

#6043



**Sufco Mine**

John Byars  
General Manager  
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January 16, 2020

Permit Supervisor  
Utah Coal Regulatory program  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
PO Box 145801  
Salt Lake City, UT 84114-5801

**Re: Clean Copies for Phase 3,4 Construction As-built Information Amendment, Canyon Fuel Company, LLC, Sufco Mine, Sufco Waste Rock Site, Permit Number C/041/0002**

Dear Sirs,

Attached to this letter are two clean copies associated with the WRS As-Built Information Amendment (Task ID#5964) which was recently approved.

If you have questions or need additional information, please contact Bryant Bunnell at (435) 286-4490.

Regards,

A handwritten signature in blue ink, appearing to read 'Bryant Bunnell', is written over a horizontal line.

Bryant Bunnell  
Environmental Engineer

Canyon Fuel Company, LLC  
SUFSCO Mine  
P: (435) 286 - 4490  
E: [bbunnell@wolverinefuels.com](mailto:bbunnell@wolverinefuels.com)

Encl.

cc: DOGM Correspondence File

Received  
1-21-20  
SRS

## APPLICATION FOR COAL PERMIT PROCESSING

Permit Change  New Permit  Renewal  Exploration  Bond Release  Transfer

**Permittee:** Canyon Fuel Company, LLC

**Mine:** Sufco Mine, WRS

**Permit Number:** C/041/0002

**Title:** Clean Copies, WRS As-Built Amendment

**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.

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

Jack Smith  
Print Name

[Signature]  
Sign Name, Position, Date

Eng. Manager 1/15/20

Subscribed and sworn to before me this 15<sup>th</sup> day of January 2020

Notary Public

My commission Expires:

Attest: State of

County of

Jill White  
3/28, 2020  
Sevier Utah } ss:



**For Office Use Only:**

Assigned Tracking Number:

Received by Oil, Gas & Mining





**LIST OF APPENDICES**

- APPENDIX I Cultural Resource Evaluations
- APPENDIX I (A) Cultural Resource Evaluations - **Confidential**
- APPENDIX II Geotechnical/Hydrological Investigation Report Waste Rock Disposal Site
- APPENDIX II(A) Slope Stability Report Waste Rock Disposal Site
- APPENDIX III Engineering Calculations
- APPENDIX IV Vegetation of the Proposed Waste Rock Disposal Site
- APPENDIX IV(A) Vegetation Report of the Proposed Waste Rock Disposal Site
- APPENDIX V Soils Report
- APPENDIX V (A) Soils Report
- APPENDIX VI Vegetation Guidelines
- APPENDIX VII Waste Rock Pile Hydrology
- APPENDIX VIII Density Data
- APPENDIX IX Construction As-Built Information



pile is sufficient to meet reclamation standards for bond release. The Division has previously approved 30" at the waste rock site as being sufficient to cover the placed waste and promote the establishment of vegetation. Historically, portions of the waste rock pile have received the 30" of topsoil and have revegetated well. To demonstrate that the 30" is sufficient for cover and revegetation additional information pertaining to a contemporaneous reclamation project will be provided to the Division for review and approval.

**Soil Thickness:** The topsoil will be distributed to the disturbed areas illustrated on Map 8. Soil will be spread to a minimum depth of approximately 30 inches . The 30 inches will be made up of approximately 15 inches of topsoil and 15 inches of subsoil. Deeper soil cover up to 48"(15 - 24" topsoil and 24 - 33" subsoil) will be applied, if necessary, to avoid plant toxicity problems.

**Phases 1 - 6 -** It is planned that during the reclamation of Phases 1 thru 6 that approximately 30 inches of topsoil and 18 inches of subsoil (48") will be placed atop the waste rock piles. The four foot depth of placed soil could vary from 24 to 30 inches of topsoil and from 18 to 24 inches of subsoil, these amounts are dependent upon the actual quantity of soils salvaged during the construction of the site.

The remainder of the disturbed site area, not used for refuse storage will be covered with approximately 12 inches of topsoil (i.e. reclaimed roads, ditches, berms, etc. approximately 4.34 acres). The area and topsoil/subsoil cubic yards for each phase are shown on Plates 2A thru 2F.

The quantity of topsoil/subsoil placed during reclamation of will be determined by surveying the phased area prior to placement and post placement. The M&RP will be updated with as-built drawings, cross sections and a table(s) listing volumes of subsoil and topsoil stockpiles placed within 6 months of the completion of salvage for each phase.

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The soil salvaged from phase 1 and 2 in 2016 and phases 3 and 4 in 2018 are shown on page 2-27. See Appendix IX for as-built information.

The topsoil and subsoil salvaged and the quantities stockpiled will all be utilized throughout the phases for reclamation, leaving no salvaged soils at final reclamation.

Historic - The first lift was covered with topsoil from the existing adjacent stockpile.

Expansion - Subsequent lifts will be covered with topsoil/subsoil from the next lift site. Sufficient topsoil/subsoil will be placed in the long term storage stockpile to ensure minimum depth coverage of the final lift and the sediment pond area. During the construction of phases 1 and 2 salvaged soil was placed near phase 6. During the construction of phases 3 and 4 salvaged soil was placed on the phase 4 and phase 5 pads. This was done to make reclaiming cells 2 and 3 easier.

**Compaction** - To prevent compaction of topsoil, soil-moving equipment will refrain from unnecessary operation over spread soil. When possible to minimize compaction, track-mounted equipment (e.g. bulldozers, trackhoes) will be used to spread the soil.

**Erosion** - Care will be exercised to ensure the stability of soil on graded slopes to guard against erosion during and after soil application. Erosion control measures will include but not be limited to extreme surface roughening (also known as pocking and gouging).

#### **242.200      Regrading**

Since the site has been disturbed by previous activities and will be used to permanently store coal mine waste, the area will not be returned to the original geometric configuration. Prior to soil redistribution, the disturbed area will be graded to meet the proposed final reclamation topography (Map 8 ).

The surface of the refuse pile will be left in a roughened state and in addition will be ripped prior to the application of soil. After the 1<sup>st</sup> lift of subsoil is placed, the surface of the refuse pile will be ripped again to a depth of approximately 12 inches in an effort to promote root penetration and to mix the top layer of the refuse with the subsoil.

These repaired areas shall be reseeded, also by hand, with the standard seed mixture on a schedule consistent with the proposed revegetation plan.

