

Appendix A. Construction Verification Data Contents

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NOTE: Appendices A4 through A7 are not included as they are not relevant to the period covered in this Addendum.

**Appendix A3.
Interim Cover**

**Standard Proctor Test Results Summary
Lift Approval Summary
Lift Approval Package
Buyoff Surveys**

**Appendix A3. Interim Cover
Standard Proctor Test Results Summary**

Proctor ID #	Date Sampled	Date Approved	Maximum Dry Density (lb/ft³)	Optimum Moisture Content (%)	Soils Description
Interim Cover 2016 # 1	7/6/2016	7/25/2016	116.0	14.0	Grey Brown Sandy Lean Clay
Interim Cover 2016 # 2	7/6/2016	7/25/2016	113.0	13.0	Grey Brown Sandy Lean Clay

Appendix A3. Interim Cover Lift Approval Summary

August 2016										
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd ³)	Cumulative Quantity Approved (yd ³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID #	# of nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
8/24/16	U11I01160824-00	2	4,892	4892	N/A	0.8	IC-1(2016)	2	1	99.4
8/25/16	U11I05160825-00	2	4,665	9557	N/A	0.8	IC-1&2(2016)	2	0	100.5
8/25/16	U11B05160825-00	2	4,888	14445	N/A	0.8	IC-1(2016)	2	0	95.3
8/30/16	U11I01160829-00	3	2,916	17361	N/A	0.2	IC-1(2016)	3	0	97.6
<p>Average CAES Screen Passing Pixels (%) = N/A</p> <p>Total Quantity Approved (yd³) = 17361</p> <p>Total # of Nuclear Density Gauge Tests = 9</p> <p>Total # of Moisture Tests = 9</p> <p>Quantity per Moisture Test (yd³) = 1929</p> <p>Average Average Thickness (ft) = 0.7</p>										

Appendix A3. Interim Cover Lift Approval Package (continued)

Slope Elevation Survey

Average lift thickness=		0.2		Bounding Box		Northing		Easting	
Grid Size=		N/A		Lower Left		N			
Lift ID:		UH101160829-00		Upper Right		A			
Last Lift Elevations			Lift Approval Elevations			Lift Thickness			
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness			
6795955	2123826	4993.3	6795955	2123826	4993.507	0.3		OK	
6795856	2123838	4995.3	6795856	2123838	4995.485	0.1		OK	
6795757	2123850	4997.3	6795757	2123850	4997.535	0.2		OK	
6796066	2123913	4990.9	6796066	2123913	4991.175	0.3		OK	
6795967	2123925	4993.1	6795967	2123925	4993.197	0.1		OK	
6795868	2123937	4995.1	6795868	2123937	4995.176	0.1		OK	
6795769	2123950	4997.0	6795769	2123950	4997.223	0.2		OK	
6796079	2124012	4990.7	6796079	2124012	4990.874	0.1		OK	
6795979	2124025	4992.7	6795979	2124025	4992.901	0.2		OK	
6795880	2124037	4994.7	6795880	2124037	4994.868	0.1		OK	
6795781	2124049	4996.7	6795781	2124049	4996.930	0.2		OK	
6795688	2124111	4998.6	6795688	2124111	4998.790	0.2		OK	
6795489	2124135	4996.3	6795489	2124135	4996.364	0.1		OK	
6795390	2124147	4993.6	6795390	2124147	4993.819	0.2		OK	
6795378	2124048	4994.0	6795378	2124048	4994.113	0.1		OK	
6795477	2124036	4996.3	6795477	2124036	4996.597	0.3		OK	
6795676	2124011	4998.9	6795676	2124011	4999.088	0.2		OK	
6795316	2123955	4992.9	6795316	2123955	4993.099	0.2		OK	
6795593	2123786	5000.7	6795593	2123786	5000.846	0.2		OK	
6795582	2123687	5001.0	6795582	2123687	5001.132	0.1		OK	
6795484	2123682	4998.6	6795484	2123682	4998.782	0.2		OK	
6795385	2123695	4996.0	6795385	2123695	4996.267	0.2		OK	
6795285	2123707	4993.4	6795285	2123707	4993.802	0.4		OK	
6795317	2123552	4994.8	6795317	2123552	4994.947	0.2		OK	
6795422	2123589	4997.5	6795422	2123589	4997.662	0.1		OK	
6795466	2123533	4998.5	6795466	2123533	4998.763	0.2		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
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						0.0		OK	
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						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	
						0.0		OK	

Appendix A3. Interim Cover Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER _____																												
LIFT IDENTIFICATION: <u>UI1101160829-00</u>	DATE: <u>8/29/2016</u>																											
TEST ID NUMBER(S): _____ # <u>1</u>																												
TEST LOCATION: <u>PI</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> <u>D6938</u>																											
<p>ASTM D6938 (DENSITY DETERMINATION)</p> <p>Make/Model <u>Troxler 3430</u> Gauge Serial # <u>28098</u> Last Calibration Date: <u>11/24/15</u> Daily Standard Counts: <i>Off-Cell Standard</i></p> <p>Density <u>2282</u> Moisture <u>665</u> <i>Method A (Direct Transmission)</i> Depth Setting <u>6</u> (inches) Count Time <u>1</u> (minutes)</p> <p>Moisture Count <u>166</u> Density Count <u>1811</u></p> <p>Wet Density (ρ_m) <u>130.0</u> (lbs/ft³) Dry Density <u>115.4</u> (lbs/ft³) Moisture Density <u>14.6</u> (lbs/ft³) Moisture Fraction <u>12.7</u> (%)</p>	<p>ASTM D1556 (DENSITY DETERMINATION)</p> <p>Testing Apparatus _____ Calibrated Vol. (lbs/ft³) _____ Bulk Density of sand (ρ_1) _____ g/cm³ _____ lbs/ft³ Mass of Sand to Fill Cone & Plate (M_2) _____ g</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>Mass of bottle & cone before filling</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of bottle & cone after filling</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of sand to fill cone, plate, & hole (M_1)</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of sand to fill hole</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of wet soil & container</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of container</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of wet soil (M_3)</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> </table> <p>Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ cm³</p> <p>Dry Mass of soil $M_d = 100 M_3 / (w + 100)$ _____ g Wet Density $\rho_m = (M_3 / V) \times 62.43$ _____ lbs/ft³ Dry Density $\rho_d = M_d / V$ _____ g/cm³ Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ lbs/ft³</p>	Mass of bottle & cone before filling		g	Mass of bottle & cone after filling		g	Mass of sand to fill cone, plate, & hole (M_1)		g	Mass of sand to fill hole		g	Mass of wet soil & container		g	Mass of container		g	Mass of wet soil (M_3)		g						
Mass of bottle & cone before filling		g																										
Mass of bottle & cone after filling		g																										
Mass of sand to fill cone, plate, & hole (M_1)		g																										
Mass of sand to fill hole		g																										
Mass of wet soil & container		g																										
Mass of container		g																										
Mass of wet soil (M_3)		g																										
<p>MOISTURE DETERMINATION</p> <p>_____ ASTM D2216 @ 110° C or _____ ASTM D4643</p> <p>Container ID _____</p> <p>Scale Serial # <u>0</u> Last Calibration Date: <u>1/0/00</u></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>Mass of container & wet specimen (M_{cms})</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of container & dry specimen (M_{cbs})</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of water (M_w)</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>$M_w = M_{cms} - M_{cbs}$</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of container (M_c)</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Mass of dry specimen (M_s)</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>$M_s = M_{cbs} - M_c$</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">g</td></tr> <tr><td>Moisture content (w)</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">%</td></tr> <tr><td>$w = (M_w / M_s) \times 100$</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">%</td></tr> </table>		Mass of container & wet specimen (M_{cms})		g	Mass of container & dry specimen (M_{cbs})		g	Mass of water (M_w)		g	$M_w = M_{cms} - M_{cbs}$		g	Mass of container (M_c)		g	Mass of dry specimen (M_s)		g	$M_s = M_{cbs} - M_c$		g	Moisture content (w)		%	$w = (M_w / M_s) \times 100$		%
Mass of container & wet specimen (M_{cms})		g																										
Mass of container & dry specimen (M_{cbs})		g																										
Mass of water (M_w)		g																										
$M_w = M_{cms} - M_{cbs}$		g																										
Mass of container (M_c)		g																										
Mass of dry specimen (M_s)		g																										
$M_s = M_{cbs} - M_c$		g																										
Moisture content (w)		%																										
$w = (M_w / M_s) \times 100$		%																										
<p>Dry Density (ρ_d) = $(100 \times \rho_m) / (100 + w)$ $\rho_d = (100 \times \frac{130.0}{100 + 12.7}) / 100 = \frac{115.4}{100} = 115.4$ lbs/ft³ Note: Wet Density from ASTM D 1556 (ρ_m) taken in accordance over ASTM D 6938 (ρ_m)</p> <p>Percent Compaction = $\rho_d / \gamma_d \text{max} \times 100$ $115.4 / 116.0 \times 100 = 99.5$ %</p>																												
<p>Soil Description: <u>Grey brown, sandy lean clay.</u> Proctor ID: <u>Interim Cover 2016 # 1</u></p> <p>Maximum Dry Density ($\gamma_d \text{max}$) <u>116.0</u> (lbs/ft³) Optimum Moisture (w_{opt}) <u>14.0</u> (%) Required Moisture: <u>9.0</u> % to <u>19.0</u> % Required Percent Compaction: <u>90.0</u> (%)</p>																												
Comments:	<p>TEST RESULTS:</p> <p><input checked="" type="checkbox"/> Pass Date: <u>8/29/16</u> <input type="checkbox"/> Failed Moisture <input type="checkbox"/> Failed Compaction Time: <u>1428</u></p> <p>By: <u>Beachem Bosh</u> (signature) (print)</p>																											
<p><u>[Signature]</u> QA/QC APPROVAL</p>	<p><u>09-01-2016</u> DATE</p>																											

