A5. Infiltration and Biointrusion Barrier

Lift Approval Summary

Buyoff Surveys

Durability and Gradation Test Results

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A5. Infiltration and Biointrusion Barrier
Lift Approval Summary

Date	Lift ID #	# of Passing Gradation Tests	# of Passing Durability Tests	Quantity Approved (yd^3)	Cumulative Quantity Approved (yd^3)	Average Thickness (ft.)	Area ($ft.^2$)	Notes
10/04/10	UBA11101004-00	1	1	4,657	4,657	0.5	251,478	1
10/25/10	UBA01101004-00	1	0	2,820	7,477	0.5	126,921	1
06/15/11	UBD01110615-00	1	1	4,572	12,049	0.5	114,344	1
06/17/11	UBK01110617-00	1	0	2,117	14,166	0.5	230,926	1
06/17/11	UBG01110617-00	1	1	4,276	18,442	0.5	146,904	1
11/09/11	UBL19111102-00	2	4	6,709	25,151	0.5	362,261	1

Total # of Gradation Tests Performed = 7

Total # of Durability Tests Performed = 7

Total # of Gradation Tests Included with Lift Approval Package = 12

Total # of Durability Tests Included with Lift Approval Package = 7

Total Quantity Approved (yd^3) = 25,151

Quantity per Gradation Test (yd^3) = 3,593

Quantity per Durability Test (yd^3) = 3,593

Total Average Thickness (ft.) = 0.5

1. To access durability and gradation test information please view lift packets.

A5. Infiltration and Biointrusion Barrier Buyoff Surveys

CRJ 000625

Biointrusion Barrier Layer Buy Off Survey

		Buy off ID:	UBA11101004-00			Date:	10/20/2010	
Point #	Northing	Easting	Surveyed Elevation	Design Elevation	Pre-Installation Elevation	Difference from Design	PreDifference from Pre-installation	Bio Layer Thickness
1259	6795350	2122150	4999.6	4999.5	4999.1	0.1	0.5	0.5
1257	6795350	2122250	4999.6	4999.5	4999.1	0.0	0.5	0.5
1341	6795150	2122250	4994.5	4994.5	4994.0	0.0	0.5	0.5
1343	6795150	2122150	4994.5	4994.4	4994.0	0.0	0.5	0.5
1426	6794950	2122200	4989.5	4989.4	4989.0	0.1	0.5	0.5
1424	6794950	2122300	4989.5	4989.5	4989.0	0.0	0.5	0.5
1508	6794750	2122300	4984.5	4984.4	4984.0	0.1	0.5	0.5
1510	6794750	2122200	4984.4	4984.3	4983.9	0.1	0.5	0.5
1593	6794550	2122250	4979.4	4979.3	4978.9	0.1	0.5	0.5
1591	6794550	2122350	4979.4	4979.4	4978.9	0.0	0.5	0.5
1674	6794350	2122350	4974.3	4974.3	4973.8	0.0	0.5	0.5
1676	6794350	2122250	4974.3	4974.3	4973.8	0.0	0.5	0.5
1733	6794150	2122300	4969.4	4969.2	4968.8	0.1	0.5	0.5
1731	6794150	2122400	4969.3	4969.3	4968.9	0.0	0.5	0.5
						0.0	0.0	0.00
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Comments:								
Approval Date:	10/20/2010		Total Square Feet:			251,428 ft²		
QC Signature: Beachem Bosh			Reviewed By: Mitch Hogan				10.20.2010	

N/A

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RECORD COPY 12/28/10

43.8.3.1
Pu 2 of 2 KT 12/3/10

A5. Infiltration and Biointrusion Barrier Buyoff Surveys

Biointrusion Barrier Layer Buy Off Survey

Buy off ID: UBA01 Date: 10.25.2010

Point #	Northing	Easting	Surveyed Elevation	Design Elevation	Pre-Installation Elevation	Difference in feet	Difference in inches	Radon Barrier Thickness
1039	6795900	2122150	4990.7	4990.6	4990.2	0.0	0.6	0.5
1037	6795900	2122250	4991.3	4991.2	4990.8	0.1	1.2	0.5
1118	6795700	2122150	4994.5	4994.6	4994.0	0.0	0.4	0.5
1116	6795700	2122250	4995.1	4995.1	4994.7	0.0	0.3	0.5
1198	6795500	2122150	4998.4	4998.4	4997.9	0.1	0.6	0.5
1196	6795500	2122250	4999.0	4999.0	4998.5	0.0	0.6	0.5
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Comments:

Approval Date: 10/25/2010

Total Square Feet: 126921 ft²

QC Signature: Mitch Hogan

Reviewed By: ~~Beachem Bosh~~

Jared Knight 10-26-10

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A5. Infiltration and Biointrusion Barrier Buyoff Surveys

Biointrusion Barrier Layer Buy Off Survey

Buy off ID: UBA01 — Date: 10.25.2010

Point #	Northing	Easting	Surveyed Elevation	Design Elevation	Pre-Installation Elevation	Difference in feet	Difference in inches	Radon Barrier Thickness
1039	6795900	2122150	4990.7	4990.6	4990.2	0.0	0.5	0.5
1037	6795900	2122250	4991.3	4991.2	4990.8	0.1	1.2	0.5
1118	6795700	2122150	4994.5	4994.5	4994.0	0.0	0.4	0.5
1116	6795700	2122250	4995.1	4995.1	4994.7	0.0	0.3	0.5
1198	6795500	2122150	4998.4	4998.4	4997.9	0.1	0.6	0.5
1196	6795500	2122250	4999.0	4999.0	4998.5	0.0	0.5	0.5
						0.0	0.0	0.0
						0.0	0.0	0.0
						0.0	0.0	0.0
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						0.0	0.0	0.0

Comments:

Approval Date: 10/25/2010 — Total Square Feet: 126921 ft²

QC Signature: Mitch Hogan [signature] — Reviewed By: ~~Deachem Bosh~~ RAK 10-26-10

Jared Knight [signature] 10-26-10

EnergySolutions

D. 2 of 2

CRJ 000919

Moab UMTRA Project
Biointrusion Barrier Buyoff Form

CLIENT: Department of Energy
PROJECT: Moab UMTRA
DATE: 6-22-11

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

LIFT AREA	LIFT AREA
UBD01, UBG01, UBK01	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson / Construction Manager		6/22/11
Mark Greenhalgh / Nielson Construction		6/22/11
Beachem Bosh / QA/QC Rep		6-22-11
Kevin Keele / QC Tech		6-22-11
Jared Knight / FE		6-22-11

COMMENTS		

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LV 6/29/11

OP-F-020
Rev 0, June 2011

File Code Index No: ~~1013~~ [illegible]
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L1282

A5. Infiltration and Biointrusion Barrier Buyoff Surveys

Moab UMTRA Crescent Junction Disposal Cell
Biointrusion Barrier Survey
Measured by Jason Knowlton Kevin Keele FOR JASON KNOWLTON FOR TELECONFERENCE.
Checked by Kevin Keele Kevin Keele
Johansen & Tuttle Engineering, Inc
June 20, 2011

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
700	6794199.7	2122702.2	4970.7	4970.8	0.1	1.0	4970.3	0.5
701	6794249.6	2122696.7	4972.0	4972.1	0.1	1.3	4971.6	0.5
702	6794299.3	2122689.6	4973.2	4973.4	0.2	1.9	4972.9	0.5
703	6794348.8	2122683.6	4974.5	4974.6	0.1	1.2	4974.1	0.5
704	6794398.2	2122677.8	4975.7	4975.8	0.1	1.4	4975.3	0.5
705	6794447.5	2122671.4	4977.0	4977.1	0.1	1.5	4976.6	0.5
706	6794497.5	2122665.0	4978.2	4978.3	0.0	0.5	4977.8	0.5
707	6794547.0	2122658.8	4979.5	4979.6	0.1	1.3	4979.1	0.5
708	6794597.0	2122652.6	4980.7	4980.8	0.1	1.2	4980.3	0.5
709	6794646.5	2122646.1	4982.0	4982.1	0.1	1.0	4981.6	0.5
710	6794695.8	2122640.6	4983.2	4983.3	0.1	0.8	4982.8	0.5
711	6794745.0	2122633.7	4984.5	4984.6	0.1	1.3	4984.1	0.5
712	6794795.0	2122627.6	4985.7	4985.8	0.1	1.0	4985.3	0.5
713	6794844.9	2122621.4	4987.0	4987.1	0.1	1.1	4986.6	0.5
714	6794894.7	2122615.0	4988.2	4988.3	0.1	1.2	4987.8	0.5
715	6794943.9	2122608.8	4989.5	4989.6	0.1	1.6	4989.1	0.5
716	6794994.1	2122602.9	4990.7	4990.9	0.1	1.3	4990.3	0.5
717	6795043.3	2122596.3	4992.0	4992.1	0.1	1.2	4991.6	0.5
718	6795093.0	2122590.0	4993.2	4993.4	0.1	1.5	4992.9	0.5
719	6795142.7	2122583.9	4994.5	4994.6	0.1	1.1	4994.1	0.5
720	6795192.2	2122577.7	4995.7	4995.8	0.1	1.0	4995.3	0.5
721	6795241.5	2122571.4	4997.0	4997.1	0.1	0.9	4996.6	0.5
722	6795291.2	2122565.4	4998.2	4998.3	0.1	1.1	4997.8	0.5
723	6795341.1	2122559.0	4999.5	4999.6	0.1	1.0	4999.1	0.5
724	6795390.8	2122552.0	5000.7	5000.8	0.1	1.2	5000.3	0.5
725	6795403.2	2122652.0	5001.1	5001.2	0.1	1.0	5000.7	0.5
726	6795502.8	2122539.8	5001.4	5001.5	0.1	1.4	5001.0	0.5
727	6795601.9	2122626.9	4999.4	4999.5	0.1	1.5	4999.0	0.5
728	6795708.0	2122612.7	4997.2	4997.3	0.1	1.4	4996.8	0.5
729	6795792.5	2122619.8	4995.6	4995.7	0.1	1.2	4995.2	0.5
730	6795884.9	2122571.1	4993.5	4993.6	0.1	1.1	4993.1	0.5
731	6795970.4	2122563.0	4991.8	4991.9	0.1	0.9	4991.4	0.5
732	6795956.9	2122455.7	4991.4	4991.5	0.1	0.8	4991.0	0.5
733	6795945.1	2122360.9	4991.1	4991.1	0.1	1.0	4990.6	0.5
734	6795806.0	2122356.1	4993.7	4993.8	0.1	0.8	4993.3	0.5
735	6795793.0	2122519.1	4995.0	4995.1	0.1	1.4	4994.6	0.5
736	6795685.2	2122502.1	4997.0	4997.1	0.1	1.7	4996.6	0.5
737	6795660.2	2122366.9	4996.6	4996.7	0.1	0.8	4996.2	0.5
738	6795520.7	2122385.4	4999.4	4999.5	0.1	1.4	4999.0	0.5
739	6795539.7	2122534.2	5000.0	5000.1	0.1	1.7	4999.6	0.5
740	6795366.0	2122354.7	5000.0	5000.1	0.1	0.9	4999.6	0.5
741	6795266.3	2122366.8	4997.5	4997.6	0.1	0.8	4997.0	0.5
742	6795167.6	2122379.5	4995.0	4995.1	0.1	1.4	4994.6	0.5
743	6795067.8	2122392.0	4992.5	4992.6	0.1	1.4	4992.1	0.5
744	6794968.9	2122404.2	4990.0	4990.1	0.1	1.4	4989.6	0.5
745	6794869.8	2122416.8	4987.5	4987.6	0.1	1.5	4987.1	0.5

746	6794770.7	2122429.2	4985.0	4985.1	0.1	1.3	4984.6	0.5
747	6794670.9	2122441.7	4982.5	4982.6	0.1	1.8	4982.1	0.5
748	6794572.1	2122454.3	4980.0	4980.2	0.2	2.0	4979.7	0.5
749	6794472.9	2122466.9	4977.5	4977.6	0.1	1.4	4977.1	0.5
750	6794380.1	2122528.6	4975.2	4975.3	0.1	1.1	4974.8	0.5
751	6794280.4	2122541.2	4972.7	4972.8	0.1	1.6	4972.3	0.5
752	6794181.5	2122553.6	4970.2	4970.3	0.1	1.1	4969.8	0.5

CRJ 000991

Moab UMTRA Project
Biointrusion Barrier Buyoff Form

CLIENT: DOE

PROJECT: Moab UMTRA

DATE: 11-7-11

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

LIFT AREA	LIFT AREA
UBL19 Lot # 1	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Kevin Keele / Quality Control Technician	Kevin Keele	11-7-11
Mark Greenhalgh / Nielson Construction Manager	Mark Greenhalgh	11-7-11
Brent Anderson / Construction Manager	Brent Anderson	11-7-11
Beachem Bosh / QA/QC Rep		11-7-11

COMMENTS		
Surface was visually inspected and found to be satisfactory. See attached map for area location and square footage. The attached survey includes lot 1 and lot 2 of UBL19. KK 11-7-11		

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OP-F-020
Rev 0, June 2011

File Code Index No: ~~10.1.3~~ 112311
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45.8.3.1

A5. Infiltration and Biointrusion Barrier Buyoff Surveys

UBL19

Moab UMTRA Crescent Junction Disposal Cell
Biointrusion Barrier Survey
Measured by Jason Knowlton Kevin Keele for JK via telephone conference 11-7-11
Checked by Kevin Keele Kevin Keele 11-7-11
Johansen & Tuttle Engineering, Inc
Nov. 4, 2011

QA Review: Beacham Bosh

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
600	6795000.1	2122652.4	4990.93	4991.03	0.11	1.3	4990.50	0.53
601	6794950.2	2122658.9	4989.67	4989.76	0.09	1.1	4989.26	0.50
602	6794900.8	2122664.9	4988.42	4988.53	0.11	1.3	4988.00	0.53
603	6794851.3	2122671.0	4987.18	4987.25	0.07	0.9	4986.73	0.52
604	6794801.7	2122677.4	4985.92	4986.07	0.15	1.8	4985.53	0.55
605	6794751.8	2122683.6	4984.67	4984.76	0.09	1.1	4984.24	0.52
606	6794702.2	2122689.7	4983.42	4983.51	0.09	1.1	4983.01	0.50
607	6794652.5	2122696.0	4982.17	4982.21	0.05	0.6	4981.71	0.50
608	6794603.1	2122702.2	4980.92	4981.06	0.14	1.7	4980.52	0.54
609	6794553.7	2122708.4	4979.68	4979.78	0.11	1.3	4979.24	0.54
610	6794503.9	2122714.7	4978.42	4978.57	0.15	1.8	4978.03	0.55
611	6794454.5	2122721.0	4977.18	4977.30	0.12	1.4	4976.75	0.55
612	6794404.9	2122727.3	4975.93	4975.99	0.06	0.8	4975.48	0.52
613	6794355.1	2122733.4	4974.67	4974.74	0.07	0.8	4974.23	0.51
614	6794305.3	2122739.6	4973.42	4973.50	0.08	1.0	4972.97	0.54
615	6794256.3	2122746.0	4972.18	4972.24	0.06	0.7	4971.70	0.54
616	6794206.3	2122752.2	4970.92	4971.04	0.12	1.4	4970.52	0.53
617	6794212.3	2122801.9	4971.10	4971.23	0.13	1.5	4970.69	0.54
618	6794262.0	2122795.4	4972.36	4972.49	0.14	1.6	4971.93	0.56
619	6794311.7	2122789.3	4973.61	4973.71	0.10	1.2	4973.17	0.54
620	6794361.1	2122783.1	4974.85	4974.96	0.11	1.3	4974.45	0.51
621	6794410.8	2122777.1	4976.11	4976.19	0.08	1.0	4975.66	0.53
622	6794460.5	2122770.6	4977.36	4977.43	0.07	0.8	4976.90	0.53
623	6794510.1	2122764.3	4978.61	4978.72	0.11	1.4	4978.18	0.54
624	6794559.7	2122758.4	4979.86	4979.95	0.09	1.1	4979.42	0.53
625	6794609.2	2122752.0	4981.11	4981.20	0.09	1.1	4980.65	0.55
626	6794658.9	2122745.6	4982.36	4982.45	0.09	1.1	4981.92	0.53
627	6794708.7	2122739.5	4983.61	4983.69	0.08	0.9	4983.16	0.53
628	6794758.3	2122733.2	4984.86	4984.93	0.06	0.8	4984.39	0.53
629	6794807.8	2122727.1	4986.11	4986.14	0.03	0.4	4985.63	0.51
630	6794857.6	2122720.7	4987.36	4987.42	0.05	0.6	4986.89	0.53
631	6794907.0	2122714.4	4988.61	4988.73	0.12	1.5	4988.19	0.55
632	6794956.7	2122708.2	4989.86	4989.98	0.12	1.4	4989.44	0.54
633	6794962.9	2122757.7	4990.04	4990.16	0.11	1.4	4989.59	0.57
634	6794913.1	2122764.1	4988.79	4988.90	0.11	1.4	4988.38	0.53
635	6794863.7	2122770.3	4987.55	4987.67	0.12	1.5	4987.11	0.56
636	6794813.9	2122776.5	4986.29	4986.35	0.06	0.7	4985.85	0.51
637	6794764.4	2122782.7	4985.04	4985.14	0.09	1.1	4984.61	0.52
638	6794714.8	2122789.1	4983.79	4983.89	0.10	1.1	4983.32	0.57
639	6794665.2	2122795.2	4982.54	4982.63	0.09	1.0	4982.09	0.54
640	6794615.6	2122801.5	4981.30	4981.40	0.10	1.2	4980.83	0.57
641	6794565.9	2122808.0	4980.04	4980.12	0.08	1.0	4979.58	0.54
642	6794516.5	2122814.1	4978.80	4978.88	0.08	0.9	4978.35	0.52
643	6794466.8	2122820.2	4977.54	4977.61	0.06	0.8	4977.09	0.52
644	6794417.2	2122826.6	4976.30	4976.40	0.10	1.2	4975.86	0.54
645	6794367.6	2122832.8	4975.05	4975.16	0.11	1.3	4974.60	0.55

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646	6794317.8	2122839.1	4973.79	4973.90	0.10	1.3	4973.35	0.54
647	6794268.3	2122845.2	4972.54	4972.61	0.07	0.8	4972.10	0.51
648	6794218.7	2122851.4	4971.30	4971.42	0.12	1.4	4970.85	0.57
649	6794224.7	2122901.3	4971.47	4971.56	0.09	1.0	4971.04	0.52
650	6794274.5	2122894.9	4972.73	4972.81	0.08	1.0	4972.27	0.54
651	6794324.2	2122888.6	4973.98	4974.12	0.14	1.7	4973.57	0.56
652	6794373.8	2122881.9	4975.23	4975.31	0.07	0.9	4974.80	0.51
653	6794423.3	2122875.8	4976.48	4976.61	0.14	1.6	4976.05	0.56
654	6794472.9	2122869.6	4977.73	4977.84	0.11	1.3	4977.27	0.56
655	6794522.7	2122863.6	4978.98	4979.10	0.12	1.5	4978.55	0.55
656	6794572.4	2122857.2	4980.23	4980.32	0.08	1.0	4979.79	0.53
657	6794621.9	2122851.1	4981.48	4981.60	0.12	1.5	4981.07	0.54
658	6794671.5	2122844.7	4982.73	4982.87	0.14	1.6	4982.31	0.56
659	6794721.0	2122838.7	4983.98	4984.11	0.13	1.5	4983.55	0.56
660	6794770.7	2122832.4	4985.23	4985.32	0.09	1.1	4984.79	0.53
661	6794820.2	2122826.4	4986.48	4986.57	0.09	1.1	4986.04	0.53
662	6794870.0	2122819.9	4987.73	4987.85	0.11	1.4	4987.29	0.56
663	6794919.4	2122813.6	4988.98	4989.08	0.10	1.2	4988.54	0.54
664	6794969.2	2122807.4	4990.23	4990.31	0.08	1.0	4989.79	0.52
665	6794925.9	2122863.3	4989.17	4989.30	0.13	1.6	4988.78	0.52
666	6794875.9	2122869.5	4987.91	4988.03	0.12	1.4	4987.53	0.50
667	6794826.6	2122875.7	4986.67	4986.77	0.10	1.2	4986.26	0.51
668	6794776.7	2122882.2	4985.41	4985.54	0.12	1.5	4985.00	0.53
669	6794727.3	2122888.3	4984.17	4984.28	0.11	1.3	4983.73	0.55
670	6794677.6	2122894.3	4982.91	4983.00	0.08	1.0	4982.46	0.54
671	6794628.1	2122900.8	4981.67	4981.74	0.07	0.8	4981.22	0.52
672	6794578.4	2122906.9	4980.41	4980.53	0.12	1.4	4979.97	0.56
673	6794528.7	2122913.2	4979.16	4979.26	0.10	1.2	4978.71	0.55
674	6794479.1	2122919.1	4977.91	4977.93	0.02	0.2	4977.42	0.51
675	6794429.7	2122925.3	4976.67	4976.74	0.07	0.8	4976.24	0.50
676	6794379.9	2122931.8	4975.41	4975.52	0.10	1.3	4974.96	0.56
677	6794330.5	2122938.1	4974.17	4974.32	0.15	1.8	4973.77	0.55
678	6794280.4	2122944.5	4972.91	4972.97	0.06	0.7	4972.47	0.50
679	6794231.3	2122950.8	4971.67	4971.74	0.07	0.9	4971.24	0.51
680	6794237.5	2123000.2	4971.85	4971.93	0.08	0.9	4971.42	0.51
681	6794287.1	2122994.0	4973.10	4973.12	0.02	0.2	4972.61	0.51
682	6794336.6	2122987.8	4974.35	4974.42	0.07	0.9	4973.90	0.52
683	6794386.4	2122981.3	4975.61	4975.68	0.08	0.9	4975.17	0.52
684	6794435.9	2122975.1	4976.85	4976.93	0.07	0.9	4976.38	0.55
685	6794485.2	2122969.0	4978.10	4978.22	0.13	1.5	4977.67	0.56
686	6794534.9	2122962.9	4979.35	4979.49	0.14	1.7	4978.92	0.57
687	6794584.8	2122956.6	4980.61	4980.68	0.07	0.9	4980.14	0.54
688	6794634.3	2122950.2	4981.85	4981.94	0.09	1.1	4981.41	0.54
689	6794684.3	2122943.8	4983.11	4983.19	0.08	0.9	4982.63	0.56
690	6794733.5	2122937.8	4984.35	4984.42	0.07	0.8	4983.87	0.55
691	6794783.0	2122931.6	4985.60	4985.77	0.17	2.0	4985.26	0.51
692	6794832.7	2122925.4	4986.85	4987.06	0.20	2.4	4986.55	0.51
693	6794882.2	2122919.2	4988.10	4988.25	0.15	1.8	4987.72	0.52
694	6794931.8	2122912.8	4989.35	4989.56	0.21	2.5	4989.03	0.53
695	6794938.3	2122962.5	4989.54	4989.66	0.12	1.4	4989.15	0.51
696	6794888.5	2122968.7	4988.29	4988.40	0.12	1.4	4987.88	0.52
697	6794839.0	2122975.0	4987.04	4987.15	0.11	1.3	4986.63	0.52
698	6794789.5	2122981.2	4985.79	4985.93	0.14	1.7	4985.42	0.51
699	6794739.8	2122987.4	4984.54	4984.63	0.09	1.1	4984.11	0.52
700	6794690.2	2122993.7	4983.29	4983.40	0.11	1.3	4982.83	0.57
701	6794640.5	2123000.1	4982.04	4982.13	0.10	1.1	4981.58	0.56
702	6794590.7	2123006.1	4980.78	4980.90	0.12	1.4	4980.36	0.54

