 6 E., S.L.B.&M.

Written comments on this application for transfer may be addressed to: Utah Division of Oil, Gas and Mining, 335 West North Temple, 3 Triad Center, Suite 350, Salt Lake City, Utah 84180-1203.

Published in the Sun-Advocate September 29, 1987.

My Commission expires MY COMMISSION EXPIRES OCTOBER 22, 1990

Publication fee, \$ 14.10

RECORDED
NOV 02 1987

DIVISION OF
OIL, GAS & MINING

Appendix 1-3

ACT/015/009

Permit Approval

2/1/88

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
(801) 538-5340

This permit, ACT/015/009, which incorporates the Office of Surface Mining (OSM) Permit UT-0017, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (DOGGM) to:

Trail Mountain Coal Company
P. O. Box 370
Orangeville, Utah 84537

for the Trail Mountain Mine. Trail Mountain Coal Company is the lessee of federal coal lease U-082996, the lessee of state coal leases ML-22603, and/or the lessee/owner of certain fee-owned parcels, 53 acres. The permit is not valid until a performance bond is filed with the DOGM in the amount of \$463,711.00 (filed October 29, 1984), payable to the state of Utah, Division of Oil, Gas and Mining and DSM, and the DOGM has received a copy of this permit signed and dated by the permittee.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as UCMRA.

Sec. 2 The permittee is authorized to conduct surface coal mining and reclamation operations on the following described lands (as shown on ownership map) within the permit area at the Trail Mountain Mine situated in the state of Utah, Emery County, and located:

Township 17 South, Range 6 East, Salt Lake Base and Meridian

Sec. 25: Begin at point of SW Corner of NW1/4 SE1/4, thence North 160 Rods, thence East 44 Rods to center Cottonwood Creek, Southward along creek to a point 76 Rods east of the beginning, thence West 76 Rods to the Point of Beginning.

Sec. 25: SW1/4 SE1/4, E1/2 E1/2 SW1/4

Sec. 36: All

This legal description is for the permit boundary (as shown on the permit area map) of the Trail Mountain Mine. The permittee is authorized to conduct surface and reclamation operations connected with mining on the foregoing described property subject to the conditions of the leases, the approved mining plan, and DSM permit UT-0017, to be issued February 1985, including all conditions and all other applicable conditions, laws and regulations.

- Sec. 3 This permit is issued for a term of five (5) years commencing on the date the permit is signed by the permittee, except that this permit will terminate if the permittee has not begun the surface coal mining and reclamation operations covered herein within three (3) years of the date of issuance.
- Sec. 4 The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Request for transfer, assignment or sale of permit rights must be done in accordance with applicable regulations including but not limited to 30 CFR 740.13(e) and UMC 788.17-.19.
- Sec. 5 The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives of the Office of Surface Mining, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:
- A. have the rights of entry provided for in 30 CFR 840.12, UMC 840.12, 30 CFR 842.13 and UMC 842.13; and,
 - B. be accompanied by private persons for the purpose of conducting an inspection in accordance with UMC 842.12 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.
- Sec. 6 The permittee shall conduct surface coal mining and reclamation operations only on those lands specifically designated as within the permit area on the maps submitted in the mining plan and permit application and approved for the term of the permit and which are subject to the performance bond.

- Sec. 7 Permittee shall take all possible steps to minimize any adverse impact to the environment or public health and safety resulting from noncompliance with any term or conditions of the permit, including, but not limited to:
- A. any accelerated or additional monitoring necessary to determine the nature and extent of noncompliance and the results of the noncompliance;
 - B. immediate implementation of measures necessary to comply; and
 - C. warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.
- Sec. 8 The permittee shall dispose of solids, sludge, filter backwash, or pollutants removed in the course of treatment or control of waters or emissions to the air in the manner required by Subchapter K of this Chapter, the regulatory program and which prevents violation of any other applicable state or federal law.
- Sec. 9 The permittee shall conduct its operations-
- A. In accordance with any measures specified in the permit as necessary to prevent significant, imminent environmental harm to the health or safety of the public; and,
 - B. Utilizing any methods specified in the permit by the Division in approving alternative methods of compliance with the performance standards of the Act and the regulatory program, in accordance with the provisions of the Act, UMC 786.19(m), and Subchapter K.
- Sec. 10 The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.
- Sec. 11 The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.

- Sec. 12 Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State Program and the Federal Lands Program.
- Sec. 13 If during the course of mining operations, previously unidentified cultural resources are discovered, the applicant shall ensure that the site(s) is not disturbed and shall notify the state Regulatory Authority (RA). The state RA, after coordination with OSM, shall inform the operator of necessary actions required.
- Sec. 14 APPEALS - The lessee shall have the right to appeal: (a) under 30 CFR 775 from actions or decisions of any official of OSM; (b) under 43 CFR 3000.4 from an action or decision of any official of the Bureau of Land Management; (c) under 30 CFR 290 from an action, order or decision of any official of the Minerals Management Service; or (d) under applicable regulations from any action or decision of any other official of the Department of the Interior arising in connection with this permit. In addition, the lessee shall have the right to appeal as provided for under UMC 787.
- Sec. 15 SPECIAL CONDITIONS - In addition to the general obligations and of performance set out in the leases, OSM permit UT-0017 and this permit, the permittee shall comply with the special conditions of OSM permit UT-0017 and the conditions appended hereto as Attachment A.

The above conditions (Secs. 1-15) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of the grantor and the permittee at any time to adjust to changed conditions or to correct an oversight. The grantor may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By: Deanne R. Nielson

Date: February 19, 1985

I certify that I have read and understand the requirements of this permit and any special conditions attached.

Allen P. Giddens

Authorized Representative of
the Permittee

Date: 2/24/85

APPROVED AS TO FORM:

By: Richard W. Roberts
Assistant Attorney General

Date: 2-19-85

NOTICE OF DECISION

To Whom It May Concern:

Pursuant to the Utah Coal Mining and Reclamation Act (Utah Code Annotated 1953, Section 40-10-1 et seq), and the "Regulations Pertaining to Surface Effects of Underground Coal Mining Activities" (Final Rules of the Utah Board of Oil, Gas and Mining), the Utah Division of Oil, Gas and Mining has issued a permit to mine coal to Diamond Shamrock Coal Unit for its permit application No. ACT/015/009. The Company will mine coal underground in accordance with the approved Mining and Reclamation Plan for the Trail Mountain Mine associated with Federal Coal Lease U-082996, State Mineral Lease ML 26503, and the following lands:

Township 17 South, Range 6 East, SLBM, Utah

Sec. 25: begin at point of SW Corner of NW1/4 SE1/4, thence North 160 Rods, thence East 44 Rods to Center Cottonwood Creek, Southward along creek to a point 76 Rods East of the beginning, thence West 76 Rods to the point of beginning.

