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NOTE: Appendices A1 and A3 through A7 are not included as they are not relevant to the period covered in this Addendum.

Appendix A2. RRM

Standard Proctor Test Results Summary Lift Approval Summaries Lift Approval Package

Appendix A2. RRM Standard Proctor Test Results Summary

Set	Proctor ID#	Date Sampled	Date Approved	Maximum Dry Density (lb/ft ³)	Optimum Moisture Content (%)	Soils Description
	RRM # 505	12/08/16	12/19/16	107.6	18.5	Light brown sandy clay. Drying bed 4, E-1
SET 167	RRM # 506	12/08/16	12/19/16	110.3	18.0	Light brown sandy clay. Drying bed 4, E-3
ν	RRM # 507	12/08/16	12/19/16	109.4	18.5	Light brown sandy clay. Drying bed 4, E-2
m	RRM # 508	12/08/16	12/19/16	113.0	15.7	Light brown sandy clay. Drying bed 4, W-1
SET 168	RRM # 509	12/08/16	12/19/16	114.0	14.6	Light brown sandy clay. Drying bed 4, W-2
6	RRM # 510	12/08/16	12/19/16	115.8	14.8	Light brown sandy clay. Drying bed 4, W-3
	RRM # 511	03/02/17	03/20/17	108.8	17.0	Drying bed # 5. Light brown sandy clay.
SET 169	RRM # 512	03/02/17	03/20/17	111.4	17.1	Drying bed # 5. Light brown sandy clay.
0,	RRM # 513	03/02/17	03/20/17	112.7	17.8	Drying bed # 5. Light brown sandy clay.
	RRM # 514	06/27/17	07/25/17	110.6	18.8	Drying bed # 3 west. Brown sandy clay.
SET 170	RRM # 515	06/27/17	07/25/17	107.7	18.2	Drying bed #3 mid. Brown sandy clay.
0,	RRM # 516	06/27/17	07/25/17	112.2	16.5	Drying bed # 3 east. Brown sandy clay.
	RRM # 517	06/27/17	07/25/17	112.5	16.9	Drying bed # 6 south. Brown sandy clay.
SET 171	RRM # 518	06/27/17	07/25/17	111.2	16.5	Drying bed # 6 north. Brown sandy clay.
, , , , , , , , , , , , , , , , , , ,	RRM # 519	06/27/17	07/25/17	106.4	18.3	Drying bed # 6 mid. Brown sandy clay.

Appendix A2. RRM Lift Approval Summaries

				October 2016						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
10/3/16	UWY27160927-00	1	610	610	99.6	0.7	489	0	0	N/A
10/5/16	UWY27161004-00	2	858	1,468	98.4	1.0	489	0	0	N/A
10/6/16	UWY24161004-00	1	2,342	3,810	97.4	1.0	489	0	0	N/A
10/6/16	UWY27161006-00	1	773	4,583	98.8	0.9	489	0	0	N/A
10/11/16	UWY24161006-00	0	2,108	6,691	99.7	0.9	N/A	0	0	N/A
10/11/16	UW1F24161011-00	1	1,406	8,097	99.7	0.9	489	0	0	N/A
10/17/16	UWY24161011-00	1	2,745	10,842	99.1	0.9	489	0	0	N/A
10/18/16	UW1F24161016-00	1	1,657	12,499	99.5	1.0	489	0	0	N/A
10/19/16	UWY24161018-00	1	3,050	15,549	99.6	1.0	489	0	0	N/A
10/20/16	UW1F24161020-00	1	1,607	17,156	99.6	1.0	489	0	0	N/A
10/24/16	UW1E30161020-00	0	660	17,816	99.1	0.7	N/A	0	0	N/A
10/31/16	UWY24161020-00	1	2,749	20,565	99.2	0.9	489	0	0	N/A
10/31/16	UW1F24161027-00	1	1,285	21,850	97.6	0.8	489	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.0

Total Quantity Approved (yd³) = 21,850

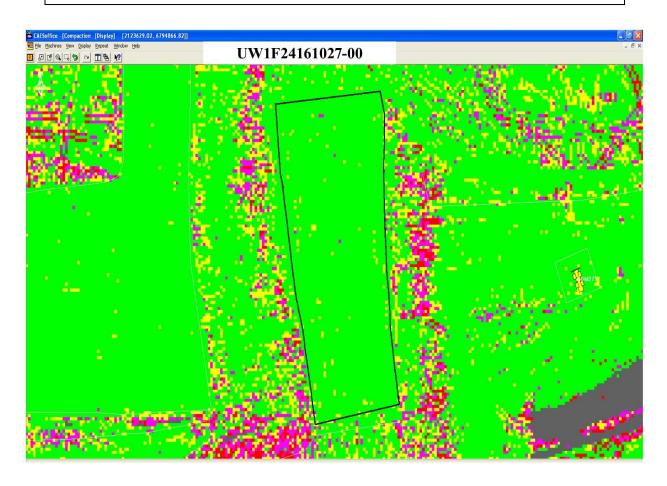
Total # of Nuclear Density Gauge Tests = 0

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd³) = 1,821

Total Average Thickness (ft)= 0.9

CAES compaction screen example from October 2016. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



			N	lovember 2016	5					
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
11/2/16	UW1E30161031-00	1	625	625	98.4	0.6	489	0	0	N/A
11/2/16	UWY24161101-00	1	2,681	3,306	99.7	0.9	489	0	0	N/A
11/3/16	UW1F24161101-00	0	1,575	4,881	99.3	0.9	N/A	0	0	N/A
11/7/16	UWY24161103-00	1	2,085	6,966	99.1	0.7	489	0	0	N/A
11/9/16	UWY24161108-00	1	2,681	9,647	99.5	0.9	489	0	0	N/A
11/10/16	UW1E30161110-00	0	833	10,480	99.2	0.8	N/A	0	0	N/A
11/18/16	UWY24161110-00	3	3,132	13,612	N/A	1.0	489	2	0	92.4
11/18/16	UW1F24161115-00	2	1,784	15,396	N/A	1.0	489	1	0	93.8
11/29/16	UWY24161118-00	3	2,506	17,902	N/A	0.8	489	0	2	97.4

Average CAES Screen Passing Pixels (%)= 99.2 Total Quantity Approved (yd³) = 17,902

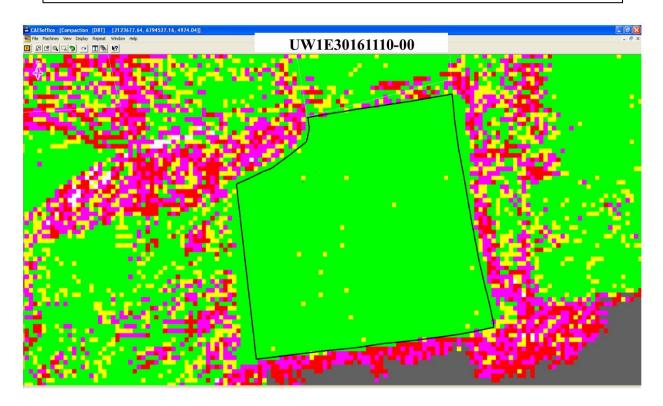
Total # of Nuclear Density Gauge Tests = 3

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd^3) = 1,492

Total Average Thickness (ft)= 0.8

CAES compaction screen example from November 2016. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been



			C	ecember 2016	;					
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
12/1/16	UW1I24161123-00	1	1,315	1,315	98.9	0.7	489	0	0	N/A
12/1/16	UWY27161129-00	1	915	2,230	99.1	0.7	489	1	0	93.4
12/5/16	UWZ20161201-00	0	618	2,848	98.5	0.8	N/A	0	0	N/A
12/5/16	UWY24161201-00	1	1,206	4,054	99.2	0.6	489	0	0	N/A
12/5/16	UW1I24161201-00	1	2,195	6,249	99.1	1.0	489	0	0	N/A
12/7/16	UW1E30161115-00	1	1,069	7,318	98.2	0.9	489	0	0	N/A
12/7/16	UW1F24161121-00	1	1,488	8,806	98.7	0.8	489	0	0	N/A
12/8/16	UWZ20161208-00	1	1,488	10,294	99.6	0.8	489	0	0	N/A
12/8/16	UWY24161206-00	0	2,010	12,304	99.2	1.0	N/A	0	0	N/A
12/12/16	UW1E30161208-00	0	1,069	13,373	98.8	0.9	N/A	0	0	N/A
12/12/16	UWY27161205-00	1	996	14,369	98.2	0.9	489	0	0	N/A
12/14/16	UW1F24161208-00	0	1,674	16,043	98.0	0.9	N/A	0	0	N/A
12/15/16	UW1E30161213-00	0	950	16,993	98.8	0.8	N/A	0	0	N/A
12/15/16	UWY27161213-00	1	775	17,768	98.8	0.7	450	0	0	N/A
12/19/16	UWY24161215-00	0	2,010	19,778	99.8	1.0	N/A	0	0	N/A
12/19/16	UWZ20161215-00	0	772	20,550	99.7	1.0	N/A	0	0	N/A
12/20/16	UWZ20161220-00	1	716	21,266	98.8	0.9	489	0	0	N/A
12/22/16	UWY24161220-00	0	2,066	23,332	99.0	1.0	N/A	0	0	N/A
12/28/16	UWY27161222-00	1	1,144	24,476	98.0	1.0	489	0	0	N/A
12/29/16	UW1F24161222-00	3	2,084	26,560	N/A	1.0	489, 508	1	0	93.2
12/29/16	UW1E30161228-00	1	1,415	27,975	N/A	1.0	508	1	0	90.8

Average CAES Screen Passing Pixels (%)= 98.9

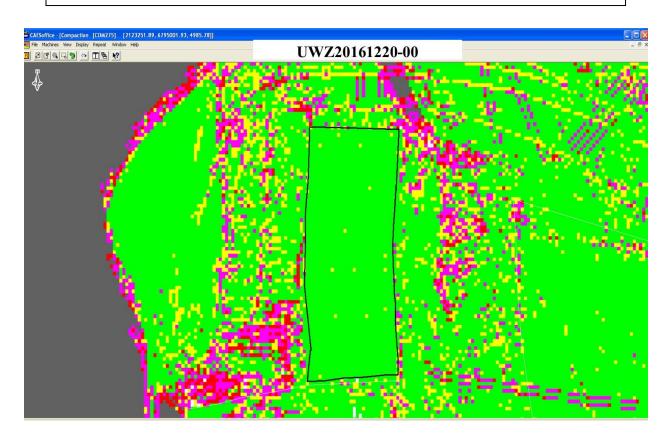
Total Quantity Approved (yd³) = 27,975

Total # of Nuclear Density Gauge Tests = 3

Total # of Moisture Tests = 15

Quantity per Moisture Test (yd³) = 1,865 Total Average Thickness (ft)= 0.9

CAES compaction screen example from December 2016. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



				January 2017						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
1/5/17	UWY27170103-00	1	885	885	N/A	0.8	489	1	0	97.9
1/5/17	UWY24161230-00	1	1,809	2,694	N/A	0.9	489	1	0	99.1
1/5/17	UWZ20161230-00	1	772	3,466	N/A	1.0	508	1	0	90.6
1/11/17	UW1F24170104-00	2	1,674	5,140	96.7	0.9	508	0	0	N/A
1/18/17	UW1F24170112-00	3	1,839	6,979	97.1	0.8	489, 508	0	0	N/A

Average CAES Screen Passing Pixels (%)= 96.9
Total Quantity Approved (yd³) = 6,979
Total # of Nuclear Density Gauge Tests = 3
Total # of Moisture Tests = 8
Quantity per Moisture Test (yd³) = 872
Total Average Thickness (ft)= 0.9

				February 201 7						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
2/1/17	UW1R02170131-00	1	1,272	1,272	98.3	0.8	508	0	0	N/A
2/6/17	UW1R02170202-00	1	1,272	2,544	96.5	0.8	505	0	0	N/A
2/7/17	UW1F24170207-00	0	149	2,693	98.5	0.8	N/A	0	0	N/A
2/8/17	UW1R02170207-00	1	1,395	4,088	98.7	0.9	505	0	0	N/A
2/13/17	UW1R02170209-00	1	1,395	5,483	96.7	0.9	505	0	0	N/A
2/14/17	UW1F24170207-01	0	93	5,576	96.2	0.5	505	0	0	N/A
2/14/17	UW1F24170119-00	3	1,380	6,956	98.1	0.6	505	0	0	N/A
2/15/17	UW1R02170214-00	1	1,258	8,214	98.4	0.8	508	0	0	N/A
2/23/17	UW1R02170216-00	2	1,258	9,472	97.5	0.8	505	0	0	N/A
2/28/17	UW1R02170224-00	1	1,199	10,671	94.7	0.9	505	0	0	N/A
2/28/17	UW1R02170228-00	1	1,332	12,003	98.3	1.0	505	0	0	N/A

Average CAES Screen Passing Pixels (%)= 97.4

Total Quantity Approved (yd³) = 12,003

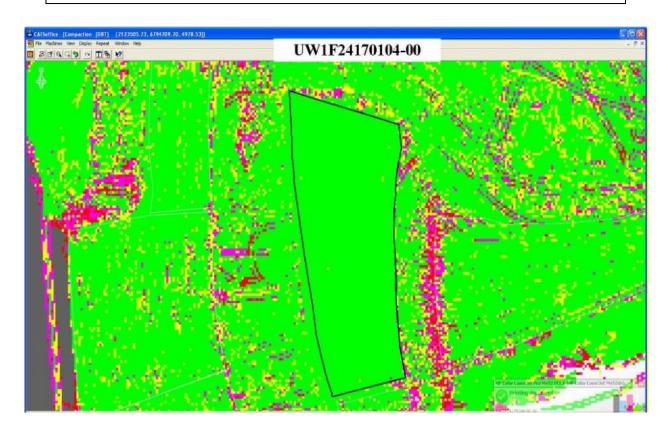
Total # of Nuclear Density Gauge Tests = 0

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd³) = 1,000

Total Average Thickness (ft) = 0.8

CAES compaction screen example from January 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



				February 201 7						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
2/1/17	UW1R02170131-00	1	1,272	1,272	98.3	0.8	508	0	0	N/A
2/6/17	UW1R02170202-00	1	1,272	2,544	96.5	8.0	505	0	0	N/A
2/7/17	UW1F24170207-00	0	149	2,693	98.5	0.8	N/A	0	0	N/A
2/8/17	UW1R02170207-00	1	1,395	4,088	98.7	0.9	505	0	0	N/A
2/13/17	UW1R02170209-00	1	1,395	5,483	96.7	0.9	505	0	0	N/A
2/14/17	UW1F24170207-01	0	93	5,576	96.2	0.5	505	0	0	N/A
2/14/17	UW1F24170119-00	3	1,380	6,956	98.1	0.6	505	0	0	N/A
2/15/17	UW1R02170214-00	1	1,258	8,214	98.4	0.8	508	0	0	N/A
2/23/17	UW1R02170216-00	2	1,258	9,472	97.5	0.8	505	0	0	N/A
2/28/17	UW1R02170224-00	1	1,199	10,671	94.7	0.9	505	0	0	N/A
2/28/17	UW1R02170228-00	1	1,332	12,003	98.3	1.0	505	0	0	N/A

Average CAES Screen Passing Pixels (%)= 97.4

Total Quantity Approved (yd³) = 12,003

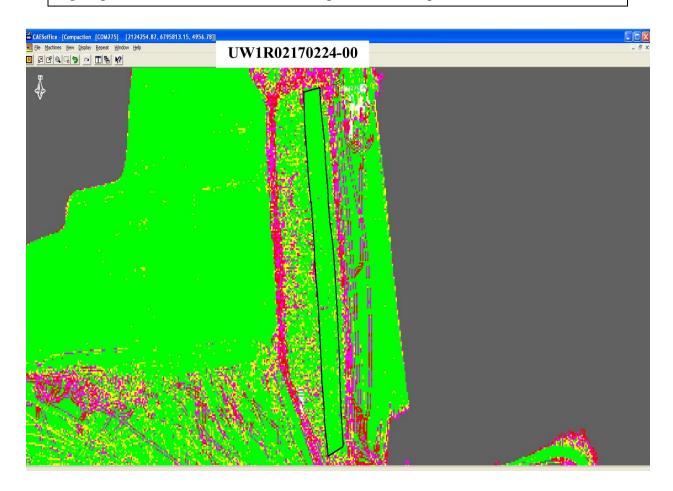
Total # of Nuclear Density Gauge Tests = 0

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd³) = 1,000

Total Average Thickness (ft)= 0.8

CAES compaction screen example from February 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.