**250 PERFORMANCE STANDARDS**

**251 Topsoil, Subsoil, and Topsoil Supplements Management**

Topsoil, subsoil, and topsoil supplements shall be managed as outlined in Sections 230 and 240.

**252 Stockpiled Topsoil and Subsoil**

Stockpiled topsoil and subsoil will be managed according to plans outlined in Sections 230 and 240.

Expansion - In the fall of 2018 construction commenced in expanding the waste rock site. Soil from phase 3 and 4 was salvaged and stockpiled. Approximately 36,510 cubic yards of topsoil was stockpiled on the phase 5 pad. Approximately 29,493 cubic yards of subsoil was stockpiled on the phase 4 pad and used to form berms. A portion of this estimate includes in situ material that the stock pile was placed on. See Appendix IX for berm locations and additional as-built information. Also see page 2-27 for more information on soil salvage.

The subsoil pile formed on the phase 4 pad is approximately two hundred feet in length, two hundred feet in width, covering approximately forty thousand square feet of the phase 4 pad. The topsoil pile formed on the phase 5 pad is approximately four hundred feet in length, two hundred feet in width, covering approximately eighty thousand square feet of the phase 5 pad. Refer to Appendix IX for more details on pile location and dimensions.

**Phase 1, 2 - Soil Salvage Summary - Post Construction (Completed 2016)**

Salvage Estimates	Phase 1, 2 - Topsoil (cy)	Phase 1, 2 - Subsoil (cy)	Total (cy)
Estimated Potential Salvage <sup>1,2,3</sup>	36,356	29,730	66,086
As-Built Salvage - Soil in Storage <sup>4</sup>	27,900	25,850	53,750

Notes:

- All quantities are approximate.
- See Section 222 and 234 for more information on soil types, soil unit designation and topsoil/subsoil salvage quantities.
- This estimate includes topsoil previously stored and re-handled, see Pre-Expansion- Historic Table MRP, Volume 3, p. 2-4.
- This estimate reflects a deduction of topsoil and subsoil placed on lift 5 (pre-expansion) in June 2016.
- See Appendix IX for As-Built information.

**Phase 3, 4 - Soil Salvage Summary - Post Construction (Completed 2018)**

Salvage Estimates	Phase 3, 4 - Topsoil (cy)	Phase 3, 4 - Subsoil (cy)	Total (cy)
Estimated Potential Salvage <sup>1,2</sup>	32,538	36,972	69,510
As-Built Salvage - Soil in Storage <sup>3</sup>	36,510	29,493 <sup>4</sup>	66,003

Notes:

- All quantities are approximate.
- See Section 222, 234 and Appendix VI(A) for more information on soil types, soil unit designation and topsoil/subsoil salvage quantities.
- This estimate includes re-handled material, see Pre-Expansion- Historic Table MRP, Volume 3, p. 2-4.
- See Appendix IX for As-Built information.
- This estimate includes soil stock piled, soil used to construct berms, and subsoil underneath the subsoil pile.

**Phase 5, 6 - Soil Salvage Summary - Pre - Construction (TBD)**

Salvage Estimates	Phase 5, 6 - Topsoil (cy)	Phase 5, 6 - Subsoil (cy)	Total (cy)
Estimated Potential Salvage <sup>1,2</sup>	33,429	28,680	62,109
As-Built Salvage - Soil in Storage	TBD	TBD	TBD

Notes:

- All quantities are approximate.
- See Section 222, 234 and Appendix VI(A) for more information on soil types, soil unit designation and topsoil/subsoil salvage quantities.
- This estimate includes re-handled material, see Pre-Expansion- Historic Table MRP, Volume 3, p. 2-4.

**General Notes:**

- See Section 242 for the acreage of each phase.

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**SUF-CO WRS Expansion Sequence - Soil Salvage Summary**

Sequence Event	Topsoil (cy)	Subsoil (cy)	Total (cy)
Ph. 1,2 Construction - Soil Salvaged (Completed 2016)	27,900	25,850	53,750
<b>Total Soil in Storage</b>	<b>27,900</b>	<b>25,850</b>	<b>53,750</b>
Ph. 3,4 Construction - Soil Salvaged (Completed 2018)	36,510	29,493	66,003
<b>(Current as of Nov. 2018) Total Soil in Storage</b>	<b>64,410</b>	<b>55,343</b>	<b>119,753</b>
Ph. 1,2 Reclamation - Soil Placed <sup>1</sup>	17,779	17,779	35,558
<b>Total Soil in Storage</b>	<b>46,631</b>	<b>37,564</b>	<b>84,195</b>
Ph. 3 Reclamation - Soil Placed	19,295	19,295	38,591
<b>Total Soil in Storage</b>	<b>27,336</b>	<b>18,269</b>	<b>45,604</b>
Ph. 5, 6 Construction - Soil Salvaged	33,429	28,680	62,109
<b>Total Soil in Storage</b>	<b>60,765</b>	<b>46,949</b>	<b>107,713</b>
Ph. 4 Reclamation - Soil Placed	15,907	15,907	31,815
<b>Total Soil in Storage</b>	<b>44,857</b>	<b>31,041</b>	<b>75,898</b>
Ph. 5 Reclamation - Soil Placed	17,489	17,489	34,977
<b>Total Soil in Storage</b>	<b>27,369</b>	<b>13,553</b>	<b>40,921</b>
Ph. 6 Reclamation - Soil Placed	8,325	8,325	16,650
<b>Total Soil in Storage</b>	<b>19,044</b>	<b>5,228</b>	<b>24,272</b>
Ph. 1 Reclamation - Soil Placed <sup>2</sup>	4,496	4,496	8,993
<b>Final Residual Storage<sup>3</sup></b>	<b>14,548</b>	<b>732</b>	<b>15,279</b>

Notes:

- All quantities are approximate.
- The portion of phase 1 that is part of the Phase 2 waste rock cell.
- The portion of phase 1 that is not covered with waste rock (e.g. large sediment pond).
- All final residual stored soils will be added to the last phase reclaimed.