Density Testing
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Appendix A3. Interim Cover Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER _____																												
LIFT IDENTIFICATION: <u>UI1101160829-00</u>	DATE: <u>8/29/2016</u>																											
TEST ID NUMBER(S): _____ # <u>2</u>																												
TEST LOCATION: <u>P2</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> <u>D6938</u>																											
<p>ASTM D6938 (DENSITY DETERMINATION)</p> <p>Make/Model <u>Troxler 3430</u> Gauge Serial # <u>28098</u> Last Calibration Date: <u>11/24/15</u> Daily Standard Counts: <i>Off-Cell Standard</i></p> <p>Density <u>2282</u> Moisture <u>665</u> <i>Method A (Direct Transmission)</i> Depth Setting <u>6</u> (inches) Count Time <u>1</u> (minutes) Moisture Count <u>178</u> Density Count <u>1782</u></p> <p>Wet Density (ρ_w) <u>130.7</u> (lbs/ft³) Dry Density <u>114.8</u> (lbs/ft³) Moisture Density <u>15.9</u> (lbs/ft³) Moisture Fraction <u>13.8</u> (%)</p>	<p>ASTM D1556 (DENSITY DETERMINATION)</p> <p>Testing Apparatus _____ Calibrated Vol. (lbs/ft³) _____ Bulk Density of sand (ρ_1) _____ g/cm³ _____ lbs/ft³ Mass of Sand to Fill Cone & Plate (M_2) _____ g</p> <p>Mass of bottle & cone before filling _____ g cone, plate & hole _____ g Mass of bottle & cone after filling _____ g cone, plate & hole _____ g Mass of sand to fill cone, plate, & hole (M_1) _____ g Mass of sand to fill hole _____ g Mass of wet soil & container _____ g Mass of container _____ g Mass of wet soil (M_3) _____ g</p> <p>Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ cm³</p> <p>Dry Mass of soil $M_4 = 100 M_3 / (w + 100)$ _____ g Wet Density $\rho_w = (M_3 / V) \times 62.43$ _____ lbs/ft³ Dry Density $\rho_d = M_4 / V$ _____ g/cm³ Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ lbs/ft³</p>																											
<p>MOISTURE DETERMINATION</p> <p>_____ ASTM D2216 @ 110° C or _____ ASTM D4643</p> <p>Container ID _____</p> <p>Scale Serial # <u>0</u> Last Calibration Date: <u>1/0/00</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Mass of container & wet specimen (M_{cws})</td> <td style="text-align: center;">N</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of container & dry specimen (M_{cds})</td> <td style="text-align: center;">A</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of water (M_w)</td> <td></td> <td style="text-align: right;">g</td> </tr> <tr> <td>$M_w = M_{cws} - M_{cds}$</td> <td></td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of container (M_c)</td> <td></td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of dry specimen (M_s)</td> <td></td> <td style="text-align: right;">g</td> </tr> <tr> <td>$M_s = M_{cds} - M_c$</td> <td></td> <td style="text-align: right;">g</td> </tr> <tr> <td>Moisture content (w)</td> <td style="text-align: center; background-color: yellow;">0.0</td> <td style="text-align: right;">%</td> </tr> <tr> <td>$w = (M_w / M_s) \times 100$</td> <td></td> <td></td> </tr> </table>		Mass of container & wet specimen (M_{cws})	N	g	Mass of container & dry specimen (M_{cds})	A	g	Mass of water (M_w)		g	$M_w = M_{cws} - M_{cds}$		g	Mass of container (M_c)		g	Mass of dry specimen (M_s)		g	$M_s = M_{cds} - M_c$		g	Moisture content (w)	0.0	%	$w = (M_w / M_s) \times 100$		
Mass of container & wet specimen (M_{cws})	N	g																										
Mass of container & dry specimen (M_{cds})	A	g																										
Mass of water (M_w)		g																										
$M_w = M_{cws} - M_{cds}$		g																										
Mass of container (M_c)		g																										
Mass of dry specimen (M_s)		g																										
$M_s = M_{cds} - M_c$		g																										
Moisture content (w)	0.0	%																										
$w = (M_w / M_s) \times 100$																												
<p>Dry Density (ρ_d) = $(100 \times \rho_w) / (100 + w)$ $\rho_d = (100 \times \frac{130.7}{100}) / (100 + 13.8) = 114.8$ lbs/ft³ Note: Wet Density from ASTM D 1556 (ρ_w) takes precedence over ASTM D 6938 (ρ_w)</p> <p>Percent Compaction = $\rho_d / \gamma_{dmax} \times 100$ $114.8 / 116.0 \times 100 = 99.0$ %</p>																												
<p>Soil Description: <u>Grey brown, sandy lean clay.</u> Proctor ID: <u>Interim Cover 2016 # 1</u></p> <p>Maximum Dry Density (γ_{dmax}) <u>116.0</u> (lbs/ft³) Optimum Moisture (w_{opt}) <u>14.0</u> (%) Required Moisture: <u>9.0</u> % to <u>19.0</u> % Required Percent Compaction: <u>90.0</u> (%)</p>																												
<p>Comments:</p>																												
<p>TEST RESULTS:</p> <p><input checked="" type="checkbox"/> Pass Date: <u>8/29/16</u> <input type="checkbox"/> Failed Moisture <input type="checkbox"/> Failed Compaction Time: <u>1445</u></p> <p>By: <u>Beachem Bosh</u> _____ (print) (signature)</p>																												
<p>QA/QC APPROVAL _____ DATE <u>08.01.2016</u></p>																												

Density Testing
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Appendix A3. Interim Cover Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER _____	
LIFT IDENTIFICATION: <u>UI101160829-00</u>	DATE: <u>8/29/2016</u>
TEST ID NUMBER(S): _____ # <u>3</u>	
TEST LOCATION: <u>P3</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> <u>D6938</u>
ASTM D6938 (DENSITY DETERMINATION)	
Make/Model <u>Troxler 3430</u> Gauge Serial # <u>28098</u> Last Calibration Date: <u>11/24/15</u> Daily Standard Counts: <i>Off-Cell Standard</i> Density <u>2282</u> Moisture <u>665</u> <i>Method A (Direct Transmission)</i> Depth Setting <u>6</u> (inches) Count Time <u>1</u> (minutes) Moisture Count <u>171</u> Density Count <u>2052</u> Wet Density (ρ_w) <u>124.4</u> (lbs/ft ³) Dry Density <u>109.3</u> (lbs/ft ³) Moisture Density <u>15.1</u> (lbs/ft ³) Moisture Fraction <u>13.9</u> (%)	
ASTM D1556 (DENSITY DETERMINATION)	
Testing Apparatus _____ Calibrated Vol. (lbs/ft ³) _____ Bulk Density of sand (ρ_1) _____ g/cm ³ _____ lbs/ft ³ Mass of Sand to Fill Cone & Plate (M_2) _____ g Mass of bottle & cone before filling _____ g Mass of bottle & cone after filling _____ g Mass of sand to fill cone, plate, & hole (M_1) <u>A</u> g Mass of sand to fill hole _____ g Mass of wet soil & container _____ g Mass of container _____ g Mass of wet soil (M_3) _____ g Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ cm ³ Dry Mass of soil $M_4 = 100 M_3 / (w + 100)$ _____ g Wet Density $\rho_w = (M_3 / V) \times 62.43$ _____ lbs/ft ³ Dry Density $\rho_d = M_4 / V$ _____ g/cm ³ Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ lbs/ft ³	
MOISTURE DETERMINATION	
_____ ASTM D2216 @ 110° C or _____ ASTM D4643 Container ID _____ Scale Serial # <u>0</u> Last Calibration Date: <u>1/0/00</u> Mass of container & wet specimen (M_{cws}) <u>N</u> g Mass of container & dry specimen (M_{cds}) <u>A</u> g Mass of water (M_w) _____ g $M_w = M_{cws} - M_{cds}$ Mass of container (M_c) _____ g Mass of dry specimen (M_s) _____ g $M_s = M_{cds} - M_c$ Moisture content (w) _____ % $w = (M_w / M_s) \times 100$ <u>0.0</u> %	
Dry Density (ρ_d) = $(100 \times \rho_w) / (100 + w)$ $\rho_d = (100 \times \frac{124.4}{100}) / (100 + \frac{13.9}{100}) = 109.3$ lbs/ft ³ Note: Wet Density from ASTM D 1556 (ρ_w) to be of precedence over ASTM D 6938 (ρ_w) Percent Compaction = $\rho_d / \gamma_{dmax} \times 100$ $109.3 / 116.0 \times 100 = 94.2$ %	
Soil Description: <u>Grey brown, sandy lean clay.</u> Proctor ID: <u>Interim Cover 2016 # 1</u> Maximum Dry Density (γ_{dmax}) <u>116.0</u> (lbs/ft ³) Optimum Moisture (w_{opt}) <u>14.0</u> (%) Required Moisture: <u>9.0</u> % to <u>19.0</u> % Required Percent Compaction: <u>90.0</u> (%)	
Comments:	TEST RESULTS: <input checked="" type="checkbox"/> Pass Date: <u>8/29/16</u> <input type="checkbox"/> Failed Moisture <input type="checkbox"/> Failed Compaction Time: <u>1505</u> By: <u>Beachem Bosh</u> (print) _____ (signature)
_____ QA/QC APPROVAL DATE	

Density Testing
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Appendix A3. Interim Cover Buyoff Surveys

CRJ 001669



Interim Cover Buyoff Form

Client: Department of Energy
Project: Moab UMTRA Project
Date: 08/30/2016

In signing this document, the signatory agrees that the lift is complete and meets both the project specifications and RAIP requirements.

Lift Area	Lift Area
UI1101	

Approver Name/Title	Signature	Sign Date
Craig Niemeyer/ Operations/ Site Manager	<i>[Signature]</i>	08.30.2016
Mitch Hogan/ QA/QC Representative	<i>[Signature]</i>	08.30.2016
Beachem Bosh/ QA/QC Representative	<i>[Signature]</i>	8.30.2016
Comments		
Lift Area: 68,339 ft ²		