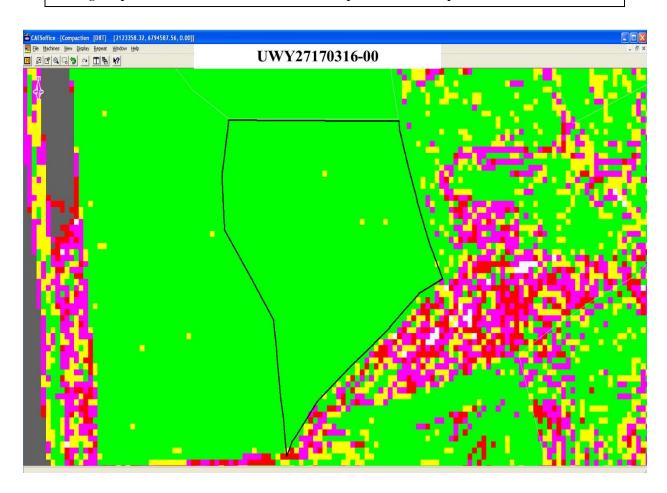


	March 2017													
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)				
3/2/17	UW1F24170214-00	1	2,678	2,678	98.8	0.9	505	0	0	N/A				
3/7/17	UW1R02170302-00	1	1,042	3,720	99.6	0.8	505	0	0	N/A				
3/9/17	UW1F24170302-00	1	2,976	6,696	98.9	1.0	505	0	0	N/A				
3/9/17	UWY24170309-00	1	0	6,696	99.4	0.0	505	0	0	N/A				
3/9/17	UWZ20170309-00	0	0	6,696	98.8	0.0	NA	0	0	N/A				
3/14/17	UW1R02170307-00	0	1,302	7,998	97.9	1.0	NA	0	0	N/A				
3/14/17	UWY27170314-00	0	0	7,998	98.2	0.0	NA	0	0	N/A				
3/16/17	UW1F24170309-00	1	2,678	10,676	99.4	0.9	508	0	0	N/A				
3/16/17	UWZ20170314-00	1	991	11,667	98.8	1.0	508	0	0	N/A				
3/20/17	UWY27170316-00	1	556	12,223	99.5	0.9	508	0	0	N/A				
3/20/17	UWY24170314-00	0	1,087	13,310	98.9	0.7	NA	0	0	N/A				
3/16/17	UW1F24170316-00	0	2,400	15,710	99.8	0.8	NA	0	0	N/A				
3/21/17	UWZ20170321-00	1	892	16,602	99.8	0.9	508	0	0	N/A				
3/21/17	UWY24170321-00	0	1,398	18,000	99.1	0.9	N/A	0	0	N/A				
3/21/17	UWY27170321-00	0	556	18,556	96.9	0.9	N/A	0	0	N/A				
3/23/17	UW1E30170323-00	1	0	18,556	99.3	0.1	489	0	0	N/A				
3/23/17	UWZ20170323-00	1	998	19,554	99.7	0.9	508	0	0	N/A				
3/23/17	UWY24170323-00	0	929	20,483	97.6	0.8	N/A	0	0	N/A				
3/23/17	UWY27170323-00	0	130	20,613	94	0.5	N/A	0	0	N/A				
3/28/17	UWZ20170328-00	0	1,200	21,813	97.5	1.0	N/A	0	0	N/A				
3/28/17	UWY24170328-00	1	813	22,626	99.1	0.7	512	0	0	N/A				
3/30/17	UW1F24170323-00	0	2,944	25,570	99.4	0.9	N/A	0	0	N/A				
3/29/17	UW1E30170329-00	0	1,298	26,868	99.8	0.9	N/A	0	0	N/A				
3/30/17	UWZ20170330-00	1	1,442	28,310	99.5	0.9	512	0	0	N/A				

Average CAES Screen Passing Pixels (%)= 98.7 Total Quantity Approved (yd³) = 28,310 Total # of Nuclear Density Gauge Tests = 0 Total # of Moisture Tests = 12 Quantity per Moisture Test (yd³) = 2,359

Total Average Thickness (ft) = 0.7

CAES compaction screen example from March 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



				April 2017						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
4/3/17	UW1E30170330-00	0	1,298	1,298	99	0.9	NA	0	0	N/A
4/3/17	UWZ20170403-00	1	1,281	2,579	98.6	0.8	505	0	0	N/A
4/4/17	UW1E30170403-00	0	1,443	4,022	99.6	1.0	NA	0	0	N/A
4/4/17	UWZ20170404-00	1	1,448	5,470	99.8	0.8	505	0	0	N/A
4/6/17	UW1E30170404-00	0	1,743	7,213	98	1.0	NA	0	0	N/A
4/6/17	UWZ20170406-00	0	1,188	8,401	99.4	0.9	NA	0	0	N/A
4/10/17	UWY24170406-00	1	1,128	9,529	99.7	0.9	468	0	0	N/A
4/11/17	UW1F24170405-00	0	3,235	12,764	99.5	1.0	NA	0	0	N/A
4/13/17	UWY27170411-00	1	1,636	14,400	99.5	0.9	468	0	0	N/A
4/13/17	UWZ20170411-00	0	1,320	15,720	99.2	1.0	NA	0	0	N/A
4/17/17	UWY24170413-00	0	1,187	16,907	99.6	0.9	N/A	0	0	N/A
4/17/17	UWY27170413-00	2	1,616	18,523	99.6	1.0	468	0	0	N/A
4/18/17	UWY1E30170412-00	0	1,568	20,091	99.5	0.9	NA	0	0	N/A
4/18/17	UWZ20170418-00	1	1,410	21,501	99.8	1.0	468	0	0	N/A
4/20/17	UWY24170418-00	0	1,319	22,820	99.9	1.0	NA	0	0	N/A
4/20/17	UWY27170420-00	1	1,616	24,436	99.9	1.0	468	0	0	N/A
4/20/17	UWY29170420-00	0	665	25,101	99.8	0.8	N/A	0	0	N/A
4/24/17	UWZ20170420-00	0	1,410	26,511	99.1	1.0	N/A	0	0	N/A
4/24/17	UW1E30170419-00	0	1,568	28,079	98.1	0.9	N/A	0	0	N/A
4/26/17	UWY24170425-00	2	1,368	29,447	99.3	1.0	468	1	0	90.8
4/26/17	UWY27170425-00	0	1,456	30,903	99.5	0.9	N/A	0	0	N/A
4/26/17	UWY29170425-00	0	764	31,667	97.9	0.9	N/A	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.3

Total Quantity Approved (yd³) = 31,667

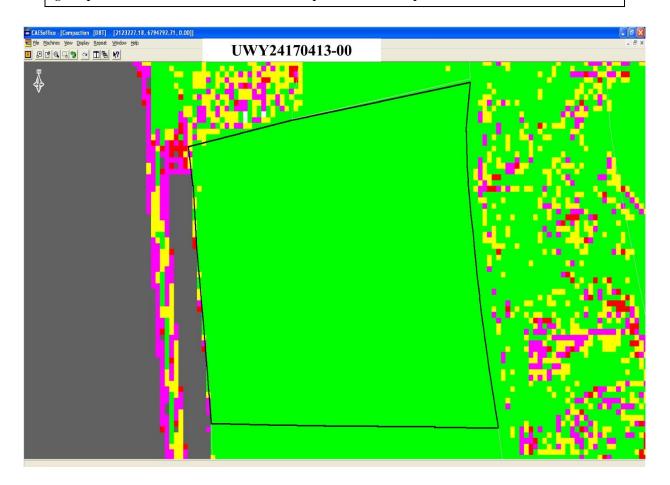
Total # of Nuclear Density Gauge Tests = 1

Total # of Moisture Tests = 10

Quantity per Moisture Test (yd³) = 3,167

Total Average Thickness (ft)= 0.9

CAES compaction screen example from April 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



				MAY 2017						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
5/1/17	UWZ20170425-00	0	1,519	1,519	99.6	1.0	NA	0	0	N/A
5/1/17	UWY24170427-00	1	1,232	2,751	99.5	0.9	417	0	0	N/A
5/2/17	UWY27170427-00	0	1,597	4,348	99.8	1.0	NA	0	0	N/A
5/3/17	UWY29170502-00	1	780	5,128	99.2	0.9	468	0	0	N/A
5/3/17	UWZ20170502-00	0	1,581	6,709	99.9	1.0	NA	0	0	N/A
5/4/17	UW1E30170425-00	0	1,905	8,614	99.1	0.9	NA	0	0	N/A
5/8/17	UWY27170504-00	1	1,597	10,211	99.8	1.0	468	0	0	N/A
5/8/17	UWY24170504-00	0	1,391	11,602	99.7	1.0	NA	0	0	N/A
5/9/17	UWY29170508-00	0	780	12,382	98.4	0.9	NA	0	0	N/A
5/10/17	UWZ20170509-00	0	1,265	13,647	99.3	0.8	NA	0	0	N/A
5/10/17	UWY24170509-00	1	1,391	15,038	99.1	1.0	468	0	0	N/A
5/11/17	UWY27170511-00	0	1,413	16,451	98.4	1.0	NA	0	0	N/A
5/15/17	UWY29170511-00	0	694	17,145	98.3	0.8	N/A	0	0	N/A
5/16/17	UWZ20170511-00	1	1,431	18,576	99.2	0.9	294	0	0	N/A
5/17/17	UWY24170516-00	1	1,391	19,967	99.8	1.0	468	0	0	N/A
5/17/17	UW1F24170501-00	0	3,310	23,277	99.5	1.0	N/A	0	0	N/A
5/18/17	UWY29170516-00	0	622	23,899	98.7	0.6	N/A	0	0	N/A
5/18/17	UWY27170516-00	0	1,272	25,171	99.3	0.9	N/A	0	0	N/A
5/18/17	UW1E30170518-00	0	1,905	27,076	99.6	0.9	N/A	0	0	N/A
5/23/17	UW1F24170518-00	1	2,979	30,055	99.2	0.9	505	0	0	N/A
5/24/17	UW1E30170523-00	1	2,117	32,172	99.2	1.0	512	0	0	N/A
5/24/17	UW1I24170522-00	2	0	32,172	96.2	0.0	489	0	0	N/A
5/25/17	UW1F24170523-00	0	3,117	35,289	99.6	0.9	N/A	0	0	N/A
5/31/17	UW1E30170525-00	1	2,468	37,757	99.3	1.0	512	0	0	N/A
5/31/17	UW1I24170530-00	1	2,016	39,773	99.5	0.9	512	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.2

Total Quantity Approved (yd³) = 39,773

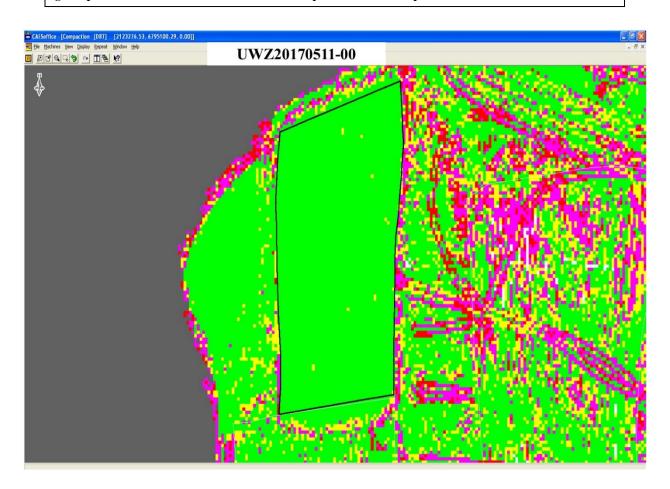
Total # of Nuclear Density Gauge Tests = 3

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd³) = 3,314

Total Average Thickness (ft)= 0.9

CAES compaction screen example from May 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



				June 2017						
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
6/5/17	UW1F24170602-00	1	2,771	2,771	98.8	0.8	512	0	0	N/A
6/6/17	UW1E30170531-00	0	1,792	4,563	99	0.8	N/A	0	0	N/A
6/7/17	UW1F24170606-00	1	1,997	6,560	99.6	0.6	512	0	0	N/A
6/12/17	UW1E30170608-00	1	2,421	8,981	99.8	0.9	512	0	0	N/A
6/12/17	UW1I24170608-00	2	2,240	11,221	99.6	1.0	505, 512	0	0	N/A
6/14/17	UW1E30170613-00	0	2,421	13,642	98.1	0.9	N/A	0	0	N/A
6/15/17	UW1I24170613-00	1	1,778	15,420	99.5	0.7	512	0	0	N/A
6/19/17	UW1E30170615-00	1	2,341	17,761	99.1	0.8	429	0	0	N/A
6/22/17	UW1F24170620-00	1	3,508	21,269	99.7	1.0	512	0	0	N/A
6/26/17	UW1E30170622-00	1	2,341	23,610	99.6	0.8	512	0	0	N/A
6/29/17	UW1I24170627-00	1	2,286	25,896	99.2	0.9	512	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.3

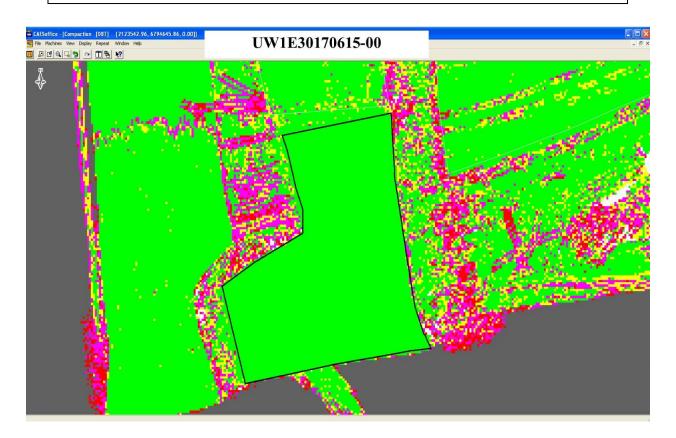
Total Quantity Approved (yd³) = 25,896

Total # of Nuclear Density Gauge Tests = 0

Total # of Moisture Tests = 10

Quantity per Moisture Test (yd³) = 2,590 Total Average Thickness (ft)= 0.8

CAES compaction screen example from June 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



	July 2017									
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
7/11/17	UW1I24170711-00	1	0	0	99.1	0.0	512	0	0	N/A
7/17/17	UW1I24170713-00	1	2,414	2,414	99	0.9	512	0	0	N/A
7/17/17	UW1E30170713-00	1	0	2,414	99.7	0.0	512	0	0	N/A
7/20/17	UW1E30170627-00	1	3,243	5,657	99.6	1.0	512	0	0	N/A
7/24/17	UW1I24170718-00	1	2,733	8,390	99.7	0.9	505	0	0	N/A
7/26/17	UW1E30170721-00	3	3,088	11,478	99	0.9	512	0	0	N/A
7/31/17	UW1I24170726-00	1	3,036	14,514	99.5	1.0	512	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.4

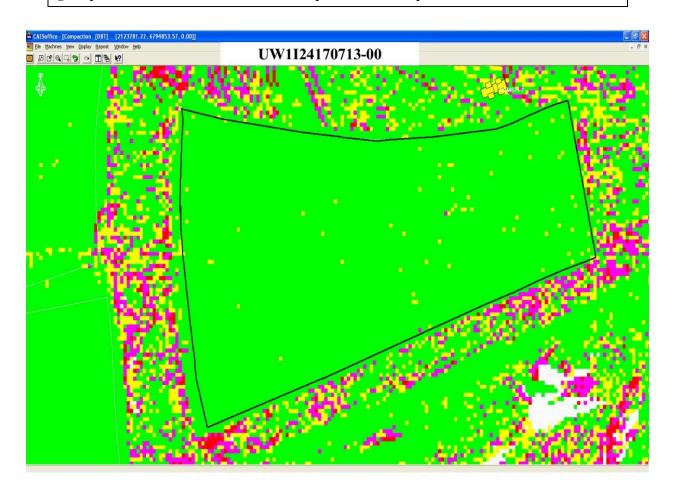
Total Quantity Approved (yd³) = 14,514

Total # of Nuclear Density Gauge Tests = 0

Total # of Moisture Tests = 9

Quantity per Moisture Test (yd³) = 2,073 Total Average Thickness (ft)= 0.9

CAES compaction screen example from July 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