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703	6794541.3	2123012.4	4979.54	4979.65	0.11	1.3	4979.11	0.54
704	6794491.7	2123018.6	4978.29	4978.35	0.06	0.7	4977.81	0.54
705	6794442.1	2123024.9	4977.04	4977.10	0.06	0.7	4976.59	0.50
706	6794392.5	2123031.1	4975.79	4975.88	0.09	1.0	4975.36	0.52
707	6794342.9	2123037.5	4974.54	4974.64	0.10	1.2	4974.09	0.56
708	6794293.0	2123043.4	4973.28	4973.33	0.05	0.6	4972.80	0.53
709	6794243.7	2123049.7	4972.04	4972.11	0.07	0.9	4971.59	0.52
710	6794204.0	2123054.9	4971.04	4971.08	0.04	0.5	4970.56	0.52
711	6794210.2	2123104.6	4971.23	4971.29	0.06	0.8	4970.76	0.53
712	6794249.8	2123099.5	4972.22	4972.29	0.07	0.8	4971.79	0.50
713	6794299.5	2123093.0	4973.47	4973.59	0.11	1.3	4973.05	0.53
714	6794349.2	2123087.0	4974.73	4974.79	0.06	0.8	4974.25	0.55
715	6794398.7	2123080.8	4975.97	4976.05	0.07	0.9	4975.53	0.52
716	6794448.2	2123074.4	4977.22	4977.30	0.08	0.9	4976.76	0.54
717	6794497.9	2123068.4	4978.47	4978.54	0.07	0.8	4978.03	0.51
718	6794547.6	2123062.0	4979.73	4979.78	0.06	0.7	4979.28	0.50
719	6794597.2	2123055.8	4980.98	4981.05	0.07	0.8	4980.51	0.54
720	6794647.0	2123049.6	4982.23	4982.30	0.07	0.8	4981.78	0.52
721	6794696.2	2123043.2	4983.47	4983.54	0.07	0.9	4983.03	0.52
722	6794746.1	2123037.1	4984.73	4984.82	0.09	1.0	4984.29	0.53
723	6794795.6	2123030.8	4985.98	4986.10	0.13	1.5	4985.58	0.53
724	6794845.2	2123024.6	4987.23	4987.34	0.11	1.4	4986.79	0.55
725	6794894.8	2123018.4	4988.48	4988.58	0.11	1.3	4988.06	0.53
726	6794944.3	2123012.0	4989.72	4989.84	0.12	1.4	4989.33	0.52
727	6794901.0	2123068.0	4988.66	4988.83	0.16	2.0	4988.32	0.50
728	6794851.4	2123074.3	4987.41	4987.55	0.14	1.7	4987.05	0.50
729	6794801.8	2123080.4	4986.16	4986.28	0.12	1.4	4985.74	0.53
730	6794752.1	2123086.8	4984.91	4985.01	0.10	1.2	4984.48	0.53
731	6794702.5	2123092.9	4983.66	4983.76	0.11	1.3	4983.22	0.55
732	6794652.9	2123099.3	4982.41	4982.44	0.04	0.4	4981.94	0.51
733	6794603.5	2123105.2	4981.16	4981.20	0.04	0.5	4980.67	0.53
734	6794553.9	2123111.6	4979.91	4980.00	0.09	1.0	4979.46	0.55
735	6794504.2	2123117.8	4978.66	4978.72	0.06	0.7	4978.22	0.50
736	6794454.6	2123124.1	4977.41	4977.47	0.06	0.7	4976.93	0.54
737	6794405.1	2123130.3	4976.17	4976.25	0.08	1.0	4975.70	0.54
738	6794355.4	2123136.6	4974.91	4974.97	0.06	0.7	4974.46	0.51
739	6794305.8	2123142.8	4973.66	4973.73	0.07	0.8	4973.19	0.54
740	6794256.2	2123149.0	4972.41	4972.42	0.01	0.1	4971.92	0.50
741	6794216.6	2123154.1	4971.42	4971.50	0.09	1.0	4970.96	0.54

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CRJ 000992

Moab UMTRA Project
Biointrusion Barrier Buyoff Form

CLIENT: DOE

PROJECT: Moab UMTRA

DATE: 11-9-11

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

LIFT AREA	LIFT AREA
UBL19 Lot # 2	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson - EnergySolutions Construction Manager		11-9-11
Beachem Bosh - E.S. QA/QC Representative		11-9-11
Adam Lucero - Nielson Construction		11-9-11
Kevin Keele - J&T QC Representative		11-9-11

COMMENTS		
Surface was visually inspected and found to be satisfactory. See attached map for area location and square footage. The attached survey includes Lot 1 and Lot 2 of UBL19.		

RECORD COPY

OP-F-020
Rev 0, June 2011

File Code Index No: 1013 112811
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43.8.3.1

A5. Infiltration and Biointrusion Barrier Buyoff Surveys

Moab UMTRA Crescent Junction Disposal Cell
Biointrusion Barrier Survey
Measured by Jason Knowlton Kevin Keele for JK via telephone conference 11-9-11
Checked by Kevin Keele Kevin Keele
Johansen & Tuttle Engineering, Inc
Nov. 4, 2011

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
600	6795000.1	2122652.4	4990.93	4991.03	0.11	1.3	4990.50	0.53
601	6794950.2	2122658.9	4989.67	4989.76	0.09	1.1	4989.26	0.50
602	6794900.8	2122664.9	4988.42	4988.53	0.11	1.3	4988.00	0.53
603	6794851.3	2122671.0	4987.18	4987.25	0.07	0.9	4986.73	0.52
604	6794801.7	2122677.4	4985.92	4986.07	0.15	1.8	4985.53	0.55
605	6794751.8	2122683.6	4984.67	4984.76	0.09	1.1	4984.24	0.52
606	6794702.2	2122689.7	4983.42	4983.51	0.09	1.1	4983.01	0.50
607	6794652.5	2122696.0	4982.17	4982.21	0.05	0.6	4981.71	0.50
608	6794603.1	2122702.2	4980.92	4981.06	0.14	1.7	4980.52	0.54
609	6794553.7	2122708.4	4979.68	4979.78	0.11	1.3	4979.24	0.54
610	6794503.9	2122714.7	4978.42	4978.57	0.15	1.8	4978.03	0.55
611	6794454.5	2122721.0	4977.18	4977.30	0.12	1.4	4976.75	0.55
612	6794404.9	2122727.3	4975.93	4975.99	0.06	0.8	4975.48	0.52
613	6794355.1	2122733.4	4974.67	4974.74	0.07	0.8	4974.23	0.51
614	6794305.3	2122739.6	4973.42	4973.50	0.08	1.0	4972.97	0.54
615	6794256.3	2122746.0	4972.18	4972.24	0.06	0.7	4971.70	0.54
616	6794206.3	2122752.2	4970.92	4971.04	0.12	1.4	4970.52	0.53
617	6794212.3	2122801.9	4971.10	4971.23	0.13	1.5	4970.69	0.54
618	6794262.0	2122795.4	4972.36	4972.49	0.14	1.6	4971.93	0.56
619	6794311.7	2122789.3	4973.61	4973.71	0.10	1.2	4973.17	0.54
620	6794361.1	2122783.1	4974.85	4974.96	0.11	1.3	4974.45	0.51
621	6794410.8	2122777.1	4976.11	4976.19	0.08	1.0	4975.66	0.53
622	6794460.5	2122770.6	4977.36	4977.43	0.07	0.8	4976.90	0.53
623	6794510.1	2122764.3	4978.61	4978.72	0.11	1.4	4978.18	0.54
624	6794559.7	2122758.4	4979.86	4979.95	0.09	1.1	4979.42	0.53
625	6794609.2	2122752.0	4981.11	4981.20	0.09	1.1	4980.65	0.55
626	6794658.9	2122745.6	4982.36	4982.45	0.09	1.1	4981.92	0.53
627	6794708.7	2122739.5	4983.61	4983.69	0.08	0.9	4983.16	0.53
628	6794758.3	2122733.2	4984.86	4984.93	0.06	0.8	4984.39	0.53
629	6794807.8	2122727.1	4986.11	4986.14	0.03	0.4	4985.63	0.51
630	6794857.6	2122720.7	4987.36	4987.42	0.05	0.6	4986.89	0.53
631	6794907.0	2122714.4	4988.61	4988.73	0.12	1.5	4988.19	0.55
632	6794956.7	2122708.2	4989.86	4989.98	0.12	1.4	4989.44	0.54
633	6794962.9	2122757.7	4990.04	4990.16	0.11	1.4	4989.59	0.57
634	6794913.1	2122764.1	4988.79	4988.90	0.11	1.4	4988.38	0.53
635	6794863.7	2122770.3	4987.55	4987.67	0.12	1.5	4987.11	0.56
636	6794813.9	2122776.5	4986.29	4986.35	0.06	0.7	4985.85	0.51
637	6794764.4	2122782.7	4985.04	4985.14	0.09	1.1	4984.61	0.52
638	6794714.8	2122789.1	4983.79	4983.89	0.10	1.1	4983.32	0.57
639	6794665.2	2122795.2	4982.54	4982.63	0.09	1.0	4982.09	0.54
640	6794615.6	2122801.5	4981.30	4981.40	0.10	1.2	4980.83	0.57
641	6794565.9	2122808.0	4980.04	4980.12	0.08	1.0	4979.58	0.54
642	6794516.5	2122814.1	4978.80	4978.88	0.08	0.9	4978.35	0.52
643	6794466.8	2122820.2	4977.54	4977.61	0.06	0.8	4977.09	0.52
644	6794417.2	2122826.6	4976.30	4976.40	0.10	1.2	4975.86	0.54
645	6794367.6	2122832.8	4975.05	4975.16	0.11	1.3	4974.60	0.55

646	6794317.8	2122839.1	4973.79	4973.90	0.10	1.3	4973.35	0.54
647	6794268.3	2122845.2	4972.54	4972.61	0.07	0.8	4972.10	0.51
648	6794218.7	2122851.4	4971.30	4971.42	0.12	1.4	4970.85	0.57
649	6794224.7	2122901.3	4971.47	4971.56	0.09	1.0	4971.04	0.52
650	6794274.5	2122894.9	4972.73	4972.81	0.08	1.0	4972.27	0.54
651	6794324.2	2122888.6	4973.98	4974.12	0.14	1.7	4973.57	0.56
652	6794373.8	2122881.9	4975.23	4975.31	0.07	0.9	4974.80	0.51
653	6794423.3	2122875.8	4976.48	4976.61	0.14	1.6	4976.05	0.56
654	6794472.9	2122869.6	4977.73	4977.84	0.11	1.3	4977.27	0.56
655	6794522.7	2122863.6	4978.98	4979.10	0.12	1.5	4978.55	0.55
656	6794572.4	2122857.2	4980.23	4980.32	0.08	1.0	4979.79	0.53
657	6794621.9	2122851.1	4981.48	4981.60	0.12	1.5	4981.07	0.54
658	6794671.5	2122844.7	4982.73	4982.87	0.14	1.6	4982.31	0.56
659	6794721.0	2122838.7	4983.98	4984.11	0.13	1.5	4983.55	0.56
660	6794770.7	2122832.4	4985.23	4985.32	0.09	1.1	4984.79	0.53
661	6794820.2	2122826.4	4986.48	4986.57	0.09	1.1	4986.04	0.53
662	6794870.0	2122819.9	4987.73	4987.85	0.11	1.4	4987.29	0.56
663	6794919.4	2122813.6	4988.98	4989.08	0.10	1.2	4988.54	0.54
664	6794969.2	2122807.4	4990.23	4990.31	0.08	1.0	4989.79	0.52
665	6794925.9	2122863.3	4989.17	4989.30	0.13	1.6	4988.78	0.52
666	6794875.9	2122869.5	4987.91	4988.03	0.12	1.4	4987.53	0.50
667	6794826.6	2122875.7	4986.67	4986.77	0.10	1.2	4986.26	0.51
668	6794776.7	2122882.2	4985.41	4985.54	0.12	1.5	4985.00	0.53
669	6794727.3	2122888.3	4984.17	4984.28	0.11	1.3	4983.73	0.55
670	6794677.6	2122894.3	4982.91	4983.00	0.08	1.0	4982.46	0.54
671	6794628.1	2122900.8	4981.67	4981.74	0.07	0.8	4981.22	0.52
672	6794578.4	2122906.9	4980.41	4980.53	0.12	1.4	4979.97	0.56
673	6794528.7	2122913.2	4979.16	4979.26	0.10	1.2	4978.71	0.55
674	6794479.1	2122919.1	4977.91	4977.93	0.02	0.2	4977.42	0.51
675	6794429.7	2122925.3	4976.67	4976.74	0.07	0.8	4976.24	0.50
676	6794379.9	2122931.8	4975.41	4975.52	0.10	1.3	4974.96	0.56
677	6794330.5	2122938.1	4974.17	4974.32	0.15	1.8	4973.77	0.55
678	6794280.4	2122944.5	4972.91	4972.97	0.06	0.7	4972.47	0.50
679	6794231.3	2122950.8	4971.67	4971.74	0.07	0.9	4971.24	0.51
680	6794237.5	2123000.2	4971.85	4971.93	0.08	0.9	4971.42	0.51
681	6794287.1	2122994.0	4973.10	4973.12	0.02	0.2	4972.61	0.51
682	6794336.6	2122987.8	4974.35	4974.42	0.07	0.9	4973.90	0.52
683	6794386.4	2122981.3	4975.61	4975.68	0.08	0.9	4975.17	0.52
684	6794435.9	2122975.1	4976.85	4976.93	0.07	0.9	4976.38	0.55
685	6794485.2	2122969.0	4978.10	4978.22	0.13	1.5	4977.67	0.56
686	6794534.9	2122962.9	4979.35	4979.49	0.14	1.7	4978.92	0.57
687	6794584.8	2122956.6	4980.61	4980.68	0.07	0.9	4980.14	0.54
688	6794634.3	2122950.2	4981.85	4981.94	0.09	1.1	4981.41	0.54
689	6794684.3	2122943.8	4983.11	4983.19	0.08	0.9	4982.63	0.56
690	6794733.5	2122937.8	4984.35	4984.42	0.07	0.8	4983.87	0.55
691	6794783.0	2122931.6	4985.60	4985.77	0.17	2.0	4985.26	0.51
692	6794832.7	2122925.4	4986.85	4987.06	0.20	2.4	4986.55	0.51
693	6794882.2	2122919.2	4988.10	4988.25	0.15	1.8	4987.72	0.52
694	6794931.8	2122912.8	4989.35	4989.56	0.21	2.5	4989.03	0.53
695	6794938.3	2122962.5	4989.54	4989.66	0.12	1.4	4989.15	0.51
696	6794888.5	2122968.7	4988.29	4988.40	0.12	1.4	4987.88	0.52
697	6794839.0	2122975.0	4987.04	4987.15	0.11	1.3	4986.63	0.52
698	6794789.5	2122981.2	4985.79	4985.93	0.14	1.7	4985.42	0.51
699	6794739.8	2122987.4	4984.54	4984.63	0.09	1.1	4984.11	0.52
700	6794690.2	2122993.7	4983.29	4983.40	0.11	1.3	4982.83	0.57
701	6794640.5	2123000.1	4982.04	4982.13	0.10	1.1	4981.58	0.56
702	6794590.7	2123006.1	4980.78	4980.90	0.12	1.4	4980.36	0.54

703	6794541.3	2123012.4	4979.54	4979.65	0.11	1.3	4979.11	0.54
704	6794491.7	2123018.6	4978.29	4978.35	0.06	0.7	4977.81	0.54
705	6794442.1	2123024.9	4977.04	4977.10	0.06	0.7	4976.59	0.50
706	6794392.5	2123031.1	4975.79	4975.88	0.09	1.0	4975.36	0.52
707	6794342.9	2123037.5	4974.54	4974.64	0.10	1.2	4974.09	0.56
708	6794293.0	2123043.4	4973.28	4973.33	0.05	0.6	4972.80	0.53
709	6794243.7	2123049.7	4972.04	4972.11	0.07	0.9	4971.59	0.52
710	6794204.0	2123054.9	4971.04	4971.08	0.04	0.5	4970.56	0.52
711	6794210.2	2123104.6	4971.23	4971.29	0.06	0.8	4970.76	0.53
712	6794249.8	2123099.5	4972.22	4972.29	0.07	0.8	4971.79	0.50
713	6794299.5	2123093.0	4973.47	4973.59	0.11	1.3	4973.05	0.53
714	6794349.2	2123087.0	4974.73	4974.79	0.06	0.8	4974.25	0.55
715	6794398.7	2123080.8	4975.97	4976.05	0.07	0.9	4975.53	0.52
716	6794448.2	2123074.4	4977.22	4977.30	0.08	0.9	4976.76	0.54
717	6794497.9	2123068.4	4978.47	4978.54	0.07	0.8	4978.03	0.51
718	6794547.6	2123062.0	4979.73	4979.78	0.06	0.7	4979.28	0.50
719	6794597.2	2123055.8	4980.98	4981.05	0.07	0.8	4980.51	0.54
720	6794647.0	2123049.6	4982.23	4982.30	0.07	0.8	4981.78	0.52
721	6794696.2	2123043.2	4983.47	4983.54	0.07	0.9	4983.03	0.52
722	6794746.1	2123037.1	4984.73	4984.82	0.09	1.0	4984.29	0.53
723	6794795.6	2123030.8	4985.98	4986.10	0.13	1.5	4985.58	0.53
724	6794845.2	2123024.6	4987.23	4987.34	0.11	1.4	4986.79	0.55
725	6794894.8	2123018.4	4988.48	4988.58	0.11	1.3	4988.06	0.53
726	6794944.3	2123012.0	4989.72	4989.84	0.12	1.4	4989.33	0.52
727	6794901.0	2123068.0	4988.66	4988.83	0.16	2.0	4988.32	0.50
728	6794851.4	2123074.3	4987.41	4987.55	0.14	1.7	4987.05	0.50
729	6794801.8	2123080.4	4986.16	4986.28	0.12	1.4	4985.74	0.53
730	6794752.1	2123086.8	4984.91	4985.01	0.10	1.2	4984.48	0.53
731	6794702.5	2123092.9	4983.66	4983.76	0.11	1.3	4983.22	0.55
732	6794652.9	2123099.3	4982.41	4982.44	0.04	0.4	4981.94	0.51
733	6794603.5	2123105.2	4981.16	4981.20	0.04	0.5	4980.67	0.53
734	6794553.9	2123111.6	4979.91	4980.00	0.09	1.0	4979.46	0.55
735	6794504.2	2123117.8	4978.66	4978.72	0.06	0.7	4978.22	0.50
736	6794454.6	2123124.1	4977.41	4977.47	0.06	0.7	4976.93	0.54
737	6794405.1	2123130.3	4976.17	4976.25	0.08	1.0	4975.70	0.54
738	6794355.4	2123136.6	4974.91	4974.97	0.06	0.7	4974.46	0.51
739	6794305.8	2123142.8	4973.66	4973.73	0.07	0.8	4973.19	0.54
740	6794256.2	2123149.0	4972.41	4972.42	0.01	0.1	4971.92	0.50
741	6794216.6	2123154.1	4971.42	4971.50	0.09	1.0	4970.96	0.54

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November 10, 2010

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Bio-Intrusion Rock
Source: Freemont Junction (After Placement) Tests were taken in place.

