

C/015/036 Incoming  
#5721



26 September 2018

Mr. Daron Haddock  
Utah Division of Oil, Gas & Mining  
1594 West North Temple, Suite 1210  
P. O. Box 145801  
Salt Lake City, Utah 84114-5801

**Re: Response to Deficiencies in Application Castle Valley Mining, LLC, C/015/0036  
Waste Rock Site, Task ID#5721**

Dear Mr. Haddock

Listed below are the responses to the deficiency letter dated 31 August 2018.

1. The application ownership & control information (Appendix 1-4) requires updating to coincide with the information listed in the AVS system.

*Ans. The Division of Oil, Gas and Mining has been contacted by Jaren Jorgenson to correct the information in the AVS system.*

2. The application must contain documents giving legal right to enter the permit area for operations and reclamation.

*Ans. A page has been added to Appendix 1-1 that stated "Once the purchase of the waste rock site from Pacificorp to Castle Valley Mining, LLC is completed a document will be sent to the Division of Oil, Gas and Mining stating the book and page number in which the transaction can be found."*

3. Appendix 1-5 Permit Description contains the proposed public notice identified in Appendix 1-6. Appendix 1-5 should be updated to contain the permit description as identified.

*Ans. The information in Appendix 1-5 was changed to the correct information.*

4. Figure 7-1 appears to be missing from the application.

*Ans. Drawing 7-1 has been added to the application.*

**RECEIVED**  
**SEP 28 2018**

**DIV. OF OIL, GAS & MINING**

P.O. Box 475 • Huntington, UT 84528  
Phone (435) 687-5454 • Fax (435) 687-5037

5. Please describe an interim seed mix which will provide an effective, quick growing vegetative cover over the topsoil stockpiles.

*Ans. References to Phase II have been removed from this application and an interim seed mix will not be needed.*

6. Please describe Phase II subsoil salvage and storage to ensure 48 inches of cover over the refuse as required by R645-301-553-252.

*Ans. The following pages have been changed to remove any reference to Phase II:*

*Page 5-10*

*Page 5-26*

*Page 5-28*

*Page 5-29*

*Page 5-32*

*Page 7-31*

*Page 8-1*

7. Permittee must also include similar toxicity reports for material from Bear Canyon mine since that is where fill material will originate from once operations are resumed.

*Ans. Toxic reports for waste rock from the Bear Canyon Mine have been added to Appendix 6-1.*

8. Provide a sampling plan for the refuse deposited at the waste rock site.

*Ans. Section R645-301-731.311 has been added to discuss how sampling and analysis of waste rock will be conducted. This discussion is found on page 7-14*

9. The operator must provide a description of how each borehole will be plugged, capped, sealed, backfilled or otherwise properly managed.

*Ans. Section R645-301-631.200 has been added stating "CFR 43 will be followed when plugging and capping the water monitoring wells"*

10. Permittee must provide a plan for backfilling, soil stabilization, and surface contouring required to establish final surface configuration within the proposed Phase 2 areas.

*Ans. References to Phase II have been removed from this application.*

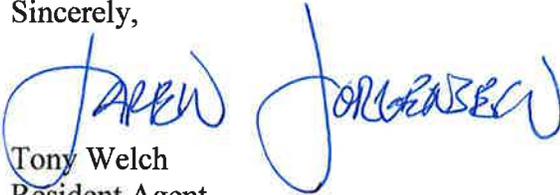
11. Please provide missing Plate 5-5 cross-sections F-F' and H-H'.

*Ans. Cross-sections F-F' and H-H' are found on Plate 5-4.*

In this submittal C1 and C2 forms are included to show what pages of this application have been changed for quick reference. Two completed amended clean copies are also attached with their respective C1 and C2 forms.

If you have any questions, please call me at (435) 687-5454

Sincerely,

 FOR TONY WELCH  
Tony Welch  
Resident Agent

## APPLICATION FOR COAL PERMIT PROCESSING

Permit Change  New Permit  Renewal  Exploration  Bond Release  Transfer

**Permittee:** Castle Valley Mining, LLC

**Mine:** Bear Canyon Mine

**Permit Number:** C/015/0036

**Title:** Deer Creek Waste Site (now know as the Castle Valley Mining, LLC Waste Rock Site)

**Description,** Include reason for application and timing required to implement:

**Instructions:** If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

- Yes  No 1. Change in the size of the Permit Area? Acres: \_\_\_\_\_ Disturbed Area: \_\_\_\_\_  increase  decrease.
- Yes  No 2. Is the application submitted as a result of a Division Order? DO# \_\_\_\_\_
- Yes  No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
- Yes  No 4. Does the application include operations in hydrologic basins other than as currently approved?
- Yes  No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes  No 6. Does the application require or include public notice publication?
- Yes  No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
- Yes  No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
- Yes  No 9. Is the application submitted as a result of a Violation? NOV # \_\_\_\_\_
- Yes  No 10. Is the application submitted as a result of other laws or regulations or policies?  
*Explain:* \_\_\_\_\_
- Yes  No 11. Does the application affect the surface landowner or change the post mining land use?
- Yes  No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
- Yes  No 13. Does the application require or include collection and reporting of any baseline information?
- Yes  No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
- Yes  No 15. Does the application require or include soil removal, storage or placement?
- Yes  No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
- Yes  No 17. Does the application require or include construction, modification, or removal of surface facilities?
- Yes  No 18. Does the application require or include water monitoring, sediment or drainage control measures?
- Yes  No 19. Does the application require or include certified designs, maps or calculation?
- Yes  No 20. Does the application require or include subsidence control or monitoring?
- Yes  No 21. Have reclamation costs for bonding been provided?
- Yes  No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
- Yes  No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

**Please attach one (1) review copy of the application.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

JAREN JORGENSEN  
Print Name

[Signature]  
Sign Name, Position, Date

Subscribed and sworn to before me this 25 day of Sept, 2018

[Signature]  
Notary Public

My commission Expires: \_\_\_\_\_  
Attest: State of Utah } ss:  
County of Emery



<b>For Office Use Only:</b>	<b>Assigned Tracking Number:</b>	<b>Received by Oil, Gas &amp; Mining</b>
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# APPLICATION FOR COAL PERMIT PROCESSING

## Detailed Schedule Of Changes to the Mining And Reclamation Plan

**Permittee:** Castle Valley Mining, LLC

**Mine:** Bear Canyon Mine

**Permit Number:** C/015/0036

**Title:** Deer Creek Waste Rock Site(now known as the Castle Valley Mining, LLC Waste Rock Site)

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

### DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 1 text, tables, figures, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 2 text, figure, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 text, table, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 4 text, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 5 text, table, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 6 text, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 7 text, tables, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 8 text, and appendices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 9 text
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cover page
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 1-1 Surface and Subsurface Owner
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 2-1 Soil Depths and Stockpile Locations
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 3-1 Vegetation Map
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 3-2 Wildlife Habitat Map
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 5-1 Permit Facilities & Typical RD X-Sections
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 5-2 Reclamation Plan Map
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 5-3 Road Reclamation Cross Sections
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 5-4 Pile Reclamation Cross Sections
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 6-1 Geology Map
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 7-1 Sediment Detention Pond
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 7-2 Site Drainage Map
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 7-3 Drainage Details
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plate 7-4 Surface Body Water Locations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

<p><b>Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.</b></p>	<p><b>Received by Oil, Gas &amp; Mining</b></p>
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## APPLICATION FOR COAL PERMIT PROCESSING

Permit Change  New Permit  Renewal  Exploration  Bond Release  Transfer

**Permittee:** Castle Valley Mining, LLC

**Mine:** Bear Canyon Mine

**Permit Number:** C/015/0036

**Title:** Red line and strikeout in response to deficiency letter date 31 August 2018, Task ID#5721

**Description,** Include reason for application and timing required to implement:

**Instructions:** If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

- Yes  No 1. Change in the size of the Permit Area? Acres: \_\_\_\_\_ Disturbed Area: \_\_\_\_\_  increase  decrease.
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- Yes  No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

**Please attach one (1) review copy of the application.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

JAREN JORGENSEN  
Print Name

JAREN JORGENSEN  
Sign Name, Position, Date

Subscribed and sworn to before me this 25 day of Sept, 2018

[Signature]  
Notary Public

My commission Expires: \_\_\_\_\_

Attest: State of Utah } ss:  
County of Emery



<b>For Office Use Only:</b>	<b>Assigned Tracking Number:</b>	<b>Received by Oil, Gas &amp; Mining</b>



**Landowner, Right-of-Entry, and Public Interest.**

Plate 1-1 shows the boundaries of lands and the names of present owners of record of those lands, both surface and subsurface, included in or contiguous to the permit area. CVM is the owner of all lands within the permit area, as indicated on the legal description provided on the warranty deeds in Appendix 1-1, and therefore has the legal right to enter the property and continue to add to the waste rock pile. The permit area consists of approximately 49.05 fee acres. No Federal or State land exists within the permit area. As the owner of the property, CVM has a legal right to operate on all of the lands within the permit area.