Phase 3, 4 Construction  
Soil Survey and Soil Salvage Reports

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# Supplementary Soil Report

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## Sufco Mine Waste Rock Site Disposal Site Phase 3 and 4 Expansion Soil Salvage Project



*Location:*

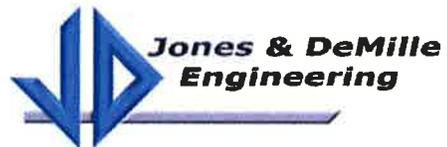
Sufco Mine Waste Rock Disposal Site

*Prepared for:*

Sufo Mine

*Prepared by:*

Jones & DeMille Engineering  
1535 South 100 West  
Richfield, Utah 84701  
(435) 896-8266



September 21, 2018

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## 1. Introduction

Jones and DeMille Engineering conducted a soil survey to supplement a survey conducted by Long Resource Consultants (LRC) in 2013 for the Sufco Mine Waste Rock Disposal Site expansion project (LRC 2013). The supplementary soil survey was conducted on August 31 and September 4, 2018. Jones and DeMille Engineering was also on-site during the majority of the topsoil salvage operation for Phase 3, and has provided estimated salvage depths based on observations.

Sufco Environmental Engineering staff have reviewed the findings of this supplementary report and concur with the findings.

## 2. Methodology

This soil survey is meant to provide supplementary soils information for the Waste Rock Disposal Site expansion project, beyond what soils information is provided by the LRC soil survey report. The LRC soil survey included several soil test pits in the general vicinity of the project area, and the LRC survey report was used as a guide and reference to extrapolate topsoil and subsoil salvage depth information based on surveys of soil pits that were excavated specifically for the Phase 3 and 4 portions of the expansion project.

## 3. Results

Test pits were excavated to an approximate depth of 6 feet by a trackhoe, or test pits were hand-excavated to a depth of approximately 15 inches (TP-4.8 and TP-4.9). Seven test pits were excavated for the Phase 3 cell, while nine test pits were excavated for the Phase 4 cell. The soil survey results are summarized as follows:

### Test Pit TP-3.1

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; leaves and twigs.

**A** – 1 to 36 cm (0.4 to 14 in.); 10YR 4/2 dry; 10YR 2/2 moist; sandy loam; soft; weak medium subangular blocky to moderate medium granular structure.

**B** – 36 to 79 cm (14 to 31 in.); 10YR 5/2 dry; 10YR 3/2 moist; sandy loam; slightly hard; moderate medium subangular blocky structure.

**C** – 79 to 128 cm (31 to 50.5 in.); 2.5Y 7/4 dry; 2.5Y 6/4 moist; sand; slightly hard; gravel and cobbles 25% by volume; moderate medium subangular blocky structure.

**R** – Castlegate sandstone at 128 cm (50.5 in.) depth

### Test Pit TP-3.2

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; leaves and twigs.

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**A** – 1 to 25 cm (0.4 to 10 in.); 10YR 4/2 dry; 10YR 3/2 moist; sandy loam; soft; weak medium subangular blocky to moderate medium granular structure.

**B** – 25 to 64 cm (10 to 25 in.); 10YR 5/2 dry; 10YR 3/2 moist; sandy loam; slightly hard; some 10-inch diameter boulders in horizon; moderate medium subangular blocky structure.

**C** – 64 to 84 cm (25 to 33 in.); 10YR 6/3 dry; 10YR 6/4 moist; sand; slightly hard; gravel and cobbles throughout horizon 50% by volume; weak to moderate medium subangular blocky structure.

**R** – Castlegate sandstone at 84 cm (33 in.) depth

### **Test Pit TP-3.3**

**A** – 0 to 34 cm (0 to 13.5 in.); 10YR 6/3 dry; 10YR 4/3 moist; sandy loam; soft; weak medium subangular blocky to moderate medium granular structure.

**AB** – 34 to 72 cm (13.5 to 28.5 in.); 10YR 5/2 dry; 10YR 4/2 moist; sandy loam; slightly hard. Narrow band (2 inches) of increased clay content, but is not representative of the horizon as a whole; weak to moderate medium subangular blocky structure.

**Bt** – 72 to 168 cm (28.5 to 66 in.); 10YR 4/2 dry; 10YR 3/2 moist; silty clay loam; slightly hard; white streaking throughout horizon, likely carbonate leaching; moderate medium subangular blocky structure.

**Restrictive Layer:** None

### **Test Pit TP-3.4**

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; Leaves and Twigs.

**A** – 1 to 46 cm (0.4 to 18 in.); 10YR 4/2 dry; 10YR 2/2 moist; sandy loam; soft; weak medium subangular blocky to moderate medium granular structure.

**B** – 46 to 74 cm (18 to 29 in.); 10YR 4/2 dry; 10YR 2/2 moist; sandy loam; slightly hard; occasional sandstone boulder in horizon, but no other rock; moderate medium subangular blocky structure.

**C** – 74 to 100 cm (29 to 39.5 in.); 10YR 6/4 dry; 10YR 5/4 moist; sandy clay loam; very hard; few rocks scattered throughout horizon; strong medium subangular blocky structure.

**R** – Castlegate sandstone at 100 cm (39.5 in.) depth

### **Test Pit TP-3.5**

**A** – 0 to 48 cm (0 to 19 in.); 10YR 5/2 dry; 10YR 3/2 moist; silty clay loam; slightly hard; weak medium subangular blocky to moderate medium granular structure.

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**AB** – 48 to 99 cm (19 to 39 in.); 10YR 4/2 dry; 10YR 2/2 moist; silt loam; moderately hard; white streaking throughout, likely carbonate leaching; weak to moderate medium subangular blocky structure.

**Bt** – 99 to 168 cm (39 to 66 in.); 10YR 4/2 dry; 10YR 3/2 moist; clay loam; slightly hard; white streaking throughout, likely carbonate leaching; moderate medium subangular blocky structure.

**Restrictive Layer:** None

#### **Test Pit TP-3.6**

**A1** – 0 to 34 cm (0 to 13.5 in.); 2.5Y 7/3 dry; 2.5Y 6/3 moist; silt loam; very hard; moderate medium platy structure (30% by volume), strong medium subangular blocky structure (70% by volume).

**A2** – 34 to 77 cm (13.5 to 30.5 in.); 10YR 5/3 dry; 10YR 3/3 moist; sandy loam; soft; weak medium subangular blocky to moderate medium granular structure.

**Bt** – 77 to 168 cm (30.5 to 66 in.); 10YR 4/2 dry; 10YR 3/2 moist; clay loam; slightly hard; moderate medium subangular blocky structure.

