I. **Legal, Financial, and Compliance Information (R645-301-1001)**

The Hidden Valley Mine was owned by CONSOL Mining Company LLC (CMCLLC). CMCLLC was the operator and permittee of the Hidden Valley Mine. The Hidden Valley Mine was sold to Bronco Utah Operations, LLC in 2015. Bronco Utah Operations, LLC will be the operator and permittee of the Hidden Valley Mine. Any references to Consol Energy Inc. or any of its subsidiaries within the permit text and maps should be considered Bronco Utah Operations, LLC (BUOLLC). These instances will be revised after closing. Please refer to Appendix I for Ownership and Control.

**Permit Applicant (112.210):** Bronco Utah Operations, LLC  
PO Box 527  
Emery, UT 84522  
435-286-2447

**Resident Agent (112.220):** All-Search & Inspection, Inc.  
1108 E South Union Avenue  
Midvale, UT 84047  
801-984-8160

**Person Who Will Pay Abandoned Mine Land Fee (112.230):** Bronco Utah Operations, LLC  
PO Box 527  
Emery, UT 84522  
435-286-2447

**Mine Operator (112.300):** Bronco Utah Operations, LLC  
PO Box 527  
Emery, UT 84522  
435-286-2447

**Mine Operation:** Hidden Valley Mine  
PO Box 527  
Emery, UT 84522  
435-286-2447

Bronco Utah Operations LLC is a Delaware limited liability company, which was formed on November 16, 2015. A list of the officers and directors of Bronco Utah Operations, LLC is contained in Appendix I (112.300).
Current or Previous Coal Mining Permits (112.400 and .410):

Appendix III contains a detailed listing of current, previous and pending coal mining related permits in the United States held, or applied for, by Bronco Utah Operations, LLC.

Legal or Equitable Owners of Record (112.500 and .600):

The Legal or Equitable Owners of the Area to be affected by the Surface Operations and Facilities are:

Surface owner is Bronco Utah Operations, LLC;

The Holders of Record of Any Leasehold Interest in Areas to be Affected by Surface Operations or Facilities:

None

The following are the Owners of Coal Estate for the Mined Areas:

Ivie Creek Coal Company Shareholders Trust.

A leasehold interest in the coal estate in the W/2 of Section 17 and all of Section 18 of Township 23 South, Range 6 East, Emery County, Utah is held by Bronco Utah Operation LLC as the lessee under that certain coal lease originally from Ivie Creek Coal Company to Clifford Minerals and Peter L. Shea dated August 20, 1976, and recorded in Emery County at Book 87, Page 698. CONSOL Mining Company, LLC, as the successor lessee to Clifford Minerals, assigned the leasehold interest to Bronco Coal Operations, LLC by Assignment and Assumption Agreement, dated December 16, 2015, a copy of which was recorded in Emery County on December 22, 2015 at Entry 411523. The Ivie Creek Coal Company Shareholders’ Trust, through its trustee First Interstate Bank of Utah, N.A., succeeded to the interest of Ivie Creek Coal Company as the lessor under the lease.

Surface and Mineral Ownership contiguous to Bronco Utah Operations, LLC:

Refer to Appendix II.

The Holders of Record of Any Leasehold Interest in the Coal to be Mined are:

Bronco Utah Operations, LLC

MSHA Number (112.700):

No current Mine Safety and Health Administration identification number is assigned for the Hidden Valley Mine (112.700).

Option - Contiguous Lands (112.800):

There are no outstanding interests in lands, options or pending bids on interests held or made by the applicant for lands which are contiguous to the area to be covered by the permit.

Revised 10/2009
Revised 12/13
Revised 3/16

ChapteI Page 2
Compliance Information (113):

Statement of Compliance (113.100 – .200):

Bronco Utah Operations, LLC, their subsidiaries and affiliates, and persons controlled by or under common control with Bronco Utah Operations, LLC have not had any federal or state mining permits suspended or revoked nor any mining bonds or similar securities deposited in lieu of bond forfeited in the previous five (5) years.
Violation Notices (113.300):

Information on all violations received by the applicant or operator during the past three (3) years related to environmental requirements are contained in Appendix IV.

Right of Entry and Operations Information (114):

Right of Entry (114.100):

Right of entry and operation is based on surface or subsurface ownership by Bronco Utah Operations, LLC or on lease agreements. Hidden Valley Mine was conveyed to Consolidation Coal Company by Special Warranty Deed and Assignment of Coal Lease executed by Hidden Valley Coal Company on November 14, 1995. The Special Warrant Deed was recorded November 21, 1995, as Entry No. 340818, in Book 219 at Pages 299-303, and the Assignment of Coal Lease was recorded on November 27, 1995, as Entry No. 340847, in Book 219, at Pages 363-369, in the real property records of Emery County, Utah. On November 25, 2013, Consolidation Coal Company conveyed and assigned its interest in the Hidden Valley Mine to CONSOL Mining Company LLC, by Quitclaim Deed, Assignment and Bill of Sale recorded in Emery County, Utah on December 4, 2013 at Entry 406198 and recorded in Sevier County, Utah on November 27, 2013 in book 688, Page 120 at Entry Number 00382267. On December 16, 2015, CONSOL Mining Company LLC conveyed its interest in the surface lands at the Emery Deep Mine and Hidden Valley Mine to Bronco Utah Operations, LLC by (i) Special Warranty Deed, recorded in Emery County on December 22, 2015 at Entry 411521, and recorded in Sevier County on December 23, 2015 at Document No. 00391679, Book 0709, Page 0986 and (ii) Assignment and Assumption Agreement, recorded in Emery County on December 22, 2015 at Entry 411523. The surface interests owned, leased or controlled by Bronco Utah Operations, LLC at the Emery Deep Mine and Hidden Valley Mine are not subject to litigation.

Relationship to Areas Designated Unsuitable for Mining (115):

The permit area does not contain any of the following areas designated as unsuitable for mining:

- National Park System
- National Wildlife Refuge System
- National System of Trails
- National Wilderness Preservation System
- Wild and Scenic Rivers System
- National Recreation Areas
- National Forests
- Public Parks
- Public places included on the National Register of Historic Places
- Public Buildings, Schools, Churches, Cemeteries, Community or Institutional Buildings

Bronco Utah Operations, LLC does not propose to mine within 300 feet of an occupied building or within 100 feet of a public road.
Permit Term (116):

Bronco Utah Operations, LLC shall conduct operations under ACT/015/0007, Mining and Reclamation Plan.

The permit term is for five (5) years.

Personal Injury and Property Damage Insurance Information (117):

Appendix V contains a copy of the insurance certificate, for the Hidden Valley Mine, covering personal injury and property damage.
APPENDIX I

Directors, Ownership & Control

INCORPORATED

JUN 19 2018

Div. of Oil, Gas & Mining

Revised 06/2018
Bronco Ownership and Control Explanatory

The Bronco Utah Operations, LLC Ownership Chart sets forth the general ownership structure above Bronco Utah Operations, LLC. As set forth in the chart, Bronco Utah Operations is wholly owned and controlled by Bronco Coal Resources, LLC, which is in turn 99.99% owned and controlled by Sandton Credit Solutions Master Fund III, L.P. Sandton Credit Solutions Master Fund III, L.P. is completely controlled by its general partner, Sandton Credit Solutions III GP, LLC. Additional entities controlled by Sandton Credit Solutions III GP, LLC as general partner are included in the Ownership Chart for reference only to provide context to the Division of related entities controlled by the same general partner.

Please note that, for limited partnership entities above Sandton Credit Solutions Master Fund III, L.P. in the Bronco Utah Operations, LLC organizational chain, limited partnership interests do not imply control. Specifically, control over the business and operations of a limited partnership entity like Sandton Credit Solutions Master Fund III, L.P. is primarily—if not entirely—vested in the general partner. Even though the entity’s limited partners may have the right to receive distributions from the entity, the limited partners nevertheless have no control over the limited partnership’s activities unless such control is granted to them in the entity’s limited partnership agreement. In the case of the limited partnerships above Bronco Utah Operations, LLC in the Ownership Chart, no such control is given to the limited partners; control over the business and affairs of each limited partnership (i.e., Sandton Credit Solutions Off-Shore III, L.P.; Sandton Credit Solutions Cayman Fund III, L.P.; Sandton Credit Solutions Onshore Fund III, L.P.; and Sandton Credit Solutions Master Fund III, L.P.) is vested completely in Sandton Credit Solutions III GP, LLC as general partner of each limited partnership.
## Ownership and Control Report

**Company**  Bronco Utah Operations LLC  **FEIN:** 81-0698226

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<tr>
<td>Daniel R. Baker</td>
<td>Chief Executive Officer/President</td>
<td>Emery Mine, P.O. Box 527</td>
<td>435-286-2447</td>
<td>zero</td>
<td>December 16, 2015</td>
<td>May 7, 2018</td>
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<td>Emery, UT 84522</td>
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<tr>
<td>Gary Takenaka</td>
<td>Chief Operating Officer/Secretary/Treasurer</td>
<td>Emery Mine, P.O. Box 527</td>
<td>435-286-2447</td>
<td>zero</td>
<td>December 16, 2015</td>
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<tr>
<td>David Petty</td>
<td>Chief Financial Officer</td>
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<td>December 16, 2015</td>
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<td>Bronco Coal Resources, LLC</td>
<td>Owner</td>
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</tbody>
</table>

*No individuals own a 10% or greater interest in Bronco Utah Operations LLC.*

- Bart Hyita                  | Chief Executive Officer/President          | Emery Mine, P.O. Box 527        | 435-286-2447 | zero         | April 17, 2018   |               |
  |                             |                                            | Emery, UT 84522                 |           |              |                  |               |
- Harold Cunningham          | Treasurer/Secretary/Controller             | Emery Mine, P.O. Box 527        | 435-286-2447 | zero         | May 18, 2018    |               |
  |                             |                                            | Emery, UT 84522                 |           |              |                  |               |

Date: 5/18/2018
# Ownership and Control Report

**Company**: Bronco Utah Reserves Inc.  
**FEIN**: 81-0692203

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<td>Daniel R. Baker</td>
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<tr>
<td>Gary Takenaka</td>
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<td>David Petty</td>
<td>Chief Financial Officer</td>
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<td>December 16, 2015</td>
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<td>Bronco Coal Resources, LLC</td>
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*No individuals own a 10% or greater interest in Bronco Utah Reserves Inc.*

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<td>Harold Cunningham</td>
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<td>May 18, 2018</td>
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Date: 5/18/2018
# Ownership and Control Report

**Company**: EF1 Holdings, LLC  
**FEIN**: 81-0815107

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<td>Officer</td>
<td>Jordan Levy</td>
<td>Manager</td>
<td>25 West 45th Street</td>
<td>212-444-7200</td>
<td>zero</td>
<td>December 16, 2015</td>
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<td>Rael Nurick</td>
<td>Manager</td>
<td>25 West 45th Street</td>
<td>212-444-7200</td>
<td>zero</td>
<td>December 16, 2015</td>
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<td>Thomas Wood</td>
<td>Manager</td>
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<td>December 16, 2015</td>
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<td>Dimitri Korvyskov</td>
<td>Manager</td>
<td>25 West 45th Street</td>
<td>212-444-7200</td>
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<td>December 16, 2015</td>
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<td>Sandton Credit Solutions Master Fund III, L.P.</td>
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<td>Sandton Fund III Holdings III, LLC</td>
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*No individuals own a 10% or greater interest in EF1 Holdings, LLC.*
# Ownership and Control Report

**Company**: Bronco Coal Resources LLC  
**FEIN**: 47-5158804

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</table>
| Daniel R. Baker| Chief Executive Officer/President          | Emery Mine, P.O. Box 527        | 435-286-2447 | zero         | December 16, 2015  
May 7, 2018          |
|                |                                            | Emery, UT 84522                  |          |              |                     |
| Gary Takenaka  | Chief Operating Officer/Secretary/Treasurer| Emery Mine, P.O. Box 527        | 435-286-2447 | zero         | December 16, 2015  
May 18, 2018         |
|                |                                            | Emery, UT 84522                  |          |              |                     |
| David Petty    | Chief Financial Officer                    | Emery Mine, P.O. Box 527        | 435-286-2447 | zero         | December 16, 2015  
August 3, 2017       |
|                |                                            | Emery, UT 84522                  |          |              |                     |
| Sandton Credit Solutions Master Fund III, L.P. | Owner | 25 West 45th Street New York, NY 10036 | 212-444-7200 | 99.99%   | N/A |
| Sandton Fund III Holdings III, LLC        | Owner | 25 West 45th Street New York, NY 10036 | 212-444-7200 | 0.01% | N/A |

*No individuals own a 10% or greater interest in Bronco Coal Resources LLC*

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<th>PHONE NO</th>
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<th>START DATE END DATE</th>
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<tr>
<td>Bart Hyita</td>
<td>Chief Executive Officer/President</td>
<td>Emery Mine, P.O. Box 527</td>
<td>435-286-2447</td>
<td>zero</td>
<td>April 17, 2018</td>
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<tr>
<td>Harold Cunningham</td>
<td>Treasurer/Secretary/Controller</td>
<td>Emery Mine, P.O. Box 527</td>
<td>435-286-2447</td>
<td>zero</td>
<td>May 18, 2018</td>
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**Date**: 5/18/2018
Ownership and Control Report

**Company**: Sandton Credit Solutions Master Fund III, L.P.  **FEIN**: 98-1113530  25 West 45th Street, New York, NY 10036

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<tbody>
<tr>
<td>Rael Nurick</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
<td>25 West 45th Street, New York, NY 10036</td>
<td>212-444-7200</td>
<td>zero</td>
<td>August 9, 2010</td>
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<tr>
<td>Thomas Wood</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
<td>25 West 45th Street, New York, NY 10036</td>
<td>212-444-7200</td>
<td>zero</td>
<td>August 9, 2010</td>
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<td>Sandton Credit Solutions Onshore Fund III, L.P.</td>
<td>Limited Partner</td>
<td>25 West 45th Street, New York, NY 10036</td>
<td>212-444-7200</td>
<td>70.77% Limited Partner Interest</td>
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<td>Sandton Credit Solutions Cayman Fund III, L.P.</td>
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<td>212-444-7200</td>
<td>29.23% Limited Partner Interest</td>
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<td>Sandton Credit Solutions III GP, LLC</td>
<td>General Partner</td>
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<td>212-444-7200</td>
<td>100% Control Interest (General Partner)</td>
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*No individuals own a 10% or greater control interest in Sandton Credit Solutions Master Fund III, L.P.*
# Ownership and Control Report

**Company**  
Sandton Fund III Holdings III, LLC  
**FEIN:** 47-5678725  
25 West 45th Street, New York, NY 10036

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<td>212-444-7200</td>
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<td>August 9, 2010</td>
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<td>Thomas Wood</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
<td>25 West 45th Street, New York, NY 10036</td>
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<td>Sandton Credit Solutions Master Fund III, L.P.</td>
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*No individuals own a 10% or greater interest in Sandton Fund III Holdings III, LLC.*
 Ownership and Control Report

Company: Sandton Credit Solutions Onshore Fund III, L.P.  FEIN: 32-0413100  25 West 45th Street, New York, NY 10036

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<tr>
<td>Thomas Wood</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
<td>25 West 45th Street</td>
<td>212-444-7200</td>
<td>zero</td>
<td>August 9, 2010</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>New York, NY 10036</td>
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<tr>
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</table>

*No individuals own a 10% or greater control interest in Sandton Credit Solutions Onshore Fund III, L.P.
# Ownership and Control Report

**Company**  | Sandton Credit Solutions Cayman Fund III, L.P.  | **FEIN:** 98-1114113  | 25 West 45th Street, New York, NY 10036

| Relationship | Authorized Person |

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<th>NAME</th>
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<th>ADDRESS CITY</th>
<th>ADDRESS STATE ZIP</th>
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<th>OWNERSHIP</th>
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<th>END DATE</th>
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<tbody>
<tr>
<td>Rael Nurick</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
<td>25 West 45th Street New York, NY 10036</td>
<td>212-444-7200</td>
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<tr>
<td>Thomas Wood</td>
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<tr>
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<td>Limited Partner</td>
<td>25 West 45th Street New York, NY 10036</td>
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*No individuals own a 10% or greater control interest in Sandton Credit Solutions Cayman Fund III, L.P.*
# Ownership and Control Report

**Company**  
Sandton Credit Solutions Fund III Subsidiary VIII, LLC  
**FEIN:** 47-5678847  
**25 West 45th Street, New York, NY 10036**

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*No individuals own a 10% or greater interest in Sandton Credit Solutions Fund III Subsidiary VIII, LLC.*
# Ownership and Control Report

**Company**  
Sandton Credit Solutions Off-Shore III, L.P.  
**FEIN:** 98-1113555  
25 West 45th Street, New York, NY 10036

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<td>100% Control Interest (General Partner)</td>
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*No individuals own a 10% or greater control interest in Sandton Credit Solutions Off-Shore III, L.P.*
Ownership and Control Report

**Company**  Sandton Credit Solutions III GP, LLC  **FEIN:** 38-3910290  
**Address:** 25 West 45th Street, New York, NY 10036

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<tr>
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<td>212-444-7200</td>
<td>100%</td>
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*No individuals own a 10% or greater interest in Sandton Credit Solutions III GP, LLC.*
Ownership and Control Report

Company: Sandton Fund Advisors, LLC  FEIN: 27-2999610  25 West 45th Street, New York, NY 10036

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<tr>
<td>Rael Nurick</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
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<tr>
<td>Thomas Wood</td>
<td>Managing Member of Sandton Fund Advisors, LLC</td>
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APPENDIX II

OWNERSHIP AND LEASHOLD INTERESTS FOR SURFACE AND COAL

INCORPORATED

APR 07 2016

Div. of Oil, Gas & Mining
**ATTACHMENT “C”**

**SURFACE AND MINERAL OWNERSHIP**

**CONTIGUOUS TO BRONCO UTAH OPERATIONS LLC**

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subject to interest, if any, of Johnson Cattle Company. Note: Sevier County Shows ownership of Johnson Cattle Company

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<tr>
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Revised 12/13
Revised 3/16

92-007

**INCORPORATED**

**APR 07 2016**

Div. of Oil, Gas & Mining
APPENDIX 1-3

LIST OF PERMITS
Permits affiliated with officers of Bronco Utah Operations within the last 5 years from February 2016

Horizon Mine (DOGM Permit #C/007/0020)
Wildcat Loadout (DOGM Permit #C/007/0033)
APPENDIX IV
HISTORY OF VIOLATIONS
APPENDIX I-4
LIST OF VIOLATIONS

APPENDIX I-4-A  Hidden Valley
APPENDIX I-4-B  Wildcat Loadout
APPENDIX I-4-C  Emery Deep
APPENDIX I-4-A

Hidden Valley - List of Violations
APPENDIX I-4-B

Wildcat Loadout - List of Violations
<table>
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<tr>
<th>Site Name (Db-Click for Detail)</th>
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<th>Sta</th>
<th>Type</th>
<th>Year</th>
<th>Task ID</th>
<th>Num</th>
<th>Rev</th>
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<td>11/26/2013</td>
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APPENDIX I-4-C

Emery Deep - List of Violations
CONSOL Energy and Related Companies - Violation History
Attachment Page 1 of 1

Entity to whom violation(s) were issued: CONSOL Mining Company, LLC

PERMIT NO: ACT/015/015 MSHA NO: 42-00079 MSHA DATE: 05/13/75
VIOLATION NO: 10088 DATE VIOL. ISSUED: 6/30/2011 ISSUED BY: Utah DOGM
VIOLATION DESCRIPTION: Terminated because: The Permittee is collecting water monitoring
data in accordance with Table VI-17 of the approved MRP. As well
as provided revised water monitoring plan.
CURRENT STATUS: TERMINATED
REQUIRED ACTIONS:

ABATEMENT ACTIONS:

PERMIT NO: C0150015 MSHA NO: MSHA DATE: UT DOGM
VIOLATION NO: C0150015 (10146) DATE VIOL. ISSUED: 6/25/2014 ISSUED BY: UT DOGM
VIOLATION DESCRIPTION: Failed to do a quarterly inspection and P.E. certified report
for the refuse pile during the first quarter of 2014.
CURRENT STATUS: TERMINATED
REQUIRED ACTIONS: Operator needs to insure that quarterly inspection and P.E.
certified reports are done for the refuse pile.

ABATEMENT ACTIONS: Operator has already completed inspection and P.E. certified report
for the second quarter of 2014 on April 20, 2014.

PERMIT NO: C0150015 MSHA NO: MSHA DATE: UT DOGM
VIOLATION NO: C0150015 (15148) DATE VIOL. ISSUED: 12/17/2014 ISSUED BY: UT DOGM
VIOLATION DESCRIPTION: Failed to submit certified reports to the Division promptly
after each inspection of the refuse pile.
CURRENT STATUS: TERMINATED
REQUIRED ACTIONS: Submit refuse pile reports promptly after each inspection

ABATEMENT ACTIONS:
APPENDIX V

PERSONAL INJURY AND PROPERTY DAMAGE INSURANCE INFORMATION
CERTIFICATE OF LIABILITY INSURANCE

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Diversified Insurance Group
136 E. South Temple Street
Suite 2300
Salt Lake City UT 84111

INSURED
Bronco Coal Resources, LLC
550 W. Consol Road
Emery UT 84522

CONTACT NAME: Regan Guth
PHONE: (801) 325-5000
FAX: (801) 532-2804
E-MAIL: rguth@digrisk.com

INSURER(S) AFFORDING COVERAGE
INSURER A: Illinois National Insurance Company

Covers:

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<th>REVISION NUMBER:</th>
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<td>THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.</td>
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WORKERS COMPENSATION AND EMPLOYERS' LIABILITY

Y/N | N/A |

ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) |

If yes, describe under DESCRIPTION OF OPERATIONS below:

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

All operations usual to the business of the insured at the Hidden Valley Mine (mine permit #CO150007). Blasting is not excluded under the General Liability policy.

CERTIFICATE HOLDER

State of Utah
Utah Coal Regulatory Program
1594 W. North Temple, Ste 1210
Box 145801
Salt Lake City, UT 84114-5801

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Regan Guth/ANMAVA

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HIDDEN VALLEY COAL MINE

RECLAMATION PLAN

CHAPTER III

Soldier Creek Coal Company

Submitted by

JBR Consultants Group

May, 1986
Executive Summary

The Hidden Valley Coal property, in the Emery Coal Field south of Emery Town, was to be developed by Soldier Creek Coal Company, a Utah corporation and wholly owned subsidiary of CalMat Company. The property is 960 acres and Soldier Creek Coal Company owns the surface and has the rights to the coal under a long term lease. A mining and reclamation plan, with two amendments, were submitted and approved under the OSM Interim Program. The access road, coal seam exploration, graded pads and drainage control were the only developments realized as economic changes forced curtailment of mine development. This document is a revised Reclamation Plan for the reclaiming of the small developed areas (approximately 6.7 acres of disturbed ground) within the permit area in 1986.

The culverts will be removed from the access road and from the two pad areas. The natural ephemeral drainage crossing the developed area will be restored to accept most of the flow from the reclaimed sites. Because the original drainage control pattern will be restored, the sediment pond will no longer function and can be opened to drain into Ivie Creek.

The access road will be accessible to 4-wheel drive vehicles only and be waterbarred to control surface flows. The road surface will be scarified and seeded. The integrity of the road alignment will be maintained in support of the postmining land use of grazing by improving watershed values and providing a livestock trailway.

The adits in the two coal seams will be sealed and the seams covered and graded. Topsoil materials stored on site will be spread over a portion of the disturbed areas to provide a seedbed. Other materials on site will be used for seedbed material where topsoils are not available. All of the reclaimed areas will be mulched, fertilized and seeded in late fall as the final phase of

Permit Revision

March 15, 1991
reclamation. Drift fences will be installed to restrict cattle use of the seedings.

A ten year monitoring plan will sample the water quality and flows semi-annually in Ivie Creek and check on the progress of the revegetation efforts. Projects cost for reclaiming the site in 1986 are $148,716 and $23,000 for 10 years of monitoring.
Table of Contents

* Revised, Modified or Added for Completeness and Technical Review

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   UMC 817.133
   UMC 823.11
   UMC 823.14
   UMC 823.15

II  Structural Removal and Site Clean-up .......................... 9
   *UMC 784.11(b)
   UMC 784.11(b)(2)(6)
   UMC 784.13(a)
   *UMC 784.13(b)(1)(3-5)
   *UMC 784.13(b)(8)
   *UMC 817.13-.15
   UMC 817.17-.74
   UMC 817.18-.88
   UMC 817.91-.92
   UMC 817.95
   UMC 817.97
   UMC 817.132

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   *UMC 817.101
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   *UMC 817.106

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   UMC 784.16(a)(3)(iv)
IV Drainage Control Con't.

*UMC 784.16(b)(1)
*UMC 784.16(b)(2)
*UMC 784.16(c)
UMC 784.16(d)(e)
*UMC 784.22
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*UMC 817.160-.165
*UMC 817.166
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Chapter III

Introduction

Consolidation Coal Company, a Utah Corporation and a wholly-owned subsidiary of CalMat Company, purchased this property from Soldier Creek Coal Company, a Utah Corporation and a wholly-owned subsidiary of CalMat Company, and leased the right to mine coal from Ivie Creek Coal Company. The mine was developed by Soldier Creek Coal Company to develop the coal as a fuel source for their cement kilns (See Plate I for location, Plate 1a for ownership and Plate 1b for permit area). A mining and reclamation plan was submitted for this mine on September 7, 1979 under the OSM Interim Regulations. This mining and reclamation plan granted conditional tentative approval on February 4, 1980 under the Interim Program by the Utah Division of Oil, Gas and Mining. Final approval under the Interim Program Regulations for Coal Mining and Reclamation Operations and the Utah Mined Land Reclamation Act was received April 14, 1980. A corporate guarantee of $152,500 was posted to cover projected reclamation costs under the Interim Plan. These plans, amendments and correspondence are on file at the Division's offices in Salt Lake City.

On November 2, 1995, this permit was transferred from Hidden Valley Coal Company to Consolidation Coal Company. The Hidden Valley Mine was conveyed to Consolidation Coal Company by Special Warranty Deed and Assignment of Coal Lease on November 14, 1995. The Special Warranty Deed was recorded on November 21, 1995, as Entry No. 340818, in Book 219, at Pages 299-303, and Assignment of Coal Lease was recorded on November 27, 1995, as Entry No. 340847, in Book 219, at Pages 363-369, in the real property records of Emery County, Utah. Reclamation Agreement was signed on December 8, 1995 by Consolidation Coal and submitted to the State of Utah's, Division of Oil, Gas and Mining.

The mining plan for Hidden Valley proposed production to begin in

Revised 9/3/96
HIDDEN VALLEY MINE SITE
Township 23 South, Range 6 East
Salt Lake Base and Meridian
Section 18 & the West 1/2 of Section 17

AREA OF 1" : 100' SCALE MAPS
(PLATES II, III & IV)
I

CONSOliDATED COAL - 50% SURFACE AND MINERAL
THE PITTSBURG MIDWAY - 50% SURFACE AND MINERAL
GULF OIL CORP. - 50% COAL

BANK OF CALIFORNIA (LOVELLA COOK
ROYALTY CONVEYANCE)
JOHN E. LANSING

IVIE CREEK COAL ASSOCIATES -
100% MINERALS
June, 1981. Maximum production was to be 500,000 tons annually with an expected mine life of 40 years. The initial development work commenced on April 17, 1980 with this goal in mind. However by August, 1980 it became evident that economic conditions had changed and it was decided by the company to cease development.

Within this short construction period a paved 2.75 mile access road from Highway 10 to the proposed coal processing site was completed with state funds and dedicated to Sevier and Emery Counties (See Appendix I, ROW documents). A 0.5 mile graveled Class II road was completed to gain access to the coal seams adjacent to Ivie Creek. The upper seam is designated the B coal seam and the lower seam is called the A seam. At the coal seams two pads were constructed for the future portal operations area. Culverts were installed in the graveled access road and in the benches for drainage control. A sediment pond was constructed on the lower pad to receive surface flows from the pads. Bulk coal samples were obtained from the existing exploratory adits in the two naturally exposed coal seams (See Figure I). These exposed coal seams were faced up and safety benches were constructed above the seams in anticipation of portal construction. Topsoil was stockpiled adjacent to the upper or "B" seam pad.

Because mine development did not proceed beyond this stage, no coal production was realized. Consequently, no other proposed facilities for mining and coal processing were constructed on the
SAMPLE SITE

B SEAM

A SEAM

SOLDIER CREEK COAL COMPANY
HIDDEN VALLEY MINE

EXPLORATORY ADITS

CONSULTANTS GROUP
SALT LAKE CITY, UTAH

5/13/86
property (Plate II). The disturbed area is approximately 6.7 acres consisting of an access road, pads and drainage control structures.

This reclamation plan will meet the regulations of the Permanent State OSM Program and supercedes the plan submitted under the Interim Program. The baseline data and mine plans are available in the Division of Oil, Gas and Mining files and will not be repeated in this plan. Many of the regulation sections usually required in a reclamation plan do not apply because facilities for coal production were never constructed. All sections of the required regulations are addressed in the plan but those not applicable are dismissed with a brief explanation. An Addendum is attached to this report to provide the information necessary to complete the original application.
I. Proposed Postmining Land Use Acreage to be Reclaimed and Timing and Sequence

UMC 784.15 Reclamation Plan. Post Mining Land Use

The adjacent BLM lands are permitted for cattle grazing in the winter and early spring. Most of the forage production is confined to the flats and benches in Castle Valley. Some grazing occurs on the upper benches of the permit areas. The livestock use of the fee lands is presently unregulated. The declaration for postmining land use would be wildlife habitat and livestock grazing. This was the land use prior to the proposed mine development and this land use has continued to the present.

Because a variance to leave cut and fill slopes associated with the access road is being requested (see revised page 24 of this Plan), part of the disturbed area would involve an alternative postmining land use as defined by the Division. This is due to the fact that the cut and fill slopes, although still used for the postmining uses of livestock grazing and wildlife habitat, would allow a higher or better usage than occurred previous to the disturbance. This use would be compatible with the surrounding land uses. Emery County officials have indicated that their preference generally is not to close existing roads (Personal communication with Scott Johansen, Emery County Attorney, March 14, 1991).

BLM Saleratus Allotment

409 cattle from Nov. 11th to March 31st, stocking rate is 1 AUM/10 Acres for total AUM's of 1843.

The disturbed acreage of the permit area is mostly sandstone talus slopes that provides very little livestock forage or wildlife habitat as is generally defined. The revegetation of these small disturbed areas will be in accordance with adjacent surveyed range reference sites. This revegetation will not provide either

Permit Revision

APPROVED Mining & Reclamation Plan
7 Approved, Division of Oil, Gas & Mining
March 15, 1991
wildlife or livestock forage of any significance but will stabilize the site.

As with the surrounding BLM land, there is no crucial wildlife habitat in the area; wildlife species utilizing the site would most likely be small mammals and birds. Cattle would likely be the type of livestock using the area; they also graze adjacent federal land managed by the Bureau of Land Management. A grazing management plan for the site is detailed below, and is based upon livestock management in the adjacent BLM grazing allotment. In this way, the postmining land use and management at Hidden Valley will be compatible with management of the surrounding land. The BLM’s proposed Resource Management Plan for the San Rafael Planning Area was utilized in preparation of the grazing plan.

Critical soils are present at the Hidden Valley site, in the form of both saline and erodible soil. A grazing plan should ensure protection of these soils. Therefore, in line with both BLM policy for the adjacent lands and site specific conditions, emphasis on achievement of the postmining land use will be through protection of critical soils, and management of the site to increase vegetation. The revegetation seed mix, as described on page 58 was chosen with this in mind, rather than exclusively specifying native plants with high forage values.

Application of the grazing rate used on the Saleratus Allotment to the disturbed and reclaimed area would result in a forage production of less than one AUM, so livestock grazing will likely be minimal at the site, unless better forage production than provided by native vegetation is achieved. Cattle would be the preferred user. Period of use of the reclamation site will be the same as the adjacent federal land: November 16 through March 15. The access road will be used as the primary travelway for livestock, both to gain entry to the revegetated disturbed areas and to access Ivie Creek, the only nearby perennial water source.

Plan Revision 7-a March 15, 1991

AMENDMENT TO
APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining
by Smh/SP date 4/25/91
(The access road has been left in place to aid in achievement of the postmining land uses, as described under the request for variance in this document).

The objective of the grazing plan would be to lease the 1.5 square-mile permit area to the adjacent BLM permittee. (This operator currently has access to much of the undisturbed permit acreage that is not fenced.) If that permittee did not wish to lease the property, then CalMat would open the lease to competitive bidding. The lessee would then need to insure that his livestock did not trespass to adjacent BLM land and that the BLM permittee no longer accessed the Hidden Valley property.

AMENDMENT TO
APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by SmW/JR date 4/27/91
7-b
March 15, 1991
Plan Revision
UMC 817.133 Postmining Land Use

The original permit contemplated reclaiming approximately 6.7 acres of disturbed land in the fall of 1986 with completion by December 31, 1986. The entire 960 acres (section 18, all and section 17, W1/2) is currently under Permit ACT 015/0007. CONSOL currently holds reclamation bond on this area. CalMet, the applicant under the original interim permit, began initial construction of an underground coal mine in the late 1970's. Approximately 6.7 acres of surface was affected by CalMet during construction of a haul road into the canyon, a buried culvert to direct unaffected surface drainage under the affected area, a sediment pond to control affected surface runoff, and four exploratory adits into both the A seam and CD Seam (CalMet called this the B seam). Topsoil was not required to be removed under the original permit. The mine never reached full production and CalMet began reclamation in 1987 under a permanent program Mining and Reclamation Plan approved by the Division. Consol purchased the property in 1995 and assumed the mining permit, bond and reclamation liability. Consol was in the process of completing final reclamation on the site until the decision was reached to investigate the mineability of the A seam. The majority of the reclamation work was completed then with the exception of the “A” and “B” seam benches. With the approval of Amendment 97B on September 22, 1997, the B seam side was reclaimed with the “A” seam side to follow a few years later, once vegetative success was demonstrated. Per Emery Deep mine’s 2011 annual report and Hidden Valley mid-term review deficiency task 4604, CONSOL will initiate discussions with DOGM regarding development of a reclamation strategy for the remaining disturbed portions of the Hidden Valley Mine. With market changes in mid-2005, CONSOL requested that the reclamation of the “A” side seam bench be postponed. Submittal in 2006 of a Minor Exploration Permit for exploratory drilling and a Major Exploration Permit to re-open both “A” and “B” adits for test coal shipments followed with further requests to postpone reclamation due to the possibility of opening a large scale underground mine at the site. All water monitoring and sediment control maintenance have remained functional. At this time, CONSOL continues to evaluate and market this reserve along with the adjacent properties and will continue to request reclamation extensions through the annual review process. CONSOL continues to own in fee the 480 acres adjacent to the north side of the present permit boundary.

Borehole Reclamation:

During the exploration phase of the Minor Exploration Permit (MEP) in 2006/2007, CONSOL drilled nine exploration boreholes. Upon completion of down-hole procedures, six of the nine exploration bore holes were reclaimed per MEP requirements. The remaining three boreholes (HV-06-01, HV-06-02 and HV-06-03) were completed as groundwater monitoring wells to supply background information for the contemplated Major Exploration Permit and subsequent Major Revision to this MRP. During final reclamation each drill hole will be sealed with cement from the bottom of the hole to ground level. A brass monument marker will be placed in the top of the cement surface plug with the hole number.
All areas disturbed under this drilling program that were not previously disturbed (e.g., roads) will be regraded after drilling to the approximate original contour during reclamation. All existing dirt roads will be left in place at serviceability at least equal to that which existed prior to drilling. During reclamation, soils compacted by vehicle and equipment traffic will be loosened to promote revegetation. Final grading will be along the contour to control erosion. After soils have been loosened the impacted area will be reseeded with the following seed mix:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Pounds Pure Live Seed/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian ricegrass</td>
<td><em>Oryzopsis hymenoides</em></td>
<td>3.0</td>
</tr>
<tr>
<td>Alkali sacaton</td>
<td><em>Sporobolus airoides</em></td>
<td>0.5</td>
</tr>
<tr>
<td>Galleta hilaria</td>
<td><em>Hilaria jamesii</em></td>
<td>2.5</td>
</tr>
<tr>
<td>Western wheatgrass</td>
<td><em>Agropyron smithii</em></td>
<td>3.0</td>
</tr>
<tr>
<td>Winterfat</td>
<td><em>Eurotia lanata</em></td>
<td>4.0</td>
</tr>
<tr>
<td>Fourwing saltbush</td>
<td><em>Atriplex canescens</em></td>
<td>4.0</td>
</tr>
<tr>
<td>Desert globemallow</td>
<td><em>Sphaeralcea ambigua</em></td>
<td>0.5</td>
</tr>
<tr>
<td>Blueleaf aster</td>
<td><em>Aster laevis</em></td>
<td>0.5</td>
</tr>
<tr>
<td>Sand dropseed</td>
<td><em>Sporobolus cryptandrus</em></td>
<td>0.25</td>
</tr>
<tr>
<td>Castle valley clover</td>
<td><em>Atriplex gardneri</em> (var. cuneata)*</td>
<td>4.0</td>
</tr>
<tr>
<td>Black sagebrush</td>
<td><em>Artemesia nova</em></td>
<td>0.25</td>
</tr>
<tr>
<td>Mat saltbush</td>
<td><em>Atriplex corrugate</em></td>
<td>4.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>26.5</strong></td>
</tr>
</tbody>
</table>

Seed will be placed by broadcasting. Following placement of seed, the soil will be lightly raked to cover the seed.

**UMC 785.17 (b)(2, 6, 9); UMC 823.11 (c); UMC 823.14; UMC 823.15 Prime Farmland**

Prime Farmland was not designated in the permit and does not exist within the permit area. All the lands in the permit area are undeveloped.
II. Structural Removal and Site Clean Up

UMC 784.11 (b) Operation Plan: General Requirements
There is a sediment pond with a small dam built into the pad at the "A" seam location. There are no other embankments or impoundments.

The sediment pond will be decommissioned at the time of reclamation of the disturbed area. The pond will lose its function because the contributing drains will be removed and the natural drainages restored. This will cut off flows to the pond except for the immediate surface flows on the lower pad.