The only activity associated with this plan to be conducted within 100 feet of a public road (State Route 31) will be where the site access road joins that right-of-way.

**Mining Sequence and Planned Subsidence.** No underground mining will occur at this site. Therefore, no subsidence is anticipated. All land proposed to be affected by operations and reclamation at the waste rock site is shown on Plate 5-1. Reclamation of the site will begin as soon as practical following the completion of refuse stockpiling. An estimate of the reclamation timetable for Phase 1 is provided in Table 5-1. ~~and this table will be revised when Phase II is started.~~ It is not currently anticipated that additional permits will be sought from the Division for this operation.

**Land Surface Configuration.** The surface contour data presented in Plate 5-1 were developed by an aerial survey conducted on September 26, 2014 by Aero-graphics. The 2-foot contour interval of this map is sufficient to clearly show surface topography and slope within the permit and adjacent areas.

~~This application deals with Phase I of the operation. As Phase I is filled to capacity it will be necessary to begin construction on Phase II. Phase II will be east of Phase I. Diversion ditches will be constructed to divert runoff around the area. The disturbed drainage system of this area will flow into a sediment basin designed for this area. The size of the basin and ditches will be designed before Phase II is started. Topsoil will be removed according to this application. Maintenance work on the ditches, sediment basin and other runoff controls will be done as the need arises.~~

### **R645-301-537 Regraded Slopes**

Reclamation of this site will not involve significant regrading of slopes.

### **R645-301-540 Reclamation Plan**

### **R645-301-541 General**

Prior to disturbance of the area by Energy West for use as a waste rock disposal facility, land within the permit area was used as wildlife habitat. CVM intends to reclaim the site in a manner that returns the site to a condition that will serve as wildlife habitat. This is consistent with the pre-mining land use and also the capability of the soil as defined in Section 222.400 of this application (Class 8 capability, indicating that the soil cannot support agricultural and other high-use activities but can support recreational uses, wildlife habitat, watershed, or esthetic uses). A post-mining land use of wildlife habitat is also consistent with current zoning ordinances (see Section 411.100 of this application).

1. Install temporary sediment controls (silt fences, straw wattles, etc.) in areas not otherwise controlled.
2. Grade the waste rock pile to achieve the final configuration within the Phase I area noted on Plate 5.2
3. Construct temporary berms and diversion channels as needed along the edges of the regraded waste rock pile to convey runoff from the waste rock pile to the sedimentation pond.
4. Remove the upper foot of soil from the soil stockpiles adjacent to the waste rock pile and temporarily segregate this for use as topsoil. Initially maintain the soil stockpiles that form the embankments for the sedimentation pond for later reclamation use.
5. Place subsoil from the soil stockpiles onto the regraded waste rock pile.
6. Place topsoil on the subsoil that has been placed on the regraded waste rock pile.
7. Incorporate mulch and gouge the topsoil.
8. Revegetate the topsoil that was placed on the regraded waste rock pile.
9. Wait for 2 years to satisfy the requirements of R645-301-763.100.
10. Remove asphalt from the site access road and place this asphalt within the sedimentation pond.
11. Construct final reclamation channels RC-1 through RC-6 and regrade the surface of the reclaimed waste rock pile. ~~where disturbed by Phase II reclamation.~~
12. Regrade the areas of the current undisturbed-area diversions as needed to allow free drainage of off-site areas through the reclamation channels.
13. Place the material excavated for construction of the final reclamation channels in the area of the sedimentation pond and grade this material as needed.
14. Segregate the remaining topsoil from the berm of the sedimentation pond. Place the subsoil and topsoil from this berm on the waste rock exposed during construction of the reclamation channels and on the graded waste rock within the current boundaries of the sedimentation pond.
15. Incorporate mulch and gouge the topsoil.
16. Revegetate the topsoil that was placed during Phase II as well as previously revegetated areas that were disturbed during construction of the reclamation channels and Phase II grading activities.
17. Recontour the access road, construct the associated reclamation channels, and revegetate the area of the access road. This work will proceed from north to south in a manner that allows the efficient use of equipment.

CVM acknowledges that the Utah Coal Regulatory Program calls for sedimentation ponds to be retained for a period of at least 2 years after the last augmented seeding following the initiation of reclamation activities (see R645-301-356.300 and R645-301-763). Although, as indicated in Figure 5-3, this rule would prevent final reclamation and/or cause re-disturbance of at least 6.01 acres of the 14.69 acre total disturbed area following the waiting period after the last augmented seeding, CVM will reclaim the site in a phased approach as indicated above to comply with the rule.

The proven surface-roughening technique known as deep gouging retains essentially all of the precipitation that falls on a site. Nonetheless, temporary diversion ditches will be installed at the locations shown on Plate 5-2 to provide an extra measure of assurance that runoff from the disturbed area will report to the sedimentation pond during the period between Phase I ~~and Phase II~~ reclamation. The design of these temporary diversions is Discussed in Chapter 7. The temporary sediment controls installed at the beginning of Phase I reclamation will be retained to control sediment yield from areas not otherwise controlled.

placed in the pond basin, as outlined above. Subsoil will also be placed on the waste rock that was exposed during excavation of the reclamation channels and removal of the Phase I reclamation channels. The segregated topsoil will then be placed on the subsoil and the topsoil will be mulched. ~~All areas that were disturbed during Phase II reclamation of the waste rock pile will then be seeded as indicated above.~~

Information presented on Plate 2-1 indicates that the soil stockpiles adjacent to the current waste rock pile contain 33,898 yd<sup>3</sup> of subsoil and 2,303 yd<sup>3</sup> of topsoil. This is sufficient to place an average of approximately 35 inches of subsoil over the area of the former waste rock pile and sedimentation pond (to be occupied at that time by the waste rock pile), and 2.5 inches of topsoil over the reclaimed area. This thickness of cover over the waste rock is considered sufficient, given that the waste rock is neither acid- nor toxic-forming (see Section 623 of this application).

Final reclamation of the site access road will occur after the remainder of the site has been reclaimed (i.e., after access to the site by heavy equipment is no longer needed). The gravel road surface material and bottom ash road subgrade material will be graded against the inside cut slopes of the road cross-section. The topsoil on the embankment out-slopes will be removed and temporarily stockpiled where it will not be damaged by subsequent reclamation efforts. The subsoil material from the embankment slopes will be spread over the redistributed road base. The topsoil material from the temporary stockpiles will then be spread over the area, mulched, gouged, and seeded as outlined above. This will be accomplished in phases as needed to allow equipment access to areas along the road requiring mulching and seeding.

### **R645-301-542.300 Final Surface Configuration Maps and Cross Sections**

The anticipated final surface configuration and associated cross sections of the waste rock pile and along the site access road are shown on (Plates 5-2, 5-3 and 5-4).

**R645-301-625 Additional Geologic Information**

It is not anticipated that any additional geologic data will need to be collected at this site.

**R645-301-626 Sampling Waivers**

CVM does not request a sampling waiver for this site.

**R645-301-627 Description of the Overburden Thickness and Lithology**

No mining or coal exploration will occur in the permit area.

**R645-301-630 Operation Plan**

**R645-301-631 Casing and Sealing of Exploration Holes**

No exploration holes will be drilled in the permit area.

**R645-301-631.200 Well Plugging**

Code of Federal Regulations 43 will be followed when plugging and capping wells DH-1, DH-3 and D.

**R645-301-632 Subsidence Monitoring**

Since there will be no mining or exploration at the CVM site, subsidence will not occur as a result of site operations. Therefore, a subsidence monitoring program is not required.

### **R645-301-731.300 Acid- and Toxic-Forming Materials**

As noted in Section 623 of this application, the waste rock is neither acid- nor toxic-forming. Thus, no acid- or toxic-forming materials exist on the site.

### **R645-301-731.311 Operations**

Approximately 150 tons of rock will be stored at the mine site before being transported to the waste rock site. The waste rock will be mostly comprised of shale, mudstone, and sandstone. The average rock density of this material is approximately 104 lbs. per cu. ft. or approximately 115,600 cu. Yds. The trucks will be covered to prevent waste rock fines leaving the truck. At the site, the waste rock will be spread out in 18-inch lifts. A grid pattern of 10 ft. x 10 ft. will be laid out and a sample will be taken in the center for a depth of 18 inches. The samples will be analyzed using Tables 3 and 7 of the Division of Oil, Gas & Mining Guidelines for Management of Topsoil and Overburden. The results of the analysis will be included in the annual report.

### **R645-301-731.400 Transfer of Wells**

No wells exist at the facility.