	August 2017									
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
8/1/17	UW1E30170728-00	1	2,438	2,438	99.6	0.7	512	0	0	N/A
8/2/17	UW1I24170801-00	1	2,406	4,844	99.7	0.8	512	0	0	N/A
8/8/17	UW1E30170803-00	1	2,786	7,630	99.9	0.8	512	0	0	N/A
8/9/17	UW1I24170808-00	1	2,493	10,123	98.8	0.7	512	0	0	N/A
8/15/17	UW1I24170810-00	1	3,206	13,329	99.6	0.9	512	0	0	N/A
8/16/17	UW1E30170814-00	1	3,352	16,681	99.4	0.9	515	0	0	N/A
8/21/17	UW1E30170817-00	0	1,247	17,928	99.9	0.9	N/A	0	0	N/A
8/22/17	UW1A31170822-00	1	2,160	20,088	99.4	1.0	515	0	0	N/A
8/22/17	UW1I24170815-00	2	3,567	23,655	99.5	1.0	512, 515	0	0	N/A
8/23/17	UW1E30170822-00	0	1,247	24,902	99.4	0.9	N/A	0	0	N/A
8/24/17	UW1A31170824-00	1	1,944	26,846	99.7	0.9	515	0	0	N/A
8/28/17	UW1E30170824-00	1	1,042	27,888	93.6	0.9	515	1	0	90.7
8/29/17	UW1A31170829-00	1	1,857	29,745	99.7	0.9	515	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.1

Total Quantity Approved (yd³) = 29,745

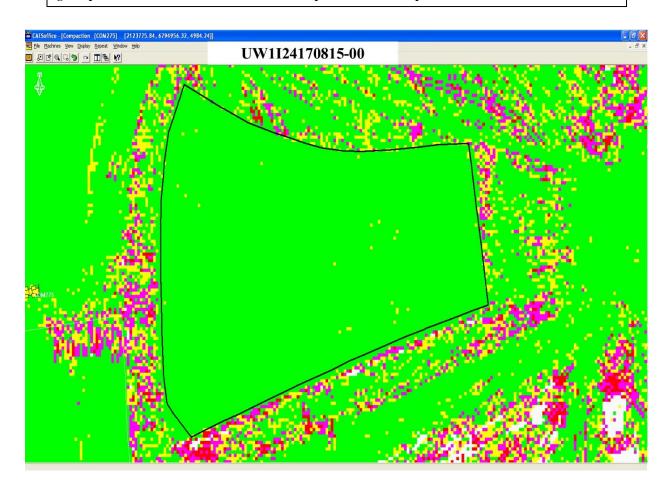
Total # of Nuclear Density Gauge Tests = 1

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd³) = 2,479

Total Average Thickness (ft)= 0.9

CAES compaction screen example from August 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been recorded.



	September 2017									
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
9/5/17	UW1A31170905-00	1	1,516	1,516	99.3	1.0	515	0	0	N/A
9/5/17	UW1E30170905-00	0	1,252	2,768	99.2	0.9	N/A	0	0	N/A
9/6/17	UW1E30170906-00	0	1,113	3,881	99.7	0.8	N/A	0	0	N/A
9/8/17	UW1A31170906-00	1	1,364	5,245	99.8	0.9	515	0	0	N/A
9/8/17	UW1I24170829-00	1	2,893	8,138	98.3	0.8	515	0	0	N/A
9/11/17	UW1E30170906-01	0	2,349	10,487	99.7	0.9	N/A	0	0	N/A
9/13/17	UW1F24170912-00	1	0	10,487	99.9	0.0	512	0	0	N/A
9/13/17	UW1E30170912-00	1	2,610	13,097	99.7	1.0	515	0	0	N/A
9/14/17	UW1E30170914-00	1	2,106	15,203	99.7	1.0	515	0	0	N/A
9/19/17	UW1B18170914-00	1	1,821	17,024	99.9	1.0	514	0	0	N/A
9/20/17	UW1I24170908-00	2	3,294	20,318	99.5	0.9	515, 477	0	0	N/A
9/21/17	UW1F24170919-00	1	1,459	21,777	99.4	0.9	515	1	1	94.5
9/21/17	UW1E30170919-00	0	1,866	23,643	98.1	1.0	N/A	0	0	N/A
9/26/17	UW1B18170921-00	1	1,821	25,464	99.4	1.0	515	0	0	N/A
9/27/17	UW1F24170926-00	1	1,459	26,923	99.5	0.9	515	1	1	94.4
9/27/17	UW1E30170926-00	0	1,866	28,789	98.3	1.0	N/A	0	0	N/A

Average CAES Screen Passing Pixels (%)= 99.3

Total Quantity Approved (yd³) = 28,789

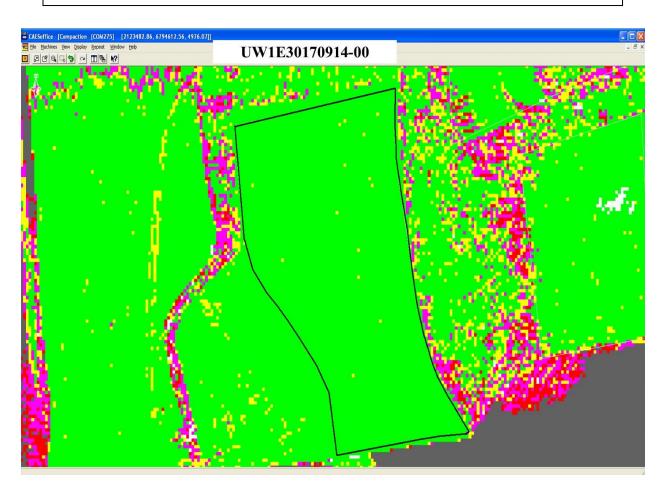
Total # of Nuclear Density Gauge Tests = 3

Total # of Moisture Tests = 12

Quantity per Moisture Test (yd³) = 2,617

Total Average Thickness (ft)= 0.9

CAES compaction screen example from September 2017. There are compaction screens for each lift approved on record. The number of passing pixels reported refers to the percentage of the lift which has green pixels. A green pixel verifies that the minimum of six wheel passes with the compactor has been



Appendix A2. RRM Lift Approval Package

LIFT APPROVAL FORM OTHER Moab UMTRA PROJECT: NW CORNER DATE: 4/25/2017 6794603 N. 2123364E. EW: 199 X 0.689 = 204 X 0.939 NS: P_2 EW: NS: P_3 204 EW: NS: P_4 EW: NS: FW age 2 attached: IDENTIFY LOTS ABOVE LIFT ID: UWY24170425-00 NW CORNER: 6794795 N. 2123227 E. Compacted Uncompacted Debris Insp. By: N/A N/A Time: N/A Thickness: Thickness: NW CORNER of EW Dimension N/A NS Dimension debris placement: 1,368 Lift Area (ft2): 36,946 Lift Volume (yd3): Comments: This is the fourth lift placed in the last seven feet of design grade. QC verified that the lift area was scarified prior to placement. The daily moisture test for 4/25/2017 was performed on this lift with satisfactory results. On 4/26/2017 QC performed an in place moisture/ density test in correlation with CAES. This test was satisfactory. Attached Forms: Grid Slope X Compaction Macro X Print Screen X Moisture/ Density X KEYING IN NOTES: N E S W Satisfactory MOISTURE/ DENSITY TESTS ID # (S): DATE: 4/26/2017 TIME: 1431 LIFT APPROVED BY: Mitch Hogan/ QA/QC APPROVAL QC-F-001 Density Testing File index No. 43.8.2

Rev. 1

DOE-EM/GJRAC1783

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Slope Elevation Survey 1.0 Bounding Box Northing **Easting** Average lift thickness= Grid Size= 45' **Lower Left** Lift ID: UWY24170425-00 Upper Right Lift Approval Elevations Last Lift Elevations Lift Thickness Easting Northing Easting Elevation Northing Elevation Thickness OK 6794654 2123250 4972.3 6794654 2123250 4973.3 2123250 4974.3 4973.4 6794699 2123250 0.9 OK 6794699 ок 4975.4 6794744 2123250 4974.4 6794744 2123250 1.0 2123250 6794789 2123250 4977.0 OK 6794789 4976.3 0.7 4973.5 1.1 OK 2123295 6794654 2123295 6794654 4972.4 OK 6794699 2123295 4973.2 6794699 2123295 4974.3 1.1 OK 4974.2 6794744 2123295 4975.3 6794744 2123295 1.1 4976.7 οк 6794789 2123295 4975.9 6794789 2123295 0.8 4972.4 6794654 2123340 4973.5 OK 6794654 2123340 1.1 6794699 2123340 4974.4 OK 1.1 6794699 2123340 4973.3 OK 6794744 2123340 4974.4 6794744 2123340 4975.5 2123340 4977.0 OK 6794789 2123340 4975.9 6794789 1.0 oĸ 4973.5 6794654 2123385 4972.5 6794654 2123385 1.0 OK 2123385 6794699 2123385 4974.5 6794699 4973.4 4975.5 OK 4974.4 6794744 2123385 1.1 2123385 6794744 OK 6794789 2123385 4975.7 6794789 2123385 4976.9 1.2 OK 6794654 2123430 6794654 2123430 4973.4 4972.5 4974.1 ок 6794699 2123430 0.8 6794699 2123430 4973.3 2123430 4974.8 OK 6794744 2123430 4974.1 6794744 0.7 OK 0.0 OK 0.0 OK 0.0 0.0 OK OK 0.0 OK 0.0 OK 0.0 OK 0.0 0.0 OK OK 0.0 ок 0.0 0.0 OK OK 0.0 ок 0.0 OK 0.0 OK 0.0 0.0 OK OK 0.0 OK 0.0 0.0 OK OK 0.0 OK 0.0 OK 0.0 ОК 0.0

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OK OK

ОК

OK

0.0

0.0

0.0

% =6	99.3%	1				
Elevation Avg	4974.9	1		Dage		Minimum Number of Machine
Total =6	3411			Pass		Passes
Total Lines	3434					3
		Lift ID:	UWY24170425-0	0		
Northing	Easting	Elevation	# of Passes	Passes =6	Count	
6794771	2123229	4975.9	6	1	1	Lift Height
6794774	2123229	4976.0	6	1	1	1' 0"
6794777	2123229	4976.1	6	1	1	
6794780	2123229	4976.3	4		1	Thick Lift Threshold
6794784	2123229	4976.3	5		1	2' 0"
6794787	2123229	4976.5	4		1	
6794790	2123229	4976.7	6	1	1	Last Lift Elevation
6794793	2123229	4977.0	5		1	N/A
6794728	2123232	4974.8	6	1	1	
6794731	2123232	4974.8	6	1	1	Min. # of Wheel Passes
6794734	2123232	4975.0	5		1	6
6794738	2123232	4975.0	5		1	
6794741	2123232	4975.2	4		1	
6794744	2123232	4975.2	4		1	
6794748	2123232	4975.3	5		1	
6794751	2123232	4975.4	6	1	1	
6794754	2123232	4975.4	6	1	1	
6794757	2123232	4975.5	6	1	1	
6794761	2123232	4975.6	6	1	1	
6794764	2123232	4975.7	6	1	1	
6794767	2123232	4975.8	6	1	1	
6794771	2123232	4975.9	6	1	1	
6794774	2123232	4976.1	6	1	1	
6794777	2123232	4976.0	6	1	1	
6794780	2123232	4976.2	6	1	1	
6794784	2123232	4976.4	5		1	
6794787	2123232	4976.6	6	1	1	
6794790	2123232	4976.8	6	1	1	
6794793	2123232	4977.0	4		1	
6794797	2123232	4977.3	2		1	
6794685	2123236	4973.7	6	1	1	
6794689	2123236	4973.8	6	1	1	
6794692	2123236	4973.8	6	1	1	
6794695	2123236	4973.9	6	1	1	.,
6794698	2123236	4974.0	6	1	1	
6794702	2123236	4974.1	6	1	1	
6794705	2123236	4974.2	6	1	1	
6794708	2123236	4974.3	6	1	1	
6794711	2123236	4974.2	6	1	1	
6794715	2123236	4974.3	6	1	1	
6794718	2123236	4974.4	6	1	1	*

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6794721

6794725

6794728

2123236

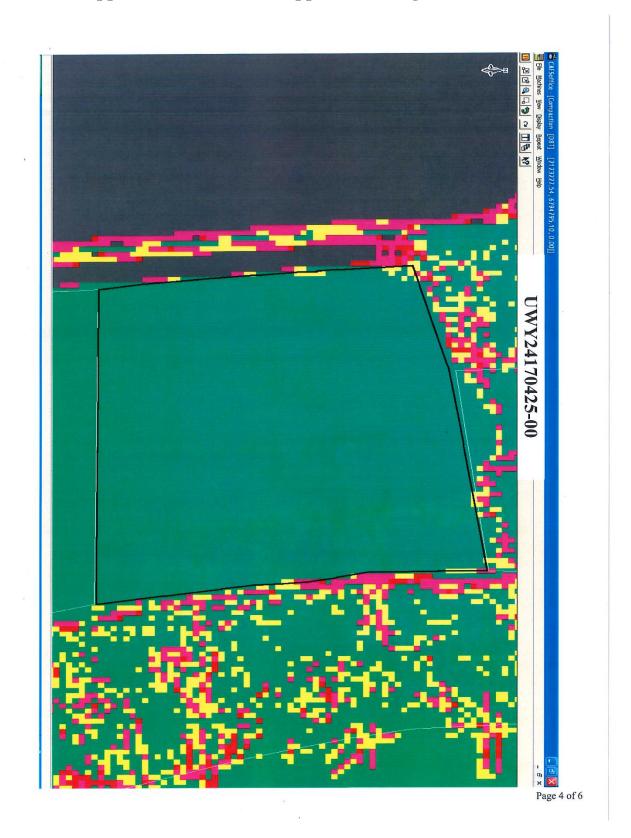
2123236

2123236

4974.5

4974.6

4974.7



ă.	FIELD DENS	SITY TEST	
PROJECT: Moab UMT	RA Project	OTHER	
LIFT IDENTIFICATION:	UWY24170425-00	DATE:	4/25/2017
TEST ID NUMBER(S):		# 1	
TEST LOCATION:		TEST METHOD: N/A D	1556 N/A D6938
ASTM D6938 (DENSITY DE		ASTM D1556 (DENS	ITY DETERMINATION)
Make/Model Gauge	e Serial #	Testing Apparatus C	Calibrated Vol. (lbs/ft ³)
Last Calibration Date: N/A		Bulk Density of sand (ρ_1)	
Daily Standard Counts:	/	Mass of Sand to Fill Cone &	$e \text{ Plate } (M_2)$
Density Moi	istare	M	hafana fillina
Method A (Direct Transmission) or	Method R (Rackscatter)	Mass of bottle & cone	plate & hole
Depth Setting (inches) A Co	unt Time (minutes)	Mass of bottle & cone	
		Mass of san	g plate & hole g d to fill cone,
Moisture Count D	ensity Count		& hole (M)
Wet Density (m) (lbs/ft ³) Dry	Density (lbs/ft ³)		nd to fill kole
		Mass of wet soil	
Moisture Density(lbs/ft ³) Mo	pisture Fraction(%)	Mass	s of Container g
MOISTURE DETERM	MINATION		et soil (M_3)
ASTM D464		/	Hole Volume
Container ID 211			$(I_1 - M_2)/\rho_1 \underline{\qquad} cm^3$
Scale Serial # 14725064 La			
Mass of container & wet specimen		Dry	Mass of soil
(M_{cms})	561.9 g		$g / (w + 100) _ g$
Mass of container & dry specimen			Wet Density
(M cds)	532.5 g		$(V) \times 62.43$ lbs/ft ³
Mass of water (M_w)			Dry Density
$M_{w} = M_{cms} - M_{cds}$	29.4 g		$\rho_d = M_4 / V \underline{\hspace{1cm} g/cm^3}$
Mass of container (M_c)	210.8	Dry	Unit Weight $= \rho_d \times 62.43$ lbs/ft ³
Mass of dry specimen (M_s)	210.8 g	/	sh brown, very fine to medium
$M_s = M_{cds} - M_c$	321.7 g		graded sand with some clay.
Moisture content (w)		V	RRM # 468
$w = (M_w/M_s) \times 100$	9.1 %		tor (ASTM D698)
Dry Density $(\rho_{d}) = (100 \times \rho_{m})$,)/(100 + w)	Maximum Dry Density	(γ _d max)117.4 (lbs/ft
ad = (100 x #####) / (100 + 9.1	0.0 lbs/ft ³	Optimum Moistur	re (w _{opt})11.4(%)
$pd = (100 \times \frac{\#\#\#\#}{})/(100 + 9.1)$ Note: Wet Density from ASTM D 1.	recedence over ASTM D 6938 (pm)		
Percent Compaction = ρ_d /		Required Moisture: 8.4	4% to14.4%
		Required Persont Con	npaction: 90.0 (%)
0.0 / 117.4 x 100 =			1paction(70)
Comments: Aicrowave oven power setting on HIGH	Initial time setting of 3	TEST RESULTS:	Date: 4/25/17
ninutes and subsequent incremental dry		X Pass Failed Moisture	Date. 4/25/17
change of 0.1 % or less of the initial we		Failed Compacti	on Time: 1418
E			1 / 2/1/
1		By: Mitch Hogan (print)	(signature)
Kall In-	d/21/11	4	
QA/QC/APPROVAL	9 13 1/11 DATE		
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Density Testing DOE-EM/GJRAC1783			File Index No. 4