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.685	8.3	9	74.7	90
Absorption %	0.6%	7.5	2	15.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.6	7.1	1	7.1	10
Schmidt Hammer	56	7.3	3	21.9	30
Total Score				**228.7**	**260**

Rating = ***88.0***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 233040

Relative Density (oven Dry)	=	2.685
Relative Density (SSD)	=	2.701
Relative Density (apparent)	=	2.728
Absorption (%)	=	0.6 %

This Durability Represents the 1st 5,000 yd.³ placed of Biointrusion

page 6 of 7

Los Angeles Abrasion ASTM C-131
Lab # 233038

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	6.6 %

Sodium Soundness ASTM C-88
Lab # 233039

% Loss	=	0.0 %

Schmitt Hammer
234317

Rebound Number		57,57,53
Average	=	56

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

page 7 of 7

A5. Infiltration and Biointrusion Barrier
Durability and Gradation Test Results

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July 22, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt Bio-Intrusion
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.709	9.2	9	82.8	90
Absorption %	0.5%	8.0	2	16.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.7	7.0	1	7.0	10
Schmidt Hammer	63	8.4	3	25.2	30
Total Score				**241.0**	**260**

Rating = *92.7*

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 258889

Relative Density (oven Dry) = 2.709
Relative Density (SSD) = 2.723
Relative Density (apparent) = 2.746
Absorption (%) = 0.5 %

THIS DURABILITY REPRESENTS THE 2ND 5,000 yd³ PLACED of Bio intrusion barrier.

Los Angeles Abrasion ASTM C-131
Lab # 258891

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	6.7 %

Sodium Soundness ASTM C-88
Lab # 258882

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	60, 62
Average	=	61

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
WEST VALLEY OFFICE: 2800 SOUTH REDWOOD ROAD, WEST VALLEY, UT 84119 (PHONE) 801.908-5859 (FAX) 801.972-5074
WEST VALLEY CITY LAB: 2688 SOUTH REDWOOD RD, STE E WEST VALLEY CITY, UT 84119 (PHONE) 801.887.0086 (FAX) 801.887.0087

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July 22, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt Bio-Intrusion
Source: Freemont Junction ~~(Stockpile)~~ In place

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.721	9.5	9	85.5	90
Absorption %	0.7%	6.8	2	13.6	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.4	6.5	1	6.5	10
Schmidt Hammer	60	8.0	3	24.0	30
Total Score				**239.6**	**260**

Rating = ***92.1***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 258885

Relative Density (oven Dry)	=	2.721
Relative Density (SSD)	=	2.740
Relative Density (apparent)	=	2.773
Absorption (%)	=	0.7 %

THIS DURABILITY IS FOR THE 320 5,000 yd³ PLACED of Biointrusion barrier.

Los Angeles Abrasion ASTM C-131
Lab # 258887

100 Revolutions Grading A
12 Spheres
% Wear = 7.4 %

Sodium Soundness ASTM C-88
Lab # 258886

% Loss = 0.1 %

Schmitt Hammer

Rebound Numbers = 60, 59

Average = 60

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt Bio-Intrusion #3
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.62	7.3	9	65.7	90
Absorption %	0.6%	7.4	2	14.4	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.1	6.6	1	6.6	10
Schmidt Hammer	51	6.5	3	19.5	30
Total Score				**216.2**	**260**

Rating = ***83.2***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287641

Relative Density (oven Dry) = 2.62
Relative Density (SSD) = 2.64
Relative Density (apparent) = 2.67
Absorption (%) = 0.6 %

This Durability represents the 4th 5,000yd3 placed of Biointrusion

A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

Los Angeles Abrasion ASTM C-131
Lab # 287639

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	7.1 %

Sodium Soundness ASTM C-88
Lab # 287640

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	50,51,52
Average	=	51

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt Bio-Intrusion #4
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.63	7.5	9	67.5	90
Absorption %	0.6%	7.4	2	14.8	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.6	6.6	1	6.6	10
Schmidt Hammer	48	6.1	3	18.3	30
Total Score				**217.2**	**260**

Rating = ***83.5***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287662

Relative Density (oven Dry) = 2.63
Relative Density (SSD) = 2.64
Relative Density (apparent) = 2.67
Absorption (%) = 0.6 %

This Durability Represents the 5th 5,000yd³ placed of Biointrusion

Los Angeles Abrasion ASTM C-131
Lab # 287660

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	7.6 %

Sodium Soundness ASTM C-88
Lab # 287661

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	44,48,52
Average	=	48

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB. 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt Bio-Intrusion #2
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.64	7.6	9	68.4	90
Absorption %	1.0 %	5.0	2	10.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.6	7.2	1	7.2	10
Schmidt Hammer	65	9	3	27.0	30
Total Score				**222.6**	**260**

Rating = *85.6*

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287644

Relative Density (oven Dry) = 2.64
Relative Density (SSD) = 2.66
Relative Density (apparent) = 2.69
Absorption (%) = 1.0 %

This durability is for the 6th 5,000 yd³ placed of Biointrusion barrier.

Los Angeles Abrasion ASTM C-131
Lab # 287642

100 Revolutions 12 Spheres		Grading A	
	% Wear	=	6.6 %

Sodium Soundness ASTM C-88
Lab # 287643

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	64,65,66
Average	=	65

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
WEST VALLEY OFFICE: 2800 SOUTH REDWOOD ROAD,WEST VALLEY, UT 84119 (PHONE) 801.908-5859 (FAX) 801.972-9074
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CMT ENGINEERING LABORATORIES

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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt Bio-Intrusion #1
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.62	7.3	9	65.7	90
Absorption %	0.6%	7.4	2	14.8	20
Sodium Sulfate %	0.8%	10	11	110	110
LA Abrasion	6.7	7.0	1	7.0	10
Schmidt Hammer	49	6.4	3	19.2	30
Total Score				**216.7**	**260**

Rating = ***83.3***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287647

Relative Density (oven Dry) = 2.62
Relative Density (SSD) = 2.64
Relative Density (apparent) = 2.66
Absorption (%) = 0.6 %

This durability is for the 7th 5,000yd³ placed/produced of Biointrusion barrier.

Los Angeles Abrasion ASTM C-131
Lab # 287645

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	6.7 %

Sodium Soundness ASTM C-88
Lab # 287646

% Loss	=	0.8 %

Schmitt Hammer

Rebound Numbers	=	48,50,48
Average	=	49

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
WEST VALLEY OFFICE: 2800 SOUTH REDWOOD ROAD,WEST VALLEY, UT 84119 (PHONE) 801.908-5859 (FAX) 801.972-9074
WEST VALLEY CITY LAB: 2688 SOUTH REDWOOD RD, STE E WEST VALLEY CITY, UT 84119 (PHONE) 801.887.0086 (FAX) 801.887.0087

A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 08/20/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 10-21-09 Biointrusion Grey Basalt Source: Freemont Junction
TESTED BY: DB SAMPLED BY: CLIENT LAB #: 5020

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	2517.2	4.3	96	
2 in. (50mm)	19271.3	32.7	63	50 - 100
1 1/2 in. (37.5mm)	9618.5	16.3	47	40 - 50
1 in. (25mm)	7572.8	12.8	34	20 - 40
3/4 in. (19mm)	3922.7	6.6	27	
1/2 in. (12.5mm)	3115.6	5.3	22	15 - 25
3/8 in. (9.5mm)	452.6	6.3	16	
# 4 (4.75mm)	279.8	3.9	12	10 - 20
# 9 (2.36mm)	189.5	2.7	9	5 - 15
# 16 (1.18mm)	125.6	1.8	7	5 - 10
# 30 (600um)	102.3	1.4	6	
# 50 (300um)	84.1	1.2	5	
#100 (150um)	89.8	1.3	3	
#200 (75um)	79.5	1.1	2.4	0 - 5
-#200 (-75um)	13.3			

Total Sample Aggregate Weight: 58988.3
- 1/2" Aggregate Weight: 1571.5 - 1/2" After Wash Weight: 1416.7

REMARKS: Test performed prior to placement.

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93. John Christensen

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CENTRAL UTAH TESTING & ANALYSIS

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 08/27/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 12-21-11 Biointrusion Grey Basalt Source: Freemont Junction
TESTED BY: DB SAMPLED BY: CLIENT LAB #: 5021

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	3025.9	4.5	95	
2 in. (50mm)	21156.6	31.8	64	50 - 100
1 1/2 in. (37.5mm)	12225.8	18.4	45	40 - 50
1 in. (25mm)	9035.9	13.6	32	20 - 40
3/4 in. (19mm)	4265.5	6.4	25	
1/2 in. (12.5mm)	4105.7	6.2	18	15 - 25
3/8 in. (9.5mm)	496.5	5.8	13	
# 4 (4.75mm)	285.3	3.4	10	10 - 20
# 8 (2.36mm)	208.7	2.5	7	5 - 15
# 16 (1.18mm)	174.2	2.1	5	5 - 10
# 30 (600um)	98.7	1.2	4	
# 50 (300um)	90.2	1.1	3	
#100 (150um)	76.5	0.9	2	
#200 (75um)	72.1	0.9	1.3	0 - 5
-#200 (-75um)	14.9			

Total Sample Aggregate Weight: 66548.7
- 1/2" Aggregate Weight: 1513.7
- 1/2" After Wash Weight: 1519.1

REMARKS: Test performed prior to placement. 12-21-11 BB

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93.

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CENTRAL UTAH TESTING & TRUCKING

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 09/02/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ Biointrusion Grey Basalt Source: Freemont Junction
TESTED BY: DB SAMPLED BY: CLIENT LAB #: 5042

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	4025.2	6.4	94	
2 in. (50mm)	17997.0	28.8	65	50 - 100
1 1/2 in. (37.5mm)	10229.9	16.4	48	40 - 50
1 in. (25mm)	9231.1	14.8	34	20 - 40
3/4 in. (19mm)	4936.8	7.9	26	
1/2 in. (12.5mm)	3811.4	6.1	20	15 - 25
3/8 in. (9.5mm)	611.7	7.0	13	
# 4 (4.75mm)	215.9	2.5	10	10 - 20
# 8 (2.36mm)	234.6	2.7	8	5 - 15
# 16 (1.18mm)	197.1	2.2	5	5 - 10
# 30 (600um)	69.5	0.8	5	
# 50 (300um)	63.1	0.7	4	
#100 (150um)	76.8	0.9	3	
#200 (75um)	80.0	0.9	2.1	0 - 5
-#200 (-75um)	12.0			

Total Sample Aggregate Weight: 62553.1
- 1/2" Aggregate Weight: 1732.6
- 1/2" After Wash Weight: 1559.7

REMARKS: Test performed prior to placement.

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93. John Christian

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 09/10/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ Biointrusion Grey Basalt Source: Fremont Junction
TESTED BY: DB SAMPLED BY: CLIENT LAB #: 5058

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	2325.4	4.5	95	
2 in. (50mm)	16165.1	31.6	64	50 - 100
1 1/2 in. (37.5mm)	9579.3	18.7	45	40 - 50
1 in. (25mm)	7016.1	13.7	31	20 - 40
3/4 in. (19mm)	3470.1	6.8	25	
1/2 in. (12.5mm)	3053.9	6.0	19	15 - 25
3/8 in. (9.5mm)	505.0	5.5	13	
# 4 (4.75mm)	300.7	3.3	10	10 - 20
# 8 (2.36mm)	212.7	2.3	7	5 - 15
# 16 (1.18mm)	119.6	1.3	6	5 - 10
# 30 (600um)	95.9	1.1	5	
# 50 (300um)	78.3	0.9	4	
#100 (150um)	90.4	1.0	3	
#200 (75um)	92.9	1.0	2.2	0 - 5
-#200 (-75um)	16.1			

Total Sample Aggregate Weight: 51140.0
- 1/2" Aggregate Weight: 1685.8
- 1/2" After Wash Weight: 1515.6

REMARKS: Test performed prior to placement. 12-21-11 BB

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93 Jake Christensen

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 08/18/10
PROJECT: MISC. QC
SAMPLE LOCATION: IN PLACE SAMPLE #1
MATERIAL TYPE: ~~COVER BIOBARRIER~~ 1-6-12BB Biointrusion Grey Basalt Source: Freemont Junction 1-6-12BB
TESTED BY: JC SAMPLED BY: JARED LAB #: 5774

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	5590.0	2.9	97.1	
2 in. (50mm)	47968.4	25.1	71.9	60 - 100
1 1/2 in. (37.5mm)	43972.5	23.1	48.9	40 - 60
1 in. (25mm)	32274.3	16.9	31.9	20 - 40
3/4 in. (19mm)	14275.2	7.5	24.5	
1/2 in. (12.5mm)	1573.9	7.1	17.4	15 - 25
3/8 in. (9.5mm)	772.4	3.5	13.9	
# 4 (4.75mm)	864.8	3.9	10.0	10 - 20
# 8 (2.36mm)	305.0	1.4	8.7	5 - 15
# 16 (1.18mm)	178.0	0.8	7.9	5 - 10
# 30 (600um)	117.3	0.5	7.3	
# 50 (300um)	126.7	0.6	6.8	
#100 (150um)	181.2	0.8	6.0	
#200 (75um)	287.1	1.3	4.7	0 - 5
-#200 (-75um)	73.0			

Total Sample Aggregate Weight: 190741.0
-3/4" Aggregate Weight: 5444.6
-3/4" After Wash Weight: 4480.3

REMARKS: THIS GRADATION WAS PERFORMED WHEN PLACEMENT BEGAN mk

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27. Jared Lambertsen

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A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES

MATERIALS FINER THAN No. 200 SCREEN

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/12/10

PROJECT: ~~MISC. OF~~ MOAB UMTRA PROJECT

SAMPLE LOCATION: BIOINTRUSION LAYER IN PLACE SAMPLE 1, UBA0101-00

MATERIAL TYPE: ~~COVER HIGHLAND~~ Biointrusion Gray Basalt Source: Freemont Junction

LAB #: 59(M

TESTED BY: JC SAMPLED BY: JC

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in (200mm)		0.0	100.0	
6 in (150mm)		0.0	100.0	
4 in (100mm)		0.0	100.0	100
3 in (75mm)	16542.4	2.3	97.7	
2 in (50mm)	147765.6	22.3	75.5	50 - 100
1 1/2 in (37.5mm)	128716.3	19.6	55.8	40 - 60
1 in (25mm)	105454.9	15.9	30.9	20 - 40
3/4 in (19mm)	50545.0	7.6	22.3	
1/2 in (12.5mm)	1718.7	10.6	21.7	15 - 25
3/8 in (9.5mm)	862.3	5.7	16.4	
# 4 (4.75mm)	887.1	5.5	10.9	10 - 20
# 8 (2.36mm)	318.8	2.9	8.9	5 - 15
# 16 (1.18mm)	193.0	1.2	7.7	5 - 10
# 30 (600um)	128.7	0.8	6.9	
# 50 (300um)	133.3	0.8	6.1	
#100 (150um)	164.7	1.0	5.1	
#200 (75um)	186.4	1.1	3.9	0 - 5
-#200 (-75um)	31.4			

Total Sample Aggregate Weight 601403.4

- 3/4" Aggregate Weight 5232.6

- 3/4" After Wash Weight 4023.9

1-6-12

REMARKS: Test performed on 1st 5,000 yd^3 placed.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27

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A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES [illegible]
MATERIALS FINER THAN No. 200 SCREEN [illegible]

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/12/10
PROJECT: ~~MINE-06~~ Moab UMTRA Project [illegible]
SAMPLE LOCATION: BIOINTRUSION LAYER IN PLACE SAMPLE 7.1 [illegible]
MATERIAL TYPE: ~~COVER BIOBARRIER~~ Biointrusion Grey Basalt Source: Freemont Junction
TESTED BY: JC SAMPLED BY: JC LAB #: 5907

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in (200mm)		0.0	100.0	
6 in (150mm)		0.0	100.0	
4 in (100mm)		0.0	100.0	100
3 in (75mm)	9787.3	2.3	97.7	
2 in (50mm)	83640.5	20.0	77.6	50 - 100
1 1/2 in (37.5mm)	71367.2	17.1	60.5	40 - 60
1 in (25mm)	78956.1	18.9	41.6	20 - 40
3/4 in (19mm)	47751.8	11.4	30.2	
1/2 in (12.5mm)	1604.1	9.7	20.5	15 - 25
3/8 in (9.5mm)	609.7	4.7	16.3	
# 4 (4.75mm)	707.7	4.3	12.0	10 - 20
# 8 (2.36mm)	369.1	2.2	9.8	5 - 15
# 16 (1.18mm)	250.2	1.5	8.3	5 - 10
# 30 (600um)	164.6	1.0	7.3	
# 50 (300um)	168.5	1.0	6.3	
#100 (150um)	198.2	1.2	5.1	
#200 (75um)	205.9	1.2	3.8	0 - 5
-#200 (-75um)	38.5			

Total Sample Aggregate Weight: 417387.0
- 3/4" Aggregate Weight: 5000.6
- 3/4" After Wash Weight: 4405.3

REMARKS: Test performed for 2nd 5,000 yd³ placed. 1-6-12 BB

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 [illegible]

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A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 06/17/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: IN PLACE SAMPLE 2 ABG01106 17-00
MATERIAL TYPE: ~~COVER BIOBARRIER~~ Biointrusion Gray Basalt Source: Freemont Junction
TESTED BY: JC SAMPLED BY: CLIENT LAB #: 6267

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	1288.6	0.7	99.3	
2 in. (50mm)	49108.0	25.5	73.8	50 - 100
1 1/2 in. (37.5mm)	40818.1	21.2	52.6	40 - 60
1 in. (25mm)	35601.3	18.5	34.1	20 - 40
3/4 in. (19mm)	16453.5	8.5	25.5	
1/2 in. (12.5mm)	1312.9	6.6	19.0	15 - 25
3/8 in. (9.5mm)	514.1	2.6	16.4	
# 4 (4.75mm)	737.7	3.7	12.7	10 - 20
# 8 (2.36mm)	381.7	1.8	10.9	5 - 15
# 16 (1.18mm)	280.9	1.4	9.5	5 - 10
# 30 (600um)	199.7	1.0	8.5	
# 50 (300um)	207.2	1.0	7.5	
#100 (150um)	244.6	1.2	6.3	
#200 (75um)	279.9	1.4	4.9	0 - 5
-#200 (-75um)	64.7			

Total Sample Aggregate Weight: 192478.5

- 3/4" Aggregate Weight: 5111.6

- 3/4" After Wash Weight: 4202.9

REMARKS: Test performed for 3rd 5,000 yd³ placed. 1-6-12 BB

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 [signature]

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A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 06/17/11
PROJECT: ENERGY SOLUTIONS 11-11313
SAMPLE LOCATION: ~~IN PLACE SAMPLE~~ (See Sample log) Material Source: Grey Basalt, Fremont Jct.
MATERIAL TYPE: ~~COVER BIOBARRIER~~ Biointrusion 1-6-12 BB
TESTED BY: JC SAMPLED BY: CLIENT LAB #: 6268

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	4417.1	2.6	97.4	
2 in. (50mm)	49351.7	24.2	73.2	50 - 100
1 1/2 in. (37.5mm)	35655.4	21.3	51.9	40 - 60
1 in. (25mm)	24873.2	14.9	37.0	20 - 40
3/4 in. (19mm)	20745.8	12.4	24.6	
1/2 in. (12.5mm)	1518.1	7.3	17.3	15 - 25
3/8 in. (9.5mm)	774.6	3.5	13.8	
# 4 (4.75mm)	750.3	3.6	10.2	10 - 20
# 8 (2.36mm)	457.0	2.2	8.0	5 - 15
# 16 (1.18mm)	250.4	1.2	6.8	5 - 10
# 30 (600um)	165.7	0.8	6.0	
# 60 (300um)	169.4	0.8	5.2	
#100 (150um)	201.9	1.0	4.2	
#200 (75um)	210.8	1.0	3.2	0 - 5
-#200 (-75um)	48.3			

Total Sample Aggregate Weight: 167081.0
- 3/4" Aggregate Weight: 5120.8 - 3/4" After Wash Weight: 4696.5

REMARKS: Test is for 4th 5,000 yd³ placed. 1-6-12 BB
Sample location: UBK01110617-00, 1-6-12 BB

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 [signature] QA Record 6-27-11

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 06/16/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: IN PLACE SAMPLE 1 UBTO111106015.00
MATERIAL TYPE: ~~COVER~~ BIOBARRIER Biointrusion Grey Basalt Source: Freemont Junction
TESTED BY: JC SAMPLED BY: JC LAB #: 6266