### **R645-301-731.500 Discharges**

No discharges will occur into, from, or within underground mines in the permit area. Operations at the site will be conducted in a manner that precludes contamination, diminishment, or interruption of State-appropriated water supplies.

### **R645-301-731.600 Stream Buffer Zones**

A detailed reclamation plan for the facility is presented in Section 540 of this application. CVM will ensure that all temporary structures are removed and reclaimed. Permanent diversions will be maintained properly and will meet the requirements of the approved reclamation plan for permanent structures and impoundments.

The diversion channels that currently convey runoff around the north and west sides of the waste rock pile are subject to frequent maintenance (due to siltation of the channel as runoff is forced to make substantial changes in flow direction). Therefore, these channels will be removed as part of site reclamation. The channels shown on Plate 5-2 will be constructed during reclamation to more efficiently convey across the reclaimed site.

The design of the reclamation channels is detailed in Appendix 7-9 and summarized in Table 7-3. Reclamation channels were designed to safely convey runoff resulting from a 100-year, 24-hour precipitation event, with a trapezoidal shape and bottom widths varying from 0 (triangular) to 10 feet. All reclamation channels were designed with 2H:1V side slopes and a riprapped depth of 2 feet. A filter layer, consisting of minus 2-inch road-base gravel, will be installed in the ~~Phase II~~ reclamation channels between the riprap and the underlying native soil.

### **R645-301-762 Roads**

The site access road will be reclaimed when it is no longer needed for site access. Reclamation of the road will include:

- Restoring natural drainage patterns
- Reshaping cut and fill slopes to be compatible with the post-mining land use and to complement the drainage patterns of the surrounding terrain.

### **R645-301-763 Siltation Structures**

## **R645-301-800 BONDING**

### **R645-301-801 Definitions and Division Responsibilities**

This chapter provides information regarding the bonding for coal recovery and reclamation operations at the CVM waste rock site (the "CVM site" or the "site"). The applicant has on file with the Utah Division of Oil, Gas and Mining a bond made payable to the Utah Division of Oil, Gas and Mining for performance of all the requirements of the State Program.

### **R645-301-820 Requirement to File a Bond**

The area covered by the bond is outlined on Plate 5-1, which includes all disturbed areas. The disturbed areas and specific acres to be reclaimed are indicated on Plate 5-2. ~~The performance bond period is for the duration of the existing waste rock placement and reclamation operations and the bond will be revised if Phase II is develop.~~ The bond is in the form of a surety bond and is described in Section 860.

### **R645-301-830 Determination of Bond Amount**

The bond amount was determined by using unit costs obtained from *RS Means Heavy Construction Cost Data 32<sup>th</sup> Edition* adjusted for the Price, Utah area, *45<sup>th</sup> Edition of Caterpillar Performance Handbook*, and Division of Oil, Gas & Mining Technical Directive 007. The total estimated bond amount is indicated in Appendix 8-1. The bond is sufficient to assure the completion of the reclamation. The reader is encouraged to look at Plate 5-2 when reviewing the bond estimate provided in Appendix 8-1. This Plate generally notes the location of the future waste rock pile (i.e., within the boundary of the current waste rock pile) as well as the corridor in which the site access road currently exists. Additional information regarding the current location of the waste rock pile and the site access road is provided on Plate 5-1.

**APPENDIX 1-1**  
**PURCHASE AGREEMENT**

Once the purchase of the waste rock site from PacifiCorp to Castle Valley Mining, LLC is completed, a document will be sent to the Division of Oil, Gas and Mining stating the book and page number in which the transaction can be found.

**APPENDIX 1-5**  
**PROPERTY DESCRIPTION**

### **Property Description**

Beginning at the Northwest corner of Section 6, Township 17 South, Range 8 East, SLB&M, and running thence S 89°52'00" W, 1272.00 feet along Section line; thence S 72°54'35" E, 314.08 feet; thence S 63°06'41" E, 224.51 feet; thence S 48°18'17" E, 268.40 feet; thence S 20°06'29" W, 1066.85 feet; thence S 39°24'03" W, 846.37 feet, more or less to the Northerly right-of-way of SR- 31; thence N 89°39'06" E, 139.42 feet along said right-of-way; thence N 43°39'42" E, 1520.19 feet; thence N 31°02'18" E, 412.96 feet; thence N 22°58'45" E, 1322.55 feet to the North line of Section 5, Township 17 South, Range 8 East, SLB&M; thence N 89°44'10" W, 744.58 feet along Section line to the point of beginning.

**APPENDIX 6-1**  
**SUMMARY OF PRIOR WASTE ROCK ANALYSIS**



DEER CREEK MINE  
WASTE ROCK MATERIAL  
ANALYSIS

SAMPLE	PH	EC	CaCO <sub>3</sub>	SAR	SAND	SILT	CLAY	TEXTURE CLASS	BORON (mg/kg)	SELENIUM (mg/kg)	ROCK FRAGMENTS	SULPHUR & NON-SULPHUR	SULPHUR	PROTIC ORGANIC
1-82988 <sup>2</sup>	7.43	5.12	26.3	5.0	55.3	23.3	21.4	SCL	1.2	0.098	88.8	30.6	0.31	0.03 0.28

1- Analysis completed according to methods identified in DGM Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining.

2- Sample is a representative sample composited from five (5) sample sites.

INCORPORATED  
AUG 11 1982  
Div. of Oil, Gas & Mining  
NPI Soil Testing/Plant Tissue Analysis Lab  
417 Weber Way, Salt Lake City, Utah 84108  
Von Esom (801) 582-0144

7-6.1

AVERAGE COAL ANALYSES, HIAWATHA NE QUADRANGLE

	No. Analyses	As-received (percent)	
		Average	Range
BEAR CANYON BED			
Moisture	6	6.8	4.5-10.9
Volatile matter	6	43.8	37.4-46.0
Fixed carbon	6	45.7	44.9-46.0
Ash	6	4.5	3.8- 5.8
Sulfur	6	0.53	0.5- 0.6
Btu/lb	6	13,014	10,840-13,530
BLIND CANYON BED			
Moisture	10	4.8	3.8- 5.3
Volatile matter	9	41.7	40.2-44.7
Fixed carbon	9	44.3	39.2-48.3
Ash	10	3.9	5.1- 12.4
Sulfur	8	0.58	0.5- 0.6
Btu/lb	9	12,492	11,700-13,080
HIAWATHA BED			
Moisture	370	5.6	0.7 -11.0
Volatile matter	357	42.3	36.3 -46.4
Fixed carbon	357	45.7	38.3 -52.7
Ash	359	6.2	3.3 -11.2
Sulfur	330	0.61	0.29- 1.1
Btu/lb	365	12,719	11,521-13,600

(AFTER DOELLING, 1972)

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Sample No. WP-8-75

U.S.G.S. Serial No. 0174679

Location Co-op Mine

Face channel Sample

Sec. 22, T. 16 S., R. 7 E.

Seam Bear Canyon Seam

Formation Blackhawk

Thickness Sampled 7'

Date Sampled May 8, 1975

Proximate Analysis

	AD	AR	Dry	MAF
M	4.4	6.1		
VM	45.6	44.8	47.7	50.8
FC	44.1	43.3	46.2	49.2
Ash	5.9	5.8	6.1	
btu/lb.	13140	12910	13740	14640

Ultimate Analysis

	AD	AR	Dry	MAF
H	5.9	5.9	5.6	6.0
C	72.6	71.4	76.0	80.9
N	1.3	1.3	1.4	1.5
O	13.8	15.1	10.4	11.1
S	0.5	0.5	0.5	0.5

FORMS OF SULFUR: Sulfate Pyritic Organic

As-received	0.02	0.16	0.30
Moist.-free	0.02	0.17	0.32
M. and ash-free	0.02	0.18	0.35

Free-swelling index No. 2 1/2

TRACE ELEMENTS BY VARIOUS DETERMINATIONS (Coal as received)

As (ppm) 1 F (ppm) <20 Hg (ppm) 0.03 Sb (ppm) 0.1 Se (ppm) 1.3

TRACE ELEMENTS, MOSTLY ATOMIC ABSORPTION ON ASH

Ag % <u>2.33</u>	Cu (ppm) <u>97</u>	Zn (ppm) <u>19</u>
As % <u>2.96</u>	Li (ppm) <u>84</u>	Mn (ppm) <u>200</u>
B (ppm) <u>4</u>	Pb (ppm) <u>25</u>	

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DELAYED NEUTRON DETERMINATION OF URANIUM AND THORIUM

ppm Th 5.0247 ppm U

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SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS OF THE ASH