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FIELD DENSITY TEST OTHER Moab UMTRA Project PROJECT: UWY24170425-00 DATE: 4/26/2017 LIFT IDENTIFICATION: TEST ID NUMBER(S): ___ # 2 TEST METHOD: D1556 X D6938 TEST LOCATION: ASTM D1556 (DENSITY DETERMINATION) ASTM D6938 (DENSITY DETERMINATION) Make/Model Troxler 3430 Gauge Serial # 36262 Testing Apparatus _____ Calibrated Vol. (lbs/ft³) Bulk Density of sand (ρ_1) _____ g/cm^3 Last Calibration Date: 12/1/16 Daily Standard Counts: On-Cell Standard Mass of Sand to Fill Cone & Plate (M2) 2667 Density_ Moisture_ Mass of bottle & cone before filling Method A (Direct Transmission) cone, plate & hole Mass of bottle & cone after filling Depth Setting 6 (inches) Count Time 1 (minutes) cone, plate & hole Mass of sand to fill cone, Moisture Count _____111 Density Count 2123 plate, & hole (M) Wet Density (ρ_m) 118.4 (lbs/ft^3) Dry Density 106.7 (lbs/ft^3) Mass of sand to fill lole Mass of wet soil container Moisture Density 11.6 (lbs/ft 3) Moisture Fraction 10.9 (%) Mass of container Mass of yet soil (M_3) MOISTURE DETERMINATION **ASTM D4643** Test Hole Volume $(M_1 - M_2)/\rho_1$ 211 Container ID Scale Serial # 14725064 Last Calibration Date: 1/5/17 Mass of container & wet specimen Dry Mass of soil 485.5 $M_4 = 100 M_3 / (w + 100)$ Mass of container & dry specimen Wet Density lbs/ft3 (M_{cds}) 458.2 $\rho_m = (M_3/V) \times 62.43$ Mass of water (M w) Dry Density $\rho_d = M_4/V$ $M_w = M_{cms} - M_{cds}$ 27.3 Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ Mass of container (M_c) 210.8 Mass of dry specimen (M_s) Light reddish brown, very fine to medium, $M_s = M_{cds} - M_c$ 247.4 Soil Description: moderately graded sand with some clay. Moisture content (w) Proctor ID: RRM # 468 $w = (M_w/M_s) \times 100$ Standard Proctor (ASTM D698) Maximum Dry Density $(\gamma_d max)$ _____117.4 ___(lbs/ft³) Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$ $\rho d = (100 \times 118.4)/(100 + 11.0) = 106.6$ Optimum Moisture (w opt) Note: Wet Density from ASTM D 1556 (pm) takes precedence over ASTM D 6938 (pm) to 14.4 % Required Moisture: 8.4 % Percent Compaction = ρ_d / $\gamma_d max x 100$ Required Percent Compaction: Comments: TEST RESULTS: Off cell standard: DS-2351 MS-500. Microwave oven power setting Date: 4/26/17 X Pass on HIGH. Initial time setting of 3 minutes and subsequent Failed Moisture incremental drying periods of 1 minute until a change of 0.1 % or less Failed Compaction of the initial wet mass of the soil. Mitch Hogan QC-F-002 Density Testing

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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/ft³)	Optimum Moisture Content %	Proctor Description
Spoils #1 (2017)	3/15/17	4/20/17	112.6	14.7	Greyish in color and consists of mostly fines.
Spoils #2 (2017)	3/15/17	4/20/17	113.2	13.2	Greyish in color and consists of mostly fines.
Spoils #3 (2017)	3/16/17	4/20/17	114.0	13.6	Greyish in color and consists of mostly fines.
Spoils #4 (2017)	3/24/17	4/20/17	118.5	11.5	Greyish in color and consists of mostly fines.
Spoils #5 (2017)	3/24/17	4/20/17	120.2	11.0	Greyish in color and consists of mostly fines mixed with some shale.
Spoils #6 (2017)	3/31/17	4/20/17	114.3	13.2	Top Soil, Greyish in color and consists of mostly fines.
Spoils #7 (2017)	3/31/17	4/20/17	117.8	12.0	Tannish in color and consists of mostly fines.
Spoils #8 (2017)	4/1/16	4/20/17	121.0	10.5	Greyish in color and consists of mostly fines mixed with shale.
Spoils #9 (2017)	4/4/17	4/20/17	118.0	11.7	Tannish in color and consists of mostly fines. Also contains a small amount of shale.
Spoils #10 (2017)	4/5/17	4/20/17	122.0	10.2	Greyish in color and consists of a good amount of shale.
Spoils #11 (2017)	4/6/17	4/20/17	121.0	10.3	Greyish in color and consists of a good amount of shale.
Spoils #12 (2017)	4/10/17	6/1/17	122.3	10.1	Tannish in color and consists of fines mixed with shale.
Spoils #13 (2017)	4/11/17	6/1/17	124.5	9.8	Tannish in color and consists of fines mixed with shale.
Spoils #14 (2017)	4/12/17	6/1/17	118.7	11.4	Grey in color and consists of fines mixed with a small amount of shale.
Spoils #15 (2017)	4/13/17	6/1/17	120.9	12.0	Tannish in color and consists of fines mixed with shale.
Spoils #16 (2017)	4/18/17	6/1/17	119.3	11.9	Tannish in color and consists of fines and mixed with a small amount of shale.
Spoils #17 (2017)	4/19/17	6/1/17	120.0	11.4	Grey in color and consists of fines and shale.
Spoils #18 (2017)	4/20/17	6/1/17	121.8	11.6	Tannish in color and consists of fines mixed with shale.
Spoils #19 (2017)	4/25/17	6/1/17	123.8	9.7	Grey in color and consists of fines mixed with shale.
Spoils #20 (2017)	4/26/17	6/1/17	119.3	11.8	Grey in color and consists of fines mixed with a small amount of shale.
Spoils #21 (2017)	4/27/17	6/1/17	123.0	10.0	Tannish in color and consists of fines mixed with shale.

Appendix A8. Spoils Embankment Standard Proctor Test Results Summary (continued)

Proctor ID#	Date Sampled	Date Approved	Maximum Dry Density (lb/ft³)	Optimum Moisture Content %	Proctor Description
Spoils #22 (2017)	5/2/17	6/1/17	121.4	10.1	Grey in color and consists of fines mixed with shale.
Spoils #23 (2017)	5/3/17	6/1/17	118.7	11.6	Grey in color and consists of fines mixed with a small amount of shale.
Spoils #24 (2017)	5/4/17	6/1/17	121.7	10.0	Tan in color and consists of fines mixed with a large amount of shale.
Spoils #25 (2017)	5/10/17	6/1/17	119.8	10.8	Tannish/Grey in color and consists of fines mixed with shale.

 $lb/ft^3 = pounds per cubic foot$

Appendix A8. Spoils Embankment Lift Approval Summary

				Mar	ch 2017					
Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
3/20/17	USA88170320-00	0	4,815	4,815	N/A	0.8	Spoils #3 (2017)	3	0	96.0
3/21/17	USA88170321-00	0	4,815	9,630	N/A	0.8	Spoils #3 (2017)	3	0	90.6
3/21/17	USA88170321-01	0	5,778	15,408	N/A	1.0	Spoils #3 (2017)	4	0	93.2
3/21/17	USA88170321-02	1	5,778	21,186	N/A	1.0	Spoils #3 (2017)	4	0	94.2
3/21/17	USA88170321-03	1	4,815	26,001	N/A	0.8	Spoils #3 (2017)	3	0	94.2
3/22/17	USA88170322-00	0	5,296	31,297	N/A	0.9	Spoils #3 (2017)	3	0	98.9
3/22/17	USA88170322-01	1	3,752	35,048	N/A	0.9	Spoils #3 (2017)	3	1	94.3
3/22/17	USA88170322-02	0	3,752	38,800	N/A	0.9	Spoils #3 (2017)	3	0	97.6
3/23/17	USA88170323-00	1	3,752	42,552	N/A	0.9	Spoils #3 (2017)	3	0	97.2
3/23/17	USA88170323-01	0	3,752	46,304	N/A	0.9	Spoils #3 (2017)	3	0	94.6
3/23/17	USA88170323-02	0	2,207	48,511	N/A	0.8	Spoils #3 (2017)	3	0	96.3
3/23/17	USA88170323-03	0	2,207	50,718	N/A	0.8	Spoils #3 (2017)	3	0	95.3
3/27/17	USA88170327-00	1	2,648	53,366	N/A	1.0	Spoils #4 (2017)	3	1	91.3
3/27/17	USA88170327-01	1	11,556	64,922	N/A	1.0	Spoils #4 (2017)	7	0	92.7
3/28/17	USA88170328-00	0	11,000	75,922	N/A	0.9	Spoils #4 (2017)	7	0	94.4
3/29/17	USA88170329-00	1	11,000	86,922	N/A	0.9	Spoils #4 (2017)	7	0	96.1
3/29/17	USA88170329-01	1	11,000	97,922	N/A	0.9	Spoils #3 (2017)	7	0	95.5
3/30/17	USA88170330-00	0	16,875	114,797	N/A	0.8	Spoils #4 (2017)	10	1	94.1

Average of Inplace Density (%)= 94.8

Total Quantity Approved (yd³) = 114,797

Total # of Nuclear Density Gauge Tests = 79

Total # of Moisture Tests = 8

Quantity per Moisture Test (yd³) = 14,350 Total Average Thickness (ft)= 0.9

				April	2017					
Date	Lift ID#	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
4/3/17	USA88170403-00	1	3,667	3,667	N/A	0.9	Spoils #7 (2017)	3	0	91.7
4/3/17	USA88170403-01	0	4,000	7,667	N/A	1.0	Spoils #7 (2017)	3	0	91.2
4/3/17	USA88170403-02	0	6,667	14,334	N/A	1.0	Spoils #7 (2017)	4	0	94.5
4/3/17	USA88170403-03	1	5,556	19,890	N/A	8.0	Spoils #7 (2017)	4	1	93.7
4/4/17	USA88170404-00	0	6,111	26,001	N/A	0.9	Spoils #7 (2017)	4	0	96.1
4/4/17	USA88170404-01	1	6,667	32,668	N/A	1.0	Spoils #7 (2017)	4	0	93.5
4/4/17	USA88170404-02	0	5,556	38,224	N/A	8.0	Spoils #7 (2017)	4	0	93.3
4/4/17	USA88170404-03	0	6,111	44,335	N/A	0.9	Spoils #7 (2017)	4	0	97.0
4/5/17	USA88170405-00	2	26,813	71,148	N/A	0.9	Spoils #7 & 8 (2017)	18	1	94.4
4/10/17	USA88170410-00	2	29,028	100,176	N/A	0.9	Spoils #10 (2017)	16	1	93.9
4/11/17	USA88170411-00	1	16,636	116,812	N/A	0.9	Spoils #10 (2017)	10	1	95.5
4/12/17	USA88170412-00	1	11,728	128,540	N/A	8.0	Spoils #10 (2017)	7	0	94.1
4/12/17	USA88170412-01	1	12,901	141,441	N/A	0.9	Spoils #10 (2017)	8	1	94.0
4/13/17	USA88170413-00	1	15,278	156,719	N/A	0.9	Spoils #10 (2017)	9	0	94.1
4/17/17	USA88170417-00	1	17,037	173,756	N/A	1.0	Spoils #12 (2017)	10	1	96.0
4/18/17	USA88170418-00	1	17,037	190,793	N/A	1.0	Spoils #12 (2017)	10	0	96.0
4/19/17	USA88170419-00	1	18,056	208,849	N/A	1.0	Spoils #12 (2017)	10	1	95.8
4/20/17	USA88170420-00	1	16,551	225,400	N/A	0.9	Spoils #12 (2017)	10	0	94.6
4/24/17	USA88170424-00	1	18,472	243,872	N/A	1.0	Spoils #12 (2017)	10	1	94.9
4/25/17	USA88170425-00	1	16,975	260,847	N/A	0.9	Spoils #12 (2017)	10	0	94.6
4/26/17	USA88170426-00	1	18,206	279,053	N/A	0.9	Spoils #12 (2017)	10	1	92.9
4/27/17	USA88170427-00	1	16,806	295,859	N/A	0.9	Spoils #12 (2017)	10	0	93.6
4/18/17	USA88170418-00 ¹	0		295,859			Spoils #12 (2017)	1	0	98.4

Average of Inplace Density (%)= 94.3 Total Quantity Approved (yd³) = 295,859

Total # of Nuclear Density Gauge Tests = 178

Total # of Moisture Tests = 19

Quantity per Moisture Test (yd³) = 15,572

Total Average Thickness (ft)= 0.9

¹This was a correlation test with Johanson and Tuttle

				May	2017					
Date	Lift ID#	# of Passing Moisture Tests	Quantity Approved (yd³)	Cumulative Quantity Approved (yd³)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID#	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)
5/1/17	USA88170501-00	1	26,481	26,481	N/A	0.9	Spoils #19 (2017)	15	1	93.6
5/2/17	USA88170502-00	1	18,334	44,815	N/A	1.0	Spoils #19 (2017)	10	1	95.1
5/3/17	USA88170503-00	1	16,611	61,426	N/A	1.0	Spoils #19 (2017)	9	1	95.0
5/4/17	USA88170504-00	1	15,833	77,259	N/A	1.0	Spoils #19 (2017)	9	0	92.0
5/8/17	USA88170508-00	1	18,333	95,592	N/A	0.9	Spoils #21 (2017)	10	1	93.9
5/9/17	USA88170509-00	1	18,333	113,925	N/A	0.9	Spoils #21 (2017)	10	0	92.7
5/10/17	USA88170510-00	1	7,833	121,758	N/A	1.0	Spoils #21 (2017)	4	1	94.1
5/10/17	USA88170510-01	0	7,333	129,091	N/A	1.0	Spoils #21 (2017)	4	0	93.2
5/11/17	USA88170511-00	1	13,889	142,980	N/A	1.0	Spoils #21 (2017)	8	0	93.8
5/15/17	USA88170515-00	1	10,000	152,980	N/A	1.0	Spoils #21 (2017)	6	1	92.5
5/16/17	USA88170516-00	0	7,130	160,110	N/A	0.9	Spoils #21 (2017)	5	0	92.2
5/17/17	USA88170517-00	1	10,694	170,804	N/A	0.9	Spoils #21 (2017)	6	1	97.4
5/18/17	USA88170518-00	0	9,167	179,971	N/A	0.9	Spoils #21 (2017)	5	0	91.6