**Restrictive Layer:** None

#### **Test Pit TP-3.7**

**A1** – 0 to 33 cm (0 to 13 in.); 2.5Y 6/2 dry; 2.5Y 5/2 moist; clay; very hard; moderate medium platy structure.

**A2** – 33 to 66 cm (13 to 26 in.) 10YR 5/3 dry; 10YR 4/3 moist; sandy loam; hard; moderate medium subangular blocky structure.

**B** – 66 to 168 cm (26 to 66 in.): 10YR 4/2 dry; 10YR 2/2 moist; silt loam; slightly hard; moderate medium subangular blocky structure.

**Restrictive Layer:** None

#### **Test Pit TP-4.1**

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; Leaves and Twigs.

**A** – 1 to 36 cm (0.4 to 14 in.); 10YR 5/2 dry; 10YR 3/2 moist; sandy loam; soft; weak medium granular structure.

**B** – 36 to 86 cm (14 to 34 in.) 10YR 5/2 dry; 10YR 3/2 moist; sandy loam; slightly hard; moderate medium subangular blocky structure.

**C** – 86 to 127 cm (34 to 50 in.): 10YR 6/3 dry and 10YR 5/4 moist (50%); 10YR 6/6 dry and 10YR 5/6 moist (50%); loamy sand; slightly hard; weak medium granular structure; gravel and cobbles throughout, with some sandstone boulders.

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**Restrictive Layer:** gravel and cobbles in C Horizon.

**Test Pit TP-4.2**

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; Leaves and Twigs.

**A** – 1 to 28 cm (0.4 to 11 in.); 10YR 5/2 dry; 10YR 2/2 moist; sandy loam; soft; weak medium subangular blocky to weak medium granular structure.

**B** – 28 to 79 cm (11 to 31 in.) 10YR 6/3 dry; 10YR 4/3 moist; loamy sand; moderately hard; moderate medium subangular blocky structure.

**C** – 79 to 142 cm (31 to 56 in.): 10YR 7/2 dry; 10YR 5/3 moist; sandy loam; soft; moderate medium granular structure.

**Restrictive Layer:** Some rock in C Horizon.

**Test Pit TP-4.3**

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; Leaves and Twigs.

**A** – 1 to 39 cm (0.4 to 15.5 in.); 10YR 3/2 dry; 10YR 2/2 moist; sandy loam; soft; weak medium granular structure.

**B** – 39 to 90 cm (15.5 to 35.5 in.) 10YR 5/2 dry; 10YR 3/2 moist; sandy loam; moderately hard; moderate medium subangular blocky structure.

**B** – 90 to 152 cm (35.5 to 60 in.): 10YR 5/3 dry; 10YR 4/4 moist; sandy loam; slightly hard; weak fine subangular blocky structure.

**Restrictive Layer:** Some cobbles and gravel at approximately 50 inches depth.

**Test Pit TP-4.4**

**A** – 0 to 38 cm (0 to 15 in.); 10YR 5/2 dry; 10YR 4/2 moist; silt loam; soft to slightly hard; moderate medium granular to weak medium subangular blocky structure.

**AB** – 38 to 75 cm (15 to 29.5 in.) 10YR 5/3 dry; 10YR 4/2 moist; sandy loam; slightly hard; weak to moderate medium subangular blocky structure.

**B** – 75 to 168 cm (29.5 to 66 in.): 10YR 4/2 dry; 10YR 3/2 moist; sandy clay loam; soft to slightly hard; weak medium subangular blocky structure; white streaking throughout horizon, likely carbonate leaching.

**Restrictive Layer:** None

**Test Pit TP-4.5**

**O** – 0 to 1 cm (0 to 0.4 in.); 10YR dry; 10YR moist; Leaves and Twigs.

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**A1** – 1 to 23 cm (0.4 to 9 in.); 10YR 5/2 dry; 10YR 3/2 moist; silty clay loam; moderately hard; moderate medium subangular blocky to moderate medium granular structure.

**Bt** – 23 to 168 cm (9 to 66 in.): 10YR 4/2 dry; 10YR 2/2 moist; silty clay loam; moderately hard; moderate medium subangular blocky structure; 6% clay film on all faces of peds.

**Restrictive Layer:** None

**Test Pit TP-4.6**

**A1** – 0 to 23 cm (0 to 9 in.); 10YR 5/2 dry; 10YR 4/2 moist; clay; very hard; moderate medium platy structure.

**A2** – 23 to 53 cm (9 to 21 in.)

**Sandy loam (50%):** 10YR 6/3 dry; 10YR 5/3 moist; moderately hard; moderate medium subangular blocky structure.

**Sandy clay loam (50%):** 10YR 6/2 dry; 10YR 4/2 moist; moderately hard; moderate medium subangular blocky structure.

**B** – 53 to 168 cm (21 to 66 in.): 10YR 4/2 dry; 10YR 3/2 moist; silty clay loam; moderately hard; weak medium subangular blocky structure.

**Restrictive Layer:** None

**Test Pit TP-4.7**

**A** – 0 to 18 cm (0 to 7 in.); 10YR 6/2 dry; 10YR 4/2 moist; clay; very hard; moderate medium platy structure.

**Bt** – 18 to 74 cm (7 to 29 in.) 10YR 5/2 dry; 10YR 3/2 moist; silty clay loam; moderately hard; strong medium subangular blocky structure; 12% clay film on all faces of peds.

**B** – 74 to 168 cm (29 to 66 in.): 10YR 5/2 dry; 10YR 3/2 moist; silty clay loam; moderately hard; strong medium subangular blocky structure.

**Restrictive Layer:** None

**Test Pit TP-4.8**

Hand-excavated pit revealed approximately 11.5 inches of topsoil associated with this location.

**Test Pit TP-4.9**

Hand-excavated pit revealed approximately 14.5 inches of topsoil associated with this location.