COPY

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9-14-16

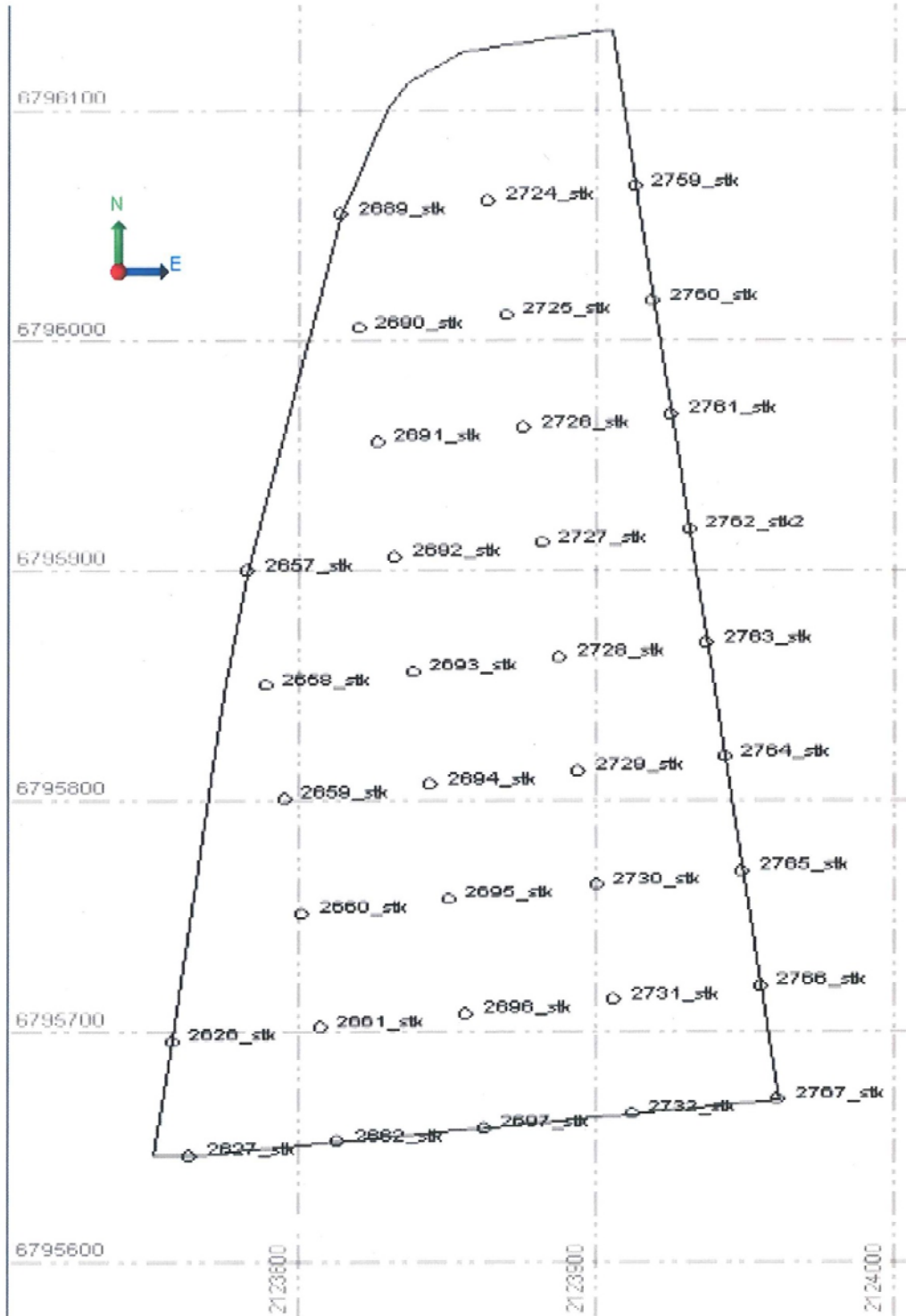
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Page 1 of 1

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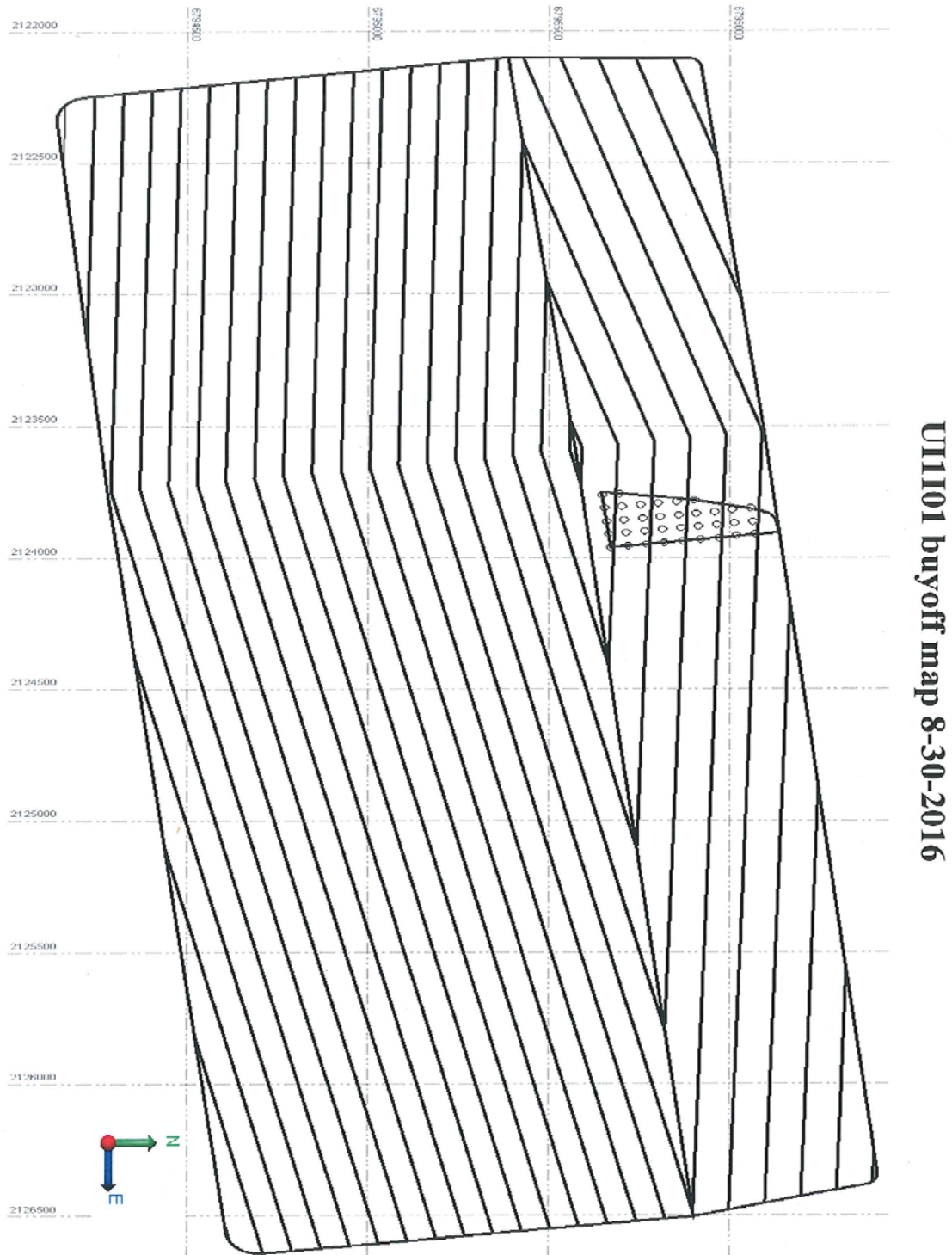
OP-F-011
Rev 0, August 2010

Appendix A3. Interim Cover Buyoff Surveys (continued)



UH101 buyoff points 8-30-2016

Appendix A3. Interim Cover Buyoff Surveys (continued)



U11101 buyoff map 8-30-2016

Appendix A3. Interim Cover Buyoff Surveys (continued)



Interim Cover Buyoff Form

Client: Department of Energy
Project: Moab UMTRA Project
Date: 08/31/2016

In signing this document, the signatory agrees that the lift is complete and meets both the project specifications and RAIP requirements.

Lift Area	Lift Area
UI1105	



Approver Name/Title	Signature	Sign Date
Craig Niemeyer/ Operations/ Site Manager	<i>[Signature]</i>	31-AUG-16
Mitch Hogan/ QA/QC Representative	<i>[Signature]</i>	08/31/2016
Beachem Bosh/ QA/QC Representative	<i>[Signature]</i>	08/31/2016
Comments		
Lift area: 279,752 ft ³		

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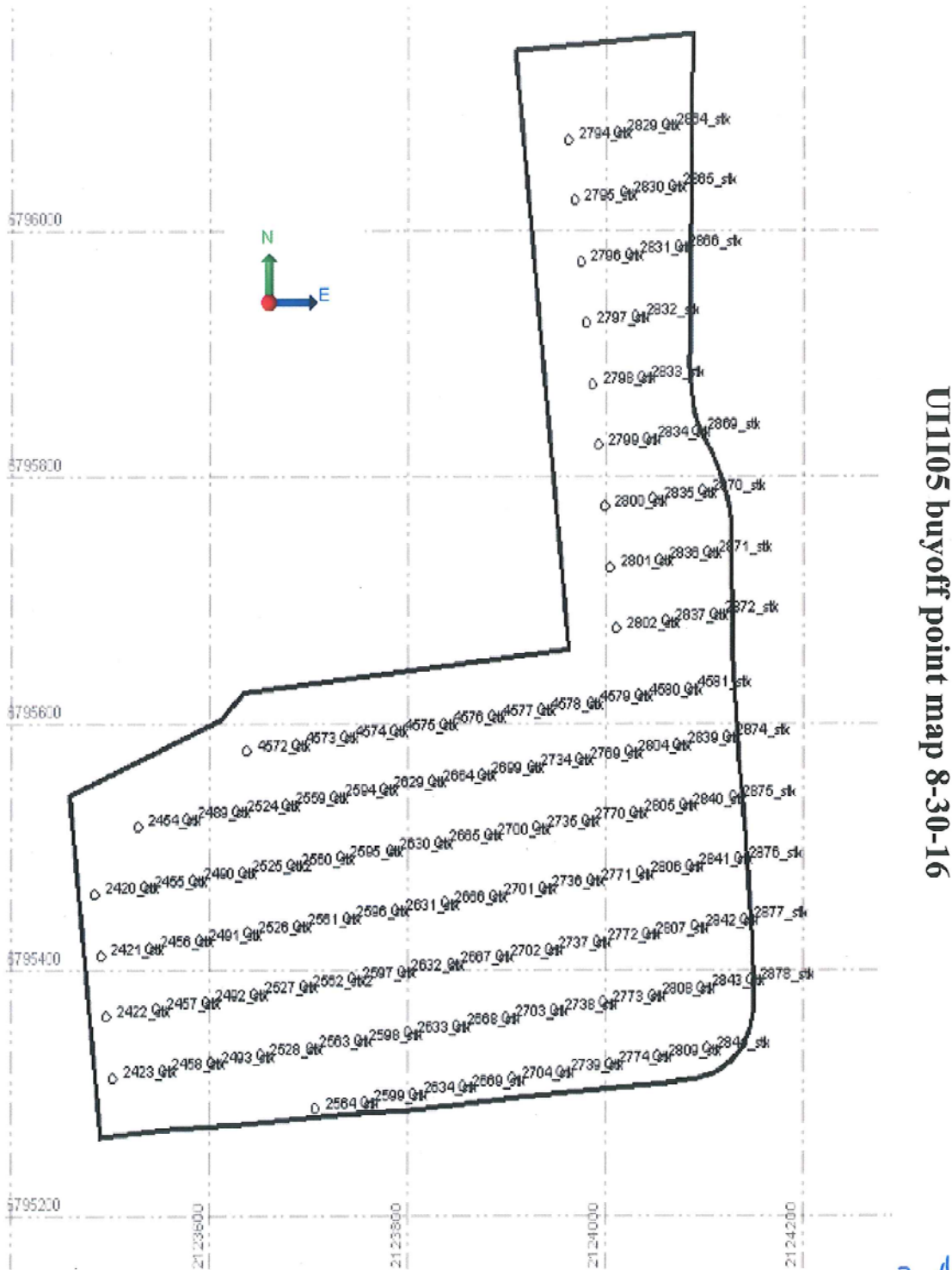
Appendix A3. Interim Cover Buyoff Surveys (continued)