Average of Inplace Density (%) = 93.6 Total Quantity Approved (yd³) = 179,971 Total # of Nuclear Density Gauge Tests = 101 Total # of Moisture Tests = 10 Quantity per Moisture Test (yd³) = 17,997 Total Average Thickness (ft) = 1.0

Appendix A8. Spoils Embankment Lift Approval Package

LIFT APPROVAL FORM OTHER Moab UMTRA PROJECT: 4/6/2017 NW CORNER DATE: EW: 1950 X 0.091 NS: 405 X 0.118 EW: 1950 X 0.612 01 NS: 405 X 0.039 P 3 6797038 N. ZIZ6868 E 03 EW: 1950 X 0.780 NS: 405 X 0.412 405 04 P 4 G796965N. 2176987 E 05 1950 X 0.841 NS: 405 X 0.592 EW: 1950 X 0.490 e 1950 -> NS: 405 X 0.773 Page 2 attached: USASSITO405-00 IDENTIFY LOTS ABOVE NW CORNER: 6797205 N. 2125347 E. 1st lift (1950' x 405') LIFT ID: Compacted Uncompacted Thickness: N/A Debris Insp. By: Date: N/A Time: Thickness: NW CORNER of NS Dimension EW Dimension N/A debris placement: Lift Volume (yd3): 789,750 Lift Area (ft2): Comments: - 5W # 8 into shale @borrow orea on Test #8 - prior To test 8 Sand Come Taken @ Test site 1 Attached Forms: Grid Slope N/A Compaction Macro N/A Print Screen N/A Moisture/ Density MOISTURE/ DENSITY TESTS ID # (S): N/A 4/6/2017 TIME: 15:39 DATE: QC-F-001 Density Testing

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LIFT APPROVAL FORM **OTHER** PROJECT: Moab UMTRA NW CORNER DATE: 4/6/2017 PAG 6797169 N. 2125 842 E. EW: 1950 X 0.254 NS: 405 X 0.090 P72 6796830 N. ZIZL381 E. EW: 1950 X 0.530 NS: 405 X 0.925 06 09 08 EW: 1950 X 0.334 010 NS: 405 X 0.265 405 94 6797105 N. ZIZG441 E. 1950 X 0.561 01 0.239 1950 X 0.932 1950 -> NS: 405 X 0.524 Page 2 attached: USA88170405-00 IDENTIFY LOTS ABOVE NW CORNER: 6797205 N. 2125347 E. LIFT ID: 1st lift (1950' x 405') Compacted Uncompacted N/A Debris Insp. By: N/A Date: N/A Time: Thickness: Thickness: NW CORNER of NS Dimension EW Dimension N/A debris placement: 789,750 Lift Volume (yd3): N/A Lift Area (ft2): Comments: Attached Forms: Grid Slope N/A Compaction Macro N/A Print Screen N/A Moisture/ Density MOISTURE/ DENSITY TESTS ID # (S): 4/6/2017 TIME: /5:39 DATE: Density Testing QC-F-001 DOE-EM/GJRAC1783 File index No. 43.8.2 Page 2 of 27 Rev. 1

LIFT APPROVAL FORM Moab UMTRA **OTHER** PROJECT: DATE: 4/6/2017 NW CORNER NS: 405 X 0.705 122 6797135 N. 2127618E EW: 1950 X 0.852 NS: 405 X 0.173 O12 P38 6797091 M. EW: 1950 X 0.640 O13 NS: 405 X 0.281 014 015 405 14 679698 N. DII 2125505E 1950 X 0.081 405 0.510 P_{15} 6797015 N . 2(26657 E) EW: 1950 X 0.672 = 1310 = 1950 → NS: 405 X 0.468 190 Page 2 attached: USA 98470405-00 IDENTIFY LOTS ABOVE 6797205 N. 2125347 E. NW CORNER: 1st lift (1950' x 405') LIFT ID: Compacted Uncompacted N/A N/A Date: N/A Time: Debris Insp. By: Thickness: Thickness: NW CORNER of NS Dimension N/A EW Dimension N/A debris placement: N/A 789,750 Lift Volume (yd3): Lift Area (ft2): Comments: Taken on Test #11 MoisTure Sa Attached Forms: Grid Slope N/A Compaction Macro N/A Print Screen N/A Moisture/ Density MOISTURE/ DENSITY TESTS ID # (S): TIME: 15:39 4/6/2017 DATE: QA/QC APPROVAL DATE

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PROJECT:	Moab UMTRA		5 OTHER
W CORNER		DATE:	4/\$/2017
-			$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
1 405 1	⊙ 18	⊙16	EW: 1950 X 0.604 = 1178
	€ 1950 ·		NS: X = P 5 EW: X = NS: X =
	VD FD IMITEVA OFFICE A DO	· · ·	Page 2 attached: Y N
USA 8817 FT ID: 1st lift	0 405-00 IDENTIFY LOTS ABO (1950' x 405') NW CORNER:	6797205 N. 2125347 E.	
Uncompacted Thickness:	Compacted	A Debris Insp. By:	N/A Date: N/A Time: N/A
NW CORNER of			NS Dimension N/A
debris placement:		Lift Volume (yd³):	N/A
Lift Area (ft²):	789,750	Ent volume (yu-):	IVA
	continuation of pg 1		
tached Forms: C	id Slope <u>N/A</u> Compaction Macr	o N/A Print Causer	N/A Moisture/ Density v
iaciicu rofilis; Gl	in Stope 14/A Compaction Macr	JANA THIR SCIENT	THE MOISIUTE DELISITYA
EYING IN NOTES:	N E S W N/A	MOISTURE/ DENSITY TESTS II	D # (S): 16-18
FT APPROVED BY	Quema tutte	DATE: 4/0	6/2017 TIME: 15:39
134			
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PROJECT: Moab UMTRA Project	OTHER
LIFT IDENTIFICATION: Lift #1 on spoils wedge	(1950 x 405) DATE: 4/5/2017
TEST ID NUMBER(S):	1
TEST LOCATION: P1	TEST METHOD: <u>x</u> D1556 <u></u> ★ D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³) 0.03941
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) 1.27 g/cm^3 79.5 lbs/s
Daily Standard Counts: On-Cell Standard	Mass of Sand to Fill Cone & Plate (M_2) 1421.0 g
Density 2123 Moisture 630	Mass of bottle & cone before filling
Method A (Direct Transmission)	cone, plate & hole 5500.1 g
Depth Setting 6 (inches) Count Time 1 (minute	Mass of bottle & cone after filling
	cone, plate & hole Mass of sand to fill cone,
Moisture Count 103 Density Count 1575	plate, & hole (M_1) 4226.5 g
Vet Density (ρ_m) 127.2 (lbs/ft^3) Dry Density 118.5 (lbs/ft^3)	Mass of sand to fill hole 2805.5 g
	Mass of wet soil & container 4687.2 g
Moisture Density 8.7 (lbs/ft ³) Moisture Fraction 7.4	(%) Mass of container 281.0 g
MOISTURE DETERMINATION	Mass of wet soil (M_3) 4406.2 g
ASTM D4643	Test Hole Volume
Container ID 1235.6	$V = (M_1 - M_2) / \rho_1 _2203 _cm^3$
Scale Serial # 5500jte-1 Last Calibration Date: 3	/17/17
Mass of container & wet specimen	Dry Mass of soil
(M _{cms}) 1904.7	g $M_4 = 100 M_3 / (w + 100) 4067.7$ g
Mass of container & dry specimen	Wet Density
(M _{cds}) 1853.3	$\rho_m = (M_3/V) \times 62.43 \underbrace{124.9}_{\text{Dry Density}} lbs/ft^3$
Mass of water (M_{w}) $M_{w} = M_{cms} - M_{cds}$ 51.4	$\rho_d = M_d / V \underline{1.8} g/cm^3$
IFI w = IFI cms = IFI cds	Dry Unit Weight
Mass of container (M _c) 1235.6	$g \gamma_d = \rho_d \times 62.43 115.3 lbs/ft^3$
Mass of dry specimen (M_s)	Sail Description Tonnish in color
$M_s = M_{cds} - M_c$ 617.7 Moisture content (w)	g Soil Description: Tannish in color Proctor ID: SW #7
$w = (M_w / M_s) \times 100$ 8.3	Proctor ID: SW #7 Standard Proctor (ASTM D698)
The production of the producti	
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	
	Optimum Moisture (w_{opt})(%)
Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ	Required Moisture: 7.0 % to 17.0 %
Percent Compaction = ρ_d / $\gamma_d max \times 100$	
116.2 / 117.8 x 100 = 98.6 %	Required Percent Compaction:(%)
fomments: 115.3 97.9	TEST RESULTS:
	Pass Date:
	Failed Moisture
	Failed Compaction Time: 10:23
	By: Lynn Tuttle (signature)
att popen 04-20-2017	
QA/QC APPROVAL DATE	

PROJECT: Moab UMTRA Project	OTHER
PROJECT: Moab UMTRA Project USASUT 0405 - 0 0 Lift I on spoils wedge (1950 x	405) DATE: 4/5/2017
TEST ID NUMBER(S):	2
TEST LOCATION: P2	TEST METHOD:D1556xD6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus Calibrated Vol. (lbs/ft ³)
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm ³
Daily Standard Counts: On-Cell Standard	Ass of Sand to Fill Cone & Plate (M ₂)
Density Moisture 628	Mass of bottle & cone before filling
Method A (Direct Transmission)	cone, plate & hole
Depth Setting 6 (inches) Count Time 1 (minutes)	Mass of bottle & cone after filling cone, plate & hole
Moisture Count 146 Density Count 1749	Mass of sand to fill cone,
	plate, & hole (M ₁)
Wet Density (ρ_m) 122.3 (lbs/ft^3) Dry Density 109.1 (lbs/ft^3)	Mass of sand to fill hole g Mass of wet soil & container g
Moisture Density 13.2 (lbs/ft ³) Moisture Fraction 12.1 (%)	
	Mass of container g
MOISTURE DETERMINATION	Mass of wet soil (M ₃) g
ASTM D4643	Test Hole Volume $V = (M_1 - M_2)/\rho_1 \qquad cm$
Container ID 1235.6	γ = (M ₁ = M ₂) γ ρ ₁ cm
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen	Dry Mass of soil
(M _{cubs})	$M_4 = 100 M_3 / (w + 100)$ g
Mass of container & dry specificer (Mass)	Wet Density $a = (M_{\star}/V) \times 62.43 \qquad lbs_{\star}$
Mass of water (M w)	$\rho_m = (M_3/V) \times 62.43 $ Dry Density
$M_w = M_{cms} - M_{cds}$	$\rho_d = M_4 / V \underline{\hspace{1cm}} g/c$
	Dry Unit Weight
Mass of container (M_c) Mass of dry specimen (M_s)	$\gamma_d = \rho_d \times 62.43 \underline{\hspace{1cm}} lbs_d$
$M_s = M_{cds} - M_c$	Soil Description: Tannish in color
Moisture content (w)	Proctor ID: SW #7
$w = (M_w/M_s) \times 100$	Standard Proctor (ASTM D698)
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density (γ _d max)117.8(lbs
$\rho d = (100 \text{ x})/(100 + \text{ = } lbs/ft^3$	Optimum Moisture (w_{opt}) 12.0 (%)
$\rho d = (100 \text{ x})/(100 + \frac{1}{\text{Note: Wet Density from ASTM D 1556 (p_n) takes precedence over ASTM D 6938 (p_m)}}$	
Percent Compaction = ρ_d / $\gamma_d max \times 100$	Required Moisture: 7.0 % to 17.0
$109.1 / 117.8 \times 100 = 92.6 \%$	Required Percent Compaction: 90.0 (%)
Comments:	
confinents.	TEST RESULTS: x Pass Date: 4/5/
	Failed Moisture
	Failed Compaction Time: 10:4
	By: Lynn Tuttle / Jynn Tuttle
	(print) \ \ (signature)
Titl/10you 04.20:2017	
QA/QC APPROVAL DATE	

PROJECT: Moab UMTRA Project	OTHER
LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950	x 405) DATE: 4/5/2017
TEST ID NUMBER(S):	3
TEST LOCATION: P3	TEST METHOD: D1556 x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Standard	Testing Apparatus 1 Calibrated Vol. (lbs/ft^3) Bulk Density of sand (ρ_1) g/cm^3 lbs Aass of Sand to Fill Cone & Plate (M_2)
Density Moisture 628	Mass of bottle & cone before filling
Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes)	cone, plate & hole Mass of bottle & cone after filling cone, plate & hole
Moisture Count115 Density Count1905	cone, plate & hole Mass of sand to fill cone, plate, & hole (M_1) g
Wet Density (ρ_m) 118.7 (lbs/ft^3) Dry Density 108.7 (lbs/ft^3)	Mass of sand to fill hole g Mass of wet soil & container g
Moisture Density 10.0 (lbs/ft ³) Moisture Fraction 9.2 (%)	Mass of container g
MOISTURE DETERMINATION ASTM D4643	Mass of wet soil (M_3) g Test Pole Volume
Container ID 1235.6	$V = (M_1 - M_2)/\rho_1 \underline{\qquad} cm^3$
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen (M cms)	Dry Mass of soil $M_4 = 100 M_3 / (w + 100) $
Mass of container & dry speciment	Wet Density $\rho_m = (M_3/V) \times 62.43 $ lbs/ft ³
(M_{cds}) Mass of water (M_{w})	Dry Density
$M_w = M_{cms} - M_{cds}$	$\rho_d = M_d/V g/cm^3$
Mass of container (M_c)	Dry Unit Weight $\gamma_d = \rho_d x 62.43$ lbs/ft ³
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$	Soil Description: Tannish in color
Moisture content (w)	Proctor ID: SW #7
$w = (M_w / M_s) \times 100$	Standard Proctor (ASTM D698)
Dry Density $(\rho_{d0} = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density (γ _d max) 117.8 (lbs/ft ²
$pd = (100 \text{ x}) / (100 + = 1bs/ft^3$ Note: Wet Density from ASTM D 1556 (p _m) takes precedence over ASTM D 6938 (p _m)	Optimum Moisture (<i>w</i> _{opt})12.0(%)
Percent Compaction = ρ_d / $\gamma_d max \times 100$	Required Moisture:% to
$108.7 / 117.8 \times 100 = 92.3 $	Required Percent Compaction: 90.0 (%)
Comments:	TEST RESULTS:
	Pass Date: 4/5/17 Failed Moisture
	Failed Compaction Time: 10:58
,	By: Lynn Tuttle (signature)
12/1/0gre 04:20:2017	
QA/QC APPROVAL DATE	