With the reestablishment of the ephemeral channel, waterbars in the access road, regrading of the A seam and B seam pads and the bench cut on the A seam face-up; the area draining to the sediment pond will be quite small, less than one half acre. As such, the pond will no longer serve a purpose. Therefore it is proposed that the discharge structures of the pond will be removed and the embankment facing Ivie Creek be breached. This will allow the discharges from the small drainage area to flow through the pond area. Peak flow from the area is only 0.35 cfs, based on a 10-year-24-hour precipitation and a curve number of 78 (Table 1 & 2). This minimal flow will not result in any significant accumulation in the area. The regraded surface of the pond is shown in Plate V and Figure II.
UMC 784.11 (b)  Operation Plan: General Requirements

The sediment pond was decommissioned and constructed with a discharge channel of sufficient size and riprapped to handle the expected discharges of a single event from the A seam pad. The second discharge channel was not constructed.
Table 1 - Peak Flows for Diversion Structures and Restored Channels

<table>
<thead>
<tr>
<th>Structure ID</th>
<th>Curve Number</th>
<th>Time of Concentration (hr)</th>
<th>Drainage Area (ac)</th>
<th>Storm Duration (hr)</th>
<th>Precip. Depth (in)</th>
<th>Rainfall Distribution</th>
<th>Peak Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ephemeral Channel</td>
<td>78</td>
<td>0.54</td>
<td>124.89</td>
<td>24</td>
<td>2.60</td>
<td>SCS Type II</td>
<td>70.97</td>
</tr>
<tr>
<td>A-seam Terrace</td>
<td>85</td>
<td>0.03</td>
<td>1.9</td>
<td>24</td>
<td>1.67</td>
<td>SCS Type II</td>
<td>1.20</td>
</tr>
<tr>
<td>A-seam pad</td>
<td>80</td>
<td>0.22</td>
<td>0.78</td>
<td>24</td>
<td>1.67</td>
<td>SCS Type II</td>
<td>0.26</td>
</tr>
<tr>
<td>Sediment Pond</td>
<td>80</td>
<td>0.43</td>
<td>0.41</td>
<td>24</td>
<td>1.67</td>
<td>SCS Type II</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Curve Number Documentation - Appendix III

Table 2 - Proposed Diversion and Channel Configuration

<table>
<thead>
<tr>
<th>Reach</th>
<th>Q (cfs)</th>
<th>Slope (%)</th>
<th>Bottom m width (ft)</th>
<th>&quot;n&quot;</th>
<th>Flow Depth (ft)</th>
<th>Flow Velocity (fps)</th>
<th>Permissible Velocity (fps)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ephemeral Channel</td>
<td>70.97</td>
<td>10.5</td>
<td>10</td>
<td>2 **</td>
<td>0.56</td>
<td>11.4</td>
<td>** Riprap w/ D50 of 0.75 ft</td>
<td></td>
</tr>
<tr>
<td>A-seam Terrace</td>
<td>1.2</td>
<td>3.0</td>
<td>0</td>
<td>5.5</td>
<td>0.034</td>
<td>0.40</td>
<td>2.7</td>
<td>5.0-6.0* Asymmetric Channel</td>
</tr>
<tr>
<td>A-seam pad</td>
<td>0.26</td>
<td>110.0</td>
<td>0</td>
<td>2</td>
<td>0.028</td>
<td>0.12</td>
<td>8.2</td>
<td>2.5-4.0* Alluvial Soils</td>
</tr>
<tr>
<td>Sediment Pond</td>
<td>0.10</td>
<td>90.0</td>
<td>0</td>
<td>2</td>
<td>0.028</td>
<td>0.09</td>
<td>6.0</td>
<td>2.5-4.0* Alluvial Soils</td>
</tr>
</tbody>
</table>

* Values obtained from Table 6.1b in Simons and Li (1982)
** Channel design selected and evaluated using Steep Slope Diversion Design method (Simons and Li, 1982)

Table 3 - Riprap Gradation

| D100 | 2.5 * D50 | 1.50 ft |
| D85  | 1.8 * D50 | 1.13 ft |
| D50  | 1.0 * D50 | 0.75 ft |
| D15  | 0.1 * D50 | 0.08 ft |
The A-seam terrace diversion has been made functional by regrading the bench cut, and has been extended by creating a ditch across the road and down onto the flat area east of the ephemeral channel. The alignment of this channel is shown on the revised Plate III, and design details are given in the addendum to Appendix III. Information on peak flows and channel configuration for this diversion is updated from that given in Tables 1 and 2 as follows:

Table 1 - Peak Flows for Diversion Structures and Restored Channels

<table>
<thead>
<tr>
<th>Structure ID</th>
<th>Curve Number</th>
<th>Time of Concent. (hr)</th>
<th>Drainage Area (ac)</th>
<th>Storm Duration (hr)</th>
<th>Precip. Depth (in)</th>
<th>Rainfall Dist.</th>
<th>Peak Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-seam Terrace</td>
<td>85</td>
<td>0.016</td>
<td>1.35</td>
<td>24</td>
<td>2.60</td>
<td>SCS B</td>
<td>1.83</td>
</tr>
</tbody>
</table>

Table 2 - Proposed Diversion and Channel Configuration

<table>
<thead>
<tr>
<th>Reach</th>
<th>Q (cfs) (%)</th>
<th>Slope</th>
<th>Bottom width (ft)</th>
<th>&quot;n&quot;</th>
<th>Flow Depth (ft)</th>
<th>Flow Vel. (ft)</th>
<th>Permissible Velocity (fps)</th>
<th>Remar</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-seam Terrace:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>upper</td>
<td>1.83</td>
<td>8</td>
<td>0</td>
<td>1&amp;3</td>
<td>.025</td>
<td>0.4</td>
<td>4.9</td>
<td>5.0-6.0</td>
</tr>
<tr>
<td>lower</td>
<td>1.83</td>
<td>17</td>
<td>0</td>
<td>3&amp;3</td>
<td>.035</td>
<td>0.3</td>
<td>5.2</td>
<td>11</td>
</tr>
</tbody>
</table>

The A-seam pad diversion was never installed. All runoff from the pad is conveyed through the sediment pond diversion. Information in Table 2 has been updated to show flow characteristics of the combined flow from the A-seam pad and the sediment pond diversions:

Table 2 - Proposed Diversion and Channel Configuration

<table>
<thead>
<tr>
<th>Reach</th>
<th>Q (cfs) (%)</th>
<th>Slope</th>
<th>Bottom width (ft)</th>
<th>&quot;n&quot;</th>
<th>Flow Depth (ft)</th>
<th>Flow Vel. (ft)</th>
<th>Permissible Velocity (fps)</th>
<th>Remar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sed. Pond</td>
<td>0.36</td>
<td>90</td>
<td>0</td>
<td>2</td>
<td>.035</td>
<td>.16</td>
<td>7.0</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Plan Amendment 1

Approved, Division of Oil, Gas & Mining

Plan Amendment 1

November 15, 1989
CROSS SECTION OF REGRADED SEDIMENT POND

LONGITUDINAL PROFILE 3 SEDIMENT POND

SOLDIER CREEK COAL COMPANY
HIDDEN VALLEY MINE

SECTION AND PROFILE OF SEDIMENT POND

FIGURE II
A hydraulic evaluation of the reach from the sediment pond to Ivie Creek was conducted and it was determined that a trapezoidal channel with a 2h:1v sideslope and a six foot bottom would have a water velocity less than the maximum allowable. Slope protection with riprap is proposed for the sediment pond channel. The pond slopes will be seeded when the bench and coal seam slopes are revegetated. See Appendix III for hydrology methods.

UMC 784.11 (b)(2)(6) Operation Plan: General Requirements
Response: Not Applicable

UMC 784.13 (a) Reclamation Plan: General Requirements
Response: Refer to Interim Plan

UMC 784.13 (b)(1)(3-5) Reclamation Plan: General Requirements
Response:
(b)(1) See Section VIII, Schedule
(b)(2) See Section VIII, Schedule
(b)(3) See Section III, Backfilling and Grading
(b)(4) See Section V, Topsoil Redistribution
(b)(5) See Section VI, Revegetation

12
(b)(6) Not Applicable

(b)(7) Not Applicable

**UMC 784.13 (b)(8) Reclamation Plan; General Requirements**

Response: See Figure III

**UMC 817.13-.15 Casing and Sealing Underground Openings: General Requirements**

Response: The four shallow exploration adits are the only underground mine openings. The closure techniques for these openings are described in Section III. There have also been seven (7) exploration drill holes completed on the property. These holes were drilled both to evaluate the coal resource and to explore for groundwater for use as a mine water supply.

The locations of these drill holes are shown on Plate IV. Drill holes 1, 2, #3, and 7 discovered artesian water. These holes are part of an approved and in-force 0.25 CFS water right issued by the Utah Division of Water Rights. The other drill holes, 4, 5, and 6, found no water and were dry. Drill holes 1, 2, 3, and 7 were cased and completed as water wells. Valves were installed on each wellhead. The valves were in turn wrapped with fiberglass insulation, covered with an empty 55 gallon drum, and buried beneath a mound of soil.
SEAM A

FERRON SANDSTONE

MAXIMUM SEAM THICKNESS 15.3 FEET

SEAM B

SANDSTONE

SHALE

SANDSTONE

MAXIMUM SEAM THICKNESS 12.5 FEET

SLOPE = 2h:1v

SLOPE = 2h:1v

CONSULTANTS GROUP
SALT LAKE CITY, UTAH

SOLDIER CREEK COAL COMPANY
HIDDEN VALLEY MINE

CROSS SECTIONS FOR COAL SEAM BACKFILLS

FIGURE III

14
HIDDEN VALLEY MINE

DRILL HOLE 1

DRILL HOLE 2

DRILL HOLE 3

DRILL HOLE 4

DRILL HOLE 5

DRILL HOLE 6

DRILL HOLE 7

HIDDEN VALLEY MINE

SOLDIER CREEK COAL COMPANY

HIDDEN VALLEY MINE

DRILL HOLE LOCATIONS

CONSULTANTS GROUP
SALT LAKE CITY, UTAH

PLATE IX
An inspection of all drill sites was carried out on July 31, 1986. This inspection revealed that drill holes 1, 2, 3, and 7 remain soil-covered as described above and that no leakage, evidenced by either wet soil or unusual plant growth, is taking place. The site of drill hole #4 was located, but the actual drill hole could not be found indicating that it has most likely been plugged and backfilled. Drill holes #5 and #6 were both located. Drill hole #5 was found to be open and covered with plastic sheeting beneath a large rock. Drill hole #6 was found to be cemented to the surface with a survey marker installed in the plug.

Drill hole #5 will be plugged with a five-foot surface plug during the reclamation work to be conducted during the Fall of 1986. Drill holes 1, 2, 3, and 7 will remain in their current condition since the water right for this property represents an asset that significantly enhances the potential for future development and also the property's value for resale. The Division of Water Rights has indicated that the water right is in force and that an extension through January 31, 1988 has been granted allowing the water right holder additional time to develop the water right. Given the potential for future coal development in this area, it is likely that further extensions (five years in term) will be granted. The Division of Water Rights has also indicated that the means of temporarily capping these wells that is described above is acceptable (Mr. Kent
The known location for drill hole #4 will again be searched with a shovel and probe at the time of reclamation to determine if the drill hole is plugged or open. The site is remote and the exploration road is not serviceable. Thus to use equipment on the site to search for this drill hole would require the re-opening of the exploration road, an additional disturbance. Should an open drill hole be discovered at this site it will be plugged with a five-foot surface plug during the reclamation construction period.

Drill holes #1, 2, 3 and 7 are part of Soldier Creek Coal Company's water right that has been extended to Jan. 31, 1988. Soldier Creek Coal Company through Calmat will notify the DOGM by March 1, 1988 of the action taken by the Utah Division of Water Rights regarding this water right. Should the water right be terminated, then abandonment procedures as required by the Utah Division of Water Rights', will be undertaken within 90 days of the date of final notice on the water right. Consolidation Coal Soldier Creek recognizes that this may require an extension of a portion of the surety bond to cover the additional costs of reclamation of the drill hole sites following abandonment action.

Should the water rights be transferred then Consolidation Soldier Creek Coal Company will follow the procedures in UMC 817.53 for transfer of water rights.

Revised 9/3/96
Drill holes 4, 5 and 6 were plugged with five (5) feet of concrete in 1986 as part of the work performed on the site.

Drill holes 1, 2, 3, and 7 are appurtenant to approved water right Application Number 47409 and Change Application A-1086 with the Utah Division of Water Rights. These water wells will remain in their present, useful condition, beyond the date when final bond release for the site occurs, unless the water right is revoked or terminated.

(Appended Dec. 17, 1992)
Project files providing information from the original 1978 site survey were located in the summer of 1993. Drill holes #1-6 were included in the survey, and their locations are provided below. Information on drill hole #7 was not included in the survey: its location is given based upon available mapping.

### Drill Hole Legal Descriptions (All in T23S, R6Em SLB&M)

<table>
<thead>
<tr>
<th>Drill Hole</th>
<th>Legal Description</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH-1</td>
<td>So 1.230 ft. and Ea 1.480 ft. from NW Corner.</td>
<td>18</td>
</tr>
<tr>
<td>DH-2</td>
<td>No 1.280 ft. and Ea 1.410 ft. from SW Corner.</td>
<td>18</td>
</tr>
<tr>
<td>DH-3</td>
<td>No 1.070 ft. and W 1.490 ft. from SE Corner.</td>
<td>18</td>
</tr>
<tr>
<td>DH-4</td>
<td>No 1.200 ft. and Ea 1.140 ft. from SW Corner.</td>
<td>17</td>
</tr>
<tr>
<td>DH-5</td>
<td>So 1.480 ft. and W 1.350 ft. from NE Corner.</td>
<td>18</td>
</tr>
<tr>
<td>DH-6</td>
<td>So 1.220 ft. and Ea 1.190 ft. from NW Corner.</td>
<td>17</td>
</tr>
<tr>
<td>DH-7</td>
<td>No 100 ft. and Ea 2.350 ft. from SW Corner.</td>
<td>18</td>
</tr>
</tbody>
</table>

During the summer of 1993, inspections were carried out to determine the status of drill holes #4, 5, and 6. After several unsuccessful attempts, drill hole #4 was located September 9, 1993 using the above-mentioned survey data. The hole was found to be capped at the surface with cement. On July 7, 1993, drill hole #5 was also found to be capped with cement at the surface. Reclamation records indicate that a five-foot cement plug was installed in each of these holes in 1966. Drill hole #6 was found to be plugged with packed soil to the surface. In July, 1993, the temporary soil plug was removed and replaced with a five-foot cement plug. Photographs were taken of all three capped holes.
Jones, Utah Division of Water Rights, Salt Lake City).

UMC 817.17-.74 Disposal of Excess Soil and Underground Development Waste: General Requirements
Response: There are no excess soils or underground wastes.

UMC 817.81-.88 Coal Processing Waste Banks: General Requirements
Response: Coal was not produced or processed under this permit.

UMC 817.91-.92 Coal Processing Waste: Dams and Embankments
Response: None exist on the property.

UMC 817.95 Air Resources Protection
Response: There was no underground mining or coal processing consequently there was no methane gases or emissions developed.

UMC 817.97 Protection of Fish, Wildlife and Related Environmental Values
Response: Refer to Interim Plan.

UMC 817.132 Cessation of Operations: Permanent
Response: There was no underground mining. Development ceased in August, 1980
Response: There was no underground mining or coal processing consequently methane gases or emissions were not produced.

(a) (b)
Construction in this small area within a protected drainage will not produce copious amounts of fugitive dust. In this remote area no croplands or developments are contiguous to the permit area. During periods of strong winds large amounts of dust are transported naturally from the many barren and exposed soils in this area often exceeding Class II particulate levels.

During periods of extreme wind (50 mph+) construction will be delayed until winds abate. Water control of dust is not deemed necessary in this protected canyon. The only activity outside of the canyon is loading of the roadbase material which is a gravelly sandy material.
The static safety factor for the fill on the "A" seam pad is 1.354 and for the fill on the "B" seam pad is 1.353. The slope stability analysis is in Appendix VII.
III Backfilling and Grading--including Portal Closure

UMC 817.100 Contemporaneous Reclamation
There have been only maintenance activities (drains, signs, etc.) on the property since August, 1980. The topsoil stockpile was hydroseeded in 1985 to stabilize and protect the soils material.

UMC 817.101 Backfilling and Grading: General Requirements
(b) Portals and Coal Seams
A dozer will be used to collapse the roof structures and push them into the exploratory adits. Soil and rock materials from the pads and culvert excavations will then be pushed into each adit for 25' to seal these openings. This is in accordance with MSHA Regulations 75.1711-2 (30 CFR Chapter I, 7-1-85 edition).

The exposed coal seams would then be covered and graded to a slope of approximately 2h:lv. The berm on the diversion above the "B" seam will be removed and cast down after backfilling. The slopes will then be covered with approximately 2" of topsoil and revegetated. Figure III shows the generalized backfill cross sections for the A and B seams. Actual cross sections showing pre- and post-reclamation configurations for the A seam and B
seam pads and highwalls are presented on Figure IV. Backfill volume required for the A seam is estimated to be 2500 cubic yards. This quantity plus the substantial existing talus bank that has naturally formed at the toe of the highwall will be adequate to achieve a 2h:1v fill slope. The volume of fill required to achieve a 2h:1v slope against the B seam is approximately 10,200 cubic yards. The source of fill for these backfills will be the estimated 11,000 cubic yards of material excavated from the channel to be cut through the B seam pad and the 1800 cubic yards of road base material stockpiled on the site. The road base material will be placed against the highwall on the B seam cut and covered with pad material.

The removal of the berm on the highwall diversion will allow the surface flows to drain down the hillside in small rivulets. To prevent gully action on the sloped portion of the diversion the sidecast material will be placed on the terrace to restore the original slope gradient (Plate III). This will require about 84 cu. yds. of material on 300' of terrace.

(1) Road

The three culverts (80' of 48" diameter, 40' of 18" diameter and 70' of 18" diameter) located in the road will be removed. The 48" diameter culvert, located at the crossing of the ephemeral channel, will be removed to construct a channel to allow fording of the creek. Based on the reaches up and downstream of the
Three small, exposed coal seams along the road cut have been backfilled at a 2h:1v slope. Surfaces were prepared and revegetated according to the original revegetation plan.
The four culverts (80' of 48" diameter, 40', 50' and 70' of 18" diameter) located on the road will be removed.
CROSS SECTION
A SEAM PAD

IVIE CREEK

A SEAM BACKFILL

CURRENT GROUND SURFACE

CROSS SECTION
B SEAM PAD

B SEAM BACKFILL

CURRENT GROUND SURFACE

IVIE CREEK

ROAD

CROSS SECTION AND POST RECLAMATION CONFIGURATION
A SEAM AND B SEAM PADS

20
portion to be restored, it is expected that the channel bottom will rest on bedrock. The gradient of the channel will be the same as it was on the culvert (0.071 ft/ft) (Figure V). The channel will be riprapped to stabilize the disturbed section.

The other two 18" diameter culverts are road drainage culverts which were spaced to convey runoff under the road to prevent significant erosion. With the removal of these culverts waterbars will be installed according to spacing in Table 3b and Plate III at a 45° angle to the direction of the roadbed. These waterbars will serve a similar purpose as the culverts, to control and collect surface runoff from the road and the hillsides above the road. The 11 waterbars will be approximately 18" high by 72" wide with a rounded crest extending across the road (Figure VI). The area just up hill from the bar will be excavated to a depth of 12" by a width of 48". The small flows diverted at each waterbar will be discharged to the west into the natural rockfill above the ephemeral drainage.

The roadbed will then be ripped to increase percolation and water-holding capacity. The entire road surface will be seeded. A gate with a lock will be installed near the top of the road to discourage trespass and prevent livestock drift onto the revegetated areas (Plate III).

This reclamation process on the road will restore the natural
Two additional waterbars have been added near the end of the road to prevent erosion of the toe of the small roadside coal seam backfill. They were installed according to the specifications in the original Plan. Where needed to control gullying, onsite rock has been placed in the waterbar outfalls to supplement existing rock fill. Small loose-rock check dams were installed at the downstream end of the waterbars to check the water before it spills over the crest of the outfall.
Two additional waterbars have been added near the end of the road to prevent erosion of the toe of the small roadside coal seam backfill. They were installed according to the specifications in the original Plan. In addition, onsite rock has been placed in the waterbar outfalls to supplement existing rock fill where needed to control gullying. Small loose-rock check dams were installed at the downstream end of the waterbars to check the water before it spills over the crest of the outfall.

During the 1989 repair work, the road was not ripped and revegetated, for the reasons described on Amendment page 51. Erosion from the road surface appears to be adequately controlled through the installation and maintenance of water bars, and through the previous three years' of revegetation.
In summer 1994, selected areas of the road outslopes were treated to control erosion. As described in the March 15, 1991 Plan Revision, the roadway intercepts runoff from up-gradient, undisturbed areas. Retention of much of that sediment-laden runoff occurs within water bars located downstream of the gate. Elsewhere on the roadway, runoff from up-gradient areas and direct precipitation is also infiltrated. The roadway thereby stores fine sediments and increases available water for plant growth. During larger storm events, runoff that is not contained within the water bars discharges down the road outslope.

Prior to the treatment described herein, erosion had occurred on the un-engineered fill at locations where water bars had previously discharged excess runoff from undisturbed areas up-gradient of the road. This discharge, and associated erosion, was primarily the result of two major storm events in 1987 and 1989. Site repairs were carried out following both events; they consisted of expanding the retention capacity of the water bars, constructing small rock check dams, and placing large, on-site rock within the discharge outfalls where locally available. In 1991, three of these locations were the subject of a Notice of Violation issued by DOGM. The NOV was subsequently vacated and no physical work was done on the outfalls. However, on May 6, 1994, DOGM was issued a Ten-Day Notice by OSM for erosion at five locations on the road outslope. The TDN cited R645-301-534.150, which requires control or prevention of erosion on roads. Although the TDN dealt with the same features as the vacated NOV, and there had been no change to those features between 1991 and 1994, erosion control treatment was implemented. Techniques and materials are described below; these were approved by DOGM before implementation.

In general, the treatment consisted of a combination of reshaping the discharge courses, and placing erosion control matting and/or fiberdam material. In addition to the five sites cited by OSM, three other locations were also treated. The treatment was implemented using non-mechanical, hand labor. Cross section and alignment varied both within and among discharge courses. In addition, particle sizes encountered at the sites range from very fine-textured clays to large boulders and bedrock. Therefore, the type, size and degree of treatment done varies among the eight sites, and field fitting was done to insure the greatest chance of success.

All eight locations were groomed or shaped by rearranging loose rock and slump features within the confines of the existing alignments. Side slopes (where steep, undercut or unstable) were laid back. Smaller boulders were strategically placed, or were removed. Larger boulders were pried loose and rolled downhill where possible and desirable. Due to the nature of the unengineered fill, the reshaping did not result in a uniform cross section aligned perpendicular down the steep slope; rather, it resulted in a site where the erosion control measures could be feasibly retrofitted, as was intended in the DOGM-approved plan for this work.
At seven of these sites, a synthetic fiber erosion matting was placed where substrate was adequate to allow sufficient anchoring with metal staples. (At one site, the amount of perennial vegetation did not warrant placement of the matting.) Landlok TRM 1060, made by Synthetic Industries Construction Products Division, was the material used. Its thickness, ground cover, void space, and durability provide both short and long term erosion protection, and facilitate vegetation establishment. It will remain in place until UV destabilization occurs and/or interfilling with sediment/vegetation integrates the matting with the surrounding substrate. In some areas, substrate precluded anchoring of the matting, and it was not used.

At six of the sites (including the one site without matting), small, porous check dams were installed at intervals along the shaped and matted discharge courses. (At two of the sites, check dams were not used due to the small, shallow, outfall cross sections.) The dams consist of a synthetic fiber material called Fiberdam, which is manufactured by Synthetic Industries Construction Products Division. Manufacturer’s installation recommendations were generally followed. Fiberdam is a flexible, moldable mass of fibers that, although irregular in shape, can be molded to fit within a non-uniform cross sectional area. Generally, it was shaped to about a one-foot thickness, with maximum height approximately two feet. The dams are held in place with 36-inch long metal rebar stakes. Distance between dams is not uniform, but typically three to four dams are located at each site.

The function of these porous dams is to reduce runoff velocity, causing deposition of sediments behind and within the fiber dams. Water is meant to pass through the dams, as well as over their tops, the porous nature of the dams should not block flow or set up conditions by which forces against the dams become excessive. Allowing water to pass through the dams also reduces the chance of erosion around their edges, which could result in failure.

Sediments should eventually clog the dams, and be deposited behind them, thereby raising the elevation of the flow line. (As with the matting, this material will remain in place and will integrate with the surrounding substrate unless UV degradation takes place first.) Any retention of the fine sediments will allow greater moisture retention and these areas will have a greater opportunity for plant colonization. The result would ideally be a series of steps down the outfall, with the flat sections vegetated and the steep sections stabilized.

However, the treatments used are non-standard, experimental methods and may require future modifications. They were used because standard engineering structures would not be appropriate on the unengineered, angle-of-repose slope that required treatment. The erosion control measures used here are thought to provide the best possible chance of success given the inherent constraints of site topography, road outslope characteristics, substrate and climate.
The treatments were designed and implemented using the best technology currently available. As described above, the fiberdam material has many advantages over more standard checkdam materials (large rock, rock-filled wire cages, or brush). Technologies available for this type of site are limited due to the nature of the site (angle of repose slopes and un-engineered fill), and limitations on types of materials suitable for use in permanent reclamation.

The erosion control measures (consisting of the water bar and its attendant discharge course with fiberdam and/or matting) will be maintained until bond release. Each site will be inspected periodically to insure proper functioning. During the regular inspection period of April through October, these areas will be examined a minimum of once per month. In addition, they will be inspected after weather patterns suggest that substantial runoff may have occurred at the site. Any needed maintenance or repairs will be done within one calendar month following the identification of a problem. In addition, a photographic record will be kept to track condition of the sediment control measures and to identify trends toward stabilization.

These treatments should prevent, to the extent possible, additional contributions of sediment to runoff outside the permit area, and minimize erosion to the extent possible. The natural, undisturbed watersheds above the roadway contribute sediment-laden runoff to the disturbed area, as evidenced by deposition in the water bars. Consequently, some erosion and sediment contribution to the ephemeral channel at the base of the slope is a natural and desirable phenomenon. The treatments are not expected to eliminate all erosion from the disturbed area, nor are they expected to prevent all sediment contribution to the ephemeral drainage. Instead, they are expected to provide a measure of stability such that erosion will be minimized to the extent possible.
LONGITUDINAL PROFILE 2
ROAD CROSSING CHANNEL RESTORATION

ROAD RESTORATION
SLOPE = 6 FT / 85 FT = 0.071%

CROSS-SECTION C-C'
ROADCUT HIGHWALL

SOLDIER CREEK COAL COMPANY
HIDDEN VALLEY MINE
SECTIONS AND PROFILE OF
ROAD CHANNEL
SLOPE OF ROADBED
drainage patterns and control erosion.

A variance is requested to allow the access road and associated cut and fill terraces to remain upon reclamation. A description of the means by which this variance will allow the postmining land use to be achieved is described in the following paragraphs. The variance will simply enhance the premining land use capabilities, while allowing the use to remain the same. It will also enhance the ability to meet other requirements of the Division such as revegetation, erosion and runoff control. In addition, CalMat, the land owner, approves of the variance; the variance is also compatible with the operation of adjacent lands.

A stability analysis has been conducted on the slopes which would not be restored to natural contours and is described in this document. All coal wastes have been covered, so retention of the cuts and fills will not result in exposure of waste materials. As described below, greater benefits to the watershed will occur as a result of maintaining the cut and fill terraces than would occur if the natural contours were restored. High velocity runoff and consequent erosion will be minimized if the road bed is in place, and use of the road surface as a livestock trail will prevent impact to Ivie Creek and its adjacent riparian lands as a result of trampling.

Retention of the cut and fill terraces of the roadway will aid in the protection of critical soils and enhance the forage production at the site. According to the RMP for the adjacent San Rafael Planning Area, one of the main BLM means of protecting critical soils is to grade slopes such that they serve to collect water to aid in onsite revegetation. The roadway functions to provide this. In addition, the roadway is in line with other BLM goals of water-barring roads and protection of riparian areas as described later in this section.

Plan Revision
During construction of the access road into the property, blasting was required along the uphill side of the road, resulting in a cut slope in bedrock, and excess materials were placed as fill along the downhill side of the road, resulting in a talus-like slope down to the ephemeral channel bottom. The natural terrain in the area is comprised of a series of cliffs, small benches and talus slopes due to the interbedded sedimentary bedrock, so the cut and fill terraces of the roadway complement the natural drainage patterns of much of the area.

During reclamation, the cut and fill slopes created during road construction were left in place. Water bars were installed along the road to control runoff from uphill areas and the roadbed itself. These water bars meet BLM criterion for construction in critical soil areas (road grade does not exceed 10 percent within a 1000-foot distance). The road surface was ripped to eliminate compaction, seeded, mulched and fertilized. The roughened condition of the road and barriers across the road prevent vehicular access.

In its current configuration, the road and associated cut and fill terraces aid achievement of the postmining land use in two ways. The first of these is site enhancement related to revegetation and erosion control.

A typical cross section of the roadway and adjacent slopes would show a steep slope comprised of bedrock outcrop interspersed with areas of colluvial material with sparse vegetation, below which occurs the road cut slope which is almost vertical sandstone bedrock with a height of approximately 10 - 15 feet. The road bed itself is approximately 20 feet wide and is in a roughened, hummocky condition with occasional large boulders. The road fill area down to the channel bottom is comprised of talus-like fill materials with some large boulders and natural bedrock outcrop.

Plan Revision

24-a

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visible. The entire slope is steep, with little vegetative growth as is typical of the surrounding undisturbed areas.

The roadbed surface acts in several ways to enhance vegetation efforts. The flat bench serves to break up the otherwise very steep sideslope of the canyon, providing a terrace to capture runoff and sediments from the upper steep, bare slopes. This lessens the potential for erosion of the bottom slope adjacent to the channel by reducing both total runoff and flow velocities. In the absence of this terrace, the very high production of runoff from the upper slopes would result in severe erosion of the lower talus slopes adjacent to the channel, which would compromise the stability of the canyon side slopes. Additional benefits are incurred by storing of runoff and conserving soil moisture in the roadbed soils rather than conveying it all to the channel. Also, the trapping of fine sediments on the roadbed enhances the road surface as a growth medium. These all serve to enhance the potential for revegetation on the road bed. Neither the upper nor lower portions of the canyon sideslope are conducive for vegetation because of the lack of soil medium.

Contour terraces that are essentially equivalent to the roadbed are commonly constructed to provide water harvesting and erosion control in slope rehabilitation. They function to shorten the slope length, consequently reducing runoff velocities which in turn encourages infiltration and storage of runoff, and lessens the potential for erosion. Because the road bed has a significant gradient, a series of water bars were constructed across the surface to further control runoff and sediment production.

In the site environment, where climate and soil types limit vegetative growth, any means of enhancing growth potential can significantly increase the value of the site as a provider of habitat and producer of forage. In this way, the cut and fill Plan Revision

24-b  March 15, 1991

AMENDMENT TO

APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

SmWJK  date  4/27/91
Terraces left during reclamation are essential in allowing achievement of the post-mining land use of grazing and wildlife habitat.

The second way in which the cut and fill terraces serve to enhance the post-mining land use is for livestock trailing. Other than the road surface, there would be two avenues for livestock to gain entrance to the disturbed areas where revegetation would be most successful. The first of these would be along the Ivie Creek bottom. This is evidently the trail that was used historically, however given the already poor quality of Ivie Creek water, the desirable protection of riparian areas, and the risk to livestock along this route (high flows, ice, and precarious travelways), this route is less than ideal. The second possible trailway would be from the top of the disturbed area down through the ephemeral drainage at the base of the roadway. This route is steep, narrow and very rocky, which unnecessarily increases the risk to livestock. Use of the roadway for livestock trailing would be preferable from an environmental standpoint, from a livestock safety standpoint, and also from the standpoint of human access to inspect animals, provide salt licks, etc.

In summary, not regrading the cut and fill terraces associated with the road allows achievement of the post mining land uses. This is accomplished primarily by site enhancement through conserving soil moisture, ensuring slope stability, and controlling erosion. A secondary benefit of the road surface is to provide a livestock trailing route that is preferable to other available options.

Pads

The 250' of 48" diameter culvert in the "B" seam pad will be removed and the ephemeral channel restored to approximately original grade. The gradient will be uniform at 10.5% and the sideslopes will be 4h:1v. The depth variation of the channel is shown in Figure VII and the cross-sections of the proposed and

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24-c

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natural channels are shown in Figure VIII. It will then discharge into Ivie Creek. This channel will be riprapped to stabilized the surface and prevent excessive headcutting. The excavated material from the channel will be used to cover the coal seam and to slope the adjacent pads to drain into the restored ephemeral channel. A silt fence will be installed on the channel banks to prevent sediments from reaching the channel prior to vegetation becoming established on the topsoiled areas.

The 160' of 18" diameter culvert in "A" seam pad will be removed and the excavated material replaced in the channel. With the
B SEAM PAD

DEPTH OF FLOW 0.56 FT.

RIPRAP ZONE (IF NOT ON BEDROCK): 1 FT. ABOVE FLOW DEPTH AND 1.35 FT. THICK

DEPTH OF FLOW = 0.48 FT.
water-barring of the road and filling of the small roadside ditch the discharge into this culvert will be eliminated.

**UMC 817.103 Backfilling and Grading: Covering Coal and Acid- and Toxic-Forming Materials**

Coal or other associated materials are not readily evident on the site. Should any of these materials be discovered during excavation and backfilling they will be placed against the coal seams and covered with other non-toxic materials. There is no water drainage from the coal seams or adits. Therefore, acid mine drainage and related toxic elements would not be discharged from the site. See letter in Appendix Ia.

**UMC 817.106 Regrading or Stabilizing Rills and Gullies**

The existing rills in the road surface will be eliminated with water-barring and ripping of the road surface. The rills or gullies that may appear during post-reclamation monitoring will be stabilized by filling with soil and rocks. Chronic sites will be stabilized with small gabions or rock check dams.
UMC 817.106 Regrading or Stabilizing Rills and Gullies

In addition to the measures discussed on Page 27 of the original Plan, gulley control may consist of the erosion control matting/fiber dam treatment described on Pages 21-B through 21-D of this amendment. This type of erosion control has been implemented at eight sites on the road outslope, and may be used elsewhere on the disturbed area if needed.
IV  Drainage Control - Including Sediment Control and Channel Restoration


Response: The measures to be taken to protect the hydrologic balance during the present suspended operations are included in the Interim Plan, Runoff Control Plan.

Measures to be taken during the reclamation phase of the operation will include the following:

1) Reestablishment of the ephemeral drainage through the B-seam pad and at the present road crossing.

2) Removal of the road culverts and replacement with waterbar structures.

3) Removal of the A-seam culvert and regrading of the site to allow natural drainage of the site.

4) Removal of the discharge structures from the sediment pond and breaching of the embankment against Ivie Creek to provide a naturally draining structure.
5) Installation of a series of berms and silt fences prior to construction to allow control of erosion and to ensure that water quality of waters that are released from the site meet acceptable standards.

The 250 feet of 48 inch diameter culvert in the B-seam pad will be removed and the ephemeral channel restored to an approximately natural grade. The gradient will be uniform at 10.5%, the sideslopes will be at 4h:1v, and the bottom width will be 10 feet. The depth of the channel will vary depending on the exact location. The depth variation is shown on Plate V and the cross-sections of the natural and proposed channels are shown on Figure VIII. While little information is available as to the material underlying the 48 inch culvert, it is expected that much of the excavation for the restored channel will result with the channel bottom resting on bedrock. For any section of the channel where the bottom will rest on fill material, the fill will be riprapped to protect against erosion (see Figure VIII).

Evaluation of the restored channel for flow depth and for flow velocity to be capable of handling a peak flow of 71 cfs, indicates that the expected flow depth in the channel is 0.55 feet while the velocity is expected to be approximately 11 fps. As indicated above, a portion of the channel is expected to be bedded on bedrock and therefore will require riprap on the slopes, however several reaches of the channel are expected be
Additional sediment and erosion control measures were implemented in the summer of 1994. Sediment control consisted of a silt fence and berm that were placed along the southern end of the former road base storage site at the top of the road. A description of this feature can be found on Page 33-B of this amendment. Erosion control matting and/or fiberdam materials were placed in eight locations on the road outslopes to control erosion. A description of that treatment is presented on pages 21-B through 21-D of this amendment.
provide adequate protection, the riprap will be required to have a $D_{50}$ of 0.75 feet. Table 3 shows design specification of the riprap gradation.

Table 3 Riprap Gradation

<table>
<thead>
<tr>
<th>D 100</th>
<th>2.5 * $D_{50}$</th>
<th>1.50 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 85</td>
<td>1.8 * $D_{50}$</td>
<td>1.13 ft.</td>
</tr>
<tr>
<td>D 50</td>
<td>1.0 * $D_{50}$</td>
<td>0.75 ft.</td>
</tr>
<tr>
<td>D 15</td>
<td>0.1 * $D_{50}$</td>
<td>0.08 ft.</td>
</tr>
</tbody>
</table>

Design calculations for all diversions and hydrologic structures are presented in Appendix III.

No filter blanket is presently planned for the site. This is due to the coarse nature of the material in the channel area. No particle size distribution for the channel material is available, because the 48 inch culvert and fill material exists at the proposed location of the channel. It is expected however, that when the culvert is removed, much of the coarse bedding material will remain in those portions of the channel requiring riprap. This is expected to provide a more than adequate blanket layer for those portions of the channel requiring riprap. To ensure that the channel design is adequate, a sample of the material in the channel area will be taken (after the culvert has been removed) for particle size analysis. The data will be used to evaluate the need for a filter blanket in those areas to be riprapped.
The 48 inch culvert, located at the crossing of the ephemeral channel (see Plate V), will be removed and the channel excavated to construct a channel to allow fording of the creek (see Figure V). Based on the reaches up and downstream of the reach to be restored, it is expected that the channel bottom will rest on bedrock. The gradient on the channel will be the same as that on the culvert (0.071 ft/ft). Assuming a conservative approach, the peak flow determined for the restored ephemeral channel through the B-seam pad will be used in the evaluation of the road crossing channel restoration. Using a peak flow of 71 cfs, the flow depth through the channel is 0.93 feet. The velocity of flow through the restored reach is 7.4 fps. This is below the maximum allowable velocity for flows over bedrock so only the slopes one-foot above flow depths will be riprapped.