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	5891.1	2.4	97.6	
2 in. (50mm)	64956.2	26.0	70.6	50 - 100
1 1/2 in. (37.5mm)	53303.3	22.1	48.6	40 - 60
1 in. (25mm)	41103.5	17.1	31.5	20 - 40
3/4 in. (19mm)	17012.4	7.0	24.5	
1/2 in. (12.5mm)	1285.4	6.0	18.4	15 - 25
3/8 in. (9.5mm)	676.7	2.7	15.7	
#4 (4.75mm)	774.0	3.6	12.1	10 - 20
#8 (2.36mm)	363.9	1.7	10.4	5 - 15
#16 (1.18mm)	205.1	1.4	9.0	5 - 10
#30 (600um)	210.7	1.0	8.0	
#50 (300um)	208.5	1.0	7.0	
#100 (150um)	244.8	1.1	5.9	
#200 (75um)	289.3	1.4	4.5	0 - 5
-#200 (-.75um)	77.0			

Total Sample Aggregate Weight: 241381.5
- 3/4" Aggregate Weight: 5217.5
- 3/4" After Wash Weight: 4325.4

REMARKS: Test is for 5th 5,000 yd³ placed. 1-6-1788

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 [signature]

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A5. Infiltration and Biointrusion Barrier Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/02/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: LOT 1 WEST HALF OF LIFT UBL1911111102-00
MATERIAL TYPE: GREY BASALT: ~~COVER BIOBARRIER~~ Biointrusion Source: Fremont Junction
TESTED BY: JC SAMPLED BY: KH LAB #: 6535

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	8497.5	2.5	97.5	
2 in. (50mm)	78375.7	23.4	74.1	60 - 100
1 1/2 in. (37.5mm)	58303.3	17.4	56.7	40 - 60
1 in. (25mm)	54347.8	16.2	40.5	20 - 40
3/4 in. (19mm)	29889.2	8.9	31.5	
1/2 in. (12.5mm)	1398.9	8.5	23.0	15 - 26
3/8 in. (9.5mm)	754.5	4.6	18.4	
# 4 (4.75mm)	821.6	5.0	13.4	10 - 20
# 8 (2.36mm)	368.9	2.2	11.1	5 - 15
# 16 (1.18mm)	279.6	1.7	9.4	5 - 10
# 30 (600um)	189.6	1.2	8.3	
# 50 (300um)	206.6	1.3	7.0	
#100 (150um)	229.0	1.4	5.6	
#200 (75um)	252.5	1.5	4.1	0 - 5
-#200 (-75um)	60.7			

Total Sample Aggregate Weight: 335047.1
- 3/4" Aggregate Weight: 5169.9 - 3/4" After Wash Weight: 4562.0

REMARKS: Test is for 6th 5,000yd³ placed. 1-6-2008

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 Jake Christensen

P.O. BOX 220427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/03/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: LOT 2 - UFL 19 UBL19111102-00
MATERIAL TYPE: GREY BASALT: ~~COVER BIOBARRIER~~ Biointrusion Source: Freemont Junction
TESTED BY: JC SAMPLED BY: KC LAB #: 6539

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	21991.7	3.4	96.6	
2 in. (50mm)	205077.6	32.0	64.5	50 - 100
1 1/2 in. (37.5mm)	134786.0	21.0	43.5	40 - 60
1 in. (25mm)	81788.3	12.8	30.7	20 - 40
3/4 in. (19mm)	33567.8	5.2	25.5	
1/2 in. (12.5mm)	1818.4	9.1	16.4	15 - 25
3/8 in. (9.5mm)	782.8	3.9	12.5	
# 4 (4.75mm)	857.6	4.3	8.2	10 - 20
# 8 (2.36mm)	320.9	1.6	6.6	5 - 15
# 16 (1.18mm)	224.2	1.1	5.5	5 - 10
# 30 (600um)	139.9	0.7	4.8	
# 50 (300um)	147.4	0.7	4.0	
#100 (150um)	167.2	0.8	3.2	
#200 (75um)	175.4	0.9	2.3	0 - 5
-#200 (-75um)	44.7			

Total Sample Aggregate Weight: 640278.2
- 3/4" Aggregate Weight: 5096.7 - 3/4" After Wash Weight: 4578.5

REMARKS: This test is the 7th 5,000 yd³ placed 11-29-11

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 John Christensen

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A6. Frost Protection Layer

Standard Proctor Test Results Summary

Lift Approval Summary

Lift Approval Package

Buyoff Surveys

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A6. Frost Protection Layer
Standard Proctor Test Results Summary

Set	Proctor ID #	Date Sampled	Date Approved	Maximum Dry Density (lb/ft^3)	Optimum Moisture Content (%)	Soils Description
Set #1	Frost Protection #1	10/21/10	11/1/2010	118.2	11.9	Grayish in color and consists of mostly fines
	Frost Protection #2	10/21/10	11/1/2010	118.6	11.9	Grayish in color and consists of mostly fines
	Frost Protection #3	10/21/10	11/1/2010	119.3	11.5	Grayish in color and consists of mostly fines
Set #2	Frost Protection #4	11/01/10	11/16/2010	118.5	11.8	Grayish in color and consists of mostly fines
	Frost Protection #5	11/01/10	11/16/2010	117.6	12.0	Grayish in color and consists of mostly fines
	Frost Protection #6	11/04/10	11/16/2010	115.6	12.0	Light tan in color and contains mostly fines
Set #3	Frost Protection #1 (2011)	06/22/11	6/28/2011	115.3	14.2	Grayish in color and consists of mostly fines
	Frost Protection #2 (2011)	06/22/11	6/28/2011	117.0	13.4	Grayish in color and consists of mostly fines
	Frost Protection #3 (2011)	06/22/11	6/28/2011	118.5	13.9	Grayish in color and consists of mostly fines
	Frost Protection #4 (2011)	11/04/11	11/9/2011	115.7	14.5	Grayish in color and consists of mostly fines

A6. Frost Protection Layer
Lift Approval Summary

Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd^3)	Cumulative Quantity Approved (yd^3)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID #	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)	Notes
10/20/10	UFA11101020-00	2	3,541	3,541	94.2	0.4	FP-2	2	0	94.5	
10/21/10	UFA11101021-00	2	6,196	9,737	93.4	0.7	FP-2	1	0	93.3	
10/28/10	UFA01101028-00	2	3,213	12,950	95.2	0.7	FP-2	2	0	94.1	
11/01/10	UFC11101101-00	1	1,812	14,762	95.3	0.5	FP-2	0	0	0.0	
11/02/10	UFA01101102-00	2	3,213	17,975	91.8	0.7	FP-2	0	0	0.0	
11/04/10	UFC11101104-00	2	1,812	19,787	92.2	0.5	FP-4	1	0	91.5	
11/04/10	UFA11101104-00	1	1,811	21,598	90.6	0.5	FP-4	0	0	0.0	
11/05/10	UFA01101105-00	2	2,754	24,352	90.8	0.6	FP-4	0	0	0.0	
11/08/10	UFA01101108-00	2	2,754	27,106	92.5	0.6	FP-4	0	0	0.0	
11/09/10	UFA01101109-00	2	2,295	29,401	92.1	0.5	FP-4	0	0	0.0	
06/23/11	UFD01110623-00	2	4,789	34,190	N/A	0.9	FP-2(2011)	2	0	93.6	1
06/27/11	UFH01110627-00	2	3,594	37,784	N/A	0.8	FP-2(2011)	2	0	97.4	1
06/28/11	UFH14110628-00	2	4,121	41,905	N/A	0.8	FP-2(2011)	2	0	95.3	1
06/29/11	UFE14110629-00	2	4,498	46,403	N/A	0.7	FP-2(2011)	2	0	96.7	1
07/05/11	UFH01110705-00	0	2,713	49,116	N/A	0.6	FP-2(2011)	2	0	98.3	1
07/07/11	UFD01110707-00	2	3,132	52,248	N/A	0.6	FP-2(2011)	2	0	99.8	1
07/12/11	UFH14110711-00	1	3,736	55,984	N/A	0.7	FP-2(2011)	2	0	98.8	1
07/13/11	UFE14110713-00	1	4,315	60,299	N/A	0.7	FP-2(2011)	2	0	96.2	1
07/14/11	UFH01110714-00	1	3,166	63,465	N/A	0.7	FP-2(2011)	2	0	96.2	1
07/18/11	UFD01110718-00	2	3,750	67,215	N/A	0.7	FP-2(2011)	2	0	91.4	1
07/19/11	UFH14110719-00	0	3,191	70,406	N/A	0.6	FP-2(2011)	2	0	92.6	1
07/20/11	UFE14110720-00	0	3,628	74,034	N/A	0.6	FP-2(2011)	2	0	94.6	1
07/21/11	UFH01110720-00	0	3,324	77,358	N/A	0.7	FP-2(2011)	2	0	97.7	1
07/21/11	UFD01110721-00	1	3,459	80,817	N/A	0.7	FP-2(2011)	2	0	95.3	1
07/27/11	UFH14110726-00	1	2,958	83,775	N/A	0.6	FP-2(2011)	2	0	96.6	1
07/28/11	UFE14110727-00	2	4,383	88,158	N/A	0.7	FP-2(2011)	2	0	97.7	1
07/29/11	UFD01110728-00	2	1,491	89,649	N/A	0.3	FP-2(2011)	2	0	97.4	1
07/29/11	UFH01110728-00	1	931	90,580	N/A	0.2	FP-2(2011)	2	0	94.7	1
08/05/11	UFE14110729-00	1	1,878	92,458	N/A	0.3	FP-2(2011)	2	0	96.3	1
08/05/11	UFH141100729-00	1	1,972	94,430	N/A	0.4	FP-2(2011)	2	0	96.0	1
11/07/11	UFK19111107-00	1	4,161	98,591	N/A	0.6	FP#2(2011)	3	0	94.4	1
11/08/11	UFK19111108-00	1	4,161	102,752	N/A	0.6	FP#4(2011)	3	1	95.4	1
11/10/11	UFK19111109-00	1	5,636	108,388	N/A	0.8	FP#4(2011)	4	0	92.6	1
11/10/11	UFP20111110-00	0	3,680	112,068	N/A	0.6	FP#4(2011)	3	0	95.6	1
11/14/11	UFP20111114-00	1	4,848	116,916	N/A	0.8	FP#4(2011)	3	1	98.7	1
11/15/11	UFP20111115-00	0	4,154	121,070	N/A	0.7	FP#4(2011)	3	0	96.8	1
11/17/11	UFK19111116-00	0	5,001	126,071	N/A	0.7	FP#4(2011)	4	0	99.6	1

A6. Frost Protection Layer
Lift Approval Summary

Date	Lift ID #	# of Passing Moisture Tests	Quantity Approved (yd^3)	Cumulative Quantity Approved (yd^3)	CAES Screen Passing Pixels (%)	Average Thickness (ft)	Proctor ID #	# of Nuclear Density Gauge Verifications	# of Sandcone Verifications	Verified Compaction (%)	Notes
11/17/11	UFP20111117-00	1	3,383	129,454	N/A	0.6	FP#4(2011)	3	0	96.3	1
11/22/11	UFK19111118-00	0	3,547	133,001	N/A	0.5	FP#4(2011)	3	0	98.5	1
11/22/11	UFP20111118-00	0	2,730	135,731	N/A	0.5	FP#4(2011)	3	0	98.7	1

Average CAES Screen Passing Pixels (%) = 92.81

Total Quantity Approved (yd^3) = 135,731

Total # of Nuclear Density Gauge Tests = 78

Total # of Moisture Tests = 47

Quantity per Moisture Test (yd^3) = 2,888

Total Average Thickness (ft) = 0.6

1. Compaction testing was done via the nuclear density gauge.

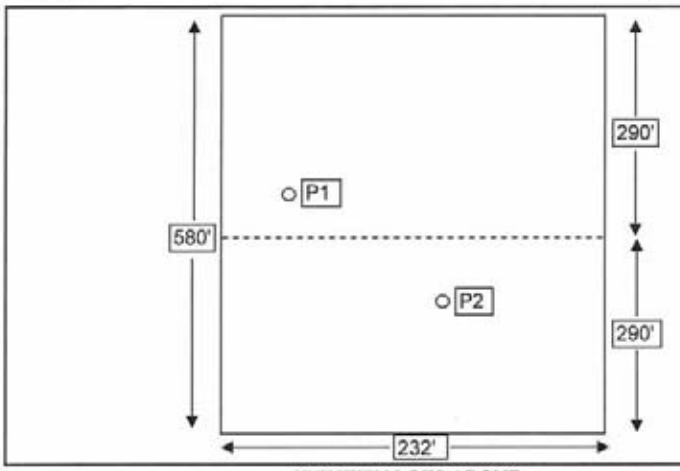
A6. Frost Protection Layer
Lift Approval Package

ENERGYSOLUTIONS

LIFT APPROVAL FORM

PROJECT: Moab UMTRA Project **OTHER**

NW CORNER **DATE:** 10/28/2010



P 1	6795682 N. 2122129 E.				
EW:	232	X	0.248	=	58
NS:	290	X	0.847	=	246
P 2	6795529 N. 2122200 E.				
EW:	232	X	0.557	=	129
NS:	290	X	0.377	=	109
P 3					
EW:		X		=	
NS:		X		=	
P 4	N A				
EW:		X		=	
NS:		X		=	
P 5					
EW:		X		=	
NS:		X		=	

Page 2 attached: Y N

IDENTIFY LOTS ABOVE

LIFT ID: UFA01101028-00 NW CORNER: 6795928 N 2122071 E

THICKNESS: UNC: ≤ 12" COM: N/A ELEV: N/A Debris Insp. By: N/A Date: N/A Time: N/A

Comments: On **10/28/2010** at 08:15 Nielsons began placement and processing of Frost Protection material. Johansen & Tuttle personnel observed this process and verified that moisture conditioning efforts were maintained during the placement and processing of this material. Nielsons finished placement of this lift at 16:00 at which time they began the process of verifying elevation. Elevation was verified at 17:00.

On **11/01/2010** at 07:45 Nielsons began compaction efforts on this lift. At 08:30 J & T personnel performed a Troxler test and pulled a moisture sample from the lift area. Both were found to be satisfactory. At 10:45 Nielsons completed compaction efforts on this lift at which time J & T personnel performed a second Troxler test and pulled a second moisture sample. Both tests were found to be satisfactory. At approximatley 1440 this lift was approved.

This lift is approximately 123,915 ft² with approximately 3,213 yds³ of Frost Protection material approved on it. Compaction was verified using the CAES and nuclear density testing. QC verified that the Bio-Intrusion Layer was approved prior to any placement of Frost Protection.

KEYING IN NOTES: N E S W N/A DENSITY TESTS ID # (S): 1,2

LIFT APPROVED BY: Kevin Keele/Kyler Edgehouse DATE: 11/1/2010 TIME: 1445

QA/QC APPROVAL 11.09.2010 DATE

Density Testing
DOE-EM/GJRAC1783
Rev. 0

QC-F-001
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A6. Frost Protection Layer
Lift Approval Package

ENERGYSOLUTIONS

Slope Elevation Survey

	Average lift thickness=		0.7	Bounding Box	Northing	Easting	
	Grid Size=	N/A		Lower Left	N		
Lift ID:	UFA01101028-00			Upper Right		A	
Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6795900	2122150	4990.7	6795900	2122150	4991.3	0.6	OK
6795900	2122250	4991.3	6795900	2122250	4992.0	0.7	OK
6795700	2122150	4994.5	6795700	2122150	4995.6	1.0	OK
6795700	2122250	4995.1	6795700	2122250	4995.8	0.7	OK
6795500	2122150	4998.4	6795500	2122150	4999.1	0.7	OK
6795500	2122250	4999.0	6795500	2122250	4999.7	0.7	OK
6795600	2122250	4997.0	6795600	2122250	4997.6	0.6	OK
6795450	2122200	5000.6	6795451	2122201	5001.0	0.4	OK
6795800	2122200	4992.8	6795800	2122201	4993.4	0.6	OK
6795550	2122200	4997.7	6795550	2122201	4998.3	0.6	OK
6795650	2122250	4996.0	6795651	2122250	4996.7	0.7	OK
6795750	2122200	4993.8	6795751	2122201	4994.4	0.6	OK
6795850	2122250	4992.2	6795850	2122250	4993.1	0.9	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
			N			0.0	OK
						0.0	OK
						0.0	OK
			A			0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK

EnergySolutions

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% =6	95.2%
Elevation Avg	4995.4
Total =6	10966
Total Lines	11519

Pass

Minimum Number of Machine Passes
3

Lift ID: UFA01101028-00

Northing	Easting	Elevation	# of Passes	Passes =6	Count
6795855	2122060	4990.2	6	1	1
6795858	2122060	4990.2	6	1	1
6795862	2122060	4990.1	6	1	1
6795865	2122060	4990.1	6	1	1
6795868	2122060	4990.0	6	1	1
6795871	2122060	4990.0	6	1	1
6795875	2122060	4989.9	6	1	1
6795878	2122060	4989.9	6	1	1
6795881	2122060	4989.8	6	1	1
6795885	2122060	4989.8	5		1
6795888	2122060	4989.7	5		1
6795809	2122064	4991.0	6	1	1
6795812	2122064	4991.0	6	1	1
6795816	2122064	4990.9	6	1	1
6795819	2122064	4990.9	6	1	1
6795822	2122064	4990.8	6	1	1
6795826	2122064	4990.8	6	1	1
6795829	2122064	4991.2	3		1
6795832	2122064	4991.1	5		1
6795835	2122064	4991.0	5		1
6795839	2122064	4991.0	6	1	1
6795842	2122064	4991.0	6	1	1
6795845	2122064	4990.9	6	1	1
6795849	2122064	4990.8	6	1	1
6795852	2122064	4990.7	6	1	1
6795855	2122064	4990.7	6	1	1
6795858	2122064	4990.6	6	1	1
6795862	2122064	4990.6	6	1	1
6795865	2122064	4990.5	6	1	1
6795868	2122064	4990.5	6	1	1
6795871	2122064	4990.4	5		1
6795875	2122064	4990.4	6	1	1
6795878	2122064	4990.3	5		1
6795881	2122064	4990.2	4		1
6795885	2122064	4990.1	4		1
6795888	2122064	4989.9	6	1	1
6795891	2122064	4989.8	6	1	1
6795894	2122064	4989.7	6	1	1
6795898	2122064	4989.7	6	1	1
6795901	2122064	4989.7	6	1	1
6795904	2122064	4989.4	6	1	1
6795908	2122064	4989.4	4		1
6795770	2122067	4991.9	6	1	1
6795773	2122067	4991.8	6	1	1

Lift Height
1' 0"

Thick Lift Threshold
2' 0"

Last Lift Elevation
N/A

Min. # of Wheel Passes
6

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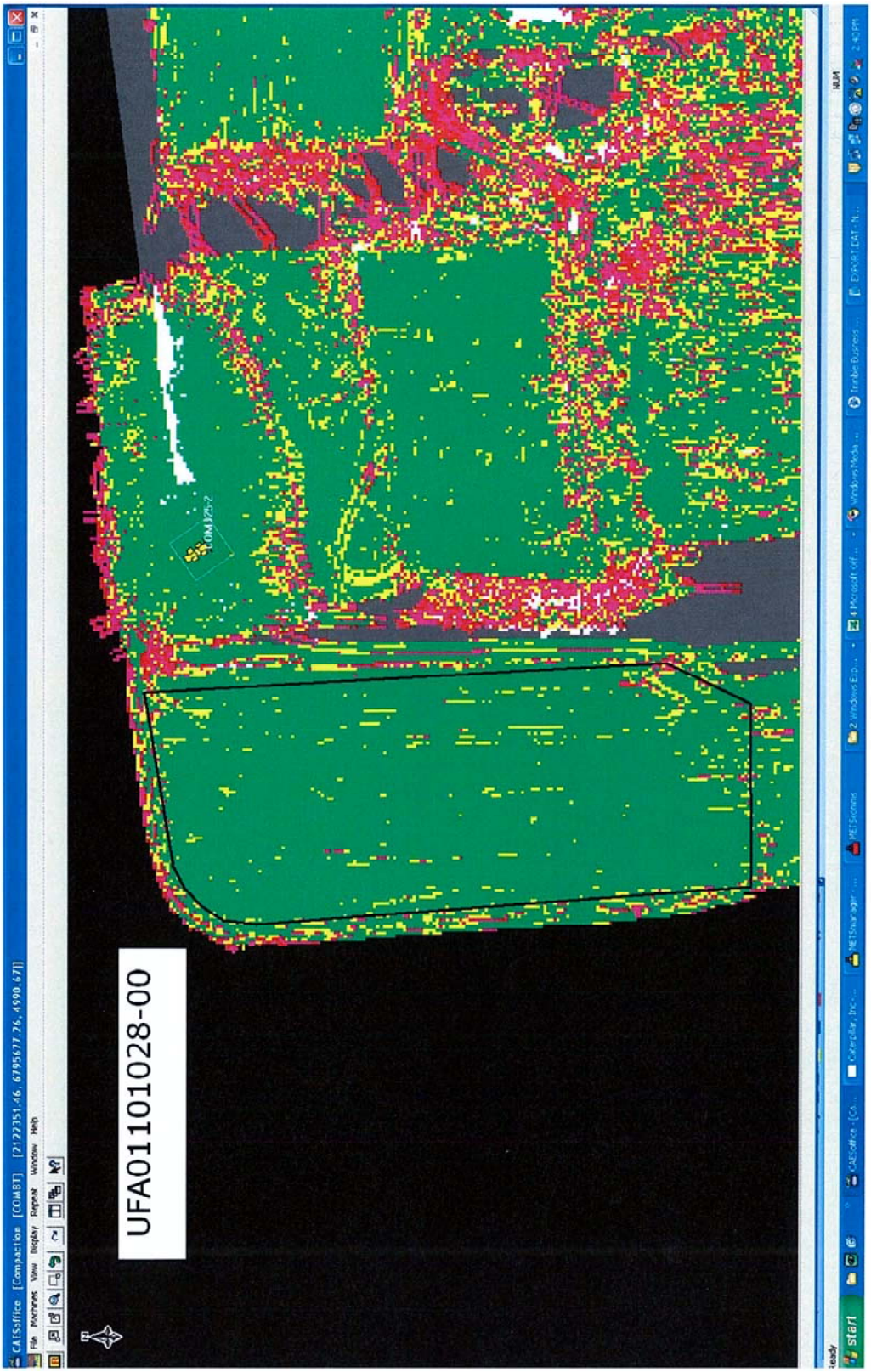
A6. Frost Protection Layer
Lift Approval Package