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#### 4. Conclusion

Topsoil and subsoil salvage depths were produced by evaluating the LRC soil survey report findings in-conjunction with information gathered from surveying new soil test pits for Phases 3 and 4. Sufco Environmental Engineering staff have reviewed and accepted the recommended soil salvage depths in the table below:

**Table 4-1. Estimated Soil Salvage Depths**

Test Pit #	Topsoil Depth (inches)	Subsoil Depth (inches)	Subsoil Depth Restrictions
TP-3.1	14	17	Rock and sandstone
TP-3.2	10	15	Rock and sandstone
TP-3.3	28.5	50*	None
TP-3.4	18	29	Hard clay/rock and sandstone
TP-3.5	39	50*	None
TP-3.6	30.5	50*	None
TP-3.7	26	50*	None
TP-4.1	14	20	Rock and sandstone
TP-4.2	11	20	Rock and sandstone
TP-4.3	15.5	35	Rock
TP-4.4	29.5	50*	None
TP-4.5	10	50*	None
TP-4.6	21	50*	None
TP-4.7	7	50*	None
TP-4.8	11.5	50**	None
TP-4.9	14.5	50**	None

\*Estimate based on lack of restrictive layers, but limiting depth based on LRC report for nearby 13SF03 and 13SF05, which decreased in AWC in subsoil and decreased in soil OM near this depth.

\*\*Pit was hand-excavated to determine depth of topsoil only. Estimating 50 inches of available subsoil based on characteristics of adjacently located test pits.

#### Phase 3 Topsoil Depth Verification

Approximate topsoil depths were monitored during the majority of topsoil salvage for Phase 3, and are represented on the map in Figure 18. Generally, topsoil depth estimations derived from soil pit data were relatively representative of observed topsoil depths of Phase 3 as a whole.

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## 5. References

Long Resource Consultants. 2014. Proposed Expansion of the Existing Waste Rock Area at the Sufco Mine, Located East of Salina, Utah. January 26, 2014.

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**Appendix A. Figures and Photos**

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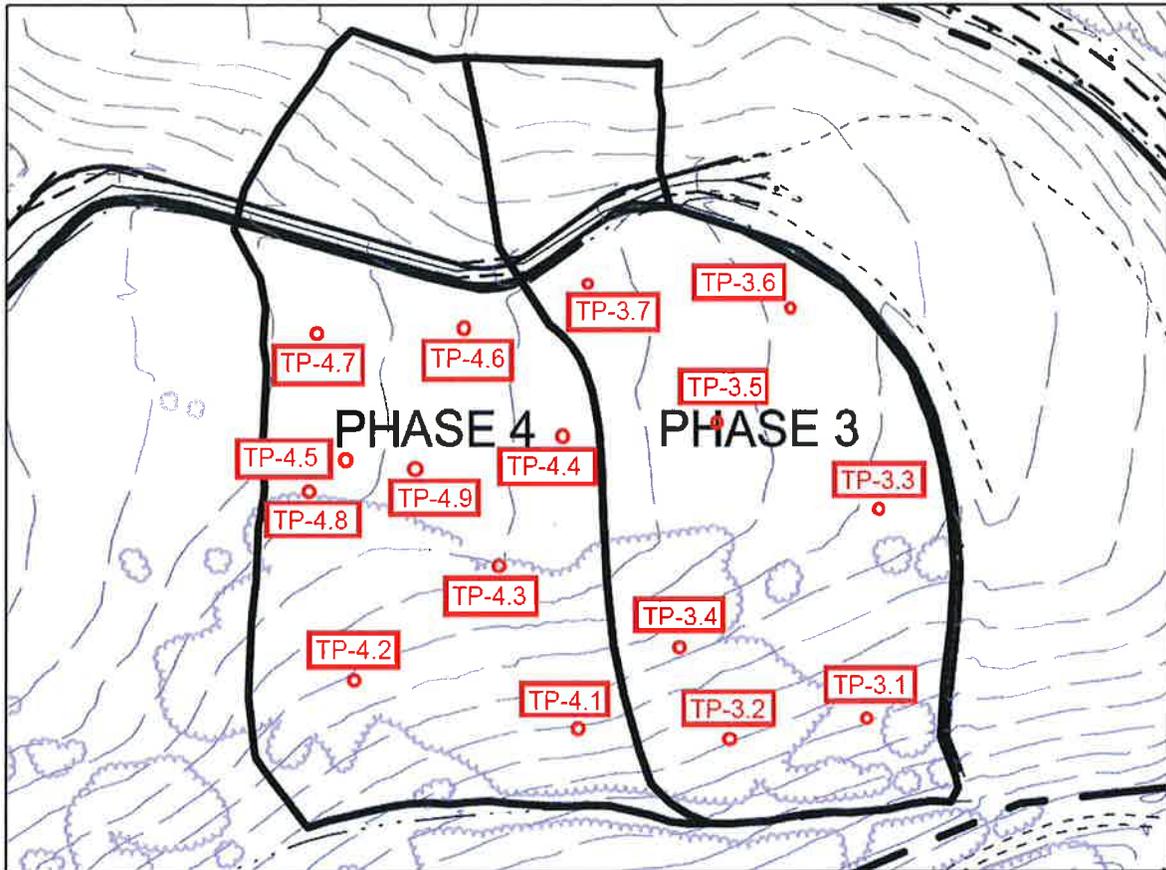


Figure 1. Approximate soil test pit locations in relation to the expansion phase boundaries.

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**Figure 2.** Test Pit TP-3.1.

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**Figure 3.** Test Pit TP-3.2.

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Figure 4. Test Pit TP-3.3.

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Figure 5. Test Pit TP-3.4

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**Figure 6.** Test Pit TP-3.5.

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Figure 7. Test Pit TP-3.6.

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**Figure 8.** Test Pit TP-3.7.

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**Figure 9.** Test Pit TP-4.1.