Greater than 10%; N=Not detected; L=Detected, but below limit of determination

Fe % <u>5.0</u>	Ba (ppm) <u>N</u>	Pb (ppm) <u>30</u>	W (ppm) <u>N</u>	Ru <u>N</u>
Mg % <u>1.5</u>	Bi <u>N</u>	Pd <u>N</u>	Y <u>30</u>	Sr <u>N</u>
Ca % <u>6</u>	Cd <u>N</u>	Pt <u>N</u>	Zn <u>N</u>	Th <u>N</u>
Ti % <u>0.3</u>	Co <u>10</u>	Sb <u>N</u>	Zr <u>200</u>	U <u>N</u>
Cl % <u>---</u>	Cr <u>70</u>	Sc <u>15</u>	Ce <u>N</u>	Mo <u>3</u>
Mn (ppm) <u>150</u>	Cu <u>70</u>	Sn <u>N</u>	Ga <u>20</u>	Pb <u>N</u>

As (ppm) <u>N</u>	La (ppm) <u>N</u>	Sr (ppm) <u>20</u>	500Ga (ppm) <u>20</u>	Al % <u>7.0</u>
Au <u>N</u>	Mo <u>15</u>	Te <u>N</u>	Hf <u>N</u>	Ni % <u>---</u>
C <u>1500</u>	Nb <u>L20</u>	U <u>N</u>	In <u>N</u>	K % <u>N</u>
Na <u>1500</u>	Ni <u>20</u>	V <u>70</u>	Li <u>N</u>	S % <u>N</u>

LOOKED FOR ONLY WHEN La OR Ce FOUND:

P	Fusibility of ash temp. °F.
Na	Initial Deform. -----2190
Sm	Softening -----2250
Eu	Fluid -----2300

% Ash determined gravimetrically ashed at 525° C. -6.8%

Ash  
Composition

AL2O3	-----11.0%	
SO3	-----1.9%	8.4%
CL	-----0.10%	
CAO	-----24.0%	
SI02	-----25.0%	24.0%
P2O5	-----0.74%	
TI02	-----0.71%	
MnO	-----0.020%	
FE2O3	-----7.6%	
K2O	-----0.1%	

# COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

WESTERN DIVISION MANAGER  
LLOYD W. TAYLOR, JR.



PLEASE ADDRESS ALL CORRESPONDENCE TO:  
10775 EAST 51st AVE., DENVER, COLO. 80239  
OFFICE TEL. (303) 373-4772

June 25, 1979

CO-OP MINING COMPANY  
Box No. 300  
Huntington, Utah 84528

Sample Identification  
by

Kind of sample reported to us	Floor Rock	CO-OP Mining Co.
Sample taken at	XXXXXX	Sample No. 57-2162 (CT&E Helper)
Sample taken by	CO-OP Mining Co.	CO-OP Mine No. 2
Date sampled	XXXXXX	Huntington Canyon
Date received	5-24-79	

Analysis report no. 72-82660

SOIL ANALYSIS

pH	8.4
Sodium	5.4
Calcium	.61
Mangesium	4.4
Sodium Adsorption Ratio	6.4
Pyrite (as S-CaCO <sub>3</sub> eq t/1000T	0.0
Sand %	65
Silt %	26
Clay %	9

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Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*G. D. Palmer*

G. D. PALMER, Manager, Denver Laboratory



Charter Member

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WESTERN DIVISION MANAGER  
LLOYD W. TAYLOR, JR.PLEASE ADDRESS ALL CORRESPONDENCE TO:  
10775 EAST 51st AVE., DENVER, COLO. 80239  
OFFICE TEL. (303) 373-4772

June 25, 1979

CO-OP MINING COMPANY  
Box No. 300  
Huntington, Utah

Sample identification  
by

Kind of sample reported to us	Roof Rock	CO-OP Mining Co.
Sample taken at	xxxxxx	Sample No. 57-2163 (CT&E Helper)
Sample taken by	CO-OP Mining Co.	CO-OP Mine No. 2
Date sampled	xxxxxx	Huntington Canyon
Date received	5-24-79	

Analysis report no. 72-82661

SOIL ANALYSIS

pH	8.7
Sodium	12.5
Calcium	.34
Magnesium	.76
Sodium Adsorption Ratio	16.9
Pyrite (as S-CaCO <sub>3</sub> eq t/1000T)	0.0
Sand %	
Silt %	
Clay %	

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G. D. PALMER, Manager, Denver Laboratory



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EASTERN DIVISION MANAGER

JAIL D. PALMER



PLEASE ADDRESS ALL CORRESPONDENCE TO

224 South Carbon Avenue

Price, Utah 84501

Phone: (801) 637-7540

March 2, 1982

CO-OP MINING CO

P.O. Box 300

Huntington, Utah 84528

Department of Education

Co-op Mining Co.

#2

Kind of sample reported to us Coal  
Sample taken at xxxxx  
Sample taken by Co-op Mining Co.  
Date sampled xxxxx  
Date received 2-25-82

Analysis report no. 57-8990

## SHORT PROXIMATE ANALYSIS

As Received Dry Basis

% Moisture	4.70	xxxxx
% Ash	7.49	7.86
Btu/lb	12937	13575
% Sulfur	0.41	0.43

% Air Dry Loss = 3.07  
Moisture, Ash-free Btu = 14733  
Pounds of SO<sub>2</sub> per 10<sup>6</sup> Btu = 0.63  
Moist, Mineral matter free Btu \* = 14088  
(Based on as rec'd moisture)\*  
Pounds of Sulfur per 10<sup>6</sup> Btu = 0.32

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JACK D. BLAIR, Manager, Price Laboratory



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JAVE SELDON  
MANAGER  
SOUTHWEST DIVISION



PLEASE ADDRESS ALL CORRESPONDENCE TO:  
224 S. CARBON AVE., PRICE, UT 84501  
OFFICE TEL. (801) 637-7540

CO-OP MINING COMPANY  
P.O. Box 300  
Huntington, Utah 84528

November 10, 1983

Sample Identification  
by

CO-OP Mining

Kind of sample  
reported to us Coal

Bear Canyon  
Hiawatha Seam

Sample taken at Bear Canyon

Sample taken by Co-op Mining Co.

Date sampled xxxxx

Date received 11-4-83

Analysis report no.57-14270

## SHORT PROXIMATE ANALYSIS

As Received    Dry Basis

% Moisture	7.95	xxxxx
% Ash	9.55	10.37
Btu/lb	11641	12646
% Sulfur	0.50	0.54

% Air Dry Loss = 5.03  
Moisture, Ash-free Btu = 14109  
Pounds of SO<sub>2</sub> per 10<sup>6</sup> Btu = 0.85  
Moist, Mineral matter free Btu \* = 12992  
(Based on as rec'd moisture)\*  
Pounds of Sulfur per 10<sup>6</sup> Btu = 0.43  
% Residual moisture = 3.07

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JB/cj

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COMMERCIAL TESTING & ENGINEERING CO.

*John Blau*

Manager, Price Laboratory



Charter Member

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,  
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES



# COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:  
P.O. BOX 1020, HUNTINGTON, UT 84528  
TELEPHONE: (801) 653-2311

July 26, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample Identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North Bottom
Sample taken by	Co-op	1 bag
		13.25 lbs.
		(amended results)
Date sampled		
Date received	May 3, 1989	Sample: CS-2B

Analysis report no. 59-100972

## SOIL ANALYSIS

pH	7.5 units	
Electrical conductivity	2700 umhos/cm	(2.7 mmhos/cm)
Saturation percent	47.2	
Soluble calcium	10.62 meq/l	
Soluble magnesium	3.06 meq/l	
Soluble sodium	0.83 meq/l	
Sodium adsorption ratio	0.31	
Exchangeable sodium percent	<0.01	
Total nitrogen	1.28 %	
Nitrate-nitrogen	0.42 mg/kg	
Organic carbon	67.48 %	
Boron	<0.01 mg/kg	
Selenium, total available	<0.1 ppm	
Available water capacity	4.94 %	

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July 26, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample Identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North Bottom
Sample taken by	Co-op	1 bag
Date sampled		13.25 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-2B

Analysis report no. 59-100972

## SOIL ANALYSIS

Max. acid potential	21.6 tons CaCO <sub>3</sub> /1000 tons
Neutralization potential	36.2 tons CaCO <sub>3</sub> /1000 tons

(acid potential based on total sulfur of 0.69%; pyritic sulfur of .14% would yield an acid potential of 4.4)

Coarse fragments 69.6 %

### Particle size analysis:

Sand	88.4 %
Silt	7.6 %
Clay	4.0 %

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P.O. BOX 1020, HUNTINGTON, UT 84528  
TELEPHONE: (801) 853-2311

July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample Identification  
by Co-op

Kind of sample reported to us COAL

Co-op  
North-west Top

Sample taken at Co-op

1 bag  
12.0 lbs.