Interim Cover Buyoff Survey							
Lift Area Buyoff ID:			UI1105		Date:		8/31/2016
Point #	Northing	Easting	Surveyed Elevation	Design Elevation	Difference in feet	Difference in inches	
2659	stk	6795800.1	2123794.7	4996.677	4995.629	1.0	12.6
2864	stk	6796084.8	2124061.9	4990.712	4989.702	1.0	12.1
2829	stk	6796078.7	2124012.4	4990.874	4989.856	1.0	12.2
2794	stk	6796072.6	2123962.7	4991.071	4990.009	1.1	12.7
2795	stk	6796023.0	2123968.7	4992.053	4991.01	1.0	12.5
2830	stk	6796029.0	2124018.5	4991.946	4990.857	1.1	13.1
2865	stk	6796035.2	2124068.1	4991.832	4990.703	1.1	13.6
2866	stk	6795985.6	2124074.1	4992.736	4991.705	1.0	12.4
2831	stk	6795979.4	2124024.4	4992.901	4991.858	1.0	12.5
2796	stk	6795973.4	2123974.9	4993.028	4992.011	1.0	12.2
2797	stk	6795923.7	2123981.0	4994.035	4993.013	1.0	12.3
2832	stk	6795929.8	2124030.6	4993.92	4992.859	1.1	12.7
2833	stk	6795880.1	2124036.7	4994.868	4993.86	1.0	12.1
2798	stk	6795874.2	2123987.1	4995.082	4994.014	1.1	12.8
2799	stk	6795824.4	2123993.1	4996.063	4995.015	1.0	12.6
2834	stk	6795830.5	2124042.8	4995.977	4994.862	1.1	13.4
2869	stk	6795836.6	2124092.3	4995.777	4994.708	1.1	12.8
2870	stk	6795787.1	2124098.5	4996.803	4995.709	1.1	13.1
2835	stk	6795780.8	2124048.9	4996.93	4995.863	1.1	12.8
2800	stk	6795774.8	2123999.2	4997.034	4996.016	1.0	12.2
2801	stk	6795725.2	2124005.4	4998.071	4997.017	1.1	12.7
2836	stk	6795731.3	2124054.9	4997.932	4996.864	1.1	12.8
2871	stk	6795737.4	2124104.5	4997.728	4996.711	1.0	12.2
2872	stk	6795687.7	2124110.7	4998.79	4997.71	1.1	13.0
2837	stk	6795681.7	2124061.0	4998.943	4997.864	1.1	13.0
2802	stk	6795675.5	2124011.4	4999.088	4998.017	1.1	12.9
4580	stk	6795621.3	2124034.7	5000.164	4999.097	1.1	12.8
4579	stk	6795615.7	2123984.9	5000.267	4999.241	1.0	12.3
4578	stk	6795610.1	2123935.3	5000.437	4999.385	1.1	12.6
4577	stk	6795604.6	2123885.6	5000.559	4999.528	1.0	12.4
4576	stk	6795599.1	2123835.9	5000.719	4999.672	1.0	12.6
4575	stk	6795593.3	2123786.2	5000.846	4999.815	1.0	12.4
4574	stk	6795587.9	2123736.5	5001.014	4999.959	1.1	12.7
4573	stk	6795582.4	2123686.8	5001.132	5000.103	1.0	12.4
4572	stk	6795576.7	2123637.1	5001.292	5000.246	1.0	12.6
4581	stk	6795627.0	2124084.3	5000.03	4998.954	1.1	12.9
2874	stk	6795588.6	2124122.9	4998.851	4997.79	1.1	12.7
2839	stk	6795582.4	2124073.2	4999.024	4997.921	1.1	13.2
2804	stk	6795576.3	2124023.6	4999.127	4998.051	1.1	12.9
2769	stk	6795570.2	2123974.0	4999.334	4998.182	1.2	13.8
2734	stk	6795564.2	2123924.4	4999.382	4998.312	1.1	12.8
2699	stk	6795558.0	2123874.7	4999.485	4998.443	1.0	12.5
2664	stk	6795552.0	2123825.1	4999.665	4998.573	1.1	13.1
2629	stk	6795545.9	2123775.5	4999.74	4998.704	1.0	12.4
2594	stk	6795539.7	2123725.9	4999.924	4998.835	1.1	13.1
2559	stk	6795533.6	2123676.2	5000.016	4998.966	1.0	12.6
2524	stk	6795527.6	2123626.6	5000.178	4999.096	1.1	13.0
2489	stk	6795521.5	2123577.0	5000.269	4999.124	1.1	13.7
2454	stk	6795515.4	2123527.4	5000.01	4998.942	1.1	12.8
2420	stk	6795459.7	2123483.9	4998.652	4997.509	1.1	13.7
2455	stk	6795465.8	2123533.5	4998.763	4997.691	1.1	12.9
2490	stk	6795471.8	2123583.1	4998.989	4997.873	1.1	13.4
2525	stk	6795477.9	2123632.7	4998.913	4997.846	1.1	12.8
2560	stk	6795484.0	2123682.3	4998.782	4997.715	1.1	12.8
2595	stk	6795490.2	2123732.0	4998.691	4997.585	1.1	13.3
2630	stk	6795496.3	2123781.7	4998.558	4997.454	1.1	13.3
2665	stk	6795502.3	2123831.2	4998.411	4997.323	1.1	13.1
2700	stk	6795508.4	2123880.9	4998.284	4997.192	1.1	13.1
2735	stk	6795514.5	2123930.4	4998.144	4997.061	1.1	13.0
2770	stk	6795520.6	2123980.1	4998.029	4996.931	1.1	13.2
2805	stk	6795526.7	2124029.7	4997.82	4996.8	1.0	12.2
2840	stk	6795532.8	2124079.4	4997.752	4996.669	1.1	13.0

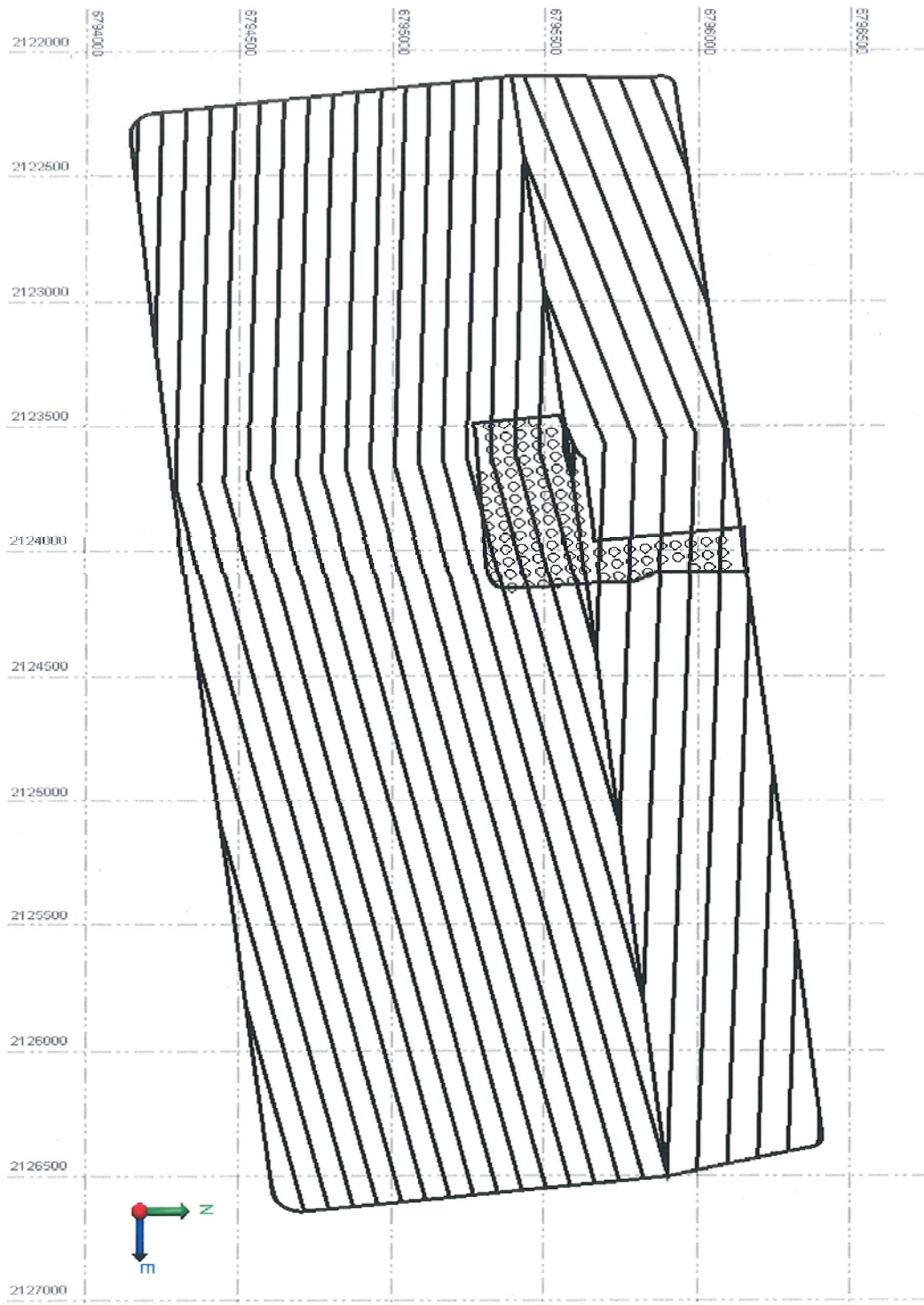
Appendix A3. Interim Cover Buyoff Surveys (continued)