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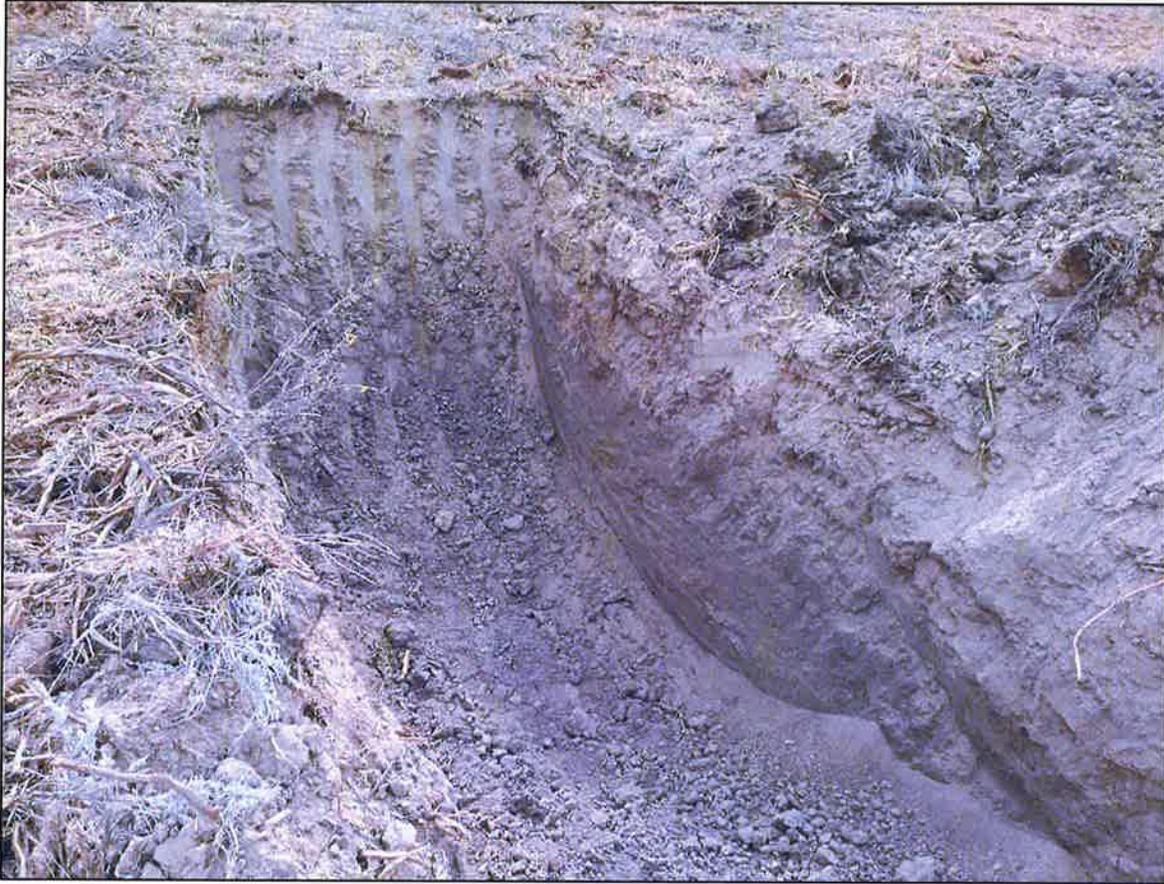
**Figure 10.** Test Pit TP-4.2

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**Figure 11.** Test Pit TP-4.3.

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**Figure 12.** Test Pit TP-4.4.

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**Figure 13.** Test Pit TP-4.5.

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**Figure 14.** Test Pit TP-4.6.

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**Figure 15.** Test Pit TP-4.7.

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**Figure 16.** Test Pit TP-4.8.

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Figure 17. Test Pit TP-7.9.

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1675 South Highway 10  
Price, UT 84501  
435.637.8266

45 South 200 West (45-13)  
Roosevelt, UT 84066  
435.722.8267

775 West 1200 North  
Suite 200A  
Springville, UT 84663  
801.692.0219

435 East Tabernacle, Suite 302  
St. George, UT 84770  
435.986.3622

16 East 300 South  
PO Box 577  
Monticello, UT 84535  
1.800.748.5275

38 West 100 North  
Vernal, UT 84078  
435.781.1988

# MEMORANDUM

**DATE:** October 26, 2018  
**TO:** Bryant Bunnell – Project Manager/Environmental Engineer  
**FROM:** Wyatt Shakespear  
**PROJECT:** Sufco Mine Waste Rock Site Soil Salvage Project 2018  
**PROJECT NO:** 1808-154  
**RE:** Soil Salvage Progress as of 8-24-2018

## Introduction

Jones and DeMille Engineering (JDE) conducted a soil survey to supplement a survey conducted by Long Resource Consultants (LRC) in 2013 for the Sufco Mine Waste Rock Disposal Site expansion project. The supplementary soil survey was conducted on August 31 and September 4, 2018. JDE conducted a site visit near the end of the soil salvage operation on October 24, 2018 in order to verify that all topsoil had been removed from areas consisting of Phases 3 and 4.

Sufco Environmental Engineering staff were present during the site visit, and concur with the findings of the site visit. The methods and results of the site visit are detailed in this memo.

## Methods

JDE conducted a site visit of the soil salvage operation on October 24, 2018 in order to verify that all topsoil had been removed from areas consisting of Phases 3 and 4. Verification consisted of walking portions of the salvaged areas, excavating test pits with a shovel, and comparing soil characteristics to those found in LRC 2013 soil report and the JDE 2018 report.

Special attention was given to areas associated with the north facing slope on the southern boundary of Phases 3 and 4; these steep areas present challenges for equipment operators in salvaging all topsoil, and portions of the slope had suspect dark soils on the surface that appeared to either be an A or B horizon. Suspect soils were evaluated and determined to be either topsoil or subsoil.

## Results and Conclusion

Overall, the salvage operation appears to have gone well. The vast majority of topsoil has been removed and stockpiled. The only previously salvaged areas that have residual topsoil were associated with the very southern edge of Phases 3 and 4, located on the steep north facing slope just below the undisturbed ditch. This topsoil identification determination was confirmed by excavating a test pit in an adjacent undisturbed area located south of the undisturbed ditch. Mr. Bryant Bunnell with Sufco Mine indicated that the contractor would salvage the residual topsoil and stockpile it appropriately.

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Throughout the slope on the southern end of Phases 3 and 4, exposed soil consisted of either a yellow sand or loamy sand, or a somewhat dark and grey sandy loam or loamy sand. An evaluation of soil characteristics on the slope determined that the yellow sand or loamy sand was the C horizon, and the darker sandy loam or loamy sand was the B horizon. The darkness of the B horizon was made more noticeable than it would be otherwise because of the abundant soil moisture resulting from recent precipitation events. The apparent variation of soil color and distribution is a result of inconsistencies in the subsoil horizon depths below the topsoil, and portions of the yellow C horizon protruding into the darker B horizon.

Very little subsoil was salvaged from this area as the subsoil on the hill slope is generally quite rocky and would yield poor available water capacity for reclamation purposes.

Photos of the site visit are included below:



Figure 1. Located at the southern end of Phase 3 (facing north), analyzing soil characteristics following topsoil salvage operations of the area.