ENERGY SOLUTIONS

FIELD DENSITY TEST

PROJECT: Moab UMTRA Project **OTHER** _____

LIFT IDENTIFICATION: UFA01101028-00 DATE: 11/1/2010

TEST ID NUMBER(S): 1

TEST LOCATION: P1 TEST METHOD: N/A D1556 X D6938

ASTM D6938 (DENSITY DETERMINATION)

Make/Model Troxler 3430 Gauge Serial # 31674

Last Calibration Date: 3/4/10

Daily Standard Counts: *On-Cell Standard*

Density 2516 Moisture 703

Method A (Direct Transmission)

Depth Setting 8 *(inches)* Count Time 1 *(minutes)*

Moisture Count 134 Density Count 1944

Wet Density (ρ_m) 118.5 *(lbs/ft³)* Dry Density 108.2 *(lbs/ft³)*

Moisture Density 10.3 *(lbs/ft³)* Moisture Fraction 9.5 *(%)*

MOISTURE DETERMINATION

ASTM D4643

Container ID 1263

Mass of container & wet specimen (M_{cms})	1523.7	g
Mass of container & dry specimen (M_{cds})	1499.5	g
Mass of water (M_w) $M_w = M_{cms} - M_{cds}$	24.2	g
Mass of container (M_c)	1263.0	g
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$	236.5	g
Moisture content (w) $w = (M_w / M_s) \times 100$	10.2	%

Dry Density $(\rho_d) = (100 \times \rho_m)/(100 + w)$

$\rho d = (100 \times 118.5) / (100 + 10.2) = 107.5$ *lbs/ft³*

Note: Wet Density from ASTM D 1556 (ρ_m) takes presidence over ASTM D 6938 (ρ_m)

Percent Compaction = ρ_d / $\gamma_d max$ x 100

107.5 / 118.6 x 100 = 90.6 %

ASTM D1556 (DENSITY DETERMINATION)

Testing Apparatus _____ Calibrated Vol. *(lbs/ft³)* _____

Bulk Density of sand (ρ_1) _____ *g/cm³* _____ *lbs/ft³*

Mass of Sand to Fill Cone & Plate (M_2) _____ g

Mass of bottle & cone **before** filling cone, plate & hole		g
Mass of bottle & cone **after** filling cone, plate & hole		g
Mass of sand to fill cone, plate, & hole (M_1)		g
Mass of sand to fill hole		g
Mass of wet soil & container		g
Mass of container		g
Mass of wet soil (M_3)		g

N/A

Test Hole Volume
$V = (M_1 - M_2) / \rho_1$ _____ cm^3

Dry Mass of soil
$M_4 = 100\ M_3 / (w + 100)$ _____ g

Wet Denisty
$\rho_m = (M_3 / V) \times 62.43$ _____ lbs/ft^3

Dry Denisty
$\rho_d = M_4 / V$ _____ g/cm^3

Dry Unit Weight
$\gamma_d = \rho_d \times 62.43$ _____ lbs/ft^3

Soil Description: Grey in color consists of mostly fines.

Proctor ID: Frost Protection # 2

Standard Proctor (ASTM D698)

Maximum Dry Density ($\gamma_d max$) 118.6 (lbs/ft^3)

Optimum Moisture (w_{opt}) 11.9 (%)

Required Moisture: 6.9 % to 16.9 %

Required Percent Compaction: 90.0 (%)

Comments:

Microwave oven power setting on HIGH. Initial time setting of 3 minutes and subsequent incremental drying periods of 1 minute until a change of 0.1 % or less of the initial wet mass of the soil.

TEST RESULTS:

X Pass Date: 11/1/10

_____ Failed Moisture

_____ Failed Compaction Time: 09:30

By: Kevin Keele (print) / Kevin Keele (JHT) (signature)

QA/QC APPROVAL DATE 11-4-10

Density Testing
DOE-EM/GJRAC1783
Rev. 0

QC-F-002
File Index No. 43.8.2
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ENERGY SOLUTIONS

FIELD DENSITY TEST

PROJECT: Moab UMTRA Project **OTHER** _____

LIFT IDENTIFICATION: UFA01101028-00 DATE: 11/1/2010

TEST ID NUMBER(S): 2

TEST LOCATION: P2 TEST METHOD: N/A D1556 X D6938

ASTM D6938 (DENSITY DETERMINATION)

Make/Model Troxler 3430 Gauge Serial # 31674

Last Calibration Date: 3/4/10

Daily Standard Counts: *On-Cell Standard*

Density 2516 Moisture 703

Method A (Direct Transmission)

Depth Setting 8 *(inches)* Count Time 1 *(minutes)*

Moisture Count 164 Density Count 1586

Wet Density (ρ_{wd}) 126.1 *(lbs/ft³)* Dry Density 113.0 *(lbs/ft³)*

Moisture Density 13.1 *(lbs/ft³)* Moisture Fraction 11.6 *(%)*

ASTM D1556 (DENSITY DETERMINATION)

Testing Apparatus _____ Calibrated Vol. *(lbs/ft³)* _____

Bulk Density of sand (ρ_1) _____ *g/cm³* _____ *lbs/ft³*

Mass of Sand to Fill Cone & Plate (M_2) _____ *g*

Mass of bottle & cone **before** filling cone, plate & hole		*g*
Mass of bottle & cone **after** filling cone, plate & hole		*g*
Mass of sand to fill cone, plate, & hole (M_1)		*g*
Mass of sand to fill hole		*g*
Mass of wet soil & container		*g*
Mass of container		*g*
Mass of wet soil (M_3)		*g*

N/A

Test Hole Volume
$V = (M_1 - M_2) / \rho_1$ _____ *cm³*

Dry Mass of soil
$M_4 = 100\ M_3 / (w + 100)$ _____ *g*

Wet Denisty
$\rho_m = (M_3 / V) \times 62.43$ _____ *lbs/ft³*

Dry Denisty
$\rho_d = M_4 / V$ _____ *g/cm³*

Dry Unit Weight
$\gamma_d = \rho_d \times 62.43$ _____ *lbs/ft³*

MOISTURE DETERMINATION

ASTM D4643

Container ID 1263

Mass of container & wet specimen (M_{cms})	1544.3	g
Mass of container & dry specimen (M_{cds})	1512.0	g
Mass of water (M_w) $M_w = M_{cms} - M_{cds}$	32.3	g
Mass of container (M_c)	1263.0	g
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$	249.0	g
Moisture content (w) $w = (M_w / M_s) \times 100$	13.0	%

Soil Description: **Grey in color consists of mostly fines.**

Proctor ID: **Frost Protection # 2**

Standard Proctor (ASTM D698)

Maximum Dry Density ($\gamma_d max$) 118.6 (lbs/ft³)

Optimum Moisture (w_{opt}) 11.9 (%)

Required Moisture: 6.9 % to 16.9 %

Required Percent Compaction: 90.0 (%)

Dry Density $(\rho_d) = (100 \times \rho_m)/(100 + w)$

$\rho d = (100 \times 126.1) / (100 + 13.0) = 111.6$ *lbs/ft³*

Note: Wet Density from ASTM D 1556 (ρ_m) takes presidence over ASTM D 6938 (ρ_{wd})

Percent Compaction = ρ_d / $\gamma_d max$ x 100

111.6 / 118.6 x 100 = 94.1 %

Comments:

Microwave oven power setting on HIGH. Initial time setting of 3 minutes and subsequent incremental drying periods of 1 minute until a change of 0.1 % or less of the initial wet mass of the soil.

TEST RESULTS:

X Pass Date: 11/1/10

_____ Failed Moisture

_____ Failed Compaction Time: 11:30

By: Kevin Keele (print) / Kevin Keele (JHT) (signature)

QA/QC APPROVAL 11-1-10 DATE

Density Testing
DOE-EM/GJRAC1783
Rev. 0

QC-F-002
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CRJ 000944

Moab UMTRA Project
Frost Protection Buyoff Form

CLIENT: DOE

PROJECT: Moab UMTRA

DATE: 8-8-2011

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

LIFT AREA	LIFT AREA
UFD01	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Kevin Keele QA/QC Representative / J and T Eng.	Kevin Keele	8-8-11
Beachem Bosh / QA/QC Representative / Energysolutions		8-8-11
Mark Greenhalgh / Contruction Manager Nielson Construction		8-8-11
Jared Knight / Field Engineer / ~~Energysoltuions~~ Solutions		8-8-11
Brent Anderson / Construction Manager / Energysolutions		8-8-11

COMMENTS		
UFD01 buyoff includes 4 frostprotection lift area's, the lift area are the following: UFD01,UFH01,UFH14 and UFE14		
Total square footage for buyoff area = 567,148ft²		

RECORD COPY

OP-F-021
Rev 0, June 2011

File Code Index No. [illegible]
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A6. Frost Protection Layer
Buyoff Surveys

Moab UMTRA Crescent Junction Disposal Cell
Frost Protection Layer Survey
Measured by Jason Knowlton
Checked by Kevin Keele
Johansen & Tuttle Engineering, Inc
August 5, 2011

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
1001	6794243.5	2122646.9	4974.80	4975.01	0.21	2.5	4971.91	3.10
1002	6794237.0	2122597.1	4974.61	4974.83	0.23	2.7	4971.74	3.09
1003	6794231.0	2122547.4	4974.43	4974.66	0.23	2.8	4971.61	3.05
1004	6794280.5	2122541.2	4975.68	4975.91	0.24	2.8	4972.81	3.10
1005	6794286.6	2122590.9	4975.86	4976.14	0.28	3.3	4972.97	3.17
1006	6794293.0	2122640.4	4976.05	4976.28	0.23	2.7	4973.16	3.11
1007	6794342.6	2122634.3	4977.30	4977.56	0.26	3.1	4974.44	3.12
1008	6794336.2	2122584.6	4977.11	4977.29	0.17	2.1	4974.21	3.07
1009	6794330.3	2122535.1	4976.93	4977.12	0.19	2.2	4974.09	3.02
1010	6794380.0	2122528.6	4978.19	4978.43	0.25	3.0	4975.28	3.16
1011	6794386.0	2122578.4	4978.37	4978.66	0.29	3.5	4975.51	3.15
1012	6794392.2	2122627.9	4978.55	4978.79	0.24	2.8	4975.66	3.12
1013	6794441.8	2122621.6	4979.80	4980.04	0.24	2.9	4976.90	3.14
1014	6794435.6	2122572.2	4979.62	4979.86	0.24	2.9	4976.69	3.16
1015	6794429.4	2122522.5	4979.43	4979.71	0.28	3.4	4976.53	3.18
1016	6794423.4	2122473.2	4979.25	4979.48	0.23	2.8	4976.38	3.10
1017	6794472.9	2122466.9	4980.50	4980.75	0.25	3.0	4977.62	3.13
1018	6794479.0	2122516.3	4980.68	4980.94	0.27	3.2	4977.84	3.10
1019	6794485.1	2122566.0	4980.86	4981.11	0.24	2.9	4978.02	3.08
1020	6794491.8	2122615.5	4981.06	4981.26	0.20	2.4	4978.21	3.05
1021	6794541.0	2122609.2	4982.30	4982.54	0.24	2.9	4979.41	3.14
1022	6794534.9	2122559.4	4982.12	4982.36	0.24	2.9	4979.26	3.10
1023	6794528.5	2122509.9	4981.93	4982.17	0.25	3.0	4979.05	3.13
1024	6794522.3	2122460.7	4981.74	4981.98	0.23	2.8	4978.83	3.14
1025	6794572.2	2122454.3	4983.00	4983.24	0.24	2.8	4980.16	3.07
1026	6794578.2	2122503.8	4983.18	4983.30	0.12	1.4	4980.26	3.03
1027	6794584.6	2122553.5	4983.37	4983.54	0.17	2.1	4980.53	3.01
1028	6794590.7	2122602.7	4983.55	4983.69	0.13	1.6	4980.68	3.01
1029	6794646.4	2122646.0	4984.98	4985.14	0.16	1.9	4982.07	3.07
1030	6794640.2	2122597.1	4984.80	4985.00	0.20	2.4	4981.95	3.05
1031	6794633.9	2122547.2	4984.61	4984.80	0.19	2.2	4981.78	3.02
1032	6794627.6	2122497.8	4984.42	4984.59	0.17	2.0	4981.56	3.04
1033	6794621.7	2122448.1	4984.25	4984.42	0.17	2.0	4981.40	3.02
1034	6794671.0	2122441.7	4985.49	4985.64	0.15	1.8	4982.63	3.01
1035	6794677.5	2122491.0	4985.68	4985.82	0.14	1.7	4982.76	3.06
1036	6794683.6	2122541.0	4985.86	4986.06	0.19	2.3	4983.03	3.03
1037	6794689.6	2122590.5	4986.04	4986.21	0.17	2.0	4983.18	3.03
1038	6794695.9	2122640.6	4986.23	4986.39	0.16	1.9	4983.30	3.10
1039	6794744.9	2122633.7	4987.47	4987.62	0.15	1.8	4984.57	3.05
1040	6794739.5	2122584.4	4987.30	4987.52	0.22	2.6	4984.46	3.06
1041	6794733.0	2122534.9	4987.11	4987.33	0.23	2.7	4984.25	3.08
1042	6794727.0	2122485.2	4986.93	4987.13	0.20	2.4	4984.05	3.07
1043	6794770.3	2122429.3	4987.99	4988.17	0.18	2.1	4985.11	3.06
1044	6794776.7	2122478.8	4988.18	4988.42	0.24	2.9	4985.31	3.12
1045	6794782.9	2122528.5	4988.37	4988.55	0.19	2.3	4985.53	3.03
1046	6794789.2	2122578.1	4988.55	4988.78	0.23	2.8	4985.69	3.10
1047	6794795.1	2122627.6	4988.73	4988.94	0.21	2.5	4985.82	3.13

A6. Frost Protection Layer
Buyoff Surveys

1048	6794844.9	2122621.4	4989.99	4990.22	0.24	2.8	4987.07	3.15
1049	6794838.5	2122571.5	4989.79	4990.01	0.22	2.6	4986.93	3.08
1050	6794832.7	2122521.8	4989.62	4989.84	0.22	2.7	4986.77	3.07
1051	6794826.4	2122472.6	4989.43	4989.60	0.17	2.0	4986.58	3.02
1052	6794869.4	2122416.8	4990.49	4990.63	0.15	1.7	4987.62	3.02
1053	6794876.1	2122466.2	4990.68	4990.88	0.20	2.4	4987.85	3.03
1054	6794882.3	2122515.9	4990.87	4991.04	0.17	2.1	4988.03	3.02
1055	6794888.0	2122565.2	4991.04	4991.21	0.16	2.0	4988.19	3.01
1056	6794894.7	2122615.0	4991.24	4991.43	0.19	2.3	4988.34	3.09
1057	6794943.7	2122608.8	4992.48	4992.66	0.19	2.2	4989.61	3.05
1058	6794931.8	2122509.7	4992.12	4992.33	0.21	2.5	4989.28	3.04
1059	6794925.3	2122460.2	4991.92	4992.17	0.25	3.0	4989.04	3.13
1060	6794919.0	2122410.5	4991.74	4991.94	0.20	2.4	4988.86	3.08
1061	6794968.8	2122404.3	4992.99	4993.13	0.14	1.6	4990.11	3.02
1062	6794975.3	2122453.7	4993.18	4993.42	0.23	2.8	4990.29	3.12
1063	6794981.3	2122503.6	4993.37	4993.56	0.20	2.4	4990.48	3.08
1064	6794994.1	2122603.0	4993.75	4993.98	0.23	2.8	4990.85	3.13
1065	6795043.3	2122596.2	4994.98	4995.17	0.18	2.2	4992.08	3.09
1066	6795037.1	2122547.0	4994.80	4995.00	0.20	2.4	4991.85	3.15
1067	6795030.9	2122497.5	4994.61	4994.82	0.21	2.5	4991.78	3.04
1068	6795024.9	2122447.5	4994.44	4994.67	0.23	2.8	4991.53	3.14
1069	6795018.3	2122398.1	4994.24	4994.40	0.17	2.0	4991.40	3.00
1070	6795067.7	2122392.0	4995.48	4995.67	0.18	2.2	4992.60	3.06
1071	6795074.3	2122441.5	4995.68	4995.89	0.21	2.6	4992.83	3.07
1072	6795080.6	2122491.2	4995.87	4996.10	0.23	2.8	4993.02	3.08
1073	6795086.6	2122540.5	4996.05	4996.23	0.19	2.2	4993.14	3.09
1074	6795093.1	2122590.1	4996.24	4996.42	0.18	2.2	4993.36	3.06
1075	6795142.8	2122584.0	4997.49	4997.65	0.16	2.0	4994.58	3.07
1076	6795136.2	2122534.3	4997.30	4997.46	0.16	2.0	4994.46	3.01
1077	6795130.2	2122484.9	4997.12	4997.32	0.20	2.5	4994.28	3.04
1078	6795124.0	2122435.0	4996.93	4997.17	0.24	2.9	4994.07	3.10
1079	6795117.3	2122385.6	4996.73	4996.89	0.16	1.9	4993.85	3.04
1080	6795167.5	2122379.4	4998.00	4998.19	0.19	2.3	4995.12	3.07
1081	6795173.4	2122429.1	4998.18	4998.43	0.25	3.0	4995.29	3.14
1082	6795179.7	2122478.6	4998.36	4998.53	0.17	2.0	4995.49	3.05
1083	6795186.1	2122528.3	4998.55	4998.78	0.22	2.7	4995.68	3.09
1084	6795192.3	2122577.7	4998.74	4998.90	0.16	1.9	4995.82	3.08
1085	6795198.6	2122627.4	4998.93	4999.11	0.19	2.2	4996.02	3.09
1086	6795248.0	2122621.2	5000.17	5000.36	0.19	2.2	4997.31	3.05
1087	6795241.5	2122571.4	4999.98	5000.06	0.08	1.0	4997.05	3.01
1088	6795235.6	2122521.9	4999.80	4999.97	0.16	2.0	4996.91	3.06
1089	6795229.3	2122472.2	4999.61	4999.81	0.20	2.4	4996.71	3.11
1090	6795222.7	2122422.5	4999.42	4999.62	0.20	2.4	4996.51	3.11
1091	6795216.7	2122372.8	4999.24	4999.43	0.19	2.3	4996.36	3.07
1092	6795266.3	2122366.7	5000.49	5000.66	0.17	2.0	4997.56	3.10
1093	6795272.8	2122416.5	5000.68	5000.86	0.18	2.2	4997.76	3.10
1094	6795278.9	2122466.0	5000.86	5001.07	0.21	2.5	4997.93	3.15
1095	6795285.0	2122515.7	5001.05	5001.22	0.18	2.1	4998.22	3.01
1096	6795291.2	2122565.4	5001.23	5001.40	0.17	2.1	4998.32	3.08
1097	6795297.7	2122615.1	5001.42	5001.61	0.18	2.2	4998.53	3.07
1098	6795347.1	2122608.8	5002.67	5002.87	0.20	2.4	4999.69	3.17
1099	6795340.9	2122559.1	5002.48	5002.67	0.18	2.2	4999.57	3.10
1100	6795334.8	2122509.6	5002.30	5002.48	0.18	2.1	4999.41	3.07
1101	6795328.6	2122459.9	5002.12	5002.31	0.19	2.3	4999.18	3.13
1102	6795322.3	2122410.2	5001.93	5002.12	0.19	2.3	4998.99	3.14
1103	6795316.1	2122360.6	5001.74	5001.93	0.19	2.3	4998.87	3.06
1104	6795365.9	2122354.7	5003.00	5003.20	0.20	2.4	5000.07	3.12