Sec. 25: SW1/4 SE1/4, E1/2 E1/2 SW1/4

Sec. 36: All

This permit was approved by the Utah Division of Oil, Gas and Mining and by the federal Office of Surface Mining. A copy of the permit, the decision document and Technical Analysis is on file at the following locations:

Utah Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350 -
Salt Lake City, Utah 84180-1203
Telephone: (801) 538-5340

Office of Surface Mining
Western Technical Center
Brooks Tower
1020 Fifteenth Street
Denver, Colorado 80202
Telephone: (303) 844-3806

Anyone having comments pertaining to the Trail Mountain Mine should contract Dr. Dianne R. Nielson, Director, Utah Division of Oil, Gas and Mining, or Mr. Allen D. Klein, Administrator, Office of Surface Mining, at the addresses referenced above.

ATTACHMENT A

SPECIAL CONDITIONS

Diamond Shamrock Coal Unit
Trail Mountain Mine
ACT/015/009, Emery County, Utah

February 19, 1985

Stipulation 771.23-(1)-MB

1. Within 30 days of permit approval, the applicant will submit two current, complete and comprehensive copies of the Mining and Reclamation Plan for the Trail Mountain Mine to the Division.

Stipulation 817.41-(1)-RS

1. Within 30 days of permit approval, the operator shall provide, for Division approval, a plan for acquiring site-specific borehole data to delineate the occurrence of subsurface water(s) between the mine workings and Mancos Shale. The operator shall commit to acquiring and submitting this information by August 31, 1985.

If drilling encounters subsurface water(s), the operator shall provide, by August 31, 1985, a systematic monitoring plan for Division approval. The monitoring plan must include:

- A. The type and frequency of field measurements and sampling.
- B. A listing of water quality parameters to be tested and the frequency of laboratory analysis.
- C. A schedule for submitting water level and quality data.



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Norman H. Bangert, 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

August 30, 1985

Mr. Allen P. Childs, Engineer
Diamond Shamrock Coal Company
Trail Mountain Coal Company
P. O. Box 370
Orangeville, Utah 84537-0370

Dear Mr. Childs:

RE: Response to Stipulation 817.41-(1), Trail Mountain Mine,
ACT/015/009, #2, Emery County, Utah

The information you furnished for Well TM-1 satisfies the requirements of Stipulation 817.41-(1), Trail Mountain Mine permit. Thank you for your cooperation and timeliness in providing these data.

Sincerely,

A handwritten signature in cursive script, appearing to read "John J. Whitehead".

John J. Whitehead
Permit Supervisor/
Reclamation Hydrologist

RVS/btb
9562R-2

Appendix 1-4
ACT/015/009-1
Permit Approval

2/1/88



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

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

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

April 30, 1987

Mr. Allen Childs
Mining Engineer
Trail Mountain Coal Company
P. O. Box 370
Orangeville, Utah 84537

Dear Mr. *Allen* Childs:

Re: Final Permit Approval, Trail Mountain Coal Company, Trail Mountain Mine Tract 2 Lease, ACT/015/009-1, Folder #2 and #4, Emery County, Utah

Enclosed is the revised state permit for Trail Mountain Coal Company's Trail Mountain Mine. The revised permit includes the Tract 2 Lease along with the existing, approved Tract 1 area. Please examine the permit with stipulations and sign both copies of the attached permit (ACT/015/009-1, 4/87), on page 5 of that document. Upon signing, please keep one copy of the permit for your records and return one original Certified Return Receipt Requested to the Division at your earliest convenience.

A signed and executed performance bond for the Trail Mountain Mine is posted in the amount of \$463,711, payable to the Division of Oil, Gas and Mining. Therefore, upon your signature of the permit, it will become valid and enforceable.

Thank you for your cooperation in this matter. Should you have any questions, please feel free to contact the Division.

Best regards,

Dianne R. Nielson
Director

JJW/djh
Enclosures
cc: P. Rutledge R. Hagen
 L. Braxton J. Whitehead
 Price Field Office
0800R/83

FEDERAL
(April 1987)

Permit Number ACT/015/009-1
(Revised 4/87)

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
(801) 538-5340

This permit, ACT/015/009-1, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (DOGM) to:

Trail Mountain Coal Company
P. O. Box 370
Orangeville, Utah 84537-0570
(801) 748-2140

for the Trail Mountain Mine. Trail Mountain Coal Company is the lessee of federal coal lease U-49332 and U-082996, the lessee of state coal leases ML-22603, and/or the lessee/owner of certain fee-owned parcels. A performance bond is filed with the DOGM in the amount of \$463,711.00, payable to the state of Utah, Division of Oil, Gas and Mining and the Office of Surface Mining, Reclamation and Enforcement (OSMRE). DOGM must receive a copy of this permit signed and dated by the permittee.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act.

Sec. 2 PERMIT AREA - The permittee is authorized to conduct underground coal mining activities on the following described lands (as shown on the map appended as Attachment B) within the permit area at the Trail Mountain Mine situated in the state of Utah, Emery County, and located:

Township 17 South, Range 6 East, SLB&M

Section 25: S1/2 NW1/4, W1/2 SW1/4, W1/2 E1/2 SW1/4, SW1/4 SE1/4, E1/2 E1/2 SW1/4

Begin at point of SW Corner of NW1/4 SE1/4, thence North 160 Rods, thence East 44 Rods to center of Cottonwood Creek, Southward along creek to a point 76 Rods east of the beginning, thence west 76 Rods to the Point of Beginning.

(Township 17 South, Range 6 East, SLBM (Cont'd.))

Section 26: SE1/4 NE1/4, E1/2 SW1/4 NE1/4, E1/2 SE1/4,
E1/2 W1/2 SE1/4

Section 35: N1/2 NE1/4, SE1/4 NE1/4, E1/2 SW1/4 NE1/4,
E1/2 SE1/4, E1/2 W1/2 SE1/4

Section 36: All

This legal description is for the permit area (as shown on Attachment B) of the Trail Mountain Mine. The permittee is authorized to conduct underground coal mining activities connected with mining on the foregoing described property subject to the conditions of the leases, the approved mining plan, including all conditions and all other applicable conditions, laws and regulations.