As the road and A-seam pad are regraded it becomes necessary to remove the 18 inch culvert through the pad. With the water barring of the road and the filling-in of the road side ditch, the normal drainage to the culvert will be diverted. Therefore, there is no reason for the culvert to remain.

Regrading of the A-seam pad, as shown on Plate V, will result in two drainage areas on the pad. First is the main portion of the pad and second is the sediment pond area. Due to the reestablishment of the ephemeral channel and the regrading of the road, the main portion of the A-seam pad will convey water from a
drainage area of 0.78 acres through a silt fence to Ivie Creek via a triangular ditch. The peak flow for the area is 0.26 cfs. This flow is based on the 10 year 24 hour precipitation event and a curve number of 80. The ditch will have 2h:1v side slopes, a depth of 1.5 feet, and an anticipated flow depth of 0.17 feet. Evaluation of the flow in the ditch at its steepest section shows that 6" D50 riprap protection is required to handle the maximum expected velocity of 4.3 feet per second (f/s). The riprap gradation is presented in Table 3a. No filter blanket is proposed due to the short stretch of channel and the gravelly nature of the soil.

With the reestablishment of the ephemeral channel, regrading of the access road and the A-seam pad, the area draining to the sediment pond will be quite small, less than one acre. As such the pond will no longer serve a purpose. Therefore, it is Proposed that the discharge structures of the pond be removed and the embankment facing Ivie Creek be breached allowing the small drainage area to follow through the pond area. The regraded surface of the pond is shown in Plate V with the cross-sections and longitudinal profile shown in Figure II.

The peak flow resulting from the small area above the pond is only 0.1 cubic feet per second (cfs). This value is based on the 10 year 24 hour precipitation event and a curve number of 80. This discharge for the regraded pond area will be past through a
Flow to the pond is 0.36 cubic feet/second (original pond diversion flow plus flow from the remainder of the A-seam pad). Flow velocity is 7.0 feet/second and flow depth is 0.16 feet, as shown on the updated Table 2 on Amendment page 10-a.

AMENDMENT TO

APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by ___________________________ date 1/3/90

Plan Amendment 1 32-a November 15, 1989
Reclamation Plan: Protection of the Hydrologic Balance

Regrading of the A seam pad resulted in one drainage through the sediment pond.

The sediment pond was decommissioned and constructed with a discharge channel of sufficient size and riprapped to handle the expected discharges of a single event from the A seam pad. The second discharge channel was not constructed.
silt fence as shown on Plate III and conveyed to Ivie Creek via a triangular ditch. The ditch will have 2h:1v side slopes, a depth of 1.5 feet, and an anticipated flow depth of 0.11 feet. Elevation of the flow in the ditch at its steepest section shows that the maximum expected velocity of 3.8 feet per second (f/s) requires a riprap of 6" D50. Table 3a shows the riprap gradation for the channel. As with the A-seam diversion channel no filter blanket is proposed.

Prior to the construction of the above described drainage structures, a series of berms and silt fences will be constructed, as shown on Plate V, to control erosion from the site and aid in meeting water quality standards for any runoff from the site during construction. The material specified for the filter fabric will be required to be capable of withstanding prolonged exposure to ultraviolet rays. The construction and installation of the silt fences will consist of the following:

1) Placement of "t" fence posts at eight foot spacing along the length of the proposed silt fence location.

2) Attach "chicken" wire fence material to the fence posts at top and bottom of the wire fence material along the ground surface.

3) Secure silt fence fabric to the chicken wire fence, on
Drainage from the entire A-seam pad, including the fill slope, the main pad area and the old sediment pond location, is all conveyed through a series of silt fences to the diversion at the location of the old sediment pond which empties into Ivie Creek. The channel constructed during the original Plan is sufficient to carry these flows, as indicated on the Amendment page 10-a.

Silt fences were constructed according to original specifications, but in some areas a heavy-gauge field fence was used instead of the chicken wire called for in the original Plan. The field fence will provide a stronger support for the fabric.

The A-seam terrace diversion has been made functional by regrading the bench cut, and has been extended by creating a ditch across the road and down onto the flat area east of the ephemeral channel. The alignment of this channel is shown on the revised Plate III, and design details are given in the addendum to Appendix III. Information on peak flows and channel configuration for this diversion is updated on Amended page 10-a.

A series of small retention berms was placed downslope of the outlet of the channel parallel to the slope on the flat bench east of the ephemeral channel. The alignment of these berms is shown on revised Plate III. They are approximately 2 feet high, with 2h:1v sideslopes, constructed with cut/fill techniques. They will serve to retain runoff and sediment and pass the overflow to the next, downstream berm, thus creating a longer flow path to the silt fence and the ephemeral channel.
During the summer of 1994, a silt fence and berm were constructed along the southern end of the former road base storage site at the top of the road. The fence was constructed to the same general specifications described on pages 33 and 34 of the original Plan. However, due to the short length of fence, and to the low volumes of runoff and sediment expected from the low gradient, stable contributing area, no wire fence backing was used to support the geotextile fabric.
the upstream side of the fence, at the top of the fence only. This protects the integrity of the silt fence fabric. The lower edge of the silt fence fabric is to be buried at the base of the fence to a depth of at least 6 inches.

4) The ends of the silt fence are to be enclosed in an adjacent berm to ensure that no runoff is allowed to bypass the silt fence. Runoff water produced on the outslopes of the A- and B-Seam pads will be minimal. Treatment of that runoff will be accomplished by filtration and deposition of sediments within the coarse rock piles at the base of these areas, thereby preventing degradation of water quality in Ivie Creek.

UMC 784.14 c Reclamation Plant: Protection of Hydrologic Balance
Probable Hydrologic Consequences Assessment
for the Hidden Valley Mine

1.0 Introduction
The purpose of this section is to address the requirement raised in the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining (DOGM) regulations, UMC 784.14 (c), requiring that the operator of an underground coal mine address
the upstream side of the fence, at the top of the fence only. This protects the integrity of the silt fence fabric. The lower edge of the silt fence fabric is to be buried at the base of the fence to a depth of at least 6 inches.

4) The ends of the silt fence are to be enclosed in an adjacent berm to ensure that no runoff is allowed to bypass the silt fence.

UMC 784.14 c Reclamation Plan: Protection of Hydrologic Balance

Probable Hydrologic Consequences Assessment for the Hidden Valley Mine

1.0 Introduction
The purpose of this section is to address the requirement raised in the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining (DOGM) regulations, UMC 784.14 (c), requiring that the operator of an underground coal mine address
Table 3a. Riprap Gradation for A-Seam and Sediment pond Diversions.

<table>
<thead>
<tr>
<th>Size</th>
<th>Percentage</th>
<th>Multiplier</th>
<th>Particle size</th>
</tr>
</thead>
<tbody>
<tr>
<td>D₁₀₀</td>
<td></td>
<td>2.5 x D₅₀</td>
<td>1.25 ft</td>
</tr>
<tr>
<td>D₈₅</td>
<td></td>
<td>1.8 x D₅₀</td>
<td>0.90 ft</td>
</tr>
<tr>
<td>D₅₀</td>
<td></td>
<td>0.5 x D₅₀</td>
<td>0.50 ft</td>
</tr>
<tr>
<td>D₁₅</td>
<td></td>
<td>0.1 x D₅₀</td>
<td>0.05 ft</td>
</tr>
</tbody>
</table>
the probable hydrologic consequences of the proposed operation.

This section will present hydrologic and geologic information to allow the DOGM to review the impacts of the proposed operation. In the case of the Hidden Valley Mine, the proposed operation is the reclamation of a partially constructed underground mine.

2.0 Description of the Mining Operation

The Hidden Valley Mine is located in Emery County, Utah approximately seven miles south of the town of Emery. It was proposed to be a 500,000 ton per year underground coal mining operation. Due to poor market conditions, such development was not possible. Following several years of inactive status, the company has decided that the best course of action will be to reclaim the site.

Originally proposed as an underground mine to be developed in the A and B coal seams of the Ferron Sandstone Member of the Mancos Shale, the site was located adjacent to Ivie Creek in a small ephemeral drainage. The local geology is shown in Figure IX. Taken from Lines and Morrissey (1983), the figure shows that the Ferron Sandstone Member of the Mancos Shale is conformably overlain and underlain by the Blue Gate and Tununk Members, respectively, of the Mancos Shale. The sediments are of Cretaceous age and were deposited as part of a transgressive series of the shallow seas during middle Cretaceous time (Stokes
EXPLANATION

Oa
Alluvium

Op
Pediment gravels

Ku
Cretaceous rocks, undifferentiated

Kmm
Mancos Shale

Kme
Emery Sandstone Member

Kmb
Blue Gate Member

Kml
Ferron Sandstone Member

Km
Tununk Member

Kju
Cretaceous and Jurassic rocks, undifferentiated

Emery Mine
(underground)

Proposed surface mine

Contact—Approximately located

Fault—Approximately located; dated where concealed. Bar and ball on downhill slope.

FIGURE IX
LOCAL GEOLOGY
Mine development was never undertaken. The extent of the workings, shown in Plate II and Figure I, were never expanded beyond the exploration adits. Samples were taken within the adits and from boreholes for coal quality data. No samples were taken of underburden or overburden quality. The coal quality data is presented in Appendix VI.

3.0 Surface Water
Figure X shows the surface hydrology surrounding the Hidden Valley site. Located adjacent to Ivie Creek, a perennial stream, approximately two miles from the confluence with Quitchupah Creek, drainage from the mine site flows through the sediment pond to Ivie Creek.

The mine site is bisected by an ephemeral drainage which has been diverted through a 48" culvert through the mine site. Drainage from above the portals has also been diverted by bench cuts and 18" culverts to Ivie Creek. Flow at the site is generally limited to thunderstorm runoff. Some snow melt does occur during the spring, however generally water produced from snow melt is evaporated or it infiltrates.

Water use in the area is mainly for stock and some irrigation. The waters are generally high in Total Dissolved Solids (TDS),
averaging 3,050 mg/l, which limit the use of the waters. Seasonally, the TDS concentration varies from 700 mg/l in the spring to 3,000 to 5,000 mg/l in the fall. No significantly high metals were noted. The surface runoff is dominated by sodium and sulfate ions.

Average flow in Ivie Creek is less than 1 cfs. Minimum flows at the weir on Ivie Creek were less than 0.1 cfs. The maximum flows reported by the U.S.G.S. was 1,240 cfs. The maximum flows usually occur during either the spring as a result of snow melt runoff on the south end of the Wasatch Plateau or as thunderstorm runoff from summer storms.

4.0 Ground Water

Ground water in the area of the Hidden Valley site occurs in the Ferron Sandstone Member of the Mancos Shale. Recharge to the sandstone occurs from three areas. First and largest, is subsurface inflow, most likely from the Wasatch Plateau. Second is a moderate amount of recharge from infiltration of precipitation at the outcrop. Last is leakage from either the overlying Blue Gate Shale or the underlying Tununk Shale. This last area of recharge is quite small. Lines and Morrissey (1983) indicate that recharge values to the Ferron Sandstone are: 2.4 cubic feet per second (cfs) from subsurface inflow; >0.1 cfs from precipitation; and >0.1 cfs from leakage from both the Blue Gate
Discharge from the Ferron Sandstone occurs from six areas. In order of decreasing rate they are: leakage to the Blue Gate Shale, mine discharge, leakage along streams, leakage to the Tununk Shale, well discharge, phreatophyte transpiration, and spring and seep flows. Lines and Morrissey (1983) indicate flow rates for these discharge areas are as follows: 0.8 cfs for leakage to the Blue Gate Shale; 0.7 cfs from Browning mine discharge; 0.4 cfs each for both stream leakage and leakage to the Tununk Shale; 0.3 cfs for well discharges; and >0.1 cfs each to both phreatophyte transmission and spring and seep flows. The balance of these order of magnitude numbers for inflow to and discharges from the Ferron Sandstone is within 0.1 cfs.

Seven boreholes were drilled on and adjacent to the mine plan area. Four of these boreholes encountered water and were completed as water monitoring wells. Two of the dry holes were plugged and reclaimed. The last borehole was not plugged and will be plugged as part of the mine reclamation activities. Plate IV, Page 14, shows the locations of the boreholes. Sites DH-1, DH-2, DH-3, and DH-7 encountered water and were completed as monitoring wells.

The depth of the various boreholes is shown in Table 4. As mentioned above, only four of the holes were completed as
Table 4  Completion Details and Approximate Water Elevations For Boreholes

<table>
<thead>
<tr>
<th>Drill Hole Number</th>
<th>Collar* Elevation</th>
<th>Depth of Hole</th>
<th>Depth Cased</th>
<th>Perforated or Open Zone</th>
<th>Approximate Water Level</th>
<th>Water Elevation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH-1</td>
<td>6020</td>
<td>439</td>
<td>165</td>
<td>165-439</td>
<td>+196</td>
<td>6216</td>
<td>hole uncased thru and beneath water production zone</td>
</tr>
<tr>
<td>DH-2</td>
<td>6058</td>
<td>545</td>
<td>155</td>
<td>155-545</td>
<td>-12</td>
<td>6046</td>
<td>&quot;</td>
</tr>
<tr>
<td>DH-3</td>
<td>6140</td>
<td>484</td>
<td>155</td>
<td>155-484</td>
<td>+157</td>
<td>6297</td>
<td>&quot;</td>
</tr>
<tr>
<td>DH-4</td>
<td>6232</td>
<td>464</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Dry hole</td>
</tr>
<tr>
<td>DH-5</td>
<td>6060</td>
<td>414</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Dry hole</td>
</tr>
<tr>
<td>DH-6</td>
<td>6148</td>
<td>464</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Dry hole</td>
</tr>
<tr>
<td>DH-7</td>
<td>6152</td>
<td>600</td>
<td>600</td>
<td>300-600</td>
<td>&gt;gs**</td>
<td>&gt;6152</td>
<td>Water flowing at the surface - No pressure recorded</td>
</tr>
</tbody>
</table>

* not surveyed - taken from U.S.G.S. Topographic map, Walker Flat Quadrangle, 40 Foot contour interval.

** Ground surface.
monitoring wells. The completion details of these holes are also shown in Table 4.

DH-1, 2, 3, and 7 have water levels which are above the ground surface, representing an artesian condition in the Ferron sandstone. DH-1 has a shut-in pressure of approximately 85 psi, representing 196 feet of water. DH-2 has a water level within the casing at 6046 feet. The ground surface for DH-2 is 6058 feet. The pressure head in DH-3 is 68 psi. This represents 157 feet of water. The shut-in pressure of DH-7 was not recorded, however it has a sustained flow of approximately 5 gallons per minute (gpm) from a casing above the ground surface.

Lines and Morrissey (1983) estimate, based on a computer simulation of the Ferron Sandstone Aquifer (Morrissey, et al., 1980), that potentiometric surface in the area of the mine is between 6000 to 6050 feet and moves toward Ivie Creek and to the east. Comparison of these estimated potentiometric surface elevations with the approximate elevation values presented in Table 4, shows only one close value. The remaining three water levels are 100 to 250 feet higher. This variation is most likely due to the semiquantitative nature of the computer simulation data. Lines and Morrissey (1983) indicate that the computer model predictions are semiquantitative due to: the lack of historical data verification; the nonsteady state conditions during data collection period; and the inability of the model
used to account for the fractures in the Ferron Sandstone which act as major groundwater flow conduits.

The computer model was based on actual data inputs of transmissivity, hydraulic conductivity, and storage. As part of the Lines and Morrissey study (1983) values for each parameter were determined. Aquifer tests were conducted to determine transmissivity values. Transmissivities ranged from 200 to 700 square feet per day downdip from the outcrop area to less than 200 square feet per day in the outcrop area. Hydraulic conductivity values were evaluated for the sandstones and shales. The sandstones were found to average 1.5x10^{-1} feet per day in the horizontal direction and 9.1x10^{-2} feet per day in the vertical. Conductivity values for the shales were found to average 3.8x10^{-4} feet per day horizontally and 1.3x10^{-3} feet per day in the vertical. It is felt that the reduction of the transmissivity value toward the outcrop is a result of the thinning of the formation and a reduction in the saturated thickness rather than a change in the hydraulic conductivity.

The storage coefficient, for the confined portion of the aquifer, ranges from 3.0x10^{-6} to 2.0x10^{-3}. For the unconfined zone, the storage coefficient is estimated to average about 0.05.

Quality of the regional ground water is generally quite good, with municipal and industrial uses farther up gradient (toward
In and adjacent to the mine, four water wells were completed by Soldier Creek Coal Company for industrial use. Water rights were filed and approved for these wells (App #47409). Water analyses from these wells show the water quality to be good. TDS concentrations ranged from 610 to 850 mg/l with no elevated metals concentrations. The ground waters, like the surface waters, are dominated by sodium and sulfate ions.

During the exploration phase of the Minor Exploration Permit (MEP) in 2006/2007, CONSOL drilled nine exploration boreholes. Upon completion of down-hole procedures, six of the nine exploration bore holes were reclaimed per MEP requirements. The remaining three boreholes (HV-06-01, HV-06-02 and HV-06-03) were completed as groundwater monitoring wells to supply background information for the contemplated Major Exploration Permit and subsequent Major Revision to this MRP. During final reclamation each drill hole will be sealed with cement from the bottom of the hole to ground level. A brass monument marker will be placed in the top of the cement surface plug with the hole number. Refer to Plate IVa, Hidden Valley Drill Hole Locations and pages CH III pages 45b, for locations.

TABLE 1

Summary of Estimated Drill Hole Locations and Depths\(^{(a)}\)

<table>
<thead>
<tr>
<th>Drill Hole Number</th>
<th>Northing</th>
<th>Easting</th>
<th>Approx. Elev. (ft)</th>
<th>Estimated Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV-06-01(^{*})</td>
<td>2,058,903</td>
<td>175,945</td>
<td>6006</td>
<td>447</td>
</tr>
<tr>
<td>HV-06-02(^{*})</td>
<td>2,057,873</td>
<td>173,806</td>
<td>6063</td>
<td>492</td>
</tr>
<tr>
<td>HV-06-03(^{*})</td>
<td>2,060,829</td>
<td>177,587</td>
<td>6041</td>
<td>430</td>
</tr>
<tr>
<td>HV-06-04(^{**})</td>
<td>2,060,671</td>
<td>175,548</td>
<td>6048</td>
<td>411</td>
</tr>
<tr>
<td>HV-06-05(^{**})</td>
<td>2,062,095</td>
<td>173,298</td>
<td>6164</td>
<td>437</td>
</tr>
<tr>
<td>HV-06-06(^{**})</td>
<td>2,062,970</td>
<td>177,141</td>
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</tr>
<tr>
<td>HV-06-07(^{**})</td>
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<td>175,356</td>
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</tr>
<tr>
<td>HV-06-08(^{**})</td>
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</tr>
<tr>
<td>HV-06-09(^{**})</td>
<td>2,065,102</td>
<td>176,411</td>
<td>6198</td>
<td>340</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Total estimated depths include 30 feet of drilling beneath target seam floor.
\(^{*}\) Completed as Ground Water monitoring wells per Minor Exploration Permit in 2006/2007.
\(^{**}\) Reclaimed in 2007 per Minor Exploration Permit requirements.
5.0 Consequences of Reclamation Activities

This sub-section provides a general description of the reclamation activities and their consequences and impacts.

5.1 Description of Reclamation Plan

The reclamation plans for the Hidden Valley mine call for reclamation of the portal pad area and restoration of the portal access road. The proposed plans are:

1. Removal of the 48" culvert for the ephemeral drainage under the pad and at the road crossing and the 18" culverts from the portal bench terraces above the A and B seams to Ivie Creek, regrading of the site, and restoration of the ephemeral channel to convey water to Ivie Creek.

2. Removal of the sediment pond discharge structures and regrading of the pond embankments and A-seam pad to establish and ensure adequate drainage for the site.
3. Installation of a combination of berms and silt fences along the edge of the regraded slopes and the ephemeral channel to serve as temporary sediment control measures.

4. Removal of the road culverts, regrading of the road surface to slope to the ephemeral drainage, and installation of water bars at a 45 degree angle to ensure drainage is conveyed off of the road to the ephemeral channel.

5. Revegetation of the site with an acceptable seed mix and erosion protection with hay mulch applied at a rate of 4,000 pounds per acre.

Further details of the channel restoration plan can be found in the Hydrology Section of the reclamation plan for the Hidden Valley mine.

5.2 Impacts and Consequences of the Reclamation Plan

5.2.1 Ground Water

Based on the fact that no ground water has been encountered at the site or in the underground workings and that the ground water is confined and isolated from the surface so no surface activities can or will affect the ground waters, no ground water impacts are expected.
The fill slopes at the A- and B-seams have been covered with an erosion-control matting in place of the hay mulch.
Items 3. and 4. on page 46 of the original Plan are herein amended to include additional sediment and erosion control measures implemented in 1994. A silt fence and berm were placed along the southern end of the former road base storage site at the top of the road to control sediment. Further, erosion control matting and/or fiberdam materials were placed at eight locations on the road outslopes to control erosion.
**LOG OF BORING HV-06-01**

**Consol Energy Inc.**  
Consolidation Coal Company  
Hidden Valley Exploration Drilling

<table>
<thead>
<tr>
<th>Date Started</th>
<th>Date Finished</th>
<th>Logged By</th>
<th>Checked By</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-27-06</td>
<td>10-13-06</td>
<td>H. Windecker</td>
<td></td>
</tr>
</tbody>
</table>

**Boring Location**  
6737668.74 N 1699170.81 E (NAD 83, State Plane)

**Surface Elevation**  
6016.40 (brass cap), 6016.04 (ground)

<table>
<thead>
<tr>
<th>Depth in Feet</th>
<th>Gamma</th>
<th>Resistivity</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>125</td>
<td>250</td>
<td>1</td>
</tr>
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<td>20</td>
<td>120</td>
<td>240</td>
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<td>110</td>
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<td></td>
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<td>80</td>
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<tr>
<td>100</td>
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</tr>
<tr>
<td>120</td>
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<td>140</td>
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<td></td>
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<tr>
<td>160</td>
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<td></td>
</tr>
<tr>
<td>180</td>
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<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION**

- **0' to 20'**  
Fine to very fine sandstone with silt, very pale brown (10YR 8/3), weathered, calcareous cement

- **20' to 40'**  
Color change to gray (10YR 6/1)

- **40' to 60'**  
Interbedded with mudstone from 100' to 120'

- **60' to 80'**  
Ferron Sandstone

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*Div. of Oil, Gas & Mining*

- **80' to 100'**  
Mudstone, gray (10YR 5/1) interbedded with fine sandstone and coal

- **100' to 120'**  
3' coal bed at 200'

- **120' to 140'**  
2' coal bed at 215'

- **140' to 200'**  
2" sch 80 PVC

- **200' to 220'**  
Neat Cement

- **220' to 240'**  
Centralizer

- **240' to 260'**  
Pitless Adapter

**Surface Casing**

**Centralizer**

**Ferron Sandstone**

**Chapter III Page 46b**

*Inserted 10/14*
**LOG OF BORING HV-06-01**

**Date Started**: 09-27-06  
**Date Finished**: 10-13-06  
**Logged By**: H. Windecker  
**Chacked By**: 

<table>
<thead>
<tr>
<th>Depth in Feet</th>
<th>Gamma</th>
<th>Resistivity</th>
<th>Density</th>
<th>GRAPHIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>125</td>
<td>250</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>120</td>
<td>260</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>270</td>
<td>240</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>290</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION**

- **Mudstone interbedded with fine sandstone and coal (Continued)**
- Fine to very fine sandstone with silt, light brownish gray (10YR 6/2) interbedded with mudstone, gray (2.5YR 5/1) and coal in thin beds plus a 2' layer between 270' and 280'
- Mudstone, gray (10YR 4/1) with some coal
- Coal (D-seam)
- Mudstone as above
- Coal (C-seam)
- Fine to very fine sandstone interbedded with mudstone as above
- Mudstone, interbedded with fine to very fine sandstone and coal
- Fine to very fine sandstone
- Mudstone, dark gray
- Coal (A-seam)
- Mudstone with thin beds of sandstone
- Fine sandstone
- Bottom of hole at 442'

**Formation**

- Centralizer
- 2" sch 80 PVC
- Neat Cement
- Centralizer
- Sand - 70 mesh
- Centralizer
- Sand - 16/30
- Screen - 10 Slot
- Cement Grout

**Well**: HV-06-01  
**Elev.**: 

**Chapter III Page 46c**
LOG OF BORING HV-06-02

Date Started: 12-07-06
Date Finished: 1-08-07
Boring Location: 6735466.74 N 169059.40 E (NA83, State Plane)
Sample Interval: 10'
Surface Elevation: 6048.49 (brasws cap), 6047.95 (ground)

Well: HV-06-02
Elev.: 6047.95

Mudstone, light brownish gray (10YR 6/2)
Color change to dark gray (10YR 4/1)
Perched water at 52'
3' coal (approx)
Thin layers of fine sandstone from 80' to 90'
Fine sandstone light gray and brown (10YR 5/3) interbedded with mudstone
Saturated at 146'

Coal, interbedded with mudstone and fine sandstone (l seam and 1-5 seam)
Mudstone and claystone with some fine sandstone, gray to dark gray

Chapter III Page 46d
Inserted 10/14
LOG OF BORING HV-06-02

Date Started: 12-07-06
Date Finished: 01-08-07
Boring Location: 
Sample interval: 10'
Surface Elevation: 
Logged By: H. Windecker
Checked By: 

Mudstone with minor sandstone (continued)

Interbedded coal and mudstone (G seam at 296')
Mudstone interbedded with fine sandstone and minor coal
Fine sandstone, light gray
Coal at 345' (D seam)
Coal at 349' (C seam)
Coal at 360'
Interbedded with mudstone from 370' to 386'

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Coal (A seam)
Interbedded fine sandstone and mudstone

Bottom of hole at 488'

Consol Energy Inc.
Consolidation Coal Company
Hidden Valley Exploration Drilling

Well: HV-02
Elev.: 

Formation: 

Gamma Resistivity Density
(Not Done)

Chapter III Page 46e

Incorporated MAR 10 2015
Div. of Oil, Gas & Mining
LOG OF BORING HV-06-03

Date Started: 11-05-06
Date Finished: 11-10-06
Boring Location: 6739311.86 N 1700991.48 E (NAD 83, State Plane)
Surface Elevation: 6027.57 (brass cap), 6026.77 (ground)

Well: HV-06-03A
Elev.: 6026.77

Depth in Feet | Gamma | Resistivity | Density | DESCRIPTION
--- | --- | --- | --- | ---
0 | 0 | 0 | 0 | Very fine sandstone with silt, light gray to very pale brown (10YR 7/1 and 8/2) interbedded with coal
125 | 1 | 1 | 1 | Mudstone, gray (10YR 5/1) interbedded with fine sandstone carbonaceous shale and coal
250 | 2 | 2 | 2 | Fine to very fine sandstone with silt, pale brown (10YR 6/3)
750 | 3 | 3 | 3 | Beds of coal and mudstone
1500 | 4 | 4 | 4 | Mudstone, gray (10YR 5/1)

Chapter III Page 46f
LOG OF BORING HV-06-03

Consol Energy Inc.
Consolidation Coal Company
Hidden Valley Exploration Drilling

Consolidation Coal Company
Hidden Valley Exploration Drilling

Date Started: 11-05-06
Date Finished: 11-10-06
Boring Location: 
Surface Elevation: 

Logged By: H. Windecker
Checked By: 

Depth in Feet | Gamma | Resistivity | Density | Graphic|
--- | --- | --- | --- | ---|
0 | 125 | 250 | 750 | 1500 | 2 | 3 | 4

**Well: TW1 Elev.:**

- Centralizer
- Cement Grout
- 2" sch 80 PVC
- Centralizer
- Sand - 70 mesh
- Sand - 10/20
- Screen

**Chapter III Page 46g**

Incorporated Mar 10 2015

- Fine to very fine sandstone with beds of coal and carbonaceous shale
- Coal and carbonaceous shale (A-seam?)
- Fine sandstone
- Coal
- Interbedded sandstone, mudstone and carbonaceous shale
- Bottom of hole at 442'
5.2.2 Surface Water

Surface water impacts at the site are expected to be minimal. Construction and reclamation activities will result in suspended and settleable solids in the runoff water from the disturbed and reclaimed areas. This sediment laden runoff will be minimized by the installation of berms and silt fences adjacent to the ephemeral drainage and to Ivie Creek during all reclamation activities.

Also, some settleable solids contributions are expected from within the restored ephemeral channel during the first few runoff events. This flushing will not be a significant problem, due to the bedrock channel bottom or to riprap protection for fill sections. Also during and for a short period following channel restoration, a silt fence will be installed across the ephemeral channel, at the confluence with Ivie Creek, to aid in controlling erosion and sediment contribution.

6.0 Conclusion

No significant long term impacts are expected to either ground or surface waters. Some minor short term affects are expected to the surface water system from the reclamation activities; however, these will be minimized by the actions of the company during the reclamation and by nature once the reclamation is established.
Sediment-laden runoff will also be minimized by the installation of the berm and silt fence that have been placed along the southern end of the former road base storage site at the top of the road, and by the erosion control matting and/or fiberdam materials that were placed in eight locations on the road outslopes.
References


UMC 784.16 (a)(1)(i-iii) Reclamation Plan: Ponds, Impoundments, Banks, Dams and Embankments
Response: See Section II, Pages 9 & 11

UMC 784.16(a)(2)(iv) Timetable
Response: Refer to Section VIII, Schedule

UMC 784.16 (a)(3)(iv)
Response: The sediment pond shall be removed concurrently with reclamation of the area.

UMC 784.16 (b)(1)
Response: Refer to Interim Plan, Runoff Control Plan

UMC 784.16 (b)(2)
Response: Refer to Interim Plan, Runoff Control Plan

UMC 784.16 (c)
Response: Refer to Interim Plan, Runoff Control Plan
UMC 784.16 (d) (e)
Response: Not Applicable

UMC 784.22
Response: See Figures IV, V, VII & VIII

UMC 817.150-.156 Roads: Class I
The Class I road was constructed with public funds and is dedicated to Sevier and Emery Counties. See ROW documents in Appendix I.

UMC 817.160-.165 Roads: Class II
Response: Refer to Interim Plan, Mine Plan Section, Figure 6.1: Appendix D

UMC 817.166 Roads: Class II: Restoration
(a) Request variance for retention of road alignment only. A variance will be required to retain the road surface materials (mostly native fill materials) and the rock cuts and fills.

(1) A sign "Road Closed" will be placed at the terminus of the paved road. A 3-wire, 42" high barbed wire fence, tied to rock
UMC 817.89 Disposal of Non-Coal Wastes

A waste bin will be located onsite during reclamation construction for disposal of solid and liquid wastes. The bin wastes and culverts or drainages structures removed will be hauled offsite to the appropriate landfill for disposal.

UMC 817.166 Roads: Class II: Restoration

(a) Request variance for retention of road alignment only. A variance will be required to retain the road surface (mostly native fill materials) and the rock cuts and fills.
ledges, will be constructed across the upper portion of the road to prevent access. This fence will be checked at each site visit during the monitoring period and maintenance completed as required to retain the integrity of the fence.

(2) The 48" diameter culvert will be removed and the natural ephemeral drainage restored and stabilized. This will require the excavation of approximately 213 cu. yds. of fill. The channel design will adhere to the standards proposed in Table I except the sideslope gradient will be less to accommodate the passage of 4WD vehicles.

(3) The 48" and two 18" diameter culverts will be removed and the excavations backfilled.

(4) The roadbed shall be ripped and scarified prior to revegetating.

(5) Fill slopes are stable and similar to natural rock slopes in the area both in materials and grades.

(6) Cut slopes are rock and shall remain. They are similar to the ledges and cliffs in the area.

(7) The eleven water bars shall be spaced according to Table 3b and located on the ripped roadbed according to Plate III at a 45
Table 3b Water Bar Spacing for the Calmat Access Road.

<table>
<thead>
<tr>
<th>Section</th>
<th>Length</th>
<th>Slope</th>
<th>Spacing</th>
<th>Number of Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200 ft</td>
<td>5.8%</td>
<td>800 ft</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>450 ft</td>
<td>9.7%</td>
<td>500 ft</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>450 ft</td>
<td>3.0%</td>
<td>800 ft</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>300 ft</td>
<td>0.8%</td>
<td>1000 ft</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>850 ft</td>
<td>11.8%</td>
<td>200 ft</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>250 ft</td>
<td>15.0%</td>
<td>160 ft</td>
<td>2</td>
</tr>
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<td>7</td>
<td>200 ft</td>
<td>17.0%</td>
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<td>1</td>
</tr>
<tr>
<td>8</td>
<td>200 ft</td>
<td>1.2%</td>
<td>1000 ft</td>
<td>0</td>
</tr>
</tbody>
</table>

---

2900 ft

Slopes were taken from Plate VI, Class II Road Vertical Alignment and Plate V, Final Configuration.
After the initial revegetation attempt on the road, two additional attempts were made to establish vegetation on the road. In the fall of 1987, and again in the fall of 1988, the road surface was ripped, seeded, fertilized and mulched according to the original Revegetation Plan. As part of the 1988 revegetation work, a photo-degradable netting was also placed to help hold the mulch.

During the 1989 work, it was decided not to do further revegetation work on the road surface, for the following reasons:

1) Each successive year of ripping the road surface to prepare the seedbed has had the negative effect of bringing large rock to the surface, while the desirable soil material has fallen into the voids. In localized areas, ripping the road continues to expose the coal bedrock just under the road surface. These consequences of ripping have substantially decreased the suitability of the road surface as an adequate medium for plant growth. Ripping has also prevented the road from being suitable as a four-wheel drive road, as was permitted during the initial Reclamation Plan. It was felt that re-ripping the road would simply worsen these problems.

2) Observations of growth patterns on the road surface over three consecutive years indicates that salinity of the soil may also be worsened by excessive disturbances such as ripping. It is thought that exposing new material to the surface, as well as creating conditions for excessive evaporation of soil moisture, has increased salinity of the already-saline soil material. It was felt prolonged exposure of the ripped soils to precipitation may leach some of the salts from the surfaces, as the ripping has provided adequate internal drainage. Also, the residue from successive seeding over the last few years has provided adequate seed when future conditions allow for germination. For the above reasons, it was felt that minimizing the disturbance on the road would be the best alternative at this time.

3) It appears that erosion from the road surface is adequately controlled, so additional ripping and reseeding is not necessary from a water quality standpoint.

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degree angle to discharge into the stable rock fills. The 11 water bars will average 18" in height and 60' in length (Fig. VI). These will be checked during each site visit of the monitoring period and cleaned and repaired as necessary.

(8) No terraces are necessary.

(9) No topsoil is available to cover the road surface. The native fill is suitable growing medium if properly prepared by mulching and fertilizing.

(b) The road surface materials are suitable for revegetation as noted in (a)(9)

UMC 817.170-.176 Roads: Class III

There are no Class III roads in the permit area.
Two additional waterbars have been added near the end of the road to prevent erosion of the toe of the small roadside coal seam backfill. They were installed according to the specifications in the original Plan. Where needed to control gullying, onsite rock has been placed in the waterbar outfalls to supplement existing rock fill. Small loose-rock check dams were installed at the downstream end of the waterbars to check the water before it spills over the crest of the outfall. These checkdams were constructed with small, notched spillways to control overflow.
In the summer of 1994, erosion control matting and/or fiberdam materials were placed in eight locations on the road outslopes. A description of this treatment is presented on pages 21-B through 21-D of this amendment.
V Topsoil Redistribution and Surface Preparation Including Testing and Amendments

UMC 817.21 Topsoil: General Requirements

One topsoil pile of approximately 770 cu. yds. is located on the "B" seam pad.

UMC 817.24 Topsoil: Redistribution

The single topsoil stockpile will be redistributed on the "B" seam pad.

The soil stockpile on the B seam pad is approximately 770 cu. yds. of fine sand, silt loam salvaged from the alluvial benches during initial development. This will be used to topsoil the 2.1 acres of covered B seam and the regraded pad. This topsoil will be spread to a thickness of approximately 2.5 inches.

The pad at the "A" seam and the sediment pond were constructed of alluvial silt loams, rocky sandy loams and coal seam overburden. There is no topsoil available for this pad so the existing mixture of materials will be used for the seedbed. During construction an attempt will be made to salvage the better soil materials as they are exposed.
Composite soil samples were taken from the topsoil storage pile and from each pad in March and July, 1986. See Appendix II for the complete lab reports.

The soil materials are low in fertility. They lack sufficient cation sites and organic matter to provide the basic nutrients for plant growth. Phosphorus and nitrogen are at especially low levels. Sulfates and sodium are at high levels and very mobile in these soils. The soil textures are sandy loams. Some fines are probably contributed by coal and overburden debris. Saturation percent indicates adequate water holding capacity.