Sample taken by Co-op

(amended results)

Date sampled

Date received May 3, 1989

Sample: CS-1T

Analysis report no. 59-100973

## SOIL ANALYSIS

pH	7.5 units	
Electrical conductivity	1200 umhos/cm	(1.2 mmhos/cm)
Saturation percent	46.4	
Soluble calcium	2.32 meq/l	
Soluble magnesium	0.81 meq/l	
Soluble sodium	1.08 meq/l	
Sodium adsorption ratio	0.86	
Exchangeable sodium percent	0.01	
Total nitrogen	1.35 %	
Nitrate-nitrogen	0.28 mg/kg	
Organic carbon	75.44 %	
Boron	0.19 mg/kg	
Selenium, total available	<0.1 ppm	
Available water capacity	4.32 %	

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TELEPHONE: (801) 853-2311

July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us COAL

Sample taken at Co-op

Sample taken by Co-op

Date sampled

Date received May 3, 1989

Co-op  
North-west Top  
1 bag  
12.0 lbs.  
(amended results)

Sample: CS-1T

Analysis report no. 59-100973

## SOIL ANALYSIS

Max. acid potential 17.2 tons CaCO<sub>3</sub>/1000 tons  
Neutralization potential 13.8 tons CaCO<sub>3</sub>/1000 tons

(acid potential based on total sulfur of 0.55%; pyritic sulfur of .10% would yield an acid potential of 3.1)

Coarse fragments 97.7 %

### Particle size analysis:

Sand 90.4 %  
Silt 3.6 %  
Clay 6.0 %

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TELEPHONE: (801) 653-2311

July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us COAL

Sample taken at Co-op

Sample taken by Co-op

Date sampled -----

Date received May 3, 1989

Co-op  
North-west Middle  
1 bag  
13.75 lbs.  
(amended results)

Sample: CS-1M

Analysis report no. 59-100974

## SOIL ANALYSIS

pH	7.6 units	
Electrical conductivity	900 umhos/cm	(0.9 mmhos/cm)
Saturation percent	48.9	
Soluble calcium	1.90 meq/l	
Soluble magnesium	0.97 meq/l	
Soluble sodium	1.10 meq/l	
Sodium adsorption ratio	0.92	
Exchangeable sodium percent	0.09	
Total nitrogen	1.26 %	
Nitrate-nitrogen	0.24 mg/kg	
Organic carbon	72.58 %	
Boron	0.11 mg/kg	
Selenium, total available	<0.1 ppm	
Available water capacity	4.7 %	

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July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North-west Middle
Sample taken by	Co-op	1 bag
Date sampled	-----	13.75 lbs.
Date received	May 3, 1989	(amended results)

Sample: CS-1M

Analysis report no. 59-100974

## SOIL ANALYSIS

pH	7.6 units	
Electrical conductivity	900 umhos/cm	(0.9 mmhos/cm)
Saturation percent	48.9	
Soluble calcium	1.90 meq/l	
Soluble magnesium	0.97 meq/l	
Soluble sodium	1.10 meq/l	
Sodium adsorption ratio	0.92	
Exchangeable sodium percent	0.09	
Total nitrogen	1.26 %	
Nitrate-nitrogen	0.24 mg/kg	
Organic carbon	72.58 %	
Boron	0.11 mg/kg	
Selenium, total available	<0.1 ppm	
Available water capacity	4.7 %	

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TELEPHONE: (801) 853-2311

July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North-west Middle
Sample taken by	Co-op	1 bag
Date sampled		13.75 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-1M

Analysis report no. 59-100974

## SOIL ANALYSIS

Max. acid potential	22.2 tons CaCO <sub>3</sub> /1000 tons
Neutralization potential	13.8 tons CaCO <sub>3</sub> /1000 tons

(acid potential based on total sulfur of 0.71; pyritic sulfur of .21 would yield an acid potential of 6.6)

Coarse fragments 94.5 %

### Particle size analysis:

Sand	89.5 %
Silt	8.5 %
Clay	2.0 %

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TELEPHONE: (801) 853-2311

July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us COAL  
Sample taken at Co-op  
Sample taken by Co-op  
Date sampled -----  
Date received May 3, 1989

Co-op  
North-west Bottom  
1 bag  
15.25 lbs.  
(amended results)

Sample: CS-1B

Analysis report no. 59-100975

## SOIL ANALYSIS

pH	7.4 units	
Electrical conductivity	2600 umhos/cm	(2.6 mmhos/cm)
Saturation percent	48.3	
Soluble calcium	9.54 meq/l	
Soluble magnesium	3.20 meq/l	
Soluble sodium	1.08 meq/l	
Sodium adsorption ratio	0.43	
Exchangeable sodium percent	<0.01	
Total nitrogen	1.23 %	
Nitrate-nitrogen	0.16 mg/kg	
Organic carbon	67.73 %	
Boron	0.18 mg/kg	
Selenium, total available	<0.1 ppm	
Available water capacity	5.49 %	

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Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*W U*  
Manager, Huntington Laboratory

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For Your Protection

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,  
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES



# COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1918 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:  
P.O. BOX 1020, HUNTINGTON, UT 84528  
TELEPHONE: (801) 653-2311

July 31, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North-west Bottom
Sample taken by	Co-op	1 bag
Date sampled		15.25 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-1B

Analysis report no. 59-100975

## SOIL ANALYSIS

Max. acid potential	23.1 tons CaCO <sub>3</sub> /1000 tons
Neutralization potential	30.0 tons CaCO <sub>3</sub> /1000 tons

(acid potential based on total sulfur of .74%; pyritic sulfur of .23% would yield an acid potential of 7.2)

Coarse fragments 77.4 %

### Particle size analysis:

Sand	91.3 %
Silt	2.7 %
Clay	6.0 %

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PLEASE ADDRESS ALL CORRESPONDENCE TO:  
P.O. BOX 1020, HUNTINGTON, UT 84528  
TELEPHONE: (801) 853-2311

July 26, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample Identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North Top
Sample taken by	Co-op	1 bag
Date sampled		16.0 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-2T

Analysis report no. 59-100970

## SOIL ANALYSIS

pH	8.0 units
Electrical conductivity	600 umhos/cm (0.6 mmhos/cm)
Saturation percent	48.0
Soluble calcium	0.65 meq/l
Soluble magnesium	0.61 meq/l
Soluble sodium	1.70 meq/l
Sodium adsorption ratio	2.14
Exchangeable sodium percent	1.86
Total nitrogen	1.42 %
Nitrate-nitrogen	0.17 mg/kg
Organic carbon	73.57 %
Boron	0.07 mg/kg
Selenium, total available	<0.1 ppm
Available water capacity	4.65 %

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TELEPHONE: (801) 653-2311

July 26, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North Top
Sample taken by	Co-op	1 bag
Date sampled		16.0 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-2T

Analysis report no. 59-100970

## SOIL ANALYSIS

Max. acid potential 19.1 tons CaCO<sub>3</sub>/1000 tons  
Neutralization potential 5.0 tons CaCO<sub>3</sub>/1000 tons

(Acid potential based on total sulfur of 0.61% - pyritic sulfur would yield an acid potential of 2.2)

Coarse fragments 98.4 %

### Particle size analysis:

Sand	97.1 %
Silt	1.9 %
Clay	1.0 %

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P.O. BOX 1020, HUNTINGTON, UT 84528  
TELEPHONE: (801) 853-2311

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

July 26, 1989

Sample Identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North Middle
Sample taken by	Co-op	1 bag
Date sampled		12.5 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-2M

Analysis report no. 59-100971

## SOIL ANALYSIS

pH	7.8 units
Electrical conductivity	580 umhos/cm (0.58 mmhos/cm)
Saturation percent	47.8
Soluble calcium	0.60 meq/l
Soluble magnesium	0.36 meq/l
Soluble sodium	0.72 meq/l
Sodium adsorption ratio	1.04
Exchangeable sodium percent	0.26
Total nitrogen	1.36 %
Nitrate-nitrogen	0.06 mg/kg
Organic carbon	71.88 %
Boron	0.11 mg/kg
Selenium, total available	<0.1 ppm
Available water capacity	4.67 %

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO. INCORPORATED

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Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:  
P.O. BOX 1020, HUNTINGTON, UT 84528  
TELEPHONE: (801) 853-2311

July 26, 1989

CO-OP MINE  
P.O. Box 300  
Huntington, UT 84528

Sample identification  
by Co-op

Kind of sample reported to us	COAL	Co-op
Sample taken at	Co-op	North Middle
Sample taken by	Co-op	1 bag
Date sampled		12.5 lbs.
Date received	May 3, 1989	(amended results)
		Sample: CS-2M

Analysis report no. 59-100971

## SOIL ANALYSIS

Max. acid potential	20.6 tons CaCO <sub>3</sub> /1000 tons
Neutralization potential	11.2 tons CaCO <sub>3</sub> /1000 tons

(acid potential based on total sulfur of 0.66%; pyritic sulfur of .11% would yield an acid potential of 3.4)

Coarse fragments 94.1 %

### Particle size analysis:

Sand	90.4 %
Silt	7.6 %
Clay	2.0 %

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

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TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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InterMountain Laboratories, Inc.