- Sec. 3 PERMIT TERM - This permit expires on February 21, 1990.
- Sec. 4 ASSIGNMENT OF PERMIT RIGHTS - The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13(e) and UMC 788.17-.19.
- Sec. 5 RIGHT OF ENTRY - The permittee shall allow the authorized representative of DOGM, including but not limited to, inspectors and representatives of DSMRE, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:
- A. have the rights of entry provided for in 30 CFR 840.12, UMC 840.12, 30 CFR 842.13 and UMC 842.13; and,
 - B. be accompanied by private persons for the purpose of conducting an inspection in accordance with UMC 842.12 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.

- Sec. 6 SCOPE OF OPERATIONS - The permittee shall conduct underground coal mining activities only on those lands specifically designated as within the permit area on the maps submitted in the permit application and approved for the term of the permit and which are subject to the performance bond.
- Sec. 7 ENVIRONMENTAL IMPACTS - The permittee shall minimize any adverse impact to the environment or public health and safety through but not limited to:
- A. accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;
 - B. immediate implementation of measures necessary to comply; and
 - C. warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.
- Sec. 8 DISPOSAL OF POLLUTANTS - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable state or federal law.
- Sec. 9 CONDUCT OF OPERATIONS - The permittee shall conduct its operations:
- A. in accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and
 - B. utilizing methods specified as conditions of the permit by DOGM in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program and the Federal Lands Program.
- Sec. 10 AUTHORIZED AGENT - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.

- Sec. 11 COMPLIANCE WITH OTHER LAWS - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.
- Sec. 12 PERMIT RENEWAL - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State Program and the Federal Lands Program.
- Sec. 13 CULTURAL RESOURCES - If, during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is (are) not disturbed and shall notify DOGM. DOGM, after coordination with OSMRE, shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by DOGM within the time frame specified by DOGM.
- Sec. 14 APPEALS - The permittee shall have the right to appeal as provided for under UMC 787.
- Sec. 15 SPECIAL CONDITIONS - In addition to the general obligations and/or requirements set out in the leases, the federal mining plan approval, and this permit, the permittee shall comply with the special conditions appended hereto as Attachment A.

The above conditions (Secs. 1-15) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of DOGM and the permittee at any time to adjust to changed conditions or to correct an oversight. DOGM may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By: *Deanne R. Nielson*
Date: 4-20-87

Page 5
FEDERAL

I certify that I have read and understand the requirements of this permit and any special conditions attached.

Allen Childs

Authorized Representative of
the Permittee

Date: 5-1-87

APPROVED AS TO FORM:

By: Barbara W Roberts
Assistant Attorney General

Date: 4-30-87

djh
1134R
26-30

Attachment A
Special Conditions

Condition No. 1

The applicant must handle on-site spoil materials to achieve the following:

- A. All materials exceeding electroconductivity (EC) values of 16 mmhos/cm shall be placed under a minimum of two feet of less saline suitable topsoil substitute materials.
- B. The surface six inches of suitable topsoil substitute material shall not exceed EC values of eight mmhos/cm.
- C. The proposed test plots shall include a revegetation trial incorporating topsoil substitute materials having electroconductivity values approximating these limits. Specifically, the surface six inches shall have a uniform EC value of eight, plus or minus one mmho/cm, and the underlying 18 inches shall have a uniform EC value of 16, plus or minus two mmhos/cm.

The applicant shall provide a plan to the Division within 60 days of permit issuance to sample the regraded surface for the purpose of confirming that the salinity values cited above have not been exceeded.

Condition No. 2

Before any site redisturbance takes place, the applicant must conduct a survey, under the supervision of the Division, of the areas to be redisturbed. The survey shall identify and record locations of individuals and populations of Hedysarum occidentale var. canone (canyon sweet-vetch). If canyon sweet-vetch is found in the portions of the permit area to be redisturbed, the applicant must develop a mitigation plan for Division approval before redisturbance takes place.

Condition No. 3

At such time that the Division, in consultation with the State Historic Preservation Officer, determines that subsidence within the permit area may adversely affect known or unrecorded cultural sites, additional cultural resource studies may be required. This determination will be based on new subsidence or cultural resource information and clear justification will be presented to the applicant.

Attachment A
Special Conditions
(Continued)

Condition No. 4

During reclamation the applicant must apply seed at 12-18 lbs./acre the first time with lighter applications for spot treatment, especially for broadcast seeding (USFS Condition 2/85).

Condition No. 5

Within 30 days of permit approval, the water monitoring plan for the Trail Mountain Mine will be amended to include operational monitoring of springs T-10, T-14, T-14a, T-15, T-16, and T-6, (USFS Condition 4/87).

Condition No. 6

By August 31, 1987, the applicant will verify the existence of the unnamed spring referenced in the U.S. Forest Service letter to the Office of Surface Mining dated April 8, 1987. If the spring exists, the approved permit application will be amended to include the spring in the water monitoring inventory, operational monitoring plan, and appropriate figures (7-1 and 7-3) (USFS Condition 4/87).

Condition No. 7

Within 30 days of permit approval, Section 7.1.3.1 of the approved permit application will be amended to reflect that water right filings by the U.S. Forest Service are pending with the State Engineer for several of the springs identified in the spring inventory (USFS Condition 4/87).