To partially overcome the poor fertility structure of these soils 4,000 lbs/acre of green alfalfa hay mulch will be applied to the seedbeds to increase organic matter and also nitrogen and potassium. Diammonium phosphate fertilizer pellets will be spread in the fall at the rate of 242 lbs/acre to increase phosphorus and nitrogen. The dragging operation on the seeded soils will cover the mulch and fertilizer. A spring application of 100 lbs/acre of liquid urea will supply additional nitrogen to the plants to compensate for the increased soil microbial action. This program will provide 140 lbs of phosphorus, 84 lbs of potassium and 187 lbs of nitrogen per acre in the seedbeds.
On areas which were reseeded during the 1989 repair work (A- and B-seam fills, and pad areas adjacent to the ephemeral channel) fertilizer was spread with a cyclone spreader. The fertilizer used during the original revegetation work was not readily available, so 16-20-0-13(S) was used in its place after onsite approval was given by Henry Sauer and Lynn Kunzler of DOGM. It was applied at the rate of 100 pounds per acre, and was supplemented with additional urea (approximately 10 pounds per acre).
Table 5  Soil Fertility Summary

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.79 - 7.83</td>
</tr>
<tr>
<td>Saturation %</td>
<td>29.2 - 33.4</td>
</tr>
<tr>
<td>CEC meg/100</td>
<td>4.17 - 6.84</td>
</tr>
<tr>
<td>Alkalinity as CaCO₃ mg/l</td>
<td>45.9 - 56.3</td>
</tr>
<tr>
<td>N %</td>
<td>0.025 - 0.032</td>
</tr>
<tr>
<td>P mg/kg</td>
<td>1.50 - 3.81</td>
</tr>
<tr>
<td>K mg/kg</td>
<td>91 - 95</td>
</tr>
<tr>
<td>Ca mg/kg ≈ 20</td>
<td>365 - 440</td>
</tr>
<tr>
<td>Mg mg/kg ≈ 12</td>
<td>138 - 515</td>
</tr>
<tr>
<td>SO₄ mg/kg</td>
<td>5,490 - 10,600</td>
</tr>
<tr>
<td>Na mg/kg ≈ 22</td>
<td>120 - 425</td>
</tr>
<tr>
<td>EC estimated by mS/cm = 10 EC</td>
<td>3.67, 4.42, 2.43, 4.15</td>
</tr>
<tr>
<td>SAR</td>
<td>3.41, 2.32, 1.8, 5.75</td>
</tr>
</tbody>
</table>
The correct conductivity reading is Umhos/cm as stated in the lab reports in Appendix II.

The metals copper, iron and zinc were determined from a DPTA extract.

A lab analysis was run on a sample of native soil obtained from an adjacent undisturbed area to provide baseline fertility information. These results are located in Appendix II under sample S-5.
VI Revegetation - Including Seeding, Mulching, Planting, Irrigation, Etc.

UMC 817.111 Revegetation: General Requirements

The entire 6.7 acres of disturbed ground will be properly scarified, seeded, fertilized, mulched and covered to provide the best possible opportunity for plant growth. The road fill slopes and some small sites will require hand application of seed, mulch and fertilizer. The reclamation work is scheduled for late fall, 1986.

The proposed fertilization rate is based upon lab analysis of composite soil samples secured in March, 1986. Additional soil samples will be taken after topsoil materials are spread on the "B" seam pad and from mixed materials on "A" seam pad. These later analyses will be used to determine the actual fertilization rates.

Irrigation is not planned.

It is not contemplated that there will be a pest or disease control problem.

Cattle grazing during the revegetation process will be limited by
During the 1989 repair work, revegetation was done on the A- and B-seam fill slopes, and on pad areas adjacent to the ephemeral channel.

On the fill slopes, the seedbed was prepared by first loosening the soil and repairing the gullies by bulldozing fill materials upslope. Then a series of small depressions/catches were made by using the dozer blade to create small furrows the width of the blade (furrows were approximately 6 inches deep, 8 inches wide, spaced at 1.5-foot intervals down the slope). These were placed across the entire fill slopes. Due to the very soft, powdery nature of the recently disturbed soils, some definition of these was lost during additional disturbance by seeding and placing the erosion control matting, but they still maintained their function as a surface roughening mechanism.

Since the prepared soil surface was very loose and did not easily settle, it was not necessary to rake in the seed and fertilizer. The fertilizer was of sufficient weight to sink slightly under the soil surface, and the seed was adequately worked into the soil by the act of walking on it and applying the erosion control matting. Care was taken to apply seed during periods of no wind, and netting was done immediately afterward to prevent wind loss.

On the flatter pad areas where revegetation was done, the soil surface was prepared by ripping the soil to a depth of 6- to 8 inches. Seeding and fertilizing was done during periods of no wind and covered by the action of dozer tracks on the loose soil.

The fertilizer and seed were applied with cyclone type spreaders at the rate prescribed on previous pages.

AMENDMENT TO

APPROVED
Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by ____________________ date 11/3/90

Plan Amendment 1 56-a December 29, 1989
Contrary to statements in the original reclamation plan, there is a small area of disturbed ground that has not been seeded, fertilized and mulched. While most of the disturbed ground is revegetated using such techniques as stated in the original plan, not all of those techniques were applied at the road fill slopes and the pad outslopes near Ivie Creek. Revegetation in those areas will be accomplished by other means. These slopes are, in general, at an angle-of-repose grade. They include extensive areas of boulder cover, on which the standard revegetation techniques are difficult to carry out and are inherently ineffective. Even where adequate growth medium is available, access results in material sluffing and runoff concentration because of the steep, long slopes.

Seed was apparently applied to the road fill slopes during original reclamation in 1986. No concerted reseeding was done on the slopes during subsequent site revegetation efforts in 1987 and 1989, but some seed may have been spread either purposely or inadvertently on isolated areas of the road fill slopes. Site observations show that some vegetation currently occurs in appropriate niches on the slopes. An evaluation of the necessity and/or applicability of reseeding the road fill slopes and the pad outslopes at this time has been made. Such an action does not appear warranted, as discussed below.

First, portions of the slopes do not have adequate growth medium or water retention to produce vegetation. Any seeding efforts could only be applied in certain areas where material size and texture were adequate. If applied seed was to have any chance at survival, given the site's climate and growth medium characteristics, it could not simply be applied to the surface of the slopes. It would have to be mechanically turned in. The angle-of-repose slopes are impossible to access without causing sluffing, and covering the seed uniformly to an appropriate depth would also be impossible. Experience suggests that seed survival is difficult under the most ideal conditions at Hidden Valley, and would be extremely unlikely under conditions present at the outslopes. Further, these slopes are essentially stable due to the presence of rock and the formation of soil crusts. Vegetation is slowly becoming established where site conditions allow. Redisturbance of these areas - either by simply accessing them, or by mechanically disturbing the soil crusts - will likely result in destabilization, increased erosion, and loss of the existing vegetation, without any real possibility of increased vegetation due to reseeding. There is a much higher likelihood of degrading the slopes by reseeding efforts than there is of vegetation being established through such efforts.

Therefore, Consolidation Hidden Valley Coal Company plans to achieve revegetation on the road fill slopes and the pad outslopes by allowing natural regeneration to continue. It is recognized that, while it may not be possible to achieve the reference area objective on the slopes as isolated parcels, the reclaimed area as a whole must achieve the cover requirements before the bond could be released.
installation of 3-wire 42" barbed wire drift fences across Ivie Creek and on the road alignment (Plate III).

**UMC 817.112 Revegetation: Use of Introduced Species.**

A mixture of native and commonly used introduced species will be seeded on the disturbed areas. The introduced species are legumes that provide nitrogen-fixing capabilities. Two grasses, crested wheatgrass and Russian wildrye, are used to provide erosion control and food for wildlife.

(a) Both species are now established on the site from past undocumented seedings. These two species also did well on test plots located just north of the permit area. They became quickly established as seedlings and maintained themselves during the 5 year test of revegetation success on the Emery Coal fields. See page 9 & 10 of *Reclamation on Utah's Emery and Alton Coal Fields: Techniques and Plant Materials*; R.B. Ferguson and Frischknecht, N.C.; Research Paper INT-335; Intermountain Forest and Range Experiment Station Ogden, Utah.

(b) Indian ricegrass and sand dropseed will be slow to germinate and establish groundcover on the reclaimed sites. Quick cover species are needed to provide erosion control in the first two-three years.
(c) The species provide food and cover for small animals. Both produce high yields of seed for birds and rodents.

(d) The two species are not poisonous or noxious and meet State and Federal seed standards.

The following seed mixture and rates will be used:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>lbs/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>crested wheatgrass</td>
<td>Agropyron cristatum</td>
<td>1.0</td>
</tr>
<tr>
<td>sand dropseed</td>
<td>Sporobolus cryptandrus</td>
<td>0.5</td>
</tr>
<tr>
<td>Indian ricegrass</td>
<td>Oryzopsis hymenoides</td>
<td>3.0</td>
</tr>
<tr>
<td>Salina wildrye</td>
<td>Elymus salinus</td>
<td>3.0</td>
</tr>
<tr>
<td>Russian wildrye</td>
<td>Elymus junceus</td>
<td>1.0</td>
</tr>
<tr>
<td>yellow sweetclover</td>
<td>Melilotus officinalis</td>
<td>3.0</td>
</tr>
<tr>
<td>fourwing saltbush</td>
<td>Atriplex canescens</td>
<td>3.0</td>
</tr>
<tr>
<td>shadscale</td>
<td>Atriplex confertifolia</td>
<td>2.0</td>
</tr>
<tr>
<td>mat saltbush</td>
<td>Atriplex corrugata</td>
<td>2.0</td>
</tr>
<tr>
<td>winterfat</td>
<td>Ceratoides lanata</td>
<td></td>
</tr>
</tbody>
</table>

Total 20.5

This mixture varies from that listed in the Interim Plan. The mixture is designed to be salt tolerant and survive in the dry
Planting was redone on the A- and B-seam fillslopes and the pad areas adjacent to the ephemeral channel. The original revegetation mix was adjusted based upon experience gained with three seasons of planting since the original reclamation work was done in 1986. The revised seed mix is:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>PLS in lb/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hycrest hybrid</td>
<td>Agropyron cristatum</td>
<td>4</td>
</tr>
<tr>
<td>Indian ricegrass</td>
<td>Oryzopsis hymenoides</td>
<td>2</td>
</tr>
<tr>
<td>Russian wildrye</td>
<td>Elymus junceus</td>
<td>3</td>
</tr>
<tr>
<td>Yellow sweetclover</td>
<td>Melilotus officinalis</td>
<td>1</td>
</tr>
<tr>
<td>Fourwing saltbush</td>
<td>Atriplex canescens</td>
<td>1</td>
</tr>
</tbody>
</table>

All of these species were in the original mix, except that crested wheatgrass was replaced with a new, drought-tolerant hybrid of crested and Ephraim wheatgrasses. Species that were not hearty enough to withstand the drought conditions (i.e. winterfat) and species that did not germinate at all (i.e. sand dropseed) in past seedings were not utilized in the latest seeding attempt.
condition of the talus slopes.

UMC 817.113 Revegetation: Timing

The seedbed will be prepared by ripping all compacted surfaces and scarifying the soil materials. The areas will be broadcast seeded in the late fall (Oct-Nov) as the final reclamation phase. The species are all cool-season types except sand dropseed which actually germinates as late cool-season or early warm-season grass. The seed, mulch and fertilizer will be covered by dragging the loose soil surface.

1Based on June 1996 vegetation study conducted by JBR Consultants, a decision has been made to reaffect and revegetate portions of the 6.7 acre disturbed site. The following schedule shall be followed to develop a revised revegetation plan:

- Soil sampling & analysis by April 15, 1997
- Modify & submit "Application For Permit Change" to Utah Coal Regulatory Program by June 30, 1997
- Conduct site work and revegetation seeding/planting by Nov. 15, 1997

The developed plan may incorporate phases for the revegetation of the A and B slopes through the 1997 to 1999 time period. The modified plan may involve reconfiguration of these slopes.

UMC 817.114 Revegetation: Mulching and other stabilizing practices.

Alfalfa hay at 4000 lbs. acre will be spread on all the seeded areas. The mulch will be anchored with soil dragged over the hay. The graded slopes on the coal seams will require erosion control netting to hold the mulch and seed in place.

UMC 817.115 Revegetation: Grazing

The postmining land use is wildlife and livestock grazing. The location of the revegetated area precludes any significant value or use by livestock. Cattle use is restricted to a few head drifting along Ivie Creek. Wildlife use is restricted to small

1Inserted 2-19-97
The graded slopes on the A- and B-seams were stabilized with erosion control matting. This matting is North American Green SC-150, which is designed for use on steep slopes. It is comprised of straw and coconut fibers held together by a cotton netting and degradable, plastic netting. It was installed according to manufacturer's specifications for 2h:1v slopes, including trench-key-in, overlapping requirements, and a staple pattern of 2/sq. yd.
The green alfalfa hay was spread by hand at the rate of 4,000 lbs./acre. The fill and topsoil material proved to be loose sandy-silty material that was not amenable to backdragging with a chain. Also the fear of burying the seed too deep prompted a change in the method of anchoring the hay mulch.

The alternative method was to spread the hay then drive both rubber-tired and tracked machinery on the contour over the mulched area. This crimped the hay mulch into the loose soil and created small terraces on the slopes and depressions on the flats to capture surface runoff from snowmelt and rainfall. The spacing of small microniches in a rough soil surface is a more effective method in this dry climate than the even application of mulch and topsoil for seed germination and plant growth.

The loose soil was not a good medium to anchor netting on the A and B seam fill slopes so this method was discarded. The resultant slopes on the fills were also less than originally envisioned. The A seam fill slope is 2.4:1 and the B seam fill slope is 3.1:1 considerably less than the 2:1 planned for in the MRP. The fill slope changes came because the surveyor found that additional material would need to be excavated from the ephemeral channel than originally planned. Thus the size of the fills were
increased to accommodate this additional material.

The road from the fence to the county road and the disturbed area of the roadbase material was not mulched because livestock grazing in the area from December to April would be attracted to the hay at these sites outside the drift fences. The concentration of cattle on the moist ripped soils would tend to trample and compact the soil surface adversely affecting seed germination.
Reseeding of portions of the reclaimed area was accomplished in years 1, 2 and 3, and as such, no transects will be done until year 6. Monthly monitoring during the growing season will continue in years 4-6.
Appendix I

ROW Documents
BLM ROW
County ROW
FIGURE I
EXPLORATORY ADITS
CROSS SECTION OF REGRADED SEDIMENT POND

LONGITUDINAL PROFILE 3 SEDIMENT POND

CONsolidation Coal Company
Hidden Valley Mine

Figure II
Section and Profile of Sediment Pond
SEAM A
FERRON SANDSTONE
MAXIMUM SEAM THICKNESS 15.3 FEET
SLOPE = 2h:1v

SEAM B
SANDSTONE
SHALE
SANDSTONE
MAXIMUM SEAM THICKNESS 12.5 FEET
SLOPE = 2h:1v

CONSOLIDATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE III
CROSS SECTIONS FOR COAL SEAM BACKFILLS

jbr
environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada
DESIGN BY: JMA DRAWN BY: CP CHECKED BY: JMA SCALE 1" = 20'

DATE DRAWN 8/11/86
5/25/96
CROSS SECTION
A SEAM PAD

E

A SEAM
BACKFILL

CURRENT GROUND SURFACE

CROSS SECTION
B SEAM PAD

F

B SEAM
BACKFILL

CURRENT GROUND SURFACE

IVIE CREEK

CONSOLIDATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE IV
CROSS SECTION AND
POST RECLAMATION CONFIGURATION
A SEAM AND B SEAM PADS
LONGITUDINAL PROFILE 2
ROAD CROSSING CHANNEL RESTORATION

ROAD RESTORATION

SLOPE = 6 FT / 85 FT = 0.071%

CROSS-SECTION C-C'
ROADCUT
HIGHWALL

CONSOLIDATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE V
SECTIONS AND PROFILE
OF ROAD CHANNEL
CONSOLIDATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE VI
BLOCK DIAGRAM OF
ROAD WATERBARS

environmental consultants, inc.
Salt Lake City, Utah  Cedar City, Utah  Reno, Nevada  Elko, Nevada

DATE
DRAWN  8/11/86

REVISION
5/29/96
RIPRAPP ZONE (IF NOT ON BEDROCK): 1 FT. ABOVE FLOW DEPTH AND 1.35 FT. THICK

DEPTH OF FLOW 0.56 FT.

DEPTH OF FLOW = 0.48 FT.

CONSOLIDATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE VIII
CROSS SECTIONS OF EPHEMERAL CHANNEL
EXPLANATION

CONSOLIDATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE IX
LOCAL GEOLOGY

CONSOLIATION COAL COMPANY
HIDDEN VALLEY MINE

FIGURE IX
LOCAL GEOLOGY
April 25, 1986

Mr. Severo Chavez
California Portland Cement Company
P.O. Box 947
Colton, CA 92324-0514

Re: Hidden Valley Mine
Adit Condition

Mr. Severo Chavez:

On April 26, 1979, I entered the A and B seam portals at Hidden Valley Mine for a routine inspection. During this inspection no evidence of water was encountered. Refer to the enclosed Exhibit A for a description of the two adits.

If I can be of further help please let me know.

Sincerely,

SOLDIER CREEK COAL COMPANY

J.T. Paluso
Chief Engineer

JTP:pp
Enclosure
Appendix II

Sample S-1    "A" Seam Pad
Sample S-2    Lower "B" Seam Pad
Sample S-3    Upper "B" Seam Pad
Sample S-4    Topsoil Stockpile
Sample S-5    Native Soil
Sample HVD-1  Lower "B" Seam Pad
Sample HVD-2  Upper "B" Seam Pad
Sample HVD-3  Sediment Pond
TO: JBR Consultants  
1841 E. Fort Union Blvd.  
Salt Lake City, UT 84121

SAMPLE ID: Lab #U014090 - Soil, HVD-1  
Lab #U014091 - Soil, HVD-2  
Lab #U014092 - Soil, HVD-3

CERTIFICATE OF ANALYSIS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>U014090</th>
<th>U014091</th>
<th>U014092</th>
</tr>
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<tr>
<td>Saturation, %</td>
<td>14.6%</td>
<td>14.7%</td>
<td>16.1%</td>
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<tr>
<td>Soil Texture: Gravel, %</td>
<td>7.3</td>
<td>9.4</td>
<td>13.5</td>
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<tr>
<td>Sand, %</td>
<td>54.3</td>
<td>37.4</td>
<td>40.9</td>
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<tr>
<td>Silt/Clay, %</td>
<td>38.7</td>
<td>43.2</td>
<td>45.6</td>
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<tr>
<td>Alkalinity as CaCO₃, mg/Kg</td>
<td>45.6</td>
<td>49.9</td>
<td>56.3</td>
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<tr>
<td>Alkalinity as CaCO₃, mg/l</td>
<td>45.9</td>
<td>50.2</td>
<td>56.3</td>
</tr>
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NOTE: Alkalinity tests were run on a water extract sample.  

Rex Henderson
CLIENT: JBR Consultants  
2556 East Oak Creek Circle 
Sandy, UT 84092

LAB NO.: U011184

LOCATION: S-2, Hidden Valley Soil

CERTIFICATE OF ANALYSIS

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<td>CEC Meg/100</td>
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<td>Chloride as Cl, mg/kg</td>
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<td>Organic Matter, %</td>
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<td>Organic N, %</td>
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<tr>
<td>Nitrate as NO₃-N, mg/kg</td>
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<tr>
<td>Phosphorus as PO₄-P, mg/kg</td>
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<tr>
<td>Potassium as K, mg/kg</td>
<td>91.0</td>
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<td>Calcium as Ca, mg/kg</td>
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<td>Magnesium as Mg, mg/kg</td>
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<td>Zinc as Zn, mg/kg</td>
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<td>Copper as Cu, mg/kg</td>
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<tr>
<td>Sulfate as SO₄²⁻, mg/kg</td>
<td>5,940</td>
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<tr>
<td>Sodium as Na, mg/kg</td>
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<tr>
<td>Iron as Fe, mg/kg</td>
<td>45.4</td>
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<tr>
<td>Conductivity, umhos/cm</td>
<td>38</td>
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</table>

(NOTE: Metals determined on DPTA extract)
CLIENT: JBR Consultants  
2556 East Oak Creek Circle  
Sandy, UT 84092

LAB NO.: U011185

LOCATION: S-3, Hidden Valley Soil

CERTIFICATE OF ANALYSIS

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<td>Organic N, %</td>
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<td>Nitrate as NO₃-N, mg/kg</td>
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<td>Phosphorus as PO₄-P, mg/kg</td>
<td>3.81</td>
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<tr>
<td>Potassium as K, mg/kg</td>
<td>95.5</td>
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<td>Calcium as Ca, mg/kg</td>
<td>390</td>
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<td>Magnesium as Mg, mg/kg</td>
<td>515</td>
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<td>Zinc as Zn, mg/kg</td>
<td>1.70</td>
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<td>Copper as Cu, mg/kg</td>
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<td>Sulfate as SO₄, mg/kg</td>
<td>10,600</td>
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<td>Sodium as Na, mg/kg</td>
<td>210</td>
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<td>Iron as Fe, mg/kg</td>
<td>33.4</td>
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<td>Conductivity, umhos/cm</td>
<td>48</td>
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(Note: Metals determined on DPTA extract)
### CERTIFICATE OF ANALYSIS

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<td>Organic N, %</td>
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<td>Nitrate as NO₃-N, mg/kg</td>
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<td>Phosphorus as PO₄-P, mg/kg</td>
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<tr>
<td>Potassium as K, mg/kg</td>
<td>94.5</td>
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<td>Calcium as Ca, mg/kg</td>
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<td>Magnesium as Mg, mg/kg</td>
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<tr>
<td>Zinc as Zn, mg/kg (DPTA)</td>
<td>0.70</td>
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<tr>
<td>Copper as Cu, mg/kg (DPTA)</td>
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<td>Sulfate as SO₄₂⁻, mg/kg</td>
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<td>Sodium as Na, mg/kg</td>
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<tr>
<td>Iron as Fe, mg/kg (DPTA)</td>
<td>16.2</td>
</tr>
<tr>
<td>Conductivity, umhos/cm</td>
<td>38</td>
</tr>
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(NOTE: Metals determined on DPTA extract)
CLIENT: JBR Consultants  
2556 East Oak Creek Circle  
Sandy, UT 84092

LAB NO.: U011183
LOCATION: S-1, Hidden Valley Soil

CERTIFICATE OF ANALYSIS

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<tr>
<td>CEC Meg/100</td>
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<tr>
<td>Chloride as Cl, mg/kg</td>
<td>36.6</td>
</tr>
<tr>
<td>Organic Matter, %</td>
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<tr>
<td>Organic N, %</td>
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<td>Nitrate as NO₃-N, mg/kg</td>
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<td>Phosphorus as PO₄-P, mg/kg</td>
<td>2.37</td>
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<td>Potassium as K, mg/kg</td>
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<td>Calcium as Ca, mg/kg</td>
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<td>Magnesium as Mg, mg/kg</td>
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<td>Zinc as Zn, mg/kg</td>
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<tr>
<td>Copper as Cu, mg/kg</td>
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<td>Sulfate as SO₄, mg/kg</td>
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<td>Sodium as Na, mg/kg</td>
<td>425</td>
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<td>Iron as Fe, mg/kg</td>
<td>89.3</td>
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<td>Conductivity, umhos/cm</td>
<td>46</td>
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(NOTE: Metals determined on DPTA extract)
Appendix III

Hydrologic Methods and Calculations
APPENDIX III

HYDROLOGY

DESIGN CALCULATIONS
Hydrology Calculations for Hidden Valley Reclamation Project

Areas Considered:
- Portal Area Bench Table Above A Seam Fort
- Ephemeral Channel thru Portal Area 4th St. Bridge
- Limited Drainage thru Sediment Pond
- A-Beam Pad Area

Portal Area Diversion
  - A-Beam
    - Area - 1.9 ac
    - A.W.S - 1.05
    - Hydraulic Length - 800 ft
    - Curve Number - Based on Sandstone outcrop and colluvium
      - 85
    - Time of Concentration - 0.037 hrs.
    - Rainfall - 10yr 24hr storm - 1.67 in
    - Dist. - 30% Type II
    - Peak Flow - 1.2 CFS
HYDROLOGY CALCULATIONS FOR HIDDEN VALLEY
- EPHEMERAL CHANNEL
  - AREA - 124.89 AC
  - A.W.S. = 0.151
  - LENGTH - 5,200 FT
  - CN - 78 - BASED ON COMBINED AREAS OF SANDSTONE AND SEMI-ARID RANGE AND LAND PROFESSIONAL NUCLEAR
  - TIME OF CONCENTRATION - 0.54 HRS
  - RAINFALL - 2.6 IN - 100YR-24 HR STORM
  - D.I.S. - SCS TYPE II
  - PEAK FLOW - 70.97 CFS

- SEDIMENT POND
  - AREA - 0.41 AC
  - A.W.S. = 0.22
  - HYDRAULIC LENGTH - 300'
  - CURVE NUMBER - 80 - BASED ON SANDSTONE OUTCROP REGRADED PORTAL BENCH
  - TIME OF CONCENTRATION - 0.43 HR
  - RAINFALL - 1.67 - 10YR-24 HR STORM
  - D.I.S. - SCS TYPE II
  - PEAK - 0.1 CFS

- A-REAM PAD
  - AREA - 0.78 AC
  - TIME OF CONCENTRATION - 0.52 HR
  - A.W.S. = 0.43 FT/FT
  - RAINFALL - 1.67 IN
  - HYDRAULIC LENGTH = 200 FT
  - D.I.S. - SCS TYPE II
  - CN-90 - BASED ON SANDSTONE OUTCROP, EMBANKMENT, BENCH
  - PEAK - 0.26 CFS
EVALUATION OF CHANNEL REQUIREMENTS

- PORTAL DIVERSION
  - A-SEAM - UPPER SECTION
    - PEAK FLOW 1.2 CFS
    - EXISTING CHANNEL - TRIANGULAR SHAPE
      - Cut in bedrock

\[ M_1 = 5 \quad N = 0.032 \]
\[ M_2 = 5 \quad S = 0.034 \text{ (from 6/19/80 letter) } \]

Assume depth of 0.4 FT

\[ \text{Area} = 0.44 \text{ FT}^2 \]
\[ WP = 2.487 \text{ FT} \]
\[ R = 0.177 \text{ FT} \]
\[ Q = 1.191 \text{ FT} \quad \text{Low} \]

Assume depth of 0.42 FT

\[ A = 0.485 \]
\[ WP = 2.611 \]
\[ R = 0.186 \]
\[ Q = 1.356 \quad \text{Too High} \]

Assume depth of 0.402 FT

\[ A = 0.444 \]
\[ WP = 2.499 \]
\[ R = 0.178 \]
\[ Q = 1.207 \quad \text{OK!} \]
- Velocity Determination

\[ \frac{Q}{A} = \frac{V}{1.2/0.444} = 2.7 \text{ FPS} \]

- Maximum Allowable Velocity - 5 - 6 fps

Based on Table 6.1a, OSH Survival

- Engineers Channel - Rectangular

Flow: 71 CFS

Channel Shape: Trapezoidal

\[ z = 4 \]
\[ b = 10 \]

Slope = 0.105. (From Profile III)

Riprap Flow Depth Determined by Swirl

Li Method (OSH Survival Handbook 1982)

Fig. 5.5 (attached)

\[ D_{50} = 0.675 \text{ FT} \rightarrow 0.75 \text{ FT} \]
\[ a = 0.55 \text{ FT} \]

Riprap Calculation

\[ D_{100} = D_{50} + z = 0.75 + 2 = 1.5 \text{ FT} \]
\[ D_{85} = D_{50} + 1.5 \times 0.75 \times 1.5 = 1.13 \text{ FT} \]
\[ D_{50} = D_{50} + 1.0 \times 0.75 \times 1.0 = 0.75 \text{ FT} \]
\[ D_{15} = D_{50} - 0.1 \times 0.75 \times 0.1 = 0.675 \text{ FT} \]
Table 6.1a. Maximum Permissible Velocities Tables by Fortier and Scobey (1926).

<table>
<thead>
<tr>
<th>Original Material Excavated For Canals</th>
<th>Mean velocity of canals after aging (d&lt;3 ft)</th>
<th>Clear water, no detritus</th>
<th>Water transporting colloidal silt</th>
<th>Water transporting noncolloidal silts, sands, gravels or rock fragments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean velocity (ft/sec m/sec)</td>
<td>(ft/sec m/sec)</td>
<td>(ft/sec m/sec)</td>
<td>(ft/sec m/sec)</td>
</tr>
<tr>
<td>1. Fine sand (colloidal)</td>
<td>0.02</td>
<td>1.5 0.46</td>
<td>2.50 0.76</td>
<td>1.50 0.46</td>
</tr>
<tr>
<td>2. Sandy loam (noncolloidal)</td>
<td>0.02</td>
<td>1.45 0.53</td>
<td>2.50 0.76</td>
<td>2.00 0.61</td>
</tr>
<tr>
<td>3. Silt loam (noncolloidal)</td>
<td>0.02</td>
<td>2.00 0.61</td>
<td>3.00 0.91</td>
<td>2.00 0.61</td>
</tr>
<tr>
<td>4. Alluvial silt when noncolloidal</td>
<td>0.02</td>
<td>2.00 0.61</td>
<td>3.50 1.07</td>
<td>2.00 0.61</td>
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<tr>
<td>5. Ordinary firm loam</td>
<td>0.02</td>
<td>2.50 0.76</td>
<td>3.50 1.07</td>
<td>2.25 0.69</td>
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<tr>
<td>6. Volcanic ash</td>
<td>0.02</td>
<td>2.50 0.76</td>
<td>3.50 1.07</td>
<td>2.00 0.61</td>
</tr>
<tr>
<td>7. Fine gravel</td>
<td>0.02</td>
<td>2.50 0.76</td>
<td>5.00 1.52</td>
<td>3.75 1.14</td>
</tr>
<tr>
<td>8. Stiff clay (very colloidal)</td>
<td>0.025</td>
<td>3.75 1.14</td>
<td>5.00 1.52</td>
<td>3.00 0.91</td>
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<tr>
<td>9. Graded, loam to cobbles, when noncolloidal</td>
<td>0.03</td>
<td>3.75 1.14</td>
<td>5.00 1.52</td>
<td>5.00 1.52</td>
</tr>
<tr>
<td>10. Alluvial silt when colloidal</td>
<td>0.025</td>
<td>3.75 1.14</td>
<td>5.00 1.52</td>
<td>3.00 0.91</td>
</tr>
<tr>
<td>11. Graded, silt to cobbles, when colloidal</td>
<td>0.03</td>
<td>4.00 1.22</td>
<td>5.50 1.68</td>
<td>5.00 1.52</td>
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<tr>
<td>12. Coarse gravel (noncolloidal)</td>
<td>0.025</td>
<td>4.00 1.22</td>
<td>6.00 1.83</td>
<td>6.50 1.98</td>
</tr>
<tr>
<td>13. Cobbles and shingles</td>
<td>0.035</td>
<td>5.00 1.52</td>
<td>5.50 1.68</td>
<td>6.50 1.98</td>
</tr>
<tr>
<td>14. Shales and hard pans</td>
<td>0.025</td>
<td>6.00 1.83</td>
<td>6.00 1.83</td>
<td>5.00 1.52</td>
</tr>
</tbody>
</table>
-> CHANNEL STABILIZATION

- EROSION CONTROL WILL BE ATTAINED WITH 4:1 SLOPES AND 6 IN.
  EROSION CONTROL CAN BE ACHIEVED BY USING THIN ALLUVIAL FILLS OVER SECTIONS TO
  ALLOW ADEQUATE PROTECTION OF THE
  FILL AREAS, THE SPECIFIC REQUIREMENTS WILL BE EMPLACED AT THESE LOCATIONS TO
  PREVENT EROSION.

- NO FILTER BLANKET WILL BE USED FOR
  THE SITE. THIS IS DUE TO THE COARSE
  NATURE OF THE MATERIAL IN THE CHANNEL
  AREA. WHILE NO PARTIAL SIZE DEFINITION
  FOR THE CHANNEL MATERIAL IS AVAILABLE,
  IT IS EXPECTED THAT WHEN THE SULFATE
  IS REMOVED MUCH OF THE COARSE EBULLI
  MATERIAL WILL REMAIN PROVIDING A BLANKET
  MATERIAL. ALSO THE COARSE MATERIAL
  WILL PREVENT EROSION. OTHER FEATURES
  WITH A CORRESPONDING LOW RISK WILL
  RESULT IN SIGNIFICANT REDUCTION
  OF CHANNEL EROSION.

- ROAD CROSSING

  PEAK FLOW - 710 CFS

  SHAPE OF CHANNEL - ASYMMETRIC TRIANGLE

  MANESHOA N = 0.032

  SLOPE = 0.071 (FROM LONGITUDINAL PROFILE 2)

  

  \[
  \text{Assume depth of 1 foot} \\
  \text{Area} = \left( \frac{1}{2} \times b \times h_1 \right) + \left( \frac{1}{2} \times b_2 \times h_2 \right) \\
  = \left( \frac{1}{2} \times 12.5 \times 0 \right) + \left( \frac{1}{2} \times 10 \times 1 \right) = 11.25 \text{ ft}^2 \\
  \text{W.D} = h_1 + h_2 = \sqrt{10^2 + 10^2} + \sqrt{10^2 + 10^2} = 12.5 \text{ ft} \\
  \]
Hydraulic Radius: \( R = \frac{A}{P} = \frac{11.25}{22.59} = 0.493 \)

\[ Q = 4 \left( \frac{1.486}{11} \right) \frac{R^{3/2}}{S^{1/2}} (0.493)^{3/2} (0.071)^{1/2} \]

\[ = 87.45 \text{ cfs} \quad \text{Too High} \]

Assume depth of 0.75 ft

\[ \text{Area} = \frac{1}{2} b, h_1 + \frac{1}{2} b_2 h_2 = \frac{1}{2} 9.3(0.75) + \frac{1}{2} 7.5(0.75) = 6.3 \]

\[ W.P. = 9.40 + 7.54 = 16.94 \]

\[ R = 0.379 \]

\[ Q = 40.66 \text{ cfs} \quad \text{Too Low} \]

Assume depth of 0.9 ft

\[ h_1 = 11.25 h_1 = 0.9 b_2 = 9 h_2 = 0.9 \]

\[ A = 5.06 + 4.05 = 9.11 \text{ ft}^2 \]

\[ W.P. = 11.28 + 9.04 = 20.32 \]

\[ R = 0.448 \]

\[ Q = 65.99 \text{ cfs} \quad \text{Too Low} \]

Assume depth of 0.92 ft

\[ h_1 = 0.75 b_1 = 11.7 b_2 = 9.7 \]

\[ A = 5.29 + 4.23 = 9.52 \]

\[ W.P. = 11.54 + 9.25 = 20.78 \]

\[ R = 0.458 \]

\[ Q = 69.99 \text{ cfs} \quad \text{Low} \]

Assume depth of 0.93 ft

\[ h_1 = 0.93 b_1 = 11.63 b_2 = 9.3 \]

\[ A = 5.41 + 4.32 = 9.73 \text{ ft}^2 \]

\[ W.P. = 11.67 + 9.35 = 21.01 \]

\[ R = 0.463 \]

\[ Q = 72.06 \text{ cfs} \quad \text{High} \quad \text{Assume Flow Depth} 0.925 \text{ ft} \]
VELOCITY DETERMINATION AT ROAD CROSSING CHANNEL RESTORATION.

PEAK FLOW = 71 cfs
DEPTH OF FLOW = 0.925 ft
AREA = 9.63 ft²
VELOCITY = \( V/A = 71/9.63 \)
= 7.4 ft/s
GOOD

LESS THAN MAXIMUM ALLOWABLE FOR RED ROCK 10 ft/s.

- A-SEAM PAD - TRIANGULAR

PEAK FLOW = 0.26 cfs
MANNING'S \( n \) = 0.028 (Assuming no vegetation yet established)
SLOPE = 1.1 ft/ft
\( R = 2:1 \)
\( d = 0.12 \) ft
\( V = 8.2 \) ft/s

DETERMINATION ASSUMED NO SILT FENCE IN PLACE.
FLOW THRU SILT FENCE FABRIC WILL REDUCE THE PEAK. THE EXACT AMOUNT OF FLOW REDUCTION WILL DEPEND ON CONDITION OF THE FENCE.

- SEDIMENT POND - TRIANGULAR

PEAK FLOW = 0.1 cfs
MANNING'S \( n \) = 0.028 (Assuming no vegetation yet established)
SLOPE = 0.9 ft/ft
\( R = 2:1 \)
\( d = 0.09 \) ft
\( V = 6.0 \) ft/s

DETERMINATION ALSO ASSUMED NO SILT FENCE. FLOW WILL BE REDUCED.
Velocity Determination for Pec. Pond Area Discharge

Peak Flow = 0.10 cfs
Slope of Channel to Julie Creek = 32°/75 ft = 4.3°
Side slopes of Channel = 2:1
Bottom Width = 0

 Manning's n = 0.028 (Based on Design Charts for Open-Channel Flow, U. S. DOT, Federal Highway Admin., 1979, H.D.S. #3, Washington, D.C.) Excavated Channel
No Vegetation
Depth of Flow = 0.10 ft.

Velocity of Flow = 4.5 ft/sec.

Soil Material is an Alluvial w/Gravel
Maximum Allowable Velocity is 5.0 ft/sec - NO GOOD

Soil Riprap Required 6" D50 - n = 0.035

\[ D_{85} = 2 \text{mm} \]
\[ D_{15} = 0.005 \]

\[ D_{85} = 9 \text{in} = 22.8 \text{mm} \]
\[ D_{50} = 6 \text{in} = 152.4 \text{mm} \]
\[ D_{15} = 0.15 \times 6 = 9 \text{in} = 1 \text{in} = 25.4 \]

\[ \frac{25.4}{2} = 12.7 < 5 \text{ NO} \text{ NO GOOD} \]

Filter Blanket Required

Excavation both channels

\[ \frac{2(4 \times 4 \text{ ft})}{2} = 4 \times 100 \text{ ft} = 400 \text{ ft}^{3} = 15 \text{ cu} \]
\[ 15 \times \$5 = \$75 \]

Riprap + Filter

\[ .5 \times 4 = 2 \text{ ft}^{2} \times 2 \text{ layers} = 4 \text{ ft}^{2} \times 100 \text{ ft} = 400 \text{ ft}^{3} = 15 \text{ cu} \]
\[ 15 \times \$3 = \$45 \]
A-SEAM VELOCITY DETERMINATION

Peak Flow = 0.26 cfs.
Slope of channel to Juice Creek = 25%/85' = 0.30
Side slopes = 2:1
Bottom width = 3'
Manning's n = 0.028

Depth of flow = 0.161
Velocity of flow = 5.08 ft/sec

Soil material is Alluvium s/gravel
Maximum allowable velocity is 3.0 ft/sec - No Good Riprap Required
Assume 6” D50

N = 0.035
V = 5.04 OK

As w/ sed. Road Filter Blanket Required
### Hydrometer Analysis

<table>
<thead>
<tr>
<th>Time Readings</th>
<th>25 HR THR</th>
<th>45 MIN</th>
<th>15 MIN</th>
<th>1 HR</th>
<th>19 MIN</th>
<th>4 MIN</th>
<th>1 MIN</th>
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<tr>
<td></td>
<td>100</td>
<td>100</td>
<td>100</td>
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<td>100</td>
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<table>
<thead>
<tr>
<th>Sieve Width</th>
<th>3/8 IN</th>
<th>3/4 IN</th>
<th>1 IN</th>
<th>1 1/2 IN</th>
<th>3 IN</th>
<th>6 IN</th>
<th>12 IN</th>
<th>24 IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Number</td>
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<td>100</td>
<td>100</td>
<td>100</td>
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<td>100</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sieve Analysis Clear Openings</th>
<th>3/8 IN</th>
<th>3/4 IN</th>
<th>1 IN</th>
<th>1 1/2 IN</th>
<th>3 IN</th>
<th>6 IN</th>
<th>12 IN</th>
<th>24 IN</th>
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<tr>
<td>Equivalent Diameter</td>
<td>3 IN</td>
<td>6 IN</td>
<td>12 IN</td>
<td>24 IN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Sieve Number

- 50
- 30
- 16
- 8
- 4

#### Streambank Soil

- 15% Size

#### Gradation Curves

**Figure 7 - Gradation Curves for Filter Design**

- Sand
- Gravel
- Riprap

**Particle Size, in Millimeters**

- 0.001
- 0.005
- 0.009
- 0.019
- 0.037
- 0.074
- 0.149
- 0.297
- 0.590
- 1.19
- 2.38
- 4.76
- 9.52
- 19.1
- 25.4
- 38.1
- 76.2
- 152
- 305
- 610

**Percent Finer by Weight**

- 0
- 20
- 40
- 60
- 80

**Percent Finer by Weight**

- 0
- 20
- 40
- 60
- 80
- ALLOWING FOR WEIGHTING BY AREA

\[ \text{CWW} = \frac{78(85.4) + 83(38.6)}{124} \]

\[ = 79.5 \approx 80 \]

11/4/86 RESPONSE TO DOGM'S COMPLAINT OF 10/8/86.