Farmingington, New Mexico 87401

Tel. (505) 326-4737

2506 West Main Street

CO-OP MINING COMPANY  
HUNNINGTON, UTAH  
MINE: BEAR CANYON MINE

June 8, 1988

Lab No.	Location	Depth	pH	EC mhos/cm @ 25°C	Satur- ation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Sand %	Silt %	Clay %	Texture
2231	COAL SAMPLE	0.0-0.0	7.5	1.03	63.8	4.94	3.36	1.15	0.55	94.5	3.7	1.8	SAND
2232	ROCK ROCK	0.0-0.0	8.0	0.84	25.1	2.80	3.67	1.95	2.88	90.4	9.4	0.2	SAND
2233	FLOOR ROCK	0.2-0.0	7.8	0.72	24.5	3.44	2.28	1.24	0.73	84.5	14.0	1.5	LOAMY SAND

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Abbreviations: SAR= Sodium Adsorption Ratio; CEC= Cation Exchange Capacity; EEP= Exchangeable Sodium Percentage; Exch= Exchangeable; Avail= Available



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Farmington, New Mexico 87401

Tel. (505) 326-4737

2506 West Main Street

CO-OP MINING COMPANY  
FARMINGTON, UTAH  
MINER BEAR CANYON MINE

June 2, 1989

Lab No.	Location	Deaths	Carbonate %	Total Sulfur %	I.S. All (1/1000)	Neut. Val. (1/1000)	I.S. eqv (1/1000)	Pyritic Sulfur %	Organic Sulfur %	Nitrate-Nitrogen ppm	Baron ppm	Selenius ppm
2232	ROOF ROCK	0.3-0.0	1.2	0.90	25.0	11.7	-13.3	0.01	0.80	1.42	0.31	0.06
2233	FLOOR ROCK	0.0-0.0	< 0.1	0.04	1.25	504	503	0.01	0.04	1.51	0.44	0.02
		0.0-0.0	0.5	0.16	5.00	8.41	3.4	0.07	0.89	1.37	0.31	0.02

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Abbreviations used: acid base accounting; T.S. = Total Sulfur; AB = Acid Base; AEF = Acid Base Potential; PyrS = Pyritic Sulfur; PyrOrg = Pyritic Sulfur + Organic Sulfur; Neut. Pot. = Neutralization Potential



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Farmington, New Mexico 87401

Tel. (505) 326-4737

2508 West Main Street

CO-OP MINING COMPANY  
HENNINGTON, UTAH  
MINE: BEAR CANYON MINE

June 5, 1968

Lab No.	Description	Depth	Avail Na meq/100g	Exch Na meq/100g	Total Kjeldahl Nitrogen %	pH	Acidity 1/100g	1/3 bar	1 bar	15 bar	Organic Carbon (%)
Z231	COAL SAMPLE	0.0-3.0	78.0	77.9	0.78	-0.01	13.4	8.9	Coal	7.67	
Z232	ROOF ROCK	0.0-0.0	87.0	87.0	0.07	-0.01	4.9	3.5		6.44	
Z233	FLOOR ROCK	0.0-0.0	59.0	59.0	0.05	2.19	7.2	6.2			

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Miscellaneous Abbreviations: SMF= Sodium Adsorption Ratio; EC= Cation Exchange Capacity; ECE= Exchangeable Cation Percentage; Exchs= Exchangeable; Avail= Available

## MATERIAL PROPERTIES

Rock mass, or the overburden at Bear Canyon Mine site consists predominantly of sandstone with intermittent layers of shale and siltstone. Material properties obtained from laboratory tests on cores obtained from holes (East-B, 3-West, and North-Main) drilled into the mine roof are given in Table 1. These material properties are well within the range of properties typically obtained and reported for the corresponding general class of rocks.

Table 1: Mechanical Properties from Core Testing.

Rock Type	Compressive Strength (psi)	Young's Modulus (psi)	Poisson's Ratio
Coal	2,000 to 3,000	$4 \times 10^5$ to $4.5 \times 10^5$	.3 to .4
Shale	15,000 to 17,000	$3 \times 10^6$ to $4 \times 10^6$	.2 to .4
Sandstone	7,000 to 12,000	$3 \times 10^6$ to $4 \times 10^6$	.3 to .4

It is well established that, for realistic analysis of stresses and deformations in coal mines, rock mass, coal, and the gob material properties must be properly adjusted to account for the non-linear behavior caused by phenomena such as weakening due to immediate roof caving, pillar yielding, and gob compaction (Kripakov et al., 1988).

Based on a composite stratigraphy, compressive strength of individual layers given above, drill core quality, and water infusion; the overall rock mass was assigned a Rock Mass Rating (RMR) of 52 corresponding to the classification "Fair" (Bieniawski; 1974). Table 2 shows the geomechanics classification of rock mass based on RMR. A visual inspection of the mine suggests that the rock mass quality in general is good and the classification as fair may be treated on the conservative side.

Table 2: Geomechanics Classification of Rock Masses.

Class	Description of Rock Mass	RMR - Cumulative Rating Increments
I	Very good rock	81-100
II	Good rock	61-80
III	Fair rock	41-60
IV	Poor rock	21-40
V	Very poor rock	0-20

Reference: Sinha, Krishna P., Ph.D., TerraTek, Inc., Mathematical Simulations to Evaluate Mining and Roof Control Plan at the Bear Canyon Mine, TR93-09, August, 1992.

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2506 West Main Street

Farmington, New Mexico 87401

Tel. (505) 326-4737

CO-OP MINING CO.  
Huntington, Utah

DATE SAMPLED: September 7, 1995  
DATE REPORTED: October 17, 1995

LOCATION: Bear Canyon #2 Mine

Lab No.	Location	Depths	pH	EC mhos/cm @ 25°C	Satur- ation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
42314	RFM 4:Roof		7.5	1.10	25.0	5.40	4.49	1.26	0.57	66.4	73.8	20.0	6.2	SANDY LOAM
42315	RFM 4:Coal		7.3	1.60	74.2	13.4	4.14	0.96	0.32	79.8	81.2	16.3	2.5	LOAMY SAND
42316	RFM 4:Floor		7.8	0.97	27.2	5.01	4.28	0.87	0.40	78.9	46.2	38.8	15.0	LOAM

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Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available



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2506 West Main Street

Farmington, New Mexico 87401

Tel. (505) 326-4737

CO-OP MINING CO.  
Huntington, Utah

DATE SAMPLED: September 7, 1995  
DATE REPORTED: October 17, 1995

LOCATION: Bear Canyon #2 Mine

Lab No.	Location	Depths	Organic Matter %	Total Sulfur %	I.S. AB t/1000t	Neut. Pot. t/1000t	I.S. ABP t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyrS AB t/1000t	PyrS ABP t/1000t
42314	RFM 4:Roof		11.6	0.02	0.70	423.	422.	<0.01	0.03	0.03	0.98	422.
42315	RFM 4:Coal		24.6	0.72	22.4	9.03	-13.3	0.03	0.11	0.58	3.50	5.53
42316	RFM 4:Floor		23.1	0.05	1.56	363.	362.	<0.01	0.10	0.06	3.21	360.

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Abbreviations used in acid base accounting: I.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

JB



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Farmington, New Mexico 87401

Tel. (505) 326-4737

CO-OP MINING CO.  
Huntington, Utah

DATE SAMPLED: September 7, 1995  
DATE REPORTED: October 17, 1995

LOCATION: Bear Canyon #2 Mine

Lab No.	Location	Depths	Nitrate-Nitrogen ppm	Boron ppm	Bulk Density	Total Kjeldahl Nitrogen %	1/3 bar	15 bar	H2O Sol Selenium ppm
42314	RFM 4:Roof		<0.01	0.04		0.03	11.1	1.5	<0.02
42315	RFM 4:Coal		<0.01	0.13		1.31	11.5	6.2	<0.02
42316	RFM 4:Floor		<0.01	0.12		0.13	9.2	3.2	<0.02

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Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

Client Project ID: Bear Canyon Mine  
 Date Received: 09/30/02

Soil Analysis Report  
 C.W. Mining Company  
 Bear Canyon Mine  
 P.O. Box 1245  
 Huntington, UT 84528

Set #0103SS00365  
 Report Date: 01/14/03

1633 Terra Avenue  
 Sheridan, WY 82801

Page 1 of 3

307 672 6053

Lab Id	Sample Id	pH		Saturation %	EC @ 25°C		Calcium meq/L	Magnesium meq/L	Sodium meq/L	Potassium meq/L	SAR
		s.u.			mhos/cm						
0103SS00365	RPM-1 Floor	8.3		28.6	1.64	3.36	10.4	4.01	0.57	1.53	
0103SS00366	RPM-1 Coal	3.7		73.1	1.27	1.47	3.67	4.81	0.31	3.00	
0103SS00367	RPM-1 Ceiling	8.2		27.4	2.38	4.55	17.8	6.29	0.89	1.88	
0103SS00368	Sed Pond A	8.3		39.0	3.15	14.9	14.9	6.71	0.52	1.74	

These results only apply to the samples tested.