A6. Frost Protection Layer
Buyoff Surveys

1105	6795372.0	2122404.2	5003.18	5003.40	0.22	2.6	5000.26	3.14
1106	6795378.3	2122453.9	5003.37	5003.60	0.23	2.7	5000.43	3.16
1107	6795384.5	2122503.4	5003.56	5003.71	0.16	1.9	5000.65	3.06
1108	6795390.7	2122552.0	5003.74	5003.94	0.20	2.4	5000.84	3.09
1109	6795397.0	2122602.6	5003.93	5004.14	0.21	2.5	5001.00	3.14
1110	6795446.6	2122596.2	5005.17	5005.30	0.13	1.5	5002.19	3.10
1111	6795440.1	2122546.7	5004.98	5005.13	0.15	1.8	5002.03	3.10
1112	6795434.1	2122496.9	5004.80	5004.96	0.16	1.9	5001.86	3.09
1113	6795427.8	2122447.2	5004.61	5004.76	0.14	1.7	5001.68	3.07
1114	6795421.6	2122397.8	5004.43	5004.57	0.15	1.8	5001.51	3.06
1115	6795415.1	2122348.0	5004.24	5004.37	0.13	1.5	5001.31	3.06
1116	6795464.6	2122342.0	5003.25	5003.47	0.22	2.7	5000.31	3.15
1117	6795471.2	2122391.5	5003.43	5003.60	0.17	2.1	5000.50	3.09
1118	6795477.3	2122441.5	5003.62	5003.84	0.23	2.7	5000.71	3.14
1119	6795483.8	2122490.9	5003.80	5003.99	0.20	2.4	5000.91	3.09
1120	6795489.7	2122540.5	5003.99	5004.22	0.23	2.8	5001.11	3.11
1121	6795496.0	2122589.9	5004.17	5004.35	0.17	2.1	5001.24	3.10
1122	6795545.4	2122583.8	5003.18	5003.34	0.16	2.0	5000.34	3.01
1123	6795539.8	2122534.1	5002.98	5003.21	0.24	2.8	5000.12	3.09
1124	6795533.1	2122484.5	5002.80	5003.01	0.21	2.5	4999.89	3.12
1125	6795527.0	2122435.0	5002.61	5002.85	0.24	2.8	4999.71	3.14
1126	6795520.7	2122385.5	5002.43	5002.62	0.19	2.3	4999.54	3.08
1127	6795514.4	2122336.0	5002.24	5002.48	0.24	2.8	4999.40	3.08
1128	6795570.4	2122379.2	5001.43	5001.62	0.19	2.3	4998.47	3.15
1129	6795576.7	2122428.7	5001.61	5001.86	0.25	3.0	4998.69	3.17
1130	6795583.0	2122478.3	5001.80	5002.06	0.26	3.2	4998.88	3.18
1131	6795589.0	2122528.0	5001.99	5002.19	0.20	2.4	4999.08	3.11
1132	6795595.4	2122577.6	5002.17	5002.38	0.21	2.5	4999.30	3.08
1133	6795644.8	2122571.3	5001.18	5001.37	0.20	2.4	4998.23	3.15
1134	6795638.7	2122521.7	5000.98	5001.20	0.21	2.5	4998.05	3.14
1135	6795632.3	2122472.1	5000.80	5000.96	0.16	1.9	4997.91	3.05
1136	6795625.9	2122422.4	5000.62	5000.88	0.27	3.2	4997.64	3.24
1137	6795667.9	2122418.0	4999.78	5000.06	0.28	3.4	4996.84	3.22
1138	6795620.0	2122372.8	5000.43	5000.60	0.17	2.0	4997.56	3.04
1139	6795660.1	2122366.9	4999.61	4999.80	0.19	2.3	4996.68	3.13
1140	6795685.1	2122502.2	4999.97	5000.14	0.18	2.1	4997.10	3.04
1141	6795793.1	2122519.1	4997.98	4998.22	0.24	2.8	4995.10	3.12
1142	6795796.9	2122440.0	4997.41	4997.61	0.20	2.4	4994.51	3.10
1143	6795805.9	2122356.1	4996.72	4996.93	0.20	2.5	4993.79	3.14
1144	6795872.7	2122359.9	4995.45	4995.63	0.18	2.2	4992.51	3.12
1145	6795945.1	2122360.9	4994.05	4994.25	0.20	2.4	4991.13	3.12
1146	6795956.9	2122455.7	4994.41	4994.60	0.19	2.3	4991.48	3.12
1147	6795878.4	2122472.0	4996.03	4996.23	0.19	2.3	4993.14	3.09
1148	6795884.9	2122571.1	4996.52	4996.69	0.17	2.0	4993.61	3.08
1149	6795970.5	2122563.0	4994.81	4995.08	0.26	3.2	4991.89	3.19
1201	6795911.4	2122285.8	4994.24	4994.40	0.16	2.0	N/A	N/A
1202	6795917.6	2122335.4	4994.43	4994.60	0.17	2.0	N/A	N/A
1203	6795923.8	2122385.0	4994.61	4994.85	0.24	2.9	N/A	N/A
1204	6795930.1	2122434.6	4994.80	4995.04	0.24	2.9	N/A	N/A
1205	6795936.3	2122484.2	4994.99	4995.15	0.16	1.9	N/A	N/A
1206	6795942.6	2122533.9	4995.17	4995.29	0.12	1.5	N/A	N/A
1207	6795948.8	2122583.5	4995.36	4995.59	0.23	2.8	N/A	N/A
1208	6795899.2	2122589.7	4996.36	4996.50	0.14	1.7	N/A	N/A
1209	6795892.9	2122540.1	4996.17	4996.31	0.14	1.6	N/A	N/A
1210	6795886.7	2122490.5	4995.99	4996.18	0.20	2.4	N/A	N/A
1211	6795880.5	2122440.9	4995.80	4996.07	0.27	3.2	N/A	N/A
1212	6795874.2	2122391.3	4995.61	4995.82	0.21	2.5	N/A	N/A

A6. Frost Protection Layer
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1213	6795868.0	2122341.7	4995.43	4995.62	0.19	2.3	N/A	N/A
1214	6795861.8	2122292.0	4995.24	4995.45	0.21	2.5	N/A	N/A
1215	6795812.1	2122298.3	4996.24	4996.38	0.14	1.7	N/A	N/A
1216	6795818.4	2122347.9	4996.43	4996.63	0.20	2.4	N/A	N/A
1217	6795824.6	2122397.5	4996.61	4996.87	0.26	3.1	N/A	N/A
1218	6795830.9	2122447.1	4996.80	4997.04	0.24	2.9	N/A	N/A
1219	6795837.1	2122496.7	4996.99	4997.15	0.17	2.0	N/A	N/A
1220	6795843.3	2122546.3	4997.17	4997.36	0.18	2.2	N/A	N/A
1221	6795849.6	2122595.9	4997.36	4997.55	0.19	2.2	N/A	N/A
1222	6795800.0	2122602.2	4998.36	4998.52	0.16	1.9	N/A	N/A
1223	6795793.7	2122552.6	4998.17	4998.38	0.20	2.4	N/A	N/A
1224	6795787.5	2122503.0	4997.99	4998.14	0.15	1.8	N/A	N/A
1225	6795781.2	2122453.4	4997.80	4997.98	0.18	2.2	N/A	N/A
1226	6795775.0	2122403.7	4997.61	4997.78	0.16	1.9	N/A	N/A
1227	6795768.8	2122354.1	4997.43	4997.63	0.20	2.4	N/A	N/A
1228	6795762.5	2122304.5	4997.24	4997.44	0.20	2.4	N/A	N/A
1229	6795712.9	2122310.8	4998.24	4998.43	0.19	2.3	N/A	N/A
1230	6795719.2	2122360.4	4998.43	4998.62	0.19	2.3	N/A	N/A
1231	6795725.4	2122410.0	4998.61	4998.86	0.24	2.9	N/A	N/A
1232	6795731.6	2122459.6	4998.80	4999.01	0.21	2.5	N/A	N/A
1233	6795737.9	2122509.2	4998.99	4999.18	0.19	2.3	N/A	N/A
1234	6795744.1	2122558.8	4999.17	4999.41	0.24	2.8	N/A	N/A
1235	6795750.4	2122608.4	4999.36	4999.55	0.19	2.3	N/A	N/A
1236	6795694.5	2122565.0	5000.17	5000.38	0.21	2.5	N/A	N/A
1237	6795688.3	2122515.4	4999.99	5000.16	0.17	2.1	N/A	N/A
1238	6795682.0	2122465.8	4999.80	5000.06	0.26	3.1	N/A	N/A
1239	6795675.8	2122416.2	4999.61	4999.86	0.25	3.0	N/A	N/A
1240	6795669.6	2122366.6	4999.43	4999.61	0.18	2.2	N/A	N/A
1241	6795663.3	2122317.0	4999.24	4999.44	0.20	2.4	N/A	N/A
1242	6795613.7	2122323.2	5000.24	5000.50	0.26	3.1	N/A	N/A
1243	6795557.9	2122279.9	5001.05	5001.26	0.20	2.4	N/A	N/A
1244	6795564.1	2122329.5	5001.24	5001.49	0.25	3.0	N/A	N/A
1245	6795508.3	2122286.1	5002.06	5002.24	0.19	2.3	N/A	N/A
1246	6795458.6	2122292.3	5003.06	5003.27	0.22	2.6	N/A	N/A
1247	6795409.0	2122298.6	5004.06	5004.20	0.14	1.7	N/A	N/A
1248	6795359.4	2122304.8	5002.81	5003.02	0.21	2.5	N/A	N/A
1249	6795309.8	2122311.1	5001.56	5001.74	0.19	2.2	N/A	N/A
1250	6795260.2	2122317.3	5000.31	5000.47	0.16	1.9	N/A	N/A
1251	6795210.6	2122323.5	4999.06	4999.21	0.15	1.8	N/A	N/A
1252	6795161.0	2122329.8	4997.81	4997.98	0.17	2.1	N/A	N/A
1253	6795111.4	2122336.0	4996.56	4996.68	0.12	1.5	N/A	N/A
1254	6795061.8	2122342.2	4995.31	4995.46	0.16	1.9	N/A	N/A
1255	6795012.2	2122348.5	4994.06	4994.21	0.15	1.8	N/A	N/A
1256	6794962.5	2122354.7	4992.81	4993.01	0.20	2.4	N/A	N/A
1257	6794912.9	2122361.0	4991.55	4991.73	0.17	2.1	N/A	N/A
1258	6794863.3	2122367.2	4990.31	4990.47	0.17	2.0	N/A	N/A
1259	6794813.7	2122373.4	4989.06	4989.20	0.15	1.8	N/A	N/A
1260	6794820.0	2122423.0	4989.24	4989.43	0.19	2.2	N/A	N/A
1261	6794764.1	2122379.7	4987.81	4987.99	0.19	2.2	N/A	N/A
1262	6794714.5	2122385.9	4986.56	4986.75	0.19	2.3	N/A	N/A
1263	6794720.7	2122435.5	4986.74	4986.91	0.17	2.0	N/A	N/A
1264	6794664.9	2122392.1	4985.31	4985.50	0.20	2.4	N/A	N/A
1265	6794615.3	2122398.4	4984.06	4984.22	0.17	2.0	N/A	N/A
1266	6794565.7	2122404.6	4982.81	4983.03	0.23	2.7	N/A	N/A
1267	6794516.1	2122410.9	4981.56	4981.74	0.18	2.2	N/A	N/A
1268	6794466.5	2122417.1	4980.31	4980.51	0.20	2.4	N/A	N/A
1269	6794416.8	2122423.3	4979.06	4979.26	0.20	2.4	N/A	N/A

A6. Frost Protection Layer
Buyoff Surveys

1270	6794367.2	2122429.6	4977.81	4978.01	0.21	2.5	N/A	N/A
1271	6794373.5	2122479.2	4977.99	4978.19	0.20	2.4	N/A	N/A
1272	6794323.9	2122485.4	4976.74	4976.93	0.19	2.3	N/A	N/A
1273	6794317.6	2122435.8	4976.56	4976.80	0.24	2.9	N/A	N/A
1274	6794268.0	2122442.0	4975.30	4975.53	0.22	2.7	N/A	N/A
1275	6794274.3	2122491.7	4975.49	4975.66	0.17	2.0	N/A	N/A
1276	6794224.6	2122497.9	4974.24	4974.40	0.16	1.9	N/A	N/A
1277	6794218.4	2122448.3	4974.06	4974.23	0.17	2.1	N/A	N/A
1278	6794937.9	2122559.4	4992.30	4992.49	0.19	2.3	N/A	N/A
1279	6794987.5	2122553.2	4993.55	4993.73	0.18	2.2	N/A	N/A

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Frost Protection Layer Buy Off Survey

Buy off ID: UFA01 Date: 11/15/2010

Point #	Northing	Easting	Surveyed Elevation	Design Elevation	Difference in feet	Difference in inches
1733	6794150	2122300	4972.3	4972.2	0.1	0.9
1732	6794150	2122350	4972.3	4972.3	0.1	0.9
1731	6794150	2122400	4972.3	4972.3	0.0	0.4
1729	6794200	2122300	4973.5	4973.5	0.0	0.2
1728	6794200	2122350	4973.6	4973.5	0.0	0.5
1727	6794200	2122400	4973.6	4973.6	0.0	0.4
1712	6794250	2122400	4974.9	4974.8	0.0	0.3
1713	6794250	2122350	4974.8	4974.8	0.0	0.4
1714	6794250	2122300	4974.8	4974.8	0.0	0.2
1695	6794300	2122300	4976.1	4976.0	0.0	0.3
1715	6794250	2122250	4974.0	4974.7	-0.7	-8.8
1696	6794300	2122250	4975.3	4976.0	-0.7	-8.8
1694	6794300	2122350	4976.1	4976.1	0.0	0.1
1693	6794300	2122400	4976.1	4976.1	0.0	0.0
1673	6794350	2122400	4977.4	4977.4	0.0	0.6
1674	6794350	2122350	4977.3	4977.3	0.0	0.1
1675	6794350	2122300	4977.3	4977.3	0.0	0.2
1676	6794350	2122250	4976.6	4977.3	-0.6	-7.8
1655	6794400	2122250	4978.6	4978.5	0.1	0.8
1654	6794400	2122300	4978.6	4978.6	0.0	0.1
1653	6794400	2122350	4978.6	4978.6	0.0	0.0
1652	6794400	2122400	4978.6	4978.6	0.0	0.2
1632	6794450	2122350	4979.9	4979.8	0.0	0.4
1633	6794450	2122300	4979.9	4979.8	0.0	0.4
1634	6794450	2122250	4979.8	4979.8	0.0	0.3
1613	6794500	2122250	4981.1	4981.1	0.1	0.7
1612	6794500	2122300	4981.1	4981.1	0.0	0.2
1611	6794500	2122350	4981.1	4981.1	0.0	0.2
1591	6794550	2122350	4982.4	4982.4	0.0	0.2
1592	6794550	2122300	4982.4	4982.3	0.0	0.1
1593	6794550	2122250	4982.3	4982.3	0.0	0.3
1573	6794601	2122206	4982.9	4983.6	-0.7	-8.4
1572	6794600	2122250	4983.6	4983.6	0.0	0.3
1571	6794600	2122300	4983.7	4983.6	0.0	0.5
1570	6794600	2122350	4983.7	4983.6	0.0	0.2
1549	6794650	2122350	4984.9	4984.9	0.0	0.4
1550	6794650	2122300	4984.9	4984.9	0.0	0.3
1551	6794650	2122250	4984.9	4984.8	0.0	0.2
1552	6794650	2122200	4984.1	4984.8	-0.7	-8.6
1531	6794700	2122200	4985.4	4986.1	-0.7	-8.5
1530	6794700	2122250	4986.1	4986.1	0.0	0.3
1529	6794700	2122300	4986.2	4986.1	0.0	0.3
1528	6794700	2122350	4986.2	4986.2	0.0	0.3
1507	6794750	2122350	4987.4	4987.4	0.0	0.2
1508	6794750	2122300	4987.4	4987.4	0.0	0.4
1509	6794750	2122250	4987.4	4987.4	0.0	0.5
1510	6794750	2122201	4987.4	4987.3	0.0	0.1
1489	6794800	2122200	4988.6	4988.6	0.0	0.1
1488	6794800	2122250	4988.6	4988.6	0.0	0.0
1487	6794800	2122300	4988.7	4988.7	0.0	0.1
1466	6794850	2122300	4990.0	4989.9	0.0	0.3
1465	6794850	2122250	4989.9	4989.9	0.0	0.1
1468	6794850	2122200	4989.9	4990.9	0.0	0.1
1447	6794900	2122200	4991.1	4991.1	0.0	0.1
1446	6794900	2122250	4991.2	4991.2	0.0	0.6
1445	6794900	2122300	4991.2	4991.2	0.0	0.1
1424	6794950	2122300	4992.5	4992.5	0.0	0.2
1425	6794950	2122250	4992.4	4992.4	0.0	0.3
1426	6794950	2122200	4992.4	4992.4	0.0	0.1
1405	6795000	2122200	4993.7	4993.7	0.0	0.2
1404	6795000	2122250	4993.7	4993.7	0.0	0.2
1403	6795000	2122300	4993.7	4993.7	0.0	0.0
1382	6795050	2122300	4995.0	4995.0	0.0	0.4
1383	6795050	2122250	4995.0	4995.0	0.0	0.1
1384	6795050	2122200	4994.9	4994.9	0.0	0.1
1385	6795050	2122150	4994.2	4994.9	-0.7	-8.2

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A6. Frost Protection Layer
Buyoff Surveys

1364	6795100	2122150	4995.4	4996.2	-0.7	-8.6
1363	6795100	2122200	4996.2	4996.2	0.0	0.2
1362	6795100	2122250	4996.3	4996.2	0.1	0.6
1361	6795100	2122300	4996.3	4996.2	0.0	0.5
1340	6795150	2122300	4997.4	4997.5	0.0	0.3
1341	6795150	2122250	4997.5	4997.5	0.0	0.5
1342	6795150	2122200	4997.5	4997.5	0.0	0.1
1343	6795150	2122150	4997.2	4997.4	-0.3	-3.0
1322	6795200	2122150	4998.7	4998.7	0.0	0.3
1321	6795200	2122200	4998.7	4998.7	0.0	0.0
1320	6795200	2122250	4998.8	4998.7	0.0	0.2
1299	6795250	2122250	5000.0	5000.0	0.0	0.2
1300	6795250	2122200	5000.0	5000.0	0.0	0.4
1301	6795250	2122150	5000.0	5000.0	0.0	0.2
1280	6795300	2122150	5001.3	5001.7	0.0	0.4
1279	6795300	2122200	5001.3	5001.7	0.0	0.6
1278	6795300	2122250	5001.3	5001.3	0.0	0.0
1257	6795350	2122250	5002.5	5002.5	0.1	0.7
1258	6795350	2122200	5002.5	5002.5	0.0	0.2
1259	6795350	2122150	5002.4	5002.5	0.1	0.9
1238	6795400	2122150	5003.3	5003.3	0.0	0.3
1237	6795400	2122200	5003.7	5003.8	0.0	0.5
1236	6795400	2122250	5003.8	5003.8	0.0	0.2
1216	6795450	2122250	5003.0	5003.0	0.0	0.1
1217	6795450	2122200	5002.7	5002.7	0.0	0.0
1218	6795450	2122150	5002.4	5002.3	0.0	0.3
1198	6795500	2122150	5001.4	5001.4	0.0	0.1
1197	6795500	2122200	5001.7	5001.7	0.0	0.3
1196	6795500	2122250	5002.0	5002.0	0.0	0.1
1176	6795550	2122250	5001.0	5001.0	0.0	0.1
1177	6795550	2122200	5000.7	5000.7	0.0	0.2
1178	6795550	2122150	5000.4	5000.4	0.0	0.1
1158	6795600	2122150	4999.5	4999.4	0.0	0.3
1157	6795600	2122200	4999.8	4999.7	0.0	0.5
1156	6795600	2122250	5000.1	5000.1	0.0	0.1
1136	6795650	2122250	4999.1	4999.1	0.0	0.3
1137	6795650	2122200	4998.8	4998.8	0.0	0.4
1138	6795650	2122150	4998.5	4998.5	0.0	0.3
1118	6795700	2122150	4997.5	4997.5	0.0	0.5
1117	6795700	2122200	4997.8	4997.8	0.0	0.4
1116	6795700	2122250	4998.2	4998.1	0.0	0.6
1096	6795750	2122250	4997.2	4997.1	0.0	0.5
1097	6795750	2122200	4996.9	4996.8	0.0	0.3
1098	6795750	2122150	4996.5	4996.5	0.0	0.2
1078	6795800	2122150	4995.6	4995.6	0.0	0.6
1077	6795800	2122200	4995.9	4995.9	0.0	0.1
1076	6795800	2122250	4996.2	4996.2	0.0	0.4
1056	6795850	2122250	4995.2	4995.2	0.0	0.2
1057	6795850	2122200	4994.9	4994.9	0.0	0.3
1058	6795850	2122150	4994.7	4994.6	0.1	0.8
1039	6795900	2122150	4993.7	4993.6	0.0	0.4
1038	6795900	2122200	4993.9	4993.9	0.0	0.1
1037	6795900	2122250	4994.3	4994.2	0.0	0.6
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0

Comments: Points 1343, 1384, 1385, 1552, 1531, 1573, 1676 1696 and 1715 are all below design grade, due to the 10' transition offset on the edge.