- WATER BAR SPACING
  - BASED ON UMC 017.153 +
  - FOR THE SLOPE LESS THAN 10% USE UMC 817.158
  - FOR SLOPE GREATER THAN 10% USE FIGURE 7.11

- USING ROAD PROFILE
  - SLOPE SPACING

SECTION 1 - 200 FT - 5.8% - 800' 0
SECTION 2 - 450 FT - 9.73% - 800' 2
SECTION 3 - 450 FT - 3.04% - 800' 1
SECTION 4 - 200 FT - 0.82% - 1000' 0
SECTION 5 - 850 FT - 11.82% - 200' 5
<table>
<thead>
<tr>
<th>LENGTH</th>
<th>SLOPE</th>
<th>SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECTION 6 - 250</td>
<td>15.00%</td>
<td>1100 FT</td>
</tr>
<tr>
<td>SECTION 7 - 200</td>
<td>17.00%</td>
<td>150 FT</td>
</tr>
<tr>
<td>SECTION 8 - 567</td>
<td>1.17%</td>
<td>1000 FT2</td>
</tr>
<tr>
<td>32.67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MAP LENGTH - 2925 FT.

FROM PLATE III

- USING THE ABOVE PROFILE INFORMATION
- PLOTTED ON PLATE IV. TOTAL # OF
- WATER BARS IS 11. (SEE PLATE IV
- FOR LOCATIONS.

TEXT CHANGES:
P21 SECOND PARAGRAPH WATER
BAR SPACING & LOCATION
P29 - 860 Pond & A. Steam AV
DRAINAGE
MEMORANDUM

To: Joe Jarvis, JBR Consultants

From: Tom Suchoski, Uintex

Date: September 22, 1986

Subject: Justification of Curve Number for Calmat mine site

The Division of Oil, Gas, and Mining has raised question concerning the validity of the curve numbers used in the channel design of the Calmat mine site. This memo will provide justification for the curve numbers chosen.

As was indicated to both yourself and to the DOGM staff, no soil survey information is available for the site. Therefore, it was not possible to determine a hydrologic soil group for the site based on published data. Due to this lack of data, professional judgement was used to generate a curve number for the site.

As this was not sufficient for the DOGM staff, I will attempt to justify my previous curve number selection. Several conversations were held by telephone with DOGM, SCS, and BLM soil scientists and specialists to determine if any published soils data was available for the site. Based on these conversations no additional data could be obtained. Discussions with DOGM soil specialist James Leatherwood and BLM soil scientist Dan Cressy, indicate that steep sections of the canyon where bedrock is close to the surface and where significant outcropping occur, would most likely be classified as D type soils, and that in gently sloping areas where bedrock is at a greater depth, soils would likely be classed as C type soils. Using these descriptions of hydrologic soil group classification, the attached map delineates those areas of the ephemeral drainage which would fall in each group.

Vegetation of the site is quite limited, as shown by data from the reference area transects. As this data was site-specific, it was used to determine cover and vegetation type. The average cover percentage was approximately 7% vegetation and 2% litter, for a total of 9%. The vegetation type in the drainage area is
Using Van Haveren (1986), hydrologic condition for drainage areas with less than 20% cover are in poor hydrologic condition. Based also on Van Haveren (1986), curve numbers for a sagebrush-grass community in poor hydrologic condition with C and D hydrologic group soils are 78 and 83, respectively.

Using the areas determined for each hydrologic group from the attached map, the weighted curve number for the ephemeral drainage is 79.5, which was rounded to 80.

I hope this justification is acceptable and answers all of DOGM's concerns.

References

Mr. Tom Suchoski  
Division of Oil, Gas, and Mining  
1588 West North Temple  
Salt Lake City, Utah 84111

Re: B-Seam Bench Cut  
Soldier Creek Coal Company  
Hidden Valley Mine  
ACT/015/022

Dear Mr. Suchoski:

As per your telephone conversation with Dave Spillman on June 6, 1980, a description of the techniques to be used for reclamation of the portal area highwalls is as follows:

Please refer to figure 12, page 27, of the "Runoff Control Plan, Sedimentation Pond Design," submitted on May 5, 1980, for an illustration of the area in question.

Highwalls within the portal area are the necessary result of portal and bench cut development. The existing highwalls were constructed during the summer of 1977. Final reclamation of these disturbed areas will require permanent portal seals, backfilling, grading, and stabilization.

The cut and fill terrace method of backfilling described in 30 CFR 817.102 is believed to be the most compatible with the desired reclamation of the portal area. There is sufficient material in this area to facilitate such reclamation. It is speculated that the material to be used for highwall reclamation will come
from the immediate vicinity. The initial source of material would be centered around the removal of the 48 inch culvert, which bisects the portal area. As additional material is removed and pushed towards the highwall area, a dished out effect will result.

All backfilling and grading will be in accordance with 30 CFR 817.101 and 817.102. All stabilization will follow an approved revegetation plan.

I would like to remind you that the bench cut proposed above the B-Seam portals will not initially be used as a runoff diversion. Runoff from this area will be contained in the sedimentation pond. If the bench cut is going to be used as a diversion, the necessary diversion requirements will be submitted to the Division for approval at a later date.

Questions regarding the A-Seam diversion have been asked by the Division in a letter dated June 2, 1980. In response to these questions, a longitudinal profile of the drainage ditch is attached. Conveyance of runoff water from the diversion to Ivie Creek is by culvert as shown on page 27 of the "Runoff Control Plan, Sedimentation Pond Design." A typical portal reclamation profile is also enclosed.

Approval as quickly as possible of the B-Seam bench cut would be appreciated.

Sincerely,

SOLDIER CREEK COAL COMPANY
Hidden Valley Mine

J. T. Paluso
Project Engineer

JTP: tp
Enclosures
Note: Cut-and-fill terraces may be utilized to ensure stability and control erosion. This is in accordance to 30 CFR 817.102.
Existing A-Seam Bench-Cut Profile
Proposed Runoff Diversion

3.4% Average
If $\frac{u^2}{n} - \frac{u^2}{n} = \frac{n}{2}$, then

$$R_n = \frac{b}{F} = \frac{b}{a^2} = \frac{3}{4} = 1.247$$

$$e = \frac{u^2}{0.646(0.125)^{1/2}(0.033)^{1/2}}$$

$$= 1.72 \; F/S$$

on a bed rock surface so no erosion or scour should occur.
ADDENDUM

TO

APPENDIX III - HYDROLOGY CALCULATIONS

AMENDMENT TO

APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

hv 1/3/90

Plan Amendment 1 60-a November 15, 1989
To prevent gullying of A-seam fill, construct diversion at contact between cliff face and fill slope along existing bench at grade. Divert across road and to retention berms on flat area east of main, ripped channel.

**Drainage area above A-seam fill:**

\[ 5.9 \text{ in}^2 = 1.35 \text{ ac} \quad (100' : 1' \text{ map scale}) \]

**Curve Number = 85**

*Taken from info contained in Reo Plan

**Time of Concentration:**

\[ T_c = C' \left( \frac{11.9 (L)^3}{H} \right)^{385} \]

where

- \( C' = \text{based on CN for } CN = 85, C' = 0.8 \)
- \( L = \text{hydraulic length in miles} \)
- \( H = \text{Elevation change or Underflow in ft} \)

\[ T_c = 0.8 \left( \frac{11.9 \ (0.095)^3}{240} \right)^{385} \]

\[ T_c = 0.016 \text{ hr} \]

Precipitation for 100-yr 24-hr Storm:

2.6 in (from Reclamation Plan)

Using Harkins - SCS CN program for rainfall- RO = peak flow is:

1.83 cfs

**AMENDMENT TO**

**APPROVED Mining & Reclamation Plan**

Approved, Division of Oil, Gas & Mining

by [Signature] 

Data 1/3/90
Hidden Valley Coal Mine - Amendment 1 - Nov. 15, 1989

OUTPUT FROM SCS STORM HYDROGRAPH PROGRAM

INPUT FOR: Above A seam - 100yr

<table>
<thead>
<tr>
<th>STORM:</th>
<th>WATERSHED:</th>
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<tbody>
<tr>
<td>dist = SCS Type II - 24 Hr</td>
<td>area = 1.35 acres</td>
</tr>
<tr>
<td>depth = 2.60 inches</td>
<td>cn = 85.00</td>
</tr>
<tr>
<td>duration = 24.00 hrs</td>
<td>time conc = 0.016 hrs</td>
</tr>
</tbody>
</table>

OUTPUT SUMMARY

<table>
<thead>
<tr>
<th>parameter</th>
<th>value</th>
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</thead>
<tbody>
<tr>
<td>runoff depth</td>
<td>1.25862 inches</td>
</tr>
<tr>
<td>initial abstr</td>
<td>0.35294 inches</td>
</tr>
<tr>
<td>peak flow</td>
<td>1.83 cfs (1.34149 ion)</td>
</tr>
<tr>
<td>at time</td>
<td>12,000 hrs</td>
</tr>
</tbody>
</table>

AMENDMENT TO

APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by __________________ date 1/3/90
Hidden Valley Coal Mine - Amendment 1 - Nov. 15, 1989

**RAP NORM**

Find the Normal Depth of a Trapezoidal Channel
*** September 22, 1986. Uintex Corp. SLC. Utah ******

**Each 1 - A Seam Diversion - Across fill/slope**

**ENTER DATA** below:

- Bottom width, ft: 0.01
- Left bank, slope (mH:1V): 3
- Right bank, slope (mH:1V): 2
- Discharge, cfs: 1.83
- n value: 0.025
- Channel Slope: 0.075

Here are the normal depth and velocity:

\[
Y_n = \frac{1}{2} \times 1.83 \times 1.83 = 3.35769 \text{ feet}
\]

\[
V_n = \frac{1.83}{0.075} = 24.4 \text{ fps}
\]

---

**AMENDMENT TO**

**APPROVED** Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by [Signature]

**RAP NORM**

Find the Normal Depth of a Trapezoidal Channel
*** September 22, 1986. Uintex Corp. SLC. Utah ******

**Reach 2 - A Seam diversion - Down road fill**

**ENTER DATA** below:

- Bottom width, ft: 0.01
- Left bank, slope (mH:1V): 3
- Right bank, slope (mH:1V): 3
- Discharge, cfs: 1.83
- n value: 0.0354
- Channel Slope: 0.17

Here are the normal depth and velocity:

\[
Y_n = \frac{1}{2} \times 1.83 \times 1.83 = 3.35769 \text{ feet}
\]

\[
V_n = \frac{1.83}{0.17} = 10.8 \text{ fps}
\]
1) Channel Cross sections for A-seam diversion

Reach 1 (Across top of fill)

Reach 2 (Down Road fill)

2) Cross-section of retention berms:

AMENDMENT TO
APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by [Signature] date 11/31/90
The cover, density and productivity of the seeded sites will be sampled in years 9 & 10 in preparation for bond release. The reference sites will be measured again with the methods used for the original measurements (See Appendix IV). The fences protecting the seedings will be removed once the plant cover goals are achieved.

**UMC 817.117 Revegetation: Trees and Shrubs**

No trees will be planted. A variety of shrub species are included in the seed mixture.
VII Monitoring and Maintenance

UMC 817.41-.50 Hydrologic Balance: General Requirements

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The surface flows in Ivie creek, a perennial stream, are and will be sampled and measured semi-annually, during the months of May and September. The water analysis includes:

**Parameter**

- **Field Measurements**
  - 4 Specific Conductivity (umhos/cm)
  - pH
  - 1 Water Temperature (Degrees Centigrade)
  - Dissolved Oxygen

- 11 Flows (cfs)

- **Laboratory Analyses (mg/l)**
  - 68 Total Dissolved Solids
  - 16 Total Suspended Solids
  - 99 Total Settleable Solids
  - Total Hardness (as CaCO₃)
  - 51 Acidity (HC0₃⁻)
  - 52 Carbonate (CO₃⁻₂)
  - 50 Bicarbonate (HC0₃⁻)
  - 36 Calcium
  - 53 Chloride

Revised 9/11/96
1. The upstream surface water sampling point is 1400 feet upstream from the confluence of the ephemeral channel in the development area and Ivie Creek in section 17. See Plate Ib. The site is on a curve of Ivie Creek below cliffs.

2. The downstream surface water sampling point is 400 feet downstream of the natural channel discharge below the disturbed area in section 17. This site is on the east shore north of the large curve in Ivie Creek. See Plate Ib.
<table>
<thead>
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<th>Substance</th>
<th>Measurement</th>
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<tr>
<td>Iron</td>
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<tr>
<td>Magnesium</td>
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<tr>
<td>Manganese</td>
<td>(Total)</td>
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<td>Potassium</td>
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</tr>
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<tr>
<td>Oil &amp; Grease</td>
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<tr>
<td>Cation-Anion Balance</td>
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This monitoring program will be continued until bond release is obtained.

There is no ground water monitoring planned since there was no underground development and mine-water discharge.

Water quality samples will also be secured at the discharge points from the reclaimed area to Ivie Creek during each runoff event encountered during scheduled monitoring visits (water quality and revegetation checks).

**UMC 817.56** Hydrologic Balance: Postmining Rehabilitation of Sedimentation Ponds, Diversions, Impoundments and Treatment Facilities

The sediment pond will be decommissioned concurrent with reclamation as stated in UMC 784.11(b) & 784.14(a & b).
The ephemeral stream channels disturbed during reclamation will be stabilized in a 2h:1v or 4h:1v sideslope configuration. Silt fences as shown in Plate V will aid in control of sediments from surface flows until revegetation adequately stabilizes the ground surface. The small berm and silt fences adjacent to Ivie Creek will remain throughout monitoring. Within the buffer zone, the following reclamation activities will occur:

1. Removal of culverts that empty into the creek and the subsequent restoration of channel discharges;
Schedule  Sequence of Reclamation Components

1. Haul stockpiled roadbase material (1800 cu. yds.) to "B" seam pad. 3 days*

2. Remove culverts in pads. 5 days
   - 250' of 48" culvert, est. 10,924 cu. yds excavated
   - 160' of 18" culvert, est. 480 cu. yds. excavated and refilled
   - 70' of 18" culvert under the road between the pads, est. 21 cu. yds. excavated and refilled.

3. Remove pipe drains and open sediment pond dam to drain into Ivie Creek. 1 day
   - 40' of 18" pipe, est. 178 cu. yds excavated

4. Collapse roof structures into adits and backfill (compacted) 25' into adits to seal. 2 days
   - 74 cu. yds. of compacted fill/adit(4) = 296 cu. yds. total

5. Backfill and grade coal seams and regrade pads to drain into riprapped channels ("B" seam pad) or into channel in breached sediment pond dam ("A" seam pad). 5 days
   - A seam = 2,500 cu. yds.
   - B seam = 10,250 cu. yds.
   - Slopes = 1,800 cu. yds.
6. Riprap channel in "B" seam pad and install drains for "A" seam pad. 3 days
   250' of channel = 458 cu. yds.

7. Spread topsoil on "B" seam bench. 1 day
   770 cu. yds of topsoil

8. Prepare seedbed on 4.2 acres. 3 days
   Scarify = 4 acres
   Fertilize = 1016 lbs of diammonium phosphate
              420 lbs of urea
   Mulch = 16,800 lbs of hay
   Seed = 86 lbs of seed
   Broadcast and cover seed = 4.2 acres

9. Install silt fences, drift fences and erosion netting. 4 days
   silt fences = 700'
   drift fences = 240'
   erosion netting = 2025'

* These days for each component may run concurrent or sequential. Project is estimated to take 15-20 working days to complete.
10. Remove culverts from road. 1 day
   80' of 48" diameter culvert and riprap, 213 cu. yds. of excavation
   60' of 18" diameter culvert and refill, 20 cu. yds. of excavation

11. Water bar road and rip surface for seeding. 1 day
   11 waterbars
   2.4 acres of ripping and scarifying

12. Seed road and roadbase storage site. 2 days
   2.5 acres of seeding
   51 lbs of seed
   10,000 lbs of hay
   605 lbs of diammonium phosphate
   250 lbs of urea

13. Install fence and gate on road. 1 day
   60' of fence

14. Monitor, 10 year period
   20 water sampling trips
   20 revegetation checks
## IX Costs

**Means Site Work Cost Data, 1986, 5th Edition**

Hours represent total equipment time.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Hours</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hauling roadbase 1800 cu yds, 25 hrs.</td>
<td>$2.30</td>
<td>1800 cu yds</td>
<td>$4,140</td>
</tr>
<tr>
<td>spreading topsoil 770 cu yds, 11 hrs.</td>
<td>$1.61</td>
<td>770 cu yds</td>
<td>$1,240</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>$5,380</td>
</tr>
<tr>
<td>2. Removing culverts, 89 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>road 80' of 48&quot;, 213 cu yds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>excavation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60' of 18&quot;, 20 cu yds</td>
<td>$3.85</td>
<td>20 cu yds</td>
<td>$77</td>
</tr>
<tr>
<td>excavation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pads 250' of 48&quot;, 10,924 cu yds</td>
<td>$1.36</td>
<td>10,924 cu yds</td>
<td>$14,857</td>
</tr>
<tr>
<td>excavation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230' of 18&quot;, 501 cu yds</td>
<td>$3.85</td>
<td>501 cu yds</td>
<td>$1,945</td>
</tr>
<tr>
<td>excavation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sed pond 40' of 18&quot;, 178 cu yds</td>
<td>$3.32</td>
<td>178 cu yds</td>
<td>$591</td>
</tr>
<tr>
<td>excavation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>remove pipe and concrete pads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sampling for particle analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>$18,210</td>
</tr>
<tr>
<td>3. Covering coal seams and grading, 179 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collapse structures in 4 adits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fill 4 adits</td>
<td>$3.39</td>
<td>296 cu yds</td>
<td>$1,003</td>
</tr>
<tr>
<td>&quot;A&quot; seam cover</td>
<td>$3.39</td>
<td>2500 cu yds</td>
<td>$8,475</td>
</tr>
<tr>
<td>&quot;B&quot; seam cover</td>
<td>$3.39</td>
<td>10250 cu yds</td>
<td>$34,748</td>
</tr>
<tr>
<td>Slope grading</td>
<td>$3.39</td>
<td>1800 cu yds</td>
<td>$6,102</td>
</tr>
<tr>
<td>General grading</td>
<td>$3.39</td>
<td>500 cu yds</td>
<td>$1,695</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>$52,503</td>
</tr>
<tr>
<td>4. Riprap channels, 44 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80' in road 67 cu yds</td>
<td>$21.13</td>
<td>67 cu yds</td>
<td>$1,416</td>
</tr>
<tr>
<td>250' in pad 930 cu yds</td>
<td>$21.00</td>
<td>930 cu yds</td>
<td>$19,530</td>
</tr>
<tr>
<td>100' in A pad 15 cu yds</td>
<td>$21.00</td>
<td>15 cu yds</td>
<td>$315</td>
</tr>
<tr>
<td>Hauling rock all sites</td>
<td>$1.78</td>
<td></td>
<td>$2,422</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>$23,683</td>
</tr>
</tbody>
</table>
5. Waterbars in road and ripping, 10 hrs.
   11 waterbars rip, 2.4 acres $ 314.58 $ 755
   Subtotal $ 1,405

   benches, 4.2 acres $ 1,800 $ 7,560
   road and roadbase site, 2.5 acres $ 1,800 $ 4,500
   Subtotal $ 12,060

7. Fences, gates and erosion netting, 55 hrs.
   fences, 180' $ 4.60 $ 843
   gate, 1 ea. $ 200
   silt fences, 700' $ 5.85 $ 4,095
   erosion netting, 2250 sy $ 0.55 $ 1,238
   Subtotal $ 6,376

8. Drill Hole plugging, 2 holes $ 500 $ 1,000

9. Miscellaneous, 64 hrs.
   Equipment mobilization $ 5,000
   Equipment rental $ 2,500
   Materials disposal $ 2,500
   Subtotal $ 10,000

Reclamation Total $130,617

10. Monitoring, 10 years
   Water sampling, 20 trips $ 16,000
   Revegetation checks, 20 $ 7,000
   Total $ 23,000

10. Contingency 10% $ 15,362
    Escalation 1.62% for 1 yr. $ 2,737
    Subtotal $ 18,099

Grand Total $171,716
<table>
<thead>
<tr>
<th><strong>Total Reclamation Bond 2004 Dollars</strong></th>
<th><strong>2005 Escalation Factor</strong></th>
<th><strong>2006 Escalation Factor</strong></th>
<th><strong>2007 Escalation Factor</strong></th>
<th><strong>2008 Escalation Factor</strong></th>
<th><strong>2009 Escalation Factor</strong></th>
<th><strong>2010 Escalation Factor</strong></th>
<th><strong>2011 Escalation Factor</strong></th>
<th><strong>2012 Escalation Factor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Years</td>
<td># of Years</td>
<td># of Years</td>
<td># of Years</td>
<td># of Years</td>
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<td># of Years</td>
<td># of Years</td>
</tr>
<tr>
<td></td>
<td>Escalation Dollars</td>
<td>Escalation Dollars</td>
<td>Escalation Dollars</td>
<td>Escalation Dollars</td>
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<td>Total 2005 Dollars</td>
<td>Total 2006 Dollars</td>
<td>Total 2007 Dollars</td>
<td>Total 2008 Dollars</td>
<td>Total 2009 Dollars</td>
<td>Total 2010 Dollars</td>
<td>Total 2011 Dollars</td>
<td>Total 2012 Dollars</td>
</tr>
<tr>
<td></td>
<td>$95,501.00</td>
<td>$97,029.02</td>
<td>$100,133.94</td>
<td>$105,290.24</td>
<td>$105,816.69</td>
<td>$107,615.58</td>
<td>$108,906.96</td>
<td>$110,540.57</td>
</tr>
</tbody>
</table>

- **2005 Escalation Factor**: Escalation Dollars = $95,501.00, Total 2005 Dollars = $97,029.02
- **2006 Escalation Factor**: Escalation Dollars = $3,104.93, Total 2006 Dollars = $100,133.94
- **2007 Escalation Factor**: Escalation Dollars = $3,805.09, Total 2007 Dollars = $103,939.03
- **2008 Escalation Factor**: Escalation Dollars = $1,351.21, Total 2008 Dollars = $105,290.24
- **2009 Escalation Factor**: Escalation Dollars = $526.45, Total 2009 Dollars = $105,816.69
- **2010 Escalation Factor**: Escalation Dollars = $1,798.88, Total 2010 Dollars = $107,615.58
- **2011 Escalation Factor**: Escalation Dollars = $1,291.39, Total 2011 Dollars = $108,906.96
- **2012 Escalation Factor**: Escalation Dollars = $1,633.60, Total 2012 Dollars = $110,540.57
### 2013 Escalation Factor

<table>
<thead>
<tr>
<th># of Years</th>
<th>Escalation Dollars</th>
<th>Total 2013 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,658.11</td>
<td>$112,198.68</td>
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</table>

### 2014 Escalation Factor

<table>
<thead>
<tr>
<th>Escalation Dollars</th>
<th>Total 2014 Dollars</th>
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<tbody>
<tr>
<td>$2,131.77</td>
<td>$119,751.45</td>
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</table>

#### Addition of 3 Monitoring wells

<table>
<thead>
<tr>
<th>Escalation Dollars</th>
<th>Total 2014 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5,421.00</td>
<td>$119,751.45</td>
</tr>
</tbody>
</table>

### 2014 Escalation Factor @ 1.019

<table>
<thead>
<tr>
<th># of Years / Next MidTerm Review 2019</th>
<th>Escalation Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>$11,816.98</td>
</tr>
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</table>

Total 2019 Dollars: $131,568.43

<table>
<thead>
<tr>
<th>Total 2019 Reclamation Bond Rounded to Nearest $1,000</th>
<th>$132,000.00</th>
</tr>
</thead>
</table>

Bond Posted in 2009 Dollars: $112,000.00

Bond Short: $20,000.00

% Difference: 18%

---

Incorporated

MAR 10 2015

Div. of Oil, Gas & Mining

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Inserted 12/14
ADDENDUM

This Section contains the regulatory sections normally listed in the PAP. These additional sections have been requested by the DOGM in the Completeness Review to provide other information and data for evaluation of the Reclamation Plan.

771.25 Permit Fees
The $5.00 fee will be filed with the application.

771.27 Verification of Application
The copy of verification is located at the front of the application.

782.13 Identification of Interests
(a)(1)
Permit Applicant: Soldier Creek Coal Company
subsidiary of CalMat Co.
3200 San Fernando Road
Los Angeles, California 90065

Mailing Address:
P.O. Box 2950
Los Angeles, California 90051
(213) 258-2777
Surface Owners: Soldier Creek Coal Company

Mineral Owners: Soldier Creek Coal Company, lessee; see attached owners:

B.G. Raybould 0.23530%
Sigler and Co. 2.94134%
Barbara D. Williams 1.61774%
A.W. Walker & Lovejoy Prosser 2.94134%
Helen G. Paul 2.43543%
Katherine Paul Littlefield 2.43543%
Dale W. Ahern, as personal representative of the Dorothy R. Ward Estate 2.42955%
Winifred W. Fehr 2.18052%
Zions First National Bank, as personal representative of the Samuel Walker Estate 1.09026%
Smith and Co. 4.85910%
Bank of America, as personal representative of Francis Lewis Noonan Estate 5.31501%
Forrest Kelly Eccles 4.48555%
William Walker Eccles 4.49144%
Samuel Franklin Eccles 4.49144%
Eugene K. Walker 3.77669%
Helen Kennedy Rogers 0.27060%
Paul D. Augsburg 0.27060%
June E. Kimball 0.54120%
Roger Walker Daynes 0.81181%
Sarah Daft Home 4.08553%
Nicholas W. Kuryla 1.08929%
Michale A. Kuryla 1.08929%
Charles Kuryla 1.08929%
Virginia Godnick 5.28266%
Robert von Khrum 2.22366%
M. Walker Wallace 11.76539%
Glen Walker Wallace 11.76539%
Karen Bertagnole 2.22366%
First Interstate Bank of Utah, as personal representative of John M. Wallace Jr. Estate 11.76539%

No purchasers of record under a real estate contract.

Operator: Soldier Creek Coal Company
Resident Agent:

Corporation: Soldier Creek Coal Company

Officers: See attached list of officers

Shareholders: See attached list of shareholders

Previous Coal Mining Permits: Permit No. ACT-007-018
Soldier Creek Coal Company Price, Utah

Contiguous Owners: See Plate 1a

- SW 1/4 of Section 7
- SE 1/4 of Section 8
- Sections 19 & 20
- T. 23 S., R. 6 E.
- Bureau of Land Management
- Price, Utah

- Sections 12, 13, & 24
- T. 23 S., R. 5 E.
- Bureau of Land Management
- Richfield, Utah

- E 1/2 of Section 17
- T. 23 S., R. 6 E.
- Bank of California
- John E. Lansing
- Lovella Clark royalty conveyance

- SW 1/4 of Section 8
- T. 23 S., R. 6 E.
- Consolidated Coal, 50% surface & mineral

- SW 1/4 of Section 8
- T. 23 S., R. 6 E.
- The Pittsburg Midway, 50% surface & mineral

- SW 1/4 of Section 8
- T. 23 S., R. 6 E.
- Gulf Oil Corp., 50% coal

MSHA ID No. 42-01407, Hidden Valley
(3)(g) Soldier Creek Coal Company does not have any interest or pending application for contiguous lands or minerals.

782.14 Compliance Information

(a) No permit suspended or revoked

(b) No bond or security forfeiture

(c) Violations:

<table>
<thead>
<tr>
<th>Date</th>
<th>Agency</th>
<th>Regulation</th>
<th>Action</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/30/85</td>
<td>DOGM</td>
<td>UMC 817.131</td>
<td>resume monitoring</td>
<td>3/20/85</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>no water monitoring</td>
<td></td>
</tr>
<tr>
<td>3/21/85</td>
<td>DOGM</td>
<td>UMC 817.23</td>
<td>seed stockpile</td>
<td>4/25/85</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>topsoil stockpile not protected</td>
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</tr>
<tr>
<td>3/21/85</td>
<td>DOGM</td>
<td>UMC 817.42</td>
<td>signed road and area</td>
<td>5/24/85</td>
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<td></td>
<td></td>
<td>no signs</td>
<td></td>
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<tr>
<td>1/27/86</td>
<td>DOGM</td>
<td>UMC 817.52</td>
<td>resume monitoring</td>
<td>1/27/86</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>no water monitoring</td>
<td></td>
</tr>
</tbody>
</table>

UMC 782.15 Right of Entry and Operation Information

(a) Soldier Creek Coal Company is the surface owner. Warranty Deed is attached.

(b) Soldier Creek Coal Company has a long term coal lease to 2022. Lease is attached.

782.16 Relationship to Areas Designated Unsuitable for Mining

No areas designated unsuitable for mining are located on or near the permit area.

782.17 Permit Term Information

Coal mining is not or will not be conducted under this permit.
782.18 Personal Injury and Property Damage Insurance Information

Certificate included with Application.

782.19 Identification of Other Licenses and Permits

N.P.D.E.S. Permit # UT-002370 with E.P.A. Denver, Colorado no record of approval or termination

782.20 Identification of Public Office for Filing Information

The Emery County Recorder's Office; Castledale, Utah 84513

782.21 Newspaper Advertisement and Proof of Publication

To be filed in the Carbon County and Salt Lake City metropolitan newspapers.

783.18 Climatological Information

The closest official weather station is located at Emery, Utah about 8 miles north-northwest of the mine site. The information is taken from the Utah State by the National Oceanic and Atmospheric Administration.

(a) The average annual precipitation is 7.55 inches. The prevailing strong winds are from the south. The daily winds shift from southeast A.M. winds to northwest P.M. winds.

Precipitation and Temperatures by Month

<table>
<thead>
<tr>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>.47</td>
<td>.41</td>
<td>.45</td>
<td>.42</td>
<td>.62</td>
<td>.69</td>
<td>1.17</td>
<td>.79</td>
<td>.85</td>
<td>.40</td>
<td>.57</td>
<td>7.55</td>
<td></td>
</tr>
<tr>
<td>23.9</td>
<td>28.9</td>
<td>36.5</td>
<td>44.6</td>
<td>53.3</td>
<td>61.4</td>
<td>67.8</td>
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<td>58.2</td>
<td>47.9</td>
<td>35.0</td>
<td>26.8</td>
<td>45.9</td>
</tr>
</tbody>
</table>

783.19 Vegetation Information

(a)

Vegetation Type | Disturbed Acres
---|---
Rocky Slopes | 6.67
Pinyon-Juniper Woodland | 0.14
Total | 6.71
Fish and Wildlife Resources Information

See 784.21 Fish and Wildlife Plan

Maps: General Requirements

See Plate la

General Reclamation Requirements - Revegetation

See 817.111 - 817.116 and Section VIII & IX

Protection of the Hydrologic Balance

See revised Section IV, Drainage Control

Reclamation Plan; Pond, Impoundments, Banks, Dam and Embankments

See revised Section IV, Drainage Control

Protection of Public Parks and Historic Places

There are no public parks or historic places on the disturbed area or on the Permit Area.

Fish and Wildlife Plan

The resident wildlife populations consist of small mammals, small birds, a few carnivorous mammals and raptors. The small mammals populations and the fluctuating seasonal small bird populations provide the prey base for the carnivores and raptors. Reptiles, especially lizards, are part of the prey base during the summer.

The plant cover is generally sparse and consequently forage production is low. The cliffs and rock slopes provide ample cover and security for the animals. Ivie Creek has a sparse narrow band of riparian vegetation.

The only specific wildlife reports (USFWS, 1980) for the area mentioned a owl's nest in one of the adits. This site was visited in March, April and May of 1986 with no reports of owl observations. An active prairie falcon nest was noted on a cliff face south of Ivie Creek about 900 feet from the portal pads. The nesting was completed by late April.

The fall construction period will not impact falcon nesting in the vicinity. The restoration of vegetation will provide some
habitat on otherwise barren sites. The use of legumes and grasses will provide a small amount of additional forage for small mammals and birds. The new shrubs will provide sparse cover for these small animals. Probably the major beneficiary of this small amount of forage from the increased cover and food will be the migratory flocks of small birds and mourning doves.

The closing of the road will reduce harassment of wildlife and particularly the nesting prairie falcons.

784.22 Diversions

See revised Section IV, Drainage Control.

784.26 Air Pollution Control Plan

(a)(b)
Construction in this small area within a protected drainage will not produce copious amounts of fugitive dust. In this remote area no croplands or developments are contiguous to the permit area. During periods of strong winds large amounts of dust are transported naturally from the many barren and exposed soils in this area often exceeding Class II particulate levels.

During periods of extreme wind (50 mph+) construction will be delayed until winds abate. Water control of dust is not deemed necessary in this protected canyon. The only activity outside of the canyon is loading of the roadbase material which is a gravelly sandy material.

817.99 Slides and Other Damage

Soldier Creek Coal Company will mitigate any slide damage on the permit area for the period of their obligations under the Reclamation Plan.
GENERAL OFFICES: 3200 SAN FERNANDO ROAD
LOS ANGELES, CA 90065
TEL: 213-258-2777

DIRECTORS
Thomas F. Call
   Attorney, Partner
   Adams, Duque & Hazeltine
Keith W. Colburn
   Chairman of the Board
   Consolidated Electrical Distributors, Inc.
Harry M. Conger
   Chairman, President
   and Chief Executive Officer
   Homestake Mining Company
A. Frederick Gerstell
   President and Chief Operating Officer
Richard A. Grant
   Trustee
   The Dan Murphy Foundation
Grover R. Heyler
   Attorney, Partner, Latham & Watkins
Albert J. Hicks
   Partner, Coopers & Lybrand (Ret.)
William T. Huston
   Chairman of the Board and Chief Executive Officer
   Watson Land Company
William Jenkins
   Chairman of the Board and
   Chief Executive Officer
Oscar T. Lawler
   Retired Chairman of the Executive Committee
   Security Pacific National Bank
Thomas M. Linden
   Executive Vice President and General Manager
   Properties Division
Thomas L. Lowe
   Chairman, Monarch Bancorp
   Formerly Chairman
   The Newhall Land & Farming Company
Stuart T. Peeler
   Chairman, President and
   Chief Executive Officer
   Statex Petroleum, Inc.
Harold H. Short
   Chairman of the Board
   Flatiron Companies

OFFICERS
William Jenkins
   Chairman of the Board and
   Chief Executive Officer
A. Frederick Gerstell
   President and Chief Operating Officer
Ronald E. Evans
   Executive Vice President and
   General Manager, Cement Division
Michael J. Kerstetter
   Executive Vice President and
   General Manager, Concrete & Aggregates Division
Thomas M. Linden
   Executive Vice President and
   General Manager, Properties Division
Ronald C. Hadfield
   Senior Vice President, Finance
   Chief Financial Officer
Scott J. Wilcott
   Senior Vice President, Legal Counsel and Secretary
Gene R. Block
   Vice President, Properties
David S. Cann
   Vice President, Regulatory Matters
John L. Frogge
   Vice President, Administration
Wilbur B. Jager
   Vice President, Marketing
John G. S. Mills
   Vice President, Chief Accounting Officer
Anthony E. Sarris
   Vice President, Technical Services
David C. Lauritzen
   Treasurer and Assistant Secretary
Brian W. Ferris
   Assistant Secretary
Joana J. Pierce
   Assistant Secretary
This statement is furnished in connection with the solicitation of proxies to be mailed on or about March 19, 1986, for use at the Annual Meeting of Shareholders of CALMAT CO. (the "Company"), to be held on Wednesday, April 16, 1986. This solicitation is made by the Board of Directors of the Company, and the costs thereof, which will be borne by the Company, are expected to be nominal. In addition to solicitation of proxies by mail, the Company may utilize the services of directors, officers and regular employees of the Company (who will receive no additional compensation therefor) to solicit proxies personally and by telephone and telegraph.

Brokerage houses, custodians, nominees, and others who hold stock in their names will be reimbursed for expenses incurred by them in sending proxy material to their principals.

The shareholders of record at the close of business on March 14, 1986, are entitled to one vote for each share of stock held by them. Each shareholder entitled to vote at any election for directors has the right to cumulate his votes and give one candidate a number of votes equal to the number of directors to be elected multiplied by the number of votes to which his shares are entitled, or to distribute his votes on the same principle among as many candidates as he thinks fit. The proxy solicited by the Board of Directors confers discretionary authority on the proxies to cumulate votes so as to elect the maximum number of nominees. Proxies cannot be voted for a greater number of persons than the number of nominees named.