Condition No. 8

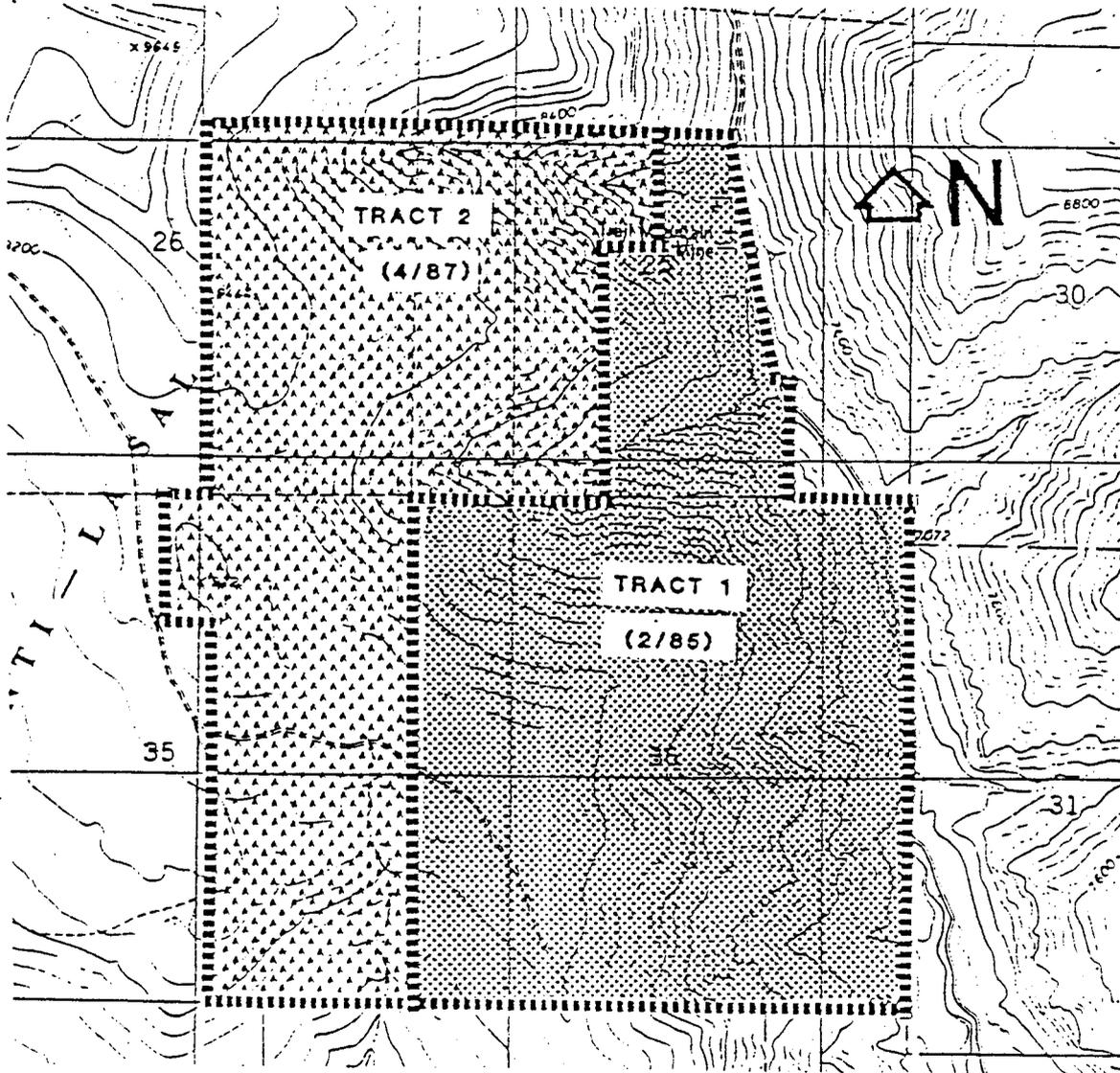
Underground coal mining activities shall not commence within Federal Lease U-49332 until the Mining Plan Modification is approved by the U.S. Department of the Interior. The Division reserves the right to amend this permit (ACT/015/009-1) to incorporate any changes or requirements set out in the approved Mining Plan Modification.

1134R/31-32

ATTACHMENT B

Trail Mountain Coal Company
Trail Mountain Mine
Permit Area
ACT/015/009-1

(Township 17 South, Range 6 East SLBM)



Scale 1":24000"

(adapted from plate 4-3, Tract 2 application 3-87)



August 18, 1987

Mr. Allen Childs
Mine Engineer
Trail Mountain Coal Company
P. O. Box 550
Orangeville, Utah 84537

*Mid-term Review
Comments*

Allen
Dear Mr. Childs:

Re: Mid-Term Review, Trail Mountain Coal Company, Trail
Mountain Mine, ACT/015/009, Folder #2, Emery County, Utah

Attached are the items which must be addressed for the Mid-Term Permit Review for the Trail Mountain Mine. In addition to the specific items attached, two other significant items must be addressed as follows.

1. Permit Transfer - Due to the recent acquisition of Trail Mountain Coal Company by Arch Minerals, a formal permit transfer must be undertaken. Please note the requirements of UMC 788.17 and 788.18 for the specific requirements which must be addressed.
Submitted - Chapter 2, Appendix
2. Mine Plan Consolidation - The recent approval of the Tract 2 lease has resulted in a substantial amount of materials in the Tract 1 PAP being outdated or superceded. These two portions of what is now the approved PAP for the Trail Mountain Mine must be consolidated and all dated or superceded materials removed.
Forthcoming

Attached are letters from the Office of Surface Mining and the U.S. Forest Service which raise concerns to also be addressed in your response to this letter.

Page 2
Mr. Allen Childs
ACT/015/009
August 18, 1987

Thank you for your cooperation in this matter. Would you please have 14 copies of your response to all items to the Division offices no later than October 16, 1987.

Sincerely,



Lowell P. Braxton
Administrator
Mineral Resource Development
and Reclamation Program

JJW/djh
Attachments
cc: P. Rutledge, DSMRE
Tech Review Team
1266R/1

ATTACHMENT "A"

UMC 771.23(b) and 784.23(b) (PGL)

Figures 3-1 and 3-5 received 3/22/85) must be updated to accurately reflect the on-site surface facilities as they exist today.

New Figures 3-1, 3-5

UMC 782.13(a)(2) (PGL)

The owners of record of the surface area and of coal rights must be updated, if necessary. Chapter 2, Page 2-1

UMC 782.13(b)(1) (PGL)

The officers and directors of the applicant must be updated.

Chapter 3, page 2-3

UMC 782.13(b)(2) (PGL)

The principal shareholder of the applicant must be updated.

Chapter 2 - Page 2-4

UMC 782.13(c) (PGL)

The owners of record of surface and subsurface areas contiguous to the permit must be updated, if necessary. Chapter 2, Page 2-6

UMC 783.19 Vegetation Information (KMM)

Page 9-37 indicates that Threatened and Endangered plants are not known in the mine plan area. Please update this section with a brief discussion of Hedysarum occidentale var canone, which is known from the vicinity of the mine plan area (Miller Canyon, on UP&L property). Bob Thompson, USFS, can provide the necessary information on its status in your permit area. Chapter 9, Page 9-37

UMC 784.11 (PGL)

The plan mentioned on page 3-11a as Figure 3-6 is missing. Please submit. See Figure 3-6

UMC 784.13(b)(2) (PGL)

An updated reclamation cost estimate may be submitted with this mid-term review if Trail Mountain Coal Company desires. N/A

UMC 784.17 Protection of Public Parks and Historical Places (KMM)

Page 3-29 indicates that future development of the access road will impact cultural resources. Since the access road has already been developed, please revise the text to indicate this construction and what, if anything, happened to the cultural resources.