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[www.jonesanddemille.com](http://www.jonesanddemille.com)



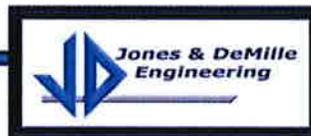
Figure 2. Located at the southeastern end of Phase 3 (facing northwest), following topsoil salvage operations of the area.



Figure 3. Located at the southern end of Phase 4 (facing east), following topsoil salvage operations of the area.

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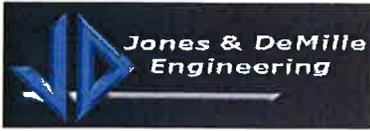
Phase 3, 4 Construction

Density Lab Data and Compaction Reports

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Jones & DeMille  
 1535 South 100 West  
 Richfield, Utah 84701  
 Phone: (435) 896-8266  
 Fax:

Project: Main 2019

Phone:  
 Fax:

# DENSITY REPORT

## NUCLEAR MOISTURE DENSITY TEST DATA

DATE:	6/10/2019	STANDARD COUNT N(D)=:	2091
REPORT NUMBER:	26	STANDARD COUNT N(M)=:	689
TECHNICIAN'S NAME:	Jaron Coleman	MATERIAL:	native on site
PROJECT NAME:	sufco waste rock	SOURCE:	
PROJECT NUMBER:	1607-335	MAXIMUM OBTAINABLE DENSITY (PCF):	119.5
ENGINEER:		OPTIMUM MOISTURE (%):	10.8
TROXLER NUMBER:	65823	COMPACTION REQUIRED (%):	95+

## TEST RESULTS:

TEST STATION	OFFSET	REFERENCE /LIFT	PROB DEPTH	WET DENSITY	DRY DENSITY	% MOISTURE	% COMPACTION
slope, east side 7		top	6"	127.3	116.4	9.4	97.4
slope, middle 8		top	6"	128.2	116.4	10.1	97.4
slope, west side 9		top	6"	127.6	118.7	7.5	99.3

## COMMENTS:

## ATTACH PICTURE:



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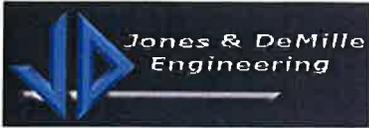
ATTACH PICTURE:



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Project: Main 2019

Phone:  
 Fax:

# DENSITY REPORT

## NUCLEAR MOISTURE DENSITY TEST DATA

DATE:	6/10/2019	STANDARD COUNT N(D)=:	2091
REPORT NUMBER:	27	STANDARD COUNT N(M)=:	689
TECHNICIAN'S NAME:	Jaron Coleman	MATERIAL:	native on site
PROJECT NAME:	sufco waste rock	SOURCE:	
PROJECT NUMBER:	1607-335	MAXIMUM OBTAINABLE DENSITY (PCF):	113.4
ENGINEER:		OPTIMUM MOISTURE (%):	13.7
TROXLER NUMBER:	65823	COMPACTION REQUIRED (%):	95+

## TEST RESULTS:

TEST STATION	OFFSET	REFERENCE /LIFT	PROB DEPTH	WET DENSITY	DRY DENSITY	% MOISTURE	% COMPACTION
north edge pad, east side 1		top	6"	126.1	112.5	12.1	99.2
north edge pad, middle 2		top	6"	124.3	110.7	12.3	97.6
north edge pad, west 3		top	6"	126.6	113.3	11.7	99.9

## COMMENTS:

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ATTACH PICTURE:



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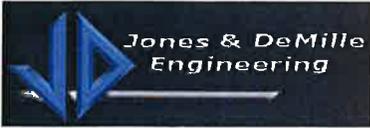
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 Richfield, Utah 84701  
 Phone: (435) 896-8266  
 Fax:

Project: Main 2017

Phone:  
 Fax:

# DENSITY REPORT

## NUCLEAR MOISTURE DENSITY TEST DATA

DATE:	12/20/2018	STANDARD COUNT N(D)=:	2328
REPORT NUMBER:	254	STANDARD COUNT N(M)=:	683
TECHNICIAN'S NAME:	Jaron Coleman	MATERIAL:	native ph3
PROJECT NAME:	sufco waste rock testing	SOURCE:	
PROJECT NUMBER:	1607-335	MAXIMUM OBTAINABLE DENSITY (PCF):	113.4
ENGINEER:		OPTIMUM MOISTURE (%):	13.7
TROXLER NUMBER:	65824	COMPACTION REQUIRED (%):	90+

## TEST RESULTS:

TEST STATION	OFFSET	REFERENCE /LIFT	PROB DEPTH	WET DENSITY	DRY DENSITY	% MOISTURE	% COMPACTION
east edge pad middle section	4		4	115.5	107.0	8.0	94.4
middle pad middle section	5		4	117.0	107.9	8.4	95.1
west edge middle section	6		4	117.8	109.3	7.8	96.4

## COMMENTS:

tested in 3 lines (north, middle, south) where snow was cleared off pad. the north line was very dry and i tried multiple locations on west middle and east locations. the material was very silty on the top and though it was a bit frozen would not read very dense at all 80-85% was a constant avg (using the 113.4 proc) i tested between 6-8 areas in each quadrant (north west, north middle, north east, south west, south middle, south east) and same result 80-85% was as high as tests were coming in. there was an area that a dozer had pushed out down the middle section (east middle, middle middle, west middle) the area was 6-8" lower than the elevation of the rest of the pad and that where the 3 passing tests came from. each of those areas only required 1 test in each location.