Approval Date: 11/15/2010 **Total Square Feet:** 679,870 ft²

QC Signature: Kyler Edgehouse / **Reviewed By:** Beachem Bosh /

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CRJ 000996

Moab UMTRA Project
Frost Protection Buyoff Form

CLIENT: DOE

PROJECT: Moab UMTRA

DATE: 11-22-11

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

LIFT AREA	LIFT AREA
UFK19 & UFP20	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson - EnergySolutions Construction Manager	Brent Anderson	11-22-11
Mark Greenhalgh - Nielson Construction Manager	Mark Greenhalgh	11-22-11
Beachem Bosh - E.S. QA/QC Representative	Beachem Bosh	11-22-11
Kevin Keele - J&T QC Representative	Kevin Keele	11-22-11

COMMENTS		
This buyoff includes two lift areas. Surface was visually inspected and found to be satisfactory. See attached map for area location and square footage.		

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OP-F-021
Rev 0, June 2011

File Code Index No: ~~1043~~ 12121
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112921

A6. Frost Protection Layer
Buyoff Surveys

UFK19 4UFP20

QA Review: Beachem Bosh 12-2-11

Moab UMTRA Crescent Junction Disposal Cell
Frost Protection Layer Survey
Measured by Jason Knowlton Kevin Keele for JK 11-22-11
Checked by Kevin Keele Kevin Keele
Johansen & Tuttle Engineering, Inc
Nov. 21, 2011

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
800	6794950.3	2122659.0	4992.67	4992.92	0.25	3.0	4989.76	3.16
801	6794900.8	2122664.9	4991.42	4991.62	0.20	2.4	4988.53	3.09
802	6794851.4	2122670.9	4990.18	4990.47	0.29	3.5	4987.25	3.22
803	6794801.7	2122677.5	4988.93	4989.21	0.29	3.4	4986.07	3.14
804	6794751.8	2122683.6	4987.67	4987.98	0.31	3.7	4984.76	3.22
805	6794702.2	2122689.7	4986.42	4986.68	0.26	3.1	4983.51	3.16
806	6794652.5	2122696.0	4985.17	4985.44	0.27	3.3	4982.21	3.23
807	6794603.1	2122702.3	4983.92	4984.14	0.22	2.6	4981.06	3.08
808	6794597.0	2122652.7	4983.74	4983.99	0.26	3.1	4980.84	3.15
809	6794547.0	2122658.8	4982.48	4982.76	0.28	3.4	4979.59	3.17
810	6794553.6	2122708.3	4982.67	4982.95	0.27	3.3	4979.78	3.17
811	6794503.8	2122714.7	4981.42	4981.65	0.23	2.8	4978.57	3.08
812	6794497.5	2122665.1	4981.23	4981.47	0.24	2.9	4978.27	3.20
813	6794447.5	2122671.4	4979.97	4980.31	0.34	4.1	4977.10	3.21
814	6794454.5	2122721.1	4980.18	4980.38	0.20	2.4	4977.30	3.08
815	6794405.0	2122727.3	4978.93	4979.17	0.24	2.9	4975.99	3.18
816	6794398.2	2122677.9	4978.73	4979.03	0.29	3.5	4975.85	3.18
817	6794348.6	2122683.7	4977.48	4977.75	0.27	3.2	4974.59	3.16
818	6794355.0	2122733.3	4977.67	4977.91	0.24	2.9	4974.74	3.18
819	6794305.3	2122739.5	4976.42	4976.62	0.20	2.4	4973.50	3.12
820	6794299.3	2122689.6	4976.24	4976.52	0.28	3.4	4973.39	3.12
821	6794249.7	2122696.8	4974.99	4975.24	0.25	3.0	4972.09	3.15
822	6794256.2	2122746.1	4975.18	4975.36	0.18	2.2	4972.24	3.12
823	6794206.2	2122752.3	4973.92	4974.24	0.32	3.8	4971.04	3.20
824	6794200.3	2122702.0	4973.74	4973.93	0.19	2.3	4970.81	3.12
825	6794212.3	2122801.8	4974.10	4974.39	0.28	3.4	4971.23	3.16
826	6794261.9	2122795.5	4975.35	4975.60	0.24	2.9	4972.49	3.10
827	6794311.6	2122789.4	4976.61	4976.85	0.25	3.0	4973.71	3.14
828	6794361.3	2122783.2	4977.86	4978.10	0.24	2.9	4974.96	3.14
829	6794410.8	2122777.0	4979.10	4979.36	0.25	3.0	4976.19	3.17
830	6794460.2	2122770.6	4980.35	4980.55	0.20	2.4	4977.43	3.13
831	6794509.8	2122764.3	4981.60	4981.88	0.28	3.4	4978.72	3.16
832	6794559.7	2122758.4	4982.86	4983.11	0.26	3.1	4979.95	3.16
833	6794609.2	2122752.0	4984.10	4984.40	0.30	3.6	4981.20	3.21
834	6794658.8	2122745.6	4985.35	4985.61	0.26	3.1	4982.45	3.16
835	6794708.7	2122739.4	4986.61	4986.90	0.29	3.5	4983.69	3.21
836	6794758.4	2122733.2	4987.86	4988.18	0.31	3.8	4984.93	3.25
837	6794807.8	2122727.0	4989.11	4989.35	0.25	3.0	4986.14	3.22
838	6794857.6	2122720.7	4990.36	4990.67	0.31	3.7	4987.42	3.26
839	6794907.1	2122714.4	4991.61	4991.99	0.38	4.5	4988.73	3.26
840	6794913.2	2122764.1	4991.79	4992.07	0.27	3.3	4988.91	3.16
841	6794863.7	2122770.4	4990.55	4990.81	0.27	3.2	4987.67	3.15
842	6794813.8	2122776.4	4989.29	4989.51	0.22	2.7	4986.35	3.16
843	6794764.4	2122782.8	4988.04	4988.30	0.26	3.1	4985.14	3.16
844	6794714.8	2122789.3	4986.79	4987.04	0.25	3.0	4983.89	3.15
845	6794665.1	2122795.3	4985.54	4985.74	0.20	2.4	4982.63	3.11
846	6794615.6	2122801.4	4984.30	4984.53	0.23	2.8	4981.40	3.13

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847	6794565.9	2122808.1	4983.04	4983.29	0.25	3.0	4980.12	3.17
848	6794516.3	2122814.1	4981.79	4982.07	0.28	3.3	4978.87	3.19
849	6794466.8	2122820.2	4980.55	4980.82	0.27	3.2	4977.61	3.21
850	6794417.2	2122826.7	4979.30	4979.53	0.23	2.8	4976.40	3.13
851	6794367.6	2122832.8	4978.05	4978.24	0.19	2.3	4975.16	3.09
852	6794317.9	2122839.3	4976.79	4977.01	0.22	2.7	4973.90	3.12
853	6794268.5	2122845.3	4975.55	4975.85	0.31	3.7	4972.61	3.24
854	6794218.6	2122851.5	4974.29	4974.55	0.26	3.1	4971.42	3.14
855	6794224.6	2122901.3	4974.47	4974.77	0.30	3.6	4971.56	3.21
856	6794274.6	2122895.0	4975.73	4976.04	0.31	3.7	4972.81	3.23
857	6794324.1	2122888.6	4976.98	4977.33	0.35	4.2	4974.12	3.21
858	6794373.9	2122881.8	4978.23	4978.52	0.29	3.4	4975.30	3.22
859	6794423.2	2122875.7	4979.48	4979.80	0.32	3.9	4976.62	3.18
860	6794473.0	2122869.7	4980.73	4981.09	0.36	4.3	4977.84	3.25
861	6794522.7	2122863.6	4981.98	4982.30	0.32	3.8	4979.10	3.19
862	6794572.3	2122857.2	4983.23	4983.54	0.31	3.7	4980.32	3.23
863	6794621.9	2122851.1	4984.48	4984.79	0.30	3.6	4981.60	3.18
864	6794671.4	2122844.7	4985.73	4986.02	0.29	3.5	4982.87	3.15
865	6794720.9	2122838.7	4986.98	4987.33	0.35	4.2	4984.11	3.22
866	6794770.6	2122832.3	4988.23	4988.52	0.29	3.5	4985.32	3.19
867	6794820.2	2122826.3	4989.48	4989.78	0.30	3.6	4986.57	3.21
868	6794870.1	2122819.8	4990.73	4990.99	0.26	3.1	4987.85	3.15
869	6794919.5	2122813.6	4991.98	4992.29	0.31	3.8	4989.08	3.21
870	6794925.8	2122863.3	4992.17	4992.53	0.36	4.3	4989.30	3.23
871	6794876.0	2122869.4	4990.91	4991.27	0.35	4.3	4988.03	3.24
872	6794826.4	2122875.8	4989.67	4990.02	0.35	4.2	4986.77	3.25
873	6794776.6	2122882.1	4988.41	4988.72	0.31	3.7	4985.54	3.19
874	6794727.3	2122888.4	4987.17	4987.46	0.30	3.6	4984.28	3.19
875	6794677.6	2122894.2	4985.91	4986.20	0.28	3.4	4983.00	3.20
876	6794628.0	2122900.8	4984.67	4984.99	0.33	3.9	4981.74	3.26
877	6794578.3	2122907.1	4983.41	4983.78	0.37	4.4	4980.53	3.25
878	6794528.8	2122913.1	4982.17	4982.40	0.23	2.8	4979.26	3.14
879	6794479.0	2122919.1	4980.91	4981.18	0.27	3.2	4977.93	3.25
880	6794429.7	2122925.3	4979.67	4979.93	0.26	3.1	4976.74	3.19
881	6794380.0	2122931.8	4978.41	4978.72	0.31	3.7	4975.52	3.20
882	6794330.6	2122938.0	4977.17	4977.52	0.35	4.2	4974.32	3.20
883	6794280.4	2122944.6	4975.91	4976.18	0.27	3.3	4972.97	3.21
884	6794231.2	2122950.9	4974.67	4974.93	0.27	3.2	4971.74	3.19
885	6794237.5	2123000.1	4974.85	4975.09	0.24	2.9	4971.93	3.16
886	6794287.1	2122994.0	4976.10	4976.34	0.24	2.9	4973.12	3.22
887	6794336.6	2122987.8	4977.35	4977.63	0.28	3.4	4974.42	3.21
888	6794386.4	2122981.4	4978.61	4978.87	0.26	3.1	4975.68	3.19
889	6794436.0	2122975.2	4979.86	4980.13	0.27	3.3	4976.93	3.20
890	6794485.0	2122968.9	4981.09	4981.38	0.29	3.5	4978.22	3.16
891	6794535.0	2122962.9	4982.35	4982.70	0.35	4.2	4979.49	3.22
892	6794584.8	2122956.6	4983.61	4983.89	0.29	3.5	4980.68	3.21
893	6794634.2	2122950.2	4984.85	4985.14	0.29	3.4	4981.94	3.19
894	6794684.4	2122943.7	4986.11	4986.45	0.34	4.0	4983.19	3.26
895	6794733.5	2122937.8	4987.35	4987.63	0.28	3.3	4984.42	3.21
896	6794783.0	2122931.6	4988.60	4988.92	0.32	3.9	4985.77	3.16
897	6794832.6	2122925.2	4989.85	4990.23	0.38	4.5	4987.06	3.17
898	6794882.3	2122919.3	4991.10	4991.44	0.34	4.1	4988.25	3.20
899	6794931.8	2122912.8	4992.35	4992.78	0.44	5.2	4989.56	3.22
900	6794938.2	2122962.5	4992.54	4992.89	0.35	4.2	4989.66	3.23
901	6794888.5	2122968.8	4991.29	4991.60	0.31	3.8	4988.40	3.20
902	6794839.0	2122975.0	4990.04	4990.38	0.34	4.1	4987.15	3.23
903	6794789.5	2122981.2	4988.79	4989.12	0.33	4.0	4985.93	3.19

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A6. Frost Protection Layer
Buyoff Surveys

904	6794739.7	2122987.4	4987.54	4987.87	0.33	4.0	4984.63	3.24
905	6794690.3	2122993.8	4986.29	4986.62	0.33	3.9	4983.40	3.22
906	6794640.3	2123000.1	4985.03	4985.34	0.30	3.6	4982.13	3.20
907	6794590.8	2123006.0	4983.79	4984.06	0.28	3.3	4980.90	3.16
908	6794541.3	2123012.5	4982.54	4982.84	0.31	3.7	4979.65	3.19
909	6794491.7	2123018.5	4981.29	4981.57	0.28	3.4	4978.35	3.23
910	6794442.0	2123024.9	4980.04	4980.31	0.27	3.3	4977.10	3.21
911	6794392.4	2123031.1	4978.79	4979.09	0.31	3.7	4975.88	3.22
912	6794343.0	2123037.6	4977.54	4977.86	0.31	3.8	4974.64	3.21
913	6794293.1	2123043.4	4976.28	4976.54	0.26	3.1	4973.33	3.22
914	6794243.5	2123049.8	4975.03	4975.30	0.27	3.2	4972.11	3.19
915	6794249.9	2123099.4	4975.23	4975.54	0.31	3.7	4972.29	3.24
916	6794299.5	2123092.9	4976.48	4976.74	0.26	3.2	4973.59	3.15
917	6794349.2	2123086.9	4977.73	4977.97	0.25	3.0	4974.79	3.18
918	6794398.6	2123080.7	4978.97	4979.29	0.32	3.9	4976.05	3.25
919	6794448.1	2123074.4	4980.22	4980.53	0.31	3.7	4977.30	3.23
920	6794497.9	2123068.2	4981.47	4981.79	0.31	3.8	4978.54	3.24
921	6794547.5	2123062.0	4982.72	4982.96	0.23	2.8	4979.78	3.17
922	6794597.1	2123055.7	4983.97	4984.27	0.30	3.6	4981.05	3.23
923	6794647.0	2123049.5	4985.23	4985.55	0.32	3.8	4982.30	3.25
924	6794696.3	2123043.0	4986.47	4986.78	0.31	3.7	4983.54	3.24
925	6794746.0	2123037.1	4987.73	4988.05	0.32	3.9	4984.82	3.23
926	6794795.6	2123030.7	4988.97	4989.29	0.31	3.8	4986.10	3.19
927	6794845.3	2123024.5	4990.23	4990.56	0.33	4.0	4987.34	3.22
928	6794894.8	2123018.4	4991.47	4991.82	0.34	4.1	4988.58	3.23
929	6794944.1	2123011.9	4992.72	4992.91	0.19	2.3	4989.84	3.07
930	6794802.1	2123080.5	4989.17	4989.42	0.25	3.0	4986.28	3.15
931	6794752.1	2123086.8	4987.91	4988.16	0.25	3.0	4985.01	3.14
932	6794702.6	2123093.0	4986.66	4986.93	0.27	3.3	4983.76	3.17
933	6794652.8	2123099.3	4985.41	4985.62	0.21	2.5	4982.44	3.17
934	6794603.7	2123105.3	4984.17	4984.33	0.16	1.9	4981.20	3.12
935	6794553.9	2123111.6	4982.91	4983.10	0.18	2.2	4980.00	3.09
936	6794504.1	2123117.9	4981.66	4981.88	0.22	2.6	4978.72	3.16
937	6794454.8	2123124.2	4980.42	4980.62	0.21	2.5	4977.47	3.15
938	6794405.2	2123130.3	4979.17	4979.35	0.18	2.2	4976.25	3.10
939	6794355.4	2123136.6	4977.91	4978.14	0.23	2.7	4974.97	3.17
940	6794305.8	2123142.8	4976.66	4976.81	0.15	1.8	4973.73	3.08

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A7. Cap Rock and Armoring

Cap Rock Lift Approval Summary

Cap Rock Buyoff Surveys

Cap Rock Durability and Gradation Test Results

Armoring Lift Approval Summaries

Armoring Buyoff Surveys

Armoring Durability and Gradation Test Results

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A7. Cap Rock and Armoring
Cap Rock Lift Approval Summary

Date	Lift ID #	# of Passing Gradation Tests	# of Passing Durability Tests	Quantity Approved (yd^3)	Cumulative Quantity Approved (yd^3)	Average Thickness (ft)	Area (ft^2)	Notes
11/24/10	UCA01101124-00	2	2	5,918	25,502	0.5	319,579	1
11/15/11	UCD01110809-00	2	2	12,131	12,131	0.5	545,873	1
12/12/11	UCK20111122-00	2	2	7,453	19,584	0.5	335,384	1

Total # of Gradation Tests Included with Lift Approval Package = 6

Total # of Durability Tests Included with Lift Approval Package = 6

Total # of Gradation Tests Performed = 13

Total # of Durability Tests Performed = 10

Total Quantity Approved (yd^3) = 25,502

Quantity per Gradation Test (yd^3) = 4,250

Quantity per Durability Test (yd^3) = 4,250

Total Average Thickness (ft) = 0.5

1. To access durability and gradation test information please view lift packets.
2. Additional tests were performed prior to lift placement. This explains difference in totals and table columns.

Cap Rock Buyoff Survey

Lift Area Buyoff ID:			UCA01		Date:	11/24/2010
Point #	Northing	Easting	Surveyed Elevation	Pre installation	Thickness in tenths	Thickness in inches
1001	6794150	2122300	4972.8	4972.3	0.5	5.4
1002	6794150	2122350	4972.8	4972.3	0.5	6.0
1003	6794250	2122400	4975.4	4974.9	0.5	6.0
1004	6794250	2122350	4975.3	4974.8	0.5	6.0
1005	6794250	2122300	4975.3	4974.8	0.5	6.0
1006	6794350	2122350	4977.8	4977.3	0.5	6.0
1007	6794350	2122300	4977.8	4977.3	0.5	6.0
1008	6794350	2122250	4977.1	4976.6	0.5	6.0
1009	6794550	2122350	4982.9	4982.4	0.5	6.0
1010	6794550	2122300	4982.9	4982.4	0.5	6.5
1011	6794550	2122250	4982.8	4982.3	0.5	6.0
1012	6794750	2122300	4987.9	4987.4	0.5	6.0
1013	6794750	2122250	4988.0	4987.4	0.6	6.9
1014	6794750	2122201	4987.9	4987.4	0.5	6.0
1015	6794950	2122300	4993.0	4992.5	0.5	6.0
1016	6794950	2122250	4992.9	4992.4	0.5	6.0
1017	6794950	2122200	4992.9	4992.4	0.5	6.0
1018	6795150	2122300	4998.0	4997.5	0.5	6.0
1019	6795150	2122250	4998.1	4997.5	0.6	7.2
1020	6795150	2122200	4998.0	4997.5	0.5	6.0
1021	6795350	2122250	5003.1	5002.6	0.5	6.0
1022	6795350	2122200	5003.0	5002.5	0.5	6.0
1023	6795350	2122150	5003.1	5002.6	0.5	6.0
1024	6795550	2122250	5001.5	5001.0	0.5	6.0
1025	6795550	2122200	5001.2	5000.7	0.5	6.0
1026	6795550	2122150	5001.0	5000.4	0.5	6.5
1027	6795750	2122250	4997.7	4997.2	0.6	6.6
1028	6795750	2122200	4997.4	4996.9	0.5	6.0
1029	6795750	2122150	4997.0	4996.5	0.5	6.0
1030	6795900	2122150	4994.2	4993.7	0.5	6.5
1031	6795900	2122200	4994.4	4993.9	0.5	6.0
1032	6795900	2122250	4994.8	4994.3	0.5	6.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
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					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0

Comments: QC performed a visual inspection of the final surface with satisfactory results. Visual inspection notes: The area was free of humping, thickened edges and defects. The layer uniform thickness was satisfactory see above survey results for layer thickness.

Approval Date: 11/24/2010 | Total Square Feet: 319,579

North West Corner: 6795980 N 2122067 E

QC Signature: Beachem Bosh | Reviewed By: Mitch Hogan

EnergySolutions

CRJ 000993

Moab UMTRA Project
Cap Rock Buyoff Form

CLIENT: DOE

PROJECT: Moab UMTRA

DATE: 11-15-11

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

LIFT AREA	LIFT AREA
UCD01	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson - EnergySolutions Construction Manager		11-15-11
Adam Lucero - Nielson Construction		11-15-11
Beachem Bosh - E.S. QA/QC Representative		11-15-11
Kevin Keele - J&T QC Representative		11-15-11
Mark Greenhalgh - Nielson Construction Manager		11-15-11

COMMENTS		
Surface was visually inspected and found to be satisfactory. See attached map for area location and square footage.		