Chapter 3 page 3-29

UMC 784.21 Fish and Wildlife Plan (KMM)

Page 3-44 discusses a decrease in the macroinvertebrate population of Cottonwood Creek from above to below the mine; page 3-48/9 indicates that there will be an impact of mining on microinvertebrates; page 3-52/3 indicates that the creek will be culverted; and the Division received a copy of a letter dated 11/25/86 from DWR indicating that invertebrate sampling of Cottonwood Creek could be discontinued.

Please revise this section of the PAP to indicate current status of the creek, its culverts, its macroinvertebrate population, the impacts of the mining on the creek, mitigation measures you have or will institute and the status of your monitoring program, including pertinent correspondence as necessary. Chapter 3, pages 44,49,& 52-53 Appendix 10-8, Appendix 7-13.3, Chapter 9 page 37A
UMC 784.23(b)(1) and (b)(5) (PGL)

Fencing and topsoil sites should be shown on the surface facilities map. The fencing mentioned on page 3-21b must include all fencing on the property. Chapter 3, page 3-21b

UMC 784.23(b)(4) (PGL)

The coal yard described on page 3-11 was never developed; please update the PAP to reflect this. Chapter 3, page 3-11

UMC 784.26 Air Pollution Control Plan (KMM)

Page 4-9 indicates that roads are watered for dust suppression. Please revise this section discussing the new road pavement, coal yard sprinklers and any other modifications of your air pollution control plan. Chapter 4, page 9

UMC 817.11(c)(2)

The signs portrayed on page 3-22 are not correct as shown. Please correct and update. Chapter 3, page 3-22

UMC 817.21-.26 (DD)

On June 12, 1987, Trail Mountain Coal Company submitted an acceptable sampling program to assess if salinity is a problem with the existing pad materials which are proposed to be used for final reclamation. The sampling will occur after backfilling and grading operations are completed and before final reclamation.

In order to fully address the implications of the sampling program, soil analysis of the test plot area must be undertaken as well. This will allow correlation of test plot revegetation success with soil chemical and physical characteristics, and validate test plot results with the reasoning behind OSM Condition #1. Please submit a sampling program and data collected to date on the test plot, including a summary of any conclusions or findings..

Appendix 9-A (update) page 1-35

UMC 817.41-.46 Hydrologic Balance: General Requirements (JRF)

The PAP discusses the ground-water regime in Section 7.1. Due to recent studies (Lines, 1981), the operator should modify portions of the text that refer to the impermeability of the Blackhawk Formation and Starpoint Sandstone. Additionally, the PAP should reflect the current ground-water regime; including but not limited to the following:

- o Recent spring and seep survey maps and information
- o Modify text in Section 7.1 to reflect recent research performed on aquifer characteristics.
- o Modify the well discussion to include the monitor well in the mine yard, UP&L well, and the new water well.
- o The water rights section should be changed according to recent Forest Service comments.
- o The PAP should incorporate recent data and information that were derived for the Tract 2 permit into one comprehensive PAP. Mine Plan Consolidation/Forthcoming

Diversions

The sizing of the Cottonwood Creek channel at the outlet of the main bypass culvert must adequately pass the design event. Please submit calculations which document that the present configuration is adequate. Appendix 7-30

Sediment Control Plan

All figures (7-11, 7-12) and verbage in the PAP must reflect modifications to the sediment control plan including, but not limited to, the curb and gutter modification. Information in related appendices (Ap. 7) must be modified to reflect on the ground conditions. Figures 7-11,7-12

Water Distribution Plan

The PAP should be updated with the current water distribution plan. The in-mine water discharge system has been modified since permit approval. All verbage and maps must be altered to the current system (NPDES discharge). Additionally, a current water balance of mine water inflows and total mine water requirements should be incorporated into the PAP.

Reclamation

The PAP must contain a map and organized design details on the post-mining reclamation of the drainage system. The operator should address placement of sediment barriers along the stream channels to prevent sedimentation of the surface waters. The operator proposes to use contour furrows as runoff/sedimentation controls. Recent experience has shown that contour furrows may be a reclamation liability. The operator should consider alternative runoff/sediment controls. Land roughening has proven to be effective in the coal mining regions of Utah. Appendix 9 , page 11

Probable Hydrologic Consequences

The PAP should contain the most recent PHC document. Additionally, verbage and maps should be modified to reflect the current hydrologic regime at Trail Mountain. Appendix 7-30

Waste Disposal

The PAP states that sediment pond waste will be disposed of in the mine. The operator should consult with MSHA on recent developments on waste disposal policies. Furthermore, the operator must commit to providing a plan that ensures the protection of groundwater resources during and after waste disposal.

Chapter 7, page 8
UMC 817.52

Hydrologic Balance: Surface and Ground Water Monitoring (JRF)

The PAP should be updated to reflect all modifications and additions pertaining to ground-water monitoring. This should include, but is not limited to, the following:

- o Compilation of all (Tract 1 and 2) water quality data into one appendix.
- o Table or chart depicting sample points, sample frequencies, and chemical parameters to be analyzed.
- o Submit an accurate map depicting monitor points as of June, 1987.

The operator should incorporate all modifications to the water monitoring plan. The updated monitoring plan should reflect Tract 1 and Tract 2 monitoring schedules and parameters to be sampled. Verbage in Section 3, Section 7, and all corresponding tables and maps must be updated to the current monitoring schedule.