Abbreviations for endocards: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate  
 Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential  
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Streeley, Soils Lab Supervisor

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Client Project ID: Bear Canyon Mine  
Date Received: 09/30/02

Soil Analysis Report  
C.W. Mining Company  
Bear Canyon Mine  
P.O. Box 1245  
Huntington, UT 84528

1633 Terra Avenue  
Sheridan, WY 82801

Page 2 of 3

Set #0103S00365  
Report Date: 01/14/03

Lab Id	Sample Id	Very Fine					CO3	Organic		Alkalinity
		Sand %	Sand %	Silt %	Clay %	Texture		Matter %	PE meq/L	
0103S00365	RFM-1 Floor	18.9	74.0	18.0	8.0	SANDY LOAM	45.8	0.2	2.20	
0103S00366	RFM-1 Coal	<0.1	92.0	6.0	2.0	SAND	<0.5	32.3	8.56	
0103S00367	RFM-1 Ceiling	8.0	54.0	32.0	14.0	SANDY LOAM	66.9	0.2	1.40	
0103S00368	Sed Pond A	19.2	76.0	14.0	10.0	SANDY LOAM	12.8	1.1	0.80	

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osof= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate  
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, Pyr-S= Pyritic Sulfur, Pyr-Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential  
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage  
Reviewed By: \_\_\_\_\_

Joey Sheeley, Soils Lab Supervisor

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Inter-Mountain Laboratories, Inc.

Client Project ID: Bear Canyon Mine  
Date Received: 09/30/02

Soil Analysis Report  
C.W. Mining Company  
Bear Canyon Mine  
P.O. Box 1245  
Huntington, UT 84528

Set #0103S00365  
Report Date: 01/14/03

1633 Terra Avenue  
Shepherd, WY 82801

Page 3 of 3

01/13/03

Lab Id	Sample Id	Total		Neutral Pot.	Boron PE	Nitrogen Nitrate	Phosphorus mg/Kg	Selenium Ppm
		TOC %	Sulfur %					
0103S00365	RFM-1 Floor	0.1	<0.01	470	0.17	0.66	2.00	<0.02
0103S00366	RFM-1 Coal	18.8	0.44	-2.56	10.6	12.3	4.90	<0.02
0103S00367	RFM-1 Gritting	0.1	<0.01	691	0.52	0.92	1.70	<0.02
0103S00368	Soil Pond A	0.6	0.29	127	0.86	0.69	3.60	<0.02

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2O/Sol= water soluble AB-DTPA= Ammonium Bicarbonate-DTPA, AAQ= Acid Ammonium Oxalate  
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyS= Pyritic Sulfur, Py-Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential  
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By:

Joey Sheeley, Soils Lab Supervisor

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Div. of Oil, Gas & Mining



Inter-Mountain Laboratories, Inc  
 1573 Terra Avenue, Sheridan Wyoming 82801  
 (307) 672-8945

**Soil Analysis Report**  
**CW Mining Company**  
 P.O. Box 1245  
 Huntington, UT 84528

Report ID: S0704392001

Date: 5/17/2007  
 Work Order: S0704392

Project: C W Mining  
 Date Received: 4/25/2007

Lab ID	Sample ID	pH	Saturation %	Electrical		Organic		Alkalinity		
				Conductivity dS/m	Matter %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	PE
S0704392-001	RFM-5 Floor	8.0	30.2	4.82	4.3	24.0	19.0	16.0	3.44	1.88
S0704392-002	RFM-5 Roof	8.0	58.8	0.40	6.0	1.17	1.65	0.61	0.51	1.67
S0704392-003	RFM-5 Seam	7.8	73.1	0.38	1.8	1.52	0.72	0.77	0.73	1.36
S0704392-004	RFM-5 Floor	8.5	28.6	0.41	3.7	0.58	0.73	2.26	2.80	2.40
S0704392-005	RFM-5 Roof	7.8	31.7	0.82	8.7	2.82	2.95	1.06	0.62	3.34
S0704392-006	RFM-5 Seam	8.1	69.3	0.26	4.2	0.72	0.35	1.01	1.38	1.25

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These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAD= Acid Ammonium Oxalate  
 Abbreviations used in acid base accounting: T.S = Total Sulfur, AB= Acid Base Potential, Pyrs= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral Pot.= Neutralization Potential  
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by Karen A Secon  
 Karen Secon, Soil Lab Supervisor



Inter-Mountain Laboratories  
 1673 Terra Avenue Shendean, Wyoming 82801  
 (307) 672-8945

**Soil Analysis Report**  
 CW Mining Company  
 P.O. Box 1245  
 Huntington, UT 84528

Report ID: S0704392001

Date: 5/17/2007

Work Order: S0704392

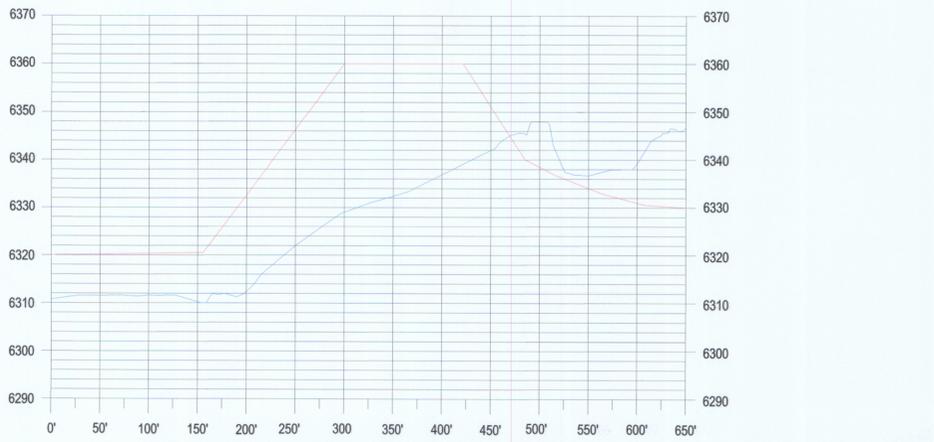
Project: C. W. Mining  
 Date Received: 4/25/2007

Lab ID	Sample ID	Sand		Silt		Clay		Texture		Nitrogen		Phosphorus ppm	CO <sub>3</sub> %
		%		%		%				ppm	%		
S0704392-001	RFM-5 Floor	56.0	28.0	16.0	Sandy Loam	1.92	1.16	33.3					
S0704392-002	RFM-5 Roof	94.0	5.0	1.0	Sand	0.12	0.57	3.7					
S0704392-003	RFM-5 Seam	46.0	27.0	27.0	Sandy Clay Loam	0.12	0.82	0.5					
S0704392-004	RFM-6 Floor	74.0	17.0	9.0	Sandy Loam	0.18	0.40	2.3					
S0704392-005	RFM-6 Roof	96.0	4.0	<0.1	Sand	0.03	1.36	24.5					
S0704392-006	RFM-6 Seam					-0.02	0.38	0.9					

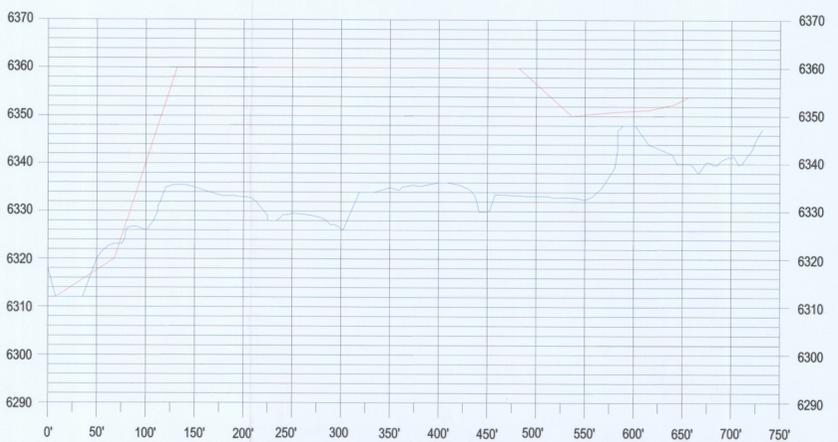
INCORPORATED  
 AUG 22 2007  
 Div. of Oil, Gas & Mining