2875 stk	6795539.0	2124129.0	4997.58	4996.539	1.0	12.5
2876 stk	6795489.2	2124135.0	4996.364	4995.288	1.1	12.9
2841 stk	6795483.2	2124085.5	4996.489	4995.419	1.1	12.8
2806 stk	6795477.1	2124035.8	4996.597	4995.55	1.0	12.6
2771 stk	6795471.0	2123986.2	4996.748	4995.68	1.1	12.8
2736 stk	6795464.9	2123936.6	4996.898	4995.811	1.1	13.0
2701 stk	6795458.9	2123886.9	4996.957	4995.942	1.0	12.2
2666 stk	6795452.7	2123837.3	4997.169	4996.073	1.1	13.2
2631 stk	6795446.6	2123787.7	4997.278	4996.204	1.1	12.9
2596 stk	6795440.5	2123738.1	4997.414	4996.334	1.1	13.0
2561 stk	6795434.4	2123688.4	4997.496	4996.465	1.0	12.4
2526 stk	6795428.3	2123638.8	4997.657	4996.596	1.1	12.7
2491 stk	6795422.2	2123589.2	4997.662	4996.622	1.0	12.5
2456 stk	6795416.2	2123539.5	4997.474	4996.44	1.0	12.4
2421 stk	6795410.0	2123489.9	4997.338	4996.258	1.1	13.0
2422 stk	6795360.4	2123496.0	4996.042	4995.007	1.0	12.4
2457 stk	6795366.5	2123545.6	4996.231	4995.189	1.0	12.5
2492 stk	6795372.6	2123595.3	4996.483	4995.371	1.1	13.3
2527 stk	6795378.7	2123644.9	4996.416	4995.346	1.1	12.8
2562 stk	6795384.7	2123694.5	4996.267	4995.215	1.1	12.6
2597 stk	6795390.9	2123744.1	4996.114	4995.084	1.0	12.4
2632 stk	6795397.0	2123793.8	4996.073	4994.953	1.1	13.4
2667 stk	6795403.1	2123843.4	4995.871	4994.823	1.0	12.6
2702 stk	6795409.2	2123893.0	4995.754	4994.692	1.1	12.7
2737 stk	6795415.2	2123942.7	4995.624	4994.561	1.1	12.8
2772 stk	6795421.3	2123992.3	4995.441	4994.43	1.0	12.1
2807 stk	6795427.4	2124041.9	4995.369	4994.299	1.1	12.8
2842 stk	6795433.5	2124091.5	4995.229	4994.169	1.1	12.7
2877 stk	6795439.6	2124140.9	4995.086	4994.038	1.0	12.6
2423 stk	6795310.8	2123502.1	4994.859	4993.756	1.1	13.2
2458 stk	6795316.9	2123551.8	4994.947	4993.938	1.0	12.1
2493 stk	6795323.0	2123601.3	4995.138	4994.12	1.0	12.2
2528 stk	6795329.1	2123650.9	4995.099	4994.096	1.0	12.0
2563 stk	6795335.2	2123700.6	4995.038	4993.965	1.1	12.9
2598 stk	6795341.2	2123750.2	4994.883	4993.834	1.0	12.6
2633 stk	6795347.4	2123799.8	4994.758	4993.703	1.1	12.7
2668 stk	6795353.5	2123849.5	4994.606	4993.572	1.0	12.4
2703 stk	6795359.6	2123899.1	4994.495	4993.442	1.1	12.6
2738 stk	6795365.7	2123948.7	4994.357	4993.311	1.0	12.6
2773 stk	6795371.8	2123998.4	4994.27	4993.18	1.1	13.1
2808 stk	6795377.9	2124048.0	4994.113	4993.049	1.1	12.8
2843 stk	6795383.9	2124097.6	4994.013	4992.918	1.1	13.1
2878 stk	6795390.0	2124147.2	4993.819	4992.788	1.0	12.4
2844 stk	6795334.4	2124103.7	4992.712	4991.668	1.0	12.5
2809 stk	6795328.2	2124054.1	4992.888	4991.799	1.1	13.1
2774 stk	6795322.0	2124004.5	4993.016	4991.93	1.1	13.0
2739 stk	6795316.0	2123954.8	4993.099	4992.061	1.0	12.5
2704 stk	6795310.0	2123905.2	4993.251	4992.191	1.1	12.7
2669 stk	6795303.8	2123855.6	4993.37	4992.322	1.0	12.6
2634 stk	6795297.8	2123805.9	4993.487	4992.453	1.0	12.4
2599 stk	6795291.6	2123756.3	4993.706	4992.584	1.1	13.5
2564 stk	6795285.5	2123706.7	4993.802	4992.715	1.1	13.0
Comments: QC performed a visual inspection of the final surface with satisfactory results. Visual inspection notes: The area was free of humping, thickened edges and defects. The layer uniform thickness was satisfactory see						
Approval Date: 8/31/2016			Total area: 279,752 ft			
North West Corner: 6796154 N. 2123907 E.						
QC Signature: Beachem Bosh/  Reviewed By: Mitch Hogan/ 						

Appendix A3. Interim Cover Buyoff Surveys (continued)



Appendix A3. Interim Cover Buyoff Surveys (continued)



U11105 buyoff area map 8-30-16

**Appendix A8.
Spoils Embankment**

**Standard Proctor Test Results Summary
Lift Approval Summaries
Lift Approval Package**

Appendix A8. Spoils Embankment Standard Proctor Test Results Summary

Proctor ID #	Date Sampled	Date Approved	Maximum Dry Density (lb/ft ³)	Optimum Moisture Content %	Proctor Description
Spoils # 1 (2016)	4/11/2016	5/2/2016	121.1	12.2	Light Grey Shale
Spoils # 2 (2016)	4/13/2016	5/2/2016	121.1	12.4	Light Grey Shale
16-0163	4/7/2016	9/13/2016	118.5	13.5	Brown clay
16-0164	4/7/2016	9/13/2016	117	14	Brown clay
16-0138	4/1/2016	9/13/2016	116	13	Top Soil
16-0139	4/1/2016	9/13/2016	117	14	Top Soil
16-0140	4/1/2016	9/13/2016	117.5	11.5	Top Soil
16-0141	4/1/2016	9/13/2016	119	13.5	Brown clay
16-0142	4/1/2016	9/13/2016	119	12.5	Brown clay
16-0143	4/1/2016	9/13/2016	116.5	13.5	Grey Clay
16-100	3/15/2016	9/13/2016	118	12.5	Top Soil
Spoils # 15 (2016)	4/26/2016	5/2/2016	119.5	11.5	Light brown sandy lean clay
Spoils # 16 (2016)	4/26/2016	5/2/2016	121.5	11	Light brown sandy lean clay w/shale
Spoils # 17 (2016)	4/26/2016	5/2/2016	123	11	Brown sandy lean clay w/shale
Spoils # 18 (2016)	4/26/2016	5/2/2016	122	12.5	Brown sandy lean clay w/shale
Spoils # 19 (2016)	4/26/2016	5/2/2016	123.5	11.5	Brown sandy lean clay w/shale
Spoils # 20 (2016)	4/26/2016	5/2/2016	122.5	12.5	Brown sandy lean clay w/shale
Spoils # 21 (2016)	5/23/2016	6/2/2016	114	9.5	Brownish grey silty sand w/shale
Spoils # 22 (2016)	5/23/2016	6/2/2016	114.5	9.5	Brownish grey silty sand w/shale
Spoils # 23 (2016)	5/23/2016	6/2/2016	115.5	12.5	Brownish grey silty sand w/shale
Spoils # 24 (2016)	5/23/2016	6/2/2016	116	12.5	Light brown silty sand w/shale
Spoils # 25 (2016)	5/23/2016	6/2/2016	120	12	Light brown silty sand w/shale
Spoils # 26 (2016)	5/23/2016	6/2/2016	116.5	14.5	Light brown silty sand w/shale
Spoils # 27 (2016)	5/23/2016	6/2/2016	117	13	Light brown silty sand w/shale
Spoils #28 (2016)	5/23/2016	6/2/2016	115	13	Light brownish grey silty sand w/shale
Spoils # 29 (2016)	5/23/2016	6/2/2016	116.5	14	Light brown silty sand
Spoils # 30 (2016)	5/23/2016	6/2/2016	117.5	13	Light brown silty sand

lb/ft³ = pounds per cubic foot

Appendix A8. Spoils Embankment Lift Approval Summaries

March 2016										
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd ³)	Cumulative Quantity Approved (yd ³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID #	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
3/22/16	USB80160322-00	0	3333	3,333	N/A	1.0	16-0100	1	0	92.7
3/22/16	USB80160322-01	0	3333	6,666	N/A	1.0	16-0100	1	0	98.2
3/23/16	USA87160323-00	0	7397	14,063	N/A	1.0	16-0100	2	0	94.9
3/23/16	USA87160323-01	0	7397	21,460	N/A	1.0	16-0100	2	0	94.9
3/23/16	USA87160323-02	0	7397	28,857	N/A	1.0	16-0100	2	0	97.3
3/24/16	USB80160324-00	0	14777	43,634	N/A	1.0	16-0100	4	0	97.5
3/29/16	USB80160329-00	1	14778	58,412	N/A	1.0	Spoils # 3 (2014)	4	1	97.8
3/29/16	USB80160329-01	0	14778	73,190	N/A	1.0	Spoils # 3 (2014)	4	0	98.2
3/30/16	USB80160329-02	0	14778	87,968	N/A	1.0	Spoils # 3 (2014)	4	0	97.4
3/30/16	USB80160330-00	1	14778	102,746	N/A	1.0	Spoils # 3 (2014)	4	1	97.5
3/31/16	USB80160331-00	2	14777	117,523	N/A	1.0	16-0100	4	0	92.8
<p>Average CAES Screen Passing Pixels (%)= N/A Total Quantity Approved (yd³) = 117,523 Total # of Nuclear Density Gauge Tests = 32 Total # of Moisture Tests = 4 Quantity per Moisture Test (yd³) = 29,381 Total Average Thickness (ft)= 1.0</p>										

Appendix A8. Spoils Embankment Lift Approval Summaries (*continued*)

April 2016										
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd ³)	Cumulative Quantity Approved (yd ³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID #	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
4/1/16	USB80160401-00	1	14777	14,777	N/A	1.0	16-0100	4	0	95.3
4/4/16	USB80160404-00	0	14777	29,554	N/A	1.0	16-0100	4	0	92.1
4/5/16	USB80160405-00	0	14777	44,331	N/A	1.0	16-0100	4	0	94.2
4/6/16	USB80160406-00	1	14777	59,108	N/A	1.0	16-0100	4	1	94.2
4/7/16	USB80160407-00	0	14777	73,885	N/A	1.0	16-0100	4	0	92.5
4/11/16	USB80160411-00	0	14778	88,663	N/A	1.0	Top Soil	4	0	94.7
4/12/16	USB80160412-00	1	14778	103,441	N/A	1.0	Spoils # 3(2014)	4	0	95.7
4/13/16	USB80160413-00	0	14778	118,219	N/A	1.0	16-0100	4	0	96.9
4/14/16	USB80160414-00	1	14778	132,997	N/A	1.0	Spoils #	4	1	98.2
4/15/16	USB80160414-01	0	13902	146,899	N/A	1.0	16-0100, 16-0140	4	0	96.2
4/15/16	USB80160415-00	1	13902	160,801	N/A	1.0	16-0142, 16-0140	4	0	92.6
4/15/16	USB80160415-01	0	13902	174,703	N/A	1.0	16-0142	4	0	93.1
4/18/16	USB80160418-00	2	13902	188,605	N/A	1.0	16-0140	4	1	92.7
4/19/16	USB80160419-00	0	13902	202,507	N/A	1.0	16-0142, 16-141	4	0	94.4
4/20/16	USB80160420-00	1	13902	216,409	N/A	1.0	16-0142	4	0	94.7
4/21/16	USB80160421-00	0	13902	230,311	N/A	1.0	16-0142, 16-0140	4	0	94.1
4/22/16	USH68160421-00	1	7319	237,630	N/A	1.0	16-0142	2	1	93.1
4/25/16	USB80160422-00	0	13902	251,532	N/A	1.0	16-0142	4	0	94.6
4/25/16	USB80160425-00	0	13902	265,434	N/A	1.0	16-0142	4	0	95.8
4/26/16	USB80160426-00	2	18333	283,767	N/A	1.0	16-0142	5	0	94.0
4/27/16	USB80160427-00	1	18333	302,100	N/A	1.0	16-0142	5	1	94.8
4/28/16	USB80160428-00	0	18333	320,433	N/A	1.0	16-0142, 16-0140	5	0	95.3
4/29/16	USB80160429-00	1	18333	338,766	N/A	1.0	16-0140	5	0	94.2
<p>Average CAES Screen Passing Pixels (%)= N/A Total Quantity Approved (yd³) = 338,776 Total # of Nuclear Density Gauge Tests = 94 Total # of Moisture Tests = 13 Quantity per Moisture Test (yd³) = 26,060 Total Average Thickness (ft)= 1.0</p>										