The PAP should contain information on the most recent spring and seep survey. The current mine plan has water quality information in Section 7 and in several appendices. Information for both Tract 1 and 2 should be incorporated into one section or appendix.

| | |
|---|------------------------------------|
| Figures (appendix - 7-16, 7-19, 7-29, 7-30) | Appendis 7-11.2 (Spring Inventory) |
| 7-13.1 Macroinvertebrate (Intern) | 7-16 Water monitoring Stations |
| 7-13.2 (Final) | 7-16.1 Water monitoring Guidelines |
| 7-13.3 (Discontinue Sampling) | 7-21 Mine Inflows |

Table 7-2 (water quality parameters) should demonstrate compliance with the Division's 1986 Water Monitoring Guidelines. Chapter 7 page 7-22

UMC 817.111 Revegetation: General (KMM)

Page 3-39 indicates that test plots will be installed. Please revise this text and Appendix 9, if necessary, to reflect what was actually done on the test plots. Chapter 3, page 39 Appendix 9-A

Please revise Figure 10-A to indicate the current status of revegetation on the mine site. Figure 10-A, page 25

UMC 817.116 Revegetation: Standards for Success (KMM)

Page 3-40 and Appendix 9, page 23, indicate that revegetation areas will be monitored annually by quantitatively sampling cover, density and production. There is no indication of where this data will be reported. This schedule includes more intensive sampling than seems necessary and, in terms of productivity, may be hazardous to the health of the revegetation. The Division recommends qualitative evaluation of revegetation each year and quantitative sampling in years 2, 3 (optional), 5, 9 and 10 of the liability period which begins when revegetation, including maintenance activities, are completed (see attached guideline). The applicant should consider revising their monitoring schedule, but must at least commit to providing data from monitoring in an annual report to be submitted to the Division by April 1 of each year.

Chapter 3, page 40 Appendix 9, pages 18-38; Appendix 9A, pages 1-17

1266R

1987

MODIFICATIONS / AMENDMENTS



355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-536-5340

March 2, 1988

Mr. Dan W. Guy, Manager
Permitting & Compliance
Beaver Creek Coal Company
P. O. Box 1378
Price, Utah 84501

Dear Mr. Guy:

Re: Final Approval of PAP Amendment, Second Mining East of Escarpment
in Cottonwood Canyon, Beaver Creek Coal Company, Trail Mountain
#9 Mine, ACT/015/009-88A, Folder No. 3, Carbon County, Utah

On February 22, 1988, the Division received Beaver Creek Coal Company's (BCCC) amended response to our deficiency review letter dated February 11, 1988. The supplemental information has been reviewed by Pamela Grubaugh-Littig, Reclamation Engineer, and Richard Smith, Geologist of the Division's technical staff. The operator's proposal has been determined technically adequate for approval. Please refer to the attached technical memorandum for an explanation of the technical review and approval recommendation. This letter will serve as the Division's final approval for this permit change application. Beaver Creek Company has now provided all of the information required by this office to finalize this permitting action.

The Division will forward extra copies of the approved plans to the appropriate state and federal agencies to update file copies of BCCC's approved Mining and Reclamation Plan (MRP). Thank you for your cooperation in completing this permitting action.

Sincerely,

D. Wayne Hedberg
Data Management Coordinator

djh

Attachment

cc: J. Dryden

R. Hagen

P. G.-Littig

8992R/36

G. Morris

P. Rutledge

J. Whitehead

P.F.O.



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

March 1, 1988

TO: John Whitehead, Permit Supervisor

FROM: Pamela Grubaugh-Littig, Reclamation Engineer *pgl*
Rick Smith, Geologist *RVS per pgl*

RE: Amendment to Conduct Second Mining East of Escarpment in
Cottonwood Canyon, Beaver Creek Coal Company, Trail Mountain
#9 Mine, ACT/015/009-88A, Emery County, Utah

Materials dated January 28, 1988, Plate 1 submitted February 10, 1988, and the reply to deficiency letter submitted February 22, 1988, were all reviewed for the above-identified amendment.

Proposed second mining is delineated on Plate 3-6 and will occur in Section 36 (State Lease ML-22603), approximately 800 feet south of Section 25. Second mining will be conducted beyond outcropping Castlegate Sandstone.

The overburden as shown on Plate 1 is from 1,200 to 1,300 feet thick above the proposed area of second mining. Room entries were originally driven on 80 foot centers and 60 x 60 foot square pillars were developed. Proposed second mining will result in either leaving 40 x 60 foot pillars or 47 x 60 foot pillars and maintenance of a minimum safety factor of 1.5 for the proposed pillar sizes at the given depths. Calculations (using three methodologies) indicate proposed pillars will be relatively stable and slowly crush over time.

The maximum extent of surface subsidence will be based on a 15 degree angle-of-draw, confined within a horizontal distance of 500 feet from the area of proposed second mining and will not affect USFS lands in Section 25.

Overburden thickness and the proposed development method suggest the area above second mining will be at relatively low risk for surface manifestations of subsidence (tension cracking, catastrophic failure) and accordingly, a relatively low risk is designated for potential impacts to renewable resource lands and other environmental resources.

It is herein recommended that the above-identified amendment be approved.

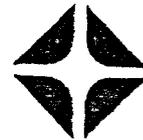
djh
9075R/53

Beaver Creek Coal Company

P.O. Box 1378

Price, Utah 84501

Telephone 801 637-5050



January 28, 1988

Mr. Lowell P. Braxton
Administrator
Utah Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center Suite 350
Salt Lake City, Utah 84180-1203

RE: Amendment on Second Mining
Trail Mountain No.9 Mine
ACT/015/009
Emery County, Utah

Dear Mr. Braxton:

Herein submitted are 8 copies of a proposed amendment on second mining east of the escarpment in Cottonwood Canyon.

The original plans for this mine stated that second mining would not occur east of this escarpment, for protection of the canyon walls; however, these plans were devised prior to any geotechnical studies on this mine. In 1985, a study was performed on the area in question, wherein it was determined that limited second mining could occur east of the escarpment with no danger of subsidence or damage to the canyon. The possibility of performing second mining was also discussed with Mr. John Blake, the Utah State Minerals Resource Specialist, and he agreed that second mining should be performed where feasible to maximize coal recovery on the State Land. He also discussed this with Mr. John Whitehead at this time and Mr. Whitehead indicated the Division's willingness to consider an amendment to the mine plan to allow for second mining.

The geotechnical study indicated that a 1.5 safety factor could be maintained with a pillar size of 40' x 60' up to an overburden of 685 feet, allowing for 63% recovery, and a 47' x 60' pillar should be left up to an overburden of 1330 feet, allowing for 56% recovery.

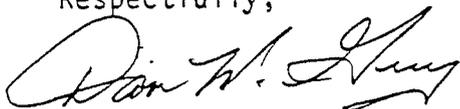
The geotechnical study and the letter from Mr. Blake are enclosed as Appendix 12-1, and should be added to Chapter 12 of the Tract I M.R.P..