These results apply only to the samples tested.  
 Abbreviations for extractants: PE= Saturated Paste Extract, H2O<sub>sat</sub>= water soluble-AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate  
 Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABIP= Acid Base Potential, PYS= Pyritic Sulfur, Pys+Org= Pyritic Sulfur + Organic Sulfur, Neutral, Pot = Neutralization Potential  
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

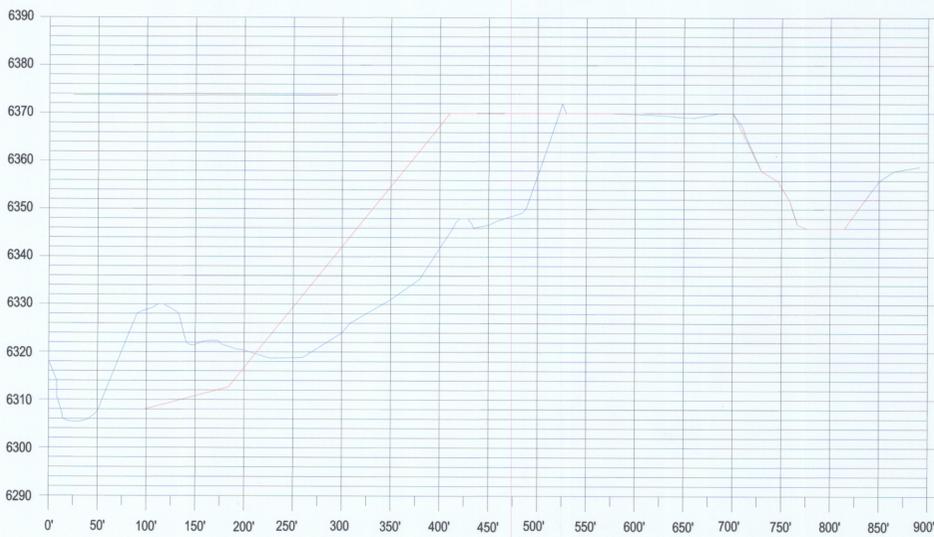
Reviewed by: Karen A. Secor  
 Karen Secor, Soil Lab Supervisor



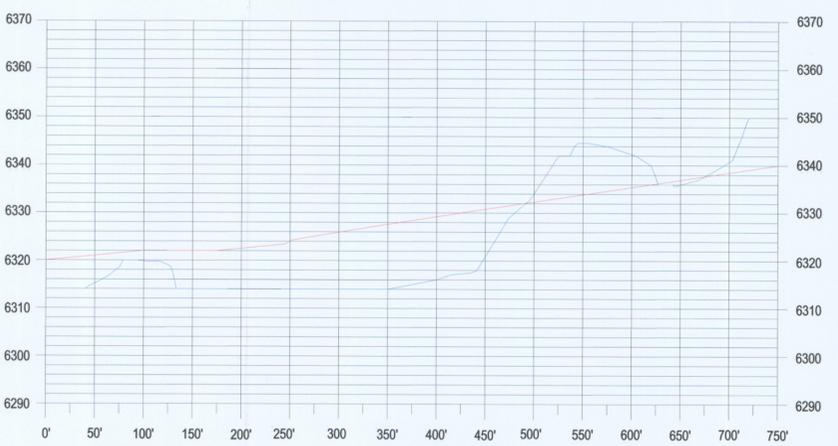
SECTION AA



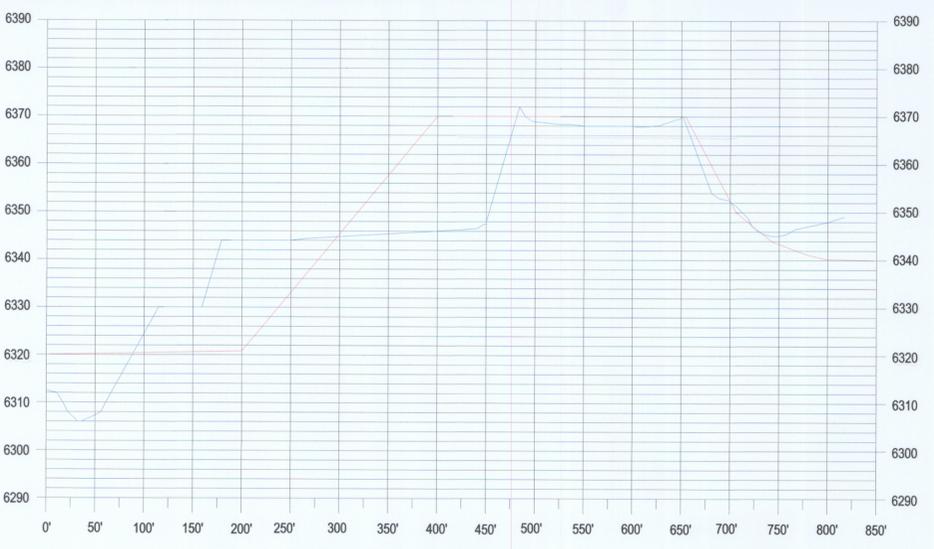
SECTION FF



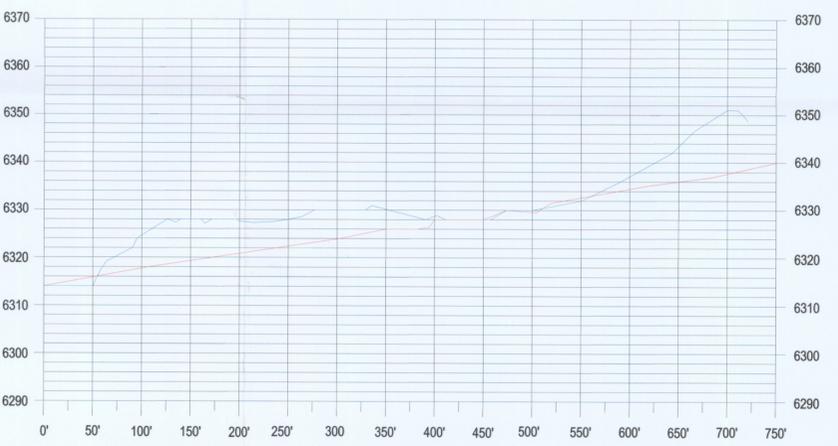
SECTION BB



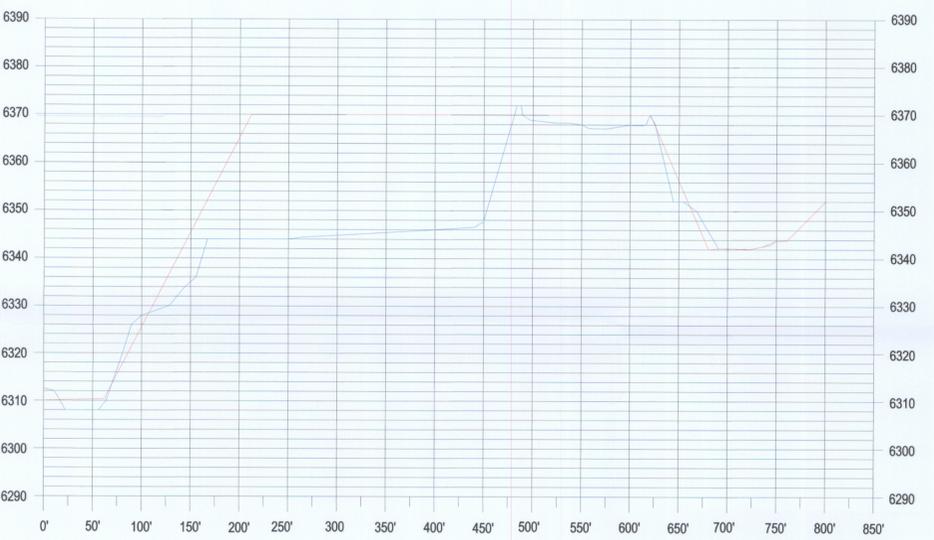
SECTION GG



SECTION CC



SECTION HH



SECTION DD



SECTION EE

LEGEND

- RECLAMATION GROUND SURFACE
- EXISTING GROUND SURFACE



	<p>Castle Valley Mining LLC  <b>WASTE ROCK STORAGE FACILITY</b>          DOGM PERMIT# C/015/0036</p>
<p>TITLE: <b>PILE RECLAMATION CROSS SECTIONS</b></p>	
<p>SCALE: N/A</p>	<p>DATE: 9-24-2018</p>
<p>DRAWN BY: J. JORGENSEN   PLATE: 5-4</p>	