Appendix A8. Spoils Embankment Lift Approval Summaries (*continued*)

May 2016										
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd ³)	Cumulative Quantity Approved (yd ³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID #	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
5/2/16	USB80160502-00	0	18333	18,333	N/A	1.0	16-0140, 16-0142	5	0	94.2
5/3/16	USB80160503-00	1	18333	36,666	N/A	1.0	16-0140, 16-0142	5	1	101.6
5/4/16	USF56160504-00	0	3333	39,999	N/A	1.0	Spoils # 1 (2016)	1	0	99.0
5/4/16	USF56160504-01	0	3333	43,332	N/A	1.0	Spoils # 1 (2016)	1	0	95.7
5/4/16	USF56160504-02	0	3333	46,665	N/A	1.0	Spoils # 1 (2016)	1	0	95.7
5/4/16	USF56160504-03	0	3333	49,998	N/A	1.0	Spoils # 1 (2016)	1	0	95.1
5/5/16	USB80160504-00	1	18333	68,331	N/A	1.0	Spoils # 1 (2016) Spoils # 19 (2016)	5	0	99.2
5/9/16	USF56160505-00	0	10963	79,294	N/A	1.0	Spoils # 19 (2016)	3	0	94.3
5/10/16	USF56160510-00	0	10963	90,257	N/A	1.0	Spoils # 19 (2016)	3	0	93.7
5/12/16	USF56160511-00	0	10963	101,220	N/A	1.0	16-0138	3	0	94.9
<p>Average CAES Screen Passing Pixels (%)= N/A Total Quantity Approved (yd³) = 101,220 Total # of Nuclear Density Gauge Tests = 28 Total # of Moisture Tests = 2 Quantity per Moisture Test (yd³) = 50,610 Total Average Thickness (ft)= 1.0</p>										

Appendix A8. Spoils Embankment Lift Approval Package

LIFT APPROVAL FORM

PROJECT: Moab UMTRA	OTHER: _____
NW CORNER	DATE: 4/27/2016

	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>P 1</td> <td>6797053 N, 21250187 E</td> </tr> <tr> <td>EW:</td> <td>1100 X .717 = 789'</td> </tr> <tr> <td>NS:</td> <td>90 X .134 = 12'</td> </tr> <tr> <td>P 2</td> <td>6796948 N, 2124844 E</td> </tr> <tr> <td>EW:</td> <td>1100 X .559 = 615'</td> </tr> <tr> <td>NS:</td> <td>90 X .296 = 27'</td> </tr> <tr> <td>P 3</td> <td>6796854 N, 2125209 E</td> </tr> <tr> <td>EW:</td> <td>1100 X .891 = 980'</td> </tr> <tr> <td>NS:</td> <td>90 X .347 = 31'</td> </tr> <tr> <td>P 4</td> <td>6796714 N, 2125308 E</td> </tr> <tr> <td>EW:</td> <td>1100 X .976 = 1074'</td> </tr> <tr> <td>NS:</td> <td>90 X .898 = 81'</td> </tr> <tr> <td>P 5</td> <td>6796661 N, 2125127 E</td> </tr> <tr> <td>EW:</td> <td>1100 X .816 = 898'</td> </tr> <tr> <td>NS:</td> <td>90 X .485 = 44'</td> </tr> <tr> <td>Page 2 attached:</td> <td style="text-align: center;">Y <input type="checkbox"/> N <input checked="" type="checkbox"/></td> </tr> </table>	P 1	6797053 N, 21250187 E	EW:	1100 X .717 = 789'	NS:	90 X .134 = 12'	P 2	6796948 N, 2124844 E	EW:	1100 X .559 = 615'	NS:	90 X .296 = 27'	P 3	6796854 N, 2125209 E	EW:	1100 X .891 = 980'	NS:	90 X .347 = 31'	P 4	6796714 N, 2125308 E	EW:	1100 X .976 = 1074'	NS:	90 X .898 = 81'	P 5	6796661 N, 2125127 E	EW:	1100 X .816 = 898'	NS:	90 X .485 = 44'	Page 2 attached:	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>
P 1	6797053 N, 21250187 E																																
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EW:	1100 X .816 = 898'																																
NS:	90 X .485 = 44'																																
Page 2 attached:	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>																																

IDENTIFY LOTS ABOVE

LIFT ID: USB80160427-00	NW CORNER: 6797065 N, 2124229 E
Uncompacted Thickness: ≤ 12"	Compacted Thickness: N/A
NW CORNER of debris placement: N/A	EW Dimension: N/A
Lift Area (ft ²): 495,000	Lift Volume (yd ³): 18,333

Debris Insp. By: **N/A** Date: **N/A** Time: **N/A**

NS Dimension: **N/A**

Comments: QC verified that the lift area was scarified prior to placement. QC performed a visual inspection and found the lift area to be less than or equal to 1' above the last approved lift. *QC performed a sand cone / moisture correlation test on this lift w/ satisfactory results.*

Attached Forms: Grid Slope **N/A** Compaction Macro **N/A** Print Screen **N/A** Moisture/ Density **X**

KEYING IN NOTES: N E S **W** **Satisfactory** MOISTURE/DENSITY TESTS ID # (S): **1, 2, 3, 4, and 5**

LIFT APPROVED BY: *Beachem Bosh / [Signature]* DATE: **04/27/2016** TIME: **17:10**

QA/QC APPROVAL: *[Signature]* DATE: **05-02-2016**

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Appendix A8. Spoils Embankment Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER _____																			
LIFT IDENTIFICATION: <u>USB80160427-00</u>	DATE: <u>4/27/2016</u>																		
TEST ID NUMBER(S): <u>#1</u>																			
TEST LOCATION: <u>P1</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> D6938																		
<p>ASTM D6938 (DENSITY DETERMINATION)</p> <p>Make/Model <u>Troytek 3430</u> Gauge Serial # <u>38098</u> Last Calibration Date: <u>11/24/15</u></p> <p>Daily Standard Counts: Density <u>2208</u> Moisture <u>669</u> <input checked="" type="checkbox"/> Method A (Direct Transmission) or <input type="checkbox"/> Method B (Backscatter) Depth Setting <u>60</u> (inches) Count Time <u>1</u> (minutes)</p> <p>Moisture Count <u>137</u> Density Count <u>1960</u></p> <p>Wet Density (ρ_m) <u>125.2</u> (lbs/ft³) Dry Density <u>114.3</u> (lbs/ft³) Moisture Density <u>10.9</u> (lbs/ft³) Moisture Fraction <u>9.5</u> (%)</p>	<p>ASTM D1556 (DENSITY DETERMINATION)</p> <p>Testing Apparatus _____ Calibrated Vol. (lbs/ft³) _____ Bulk Density of sand (ρ_1) _____ g/cm³ _____ lbs/ft³ Mass of Sand to Fill Cone & Plate (M_2) _____ g</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>Mass of bottle & cone before filling</td><td>g</td></tr> <tr><td> conc. plate & hole</td><td>g</td></tr> <tr><td>Mass of bottle & cone after filling</td><td>g</td></tr> <tr><td> conc. plate & hole</td><td>g</td></tr> <tr><td>Mass of sand to fill cone, plate, & hole (M_1)</td><td>g</td></tr> <tr><td>Mass of sand to fill hole</td><td>g</td></tr> <tr><td>Mass of wet soil & container</td><td>g</td></tr> <tr><td> Mass of container</td><td>g</td></tr> <tr><td> Mass of wet soil (M_3)</td><td>g</td></tr> </table> <p>Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ cm³</p> <p>Dry Mass of soil $M_d = 100 M_3 / (w + 100)$ _____ g</p> <p>Wet Density $\rho_m = (M_3 / V) \times 62.43$ _____ lbs/ft³</p> <p>Dry Density $\rho_d = M_d / V$ _____ g/cm³</p> <p>Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ lbs/ft³</p> <p>Soil Description: <u>Grey Clay</u> Proctor ID: <u>16-0142</u> Standard Proctor (ASTM D698)</p> <p>Maximum Dry Density (γ_{dmax}) <u>119.0</u> (lbs/ft³) Optimum Moisture (w_{opt}) <u>12.5</u> (%) Required Moisture: <u>7.5</u> % to <u>17.5</u> % Required Percent Compaction: <u>90.0</u> (%)</p>	Mass of bottle & cone before filling	g	conc. plate & hole	g	Mass of bottle & cone after filling	g	conc. plate & hole	g	Mass of sand to fill cone, plate, & hole (M_1)	g	Mass of sand to fill hole	g	Mass of wet soil & container	g	Mass of container	g	Mass of wet soil (M_3)	g
Mass of bottle & cone before filling	g																		
conc. plate & hole	g																		
Mass of bottle & cone after filling	g																		
conc. plate & hole	g																		
Mass of sand to fill cone, plate, & hole (M_1)	g																		
Mass of sand to fill hole	g																		
Mass of wet soil & container	g																		
Mass of container	g																		
Mass of wet soil (M_3)	g																		
<p>MOISTURE DETERMINATION ASTM D4643</p> <p>Container ID _____ Scale Serial # _____ Last Calibration Date: _____</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>Mass of container & wet specimen (M_{cms})</td><td>g</td></tr> <tr><td>Mass of container & dry specimen ($M_{c ds}$)</td><td>g</td></tr> <tr><td>Mass of water (M_w)</td><td>g</td></tr> <tr><td>$M_w = M_{cms} - M_{c ds}$</td><td>g</td></tr> <tr><td>Mass of container (M_c)</td><td>g</td></tr> <tr><td>Mass of dry specimen (M_s)</td><td>g</td></tr> <tr><td>$M_s = M_{c ds} - M_c$</td><td>g</td></tr> <tr><td>Moisture content (w)</td><td>%</td></tr> <tr><td>$w = (M_w / M_s) \times 100$</td><td>%</td></tr> </table>		Mass of container & wet specimen (M_{cms})	g	Mass of container & dry specimen ($M_{c ds}$)	g	Mass of water (M_w)	g	$M_w = M_{cms} - M_{c ds}$	g	Mass of container (M_c)	g	Mass of dry specimen (M_s)	g	$M_s = M_{c ds} - M_c$	g	Moisture content (w)	%	$w = (M_w / M_s) \times 100$	%
Mass of container & wet specimen (M_{cms})	g																		
Mass of container & dry specimen ($M_{c ds}$)	g																		
Mass of water (M_w)	g																		
$M_w = M_{cms} - M_{c ds}$	g																		
Mass of container (M_c)	g																		
Mass of dry specimen (M_s)	g																		
$M_s = M_{c ds} - M_c$	g																		
Moisture content (w)	%																		
$w = (M_w / M_s) \times 100$	%																		
<p>Dry Density (ρ_d) = $(100 \times \rho_m) / (100 + w)$ $\rho_d = (100 \times 125.2) / (100 + 9.5) = 114.3$ lbs/ft³ Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m)</p> <p>Percent Compaction = $\rho_d / \gamma_{dmax} \times 100$ $114.3 / 119.0 \times 100 = 96.0$ %</p>																			
<p>Comments: <u>4</u> <u>04/27/2016 BB</u></p>																			
<p>TEST RESULTS: <input checked="" type="checkbox"/> Pass Date: <u>4/27/2016</u> <input type="checkbox"/> Failed Moisture <input type="checkbox"/> Failed Compaction Time: <u>08:15</u> By: <u>Beachum Bosh</u> (print) <u>[Signature]</u> (signature)</p>																			
<p><u>[Signature]</u> QA/QC APPROVAL</p>	<p><u>05-07-2016</u> DATE</p>																		