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PROJECT: Moab l	FIELD DENS	OTHER	
LIFT IDENTIFICATION:	Lift #1 on spoils wedge (1950)	(405) DATE:	4/5/2017
TEST ID NUMBER(S):	P4	TEST METHOD:	D1556 x D6938
TEST LOCATION: ASTM D6938 (DENSITY		1.07 100 000 0000 00000 00000 00000	SITY DETERMINATION)
		Testing Apparatus 1 C	Calibrated Vol. (lbs/ft ³)
Make/Model <u>Troxler 3430</u> Contact Calibration Date: 3		Bulk Density of sand (ρ_1)	g/cm ³ lbs/f
Daily Standard Counts: On-Cell Standard		Vass of Sand to Fill Cone &	
		2000	
Density 2127		Mass of bottle & cone	/
Method A (Direct Depth Setting 6 (inches)		Mass of bottle & cone	
· · · · · · · · · · · · · · · · · · ·		Mass of san	, plate & hole g id to fill cone,
Moisture Count115	Density Count1604	1	& hole (M ₁)
Wet Density (ρ_m) 126.3 (lbs/ft^3)	Dry Density 116.3 (lbs/ft ³)		nd to fill hole
vet Delisity (p_{m}) 120.5 (10.5)	Dif Denoity(real).	Mass of wet soi	
Moisture Density 10.0 (lbs/ft ³)	Moisture Fraction 8.6 (%)	Mas	of container g
MOISTURE DET		t	g
ASTM			Hole Volume
Container ID 123			$(I_1 - M_2)/\rho_1$ cm ³
Scale Serial # 5500jte-1	Last Calibration Date: 3/17/17	- /	
Mass of container & wet specimen			y Mass of soil
(M_{cms})		$M_4 = 100 M$	(y + 100)g Wet Density
Mass of container & dry specimen (M cus)		$\rho_{m} = \ell M$	wet Density $_3/V) \times 62.43$ lbs/ft ³
Mass of water (M		. /^	Dry Density
$M_{w} = M_{cms} - M_{cds}$	g	My D.	$\rho_d = M_4 / V \underline{\hspace{1cm}} g/cm^3$
		Dry	y Unit Weight $= \rho_d \times 62.43 $ lbs/ft ³
Mass of container (M_c) Mass of dry specimen (M_s)		7 4 7 4	- p _d x 02.4310s/ji
$M_s = M_{cds} - M_c$	The state of the s	Soil Description:	Tannish in color
Moisture content (w)			SW #7
$w = (M_w / M_s) \times 100$	%	Standard Pro	octor (ASTM D698)
Dry Density $(\rho_{d}) = (100)$	$(x \rho_m)/(100 + w)$	Maximum Dry Density	$(\gamma_d max)$ 117.8 (lbs/ft ³)
$\rho d = (100 \ x) / (100 + $	$=$ lbs/ft^3	Optimum Moistu	are (w opt)12.0(%)
Note: Wet Density from ASTM D 1556 (pm)	takes precedence over ASTM D 6938 (pm)	Required Moisture: 7	1.0 % to
Percent Compaction =	$\rho_d / \gamma_d max \times 100$		
116.3 / 117.8 x 100 =	98.8 %	Required Percent Co	ompaction: 90.0 (%)
Comments:	W. Carlotte and Ca	TEST RESULTS:	
		x Pass	Date: 4/5/17
		Failed Moistur Failed Compac	
		-	tion Time: 11:15
		By: Lynn Tuttle (print)	(signature)
128/1/	10.7 N.7 N.7		
QA/QC APPROVAL	DATE		
2	M.A. M.		OC-F-002
Density Testing DOE-EM/GJRAC1783			File Index No. 43.8.
DOE-EM/GJRACI / 83			Page <u>8</u> of <u>22</u>

TEST ID NUMBER(S): TEST ID NUMBER(S): TEST ID NUMBER(S): ASTM D6938 (DENSITY DETERMINATION) Make/Model Troster 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cett Standard Density 2127 Moisture 628 Method A (Direct Transmission) Depth Setting 6 (Inches) Count Time 1 (mimutes) Moisture Count 106 Density Count 1640 Wet Density (ρ_m) 125.4 (hbs/h^2) Dry Density 116.3 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Moisture Density 9.0 (hbs/h^2) Moisture Fraction 7.8 (hbs/h^2) Mass of container & we specimen (hbs/h^2) Mass of container & we specimen (hbs/h^2) Mass of vacter (hbs/h^2) Mass of container & we specimen (hbs/h^2) Mass of vacter (hbs/h^2) Mass of vacter (hbs/h^2) Mass of container & we specimen (hbs/h^2) Mass of container & we specimen (hbs/h^2) Mass of vacter (hbs/h^2) Mass	PROJECT: Moab UMTRA Project	OTHER
TEST LOCATION: P5 ASTM D6938 (DENSITY DETERMINATION) Make/Model Troyler 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Seandard Density 2127 Moisture 628 Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes) Moisture Count 106 Density Count 1640 Density (ρ_{nl}) 125.4 (lbs/l^{3}) Dry Density 116.3 (lbs/l^{3}) Moisture Density 9.0 (lbs/l^{3}) Moisture Fraction 7.8 (%) MOISTURE DETERMINATION ASTM D1556 (DENSITY DETERMINATION) Testing Apparatus 1 Calibrated Vol. (lbs/l^{3}) ls Mass of bottle & cone before filling cone, plate & hole ll_{1} ll_{2} Mass of bottle & cone after filling cone, plate & hole ll_{1} ll_{2} Mass of bottle & cone after filling cone, plate & hole ll_{1} ll_{2} Mass of bottle & cone after filling cone, plate & hole ll_{1} ll_{2} Mass of bottle & cone after filling cone, plate & hole ll_{1} ll_{2} Mass of wet sail & container ll_{2} Mass of container & wet specimen ll_{2} Mass of container	LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	(405) DATE: 4/5/2017
TEST LOCATION: PS ASTM D6938 (DENSITY DETERMINATION) Make/Model Troxler 3430 Gauge Serial # 24445 Lust Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Sundaur Density 2127 Moisture 628 Method A (Direct Transmission) Depth Setting 6 (inchest) Count Time 1 (minutes) Moisture Count 106 Density Count 1640 Vet Density (ρ_{nl}) 125.4 ($lbstft^3$) Dry Density 116.3 ($lbstft^3$) Moisture Density 9.0 ($lbstft^3$) Moisture Fraction 7.8 (%) Moisture Density 9.0 ($lbstft^3$) Moisture Fraction 7.8 (%) Moisture Density 9.0 ($lbstft^3$) Moisture Fraction 7.8 (%) Mass of container & wet specimen (M_{nl}) Mass of container & wet spec	TEST ID NUMBER(S):	5
ASTM D6938 (DENSITY DETERMINATION) Make/Model Troxler 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Standard Density 2127 Moisture 628 Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (inimates) Moisture Count 106 Density Count 1640 Vet Density (ρ_{to}) 125.4 (lbs/fr^2) Dry Density 116.3 (lbs/fr^3) Wet Density 9.0 (lbs/fr^2) Moisture Fraction 7.8 (%) MOISTURE DETERMINATION ASTM D4643 Container ID 1235.6 Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17 Mass of container & wet specimen (M_{to}) Mass of container & wet specimen (M_{to}) Mass of container (M_{to})	TEST LOCATION: P5	
Last Calibration Date: $3/14/17$ Daily Standard Counts: $On-Cell Samdard$ Density $On-Cell Samd$		
Mass of container & wet specimen (M_{com}) Mass of container & dry specimen (M_{com}) Mass of water (M_{com}) Mass of water (M_{com}) Mass of water (M_{com}) Mass of container (M_{com}) Mass of water (M_{com}) Mass of container (M_{com}) Mass of water (M_{com}) Mass of container (M_{com}) Mass of water (M_{com}) Mass o	Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Standard Density 2127 Moisture 628 Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes) Moisture Count 106 Density Count 1640 Wet Density (ρ_m) 125.4 (lbs/ft ³) Dry Density 116.3 (lbs/ft ³) Moisture Density 9.0 (lbs/ft ³) Moisture Fraction 7.8 (%) MOISTURE DETERMINATION ASTM D4643 Container ID 1235.6	Bulk Density of sand (ρ_1)
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$ Moisture content (w) $w = (M_w / M_s) \times 100$ Dry Density $(\rho_{d)} = (100 \times \rho_m)/(100 + w)$ $pd = (100 \times 1)/(100 + w)$ $pd = (100$	Mass of container & wet specimen (M_{cms}) Mass of container & dry specimen (M_{cd}) Mass of water (M_{cd}) $M_{w} = M_{cms} - M_{cds}$ Mass of container (M_{c}) g	$M_4 = 100 M_3 / (w + 100) $ Wet Density $\rho_m = (M_3 / V) \times 62.43 $ Dry Density $\rho_d = M_4 / V $ g/cm^3
Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m) Percent Compaction = ρ_d / $\gamma_d max \times 100$ 116.3 / 117.8 $\times 100$ = 98.8 % Required Moisture: 7.0 % to 17.0 % Required Percent Compaction: 90.0 (%) TEST RESULTS: 2 Pass Pass Date: 4/5/17 Failed Moisture Failed Compaction Time: 11:50 By: Lynn Tuttle (print) (signature)	$M_s = M_{cds} - M_c$ Moisture content (w) $w = (M_w / M_s) \times 100$ $M_s = M_{cds} - M_c$ Moisture content (w) $W = (M_w / M_s) \times 100$ Moisture content (w)	Soil Description: Tannish in color Proctor ID: SW #7 Standard Proctor (ASTM D698) Maximum Dry Density (7 dmax) 117.8 (lbs/ft
Failed Moisture Failed Compaction Time: 11:50 By: Lynn Tuttle / (print) (signature)	Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m) Percent Compaction = ρ_d / $\gamma_d max$ x 100 116.3 / 117.8 x 100 = 98.8 %	Required Moisture: 7.0 % to 17.0 %
QA/QC APPROVAL DATE	13 Jagen 04:20:2017	Pass Date: 4/5/17 Failed Moisture Failed Compaction Time: 11:50 By: Lynn Tuttle

PROJECT:	Moah	UMTRA Project		ro	THER	
LIFT IDENTIF	ICATION:	Lift #1 on spoils wedge	(1950 x	405) DATE:	4/5/20	17
TEST LOCATION: _				TEST METHOD:	D1556	D6938
		Y DETERMINATION)			DENSITY DETER	
		Gauge Serial # 24445		Testing Apparatus		
Last Calibration l			- 1	Bulk Density of sand (9.1)	m^3 lb
Daily Standard Count				Mass of Sand to Fill C	Cone & Plate (M ₂)	g
Density 212	27	Moisture 628	_		cone before filling	$\overline{}$
	lethod A (Direc	Transmission)			cone, plate & hole	g
Depth Setting 6	_(inches)	Count Time 1 (minute:	s)		cone after filling	
Moisture Count	108	Density Count 1756		Mass o	cone, plate & hole of sand to fill cone,	g
	-			p	olate, & hole (M ₁)	g
Vet Density (ρ_m) 12	$\frac{2.3}{\text{(lbs/ft}^3)}$	Dry Density 113.3 (lbs	s/ft 3)		of sand to fill hole	/g
Maiatuma Danaita	2 (11-163)	Min Eni 00	<i>mu</i>	Mass of w	et soil & container	g
violsture Delisity9	. <u>s</u> (10s/ji)	Moisture Fraction 8.2	-(%)		Mass of container	g
MO		ERMINATION		Mass	s of wet soil (M ₃)	g
	ASTM I				Test Hole Volume	
Container ID	123	35.6		V	$= (M/FM_2)/\rho_1$	cm ³
Scale Serial # 55	500jte-1	Last Calibration Date: 3/	17/17			
Mass of container &	wet specimen		1	/	Dry Mass of soil	
	(M _{cms})		g		$90 M_3 / (w + 100)$	g
Mass of container &]		Wet Density	
M	of water (M _w)		g	$\rho_m =$	$= (M_3/V) \times 62.43$	
	$= M_{cms} - M_{cds}$		g	MA TY	Dry Density $\rho_d = M_4/V$	
772 Hp	ems - IVI eds		8	32	Dry Unit Weight	100
	ontainer (M _c)		g	/	$\gamma_d = \rho_d \times 62.43$	
Mass of dry sp			1 -	NV SRCSHO SE DES		
11	$= M_{cds} - M_c$		g S	Soil Description:	Tannish in c	olor
	re content (w) $_{\nu}/M_{s}$) x 100		0,	Proctor ID:		
3/1			%	Standard	d Proctor (ASTM D	698)
Dry Density	$(\rho_{d)} = (100)$	$(x \rho_m)/(100 + w)$		Maximum Dry De	nsity (y _d max)	117.8 (lbs/ft
		=lbs/j		Optimum M	oisture (w opt)	12.0 (%)
Note: Wet Density from A	ISTM D 1556 (ρ_m) to	akes precedence over ASTM D 6938 (ρ _m))	Required Moisture:	7.0 % to	17.0 %
Percent Cor	mpaction = ρ	$_d$ / γ_d max x 100		required Moisture.	7.0 70 10	17.0 70
113.3 / 11	$\frac{17.8}{}$ x 100 =	96.0 %		Required Percen	t Compaction:	90.0 (%)
omments:				TEST RESULTS:		
				Pass		Date: 4/5/17
				Failed Moi		Pi 40 40
				Failed Com	0	Γime: 12:40
				By: Lynn Tuttle (print)	100,400	signature)
will // squ	n	04.20.2017				■ Constituted
QA/QC APPRO	VAL	DATE				
Density Testing DOE-EM/GJRAC178	33				File	QC Index No

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PROJECT: Moab UMTRA Project	OTHER
LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/5/2017
TEST ID NUMBER(S):	
TEST LOCATION: P7	TEST METHOD: D1556 x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³)
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm^3
Daily Standard Counts: On-Cell Standard	Vass of Sand to Fill Cone & Plate (M ₂)
Density Moisture 628	Mass of bottle & cone before filling
Method A (Direct Transmission)	cone, plate & hole Mass of bottle & cone after filling
Depth Setting 6 (inches) Count Time 1 (minutes)	cone, plate & hole
Moisture Count 107 Density Count 1855	Mass of sand to fill cone,
	plate, & hole (M_I) g
Wet Density (ρ_m) 119.9 (lbs/ft^3) Dry Density 110.8 (lbs/ft^3)	Mass of sand to fill hore g Mass of wet soil & container g
Moisture Density 9.2 (lbs/ft ³) Moisture Fraction 8.3 (%)	
	Massrof container g
MOISTURE DETERMINATION	Mass of wet soil (M ₃)
ASTM D4643	Test Hele Volume $V = (M_1 - M_2) / \rho_1 \qquad cm^2$
Container ID 1235.6	(M ₁ -M ₂)/p ₁
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen	Dry Mass of soil
(M _{cm})	$M_4 = 100 M_3 / (w + 100)g$
Mass of container & dry speciment	Wet Density $\rho_m = (M_3/V) \times 62.43 $ lbs/
Mass of water (M_w)	Dry Density
$M_w = M_{ems} - M_{cds}$	$\rho_d = M_d / V \underline{\hspace{1cm}} g/cr$
	Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ lbs/
Mass of container (M_c) Mass of dry specimen (M_s)	γ _d - ρ _d x θ2.431055
$M_s = M_{cds} - M_c$	Soil Description: Tannish in color
Moisture content (w)	Proctor ID: SW #7
$w = (M_w / M_s) \times 100$ %	Standard Proctor (ASTM D698)
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density $(\gamma_d max)$ 117.8 (lbs
$\rho d = (100 \text{ x})/(100 + = lbs/ft^3$	Optimum Moisture (w_{opt}) 12.0 (%)
Note: Wet Density from ASTM D 1556 (pm) takes precedence over ASTM D 6938 (pm)	Required Moisture: 7.0 % to 17.0
Percent Compaction = ρ_d / $\gamma_d max \times 100$	Required Moisture:
$110.8 / 117.8 \times 100 = 94.0 \%$	Required Percent Compaction: 90.0 (%)
Comments:	TEST RESULTS:
	Pass Date:4/5/1
	Failed Moisture
	Failed Compaction Time: 13:0
	By: Lynn Tuttle (signature)
Na 1 1	(prini) (signature)
QA/QC APPROVAL DATE Density Testing	

DOE-EM/GJRAC1783

File Index No. 43.8.2
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PROJECT: Moab UMTRA Project	OTHER
LIFT IDENTIFICATION: Moab UMTRA Project WSASS (704.05 - 0.2) Lift #1 on spoils wedge (1950 x	405) DATE: 4/5/2017
TEST ID NUMBER(S):	8
TEST LOCATION: P8	TEST METHOD: D1556 x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Standard	Testing Apparatus 1 Calibrated Vol. (lbs/ft^3) Bulk Density of sand (ρ_1) g/cm^3 lb_3 vlass of Sand to Fill Cone & Plate (M_2)
Density 2127 Moisture 628 Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes) Moisture Count 108 Density Count 1521 Vet Density (ρ_{m}) 128.7 (lbs/ft ³) Dry Density 119.5 (lbs/ft ³)	Mass of bottle & cone before filling cone, plate & hole Mass of bottle & cone after filling cone, plate & hole Mass of sand to fill cone, plate, & hole (M _I) Mass of sand to fill hole g
Moisture Density 9.3 (lbs/ft ³) Moisture Fraction 7.7 (%)	Mass of wet soil & container g Mass of container g
MOISTURE DETERMINATION ASTM D4643 Container ID 1235.6	Mass of wet soil (M_3) g Test thirte Volume $V = (M_1 - M_2)/\rho_1 \qquad cm^3$
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen (M_{cms}) Mass of container & dry specimen (M_{cds}) Mass of water (M_{cds}) $M_{w} = M_{cms} - M_{cds}$ Mass of container (M_{c}) Mass of dry specimen (M_{s})	Dry Mass of soil $M_4 = 100 \ M_3 / (w + 100) $ Wet Density $\rho_m = (M_3 / V) \times 62.43 $ Dry Density $\rho_d = M_4 / V $ Dry Unit Weight $\gamma_d = \rho_d \times 62.43 $ lbs/ft
$M_s = M_{cds} - M_c$	Soil Description: Grey and contains shale
Moisture content (w)	Proctor ID: SW #8 Standard Proctor (ASTM D698)
$w = (M_{w} / M_{s}) \times 100$ Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$ $\rho d = (100 \times 1)/(100 + w)$ Note: Wet Density from ASTM D 1556 (ρ_{m}) takes precedence over ASTM D 6938 (ρ_{m}) Percent Compaction = ρ_{d} / $\gamma_{d} max \times 100$	Maximum Dry Density ($\gamma_d max$) 121.0 (lbs/f Optimum Moisture (w_{opt}) 10.5 (%) Required Moisture: 5.5 % to 15.5 %
$119.5 / 117.8 \times 100 = 98.8 \%$	Required Percent Compaction:90.0(%)
Comments:	TEST RESULTS: x Pass Date: 4/5/17 Failed Moisture Failed Compaction Time: 13:28 By: Lynn Tuttle (signature)
OA/OC APPROVAL DATE	