In addition, I have amended 4 pages of the M.R.P. to help clarify the question of limited second mining. Pages 3-14, 3-19, and 3-19A should replace corresponding pages in Chapter 3 of the Tract I M.R.P.. Page 3 should replace the corresponding page 3 in Chapter 3 of the Tract II M.R.P.

It is our hope this proposal will meet with your early approval. It is our plan to begin retreat from the Main South Entries toward the end of February, 1988. This retreat is much earlier than previously planned; however, recent limitations on pillaring in our 6th West Section imposed by M.S.H.A. and geologic conditions have shortened the life of this section.

If you have any questions, or need any further information, please let me know.

Respectfully,

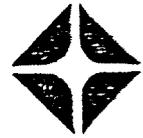


Dan W. Guy
Manager Permitting/Compliance

cc: Dan Meadors
Joe Fielder
Johnny Coffey
Allen Childs
Jay Marshall
File

BEAVER CREEK Coal Company

Post Office Box 1378
Price, Utah 84501
Telephone 801 637-5050



March 4, 1988

Mr. Lowell P. Braxton
Administrator
Utah Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

RE: Temporary Screen Plant Addition
Trail Mountain No.9 Mine
ACT/015/009
Emery County, Utah

Dear Mr. Braxton:

In reference to our phone conversation on March 1, 1988, this letter will confirm our plan to install a portable screening plant at the Trail Mountain No.9 Mine.

The screen plant is being installed on a temporary basis to allow for separation of fine vs. coarse coal fractions for ash fusion comparisons. The operation of the portable plant will be identical to the existing crusher/screen system, with the exception that the $-\frac{1}{2}$ " product will be kept separate rather than blended back into the mine run.

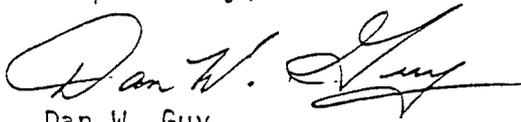
I have also checked on the limitations of such an installation with our air quality requirements. Due to the small size of the operation, no air quality permit has been issued. A Notice of Intent has been filed with the Bureau of Air Quality, and the property has been inspected and found to be in compliance in the past. An emission inventory was also filed on this property in 1987. Based on the emission inventory, the screen plant would have only a minimal effect on the overall emission from the property, since the previous screen was covered, and the portable screen plant is to be fitted with water sprays if necessary, for dust control. All other phases of the operation will remain the same. I have enclosed a copy of the Bureau of Air Quality inspection report and the 1987 Emission Inventory for your reference.

page 2

As mentioned, the plant is portable and temporary, therefore, no bonding adjustments will be necessary for this proposal. Also, the plant is to be placed in the existing loadout stockpile area; therefore, no additional drainage controls will be necessary.

If you have any questions, or need any further information, please let me know.

Respectfully,



Dan W. Guy
Manager Permitting/Compliance

cc: Dan Meadors
Joe Fielder
Johnny Coffey
Allan Childs
File

UTAH STATE DIVISION OF HEALTH
Bureau of Air Quality
Enforcement

DATE 11/4/71

Source Evaluation Report

NAME Winters Coal Co.
 LOCATION East Mt. Park Mine
 SOURCE Coal Mine
 STACK NUMBER or DESIGNATION Section 12
 CONTROL FACILITY(S) Scrubber & Precipitator
 HEIGHT OF DISCHARGE POINT 120 ft
 POINT OF EMISSIONS Scrubber Top
 TYPE OF FUEL Coal
 STACK DIMENSIONS 4 x 10
 APPLICABLE REGULATIONS UACR 4.1.1 & 4.5

OBSERVER Jeff N. Deon
 OBSERVER AFFILIATION Bureau of Air Quality
 OBSERVER CERTIFICATION DATE 10/29/71
 OBSERVER SIGNATURE Jeff N. Deon
 TIME OF ARRIVAL 11:10 AM
 TIME OF DEPARTURE 11:22 AM
 COPY OF REPORT GIVEN TO Control Room
 CONTACT SIGNATURE Jeff N. Deon
 COMPLIANCE NON-COMPLIANCE

OPERATING PARAMETERS

SOURCE ACTUAL 27-29 hrs - 1200-16 hrs
 MAXIMUM 1200 - 16 hrs @ 1 hrs
 CONTROL FACILITY ACTUAL Scrubber & Precipitator
 MAXIMUM 1200 - 16 hrs

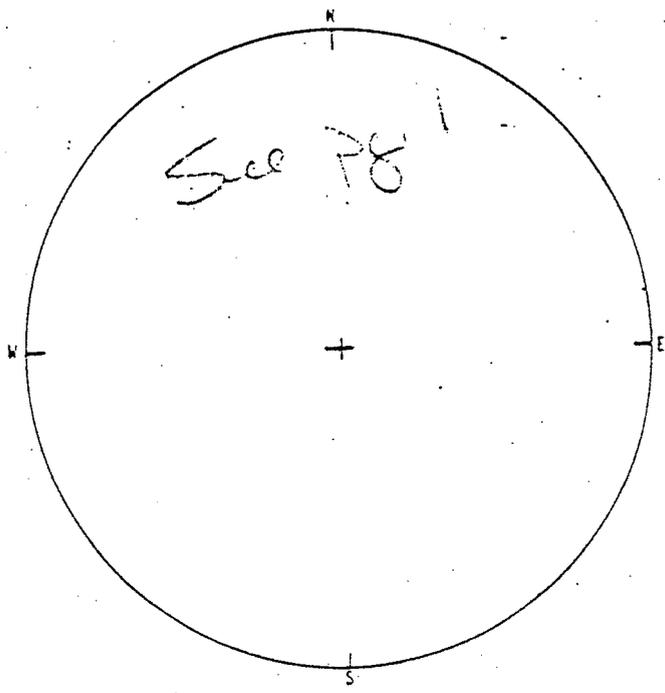
STEAM PLUME YES NO
 D YES NO

BACKGROUND DESCRIPTION 11:10 AM
 WEATHER CONDITIONS Wind Speed 0-5 mph Color White
 Wind Direction Calms Distance Visible 1/4 mi
 Ambient Temperature 47°F
 Relative Humidity 20%
 Note any changes in weather conditions None