Density Testing
 DOE-EM/GJRAC1783

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Appendix A8. Spoils Embankment Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER: _____	
LIFT IDENTIFICATION: <u>USB80160427-00</u>	DATE: <u>4/27/2016</u>
TEST ID NUMBER(S): <u>#2</u>	
TEST LOCATION: <u>P2</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> <u>D6938</u>
<p>ASTM D6938 (DENSITY DETERMINATION)</p> <p>Make/Model <u>Troxler/3430</u> Gauge Serial # <u>28098</u></p> <p>Last Calibration Date: <u>11/24/15</u></p> <p>Daily Standard Counts:</p> <p>Density <u>2208</u> Moisture <u>669</u></p> <p><input checked="" type="checkbox"/> Method A (Direct Transmission) or <input type="checkbox"/> Method B (Backscatter)</p> <p>Depth Setting <u>6</u> (inches) Count Time <u>1</u> (minutes)</p> <p>Moisture Count <u>146</u> Density Count <u>1956</u></p> <p>Wet Density (ρ_m) <u>125.3</u> (lbs/ft³) Dry Density <u>113.5</u> (lbs/ft³)</p> <p>Moisture Density <u>11.8</u> (lbs/ft³) Moisture Fraction <u>10.4</u> (%)</p>	<p>ASTM D1556 (DENSITY DETERMINATION)</p> <p>Testing Apparatus _____ Calibrated Vol. (lbs/ft³) _____</p> <p>Bulk Density of sand (ρ_1) _____ g/cm³ _____ lbs/ft³</p> <p>Mass of Sand to Fill Cone & Plate (M_2) _____ g</p> <p>Mass of bottle & cone before filling _____ g</p> <p>Mass of bottle & cone after filling _____ g</p> <p>Mass of sand to fill cone, plate, & hole (M_1) _____ g</p> <p>Mass of sand to fill hole _____ g</p> <p>Mass of wet soil & container _____ g</p> <p>Mass of container _____ g</p> <p>Mass of wet soil (M_3) _____ g</p> <p>Test Hole Volume <u>N/A</u> _____ cm³</p> <p>$V = (M_1 - M_2) / \rho_1$</p> <p>Dry Mass of soil <u>N/A</u></p> <p>$M_4 = 100 M_3 / (w + 100)$ _____ g</p> <p>Wet Density _____ lbs/ft³</p> <p>$\rho_m = (M_3 / V) \times 62.43$</p> <p>Dry Density _____ g/cm³</p> <p>$\rho_d = M_4 / V$</p> <p>Dry Unit Weight _____ lbs/ft³</p> <p>$\gamma_d = \rho_d \times 62.43$</p>
<p>MOISTURE DETERMINATION</p> <p>ASTM D4643</p>	
Container ID _____	Last Calibration Date: _____
Scale Serial # _____	
Mass of container & wet specimen (M_{ws}) _____ g	
Mass of container & dry specimen (M_{cbs}) _____ g	
Mass of water (M_w) _____ g	
$M_w = M_{ws} - M_{cbs}$ _____ g	
Mass of container (M_c) _____ g	
Mass of dry specimen (M_s) _____ g	
$M_s = M_{cbs} - M_c$ _____ g	
Moisture content (w) _____ %	
$w = (M_w / M_s) \times 100$	
<p>Dry Density ($\rho_d = (100 \times \rho_m) / (100 + w)$) <u>113.45</u> lbs/ft³</p> <p>$\rho_d = (100 \times 125.3) / (100 + 10.4) = 113.45$ lbs/ft³</p> <p>Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m)</p> <p>Percent Compaction = $\rho_d / \gamma_{dmax} \times 100$</p> <p>$113.45 / 119.0 \times 100 = 95.3$ %</p>	
<p>Soil Description: <u>Grey Clay</u></p> <p>Proctor ID: <u>16-0142</u></p> <p>Standard Proctor (ASTM D698)</p> <p>Maximum Dry Density (γ_{dmax}) <u>119.0</u> (lbs/ft³)</p> <p>Optimum Moisture (w_{opt}) <u>12.5</u> (%)</p> <p>Required Moisture: <u>7.5</u> % to <u>17.5</u> %</p> <p>Required Percent Compaction: <u>90.0</u> (%)</p>	
Comments:	TEST RESULTS:
<u>N/A</u>	<input checked="" type="checkbox"/> Pass Date: <u>4/27/2016</u>
	<input type="checkbox"/> Failed Moisture
	<input type="checkbox"/> Failed Compaction Time: <u>09:30</u>
	By: <u>Beachum Bush</u> (signature)
	(print)
QA/QC APPROVAL: _____	DATE: <u>05-01-2016</u>

Density Testing
DOE-EM/GJRAC1783

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Appendix A8. Spoils Embankment Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER: _____																			
LIFT IDENTIFICATION: <u>USB8016042700</u> DATE: <u>4/27/2016</u>																			
TEST ID NUMBER(S): <u>#4</u>																			
TEST LOCATION: <u>P4</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> <u>D6938</u>																		
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>ASTM D6938 (DENSITY DETERMINATION)</p> <p>Make/Model: <u>3420 Trodes/3430</u> Gauge Serial #: <u>28098</u></p> <p>Last Calibration Date: <u>11/24/15</u></p> <p>Daily Standard Counts:</p> <p>Density: <u>2208</u> Moisture: <u>1069</u></p> <p><input checked="" type="checkbox"/> Method A (Direct Transmission) or <input type="checkbox"/> Method B (Backscatter)</p> <p>Depth Setting: <u>6</u> (inches) Count Time: <u>1</u> (minutes)</p> <p>Moisture Count: <u>138</u> Density Count: <u>2114</u></p> <p>Wet Density (ρ_m): <u>121.9</u> (lbs/ft³) Dry Density: <u>110.9</u> (lbs/ft³)</p> <p>Moisture Density: <u>11.0</u> (lbs/ft³) Moisture Fraction: <u>9.9</u> (%)</p> </div> <div style="width: 48%;"> <p>ASTM D1556 (DENSITY DETERMINATION)</p> <p>Testing Apparatus: _____ Calibrated Vol. (lbs/ft³): _____</p> <p>Bulk Density of sand (ρ_1): _____ g/cm³ _____ lbs/ft³</p> <p>Mass of Sand to Fill Cone & Plate (M_2): _____</p> <p>Mass of bottle & cone before filling cone, plate & hole: _____ g</p> <p>Mass of bottle & cone after filling cone, plate & hole: _____ g</p> <p>Mass of sand to fill cone, plate, & hole (M_1): _____ g</p> <p>Mass of sand to fill hole: _____ g</p> <p>Mass of wet soil & container: _____ g</p> <p>Mass of container: _____ g</p> <p>Mass of wet soil (M_3): _____ g</p> <p>Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ cm³</p> <p>Dry Mass of soil $M_4 = 100 M_3 / (w + 100)$ _____ g</p> <p>Wet Density $\rho_m = (M_3 / V) \times 62.43$ _____ lbs/ft³</p> <p>Dry Density $\rho_d = M_4 / V$ _____ g/cm³</p> <p>Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ lbs/ft³</p> </div> </div>																			
<p style="text-align: center;">MOISTURE DETERMINATION ASTM D4643</p> <p>Container ID: _____</p> <p>Scale Serial #: _____ Last Calibration Date: _____</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>Mass of container & wet specimen (M_{cms})</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of container & dry specimen (M_{cbs})</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of water (M_w)</td> <td style="text-align: right;">g</td> </tr> <tr> <td>$M_w = M_{cms} - M_{cbs}$</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of container (M_c)</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Mass of dry specimen (M_s)</td> <td style="text-align: right;">g</td> </tr> <tr> <td>$M_s = M_{cbs} - M_c$</td> <td style="text-align: right;">g</td> </tr> <tr> <td>Moisture content (w)</td> <td style="text-align: right;">%</td> </tr> <tr> <td>$w = (M_w / M_s) \times 100$</td> <td style="text-align: right;">%</td> </tr> </table>		Mass of container & wet specimen (M_{cms})	g	Mass of container & dry specimen (M_{cbs})	g	Mass of water (M_w)	g	$M_w = M_{cms} - M_{cbs}$	g	Mass of container (M_c)	g	Mass of dry specimen (M_s)	g	$M_s = M_{cbs} - M_c$	g	Moisture content (w)	%	$w = (M_w / M_s) \times 100$	%
Mass of container & wet specimen (M_{cms})	g																		
Mass of container & dry specimen (M_{cbs})	g																		
Mass of water (M_w)	g																		
$M_w = M_{cms} - M_{cbs}$	g																		
Mass of container (M_c)	g																		
Mass of dry specimen (M_s)	g																		
$M_s = M_{cbs} - M_c$	g																		
Moisture content (w)	%																		
$w = (M_w / M_s) \times 100$	%																		
<p>Dry Density ($\rho_d = (100 \times \rho_m) / (100 + w)$)</p> <p>$\rho_d = (100 \times 121.9) / (100 + 9.9) = 110.9$ lbs/ft³</p> <p><small>Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m)</small></p> <p>Percent Compaction = $\rho_d / \gamma_{d,max} \times 100$</p> <p>$110.9 / 119.0 \times 100 = 93.2$ %</p>																			
<p>Soil Description: <u>Grey Clay</u></p> <p>Proctor ID: <u>16-0142</u></p> <p>Standard Proctor (ASTM D698)</p> <p>Maximum Dry Density ($\gamma_{d,max}$): <u>119.0</u> (lbs/ft³)</p> <p>Optimum Moisture (w_{opt}): <u>12.5</u> (%)</p> <p>Required Moisture: <u>7.5</u> % to <u>17.5</u> %</p> <p>Required Percent Compaction: <u>90.0</u> (%)</p>																			
<p>Comments:</p> <p><u>04/27/2016 BB</u> <u>NA</u></p>	<p>TEST RESULTS:</p> <p><input checked="" type="checkbox"/> Pass Date: <u>4/27/2016</u></p> <p><input type="checkbox"/> Failed Moisture</p> <p><input type="checkbox"/> Failed Compaction Time: <u>11:10</u></p> <p>By: <u>Beacham Bosh</u> (print) <u>[Signature]</u> (signature)</p>																		
<p><u>[Signature]</u></p> <p>QA/QC APPROVAL</p>	<p><u>05-02-2016</u></p> <p>DATE</p>																		