PROJECT: Moab UMTRA Project	OTHER
PROJECT: Moab UMTRA Project LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/5/2017
TEST ID NUMBER(S):	9
TEST LOCATION: P9	TEST METHOD: D1556x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³)
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm ³
Daily Standard Counts: On-Cell Standard	Vass of Sand to Fill Cone & Plate (M ₂)
Density 2127 Moisture 628	Mass of bottle & cone before filling
Method A (Direct Transmission)	cone, plate & hole
Depth Setting 6 (inches) Count Time 1 (minutes)	Mass of bottle & cone after filling
Moisture Count 101 Density Count 1595	cone, plate & hole g Mass of sand to fill cone,
	plate, & hole (M_I)
/et Density (ρ_m) 126.6 (lbs/ft^3) Dry Density 118.1 (lbs/ft^3)	Mass of sand to fill hole
Moisture Density 8.5 (lbs/ft ³) Moisture Fraction 7.2 (%)	Mass of wet soil & container g
Moisture Density 8.5 (108/JL) Moisture Fraction 7.2 (76)	Mass of container g
MOISTURE DETERMINATION	Mass of wet soil (M_3) g
ASTM D4643	Test Høle ₩olume
Container ID 1235.6	$V = (M_1 - M_2) / \rho_1 \underline{\hspace{1cm}} cm$
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen	Dry Mass of soil
(<i>M</i> _{cms}) g	$M_4 = 100 M_3 / (w + 100)g$
Mass of container & dry specimen	Wet Density
(M Eds)	$\rho_m = (M_3/V) \times 62.43 \underline{\hspace{1cm}} lbs$
Mass of water (M,	Dry Density $\rho_d = M_4/V \underline{\hspace{1cm}} g/c$
$M_w = M_{cms} - M_{cds}^{\dagger}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Mass of container (M_c)	$\gamma_d = \rho_d \times 62.43 $ [bs
Mass of dry specimen (M_s)	γ _d - ρ _d x θ2.431θ3
$M_s = M_{cds} - M_c$	Soil Description: Grey and contains shale
Moisture content (w)	Proctor ID: SW #8
$w = (M_w / M_s) \times 100$ %	Standard Proctor (ASTM D698)
Dry Density $(\rho_{ab} = (100 \times \rho_m)/(100 + w)$	Maximum Dry Density (γ _d max) 121.0 (lb
, , , , , , , , , , , , , , , , , , , ,	
$\rho d = (100 \text{ x})/(100 + \frac{lbs/ft^3}{Note: Wet Density from ASTM D 1556}(\rho_m) takes precedence over ASTM D 6938 (\rho_m)$	Optimum Moisture (w opt) 10.5 (%
	Required Moisture: 5.5 % to 15.5
Percent Compaction = ρ_d / $\gamma_d max \times 100$	
$118.1 / 117.8 \times 100 = 97.6 \%$	Required Percent Compaction: 90.0 (%
omments: 4.20.17	TEST RESULTS:
100000	Pass Date:4/5/
	Failed Moisture
	Failed Compaction Time: 14:
	By: Lynn Tuttle
	(print) (signature)
Till/oyou 04.20.2017	
QA/QC APPROVAL DATE	
Density Testing	QC-I

Moch LIMTDA Project	OTHER
PROJECT: Moab UMTRA Project LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/5/2017
LIFT IDENTIFICATION.	10
TEST ID NUMBER(S):	TEST METHOD: D1556 x D6938
ST LOCATION: P10	ASTM D1556 (DENSITY DETERMINATION)
ASTM D6938 (DENSITY DETERMINATION)	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³)
Make/Model Troxler 3430 Gauge Serial # 24445	Bulk Density of sand (ρ_1) g/cm ³
Last Calibration Date: 3/14/17 aily Standard Counts: On-Cell Standard	Mass of Sand to Fill Cone & Plate (M ₂)
3-501 - 1-20-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0	Mass of bottle & cone before filling
Density Moisture 628	cone, plate & hole / g
Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes)	Mass of bottle & cone after filling
	cone, plate & hole Mass of sand to fill cone,
Moisture Count108 Density Count1863	plate, & hole (M ₁)
et Density (ρ_m) 119.7 (lbs/ft^3) Dry Density 110.5 (lbs/ft^3)	Mass of sand to fill hole g
	Mass of wet soil & container g
oisture Density 9.3 (lbs/ft ³) Moisture Fraction 8.4 (%)	Mass of container g
MOISTURE DETERMINATION	Mass of websoil (M ₃)
ASTM D4643	Test Hole Volume
Container ID	$V = (M_1 - M_2)/\rho_1 \underline{\hspace{1cm}} cm$
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
	Dry Mass of soil
Mass of container & wet specimen (M cms)	$M_4 = 100 M_3 / (w + 100)$ g
Mass of container & dry specimen	Wet Density
(M_{cds}) g	$\rho_m = (M_3/V) \times 62.43 \underline{\hspace{1cm}} lbs.$ Dry Density
Mass of water M	$\rho_d = M_d / V \underline{\hspace{1cm}} g/c$
$M_{w} = M_{cms} - M_{cds}$	Dry Unit Weight
Mass of container (M _c)	$\gamma_d = \rho_d \times 62.43$ lbs
Mass of dry specimen (M_s)	Soil Description: Grey and contains shale
$M_s = M_{cds} - M_c$	Proctor ID: SW #8
Moisture content (w) $w = (M_w / M_s) \times 100$ %	Standard Proctor (ASTM D698)
	Maximum Dry Density (y dmax) 121.0 (lb
Dry Density $(\rho_{d)} = (100 \times \rho_{m})/(100 + w)$	
$\rho d = (100 \text{ s})/(100 + 100 \text{ s})$	Optimum Moisture (w opt)10.5(%
Note: Wet Density from ASTM D 1556 (pm) takes precedence over ASTM D 6938 (pm)	Required Moisture: 5.5 % to 15.5
Percent Compaction = ρ_d / $\gamma_d max \times 100$	
$110.5 / \frac{127.8}{117.8} \times 100 = 91.3$	Required Percent Compaction: 90.0 (%
Comments: 420.77	TEST RESULTS: Pass Date: 4/5
	Pass Date: 4/5
	Failed Compaction Time: 16
	By: Lynn Tuttle / Jynn Tut
	(print) (signature)
Willform 04.20.2017	
OA/OC APPROVAL DATE	

FIE	LD DENSI	TY TEST		
PROJECT: Moab UMTRA Project		O'.	THER	5
LIFT IDENTIFICATION: Lift #1 on spoils v	vedge (1950 x	405) DATE	:4	<u>/6/2017</u>
TEST ID NUMBER(S):		11		
TEST LOCATION: P11		TEST METHOD:	D1556	xD6938
ASTM D6938 (DENSITY DETERMINATIO	N)	ASTM D1556 (DENSITY DE	ETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 244	445	Testing Apparatus	1 Calibrate	d Vol. (lbs/ft 3)
Last Calibration Date: 3/14/17		Bulk Density of sand (
Daily Standard Counts: On-Cell Standard		√ass of Sand to Fill C	Cone & Plate ($M_2)$
Density Moisture 630		Mass of bottle &	cone before fi	Illing
Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (inches)		Mass of bottle	cone, plate &	
Depth Setting 6 (inches) Count Time 1 (i	minutes)		cone, plate &	hole / g
Moisture Count Density Count	1842		of sand to fill of plate, & hole (/
Wet Density (ρ_m) 120.2 (lbs/ft^3) Dry Density 109.9	9 (lbs/ft ³)	52	of sand to fill	/
		Mass of v	vet soil & cont	
Moisture Density 10.3 (lbs/ft ³) Moisture Fraction	9.4 (%)		Mass of cont	ainer g
MOISTURE DETERMINATION		Mas	ss of wet soil (M_3) g
ASTM D4643			Test Hole Vo	
Container ID 1235.6		ı	$f = (M_1 - M_2)$	$/\rho_1$ cm ³
Scale Serial # 5500jte-1 Last Calibration Da	ite: 3/17/17			
Mass of container & wet specimen			Dry Mass of	
(M _{cms}) 2114.3	g	$M_4 = 1$		100)g
Mass of container & dry specimen (M_{cds}) 2041.1	g		Wet De $= (M_3/V) \times 6$	
Mass of water (M_{vv})	g	A A Pm	$-(m_3/r) \times 0$ Dry De	
$M_{w} = M_{cms} - M_{cds} $ 73.2	g	11/20		4/Vg/cm
Mass of container (M.)		/N	Dry Unit W	
Mass of container (M_c) 1235.6 Mass of dry specimen (M_s)	g		$\gamma_d = \rho_d \times \sigma$	2.43lbs/f
$M_s = M_{cds} - M_c $ 805.5	g	Soil Description:	Grey and	contains shale
Moisture content (w)			:	
$w = (M_w / M_s) \times 100 $ 9.1	%		rd Proctor (AS	
Dry Density $(\rho_{d)} = (100 \times \rho_{m})/(100 + w)$		Maximum Dry D	ensity (γ _d max,	121.0 (lbs/
$\rho d = (100 \times 120.2)/(100 + 9.1) = 110.2$	lbs/ft 3	Optimum N	Aoisture (w opt)	(%)
Note: Wet Density from ASTM D 1556 (p _m) takes precedence over ASTM D	6938 (ρ _m)	Required Moisture	5.5 %	to15.5%
Percent Compaction = ρ_d / $\gamma_d max \times 10^{\circ}$	0			
$110.2 / 117.8 \times 100 = 91.1 $	6	Required Perce	nt Compaction	:(%)
Comments: 42017		TEST RESULTS:		
		x Pass		Date: 4/6/17
		Failed Mo		Time: 10:20
		By: Lynn Tuttl	. 0	Una Airly
		(print)		(signature)
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QA/QC APPROVAL DATE				
Density Testing				QC-F-(

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PROJECT: Monh LIMTRA Project	OTHER 5
PROJECT: Moab UMTRA Project LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/8/2017
TEST ID NUMBER(S):	12
TEST LOCATION: P12	TEST METHOD: D1556 x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³)
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm^3
Daily Standard Counts: On-Cell Standard	Aass of Sand to Fill Cone & Plate (M ₂)
Density Moisture 630	Mass of bottle & cone before filling
Method A (Direct Transmission)	cone, plate & hole Mass of bottle & cone after filling
Depth Setting 6 (inches) Count Time 1 (minutes)	cone, plate & hole
Moisture Count 114 Density Count 1640	Mass of sand to fill cone,
	plate, & hole (M_1) g
Vet Density (ρ_m) 125.3 (lbs/ft^3) Dry Density 115.5 (lbs/ft^3)	Mass of sand to fill hole g Mass of wet soil & container g
Moisture Density 9.9 (lbs/ft ³) Moisture Fraction 8.6 (%)	/ -
,	Mass of container g
MOISTURE DETERMINATION	Mass of websoil (M ₃)g
ASTM D4643	Test Hold Volume
Container ID 1235.6	$V = (M_1 - M_2) / \rho_1 \underline{\qquad} cm^3$
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen	Dry Mass of soil
(M _{cms})	$M_4 = 100 M_3 / (w + 100)g$
Mass of container & dry specimen	Wet Density
(M_{ds}) Mass of water (M_{w})	$\rho_m = (M_3/V) \times 62.43 \underline{\hspace{1cm}} lbs/f_1$ Dry Density
$M_{w} = M_{cms} - M_{cds}$	$\rho_d = M_4/V \underline{\hspace{1cm}} g/cm$
	Dry Unit Weight
Mass of container (M_c) Mass of dry specimen (M_s)	$\gamma_d = \rho_d \times 62.43 \underline{\hspace{1cm}} lbs/f$
wasson dry specimen (M_s) $M_s = M_{cds} - M_c$ g	Soil Description: Grey and contains shale
Moisture content (w)	Proctor ID: SW #8
$w = (M_w / M_s) \times 100$ %	Standard Proctor (ASTM D698)
Dry Density $(\rho_{i0} = (100 \times \rho_m)/(100 + w)$	Maximum Dry Density (γ _d max) 121.0 (lbs/
$\rho d = (100 \ x) / (100 + = lbs/ft^3)$	Optimum Moisture (w opt) 10.5 (%)
Note: Wet Density from ASTM D 1556 (p _m) takes precedence over ASTM D 6938 (p _m)	740 340 Bassaco
Percent Compaction = ρ_d / $\gamma_d max \times 100$	Required Moisture: 5.5 % to 15.5 %
	Required Percent Compaction: 90.0 (%)
<u>115.5</u> / <u>121.0</u> x 100 = <u>95.4</u> %	TEST RESULTS:
	TEST RESULTS: Name of the property of the pro
	Failed Moisture
	Failed Compaction Time: 10:32
	By: Lynn Tuttle / Jynn Julla
1 2911 11	(print) (signature)
Will / (0700 04.20.2017	
QA/QC APPROVAL DATE	

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FIELD DENS	ITY TEST
PROJECT: Moab UMTRA Project	OTHER
PROJECT: Moab UMTRA Project LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/9/2017
TEST ID NUMBER(S):	
TEST LOCATION: P13	TEST METHOD: D1556x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
ASTM D6938 (DENSITY DETERMINATION) Make/Model Troxler 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Standard Density 2123 Moisture 630 Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes) Moisture Count 102 Density Count 1939 Wet Density (ρ _m) 118.0 (lbs/ft ³) Dry Density 109.4 (lbs/ft ³) Moisture Density 8.6 (lbs/ft ³) Moisture Fraction 7.9 (%) MOISTURE DETERMINATION ASTM D4643 Container ID 1235.6 Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17 Mass of container & wet specimen	ASTM D1556 (DENSITY DETERMINATION) Testing Apparatus 1 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 cone, plate & hole Mass of bottle & cone after filling cone, plate & hole 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 wet soil & container g Mass of wet soil (M_3) g Test Hole Volume $V = (M_1 - M_2)/\rho_1$ cm^3
Mass of container & dry speciment (M_{cds}) Mass of water (M_{vd}) $M_{vv} = M_{priss} - M_{cds}$ Mass of container (M_c) Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$ g	$M_4 = 100 \ M_3 / (w + 100) \underline{\hspace{1cm}} g$ Wet Density $\rho_m = (M_3 / V) \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$ Dry Density $\rho_d = M_4 / V \underline{\hspace{1cm}} g/cm^3$ Dry Unit Weight $\gamma_d = \rho_d \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$ Soil Description: $\underline{\hspace{1cm}} Grey \text{ and contains shale}$
Moisture content (w)	Proctor ID: SW #8
$w = (M_w / M_s) \times 100$ Dry Density $(\rho_{d)} = (100 \times \rho_m)/(100 + w)$ $\rho d = (100 \times)/(100 + = 100 \times 10^{3})$ Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m) Percent Compaction = ρ_d / $\gamma_d max \times 100$ $109.4 / 121.0 \times 100 = 90.4 \%$	Standard Proctor (ASTM D698) Maximum Dry Density ($\gamma_d max$)121.0(lbs/ft³) Optimum Moisture (w_{opt})10.5(%) Required Moisture:5.5 % to15.5 % Required Percent Compaction: 90.0 (%)
Comments:	TEST RESULTS:
	Pass Date: 4/6/17 Failed Moisture Failed Compaction Time: 10:40 By: Lynn Tuttle / (signature)
QA/QC APPROVAL DATE Density Testing	QC-F-002