Observers Distance to Source 150 ft Sun L

OPACITY READINGS

| No. | Hr:Min. | Seconds | | | | Ave. | Set Ave. |
|-----|---------|---------|----|----|----|------|----------|
| | | 0 | 15 | 30 | 45 | | |
| 1 | 10:09 | 25 | 25 | 25 | 25 | 25 | |
| 2 | 10:10 | 25 | 25 | 25 | 25 | 25 | |
| 3 | 10:11 | 25 | 25 | 25 | 25 | 25 | |
| 4 | 10:12 | 25 | 25 | 25 | 25 | 25 | |
| 5 | 10:13 | 25 | 25 | 25 | 25 | 25 | |
| 6 | 10:14 | 25 | 25 | 25 | 25 | 25 | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |



COMMENTS See pg 1
18
Purchased Mine on 11/4/71
about 70% of production
was by open pit method
Scrubber "down" to control

TRAIL MOUNTAIN COAL CO.
EST. EMISSIONS

1986 STOCKPILE DATA

ANNUAL THROUGHPUT = 300,000 T/Y

| | | | |
|--------------|--------------|---|----------|
| CONVEYING | .05 lbs/TON | = | 7.5 TONS |
| LOAD-OUT | .05 lbs/TON | = | 7.5 TONS |
| WIND EROSION | .018 lbs/TON | = | 2.7 TONS |
| MAINTENANCE | .02 lbs/TON | = | 3.0 TONS |

TOTAL EMISSION
TONS PER YEAR 20.7 T/YR



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

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

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

December 1, 1987

Mr. Dan Guy, Manager
Permitting & Compliance
Beaver Creek Coal Company
Price, Utah 84501

Dear Mr. Guy:

Re: Approval for Removal and Disposal of Sediment Pond Waste
Material for Trail Mountain #9 Sediment Pond Waste, Beaver Creek
Coal Company, Trail Mountain Mine, ACT/015/009, Folder #2, Emery
County, Utah

This letter shall serve as the Division's formal approval to remove and dispose of the sediment pond waste materials currently stockpiled at the Trail Mountain #9 Mine. Division Soils Specialist Dan Duce has reviewed the data submitted by the mine dated August 31, 1987, and indicates the materials are non-toxic, and non acid forming. Therefore the current stockpile can be disposed of as non-coal waste.

Please feel free to contact me if you should have any further questions on this.

Sincerely,

John J. Whitehead
Permit Supervisor/
Reclamation Hydrologist

djh
cc: L. Braxton
D. Duce
H. Sandbeck
0800R/30



Date: September 28, 1987

Subject: Trail Mountain Mine -- Soil Analysis

From/Location/Tel: D. M. Arnolds DAT/1848

To/Location: D. Guy BCCC

Attached is a copy of a soil analysis performed by Standard Laboratories for Mountain Coal Company, which was provided to us by Bill Prince, the attorney for Arch. Our attorney, Clay Parr, believes that the analysis relates to the sedimentation pond at the mine. If you need any further information, please give me a call.

Attachment

DMA:18:2:pjp

STANDARD LABORATORIES, INC.

BRANCH CODE 43
(SEE REVERSE)

LAB NO. 68980

DATE REC. 02.03.89

DATE SAMPLED _____

SAMPLED BY TMCC

SOIL SAMPLE

TRAIL MOUNTAIN COAL COMPANY
PO BOX 370
ORANGEVILLE, UT 84537

% COMBUSTIBLE 39.36
 SODIUM ABSORPTION RATIO (MEG/L) 3.46
 SATURATED WATER PERCENTAGE (%) 33.6
 HOT-WATER SOLUBLE BORON 2.4 PPM
 ELECTRICAL CONDUCTIVITY 4,900 UMHOS/CM
 SELENIUM 1.07 PPM
 TEXTURE (BY HYDROMETER)
 % SAND 44.32
 % SILT 17.04
 % CLAY 38.64

ACID-BASE ACCOUNTABILITY

CACO3 EQUIV. (TONS/1000 TONS OF MATERIAL)
 AMOUNT MAX
 NEEDED

| GROUP | PIZZ | % SUL. | MAX FROM % SUL. | PRESENT | PH & EXCESS | PASTE PH |
|-------|------|--------|--------------------|---------|----------------|-------------|
| 2.0 | 4 | 0.027 | 0.84 | 75.53 | 74.69 | 8.18 |

FOR YOUR PROTECTION THIS DOCUMENT HAS
BEEN PRINTED ON CONTROLLED PAPER STOCK

Respectfully Submitted

Clyff Smith

Branch Code 43
 Lab No. 72338
 Date Rec'd 07.01.87
 Date Sampled 02.12.87
 Sampled By TMCC



SAMPLE ID:

SOIL SAMPLE

ARCH OF UTAH
 TRAIL MOUNTAIN MINE
 P.O. BOX 370
 ORANGEVILLE, UTAH 84537
 (801) 748-2140

| | |
|---------------------------------|----------------|
| % COMBUSTABLE | 39.56 |
| *% COMBUSTABLE @ 350oC | 23.41 |
| SODIUM-ABSORPTION-RATIO (MEQ/L) | 3.46 |
| SATURATED WATER PERCENTAGE (%) | 33.6 |
| HOT-WATER SOLUBLE BORON | 2.4 PPM |
| ELECTRICAL CONDUCTIVITY | 4,900 UMHOS/CM |
| SELENIUM | 1.07 PPM |
| *WATER SOLUBLE SELENIUM | 0.010 PPM |

| | |
|----------------------------|-------|
| TEXTURE (BY HYDROMETER): | |
| % SAND | 44.32 |
| % SILT | 17.04 |
| % CLAY | 38.64 |

ACID-BASE ACCOUNTABILITY CaCO3 EQUIV. (TONS/1000 TONS OF MATERIAL)

| COLOR | FIZZ | %SUL. | MAX FROM % SUL. | AMOUNT PRESENT | MAX NEEDED PH 7 | EXCESS | PASTE PH |
|-------------|------|-------|--------------------|-------------------|-----------------------|--------|----------|
| 2.5Y 4/2 | 4 | 0.27 | 0.84 | 75.53 | | 74.69 | 8.18 |

* REQUESTED 7/1/87

FOR YOUR PROTECTION THIS DOCUMENT HAS
 BEEN PRINTED ON CONTROLLED PAPER STOCK

Respectfully Submitted, *Cliff Smart*
 CLIFF SMART 08.05.87

UPDATED MINE MAP