On February 1, 1986, there were outstanding 15,080,814 shares of common stock, $1 par value, all of which are of one class. The following shows information with respect to the only persons known to the Company to be the beneficial owners of more than 5% of the Company's outstanding stock as of February 1, 1986. For the purpose of this proxy statement, beneficial ownership of securities is defined in accordance with the rules of the Securities and Exchange Commission and means generally the power to vote or dispose of the securities, regardless of any economic interest therein. Unless noted otherwise, beneficial owners listed have sole voting and investment power with respect to the shares reported.

<table>
<thead>
<tr>
<th>Name and Address of Beneficial Owner</th>
<th>Amount and Nature of Beneficial Ownership</th>
<th>Percent of Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Dan Murphy Foundation</td>
<td>2,108,001 shares</td>
<td>14.0</td>
</tr>
<tr>
<td>Post Office Box 76026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles, CA 90010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Richard D. Colburn</td>
<td>895,605 shares(a)</td>
<td>5.9</td>
</tr>
<tr>
<td>1120 La Collina Dr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beverly Hills, CA 90210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directors and officers as a group</td>
<td>1,848,135 shares(b)</td>
<td>12.3</td>
</tr>
</tbody>
</table>

(a) Shareholder has shared voting and investment power with respect to these shares.
(b) Includes presently exercisable options to purchase 131,127 shares.
### Identification of Executive Officers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Position</th>
<th>Served in Such Office Since(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>William Jenkins</td>
<td>66</td>
<td>Chairman of the Board and Chief Executive Officer</td>
<td>June, 1984</td>
</tr>
<tr>
<td>A. Fredrick Gerstell</td>
<td>48</td>
<td>President and Chief Operating Officer</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Ronald E. Evans</td>
<td>47</td>
<td>Executive Vice President and General Manager, California Portland Cement Co.</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Michael J. Kerstetter</td>
<td>49</td>
<td>Executive Vice President and General Manager, Conrock Div.</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Thomas M. Linden</td>
<td>42</td>
<td>Executive Vice President and General Manager, Properties Division</td>
<td>April, 1985</td>
</tr>
<tr>
<td>Ronald J. Hadfield</td>
<td>45</td>
<td>Senior Vice President, Chief Financial Officer</td>
<td>April 1985</td>
</tr>
<tr>
<td>Scott J Wilcott</td>
<td>48</td>
<td>Senior Vice President, Legal Counsel and Secretary</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Gene R. Block</td>
<td>48</td>
<td>Vice President, Properties</td>
<td>June, 1984</td>
</tr>
<tr>
<td>David S. Cahn</td>
<td>47</td>
<td>Vice President, Regulatory Matters</td>
<td>June, 1984</td>
</tr>
<tr>
<td>John L. Frogge</td>
<td>39</td>
<td>Vice President, Administration</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Wilbur B. Jager</td>
<td>56</td>
<td>Vice President, Marketing</td>
<td>April, 1985</td>
</tr>
<tr>
<td>John G. S. Mills</td>
<td>34</td>
<td>Vice President, Chief Accounting Officer</td>
<td>December, 1984</td>
</tr>
<tr>
<td>Anthony E. Sarris</td>
<td>48</td>
<td>Vice President, Technical Services</td>
<td>October, 1985</td>
</tr>
<tr>
<td>David C. Lauritzen</td>
<td>43</td>
<td>Treasurer and Assistant Secretary</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Vaughn S. Corley</td>
<td>51</td>
<td>Senior Vice President, Arizona Portland Cement Co.</td>
<td>June, 1984</td>
</tr>
<tr>
<td>George W. Cosby</td>
<td>51</td>
<td>Vice President and General Manager, Valley Reclamation Co.</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Bruce A. Dyer</td>
<td>35</td>
<td>Vice President and General Manager, CalMat Co. of Arizona</td>
<td>June, 1984</td>
</tr>
<tr>
<td>Gerald H. Weber</td>
<td>56</td>
<td>Vice President and General Manager, CalMat Properties Co.</td>
<td>June, 1984</td>
</tr>
</tbody>
</table>

(a) with the exception of Messrs Linden, Hadfield, Mills and Sarris each executive officer has served in office since the date of the merger of Conrock Co. and California Portland Cement Co. which occured on June 27, 1984
SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

CalMat Co.

By /s/ William Jenkins  
William Jenkins, Chairman of the Board and Chief Executive Officer

By /s/ A. Frederick Gerstell  
A. Frederick Gerstell, President and Chief Operating Officer

March 26, 1986

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

<table>
<thead>
<tr>
<th>Signature</th>
<th>Capacity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>/s/ William Jenkins</td>
<td>Chairman of the Board and Chief Executive Officer</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>William Jenkins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ A. Frederick Gerstell</td>
<td>President and Chief Operating Officer and Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>A. Frederick Gerstell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Ronald C. Hadfield</td>
<td>Principal Financial Officer</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Ronald C. Hadfield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ John G. S. Mills</td>
<td>Principal Accounting Officer</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>John G. S. Mills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Thomas F. Call</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Thomas F. Call</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Keith W. Colburn</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Keith W. Colburn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Harry M. Conger</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Harry M. Conger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signature</td>
<td>Capacity</td>
<td>Date</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>/s/ Richard A. Grant, Jr.</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Richard A. Grant, Jr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Grover R. Heyler</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Grover R. Heyler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Albert J. Hicks</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Albert J. Hicks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ William T. Huston</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>William T. Huston</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Oscar T. Lawler</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Oscar T. Lawler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Thomas M. Linden</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Thomas M. Linden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Thomas L. Lowe</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Thomas L. Lowe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Stuart T. Peeler</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Stuart T. Peeler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/s/ Harold H. Short</td>
<td>Director</td>
<td>March 25, 1986</td>
</tr>
<tr>
<td>Harold H. Short</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# CALMAT CO.

## SUBSIDIARIES OF REGISTRANT

**December 31, 1985**

<table>
<thead>
<tr>
<th>Name of Company</th>
<th>Organized Under the Laws of</th>
<th>Percentage of Stock or Interest Owned by Registrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona Portland Cement Company</td>
<td>Arizona</td>
<td>100 %</td>
</tr>
<tr>
<td>(a division of California Portland Cement Company)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bakersfield Ready Mix Company</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>California Portland Cement Company</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>CalMat Co. of Arizona</td>
<td>Arizona</td>
<td>100 %</td>
</tr>
<tr>
<td>CalMat Properties Co.</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>Carroll Canyon Centre Co.</td>
<td>California</td>
<td>100 %*</td>
</tr>
<tr>
<td>Colton Lime and Stone Co.</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>(a division of California Portland Cement Company)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conrock Co.</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>Industrial Asphalt, a Joint Venture</td>
<td>California</td>
<td>50 %</td>
</tr>
<tr>
<td>Huntmix, Inc.</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>Palomar Transit Mix, Inc.</td>
<td>California</td>
<td>66.7%</td>
</tr>
<tr>
<td>Reliance Transport Co.</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>Sloan Canyon Sand Co.</td>
<td>California</td>
<td>100 %</td>
</tr>
<tr>
<td>Valley Reclamation Co.</td>
<td>California</td>
<td>100 %</td>
</tr>
</tbody>
</table>

*Through ownership of CalMat Properties Co.*
Assignment of Coal Lease

Pursuant to a Coal Lease dated August 20, 1976 (the "Lease"), between Ivie Creek Coal Company, a Utah corporation ("ICCC"), as lessor, and Clifford Minerals Corporation, a Utah corporation ("Clifford"), and Peter L. Shea ("Shea") as lessees, ICCC leased to Clifford and Shea certain rights, as more fully set forth in the Lease, with respect to the following described real property located in Emery County, Utah:

The West half of Section 17 and all of Section 18, Township 23 South, Range 6 East, S.L. Mer.

A Memorandum of the Lease was recorded on August 25, 1976, Entry No. 252949, Book 87, page 698, in the records of the Recorder of Emery County, Utah. The Lease
NOW, THEREFORE, for $10 and other good and valuable consideration, receipt of which is hereby acknowledged, Ivie Creek, by its two General Partners, does hereby:

Assign, sell, transfer and set over to Soldier Creek Coal Company, 90 West First North, Professional Building, Price, Utah 84501, all of Ivie Creek's right, title and interest in and to the Lease and the real property described therein.

This Assignment may be executed in counterparts and all the counterparts thereof shall be construed together as one instrument.

IN WITNESS WHEREOF, Ivie Creek has executed and delivered this Assignment as of the 12th day of January, 1978.

IVIE CREEK COAL ASSOCIATES
Acknowledgment By
General Partners

State of New York ) ss:
County of New York )

January 6, 1978

On January 6, 1978, before me, the undersigned Notary Public, personally appeared Peter L. Shea, who being first duly sworn declared (1) that he is the person whose name is subscribed; (2) that he subscribed the within instrument and acknowledged that he executed the same.

WITNESS MY HAND AND SEAL.

LEANDER T. BROWN
Notary Public
No. 41-451790

My term of office expires on the day of , 19 .

State of Utah ) ss:
County of Salt Lake )

On the 6th day of January, 1978, personally
COAL LEASE
(Short Form)

This Coal Lease made as of August 20, 1976, by and between Ivie Creek Coal Company, a Utah corporation having its principal office at 518 Walker Bank Building, Salt Lake City, Utah ("Lessor") and Ivie Creek Coal Associates, a Utah limited partnership having an office at 1720 Beneficial Life Tower, Salt Lake City, Utah ("Lessee"), witnesseth that:

Whereas, the Lessor, as lessor, and Peter L. Shea and Clifford Minerals Company, a Utah corporation, as lessee, said lessee having an office at 1720 Beneficial Life Tower, Salt Lake City, Utah, entered into a Coal Lease dated August 20, 1976, covering the coal and coal mining rights in property situated in Emery County, Utah and more particularly described therein and hereinbelow, and a Memorandum thereof was recorded in the office of the County Recorder of Emery County on August 25, 1976 in Book 87 at page 698; and

Whereas, the leasehold interest under said Coal Lease was thereafter assigned by Clifford Minerals Corporation and (signed by Nancy Shea, his wife) to Ivie Creek
described as:

The West half of Section 17 and all of Section 18 of Township 23 South, Range 6 East, Salt Lake Meridian.

During the life of this lease, Lessee may freely drill, explore, prospect, develop, mine, strip, extract and sell such coal therefrom as it may elect, and use the surface and underground thereof for all lawful purposes.

2. The term hereof commences August 20, 1976 and ends the 31st day of January, 2007, except that Lessee may extend such term for an additional 30 years thereafter (or until January 31, 2037) on certain conditions. Such term is subject to surrender, or to termination, on certain conditions.

3. Further rights and obligations of the parties under such lease are set out in full in the Coal Lease covering the subject property and dated August 20, 1976.

In witness whereof, Lessor has caused the execution hereof by its officers thereunto duly authorized, and the Lessee has caused the execution hereof by Clifford Minerals Corporation, a general partner therein, said general partner being authorized
STATE OF UTAH
COUNTY OF SALT LAKE

On the 30th day of December, 1976, personally appeared before me M. Walker Wallace and Edward G. Richards, who being by me duly sworn did say, each for himself, that he the said M. Walker Wallace is the President, and he the said Edward G. Richards is the Secretary of Ivie Creek Coal Company, and that the within and foregoing instrument was signed in behalf of said corporation by authority of a resolution of its Board of Directors, and said M. Walker Wallace and Edward G. Richards each duly acknowledged to me that said corporation executed the same.

Notary Public
Residing in: Salt Lake City, Utah

My Commission expires: [Signature]

My Commission Expires March 31, [Signature]
WHEN RECORDED, MAIL TO:
J. Randolph Elliott, Esq.
Vice President and General Counsel
California Portland Cement Company
800 Wilshire Boulevard
Los Angeles, California 90017

Space Above for Recorder's Use

WARRANTY DEED

IVIE CREEK COAL ASSOCIATES, a limited partnership organized and existing under the laws of the State of Utah, with its principal office at 1720 Beneficial Life Tower, County of Salt Lake, State of Utah, Grantor, hereby conveys and warrants to SOLDIER CREEK COAL COMPANY, a Utah corporation, of Salt Lake City, Utah, Grantee, for the sum of TEN AND NO/100 ($10.00) DOLLARS the following described tract of land in Emery County, State of Utah:

The West half of Section 17 and all of Section 18 of Township 23 South, Range 6 East, Salt Lake Meridian.

INCLUDING ALL WATER RIGHTS APPURTENANT TO SAID LAND.

BUT SUBJECT TO the certain reservation and easement contained in and more particularly described in the Warranty Deed with respect to said land from Ivie Creek Coal Company to Ivie Creek Coal Associates dated October 29, 1976, recorded under Entry No. 258784, in Book 89 at page 483, Emery County Records.

AND ALSO SUBJECT TO general taxes accruing after December 31, 1977.

IN WITNESS WHEREOF, the Grantor has executed this Warranty Deed by all of its General Partners as of the 12th day of January, 1978.
Acknowledgment By
General Partners

State of New York ) ss.
County of New York )

January 10, 1978

On January 10, 1978, before me, the undersigned Notary Public, personally appeared Peter L. Shea, who being first duly sworn declared (1) that he is the person whose name is subscribed; (2) that he subscribed the within instrument and acknowledged that he executed the same.

WITNESS MY HAND AND SEAL.

LEANDER T. BROWN
No. 41-451750
Commissioned in Queens County
Commissioned in New York County
Commission Expires March 30, 1978

Notary Public

My term of office expires on the day of , 19.

State of Utah ) ss.
County of Salt Lake )

1978 - personally.
WHEN I CORDEL, MAIL TO: RONNY L. CUTSHALL, of Jones, Waldo, Holbrook & McDonough 800 Walker Bank Building Salt Lake City, Utah 84111

Warranty Deed
(Corporate Form)

IVIE CREEK COAL COMPANY
organized and existing under the laws of the State of Utah, with its principal office at 518 Walker Bank Building, of County of Salt Lake, State of Utah, hereby conveys and warrants to

IVIE CREEK COAL ASSOCIATES, a limited partnership of Salt Lake City, Utah

for the sum of TEN AND NO/100 DOLLARS ($10.00), the following described tract of land in Emery County, State of Utah:

The West half of Section 17 and all of Section 18 of Township 23 South, Range 6 East, Salt Lake Meridian.

INCLUDING ALL WATER RIGHTS APPURTENANT TO SAID LAND.

BUT RESERVING TO GRANTOR, its successors and assigns, all coal, mineral, oil and gas rights on, in and to said land; and solely for purposes thereof, the right of reasonable access, ingress and egress in and to said land.

The officers who sign this deed hereby certify that this deed and the transfer represented thereby was duly authorized under a resolution duly adopted by the board of directors of the grantor at a lawful meeting duly held and attended by a quorum.

In witness whereof, the grantor has caused its corporate name and seal to be hereunto affixed by its duly authorized officers this 29th day of October A. D., 1976.
**Certificate of Insurance**

**Producer:** Marsh & McLennan, Inc.  
P.O. Box 75055  
Los Angeles Ca 90075

**Insured:** CalMat Co.  
California Portland Cement Company  
P.O. Box 2950, Terminal Annex  
Los Angeles CA 90051

---

**Companies Affording Coverage:**

- **COMPANY LETTER A:** Continental Casualty Company  
  **INVOICE DATE:** AUG 23 1986
- **COMPANY LETTER B:** Transportation Insurance Company  
  **INVOICE DATE:** SEP 02 1986
- **COMPANY LETTER D:** CALMAT CO.
- **COMPANY LETTER E:** Risk Management

---

**Coverages:**

This is to certify that the policies of insurance listed below have been issued to the insured named above for the policy period indicated. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions, and conditions of such policies.

<table>
<thead>
<tr>
<th>CO LR</th>
<th>TYPE OF INSURANCE</th>
<th>POLICY NUMBER</th>
<th>POLICY EFFECTIVE DATE (MM/DD/YYYY)</th>
<th>POLICY EXPIRATION DATE (MM/DD/YYYY)</th>
<th>LIABILITY LIMITS IN THOUSANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GENERAL LIABILITY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X COMPREHENSIVE FORM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X PREMISES/OPERATIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X UNDERGROUND EXPLOSION &amp; COLLAPSE HAZARD</td>
<td></td>
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<tr>
<td></td>
<td>X PRODUCTS/COMPLETED OPERATIONS</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>X CONTRACTUAL</td>
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</tr>
<tr>
<td></td>
<td>X INDEPENDENT CONTRACTORS</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>X BROAD FORM PROPERTY DAMAGE</td>
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<td></td>
<td>X PERSONAL INJURY</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>AUTOMOBILE LIABILITY</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ANY AUTO</td>
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<tr>
<td></td>
<td>ALL OWNED AUTOS (PRIV. PASS.)</td>
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</tr>
<tr>
<td></td>
<td>ALL OWNED AUTOS (OTHER THAN PRIV. PASS.)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HIRED AUTOS</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>NON-OWNED AUTOS</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>GARAGE LIABILITY</td>
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</table>

**EXCESS LIABILITY**

<table>
<thead>
<tr>
<th>CO LR</th>
<th>TYPE OF INSURANCE</th>
<th>POLICY NUMBER</th>
<th>POLICY EFFECTIVE DATE (MM/DD/YYYY)</th>
<th>POLICY EXPIRATION DATE (MM/DD/YYYY)</th>
<th>LIABILITY LIMITS IN THOUSANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>UMBRELLA FORM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X OTHER THAN UMBRELLA FORM</td>
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</tr>
</tbody>
</table>

**Workers' Compensation and Employers' Liability**

**Other**

**Description of Operations/locations/vehicles/Special Items**

Operations: Hidden Valley Mine, Emery County, Utah

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**Certificate Holder:** State of Utah  
Natural Resources  
Oil & Gas Mining  
356 W. North Temple, Suite 350  
Salt Lake City, Ut 84180-1203

**Cancellation for Material Changes:**

Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will mail 30 days written notice to the certificate holder named to the left. 

**Authorized Representative:** Marsh & McLennan, Inc.

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**Issue Date (MM/DD/YYYY):** 8/19/86
United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
University Club Building
136 East South Temple
Salt Lake City, Utah 84111

DECISION

Right-of-Way Granted

Details of Grant

Serial number of grant: Utah 43522
Name of Grantee: Sevier County
250 North Main
Richfield, UT 84701

Map showing the location
and dimensions of grant
Map designations: Sevier County Collector
Road (R-514(1) BLM
Right-of-way Easement

Date filed: 8/9/79
Permitted use by grantee: County Collector Road
100 feet wide

Authority for grant: Title V of the Federal Land Policy and
Management Act of October 21, 1976
(90 Stat. 2776; 43 U.S.C. 1781)

Date of grant: DEP 7 1979
Expiration date of grant: September 6, 2009

Rental
Amount: None (County Government)

When payable by grantee:

Terms and conditions of the grant are set forth on the
following pages.

USO 2800-1 (March 1976)
DEC 29 1980

Rex W. Friant states that he is the chief engineer or was employed to supervise or check the construction of the County Road for the Emery County; that said County Road has been constructed under his supervision; that construction was commenced on the 10th day of January, 1980, and completed on the 18th day of December, 1980; that the constructed right-of-way as aforesaid conforms to the map which received the approval of the Department of the Interior on the 22nd day of August, 1979.

(Signature of engineer)

I, Elmo Herring certify that I am the County Commission Chairman of the Sevier County; that the County Road was actually constructed as set forth in the above statement of Rex W. Friant, chief engineer, and on the exact location represented on the map approved by the Department of the Interior on the 22nd day of August, 1979; and that the county has in all things complied with the requirements of the Act of October 21, 1976 granting rights-of-way for County Roads through public lands of the United States.

(Seal)

Attest:

(Seal)

U50 2800-7 (March 1976)
In reply refer to

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Utah State Office
University Club Building
136 East South Temple
Salt Lake City, Utah 84111

In reply refer to

2800
U-43522
(U-942)

Acceptance
Notice of Stipulations

I hereby certify that I am an authorized officer for

Sevier County

and that I have reviewed the above terms and conditions of right-of-way grant U-43522

Chairman
Title

8-30-1979
Date

UTAH STATE OFFICE
SALT LAKE CITY, UTAH

DEPT. OF INTERIOR
BUREAU OF LAND MANAGEMENT

Aug 31 10 00 1779

Signature

USO 2800-9a (July 1976)
EASEMENT

WE, THE UNDERSIGNED owners of real property situated and located in Emery County, State of Utah, do hereby convey, grant, and release to Emery County, State of Utah, an easement and right-of-way for the construction, operation and maintenance of a portion of Collector Road Project CR 514 (1), over and through the following described real property situated in said Emery County, and more particularly described as follows:

See Exhibit 'A'

THE CONSIDERATION to be paid for this easement is the sum of One Dollar ($1.00), said sum to be paid to the grantors upon execution of this agreement. Grantors hereby agree that Emery County shall have the right of ingress to and egress from the property above described for the purpose of constructing, maintaining, and repairing that portion of Collector Road Project CR 514 (1) and its related facilities, to be located on the above described property.

The easement herein granted by the undersigned is a perpetual easement.

DATED this 21st day of November, 1979.

Vice President & General Manager

SUBSCRIBED AND SWORN to before me, a Notary Public, in and for the State of Utah, on this day and year above written.

Notary Public

Residing at:

Commission Expires: April 1, 1980
Right-of-Way Description for
Collector Road Project CR 514 (1) in
Emery County

Parcel 1 being a tract of property in Section 18, Township 23 South, Range 6 East, Salt Lake Base and Meridian.

The boundaries of said parcel of land are described as follows:

Beginning at a pt. S. 0003'26" E. along the Section line 1183.01 ft. from the NW cor. of Section 18, T.23S., R 6E., S.L.B. & M., which pt. is Engineers Centerline Station 90 + 36.40; thence N. 0003'26" W. along the Section line 71.85. to a pt.; thence NE'ly 225.61 ft. along the arc of a 798.83 ft. radius curve to the left, (the chord of said curve bears N. 34007'21" E. 224.85"), to a pt. 50.00 ft. radially distant NW'ly from Engineers Centerline Station 93 + 29.33; thence N. 23055'01" E. 270.86 ft. to a pt.; thence N. 9020'01" E. 52.20 ft. to a pt.; thence N. 26001'58" E. 100.00 ft. to a pt.; thence N. 52007'04" E. 34.11 ft. to a pt. 60 ft. perpendicularly distant NW'ly from Engineers Centerline Station 97 + 80.64; thence 1006.71 ft. NE'ly along the arc of a 908.83 ft. radius curve to the right, (the chord of said curve bears N. 57045'58" E. 956.03"), to a pt. 0.00 ft. radially distant N'ly from Engineer Centerline Station 107 + 20.89; thence N. 89029'58" E. 729.46 ft. to a pt. 60.00 ft. perpendicularly distant N'ly from Engineer station 114 + 50.35; thence 334.87 ft. SE'ly along the arc of a 2606.48 ft. radius curve to the right, (the chord of said curve bears S. 86049'11" E. 334.65 ft.), to a pt. 60.00 ft. radially distant N'ly from
Engineer Centerline Station 117 + 77.51; thence N. 89°052'44" E. 123.41 ft. to a pt.; thence S. 83°008'22" E. 395.12 ft. to a pt. 75.00 ft. perpendicularly distant N'ly from Engineer Centerline Station 122 + 95.12; thence 567.40 ft. E'ly along the arc of a 2471.48 ft. radius curve to the left, (the chord of said curve bears S 89°42'59" E. 566.15), to a pt. 75.00 radially distant N'ly from Engineer Centerline Station 128 + 79.74; thence S. 89°10'59" E. 121.19 ft. to a pt.; thence N. 83°42'24" E. 439.03 ft. to a pt. 60.00 ft. perpendicularly distant N'ly from Engineer Centerline Station 134 + 39.03; thence 302.90 E'ly along the arc of 2606.48 ft. radius curve to the right, (the chord of said curve bears N. 87°02'09" E. 320.73 ft.), to a pt. 60.00 ft. radially distant N'ly from Engineer Centerline Station 137 + 34.96; thence S. 89°38'06" E. 265.04 ft. to a pt.; thence N. 80°009'41" E. 101.61 ft. to a pt.; thence S. 89°38'06" E. 300.00 ft. to a pt.; thence S. 79°25'53" E. 101.61 ft. to a pt.; thence S. 89°38'06" E. 425.93 ft. to a pt. in the East Section line of said Section 18; thence S. 0°29'05" E. along the Section line 60.01 ft. to Engineer Centerline Station 149 + 26.80, which pt. is S. 0°29'05" E. along the Section line 78.86 ft. from the NE corner of Sec. 18, T.23S., R.6E., S.L.B. & M.; thence S. 0°29'05" E. along the Section line 60.01 ft. to a pt.; thence N. 89°38'06" W. 427.71 ft. to a pt.; thence S. 80°009'41" W. 101.61 ft. to a pt.; thence N. 89°38'06" W. 300.00 ft. to a pt.; thence N. 79°25'53" W. 101.61 ft. to a pt.; thence N. 89°38'06" W. 265.04 ft. to a pt. 60.00 ft. perpendicularly distant S'ly from Engineer Center-
line Station 137 + 34.96; thence 288.95 ft. SW'ly along the arc of a 2486.48 ft. radius curve to the left, (the chord of said curve bears S. 87°02'09" W. 288.79 ft.), to a pt. 60.00 ft. radially distant S'ly from Engineer Centerline Station 134 + 39.03; thence S. 83°42'24" W. 439.03 ft. to a pt.; thence S. 76°35'49" W. 121.19 ft. to a pt. 75.00 ft. perpendicularly distant S'ly from Engineer Centerline Station 128 + 79.74; thence 601.84 ft. W'ly along the arc of a 2621.48 ft. radius curve to the right, (the chord of said curve bears N. 89°42'59" W. 600.52 ft.), to a pt. 75.00 ft. radially distant S'ly from Engineer Centerline Station 122 + 95.12; thence N. 83°08'22" W. 395.12 ft. to a pt.; thence N. 76°09'27" W. 123.41 ft. to a pt. 60.00 ft. perpendicularly distant S'ly from Engineer Centerline Station 117 + 77.51; thence 319.45 ft. W'ly along the arc of a 2486.48 ft. radius curve to the left, (the chord of said curve bears N. 86°49'11" W. 319.24 ft.), to a pt. 60.00 ft. radially distant S'ly from Engineer Centerline Station 114 + 50.35; thence S. 89°29'58" W. 729.48 ft. to a pt. 60.00 ft. perpendicularly distant S'ly from Engineer Centerline Station 107 + 20.89; thence 873.79 ft. SW'ly along the arc of a 788.83 ft. radius curve to the left, (the chord of said curve bears S. 57°45'58" W. 829.79 ft.), to a pt. 60.00 ft. radially distant SE'ly from Engineer Centerline Station 97 + 80.64; thence S. 0°03'01" E. 34.11 ft. to a pt.; thence S. 26°01'58" W. 100.00 ft. to a pt. thence S. 42°43'54" W. 52.20 ft. to a pt.; thence S. 28°08'57" W. 270.86 ft. to a pt. 50.00 ft. perpendicularly distant SE'ly from Engineer Centerline Station 93 + 29.33; thence 353.12 ft. along the arc of an 898.83 ft. radius curve to the right, (the chord of said curve bears S. 38°05'24" W. 349.90 ft.), to a pt. in the West Sectionline of...
said Section 18; thence N. 00°03'26" W. along the Section
line 61.28 ft. to the pt. of beginning.

As shown on the drawings of said project on file with
Emery County. The above described parcel of land contains
17.33+ Acres.
EASEMENT

WE, THE UNDERSIGNED owners of real property situated and located in Emery County, State of Utah, do hereby convey, grant, and release to Emery County, State of Utah, an easement and right-of-way for the construction, operation and maintenance of a portion of Collector Road Project CR 514 (1), over and through the following described real property situated in said Emery County, and more particularly described as follows:

See Exhibit 'A'

THE CONSIDERATION to be paid for this easement is the sum of One Dollar ($ 1.00), said sum to be paid to the grantees upon execution of this agreement. Grantors hereby agree that Emery County shall have the right of ingress to and egress from the property above described for the purpose of constructing, maintaining, and repairing that portion of Collector Road Project CR 514 (1) and its related facilities, to be located on the above described property.

The easement herein granted by the undersigned is a perpetual easement.

DATED this 21st day of November, 1979.

Vice President & General Manager

SUBSCRIBED AND SWORN to before me, a Notary Public, in and for the State of Utah, on this day and year above written.

Notary Public

Commission Expires: April 1, 1980
Right-of-Way Description
For Collector Road Project CR 514 (1)
In Emery County

Parcel 2 being a tract of property in Section 17, T. 23S., R. 6 East, Salt Lake Base and Meridian.

The boundaries of said parcel of land are described as follows:

Beginning at a pt. S. 0°29'05" E. along the Section Line 78.86 ft. from the NW cor. of Sec. 17, T. 23S., R. 6E., Salt Lake Base and Meridian, which point is Engineer Centerline Station 149 + 26.80; thence N. 0°29'05" W. along the Section Line 60.01 ft. to a point; thence S. 89°38'06" E. 790.89 ft. to a point; thence S. 0°21'54" W. 60.00 ft. to Engineer Centerline Station 157 + 16.82; thence S. 0°21'54" W. 60.00 ft. to a point; thence N. 89°38'06" W. 789.1 ft. to a point in the West Section Line of said Sec. 17; thence N. 0°29'05" W. along the Section Line 60.01 ft. to the point of beginning

As shown on the drawings of said project on file with Emery County. The above described parcel of land contains 2.1763 acres.
Appendix IVa

Range Site Data
HIDDEN VALLEY MINE
REFERENCE AREA
May 8, 1986

Scope

The entire area around the Hidden Valley Mine was examined to find a reference area that would closely match the disturbed area of the mine. It was decided that the hillside immediately northwest of the topsoil stockpile was the area that corresponded closely with the disturbed area. Therefore, it was chosen as the reference area.

The photos and studies were taken on May 1, 1986, on what is considered a normal precipitation spring.

Photo No. 1. Hidden Valley Mine working area and topsoil stockpile.
Photo No. 2. Reference area hillside. This is a south facing slope, very rocky, and arid with sparse vegetation. It is at the 5960 ft. elevation, has the same slope and has the same aspect as the major disturbed area; therefore, it was chosen as the reference area. Major vegetation is black sagebrush, broom snakeweed, Mormon tea, Indian rice grass and galleta.

Sampling Method

The Division of Oil, Gas and Mining document Vegetation Information Guidelines and Permanent Program Submission for Coal Mines was used as the reference text for selecting the sampling procedure.

All of the methods were considered. The occular method described on Page 10 of the guidelines was chosen as the best method for this site. It was also decided to take 40 samples, which is the maximum recommended by the guide. The quadrat size was 36" x 36", one square yard.
Photo No. 3. This is the start of the transect immediately northwest of the topsoil stockpile. A 3' piece of re-bar marks the start of the transect. The transect more or less contours the hillside going in a northwesterly direction. It is approximately 100 yards long.
Photo No. 4. End of transect. This photo is from the end of the transect looking back into the sampled area.

Location of Quadrats

The 40 quadrats were randomly placed between the staked ends of the transect.

Typical Quadrats:

Following are three photographs showing typical conditions in the 40 quadrats.
<table>
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<tr>
<th>Quadrat</th>
<th>% Vegetation</th>
<th>Plant Species %</th>
<th>Litter</th>
<th>Rock</th>
<th>Pavement and Bare Ground</th>
<th>Total %</th>
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Plants in Quadrats

Shrubs
Atco - Atriplex confertifolia - Shadscale saltbush
Arno - Artemisia nova - Black sagebrush
Epvi - Ephedra viridis - Mormon tea
Gusa - Gutierrezia sarothrae - Broom snakeweed

Grasses
Orhy - Oryzopsis hymenoides - Indian rice-grass
Hija - Hilaria jamesii - Galleta

Other Plants On Area Not Picked Up In Quadrats
Save - Sarcobatus vermiculatus - Greasewood
Chna - Chrysothamnus nauseosus - Rubber rabbitbrush
Atca - Atriplex canescens - Fourwing saltbrush
Phlo - Phlox spp. - Phlox
Opnu - Opuntia spp. - Prickley pear
Summary of Data

The 40 quadrats show there is only 6.5% vegetation ground cover on the area. Of this, 27% is grasses and 73% is shrubs.

Litter covers 1.7% of the ground, rock 21.1% and pavement and bare ground 70.7%.

Shrub Density

There were 32 shrubs in the 40 quadrats, which is .8 shrubs per yard$^2$ or 3872 shrubs per acre.

Production

The production on this arid site is very low. There is only approximately 100 lbs. of air dry matter produced from the sparse grasses and shrubs per acre per year.

Goal

The goal is to have a 6.5% vegetative ground cover on the reclaimed area through revegetation work.

Frank R. Jensen
Reclamation Specialist
October 4, 1978

Mr. Mark Page
Area Engineer
Division of Water Rights
Box 718
Price, Utah 84501

Re: Test Hole Permit
T.23S., R.6E., Sec. 18
Soldier Creek Coal Company
Hidden Valley Mine

Dear Mr. Page:

On March 3, 1978, the State Engineer approved Application Number 47409 (95-1703). This application was held by Ivie Creek Coal Associates. Since this time Soldier Creek Coal Company has acquired Ivie Creek Coal Associates holdings. Enclosed you will find a copy of Warranty Deed recorded in Emery County showing this transaction.

This application approved development of three wells. Additional testing of the wells have failed to yield sufficient quantities of water necessary to operate the total mine complex. It is our intention at this time to ask for permission to drill exploratory drill holes in search of additional water.

Drilling will be located on Soldier Creek property in Section 18, Township 23 South, Range 6 East of the Salt Lake Meridian. The location of the holes are as follows:

- NE1, NE2, NW1, NE2, SW1, NE2, SE1, NE2;
- NE1, NW1, NW2, NW1, SW1, NW2, SE1, NW1;
- NE1, SW1, NW1, SW2, SW1, SW2, SE1, SW1;
- NE1, SW1, NW1, SE1, SW1, SE1, SE1, SE1;

[Handwritten notes: Not Drilled, Drilled, etc.]
The completion of all the proposed locations is dependent on the success of the prior wells. All drilling procedures will comply with any restrictions set by the Division of Water Rights.

If we can be of further assistance, please feel free to contact us.

Sincerely,
Hidden Valley Mine

Tom Paluso
J. T. Paluso
Project Engineer

Enclosure
January 31, 1983

Soldier Creek Coal Company
90 West 100 North #12
PRICE UT 84501

Dear Applicant: RE: Application No. 94-309

Request for extension of time in which to submit Proof of Appropriation or Proof of Change contemplated by the above-numbered application has been considered and the time for receiving Proof of Appropriation is hereby extended from January 31, 1983 to January 31, 1988.

This extension is granted in accordance with the law which states: "The construction of the works and the application of water to beneficial use shall be diligently prosecuted to completion within the time fixed by the state engineer. Extensions of time may be granted by the state engineer on proper showing of diligence or reasonable cause for delay. In the consideration of an application to extend the time in which to place the water to beneficial use under an approved application, ... the State engineer shall deny such extension and declare the application lapsed, unless the applicant affirmatively shows that he has exercised or is exercising reasonable and due diligence in working toward completion of the appropriation."

I earnestly recommend that you complete your development and submit Proof of Appropriation at the earliest possible date.

Yours very truly,

Dee C. Hansen, P.E.
State Engineer

EXTENSION GRANTED
STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

Soldier Creek Coal Company
Hidden Valley Mine
P.O. Box AS
PRICE UT 84501

Attention: Mr. J. T. Paluso
RE: Test Well Request

Reference is made to your request for permission to drill test wells to be located in Secton 18, T23S, R6E, SLB&M.

This letter grants you permission to proceed with the drilling with the understanding that small diameter casing be used and that no more water be diverted than is necessary to determine the availability of a good water supply. This letter in no way grants any permission to proceed with the diversion and use of the water from the test well for any purpose whatsoever.

Following the completion of the drilling and testing the casing is to be either pulled and the hole filled from the bottom to the top before the driller leaves the premises or capped until such time as proper filing has been made with the State Engineer and approval given.

The driller must be bonded and have a current permit from the State Engineer. Before starting, he must give this office notice of the day he will begin. Within 30 days after the well has been drilled or abandoned, he must file a well driller's report containing accurate and complete information regarding the work done, which is to become part of the files in this office pertaining to your test well.

This is permission for the licensed driller to begin drilling your test well. Note that the expiration date of this letter is April 23, 1979.

Yours very truly,

Stanley Green
Directing Appropriations Engineer

Issue Date: October 23, 1978
Expiration Date: April 23, 1979
Application No. 47409 (95-1703) was filed on January 4, 1977 by Ivie Creek Coal Associates, a limited partnership, of Salt Lake City, Utah to appropriate 0.25 cfs. of water from three 6-inch wells, located at the following points: (1) South 1320 feet and West 3960 feet from the NE Corner of Section 18, T23S, R6E, SLB&M; (2) South 3960 feet and West 2960 feet from the NE Corner of Section 18, T23S, R6E, SLB&M; (3) South 3960 feet and West 1320 feet from the NE Corner of Section 18, T23S, R6E, SLB&M. The water is to be used within the W½ of Section 17 and all of Section 18, T23S, R6E, SLB&M on a daily basis for a coal mining operation.

The application was advertised in the Emery County Progress starting February 10 and ending February 24, 1977. The application was subsequently protested by Emery Town. A hearing was set for 2:30 p.m., Tuesday, November 15, 1977, in the Emery County Courthouse in Castle Dale, Utah. Neither the applicant nor the protestant were represented at the hearing. Each was sent a written notice of the hearing on November 4, 1977. The applicant was later notified concerning future interest in the filing. Ivie Creek Coal Associates stated that they were still very interested in pursuing the application.

After careful consideration, it is the opinion of the State Engineer that there is groundwater available, in the particular area of this filing, to be appropriated. However, if the development of this application should adversely affect any prior water rights, Ivie Creek Coal Associates would be required to cease pumping the wells or supply replacement water to the injured party.

It is, therefore, ordered and Application No. 47409 (95-1703) is hereby APPROVED subject to prior rights, particularly those of the protestants.

This decision is subject to the provisions of Section 73-3-14, Utah Code Annotated, 1953, which provides for plenary review by the filing of a civil action in the appropriate district court within sixty days from the date hereof.

Dated this 3rd day of March, 1978.