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FIELD DENS	ITY TEST
PROJECT: Moab UMTRA Project	OTHER
LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950)	x 405) DATE: 4/6/2017
TEST ID NUMBER(S):	14
TEST LOCATION: P14	TEST METHOD: D1556x D6938
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft 3)
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm^3 lbs/fi
Daily Standard Counts: On-Cell Standard	vass of Sand to Fill Cone & Plate (M ₂)
Density Moisture 630	Mass of bottle & cone before filling
Method A (Direct Transmission)	cone, plate & hole
Depth Setting 6 (inches) Count Time 1 (minutes)	Mass of bottle & cone after filling cone, plate & hole
Moisture Count101 Density Count1805	Mass of sand to fill cone,
Wet Density (ρ_m) 121.2 (lbs/ft^3) Dry Density 112.6 (lbs/ft^3)	plate, & hole (M_1) g Mass of sand to fill høle
wet Density (p _m) 121.2 (108/ft) Dry Density 112.6 (108/ft)	Mass of sand to fill hole g Mass of wet soil & container g
Moisture Density 8.5 (lbs/ft ³) Moisture Fraction 7.6 (%)	Mass of container g
MOISTURE DETERMINATION	Mass of we soil (M_3)
ASTM D4643	Test Hole Volume
Container ID	$V = (M_1 - M_2)/\rho_1 \underline{\qquad} cm^3$
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	
Mass of container & wet specimen	Dry Mass of soil
(<i>M</i> _{cms}) g	$M_4 = 100 M_3 / (w + 100)g$
Mass of container & dry speciment	Wet Density
Mass of water (M)	$\rho_m = (M_3/V) \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$ Dry Density
$M_w = M_{cris} - M_{cds}$	$\rho_d = M_4 / V \qquad g/cm^3$
w in cms in cds	Dry Unit Weight
Mass of container (M_c)	$\gamma_d = \rho_d \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$	Soil Description: Grey and contains shale
Moisture content (w)	Proctor ID: SW #8
$w = (M_w / M_s) \times 100$	Standard Proctor (ASTM D698)
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density $(\gamma_d max)$ 121.0 (lbs/ft ³)
$pd = (100 \ x) / (100 + = lbs/ft^3)$	Optimum Moisture (w_{opt}) 10.5 (%)
Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m)	Required Moisture: 5.5 % to 15.5 %
Percent Compaction = ρ_d / $\gamma_d max \times 100$	Required Moisture. 3.5 70 to 15.5 70
112.6 / 121.0 x 100 = 93.1 %	Required Percent Compaction:90.0(%)
Comments:	TEST RESULTS:
	x Pass Date: 4/6/17
	Failed Moisture Failed Compaction Time: 10:56
	. O A
,	By: Lynn Tuttle / Symulature)
Miles 10 pm 04.20.2017	
QA/QC APPROVAL DATE	
Density Testing	OC-F-002
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PROJECT: M	oab UMTRA Project	ОТНІ	ER5	
LIFT IDENTIFICATION	oab UMTRA Project いるないつからこう : Lift #1 on spoils wedge (1950 x	405) DATE:	4/\$/2017	
TEST ID NUMBER(S):		15		
TEST LOCATION:		TEST METHOD:	D1556 x	D6938
	SITY DETERMINATION)	ASTM D1556 (DE		
	Gauge Serial # 24445	Testing Apparatus 1		
Last Calibration Date:	The second secon	Bulk Density of sand (ρ_1)		
Daily Standard Counts: On-Cell		Mass of Sand to Fill Con-		
Density 2123	Moisture 630	N 61 41 8		$\overline{}$
	Direct Transmission)	Mass of bottle & con	ne, plate & hole	g
Depth Setting 6 (inches		Mass of bottle & co	one after filling	/ °
			ne, plate & hole and to fill cone,	g
Moisture Count 143	Density Count1733		e, & hole (M)	g
et Density (ρ _m) 122.7 (lbs	$/ft^3$) Dry Density 109.9 (lbs/ft ³)	Mass of	sand to fill hole	g
BUCH SELECT CONSIDERATION CO.		Mass of wet s	soil & container	g
Noisture Density 12.9 (lbs	/ft ³) Moisture Fraction 11.7 (%)	М	ass of container	g
MOISTURE	DETERMINATION /	1	wet soil (M3)	g
	TM D4643		st Hole Volume	
Container ID	1235.6		$(M_1 - M_2)/\rho_1$	CI
Scale Serial # 5500jte-1	Last Calibration Date: 3/17/17			
Mass of container & wet spec			Ory Mass of soil	
Mass of container & dry spec	g g		$M_3/(w+100)$ _	g
	(ds)		Wet Density M_3/V \times 62.43	11
Mass of water		1 1 m	Dry Density	
$M_{w} = M_{cms}$ -	M _{cds}	/4	$\rho_d = M_4 / V _$	g
N 6	26.1	[/	Ory Unit Weight	11
Mass of container (Mass of dry specimen (.,	γ	$d = \rho_d \times 62.43$	
$M_s = M_{cds}$		Soil Description:	Grey and contain	s shale
Moisture conten		Proctor ID:		
$w = (M_w / M_s) x$: 100 %	Standard P	roctor (ASTM D6	98)
Dry Density (ρ_d) =	$(100 \times \rho_m)/(100 + w)$	Maximum Dry Densi	ity (γ _d max)1:	21.0 (l
$\rho d = (100 \text{ x})/(600)$			sture (w opt) 1	
	δ (ρ _m) takes precedence over ASTM D 6938 (ρ _m)		-	
Paraent Compaction	$= \rho_d / \gamma_d max \times 100$	Required Moisture:	5.5 % to	15.5
	$= \rho_d / \gamma_d max x 100$ $00 = 90.8 \%$	Required Percent C	Compaction: 0	0.0 /0
	00 =		compaction	0.0
omments:		TEST RESULTS: Pass	г	Date: 4/6
		Failed Moist		4/0
		Failed Compa		ime: 12
		By: Lynn Tuttle	1 Sum	tous
		(print)	(si	gnature)
Walfoyen	04.20.2017			
QA/QC APPROVAL	DATE			

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FIELD DENSITY TEST				
PROJECT: Moab UMTRA Project	OTHER 5			
LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/6/2017			
TEST ID NUMBER(S):	16			
TEST LOCATION: P16	TEST METHOD:D1556xD6938			
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)			
Make/Model Troxler 3430 Gauge Serial # 24445 Last Calibration Date: 3/14/17 Daily Standard Counts: On-Cell Standard	Testing Apparatus 1 Calibrated Vol. (lbs/ft^3) Bulk Density of sand (ρ_1) g/cm^3 lbs/ft^3 vlass of Sand to Fill Cone & Plate (M_2) g			
Density Moisture 630	Mass of bottle & cone before filling			
Method A (Direct Transmission) Depth Setting 6 (inches) Count Time 1 (minutes)	cone, plate & hole Mass of bottle & cone after filling cone, plate & hole			
Moisture Count 116 Density Count 1683	Mass of sand to fill cone, plate, & hole (M ₁)			
Wet Density (ρ_m) 124.2 (lbs/ft^3) Dry Density 114.1 (lbs/ft^3)	Mass of sand to fill hole g Mass of wet soil & container g			
Moisture Density 10.1 (lbs/ft ³) Moisture Fraction 8.1 (%)	Mass of poptainer g			
MOISTURE DETERMINATION	Mass of wet soil (M ₃)			
ASTM D4643	Test Hole Volume			
Container ID 1235.6	$V = (M_1 - M_2)/\rho_1 \underline{\qquad} cm^3$			
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17				
Mass of container & wet specimen	Dry Mass of soil			
(M _{cms}) g Mass of container & dry specimen	$M = 100 M_3 / (w + 100)$ g Wet Density			
(M cas)	$\rho_m = (M_3/V) \times 62.43$ lbs/ft ³			
Mass of water (M _w)	Dry Density $\rho_d = M_d / V \underline{\hspace{1cm} g/cm^3}$			
$M_{w} = M_{cms} - M_{cds}$	Dry Unit Weight			
Mass of container (M_c)	$\gamma_d = \rho_d \times 62.43 $ lbs/ft ³			
Mass of dry specimen (M _s)				
$M_s = M_{cds} - M_c$	Soil Description: Grey and contains shale			
Moisture content (w) $w = (M_w / M_s) \times 100$ %	Proctor ID: SW #8 Standard Proctor (ASTM D698)			
NO. 100 100 100 100 100 100 100 100 100 10	Surface and Company of the April 2000 and State Part of the April 2000 and April			
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density $(\gamma_d max)$ 121.0 (lbs/ft ³)			
$pd = (100 \text{ x})/(100 + \frac{1}{\text{Note: Wet Density from ASTM D 1556 }(p_n) \text{ lakes precedence over ASTM D 6938 }(p_n)}$	Optimum Moisture (w opt)(%)			
	Required Moisture: <u>5.5</u> % to <u>15.5</u> %			
Percent Compaction = ρ_d / $\gamma_d max \times 100$	D : 1D			
114.1 / 121.0 x 100 = 94.3 %	Required Percent Compaction:(%)			
Comments:	TEST RESULTS:			
	Failed Compaction Time: 12:45 By: Lynn Tuttle / Symmotion (Signature)			
QA/QC APPROVAL <u>0420701</u> 7 DATE				
Density Testing	QC-F-002			

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FIELD DENSITY TEST				
PROJECT: Moab UMTRA Project	OTHER g			
PROJECT: Moab UMTRA Project LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	405) DATE: 4/6/2017			
TEST ID NUMBER(S):				
TEST LOCATION: P17	TEST METHOD:D1556xD6938			
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)			
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³)			
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm^3 tbs/ft^3			
Daily Standard Counts: On-Cell Standard	Mass of Sand to Fill Cone & Plate (M ₂)			
Density Moisture 630	Mass of bottle & cone before filling			
Method A (Direct Transmission)	cone, plate & hole Mass of bottle & cone after filling			
Depth Setting 6 (inches) Count Time 1 (minutes)	cone, plate & hole			
Moisture Count 109 Density Count 1815	Mass of sand to fill cone			
Wet Density (ρ_m) 120.9 (lbs/ft^3) Dry Density 111.5 (lbs/ft^3)	plate, & hole (W_1) g Mass of sand to fill hole g			
Tree Sensity (Pm) (really / Dily Bensity (really / Pm)	Mass of wet soil & container g			
Moisture Density 9.4 (lbs/ft ³) Moisture Fraction 8.4 (%)	Mass of container g			
MOISTURE DETERMINATION	Mass of wet soil (M_3) g			
ASTM D4643	Test Hole Volume			
Container ID 1235.6	$V = (M_1 - M_2)/\rho_1 \underline{\hspace{1cm}} cm^3$			
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17				
Mass of container & wet specimen	Dry Mass of soil			
(<i>M</i> _{cms}) g	$M_4 = 100 M_3 / (w + 100)$ g			
Mass of container & dry specimen	Wet Density			
Mass of water (M,)	$\rho_m = (M_3 / V) \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$ Dry Density			
$M_{w} = M_{cms} - M_{cds}$	$\rho_d = M_4/V \qquad g/cm^3$			
	Dry Unit Weight			
Mass of container (M_c) Mass of dry specimen (M_s)	$\gamma_d = \rho_d \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$			
$M_s = M_{cds} - M_c$	Soil Description: Grey and contains shale			
Moisture content (w)	Proctor ID: SW #8			
$w = (M_w / M_s) \times 100$	Standard Proctor (ASTM D698)			
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density $(\gamma_d max)$ (lbs/ft ³)			
$\rho d = (100 \text{ x})/(100 + \text{ = } 1bs/ft^3$	Optimum Moisture (w opt)10.5(%)			
Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m	Required Moisture: 5.5 % to 15.5 %			
Percent Compaction = ρ_d / $\gamma_d max x 100$	70 to 100 70			
<u>111.5</u> / <u>121.0</u> x 100 = <u>92.2</u> %	Required Percent Compaction:90.0(%)			
Comments:	TEST RESULTS:			
	Pass Date: 4/6/17			
	Failed Moisture Failed Compaction Time: 15:07			
	By: Lynn Tuttle / Lynn Tuttle			
	(print) (signature)			
Titel / 10 pm 04.20.2017				
QA/QC APPROVAL DATE				
Density Testing	QC-F-002			

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FIELD DENSITY TEST				
PROJECT: Moab UMTRA Project	OTHER			
LIFT IDENTIFICATION: Lift #1 on spoils wedge (1950 x	. 405) DATE: 4/\$/2017			
TEST ID NUMBER(S):	18			
TEST LOCATION: P18	TEST METHOD: D1556 x D6938			
ASTM D6938 (DENSITY DETERMINATION)	ASTM D1556 (DENSITY DETERMINATION)			
Make/Model Troxler 3430 Gauge Serial # 24445	Testing Apparatus 1 Calibrated Vol. (lbs/ft ³)			
Last Calibration Date: 3/14/17	Bulk Density of sand (ρ_1) g/cm ³ lbs/ft ³			
Daily Standard Counts: On-Cell Standard	vass of Sand to Fill Cone & Plate (M ₂)			
Density Moisture 630	Mass of bottle & cone before filling			
Method A (Direct Transmission)	cone, plate & hole Mass of bottle & cone after filling			
Depth Setting 6 (inches) Count Time 1 (minutes)	cone, plate & hole			
Moisture Count 126 Density Count 1650	Mass of sand to fill cone,			
Wet Density (ρ_m) 125.0 (lbs/ft^3) Dry Density 113.9 (lbs/ft^3)	plate, & hole (M ₁) g Mass of sand to fill hole g			
wet Density (p _m) 125.0 (108/jt) Dry Density 113.9 (108/jt)	Mass of sand to fill hole g Mass of wet soil & container g			
Moisture Density 11.1 (lbs/ft ³) Moisture Fraction 9.8 (%)	Mass of container g			
MOISTURE DETERMINATION	Mass of wet soil (M ₃)			
ASTM D4643	Test Hole Volume			
Container ID 1235.6	$V = (M_1 - M_2) / \rho_1 \underline{\qquad} cm^3$			
Scale Serial # 5500jte-1 Last Calibration Date: 3/17/17	/			
Mass of container & wet specimen	Dry Mass of soil			
(<i>M</i> _{cms}) g	$M_4 = 100 M_3 / (w + 100)g$			
Mass of container & dry specimen	Wet Density			
Mass of water (Mass)	$\rho_m = (M_3 / V) \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$ Dry Density			
$M_w = M_{cms} - M_{ds}$	$\rho_d = M_4 / V \underline{g/cm^3}$			
	Dry Unit Weight			
Mass of container (M _c)	$\gamma_d = \rho_d \times 62.43 \underline{\hspace{1cm}} lbs/ft^3$			
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$	Soil Description: Grey and contains shale			
$M_s = M_{cds} - M_c$ Moisture content (w)	Proctor ID: SW #8			
$w = (M_w/M_s) \times 100$	Standard Proctor (ASTM D698)			
Dry Density $(\rho_{d}) = (100 \times \rho_{m})/(100 + w)$	Maximum Dry Density $(\gamma_d max)$ 121.0 (lbs/ft ³)			
	Optimum Moisture (w_{opt}) 10.5 (%)			
$pd = (100 \text{ x})/(100 + = lbs/ft^3$ Note: Wet Density from ASTM D 1556 (ρ_m) takes precedence over ASTM D 6938 (ρ_m)	Required Moisture: 5.5 % to 15.5 %			
Percent Compaction = ρ_d / $\gamma_d max \times 100$	Required Moisture: 5.5 % to 15.5 %			
113.9 / 121.0 x 100 = 94.1 %	Required Percent Compaction: 90.0 (%)			
Comments:	TEST RESULTS:			
	Pass Date:			
	Failed Moisture			
	Failed Compaction Time: 15:39			
	By: Lynn Tuttle / (signature)			
Millforan 04.20.2017				
QA/QC APPROVAL DATE				
Density Testing	QC-F-002			

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