Density Testing
DOE-EM/GJRAC1783

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Appendix A8. Spoils Embankment Lift Approval Package (continued)

FIELD DENSITY TEST

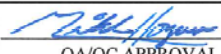
PROJECT: <u>Moab UMTRA Project</u> OTHER _____	
LIFT IDENTIFICATION: <u>USB80160427-00</u>	DATE: <u>4/27/2016</u>
TEST ID NUMBER(S): <u>#4</u>	
TEST LOCATION: <u>P4</u>	TEST METHOD: <u>D1556</u> <input checked="" type="checkbox"/> <u>D6938</u>
ASTM D6938 (DENSITY DETERMINATION) Make/Model <u>Foxler/3430</u> Gauge Serial # <u>28098</u> Last Calibration Date: <u>11/24/15</u> Daily Standard Counts: Density <u>2208</u> Moisture <u>669</u> <input checked="" type="checkbox"/> Method A (Direct Transmission) or _____ Method B (Backscatter) Depth Setting <u>02</u> (inches) Count Time <u>1</u> (minutes) Moisture Count <u>135</u> Density Count <u>2130</u> Wet Density (ρ_m) <u>121.5</u> (lbs/ft ³) Dry Density <u>110.8</u> (lbs/ft ³) Moisture Density <u>10.7</u> (lbs/ft ³) Moisture Fraction <u>9.7</u> (%)	ASTM D1556 (DENSITY DETERMINATION) Testing Apparatus _____ Calibrated Vol. (lbs/ft ³) _____ Bulk Density of sand (ρ_1) _____ g/cm ³ _____ lbs/ft ³ Mass of Sand to Fill Cone & Plate (M_2) _____ g Mass of bottle & cone before filling _____ g Mass of bottle & cone after filling _____ g Mass of sand to fill cone, plate, & hole (M_1) _____ g Mass of sand to fill hole _____ g Mass of wet soil & container _____ g Mass of container _____ g Mass of wet soil (M_3) _____ g Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ cm ³ Dry Mass of soil $M_d = 100 M_3 / (w + 100)$ _____ g Wet Density $\rho_m = (M_3 / V) \times 62.43$ _____ lbs/ft ³ Dry Density $\rho_d = M_d / V$ _____ g/cm ³ Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ lbs/ft ³
MOISTURE DETERMINATION ASTM D4643 Container ID _____ Scale Serial # _____ Last Calibration Date: _____ Mass of container & wet specimen (M_{cms}) <u>NA</u> g Mass of container & dry specimen (M_{cbs}) _____ g Mass of water (M_w) _____ g $M_w = M_{cms} - M_{cbs}$ Mass of container (M_c) _____ g Mass of dry specimen (M_s) _____ g $M_s = M_{cbs} - M_c$ Moisture content (w) _____ % $w = (M_w / M_s) \times 100$	Soil Description: <u>Grey Clay</u> Proctor ID: <u>16-0142</u> Standard Proctor (ASTM D698) Maximum Dry Density ($\gamma_{d,max}$) <u>119.0</u> (lbs/ft ³) Optimum Moisture (w_{opt}) <u>12.5</u> (%) Required Moisture: <u>7.5</u> % to <u>17.5</u> % Required Percent Compaction: <u>90.0</u> (%)
Dry Density ($\rho_d = (100 \times \rho_m) / (100 + w)$) $\rho_d = (100 \times 121.5) / (100 + 9.7) = 110.8$ lbs/ft ³ Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m) Percent Compaction = $\rho_d / \gamma_{d,max} \times 100$ $110.8 / 119.0 \times 100 = 93.0$ %	TEST RESULTS: <input checked="" type="checkbox"/> Pass Date: <u>4/27/2016</u> <input type="checkbox"/> Failed Moisture <input type="checkbox"/> Failed Compaction Time: <u>1430</u> By: <u>Beahem Bosh</u> (print) _____ (signature)
Comments: <u>04/27/2016 BB</u> <u>NA</u>	QA/QC APPROVAL: _____ DATE: <u>05-02-2016</u>

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Appendix A8. Spoils Embankment Lift Approval Package (continued)

FIELD DENSITY TEST

PROJECT: <u>Moab UMTRA Project</u> OTHER _____																												
LIFT IDENTIFICATION: <u>USB 80160427-00</u> DATE: <u>4/27/2016</u>																												
TEST ID NUMBER(S): <u>#5</u>																												
TEST LOCATION: <u>P5</u> TEST METHOD: <input checked="" type="checkbox"/> D1556 <input checked="" type="checkbox"/> D6938																												
<p>ASTM D6938 (DENSITY DETERMINATION)</p> <p>Make/Model <u>Troxler 3430</u> Gauge Serial # <u>28098</u> Last Calibration Date: <u>11/24/15</u> Daily Standard Counts: Density <u>2208</u> Moisture <u>669</u> <input checked="" type="checkbox"/> Method A (Direct Transmission) or _____ Method B (Backscatter) Depth Setting <u>0</u> (inches) Count Time <u>1</u> (minutes) Moisture Count <u>134</u> Density Count <u>2022</u> Wet Density (ρ_m) <u>123.9</u> (lbs/ft³) Dry Density <u>113.2</u> (lbs/ft³) Moisture Density <u>10.6</u> (lbs/ft³) Moisture Fraction <u>9.4</u> (%)</p>	<p>ASTM D1556 (DENSITY DETERMINATION)</p> <p>Testing Apparatus <u>Ω</u> Calibrated Vol. (lbs/ft³) <u>0.0473</u> Bulk Density of sand (ρ_1) <u>1.48</u> g/cm³ <u>92.1</u> lbs/ft³ Mass of Sand to Fill Cone & Plate (M_2) <u>1977.4</u> g</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Mass of bottle & cone before filling</td><td style="text-align: right;">6401.6</td><td style="text-align: right;">g</td></tr> <tr><td>cone, plate & hole</td><td></td><td></td></tr> <tr><td>Mass of bottle & cone after filling</td><td style="text-align: right;">2101.9</td><td style="text-align: right;">g</td></tr> <tr><td>cone, plate & hole</td><td></td><td></td></tr> <tr><td>Mass of sand to fill cone, plate, & hole (M_1)</td><td style="text-align: right;">4299.7</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of sand to fill hole</td><td style="text-align: right;">2322.3</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of wet soil & container</td><td style="text-align: right;">3218.8</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of container</td><td style="text-align: right;">9.1</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of wet soil (M_3)</td><td style="text-align: right;">3209.7</td><td style="text-align: right;">g</td></tr> </table> <p>Test Hole Volume $V = (M_1 - M_2) / \rho_1$ <u>1574</u> cm³</p> <p>Dry Mass of soil $M_d = 100 M_3 / (w + 100)$ <u>2893.0</u> g Wet Density $\rho_m = (M_3 / V) \times 62.43$ <u>127.3</u> lbs/ft³ Dry Density $\rho_d = M_d / V$ <u>1.8</u> g/cm³ Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ <u>114.7</u> lbs/ft³</p>	Mass of bottle & cone before filling	6401.6	g	cone, plate & hole			Mass of bottle & cone after filling	2101.9	g	cone, plate & hole			Mass of sand to fill cone, plate, & hole (M_1)	4299.7	g	Mass of sand to fill hole	2322.3	g	Mass of wet soil & container	3218.8	g	Mass of container	9.1	g	Mass of wet soil (M_3)	3209.7	g
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Mass of wet soil (M_3)	3209.7	g																										
MOISTURE DETERMINATION ASTM D4643																												
Container ID <u>216</u>																												
Scale Serial # <u>14715630</u> Last Calibration Date: <u>11/30/15</u>																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Mass of container & wet specimen (M_{cms})</td><td style="text-align: right;">502.1</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of container & dry specimen (M_{cbs})</td><td style="text-align: right;">473.9</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of water (M_w) $M_w = M_{cms} - M_{cbs}$</td><td style="text-align: right;">28.2</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of container (M_c)</td><td style="text-align: right;">216.3</td><td style="text-align: right;">g</td></tr> <tr><td>Mass of dry specimen (M_s) $M_s = M_{cbs} - M_c$</td><td style="text-align: right;">257.6</td><td style="text-align: right;">g</td></tr> <tr><td>Moisture content (w) $w = (M_w / M_s) \times 100$</td><td style="text-align: right;">10.9</td><td style="text-align: right;">%</td></tr> </table>	Mass of container & wet specimen (M_{cms})	502.1	g	Mass of container & dry specimen (M_{cbs})	473.9	g	Mass of water (M_w) $M_w = M_{cms} - M_{cbs}$	28.2	g	Mass of container (M_c)	216.3	g	Mass of dry specimen (M_s) $M_s = M_{cbs} - M_c$	257.6	g	Moisture content (w) $w = (M_w / M_s) \times 100$	10.9	%	<p>Soil Description: <u>Grey Clay</u> Proctor ID: <u>16-0142</u> Standard Proctor (ASTM D698) Maximum Dry Density ($\gamma_d max$) <u>119.0</u> (lbs/ft³) Optimum Moisture (w_{opt}) <u>12.5</u> (%) Required Moisture: <u>7.5</u> % to <u>17.5</u> % Required Percent Compaction: <u>90.0</u> (%)</p>									
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<p>Dry Density ($\rho_d = (100 \times \rho_m) / (100 + w)$) $\rho_d = (100 \times 127.3) / (100 + 10.9) = 114.7$ lbs/ft³ <small>Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m)</small> Percent Compaction = $\rho_d / \gamma_d max \times 100$ $114.7 / 119.0 \times 100 = 96.4$ %</p>																												
<p>Comments: <u>Microwave oven power setting on high. Initial time setting 3 minutes & subsequent incremental drying periods of 1 minute until a change of 0.1% or less of the initial wet mass of the soil.</u></p>	<p>TEST RESULTS: <input checked="" type="checkbox"/> Pass Date: <u>4/27/2016</u> <input type="checkbox"/> Failed Moisture <input type="checkbox"/> Failed Compaction Time: <u>16:55</u> By: <u>Beachum Bosh</u> (print) <u>[Signature]</u> (signature)</p>																											
 QA/QC APPROVAL	<u>05-02-2016</u> DATE																											

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