Dee C. Hansen, State Engineer

DCH:MPP:lmv
cc: Emery Town
    c/o F. Brent Bunderson, President
    Emery, Utah 84522
Ivie Creek Coal Associates
1720 Beneficial Life Tower
SALT LAKE CITY UT 84111

Dear Applicant:

RE: APPROVED APPLICATION
NUMBER 47409 (95-1703)

Enclosed find approved Application No. 47409 (95-1703). This is your authority to proceed with actual construction work which, under Sections 73-3-10 and 73-3-12, Utah Code Annotated, 1953, as amended, must be diligently prosecuted to completion. The water shall be put to beneficial use and proof of appropriation shall be made to the State Engineer on or before January 31, 1981 otherwise, the application shall lapse.

Failure on your part to comply with the requirements of the statutes may result in forfeiture of this application.

Yours truly,

Dee C. Hansen
State Engineer

Enc.: Copy of Approved Application Memorandum Decision
REQUEST FOR REINSTatement AND EXTENSION OF TIME
(Before Fourteen Years)

APPLICATION NO. 47409 (95-1703)
STATE OF UTAH
COUNTY OF Emery

Soldier Creek Coal Company—Hidden Valley Mine, being first duly sworn that he is the owner of the above-numbered application; that he knows of his own knowledge of the construction of works completed to date.

Describe briefly the type and extent of construction completed to date; cost of this construction, and the estimated cost of any remaining construction to be done for completion of project and to submit Proof of Appropriation. Give reasons why the work could not be completed and water put to beneficial use within time heretofore allowed.

Soldier Creek Coal Company as of June 15, 1981, has spent over $34,000 on the design of the water and treatment facilities at the Hidden Valley Mine. All engineering has now been completed with construction being the next phase.

It has become necessary to delay the development of the Hidden Valley Mine, due to the depressed coal market. The exact schedule for opening the mine is not known at this time. Therefore, the construction of the water facilities will be dependent upon the recovery of the coal industry.

Request is made for reinstatement and extension of time for filing proof


Affiant understands he will be notified of a hearing date, at which time he or his representative must attend, be able to defend data given; and affiant upon oath states that the information given above is to the best of his knowledge true and correct.

Vice President & General Manager
Application for Permanent Change of Point of Diversion

Place and Nature of Use of Water

STATE OF UTAH

WATER RIGHTS

Please clearly and correctly complete the information requested below which defines the right or rights being changed. (Type or clearly print.)

For the purpose of obtaining permission to permanently change: the point of diversion [X], place [ ], or nature of use [ ], of water rights acquired by... Appl. No... (95-1703)

(Give Number of Application, certificate of appropriation, title and date of Decree or other identification of right.)

If the right described has been amended by a previous approved change application, give the number of such change application. No...

1. The name of the applicant is... Soldier Creek Coal Company - Hidden Valley Mine

2. The post-office address of the applicant is... PO Box AS, Price, Utah 84501

3. The flow of water which has been or was to have been used in second-feet is... 0.25

4. The quantity of water which has been or was to have been used in acre-feet is...

5. The water has been or was to have been used for and during periods as follows:

<table>
<thead>
<tr>
<th>Mining of Water</th>
<th>from</th>
<th>to</th>
<th>incl.</th>
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</thead>
<tbody>
<tr>
<td>(purpose)</td>
<td>(month)</td>
<td>(day)</td>
<td>(month)</td>
</tr>
<tr>
<td>Culinary - bath house</td>
<td>(purpose)</td>
<td>from</td>
<td>to</td>
</tr>
<tr>
<td>and stored each year (if stored)</td>
<td>(month)</td>
<td>(day)</td>
<td>(month)</td>
</tr>
<tr>
<td>(month)</td>
<td>(day)</td>
<td>(month)</td>
<td>(day)</td>
</tr>
</tbody>
</table>

6. The direct source of supply is... 3 wells... in... EMERY... County.

7. The point or points of diversion... 1) W 3960 ft. & So 1320 ft. 2) W 3960 ft. & So 3960 ft. 3) W 1320 ft. & So 3960 ft. all from the NE Corner, Section 18, T23S, R6E...

8. Diversion works:

If a well give diameter and depth... 6-inch wells, 300 to 700 feet deep

If a dam and reservoir give height, capacity, and area inundated... 50,000 gal. tank in the...

Nf... Section 17, T23S, R6E, SLB&M
13. The water will be used each year for:

- Same as heretofore from (purpose) (month) (day) to (month) (day) incl.

14. It is now proposed to divert the water from 4 wells at a point(s) as follows: #1, #2, #3 same as heretofore. 4) No 30 ft. and W 260 ft. S miles NE Premont Sf.

15. The proposed diverting and conveying works will consist of: (if a well, state diameter and depth thereof)

- 6-inch wells 300 to 700 feet deep

16. If water is to be stored, give capacity of reservoir in acre-feet height of dam

- 150,000 gal. tanks in NW Section 17, T23S, R6E, SL&M

17. The water is to be used for the following purposes in the following described legal subdivisions: (if used for irrigation, state sole or supplemental supply, and describe other supplemental rights.)

- Irrigation

- Stockwatering (number and kind)

- Domestic (number of families and/or persons, etc.) same as heretofore

- Other same as heretofore

18. If paragraphs 11 and 12 designate that only part of the right described in paragraphs 1 to 10 inclusive is to be changed, designate the status of the water so affected by this change as to its being abandoned or used as heretofore.

EXPLANATORY

The following additional facts are set forth in order to define more clearly and completely the full purpose of the proposed change:
APPLICATION TO APPROPRIATE WATER
STATE OF UTAH

NOTE: — The information given in the following blanks should be free from explanatory matter, but when necessary, a complete supplementary statement should be made on the following page under the heading "Explanatory."

For the purpose of acquiring the right to use a portion of the unappropriated water of the State of Utah, for uses indicated by (X) in the proper box or boxes, application is hereby made to the State Engineer, based upon the following showing of facts, submitted in accordance with the requirements of the Laws of Utah.

1. **Irrigation** (X) **Domestic** (X) **Stockwatering** (X) **Municipal** (X) **Power** (X) **Mining** (X) **Other Uses** (X)

2. The name of the applicant is: _IVIE CREEK COAL ASSOCIATES, a limited partnership_

3. The Post Office address of the applicant is: _1720 Beneficial Life Tower, Salt Lake City, Utah 84111_

4. The quantity of water to be appropriated: 25 second-feet and/or _______ acre-feet

5. The water is to be used for: _Mineral_ from January 1 to December 31

   **(Major Purpose)**

   **(Month)**

   **(Day)**

   **(Month)**

   **(Day)**

   **(Minor Purpose)**

   **(Month)**

   **(Day)**

   **(Month)**

   **(Day)**

   and stored each year (if stored) from

   **(Month)**

   **(Day)**

   **(Month)**

   **(Day)**

6. The drainage area to which the direct source of supply belongs is: (Leave Blank)

7. The direct source of supply is: _Underground (_3 wells_)_

   **(Name of stream or other source)**

   which is tributary to: _IVIE CREEK_

   (Name of stream or other source)

*Note.—Where water is to be diverted from a well, a tunnel, or drain, the source should be designated as "Underground Water" in the first space and the remaining spaces should be left blank. If the source is a stream, a spring, a spring area, or a drain, so indicate in the first space, giving its name, if named, and in the remaining spaces, designate the stream channels to which it is tributary, even though the water may sink, evaporate, or be diverted before reaching said channels. If water from a spring flows in a natural surface channel before being diverted, the direct source should be designated as a stream and not a spring.

8. The point of diversion from the source is in: _Emery_ County, situated at a point*

   **Well #1, 3960'W, 1320' S. from the NE corner Sec. 18, T23S, R6E, Well #2, 3960'W, 3960' S. from the NE corner Sec. 18, T23S, R6E, well #3, 1320' W, 3960' S. from the NE corner Sec. 18, T23S, R6E, all in Emery County, 8.5 MILES S. OF EMERY WALKER FLAT._

*Note.—The point of diversion must be located definitely by course and distance or by giving the distances north or south, and east or west with reference to a United States land survey corner or United States mineral monument, if within a distance of six miles of either, or if at a greater distance, to some prominent and permanent natural object. No application will be received for filing in which the point of diversion is not defined definitely.

9. The diverting and carrying works will consist of: _Surface pipe lines to mine portals and buildings in the NW¼, Section 17, T23S, R6E._

10. If water is to be stored, give capacity of reservoir in acre-feet height of dam area inundated in acres legal subdivision of area inundated

    50,000 gal. tank in the NW¼, Section 17, T23S, R6E

11. If application is for irrigation purposes, the legal subdivisions of the area irrigated are as follows:
EXPLANATORY

The following additional facts are set forth in order to define more clearly the full purpose of the proposed application:

This application covers water encountered in exploration drilling on fee lands owned by the applicant. The aquifer is the Ferron sand member of the Mancos shale. The exploratory holes must be reamed, casing set and pipe lines laid to the coal mine surface plant site which will be built. The water is alkaline and may require treatment before use in the coal plant and the mine bathhouse.
QUIT CLAIM DEED

IVIE CREEK COAL ASSOCIATES, a limited partnership organized and existing under the laws of the State of Utah, with its principal office at Salt Lake City, Utah, Grantor, hereby quitclaims to SOLDIER CREEK COAL COMPANY, a Utah Corporation, Grantee, for Ten Dollars ($10.00) and other good and valuable consideration, all of the right, title and interest of Grantor under and with respect to that certain Application to Appropriate Water pending before the Division of Water Rights, State of Utah (being Application No. 47409 (95-1703)) and all of Grantor's rights in three wells covered thereby and situated in Emery County, Utah, the points of diversion of which are:

Well #1: 3960'W, 1320'S from the NE corner Sec. 18, T. 23 S., R. 6 E;

Well #2: 3960'W, 3960'S, from the NE corner Sec. 18, T. 23 S., R. 6 E;

Well #3: 1320'W, 3960'S from the NE corner Sec. 18, T. 23 S., R. 6 E.
STATE OF UTAH ) ss.
COUNTY OF SALT LAKE )

On the 2nd day of November, 1978, personally appeared before me Joseph C. Bennett, who being by me duly sworn, did say that he is the president of Clifford Minerals Corporation, general partner in Ivie Creek Coal Associates, a limited partnership, the Grantor above named, and that the foregoing instrument was signed in behalf of said Grantor by authority of its Articles of Partnership, and said Joseph C. Bennett acknowledged to me that he as such officer executed the same on Grantor's behalf.

My Commission Expires: January 19, 1980

Residing in Salt Lake City, Utah

Notary Public
Appendix Vα

Climatological Data
EXHIBIT 4

ENVIRONMENTAL DATA SERVICE
IN COOPERATION WITH UTAH DEPARTMENT OF EMPLOYMENT SECURITY
CLIMATOLOGICAL SUMMARY
OF THE UNITED STATES NO. 20-42
CLIMATOLOGICAL SUMMARY
UTAH STATION
EMERY, UTAH
MEANS AND EXTREMES FOR PERIOD
1941-1970

<table>
<thead>
<tr>
<th>Month</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>31.0</td>
<td>32.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Feb.</td>
<td>31.9</td>
<td>33.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Mar.</td>
<td>33.0</td>
<td>35.0</td>
<td>37.0</td>
</tr>
<tr>
<td>Apr.</td>
<td>34.0</td>
<td>36.0</td>
<td>38.0</td>
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<tr>
<td>May</td>
<td>35.0</td>
<td>37.0</td>
<td>39.0</td>
</tr>
<tr>
<td>June</td>
<td>36.0</td>
<td>38.0</td>
<td>40.0</td>
</tr>
<tr>
<td>July</td>
<td>37.0</td>
<td>39.0</td>
<td>41.0</td>
</tr>
<tr>
<td>Aug.</td>
<td>38.0</td>
<td>40.0</td>
<td>42.0</td>
</tr>
<tr>
<td>Sept.</td>
<td>39.0</td>
<td>41.0</td>
<td>43.0</td>
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<tr>
<td>Oct.</td>
<td>40.0</td>
<td>42.0</td>
<td>44.0</td>
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<tr>
<td>Nov.</td>
<td>41.0</td>
<td>43.0</td>
<td>45.0</td>
</tr>
<tr>
<td>Dec.</td>
<td>42.0</td>
<td>44.0</td>
<td>46.0</td>
</tr>
</tbody>
</table>

(a) Average length of record, years.
Trace an amount too small to measure.

** Base 65°F**

CLIMATE OF EMERY, UTAH

Emery is located in southeastern Utah on the western edge of Castle Valley. This broad valley is oriented southward and extends 20 to 25 miles east of the city, ending abruptly at the San Rafael Knob, which rises about 7900 feet MSL.

Emery is nearly surrounded by mountains. The Wasatch Plateau, about 10 miles to the north, has several peaks rising to more than 11,000 feet above sea level and extends from west to north of Emery. To the southwest is the Sevier Plateau and to the south lies the Aquarius Plateau. About 60 miles to the northeast is the West Tavaputs Plateau, which has several peaks extending to above 10,000 feet MSL. Thus, these mountain ranges provide a protecting influence from storms approaching from every direction except the southeast.

The climate is of the semi-arid (steppe) type, the most striking features being abundant sunshine, meager precipitation, dry air, and relatively light winds. There are four well-defined seasons. Winters are characterized by cold and dry weather. Temperatures below zero in nearly every winter season and in about one of every 3 years temperatures 10 degrees below zero, or colder, can be expected. The annual snowfall is light, averaging only 24 inches and rarely does the yearly snowfall exceed 40 inches. Less than 4 inches of snow was recorded in 1934 and again in 1950.

Primarily because of the elevation of Emery, summers are delightfully cool. Maxima during the hottest summer months, July and August, are usually in the low 80's, with night-time minima generally in the low 50's. Since the beginning of record in 1901, the temperature has never reached 100°F at Emery.

The principal rainfall season is in summer, when moisture-laden air masses occasionally move into the area from the Gulf of Mexico. Precipitation during this season is usually associated with thunderstorms, and the mountain ranges to the east and north are a contributing factor to the development of these storms. August is the only month of the year that has an average precipitation greater than 1 inch.

Winds are generally light to moderate in all seasons, although relatively strong southerly winds may blow for several days at a time during the spring season, when low pressure storms occasionally move through the region. The extremely strong winds that rarely occur are usually associated with thunderstorms.

The freeze-free period, or growing season, averages about 4-1/2 months, usually extending from mid-May to late September. Livestock and livestock products account for most of the farm income in the area. Wheat and hay are the most important agricultural crops grown.

### Precipitation

<table>
<thead>
<tr>
<th>Month</th>
<th>Precipitation</th>
<th>Year</th>
<th>Least</th>
<th>Record</th>
</tr>
</thead>
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<td>1919</td>
<td>0</td>
<td>27</td>
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<tr>
<td>Feb.</td>
<td>2.01</td>
<td>1905</td>
<td>0</td>
<td>1954</td>
</tr>
<tr>
<td>Mar.</td>
<td>1.97</td>
<td>1918</td>
<td>0</td>
<td>1954</td>
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<tr>
<td>Apr.</td>
<td>2.40</td>
<td>1917</td>
<td>0</td>
<td>1953</td>
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<tr>
<td>May</td>
<td>4.00</td>
<td>1928</td>
<td>0</td>
<td>1930</td>
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<tr>
<td>June</td>
<td>3.34</td>
<td>1969</td>
<td>0</td>
<td>1950</td>
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<tr>
<td>July</td>
<td>4.26</td>
<td>1969</td>
<td>0</td>
<td>1928</td>
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<tr>
<td>Aug.</td>
<td>5.47</td>
<td>1947</td>
<td>7</td>
<td>1950</td>
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<tr>
<td>Sept.</td>
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<td>1953</td>
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<tr>
<td>Oct.</td>
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<td>1916</td>
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<td>1955</td>
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<tr>
<td>Nov.</td>
<td>2.00</td>
<td>1916</td>
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<td>1944</td>
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<tr>
<td>Dec.</td>
<td>1.80</td>
<td>1913</td>
<td>0</td>
<td>1942</td>
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<tr>
<td>Annual</td>
<td>16.84</td>
<td>1941</td>
<td>0.94</td>
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Appendix VI

Coal Quality Data
**COMMERCIAL TESTING & ENGINEERING CO.**

**COMMERCIAL TESTING & ENGINEERING CO.**  
**GENERAL OFFICES:** 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601  
**AREA CODE:** 312 726-8434  
**PLEASE ADDRESS ALL CORRESPONDENCE TO:**  
10775 EAST 51st AVE., DENVER, COLO. 80239  
**OFFICE TEL.: (303) 373-4772**

**SOLDIER CREEK COAL COMPANY**  
P.O. Box 83  
Price, Utah 84501

---

**Soldier Creek Coal Co.**  
Reject Composite of 72-82395  
Core Hole No. DH-7  
Seam - B  
Req. No. 467  
P. O. No. 11347

---

**Instr. 7-5-79**

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**SHORT PROXIMATE ANALYSIS**  
**Dry Basis**  

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<th>% moisture</th>
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<th>% Pyritic Sulfur</th>
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<tbody>
<tr>
<td>% Ash</td>
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<tr>
<td>Btu/lb.</td>
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<td>% Sulfur</td>
<td>0.40</td>
<td>% Total Sulfur</td>
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</table>

---

**Respectfully submitted,**  
COMMERCIAL TESTING & ENGINEERING CO.  
G. D. PALMER, Manager, Denver Laboratory

---

**August 3, 1979**

---

**W. TAYLOR, JR.**  
**CHICAGO SELLING OFFICE**
SOLDIER CREEK COAL COMPANY
P.O. Box AS
Price, Utah 84501

Coal
Hidden Valley Mine
Soldier Creek Coal Co.

Instr. 7-5-79

Soldier Creek Coal Co.
Reject Composite of 72-82395
Core Hole No. DH-7
Seam - B
Reg. No. 467
P.O. No. 11347

August 10, 1979

SOIL TEST REPORT

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<td>Electric Cond mm/cc</td>
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<tr>
<td>Sodium, Meq/L</td>
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<tr>
<td>Potassium, Meq/L</td>
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<td>Cation Exchange Capacity, Meq/100g</td>
<td>17.5</td>
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<tr>
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</tr>
<tr>
<td>Exchangeable Sodium, Meq/100g</td>
<td>5.4</td>
</tr>
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</table>

Exchangeable Potassium, Meq/100g | 0.6
Carbonate, Meq/L                 | 1.42
Bicarbonate, Meq/L                | 10.56
Sulfate, Meq/L                    | 77.16
Chloride, Meq/L                   | 0.19
Nitrate, Meq/L                    | 4.36

Texture Class: CARB

Selenium (Soluble), PPM            | 0.06
Boron (Soluble), PPM              | 1.1

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

G. D. PALMER, Manager, Denver Laboratory

DIP/TV
Original Copy Watermarked
For Your Protection

COMMERICAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601
AREA CODE 312 726-8424

PLEASE ADDRESS ALL CORRESPONDENCE TO:
10775 EAST 51st AVE., DENVER, COLO, 80239
OFFICE TEL. (303) 373-4772
Sample identification

Kind of sample reported to us: Coal
Sample taken at: Hidden Valley Mine
Sample taken by: Soldier Creek Coal Co.
Date sampled: 7-5-79
Date received: Instr. 7-5-79

Analysis report no.: 72-84212 Page 2

<table>
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<tr>
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<td></td>
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<tr>
<td>Nitrate, Meq/L</td>
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</tr>
<tr>
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<td>Silt %</td>
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<td>Clay %</td>
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<tr>
<td>Nitrate, Meq/L</td>
<td>2.86</td>
<td></td>
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</table>

Respectfully submitte:
COMMERCIAL TESTING & ENGINEERING CO.

G. D. PALMER, Manager Denver Laboratory
**COMMERCIAL TESTING & ENGINEERING CO.**

**SOLDIER CREEK COAL COMPANY**  
P. O. Box 48  
Price, Utah 8451

---

**Sample Identification**

Kind of sample reported to us: Coal  
Sample taken at: Hidden Valley Mine  
Sample taken by: Soldier Creek Coal Co.  
Date sampled: xxxxx  
Date received: Instr. 7-5-79

---

**Analysis report no.** 72-84212

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<td><strong>Dry Basis</strong></td>
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<td>(Diff)</td>
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<td>% Total Sulfur 1.19</td>
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---

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

G. D. PALMER, Manager, Denver Laboratory

---

**Sample taken by:** Soldier Creek Coal Co.

Reject Composite of 72-82396  
Core Hole No. DH-7  
 Seam - C  
Reg. No. 467  
P. O. No. 11347

---

August 3, 1979
SOLDIER CREEK COAL COMPANY
P. O. Box AS
Price, Utah 84501

August 3, 1979

Sample identification
by

Soldier Creek Coal Co.

Reject Composite of 72-82908
Core Hole No. DI-7
Seam - A
463.0' - 475.0'
Reg. No. 467
P. O. No. 11347

Kind of sample reported to us
Coal

Sample taken at
Hidden Valley Mine

Sample taken by
Soldier Creek Coal Co.

Date sampled
xxxxx

Date received
Instr. 7-5-79

Analysis report no. 72-84237

<table>
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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

G. D. PALMER, Manager, Denver Laboratory
### Sample Identification

**Kind of sample reported to us**
Coal

**Sample taken at**
Hidden Valley Mine

**Sample taken by**
Soldier Creek Coal Co.

**Date sampled**
xxxxx

**Date received**
Instr. 7-5-79

---

**Analysis report no.** 72-84237  Page 2

**SOIL TEST REPORT**

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<td>Sand %</td>
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</tr>
<tr>
<td>Silt %</td>
<td>*</td>
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<tr>
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<td>Boron (Soluble), PPM</td>
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</tr>
</tbody>
</table>

*Carbolithic

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

G. D. PALMER, Manager, Denver Laboratory
Appendix VII

Slope Stability Analysis
COAL SEAM BACKFILL SLOPE STABILITY ANALYSIS

SOLDIER CREEK COAL COMPANY

HIDDEN VALLEY MINE

Prepared for

CalMat Co
Los Angeles, California

November 7, 1986

Prepared by

JBR Consultants Group
1841 East Fort Union Blvd
Salt Lake City, Utah
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   1.2 Scope of Work ............................................... 1

2.0 Stability Analysis .............................................. 1
   2.1 Methodology ................................................ 1
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   2.3 Material Properties ....................................... 2

3.0 Results ........................................................... 2

4.0 Conclusion ...................................................... 3

5.0 References ...................................................... 4
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<thead>
<tr>
<th>Figure No.</th>
<th>Title</th>
<th>Page No.</th>
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<tr>
<td>Figure 1</td>
<td>Cross Section A Seam Pad</td>
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</tr>
<tr>
<td>Figure 2</td>
<td>Cross Section B Seam Pad</td>
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</table>
1.0 INTRODUCTION

1.1 PURPOSE OF DOCUMENT

The purpose of this report is to present the results of slope stability analysis for the post-reclamation configuration of the coal seam backfills at the Hidden Valley Coal Mine, Emery County, Utah.

1.2 SCOPE OF WORK

This project consisted of evaluating the slope stability of the coal seam backfills proposed in the Hidden Valley Coal Mine Reclamation Plan submitted to the Division of Oil Gas and Mining on May 28, 1986. The DOGM has requested that a slope stability analysis be conducted of these slopes to demonstrate a static factor of safety of at least 1.3. The principal components of this project were:

1. Preparation of coal seam backfill cross sections.
2. Compilation of material properties.

In this report we summarize the methodology used to evaluate the slope stability and present the results of our analysis. Computer printouts from the stability analysis are presented in Appendix A.

2.0 STABILITY ANALYSIS

2.1 METHODOLOGY

The slope stability has been evaluated using the simplified Janbu method of slices (Janbu and others, 1956). A computer program has been used to generate potential failure surfaces and calculate the factor of safety for each surface (Geoslope, 1985). One hundred potential failure surfaces have been considered for each coal seam pad. Included in Appendix A are descriptions of the surfaces with the ten lowest factors of safety. Figures 1 and 2 show the coal seam backfills in cross section, and the potential failure surface with the lowest factor of safety.

Only static conditions were considered in the stability analysis.

2.2 COAL SEAM PAD GEOMETRY

The location of the coal seam backfills are identified on topographic maps showing post-reclamation topography as currently envisioned by CalMat personnel. Typical cross sections for each seam have also been prepared and were utilized for this study. Each coal seam backfill will be approximately similar to a right
triangle; Seam A having a base of 40 feet and a height of 20 feet, Seam B having a base of 60 feet and a height of 30 feet. The final slope configuration for both seam backfills will be 2h:lv. The base for the backfills is assumed to be competent materials. A similar assumption has been made for the bedrock at the back of the backfills.

2.3 MATERIAL PROPERTIES

The stability of the coal seam backfills is dependent upon parameters such as geometry, locations of piezometric surfaces, and strengths of the materials. In as much as the materials comprising the backfills will be coarse grained with only minor amounts of fines, we assumed the materials will be in drained conditions. Therefore, we have assumed one piezometric surface to exist at the contact of the fill material and the naturally occurring ground.

The fill material for the backfills will be excavated from the existing pads. This material is coarse grained sand and gravel with minor amounts of fines corresponding to a GW or GP (depending on grading) in the Unified Soil Classification System (USCS). We have used data from available references to assign the material properties necessary to perform the stability analysis.

The dry density of the material has been assigned a value of 110 pcf. This represents the average of the values for dry sand and gravel according to Spangler and Handy (1973). Furthermore, 110 pcf is the dry density for GP as reported by both USBR (1977), and E. D'Appolonia (1976). We have chosen to use the value for GP rather than for GW because it is the lower of the two values and thus yields the lower factor of safety. In this manner, we have used the 'worst case scenario'.

The angle of internal friction has been assigned a value of 34 degrees for this study. This represents the average of the values listed in the literature assuming the material is similar to 'dry sand' from Spangler and Handy (1973); 'GP' from USBR (1977); 'granular soils' from E. D'Appolonia (1976); and 'sub-rounded sand' from Brunsden and Prior (1984). The value selected is considered to be conservatively low as the values reported in the literature range up to 40 degrees.

Because the material is assumed to be coarse-grained, the cohesion is equal to 0 psi.

3.0 RESULTS

Stability analysis reveal factors of safety of 1.354 for the A Seam backfill, and 1.353 for the B Seam backfill. These factors of safety are for the potential failure surface with the
The lowest factor of safety. These failure surfaces are shown in figures 1 and 2.

4.0 CONCLUSION

Based on the available data and assumptions made, we conclude the coal seam backfills will have a factor of safety of at least 1.3.
5.0 REFERENCES


SLOPE STABILITY ANALYSIS
CROSS SECTION
A SEAM PAD

A SEAM BACKFILL
SLOPE = 2h:1v

FAILURE SURFACE
FACTOR OF SAFETY = 1.354

A SEAM MAXIMUM
THICKNESS
15.3 FEET

CURRENT GROUND SURFACE

SCALE: 1" = 5'
SLOPE STABILITY ANALYSIS
CROSS SECTION
B SEAM PAD

B SEAM BACKFILL
SLOPE = 2h:1v
FACTOR OF SAFETY = 1.353

CURRENT GROUND SURFACE

SCALE: 1" = 10'

CONSULTANTS GROUP
SALT LAKE CITY, UTAH

B SEAM MAXIMUM THICKNESS
125 FEET
Version 3.1

Supplied by GEOCOMP Corp.
342 Sudbury Rd., Concord, MA. 01742
(617) 369-8304

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GEOSLOPE V3.1 is based on the program, STABL3, developed at Purdue University under sponsorship of the Federal Highway Administration.

GEOCOMP Corp. has modified the program to run on various microcomputers and plotting devices.

GEOCOMP Corp. makes no warranties as to the fitness of this software. The user bears all responsibility for accuracy and correctness of results produced by this software. See the user's manual for further warranty information.

Supplied under exclusive license to:
JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION
CALMAT SECTION A - A'

BOUNDARY COORDINATES

2 TOP BOUNDARIES
2 TOTAL BOUNDARIES

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<th>Y-LEFT</th>
<th>X-RIGHT</th>
<th>Y-RIGHT</th>
<th>SOIL TYPE BELOW BND</th>
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<td>.00</td>
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<td>20.00</td>
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-ROPIC SOIL PARAMETERS

1 TYPE(S) OF SOIL

SOIL TOTAL SATURATED COHESION FRICTION PORE PRESSURE PIEZOMETRIC
TYPE UNIT VT UNIT VT INTERCEPT ANGLE PRESSURE CONSTANT SURFACE
PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 4 COORDINATE POINTS

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<tr>
<th>POINT NO.</th>
<th>X-WATER</th>
<th>Y-WATER</th>
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<td>4</td>
<td>45.00</td>
<td>20.00</td>
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SEARCHING ROUTINE WILL BE LIMITED TO AN AREA DEFINED BY 3 BOUNDARIES OF WHICH THE FIRST 3 BOUNDARIES WILL DEFLECT SURFACES UPWARD

<table>
<thead>
<tr>
<th>BOUNDARY NO.</th>
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<th>Y-LEFT</th>
<th>X-RIGHT</th>
<th>Y-RIGHT</th>
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<td>0.00</td>
<td>45.00</td>
<td>20.00</td>
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A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN $X = 10.00$ AND $X = 20.00$

EACH SURFACE TERMINATES BETWEEN $X = 35.00$ AND $X = 45.00$

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS $Y = 0.00$

2.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.
FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

** ** SAFETY FACTORS ARE CALCULATED BY THE MODIFIED JANBU METHOD ** **

** 

JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 1 SPECIFIED BY 17 COORDINATE POINTS

SAFETY FACTOR = 1.354

<table>
<thead>
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SLICE NO. | X | DX | DW | DQ | DU | DN | DS
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2         | 18.35 | 1.86 | 62.37 | .00 | .00 | 56.01 | 27.91 |
3         | 20.20 | 1.85 | 96.65 | .00 | .00 | 86.70 | 43.21 |
4         | 22.04 | 1.84 | 124.77 | .00 | .00 | 111.85 | 55.74 |
5         | 23.88 | 1.83 | 146.82 | .00 | .00 | 131.53 | 65.54 |
6         | 25.70 | 1.82 | 162.88 | .00 | .00 | 145.85 | 72.68 |
7         | 27.51 | 1.81 | 173.03 | .00 | .00 | 154.89 | 77.18 |
8         | 29.31 | 1.79 | 177.37 | .00 | .00 | 158.75 | 79.11 |
9         | 31.10 | 1.78 | 176.00 | .00 | .00 | 157.54 | 78.50 |
10        | 32.87 | 1.77 | 169.04 | .00 | .00 | 151.33 | 75.41 |
11        | 34.64 | 1.76 | 156.59 | .00 | .00 | 140.23 | 69.88 |
12        | 36.39 | 1.75 | 138.77 | .00 | .00 | 124.34 | 61.96 |
13        | 38.13 | 1.73 | 115.72 | .00 | .00 | 103.76 | 51.70 |
14        | 39.86 | 1.72 | 87.57  | .00 | .00 | 78.58  | 39.16 |
15        | 41.57 | 1.71 | 54.46  | .00 | .00 | 48.92  | 24.38 |
16        | 43.20 | 1.54 | 16.68  | .00 | .00 | 15.00  | 7.48 |

JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 2 SPECIFIED BY 17 COORDINATE POINTS

SAFETY FACTOR = 1.354

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----------|--------|--------|-------|
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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 3 SPECIFIED BY 16 COORDINATE POINTS

SAFETY FACTOR = 1.355

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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 4 SPECIFIED BY 17 COORDINATE POINTS

SAFETY FACTOR = 1.357

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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 5 SPECIFIED BY 18 COORDINATE POINTS

SAFETY FACTOR = 1.358

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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 6 SPECIFIED BY 16 COORDINATE POINTS

SAFETY FACTOR = 1.361

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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)
### Failure Surface # 7 Specified by 19 Coordinate Points

**Safety Factor:** 1.362

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JBR Consultants Group
Salt Lake City, UT (S/N 5076)

### Failure Surface # 8 Specified by 13 Coordinate Points

**Safety Factor:** 1.363

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JBR Consultants Group
Salt Lake City, UT (S/N 5076)

### Failure Surface # 9 Specified by 14 Coordinate Points

**Safety Factor:** 1.364

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SAFETY FACTOR = 1.376

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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

Y  A  X  I  S

| .00 | 5.63 | 11.25 | 16.88 | 22.50 | 28.13 |

X | .00 | *------------------------------------------|

A | 11.25 | +            |
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    |      | 9          |
    |      | .75        |
    |      | .9         |

X | 16.88 | + | .92    |
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**Problem Description**

CALMAT SECTION B - B'

**Boundary Coordinates**

1 Top Boundaries
1 Total Boundaries

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**Isotropic Soil Parameters**

1 Type(s) of Soil

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<th>Friction</th>
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1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 3 COORDINATE POINTS

POINT  X-WATER  Y-WATER
NO.       .00       .00
1         55.00     5.00
2         70.00     35.00

SEARCHING ROUTINE WILL BE LIMITED TO AN AREA DEFINED BY 2 BOUNDARIES
OF WHICH THE FIRST 2 BOUNDARIES WILL DEFLECT SURFACES UPWARD

BOUNDARY  X-LEFT  Y-LEFT  X-RIGHT  Y-RIGHT
NO.       .00       .00     55.00     5.00
1         55.00     5.00     70.00     35.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 10.00
AND X = 30.00

EACH SURFACE TERMINATES BETWEEN X = 50.00
AND X = 70.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
AT WHICH A SURFACE EXTENDS IS Y = .00

2.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL
FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.
* * SAFETY FACTORS ARE CALCULATED BY THE MODIFIED JANBU METHOD * *

JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 1 SPECIFIED BY 28 COORDINATE POINTS

SAFETY FACTOR = 1.353

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JBR CONSULTANTS GROUP
Salt Lake City, UT (S/N 5076)

FAILURE SURFACE # 3 SPECIFIED BY 26 COORDINATE POINTS

SAFETY FACTOR = 1.356
FAILURE SURFACE # 4 SPECIFIED BY 28 COORDINATE POINTS

SAFETY FACTOR = 1.357

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FAILURE SURFACE # 6 SPECIFIED BY 29 COORDINATE POINTS

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September 11, 1997

State of Utah
Department of Natural Resources
Division of Oil, Gas, and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801
Attn: Joseph C. Helfrich, Permit Supervisor

Re: Hidden Valley Reclamation Plan, ACT/015/007-97B, Folder #2, Emery County, Utah

Dear Mr. Helfrich:

This is in response to your letter of September 3, 1997 with attachments.

Please be informed that we have reviewed the comments from both Mr. Davidson and Ms. Falvey, including the conditions imposed as follows:

Davidson: Safeguards need to be specified during construction for the timing and sequence of soil removal and subsoil placement. The topsoil on the B-adit slope should be stripped away and placed back on the surface along with the rocky substitute soil material. All subsoil materials beneath the topsoil should be used as fills with the dark lithochromic shale material being buried under the deepest layer of fill and soil cover.

Falvey: Re-contract the ditch adjacent to the proposed borrow area to meet the existing ditch design requirements and, resubmit the approved copies without the ditch extension. (The proposed change does not meet design requirements and the proposed changes on site should not affect the existing ditch configuration).

In accordance with our phone conversation earlier today, we are in agreement with both conditions and will comply as required. We will plan on filing an "as-built" map of the work after completion of this year's phase one work for your records.

Thank you for your attention to this matter.

Sincerely,

Gary Raines
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Emery County, Utah
Consolidation Coal Company
June 23, 1997
Revised August 12, 1997

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Amendment to Reclamation Plan
Hidden Valley Mine Site
Emery County, Utah
Permit No. ACT/015/007
Consolidation Coal Company

Submitted to the:
State of Utah
Department of Natural Resources
Division of Oil, Gas, and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

June 23, 1997
Revised August 12, 1997
Narrative Description of Proposed Work and Postmining Land Use
Amendment to Reclamation Plan
Hidden Valley Mine
Emery County, Utah
Consolidation Coal Company
June 23, 1997
Revised August 12, 1997

A. Introduction

The Hidden Valley property was acquired by Consolidation Coal Company from the Cal Mat Company in December, 1995. The property remains under Utah permit number ACT/015/007 originally issued to the Soldier Creek Coal Company, a subsidiary of CalMat, in 1980.

The purpose of the project described below is to achieve the vegetative cover as necessary for bond release. Consolidation Coal has, at the present time, no interest in access to the coal seams previously accessed by the Soldier Creek Company in Hidden Valley. The proposed work is to be done in late summer or early fall, 1997.

B. Present Configuration

Section C of this submittal, Reclamation Materials Assessment, indicates that the earlier reclamation at this site placed fine-grained material from alluvial areas on the steep slopes which were formed to cover the exploratory adits. These slope areas are also experiencing active erosion, which, combined with poor aspect and the arid conditions typical of the southwestern U.S., have made revegetation unsuccessful. Earlier attempts at reclamation would, probably, have been more successful if the effort had been directed at replacement of the rock debris that formed the slopes at the base of the rock canyon walls prior to disturbance.

With respect to topography, drawing 97-1 indicates the present topography of the site as determined by actual field survey. This drawing also indicates the expected topography to result after the proposed modification.

Slope stability: the present permit includes an analysis of slope stability for a final configuration of 2H:1V. Since this plan involves a reduction of the present "B" seam adit from the actual slope as constructed at approximately 2.8H:1V to a final slope of 2H:1V, this earlier analysis is considered valid for this project.

C. Purpose of Work Proposed

It has become apparent that the site, in its present configuration, will not support adequate vegetation to control erosion and achieve bond release. The work proposed for 1997 is expected to be phase 1 of a two part project. This year's work is to consist of a regrading of the "B" seam
adit slope, with the resulting material removed from the slope to be used to flatten the area between the slope and Ivie Creek. After reconfiguration of the area, it is planned to remove rocky materials from the lower area of the access road and road slope to be used to apply a coarse fragment cover of approximate 12" thickness to the regraded "B" seam adit slope, and to create a series of depressions upon the slope through surface roughening. Selected material from the same source will be used to selectively apply a partial cover of coarse fragments to the flattened area between the slope and Ivie Creek. This area will also be surface roughened. Further, selected coarse materials will be used to effectively "riprap" the transition slope from the flattened area to existing grade (see drawing).