## ATTACH PICTURE:

## EMAIL REPORT:

-mark@jonesanddemille.com

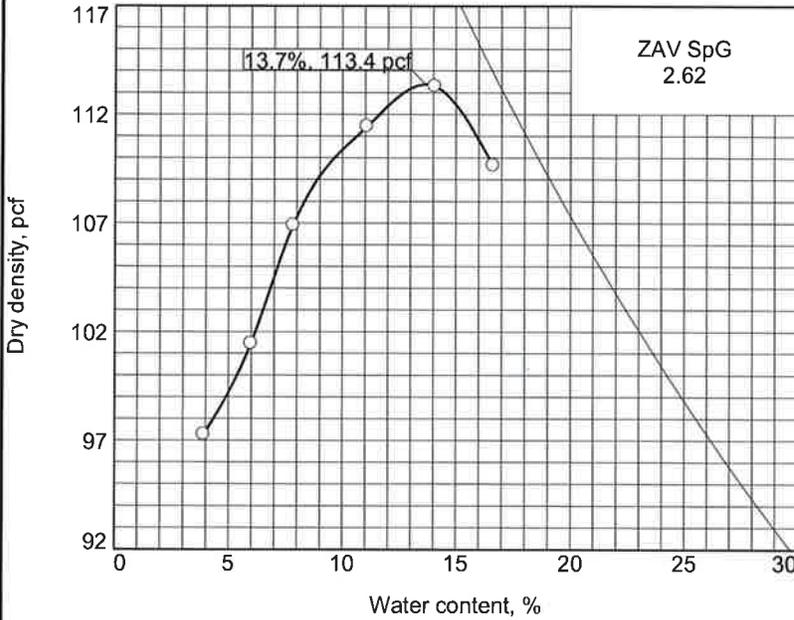
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# COMPACTION TEST REPORT

Curve No. 571



Preparation Method	As Received
Rammer: Wt.	5.5 lb. Drop 12 in.
Type	automatic
Layers: No.	three Blows per 56
Mold Size	0.075 cu. ft.
Test Performed on Material	
Passing	3/4 in. Sieve
%>3/4 in.	%<No.200
Atterberg (D 4318): LL	PI
NM (D 2216)	Sp.G. (D 854) 2.62
USCS (D 2487)	
AASHTO (M 145)	
Date: Sampled	11/15/18
Received	11/15/18
Tested	11/16/18
Tested By	Kurt Bosshardt

### COMPACTION TESTING DATA AASHTO T 99-15 Method D Standard

	1	2	3	4	5	6
<b>WM + WS</b>	9171.0	9391.0	9655.0	9944.0	10130.0	10084.0
<b>WM</b>	5733.0	5733.0	5733.0	5733.0	5733.0	5733.0
<b>WW + T #1</b>	897.1	785.0	885.4	783.0	837.4	931.5
<b>WD + T #1</b>	872.7	754.6	838.9	721.6	756.2	834.7
<b>TARE #1</b>	246.5	246.1	245.6	166.9	179.1	252.8
<b>WW + T #2</b>						
<b>WD + T #2</b>						
<b>TARE #2</b>						
<b>MOIST.</b>	3.9	6.0	7.8	11.1	14.1	16.6
<b>DRY DENS.</b>	97.3	101.5	106.9	111.4	113.3	109.7

### SIEVE TEST RESULTS AASHTO T 27 AASHTO T 11

Opening Size	% Passing	Specs.

### TEST RESULTS

Maximum dry density = 113.4 pcf

Optimum moisture = 13.7 %

**Project No.** 1607-335     **Client:** Bowie Resource Partners  
**Project:** Sufco Waste Rock Site - Materials Testing

○ **Location:** Phase 3 Pad - West Side     **Sample Number:** 18-S-571

**JONES & DEMILLE ENGINEERING INC.**

Richfield, Utah

### Material Description

Native

**Remarks:**

**Checked by:** Mark Rappleye

**Title:** Lab Manager

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Appendix IX

Construction As-Built Information

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Phase 3,4 Construction

As-Built Information

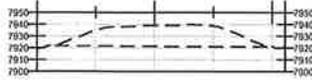
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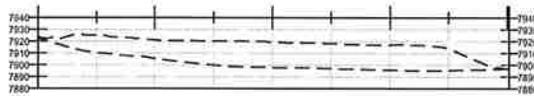
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Cross-Section: Subsoil Pile



Cross-Section: Topsoil Pile



Volume Summary							
Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Phase 4 Pile	full	1.000	1.000	230707.19	0.13	14197.23	14197.10<Fill>
Phase 5 Pile	full	1.000	1.000	248293.35	958.28	37468.14	36509.86<Fill>
Totals				2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total				479000.54	958.41	51665.37	50706.96<Fill>

\* Value adjusted by cut or fill factor other than 1.0

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SHEET NO. 02	Sevier County	 <b>Jones &amp; DeMille Engineering, Inc.</b> CIVIL ENGINEERING - SURVEYING - TESTING GIS - ENVIRONMENTAL 1.800.748.5278 www.jonesandd.com	NO DATE DESIGN SUPP. PARTIAL PROJECT		REMARKS							
	Sufco Waste Rock Site		CONDITION SUBMISSION FOR AUTHORIZATION									
	Phase 4 and Phase 5		REVISIONS									
PROJECT NUMBER: 1406-120	APPROVAL	DATE	PROJECT ENGINEER/CLIENT	DESIGN	CHECK	DATE	REVIEW	SCALE: 1"=100'	DWG NAME: Sufco Waste Rock Site	DWG CREATED	CR_DATE	SPRANK: 02/12/2010
	DATE			DATE	DATE			SHT SET: 000	PEN TEL: (865) 221-1111			PLOTTED: 02/25/2010



SUFCO Mine

C/041/002

APPENDIX 5-9  
Reclamation Bond Estimate

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### Direct Costs

Subtotal Demolition and Removal	\$1,735,252	
Subtotal Backfilling and Grading	\$1,715,437	
Subtotal Revegetation	\$205,315	
<b>Direct Costs</b>	<b>\$3,656,004</b>	<i>2014 Dollars</i>

### Indirect Costs

Mob/Demob	\$365,600	10.0%
Contingency	\$182,800	5.0%
Engineering Redesign	\$91,400	2.5%
Main Office Expense	\$248,608	6.8%
Project Management Fee	\$91,400	2.5%
<b>Subtotal Indirect Costs</b>	<b>\$979,808</b>	<b>26.8%</b>

<b>Total Cost</b>	<b>\$4,635,812.00</b>	<i>2014 Dollars</i>
-------------------	-----------------------	---------------------

<i>Escalation factor for 2018</i>	<i>0.0178</i>
<i>Number of years to next midterm</i>	<i>5</i>
<i>Escalation Amount</i>	<i>\$389,670.00</i>
<i>Reclamation Cost Escalated</i>	<i>\$ 5,025,482 2019 Dollars</i>

<b>Bond Amount (rounded to nearest \$1,000) 2019</b>	<b>\$5,025,000.00</b>
<b>Dollars</b>	

Posted Bond 2018	\$5,103,000.00
Difference Between Cost Estimate and Bond	\$78,000.00
Percent Difference	1.53%

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