The expected result will be to restore the adit slope to more closely resemble the area prior to disturbance. The use of coarse, rocky material to cover the slope, in conjunction with surface roughening, will also serve to prevent erosion, and help in re-vegetation through water harvesting and the shading effect of the larger fragments. In regrading the area between the slope and the Creek, the result will be a flatter configuration that will serve to minimize erosion and to better harvest available moisture. Any possibility of this area flowing directly into Ivie Creek will be eliminated by construction of a deflection berm. The partial application of coarse fragments in combination with surface roughening over this general area is to provide the same benefits, i.e. the harvesting of moisture, shading, and the prevention of sediment production and transport.

Phase 2 of the two part project is to consist of the same treatment to the slope covering the "A" seam adit, with the exception that this slope will not require regrading, as it is presently at 2H: IV, which is about the steepest that can be safely traversed by construction equipment in application of coarse fragments. This phase of the will depend on the success evident with the first phase. Revegetation of disturbed sites in this part of the U.S. is, admittedly, difficult, and it is appropriate to evaluate the success of this first phase of the project prior to continuing.

D. Construction

The site will be accessed using the present roadway. Equipment will consist of a crawler bull dozer, an endloader, a hydraulic excavator, and necessary support such as fueling equipment and pickup trucks. The bulldozer will be used in the initial operations of pushing the present topsoil from the adit slope for redistribution on the surface in combination with the coarse material described below. The bulldozer will then regrade the adit slope, pushing the material from the slope to the area between the slope and Me Creek. Grading will be done so as to make certain that any dark material or material of suspect quality will not be exposed on the surface. Any dark lithochromic shale will be buried under the deepest layer of fill and soil cover. The endloader will then excavate, carry, and deposit the coarse material and surface soil on both the slope and the flattened area. The excavator will serve to place the coarse fragments on the area, as well as to roughen the surface. All machines will be used to configure and finish grade the roadway area so as to restore it to a condition such that future access is available.
E. Sediment Control

During the construction phase, sediment control will be through utilization of the existing silt fences. Although it will be necessary to remove sections of the fences for access, sufficient materials consisting of silt fencing or straw bales will be kept on hand in the event of precipitation such that the fences can be restored to their present function. Longer term, it is our opinion that the final configuration as proposed will reduce sediment production to levels such that control measures will not be required with regard to surface runoff from the reconstructed areas. The final graded surface will consist of coarse fragments (rock) and depressions created by surface roughening. This surface should function to mechanically eliminate sediment production and transport. For the remaining area slated for future construction, the silt fence will be retained. These measures should provide ample protection to Ivie Creek and its buffer zone.

Seeding of the areas graded to final configuration will be done by hand, using a broadcast type spreader. After application, the seed will be incorporated to the extent possible, using hand raking. The use of hay or straw mulch is not proposed for this project, as it is considered counter-productive to the establishment of vegetation in this case. The introduction of hay as a soil stabilizer is also not proposed, as the soil is both chemically and physically suitable for the intended purpose (see Section C, this submittal). The use of either hay or straw is considered problematic from the standpoint of introduction of unwanted seed source that could serve as unwanted competition with the desirable seed for the scarce moisture available. Also, our experience at the Burnham, New Mexico project indicates that hay or straw also tends to move and collect in depressions created by surface roughening, and serves to inhibit emergence of the planted seeds. Hay could further tend to attract the native elk to the site, encouraging premature grazing of the emerged seedlings.

Present topography, proposed topography, and other proposed work is presented in map form on drawing 97-1, section E of this submittal. This map also identifies the expected final configuration of the borrow area. It further provides information on the extension of the portion of the diversion ditch which originates above the southeast reclamation slope ("A" seam) and which will be affected by this phase of the project. Hydrology for this ditch was provided with the 1989 amendment to the original permit, with design detail provided for a 100 year, 24 hour event. The calculation for the flatter section of the ditch indicates only a 0.4 feet depth of flow from the design storm. The extension of the ditch will be constructed at a cross section as indicated as "retention berms" in the referenced submittal, i.e. 2' depth, 2H:1V side slopes.

E. Seed Mix

The following seed mix is proposed for use at the site, dependent on availability. If certain seeds are not available, the Regulatory Agency will be made aware of this, and an alternative mix will be formulated.
## SEED MIX
### HIDDEN VALLEY, 1997 WORK

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* Seed to be collected on site, if possible.
F. Postmining Land Use

The discussion regarding postmining land use in the 1986 submittal by Soldier Creek Coal company addressed cattle grazing and wildlife habitat. The submittal goes on to say that "The disturbed area is mostly sandstone talus slopes that provide little livestock forage or wildlife habitat as is generally defined... This revegetation will not provide either wildlife or livestock forage of any significance but will stabilize the site."

Realistically, revegetation of the disturbed area will not contribute to stability of the site, nor will the revegetation be a major contributor to grazing. The usage evident of the site during the time it has been under Consolidation control has been by wildlife. Considering this, it is our plan to address the land use issue in a future submittal, in all likelihood proposing the reclassification of the site to wildlife forage or some other, more appropriate and more realistic category.
Reclamation Materials Assessment
CONSOL, Inc., Hidden Valley Mine
Emery County, Utah

23 June 1997

Prepared for: Mr. Gary Raines
Consolidation Coal Company
P.O. Box 566
Sesser, IL 62884

Prepared by: Lewis Munk, Ph.D., CPSS
Daniel B. Stephens & Associates, Inc.
6020 Academy, NE
Albuquerque, NM 87109
(505) 822-9400
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1.0 Introduction

Mining at the Hidden Valley property involved the exploitation of small surface exposures or outcrops of coal. Coal extraction from this site was terminated in the early 1980's and the reclamation was initiated in 1986. The reclamation activities included regrading, cover-soil redistribution, seeding, and mulching. The reclamation efforts at the Hidden Valley mine are not considered successful by the Utah-DNR, because of the lack of vegetative cover in the regraded portal areas. The primary areas of concern are the higher gradient canyon slopes near the A and B portals that have not adequately revegetated and represent potential future sediment sources. Prior to mining, these slopes were probably originally talus composed of colluvial rock debris. After termination of mining, the areas near the portals were graded and soil materials from the adjacent alluvial terraces were placed on the slopes. The alluvial terrace soil materials are medium textured and subject to erosion if not protected by a permanent mulch or vegetation. The difficulties associated with vegetation establishment in the arid climatic regime of southern Utah are accentuated by the harsh exposures (south and west) of these slopes. The vegetative cover on the undisturbed slopes in the vicinity of the reclaimed area is probably insufficient to protect the reclaimed slopes from accelerated erosion, thus, even under the best revegetation scenario the medium textured soils on the reclaimed slopes would be susceptible to erosion.

The undisturbed slopes surrounding the reclaimed area are sparsely vegetated, but protected from accelerated erosion by surface rock fragments ranging in size from gravel to boulders. A conceptual design for the reclamation of
this site was developed by CONSOL (Gary Raines, Steve Behling, and Lewis Munk) and the Utah-DNR (Bob Davidson and Susan White) during a site visit in March, 1997. The conceptual design incorporates the use of rock fragments to armor the steep south facing slopes. This design is meant to emulate the natural conditions in the surrounding undisturbed areas. The primary intent of the proposed treatments is to promote the long-term stability of the area and reduce on and off-site sedimentation. Rock cover, rather than vegetation cover, will provide the primary erosion protection on the reconstructed slopes. During the field discussions, it was recognized that the vegetation success criteria would be different for the rock covered slopes and the alluvial terraces, with a lower vegetative cover and productivity standard applied on the slopes. In general, the conceptual design for reclamation at Hidden Valley includes:

1) redistribution of the cover soils from the high gradient slopes to the alluvial terrace positions,
2) armoring the slopes with soils containing a high percentage of coarse fragments, and
3) seeding the reconstructed terraces and talus with adapted native vegetation.

The intent of this document is to evaluate the suitability of the soil materials at the site with respect to the proposed conceptual design for reclamation.

1.1 General Site characteristics

The Hidden Valley Mine is located at the base of an incised canyon characteristic of the Colorado Plateau region. The geomorphic components in the disturbed area include cliff and slope-forming canyon walls and high alluvial terraces. The disturbed areas are bounded on the south and west by the channel, low terrace, and floodplain of Ivie Creek. Berms and silt fences protect the stream from off-site sedimentation. The site occurs at an elevation of about 6000 feet and the surrounding vegetation is characterized by Utah juniper-Sagebrush-grass communities. Riparian vegetation is present in the stream corridor. The vegetation in the reclaimed area included four-wing saltbush (Atriplex canescens), Gardener saltbush (Atriplex gardneri), Big sagebrush (Artemisia tridentata), Mormon tea (Ephedra spp.), Galleta grass (Hilaria jamesii), Indian ricegrass (Oryzopsis hymenoides), Salina wildrye (Elymus salina) and several unidentified forb and grass species. The undisturbed soils were not evaluated at the site, but probably included Orthents on the canyon walls, and deep, well-drained Fluvents or Cambids on the higher terrace positions.

2.0 Methods

A total of 10 samples were collected from the eight (8) locations in the reclaimed area (Figure 97-1). All the samples were analyzed for saturated paste pH (pH₆), extract electrical conductivity (ECₑ), soluble Ca, Mg, and Na (Caₑ, Mgₑ, and Naₑ), AB-DTPA extractable Se, and particle size distribution. Selected samples were analyzed for acid base account (ABA), water soluble Ca, water soluble Se, and total acid (HNO₃-HClO₄-HF) digestible Se. The analytical methods used in this investigation conformed to the Utah-DNR guidelines or were approved as acceptable surrogates prior to testing (Table 1).
Table 1. Methods and instrumentation used in the analyses of the Hidden Valley soils samples.

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</tr>
<tr>
<td>Potential acidity (ABA)</td>
<td>Sobek et al., (1978)</td>
<td>Induction furnace</td>
</tr>
<tr>
<td>Neutralization potential (ABA)</td>
<td>Sobek et al., (1978)</td>
<td>HCl/NaOH titration</td>
</tr>
<tr>
<td>Water soluble Ca</td>
<td>Nelson, (1982)</td>
<td>ICP</td>
</tr>
<tr>
<td>Water soluble Se</td>
<td>Nelson, (1982) modified</td>
<td>ICP-MS</td>
</tr>
<tr>
<td>Total acid digestable Se</td>
<td>Spackman et al., 1995</td>
<td>HG-AAS</td>
</tr>
</tbody>
</table>

3.0 Results and Discussion

3.1 Materials Sampled

The intent of the soil sampling was to determine if any chemical or physical limitations are associated with the soil cover materials that were used on the reclaimed slopes. The majority of the samples collected at the Hidden Valley site represent the surface cover materials that will be placed back on the alluvial terraces (Table 2). The subsurface layers at sites HV1-2 and HV4-2 contained sandstone and lithochrome shale fragments and were sampled separately. Sample HV5-1 is a lithochrome shale exposed at the surface of the regraded slope near the A portal. Sample HV-1 was collected at the base of a red shale exposure above the B portal slope. The sandstone cover material proposed for armoring of the A portal slope is represented by sample HV8-1.

Table 2. Color, effervescence, and type of materials sampled at the Hidden Valley Mine Site (3-18-97)<sup>†</sup>.

<table>
<thead>
<tr>
<th>Site</th>
<th>Depth</th>
<th>Material type</th>
<th>Color</th>
<th>Eff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV1-1</td>
<td>0-18</td>
<td>Alluvial soil cover materials</td>
<td>10YR 4/3</td>
<td>es</td>
</tr>
<tr>
<td>HV1-2</td>
<td>18-24</td>
<td>Cover soil with shale and sandstone fragments</td>
<td>10YR 3/1</td>
<td>e</td>
</tr>
<tr>
<td>HV2-1</td>
<td>0-18</td>
<td>Alluvial soil cover materials</td>
<td>10YR 4/3</td>
<td>es</td>
</tr>
<tr>
<td>HV3-1</td>
<td>0-18</td>
<td>Alluvial soil cover materials</td>
<td>10YR 4/2</td>
<td>es</td>
</tr>
<tr>
<td>HV4-1</td>
<td>0-6</td>
<td>Alluvial soil cover materials</td>
<td>10YR 4/3</td>
<td>es</td>
</tr>
<tr>
<td>HV4-2</td>
<td>6-18</td>
<td>Cover soil with shale and sandstone fragments</td>
<td>10YR 3/2</td>
<td>es</td>
</tr>
<tr>
<td>HV5-1</td>
<td>0-6</td>
<td>Lithochrome shale fragments-substratum</td>
<td>5Y 5/2</td>
<td>eo</td>
</tr>
<tr>
<td>HV6-1</td>
<td>0-18</td>
<td>Alluvial soil cover materials</td>
<td>10YR 4/2</td>
<td>es</td>
</tr>
<tr>
<td>HV7-1</td>
<td>Surf</td>
<td>Red weathered shale/clay from surface exposure</td>
<td>5Y 3/3</td>
<td>eo</td>
</tr>
<tr>
<td>HV8-1</td>
<td>Grab</td>
<td>Sandstone borrow materials</td>
<td>ND</td>
<td>es</td>
</tr>
</tbody>
</table>

† Colors are of moist soil unless using the Munsell notation otherwise indicated. Eff. = reaction with 10% HCl, eo = none, e = weak, es = effervesces strongly.

3.2 Reclamation Materials Characteristics and Suitability

No chemical or physical limitations were identified in the soil cover materials in the reclaimed areas at the Hidden Valley Mine (Table 3). Thus, no limitations are predicted for the use of the cover materials that are currently on the regraded slopes. However, two samples of potential substratum materials had pH's near the Utah-DNR lower limit, and one of these samples had an extractable Se level that exceeded the Utah-DNR guideline. The implications and risks associated with acid forming materials and Se are discussed in the following sections.
Table 3. Selected chemical characteristics of the reclamation materials at the Hidden Valley Mine.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth</th>
<th>pH</th>
<th>EC</th>
<th>SAR</th>
<th>Ca&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Mg</th>
<th>Na</th>
<th>Se</th>
<th>Sand</th>
<th>Silt</th>
<th>Clay</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in</td>
<td></td>
<td>dS/m</td>
<td>meq/L</td>
<td>mg/kg</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>USDA</td>
</tr>
<tr>
<td>HV1-1</td>
<td>0-18</td>
<td>7.4</td>
<td>4.15</td>
<td>1.7</td>
<td>32.2</td>
<td>13.1</td>
<td>8.06</td>
<td>0.03</td>
<td>50</td>
<td>41</td>
<td>9</td>
<td>L</td>
</tr>
<tr>
<td>HV1-2</td>
<td>18-24</td>
<td>6.6</td>
<td>8.43</td>
<td>1.5</td>
<td>37.5</td>
<td>70.1</td>
<td>11.2</td>
<td>0.10</td>
<td>49</td>
<td>37</td>
<td>14</td>
<td>L</td>
</tr>
<tr>
<td>HV2-1</td>
<td>0-18</td>
<td>7.5</td>
<td>5.20</td>
<td>2.3</td>
<td>38.4</td>
<td>18.5</td>
<td>12.4</td>
<td>0.03</td>
<td>49</td>
<td>42</td>
<td>9</td>
<td>L</td>
</tr>
<tr>
<td>HV3-1</td>
<td>0-18</td>
<td>7.4</td>
<td>5.43</td>
<td>1.7</td>
<td>41.5</td>
<td>17.4</td>
<td>9.05</td>
<td>0.03</td>
<td>45</td>
<td>45</td>
<td>10</td>
<td>L</td>
</tr>
<tr>
<td>HV4-1</td>
<td>0-6</td>
<td>7.6</td>
<td>3.34</td>
<td>1.0</td>
<td>30.0</td>
<td>10.6</td>
<td>4.40</td>
<td>0.03</td>
<td>45</td>
<td>44</td>
<td>11</td>
<td>L</td>
</tr>
<tr>
<td>HV4-2</td>
<td>6-18</td>
<td>7.1</td>
<td>9.58</td>
<td>5.4</td>
<td>32.3</td>
<td>56.6</td>
<td>36.3</td>
<td>0.07</td>
<td>44</td>
<td>40</td>
<td>16</td>
<td>L</td>
</tr>
<tr>
<td>HV5-1</td>
<td>0-6</td>
<td>5.5</td>
<td>11.7</td>
<td>2.5</td>
<td>48.5</td>
<td>90.1</td>
<td>20.6</td>
<td>0.19</td>
<td>54</td>
<td>36</td>
<td>10</td>
<td>SL</td>
</tr>
<tr>
<td>HV6-1</td>
<td>0-18</td>
<td>7.6</td>
<td>4.39</td>
<td>2.4</td>
<td>32.6</td>
<td>14.3</td>
<td>11.5</td>
<td>0.05</td>
<td>48</td>
<td>42</td>
<td>10</td>
<td>L</td>
</tr>
<tr>
<td>HV7-1</td>
<td>Surf</td>
<td>5.8</td>
<td>7.42</td>
<td>5.9</td>
<td>24.9</td>
<td>46.1</td>
<td>35.2</td>
<td>0.05</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td>SiCL</td>
</tr>
<tr>
<td>HV8-1</td>
<td>Grab</td>
<td>7.8</td>
<td>3.93</td>
<td>2.0</td>
<td>33.9</td>
<td>10.1</td>
<td>9.31</td>
<td>0.02</td>
<td>46</td>
<td>41</td>
<td>13</td>
<td>L</td>
</tr>
</tbody>
</table>

3.3 Acid Forming Materials Assessment

The alluvial soil-cover materials were weathered, calcareous, and lacked visual evidence of pyrite. These materials are not considered acid generating sources and probably have considerable neutralization capacity. However, the occurrence of low pH’s in samples HV5-1 and HV7-1, and pyrite weathering products in the beds associated with sample HV7-1, raised concerns about the potential for acid forming materials at the site. Thus, the acid base account (ABA) of selected samples was evaluated (Table 3). A tiered testing approach was used in the ABA analysis. In the first phase of testing, total sulfur (TS) was used to calculate potential acidity (PA), and this value was subtracted from the neutralization potential (NP) to estimate the maximum acid base account (MABA). Acid base accounts calculated in this manner represent maximum values, since not all the S occurs as sulfide and sulfate minerals that have the potential to generate acidity. The MABA was calculated using the following formula: MABA = NP-TS, where NP and PA are in units of T CaCO₃ equivalents/KT. The PA was calculated using: PA = (TS)(31.25), where 31.25 is the conventional factor for converting percent S to tons of CaCO₃ equivalent.

Table 4. Acid base account data for selected samples from the Hidden Valley Mine, Emery County, Utah.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Total S</th>
<th>Extractable Sulfur Forms</th>
<th>Neutralization Potential</th>
<th>Acid Base Account Max.</th>
<th>Pyritic pH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H₂O</td>
<td>HCl</td>
<td>HNO₃</td>
<td>Residual</td>
<td>% Sulfur</td>
</tr>
<tr>
<td>HV1-2</td>
<td>1.09</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>HV5-1</td>
<td>1.21</td>
<td>0.85</td>
<td>&lt;0.01</td>
<td>0.12</td>
<td>0.24</td>
</tr>
<tr>
<td>HV7-1</td>
<td>1.02</td>
<td>0.66</td>
<td>&lt;0.01</td>
<td>0.31</td>
<td>0.05</td>
</tr>
<tr>
<td>HV8-1</td>
<td>0.27</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

Sulfur-forms analysis was conducted to better define the acid forming potential of the materials. The S-forms based PA evaluation uses pre- and post-extraction S contents to predict the acid generating potential of the materials. The water and acid extractions are meant to partition the non-acidic generating S forms (e.g., sulfate and organic S) from the acid generating forms (pyritic S). The HNO₃-extractable sulfur was used to calculate the PA associated with pyrite and the pyritic acid base account (PABA).
The MABA data indicate that the acid forming potential of these materials is limited. Two of the four samples had positive MABA values, and the MABA values of the other two samples were in -25 T CaCO₃ / KT range (Table 3). The PABA’s calculated from the HNO₃ extractable sulfur provide a more realistic representation of the potential for acid formation. The PABA for sample HV5-1 is positive indicating that this dark colored shale lacks the capacity to generate excess acidity in relation to its neutralization potential, and significant reductions in pH are not expected as this material weathered. The PABA for HV7-1 was negative suggesting that the materials in the outcrop may generate excess acidity in the long term. The red colored bed represented by sample HV7-1 is limited in extent and is not considered representative of the materials on the site. Sample HV7-1 was collected primarily to document the tolerance of native species for acid soil conditions. The HV7-1 sample site supported a vigorous stand of Gardner saltbush. Thus, the pH of the majority of the materials at the Hidden Valley site are expected to be circum-neutral to slightly alkaline in reaction in the long-term, and acid soil conditions are expected to occur to a limited extent only in localized areas. Furthermore, alkalinity from the overlying cover materials is expected to moderate changes in pH over time as leaching occurs.

3.4 Selenium

The Utah-DNR guideline for extractable selenium of 0.1 mg/kg was exceeded in only one of the ten samples collected at the site (Table 3). Previous testing of the coal at Hidden Valley did not recognize Se as an element of concern (Pers. Comm. Mr. Robert Davidson, Utah-DNR, 8 March 1997). Thus, materials with elevated extractable Se are not likely to occur at the Hidden Valley site. Nonetheless, because sample HV5-1 represents a potential substratum component in the reclaimed area additional laboratory tests were conducted to evaluate the risks associated Se at Hidden Valley. The biogeochemistry and toxicity of Se are reviewed in the following sections along with the supplementary test results.

3.4.1 Selenium Requirements and Toxicity

Selenium is essential for human and animal nutrition (Levander, 1986). The essentiality of Se in plants has not been conclusively demonstrated, but it may be essential in primary Se accumulator species (Ganje, 1966; Emerick and DeMarco, 1991). Se deficiencies in livestock and poultry may result in a long list of ailments (Egan, 1966; Shapiro, 1973; Combs and Combs, 1986). Deficiencies in humans are rare, but have been recognized in isolated areas with extremely low soil-Se levels and in instances of extreme malnutrition (Chen et al., 1980; Majaj and Hopkins, 1966). Combs and Combs (1984) suggest that elevated levels of dietary Se may function to reduce the incidence of cancer and cardiovascular disease. Animal requirements are reported to range from 0.05 to 0.1 mg Se/kg diet (Mayland et al., 1989), with up to 0.3 mg/kg diet required as feed supplements for maximum productivity of poultry and livestock (CAST, 1994).

Toxicity symptoms in livestock may occur at dietary-Se levels ranging from 3.0-20.0 mg/kg for chronic exposure, and from 400-800 mg/kg for acute exposure (Mayland et al., 1989; James et al., 1991). Selenium toxicity levels in animals depend on a number of factors including, species, age, sex, dietary compliments, and health. Acute
selenosis is rare, but may occur when livestock are forced to eat highly seleniferous plants, that are typically considered to be unpalatable. Selenium levels of 4-5 mg/kg body weight are required for manifestations of chronic toxicity symptoms (Mayland et al., 1989). Chronic selenosis (a.k.a., Alkali Staggers) occurs when animals ingest feeds containing 5-40 mg Se/kg for a period of weeks. Blind staggers is another disease associated with the chronic ingestion of Se accumulator species, however, the symptoms cannot be induced by Se-salts, and the disease may be caused by factors other than Se toxicity (Levander, 1986; James et al, 1991). Selenium toxicity in humans is rare, but has been reported from a seleniferous area in China, where the inhabitants diet was restricted to eat foods produced solely on seleniferous soils (Levander, 1986). Additional instances of human toxicity were associated with the consumption of unregulated dietary Se supplements (Levander, 1986).

Selenosis in native vegetation is undocumented, but toxicities in selected crop plants are known to occur (Ganje, 1966; Carlson et al., 1989; Mayland et al., 1989). Selenium solution concentrations in the 2-30 mg/L range are required to induce yield reductions and mortality in susceptible plants (Carlson et al., 1989). In contrast, some plant species can adsorb large amounts of Se with no apparent detrimental affects. The plant species that tolerate high levels of Se are classified as either primary or secondary accumulator species. Primary Se accumulators are apparently restricted to seleniferous soils, whereas, the secondary Se accumulators occur on both seleniferous and non-seleniferous soils (Table 5). Selenium concentrations in primary accumulators are commonly in the hundreds of mg/kg on a dry weight (DW) basis, and may range into the thousands of mg/kg. The secondary Se accumulators rarely concentrate more than 50-100 mg/kg, but may contain up to 1000 mg/kg DW. The tissue-Se levels of non-accumulator species growing on seleniferous soils rarely exceed 25-50 mg/kg DW and commonly contain < 5 mg/kg DW (Mayland et al., 1989; Emerick and DeMarco, 1991). Much attention has been directed toward Se accumulator species because of their value in geochemical exploration of uranium deposits and for locating seleniferous soils. However, it should be recognized that some plants apparently exclude Se when growing on seleniferous soils. Notable species from a mined land reclamation perspective include the grama grasses (Bouteloua sp.) and Buffalograss (Buchloe dactyloides (Nutt.) Engelm.) (Brown and Shrift, 1982; Mayland et al., 1989).

Table 5. Genera of recognized primary and secondary Se accumulator species in the western United States.

<table>
<thead>
<tr>
<th>Primary Accumulators</th>
<th>Secondary Accumulators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Genus</strong></td>
<td><strong>Common Name</strong></td>
</tr>
<tr>
<td>Aplopappus</td>
<td>Goldenweed</td>
</tr>
<tr>
<td>Astragalus</td>
<td>Locoweed</td>
</tr>
<tr>
<td>Haplopappus</td>
<td>Goldenweed</td>
</tr>
<tr>
<td>Machaeranthera</td>
<td>Aster</td>
</tr>
<tr>
<td>Oonopsis</td>
<td>Goldenweed</td>
</tr>
<tr>
<td>Stanleya</td>
<td>Primrose</td>
</tr>
<tr>
<td>Xylorrhiza</td>
<td>Aster</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hidden Valley Mine- Reclamation Materials Assessment (June 1997)
3.4.2 Selenium Chemistry in Soils

Selenium occurs in soils and geologic materials as native selenium, metal selenides, weakly soluble oxanions, adsorbed ions, and organo-selenium compounds. Selenium concentrations in uncontaminated soils generally range from 0.1 to 2.0 mg/kg and average about 0.5 mg/kg (McNeal and Balistrieri, 1989; Herring, 1991). The chemistry of Se in soils is complicated since it can concurrently exist in more than one oxidation state, including selenide (Se\(^2\)), elemental selenium (Se\(^0\)), selenite (SeO\(_4\)\(^2\) or Se(IV)), and selenate (SeO\(_4\)\(^4\) or Se(VI)). Solution pH and redox potential are the primary determinants of the Se oxidation state.

The solubility of Se is determined by its oxidation state and mineral form, and its mobility is controlled by adsorption processes (Elrashidi et al., 1987; Brown, 1991). Selenides and elemental Se are predicted to occur at low redox potentials. Selenite is predicted under mildly oxidized conditions and selenate is the major species expected under high redox conditions. Metal selenides (e.g., PbSe, CuSe, SnSe, and FeSe\(_2\)) or elemental Se solid phases are very insoluble and control the solution concentrations when they are the stable forms. In well oxidized soils the solution concentration of selenite and selenate is typically controlled by adsorption processes, rather than dissolution-precipitation reactions (Elrashidi et al., 1987). Selenite and selenate adsorption are pH dependant with maximum adsorption occurring at low pH’s (Neal et al., 1987; Neal and Sposito, 1989). Selenate is less strongly adsorbed than selenite and many of the other soil solution anions (Ryden et al., 1987). Thus, Se mobility and availability are expected to be highest in well-drained, alkaline soils, since the redox potential favors selenide mineral dissolution and the stability of the selenate species. Furthermore, selenite is not as strongly adsorbed under alkaline conditions.

3.4.3 Plant Uptake of Selenium

Plants are the primary pathway for Se exposure to grazing animals, although some uptake occurs through the direct ingestion of soils. Mikkelsen et al., (1989) and Mayland et al., (1991) reviewed the factors affecting plant uptake of Se and indicated that plant uptake of Se increased as soil pH, redox potential, and clay content increased. Plants absorb selenate, selenite, and organo-selenium, but seem to preferentially absorb selenate and organo-selenium. Increasing boron, chloride, and sulfate concentrations and decreased phosphate concentrations usually depressed Se uptake. The effect of soil organic matter content on Se uptake is not clear, and it may either enhance or depress Se uptake by plants. The antagonistics effects of SO\(_4\) on plant uptake of Se have been noted by a number of researchers (Epstein, 1955; Gissel-Nielsen, 1973; Smith and Watkinson, 1984; Wan et al., 1988). The reduction in Se uptake associated with SO\(_4\) is probably the result of specific ion competition (Epstien, 1955). Gypsum soil amendments have been used to mitigate Se uptake in seleniferous soils (Wan et al., 1988). The uptake of selenate is affected to a greater degree than selenite by competing anions (Mayland et al., 1991).
3.4.4 Selenium at Hidden Valley

The Total Se concentrations of the materials tested at Hidden Valley are within the range found in uncontaminated soils (Fig 2) and are on the low end of the range found in Cretaceous marine sediments Kabata-Pendias and Pendias, 1992). For comparison, Total Se levels in seleniferous Cretaceous shales may range from 5-300 mg/kg (Mayland et al., 1989; Martens and Suarez, 1997). Selenium fractionation studies of Cretaceous coal bearing rocks conducted by CONSOL in New Mexico, revealed that the majority of the Se in these materials occurred in extremely recalcitrant forms (Munk, 1996). Similar results were reported from Se fractionation studies of Cretaceous formations in California, where more than 80 % of the Se was accounted for in sequential NaOH and HNO₃ extractions (Martens and Suarez, 1997).

Although no Se fractionation data are available for coal-bearing formations in Utah, the majority of the Se in the rocks is expected to occur as recalcitrant selenides and organic compounds on the basis of genetic similarities with other Cretaceous marine sediments. Thus, the long-term risks associated with the Hidden Valley materials is predicted to be minimal since the dark shales do not contain high levels of Se, and the Se probably occurs in relatively stable mineral forms that will not readily weather to plant available forms.

![Figure 4. Range and mean- Total Se content of uncontaminated soils and total concentrations of Se in samples from the Hidden Valley Mine.](image)

Table 6. Extractable Se and Ca concentrations of selected samples from the Hidden Valley Mine, Emery County, UT.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Extractable Se</th>
<th>Extractable Ca</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:1 1:2.5 1:5 1:10 AB-DPTA Total</td>
<td>S.P. 1:1 1:2.5 1:5 1:10</td>
</tr>
<tr>
<td>HV1-2</td>
<td>0.09 0.08 0.10 0.13 0.10 1.3</td>
<td>313 586 1460 2900 5600</td>
</tr>
<tr>
<td>HV4-2</td>
<td>0.05 0.05 0.05 0.06 0.07 0.4</td>
<td>240 565 1420 2450 3520</td>
</tr>
<tr>
<td>HV5-1</td>
<td>0.15 0.16 0.18 0.22 0.19 1.1</td>
<td>440 646 1510 3000 5300</td>
</tr>
</tbody>
</table>

1:1, 1:2.5, 1:5, and 1:10 are soil:water dilution ratios; Total = strong acid digestible; S.P. = saturated paste extract.

The adsorption and plant uptake of Se is strongly influenced by Se speciation, with selenite being less readily absorbed by plants and more strongly adsorbed by anion exchange sites. Selenite is the predicted stable Se species in mildly oxidizing and acid conditions. Thus, selenite is expected to be the dominant species in the strongly-acid dark shales at Hidden Valley once they are buried under the sandstone cover materials. Burial of the dark shales by even a modest thickness of cover materials is expected to reduce the redox potential in the system and promote the stability of selenite.

The occurrence of gypsum in the soils at Hidden Valley affects the interpretation of risks associated with Se. Gypsum is important because of the antagonistic relationship between Se uptake and soluble SO₄ levels. In addition,
limited evidence suggests that Se solution concentrations may be controlled by gypsum precipitation-dissolution reactions. Because of the limited solubility of gypsum, only about 20-30 mg/L of Ca or SO₄ will go into solution when gypsum is present. This relationship is the basis for recognition of gypsum in the soils at Hidden Valley (Table 3). The increase in Ca content upon dilution method was used to confirm the presence of gypsum in selected samples (Salinity Laboratory Staff, 1954). The apparent increase in Ca concentration in the samples with increasing soil:water dilution indicates that the solution Ca levels are controlled by a solid phase dissolution process (Table 6; Fig.3). The divergence from linearity in the Ca plot for sample HV4-2 indicates that most of the gypsum in this sample was dissolved in the 1:5 and 1:10 dilutions. Alternatively, the linear increase in Ca with increased dilution for samples HV1-2 and HV5-1 indicates that the 1:10 dilution was insufficient to dissolve all the gypsum (Nelson, 1982). Thus, gypsum is inferred to be present in all three samples, but more abundant in samples HV1-2 and HV5-1.

The extractable soil Se concentrations in samples HV1-2, HV4-2, and HV5-1 increased with increasing dilution (Fig. 4). Although, the increase in Se concentration for sample HV4-2 was slight, and may represent analytical variability. The response of Se to increasing dilution in samples HV1-2 and HV5-1 is similar to that of Ca, suggesting that extractable Se is affected by a solid-phase dissolution process. Comparison of the solution Ca and Se data with thermodynamic equilibrium constants at 25° C for CaSeO₄·2H₂O (Log Kθeu = -5.44) and CaSeO₄·2H₂O (Log Kθeu = -3.09) indicate that the 1:1 solutions are undersaturated with respect to these solid phases. Thus, the Se solution concentrations are speculated to be controlled by solid phase gypsum that contains a minor selenite and/or selenate component (e.g., CaSO₄·(SeO₃·SeO₄)·2H₂O).

![Graph showing extractable Ca concentration and soil:water dilution ratio for selected samples from the Hidden Valley Mine, Emery County, Utah.](image1)

![Graph showing extractable Se concentration and soil:water dilution ratio for selected samples from the Hidden Valley Mine, Emery County, Utah.](image2)
The apparent coprecipitation of Se with gypsum is considered to be important in determining the bioavailability of Se under field conditions. In soil environments where gypsum is a stable mineral phase, and Se is coprecipitated with the gypsum, the bioavailability of Se is expected to be kinetically limited by the dissolution of gypsum. The kinetics of gypsum dissolution are a function of gypsum particle size, crystallinity, and antecedent soil water content. Gypsum is formed from the weathering products associated pyrite oxidation in Cretaceous marine sediments and mine spoils, and is a stable mineral phase in arid regions in the western United States, including Utah (Nettleton et al., 1982). The mineral ferroselite (FeSe₂) is a Se-pyrite analouge and probably occurs as a solid solution phase component with pyrite (Howard, 1977). Thus, the oxidation of the primary ferroselite and pyrite mineral phases are probably concurrent processes and the Se and S are expected to be simultaneously available for precipitation with gypsum under high Ca activity environments. The time transgressive weathering of pyrite and detrital feldspars should provide a continuous source of and Ca and S to the system, and gypsum is expected to increase in quantity with time. Furthermore, increases in the size and crystallinity of the gypsum precipitates is expected in the restricted leaching regime associated with the climate of the Hidden Valley site. Thus, gypsum is expected to be a stable long-term sink for Se in the soils.

3.5 Selenium Risks at Hidden Valley

The assessment of risks associated with Se in reclaimed environments is complicated. Fisher and Munshower (1991) indicated that the determination of suitable Se levels in the overburden should not be based on extractable Se levels alone. A sound assessment of risks associated with Se, should include total and extractable Se levels, post-mining land use, area of disturbance, plant species selection, and intensity of management. The selection of shallow rooted plant species with non-accumulator or Se-excluding tendencies further reduces the risks associated with soil Se. Thus, extractable Se levels greater than 0.1 mg/kg can probably be tolerated for small areas with watershed and/or wildlife habitat as the primary post-mining land. Fisher and Munshower (1991) concluded that AB-DTPA extractable Se levels of 0.25 mg/kg are reasonable when wildlife is the primary post-mining land use. In addition, an extensive five year study of soils and vegetation in natural and reclaimed areas in Wyoming concluded that AB-DTPA extractable Se levels of < 0.3 mg/kg would not compromise forage resources (Spackman et al., 1996).

The risks associated with Se at Hidden Valley are considered to be minimal since the majority of the materials do not contain elevated concentrations of Se, and the area of disturbance is small and will not be intensively managed for domestic livestock production. In addition, the physicochemical characteristics of the lithochromatic shales are not conducive to the uptake of Se by plants, since they are acid and contain significant quantities of sulfate. Burial of these materials is likely to reduce the redox potential and promote the stability of selenite. The long-term fate of selenium is speculated to be controlled by coprecipitation with gypsum.
4.0 Recommendations for Reclamation

General recommendations for reclamation of the Hidden Valley site are listed below. It is expected that CONSOL will develop and submit more detailed engineering designs and plans that incorporate the concepts included in this section. The primary conceptual components of reclamation for the Hidden Valley site include:

1. Remove the alluvial-soil cover materials from the portal area slopes and redistribute to the terrace treads. The redistributed soil materials can be used to reduce the longitudinal slope gradients on the terrace treads.

2. Regrade the portal area slopes to more nearly match the slope gradients on the adjacent undisturbed areas (talus).

3. Cover the newly-regraded portal areas with the high coarse-fragment content sandstone borrow materials.

4. Broadcast seed the portal area slopes and regraded terrace treads with a locally adapted seed mix. Raking the seeded area is recommended to promote seed-soil contact.

5. No straw mulch is recommended for the newly-regraded slopes since the rock cover will function as a mulch.
4.0 Literature Cited


## ESTIMATE OF COST
### HIDDEN VALLEY MINE SITE
### 1997 WORK
### JUNE 23, 1997
Revised AUGUST 12, 1997

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>EST. COST</th>
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<tbody>
<tr>
<td>1. Mob / demob</td>
<td>3 units</td>
<td>$3,750</td>
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<tr>
<td>2. R &amp; R surface soil</td>
<td>475 cu. yd.</td>
<td>$1,306</td>
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<td>3. Slope grading</td>
<td>3302 cu. yd.</td>
<td>$5,778</td>
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<td>4. Coarse mat'ls. application</td>
<td>1400 cu. yd.</td>
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<td>5. Roadway grading</td>
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<td>6. Hand Labor</td>
<td>40 hr.</td>
<td>$1,400</td>
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<tr>
<td>7. Materials</td>
<td>Lump Sum</td>
<td>$2,000</td>
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</tbody>
</table>

**TOTAL ESTIMATED COST**

$19,164