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OP-F-022
Rev 0, June 2011

File Code Index No: 1013 11281
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A7. Cap Rock and Armoring
Cap Rock Buyoff Surveys

Moab UMTRA Crescent Junction Disposal Cell
Rock Layer Survey
Measured by Jason Knowlton Kevin Keele for J.K. 11-15-11
Checked by Kevin Keele Kevin Keele
Johansen & Tuttle Engineering, Inc
Nov. 4, 2011

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
1301	6794243.7	2122647.0	4975.31	4975.69	0.38	4.5	4975.11	0.58
1302	6794237.0	2122597.0	4975.11	4975.38	0.27	3.2	4974.84	0.55
1303	6794231.2	2122547.3	4974.93	4975.18	0.24	2.9	4974.66	0.52
1304	6794224.7	2122497.9	4974.74	4975.01	0.27	3.2	4974.40	0.61
1305	6794218.4	2122448.3	4974.55	4974.83	0.28	3.3	4974.23	0.60
1306	6794268.1	2122442.1	4975.81	4976.06	0.25	3.1	4975.53	0.53
1307	6794274.1	2122491.8	4975.99	4976.22	0.23	2.8	4975.66	0.56
1308	6794280.4	2122541.1	4976.17	4976.45	0.28	3.3	4975.91	0.54
1309	6794286.7	2122590.9	4976.36	4976.64	0.28	3.4	4976.14	0.50
1310	6794292.9	2122640.5	4976.55	4976.80	0.25	3.0	4976.28	0.53
1311	6794342.6	2122634.3	4977.80	4978.08	0.28	3.4	4977.56	0.52
1312	6794336.4	2122584.6	4977.61	4977.94	0.32	3.9	4977.29	0.65
1313	6794330.3	2122535.0	4977.43	4977.69	0.26	3.1	4977.12	0.57
1314	6794323.8	2122485.5	4977.24	4977.60	0.36	4.4	4976.93	0.67
1315	6794317.5	2122435.8	4977.05	4977.43	0.38	4.5	4976.80	0.63
1316	6794367.3	2122429.5	4978.31	4978.66	0.35	4.2	4978.01	0.64
1317	6794373.5	2122479.3	4978.49	4978.75	0.26	3.1	4978.19	0.56
1318	6794379.8	2122528.3	4978.68	4978.96	0.28	3.3	4978.43	0.52
1319	6794386.0	2122578.3	4978.86	4979.18	0.32	3.8	4978.66	0.52
1320	6794392.2	2122628.0	4979.05	4979.32	0.27	3.2	4978.79	0.53
1321	6794441.8	2122621.6	4980.30	4980.61	0.31	3.7	4980.04	0.57
1322	6794435.7	2122572.1	4980.12	4980.36	0.25	3.0	4979.86	0.51
1323	6794429.4	2122522.5	4979.93	4980.25	0.32	3.8	4979.71	0.53
1324	6794423.4	2122473.1	4979.75	4980.01	0.27	3.2	4979.48	0.53
1325	6794416.8	2122423.4	4979.55	4979.79	0.24	2.9	4979.26	0.54
1326	6794466.4	2122417.1	4980.80	4981.17	0.36	4.4	4980.51	0.66
1327	6794472.7	2122467.1	4980.99	4981.26	0.27	3.3	4980.75	0.52
1328	6794479.0	2122516.4	4981.18	4981.47	0.30	3.6	4980.94	0.53
1329	6794485.1	2122565.9	4981.36	4981.63	0.27	3.3	4981.11	0.53
1330	6794491.7	2122615.4	4981.56	4981.84	0.28	3.4	4981.26	0.57
1331	6794541.2	2122609.2	4982.80	4983.12	0.32	3.8	4982.54	0.58
1332	6794534.9	2122559.4	4982.62	4982.88	0.27	3.2	4982.36	0.52
1333	6794528.4	2122509.7	4982.42	4982.72	0.30	3.6	4982.17	0.55
1334	6794522.2	2122460.7	4982.24	4982.53	0.29	3.5	4981.98	0.56
1335	6794516.0	2122410.9	4982.05	4982.26	0.21	2.5	4981.74	0.52
1336	6794565.5	2122404.8	4983.30	4983.54	0.23	2.8	4983.03	0.50
1337	6794572.0	2122454.2	4983.49	4983.75	0.26	3.1	4983.24	0.51
1338	6794578.2	2122503.8	4983.68	4983.97	0.30	3.6	4983.30	0.68
1339	6794584.5	2122553.5	4983.87	4984.10	0.24	2.8	4983.54	0.57
1340	6794590.8	2122602.8	4984.05	4984.40	0.35	4.2	4983.68	0.72
1341	6794640.2	2122597.1	4985.30	4985.61	0.31	3.7	4985.00	0.61
1342	6794634.0	2122547.2	4985.11	4985.42	0.31	3.7	4984.80	0.62
1343	6794627.9	2122497.7	4984.93	4985.20	0.27	3.2	4984.59	0.61
1344	6794621.7	2122448.0	4984.74	4985.07	0.33	4.0	4984.42	0.66
1345	6794615.4	2122398.4	4984.56	4984.89	0.33	3.9	4984.22	0.66
1346	6794664.9	2122392.0	4985.81	4986.10	0.29	3.5	4985.50	0.59
1347	6794671.0	2122441.8	4985.99	4986.24	0.25	3.0	4985.64	0.59

1348	6794677.5	2122491.0	4986.18	4986.41	0.23	2.8	4985.82	0.59
1349	6794683.6	2122541.2	4986.36	4986.64	0.28	3.3	4986.06	0.58
1350	6794689.8	2122590.5	4986.55	4986.85	0.30	3.6	4986.21	0.64
1351	6794739.5	2122584.5	4987.80	4988.05	0.25	3.0	4987.52	0.53
1352	6794733.1	2122535.0	4987.61	4987.84	0.23	2.7	4987.33	0.50
1353	6794727.0	2122485.2	4987.43	4987.66	0.23	2.8	4987.13	0.54
1354	6794720.9	2122435.3	4987.25	4987.53	0.29	3.5	4986.91	0.62
1355	6794714.4	2122385.9	4987.05	4987.30	0.25	3.0	4986.75	0.55
1356	6794764.2	2122379.8	4988.31	4988.55	0.24	2.9	4987.99	0.56
1357	6794770.4	2122429.2	4988.49	4988.71	0.22	2.7	4988.17	0.55
1358	6794776.7	2122478.9	4988.68	4988.92	0.24	2.8	4988.42	0.50
1359	6794783.0	2122528.5	4988.87	4989.15	0.29	3.4	4988.55	0.60
1360	6794789.2	2122578.2	4989.05	4989.31	0.26	3.1	4988.78	0.53
1361	6794838.4	2122571.6	4990.29	4990.52	0.22	2.7	4990.01	0.50
1362	6794832.6	2122521.9	4990.12	4990.36	0.24	2.9	4989.84	0.52
1363	6794826.6	2122472.4	4989.94	4990.19	0.26	3.1	4989.60	0.59
1364	6794820.0	2122423.0	4989.74	4989.99	0.25	3.0	4989.43	0.56
1365	6794813.8	2122373.5	4989.56	4989.82	0.27	3.2	4989.20	0.62
1366	6794863.0	2122367.1	4990.80	4991.12	0.33	3.9	4990.47	0.65
1367	6794869.6	2122417.0	4990.99	4991.21	0.22	2.6	4990.63	0.58
1368	6794876.0	2122466.4	4991.18	4991.50	0.32	3.8	4990.88	0.62
1369	6794882.3	2122516.1	4991.37	4991.65	0.28	3.3	4991.04	0.61
1370	6794887.9	2122565.3	4991.54	4991.76	0.22	2.6	4991.21	0.55
1371	6794894.6	2122614.9	4991.74	4991.99	0.25	3.0	4991.43	0.56
1372	6794943.7	2122608.8	4992.97	4993.18	0.20	2.4	4992.66	0.51
1373	6794937.9	2122559.3	4992.80	4993.01	0.21	2.5	4992.49	0.52
1374	6794932.0	2122509.7	4992.62	4992.87	0.25	3.0	4992.33	0.55
1375	6794925.4	2122460.3	4992.43	4992.71	0.28	3.4	4992.17	0.53
1376	6794919.2	2122410.5	4992.24	4992.49	0.24	2.9	4991.94	0.55
1377	6794913.1	2122360.9	4992.06	4992.32	0.27	3.2	4991.73	0.60
1378	6794962.3	2122354.7	4993.30	4993.56	0.26	3.2	4993.01	0.56
1379	6794968.7	2122404.1	4993.49	4993.70	0.21	2.6	4993.13	0.57
1380	6794975.1	2122453.8	4993.68	4993.93	0.25	3.0	4993.42	0.51
1381	6794981.3	2122503.6	4993.87	4994.11	0.24	2.9	4993.56	0.55
1382	6794987.7	2122553.1	4994.06	4994.30	0.25	3.0	4993.73	0.57
1383	6794994.0	2122603.0	4994.24	4994.48	0.24	2.9	4993.98	0.51
1384	6795043.2	2122596.2	4995.48	4995.75	0.27	3.2	4995.17	0.58
1385	6795037.2	2122547.1	4995.30	4995.54	0.24	2.9	4995.00	0.54
1386	6795030.8	2122497.5	4995.11	4995.36	0.25	3.0	4994.82	0.54
1387	6795024.9	2122447.5	4994.93	4995.16	0.23	2.7	4994.66	0.50
1388	6795018.2	2122398.2	4994.74	4995.00	0.27	3.2	4994.40	0.60
1389	6795012.1	2122348.4	4994.55	4994.81	0.25	3.0	4994.21	0.60
1390	6795061.9	2122342.2	4995.81	4996.16	0.35	4.2	4995.46	0.69
1391	6795067.6	2122391.8	4995.98	4996.20	0.22	2.6	4995.67	0.53
1392	6795074.3	2122441.4	4996.18	4996.43	0.25	3.0	4995.89	0.54
1393	6795080.5	2122491.5	4996.36	4996.64	0.28	3.3	4996.10	0.54
1394	6795086.7	2122540.5	4996.55	4996.89	0.34	4.1	4996.24	0.65
1395	6795093.3	2122590.1	4996.74	4996.97	0.23	2.7	4996.42	0.55
1396	6795142.7	2122584.0	4997.99	4998.17	0.18	2.1	4997.65	0.51
1397	6795136.2	2122534.3	4997.80	4998.12	0.32	3.9	4997.46	0.66
1398	6795130.0	2122484.9	4997.61	4997.84	0.23	2.7	4997.32	0.52
1399	6795123.9	2122435.1	4997.43	4997.73	0.30	3.6	4997.17	0.56
1400	6795117.3	2122385.9	4997.23	4997.44	0.21	2.5	4996.89	0.55
1401	6795111.2	2122336.1	4997.05	4997.26	0.21	2.5	4996.68	0.58
1402	6795161.2	2122329.9	4998.31	4998.53	0.22	2.7	4997.98	0.55
1403	6795167.5	2122379.6	4998.50	4998.69	0.19	2.3	4998.19	0.50
1404	6795173.4	2122429.1	4998.68	4999.02	0.34	4.1	4998.43	0.59

1405	6795179.6	2122478.5	4998.86	4999.06	0.20	2.4	4998.53	0.52
1406	6795186.0	2122528.7	4999.05	4999.31	0.26	3.1	4998.78	0.54
1407	6795192.3	2122577.6	4999.24	4999.49	0.25	3.0	4998.90	0.59
1408	6795241.6	2122571.4	5000.48	5000.57	0.09	1.1	5000.06	0.51
1409	6795235.6	2122522.1	5000.30	5000.51	0.21	2.6	4999.97	0.55
1410	6795229.3	2122472.3	5000.11	5000.31	0.20	2.4	4999.81	0.50
1411	6795222.9	2122422.5	4999.92	5000.15	0.23	2.7	4999.62	0.53
1412	6795216.7	2122372.9	4999.74	5000.02	0.28	3.4	4999.43	0.59
1413	6795210.8	2122323.4	4999.56	4999.76	0.20	2.4	4999.21	0.55
1414	6795260.2	2122317.4	5000.81	5001.07	0.26	3.1	5000.47	0.60
1415	6795266.4	2122366.5	5000.99	5001.16	0.17	2.0	5000.66	0.50
1416	6795272.9	2122416.4	5001.18	5001.38	0.20	2.4	5000.86	0.52
1417	6795278.8	2122466.1	5001.36	5001.58	0.22	2.7	5001.07	0.51
1418	6795284.9	2122515.6	5001.54	5001.75	0.20	2.5	5001.22	0.52
1419	6795291.1	2122565.4	5001.73	5001.99	0.26	3.1	5001.40	0.58
1420	6795347.0	2122608.8	5003.17	5003.40	0.23	2.8	5002.87	0.54
1421	6795340.7	2122558.9	5002.98	5003.19	0.22	2.6	5002.67	0.53
1422	6795334.8	2122509.6	5002.80	5003.10	0.30	3.6	5002.48	0.62
1423	6795328.6	2122459.7	5002.61	5002.83	0.21	2.5	5002.31	0.52
1424	6795322.3	2122410.1	5002.43	5002.72	0.29	3.5	5002.12	0.60
1425	6795316.1	2122360.6	5002.24	5002.47	0.23	2.7	5001.93	0.54
1426	6795309.8	2122311.1	5002.05	5002.25	0.20	2.4	5001.74	0.51
1427	6795359.5	2122305.0	5003.30	5003.71	0.41	4.9	5003.02	0.70
1428	6795366.0	2122354.6	5003.50	5003.71	0.21	2.5	5003.20	0.51
1429	6795371.9	2122404.2	5003.68	5003.95	0.28	3.3	5003.40	0.56
1430	6795378.3	2122453.8	5003.87	5004.11	0.24	2.9	5003.60	0.51
1431	6795384.6	2122503.4	5004.05	5004.37	0.32	3.8	5003.71	0.66
1432	6795390.6	2122551.9	5004.24	5004.47	0.24	2.8	5003.94	0.53
1433	6795397.2	2122602.6	5004.43	5004.72	0.28	3.4	5004.14	0.58
1434	6795446.5	2122596.1	5005.67	5005.80	0.13	1.6	5005.30	0.51
1435	6795440.0	2122546.7	5005.48	5005.71	0.23	2.7	5005.13	0.58
1436	6795434.0	2122496.9	5005.30	5005.46	0.17	2.0	5004.96	0.51
1437	6795427.7	2122447.2	5005.11	5005.33	0.22	2.6	5004.76	0.57
1438	6795421.5	2122397.7	5004.93	5005.14	0.21	2.6	5004.57	0.57
1439	6795415.2	2122348.0	5004.74	5004.91	0.17	2.0	5004.37	0.54
1440	6795409.0	2122298.6	5004.55	5004.71	0.16	1.9	5004.20	0.52
1441	6795458.6	2122292.3	5003.56	5003.80	0.24	2.9	5003.27	0.52
1442	6795464.8	2122342.0	5003.74	5004.00	0.26	3.1	5003.47	0.54
1443	6795471.1	2122391.5	5003.93	5004.23	0.30	3.6	5003.60	0.63
1444	6795477.3	2122441.4	5004.12	5004.41	0.29	3.5	5003.84	0.56
1445	6795483.8	2122490.9	5004.30	5004.54	0.24	2.9	5003.99	0.54
1446	6795489.6	2122540.2	5004.49	5004.78	0.29	3.5	5004.22	0.56
1447	6795496.0	2122590.0	5004.67	5004.89	0.22	2.6	5004.35	0.55
1448	6795545.5	2122584.1	5003.68	5003.88	0.20	2.4	5003.34	0.54
1449	6795539.7	2122534.1	5003.48	5003.80	0.32	3.8	5003.21	0.59
1450	6795533.2	2122484.4	5003.30	5003.52	0.23	2.7	5003.01	0.51
1451	6795526.9	2122435.0	5003.12	5003.37	0.25	3.0	5002.85	0.52
1452	6795520.7	2122385.6	5002.93	5003.16	0.23	2.8	5002.62	0.54
1453	6795514.4	2122336.1	5002.75	5003.00	0.25	3.0	5002.48	0.52
1454	6795508.1	2122285.9	5002.56	5002.81	0.25	3.0	5002.24	0.57
1455	6795557.8	2122279.8	5001.56	5001.84	0.29	3.4	5001.26	0.58
1456	6795564.0	2122329.5	5001.74	5002.02	0.28	3.4	5001.49	0.53
1457	6795570.3	2122379.2	5001.93	5002.25	0.32	3.8	5001.62	0.63
1458	6795576.8	2122428.7	5002.11	5002.36	0.25	3.0	5001.86	0.50
1459	6795583.0	2122478.3	5002.30	5002.56	0.27	3.2	5002.06	0.50
1460	6795589.0	2122527.8	5002.49	5002.79	0.30	3.6	5002.19	0.60
1461	6795595.5	2122577.5	5002.67	5002.98	0.31	3.7	5002.38	0.60

1462	6795644.7	2122571.3	5001.68	5001.98	0.31	3.7	5001.37	0.61
1463	6795638.4	2122521.7	5001.49	5001.76	0.27	3.3	5001.20	0.57
1464	6795632.4	2122472.3	5001.30	5001.54	0.24	2.9	5000.96	0.59
1465	6795626.1	2122422.4	5001.11	5001.42	0.31	3.7	5000.88	0.54
1466	6795619.9	2122372.6	5000.93	5001.21	0.28	3.3	5000.60	0.61
1467	6795613.2	2122323.3	5000.75	5001.01	0.26	3.1	5000.50	0.50
1468	6795663.2	2122316.9	4999.74	4999.99	0.25	3.0	4999.44	0.56
1469	6795669.5	2122366.6	4999.93	5000.18	0.25	3.0	4999.61	0.57
1470	6795660.0	2122367.0	5000.11	5000.30	0.19	2.2	4999.80	0.50
1471	6795667.9	2122417.9	5000.28	5000.57	0.29	3.5	5000.06	0.51
1472	6795675.7	2122416.2	5000.12	5000.38	0.27	3.2	4999.86	0.52
1473	6795682.2	2122465.7	5000.30	5000.60	0.30	3.6	5000.06	0.54
1474	6795685.3	2122502.4	5000.46	5000.72	0.26	3.1	5000.14	0.58
1475	6795688.3	2122515.5	5000.49	5000.81	0.32	3.9	5000.16	0.65
1476	6795694.6	2122565.2	5000.67	5000.91	0.23	2.8	5000.38	0.52
1477	6795744.1	2122558.8	4999.67	4999.96	0.29	3.4	4999.41	0.55
1478	6795737.5	2122509.2	4999.49	4999.80	0.30	3.6	4999.18	0.62
1479	6795731.4	2122459.6	4999.31	4999.52	0.21	2.5	4999.01	0.51
1480	6795725.4	2122410.2	4999.12	4999.38	0.26	3.1	4998.86	0.52
1481	6795719.0	2122360.2	4998.93	4999.21	0.28	3.4	4998.62	0.59
1482	6795713.0	2122310.7	4998.74	4998.93	0.19	2.3	4998.43	0.50
1483	6795762.4	2122304.5	4997.74	4998.03	0.29	3.4	4997.44	0.59
1484	6795768.9	2122354.3	4997.93	4998.25	0.32	3.9	4997.63	0.62
1485	6795775.0	2122403.7	4998.11	4998.34	0.22	2.7	4997.78	0.56
1486	6795796.9	2122439.9	4997.92	4998.13	0.22	2.6	4997.61	0.52
1487	6795781.2	2122453.4	4998.30	4998.51	0.21	2.6	4997.98	0.53
1488	6795787.6	2122503.1	4998.49	4998.70	0.21	2.6	4998.14	0.56
1489	6795793.3	2122519.2	4998.47	4998.74	0.27	3.2	4998.22	0.53
1490	6795793.7	2122552.4	4998.67	4998.93	0.25	3.0	4998.38	0.55
1491	6795849.6	2122596.1	4997.86	4998.07	0.21	2.5	4997.54	0.53
1492	6795843.3	2122546.5	4997.67	4997.97	0.29	3.5	4997.36	0.61
1493	6795837.1	2122496.9	4997.49	4997.74	0.26	3.1	4997.15	0.59
1494	6795830.5	2122447.3	4997.31	4997.56	0.25	3.0	4997.04	0.52
1495	6795824.8	2122397.5	4997.11	4997.37	0.26	3.1	4996.87	0.50
1496	6795805.7	2122356.1	4997.22	4997.49	0.26	3.1	4996.93	0.56
1497	6795818.5	2122347.7	4996.93	4997.15	0.22	2.6	4996.63	0.52
1498	6795812.1	2122298.3	4996.74	4997.03	0.29	3.5	4996.38	0.65
1499	6795861.7	2122291.8	4995.74	4996.02	0.28	3.4	4995.45	0.57
1500	6795868.2	2122341.6	4995.92	4996.15	0.22	2.7	4995.62	0.53
1501	6795872.8	2122359.8	4995.95	4996.22	0.28	3.3	4995.63	0.59
1502	6795874.4	2122391.3	4996.11	4996.42	0.30	3.6	4995.82	0.59
1503	6795880.6	2122440.8	4996.30	4996.58	0.28	3.4	4996.07	0.52
1504	6795878.6	2122471.8	4996.53	4996.81	0.28	3.4	4996.23	0.58
1505	6795886.7	2122490.3	4996.49	4996.75	0.27	3.2	4996.18	0.57
1506	6795893.0	2122540.1	4996.67	4997.02	0.34	4.1	4996.31	0.71
1507	6795885.0	2122571.0	4997.02	4997.38	0.36	4.3	4996.69	0.69
1508	6795899.2	2122589.7	4996.86	4997.05	0.19	2.3	4996.50	0.54
1509	6795948.7	2122583.3	4995.86	4996.12	0.26	3.1	4995.59	0.53
1510	6795970.4	2122563.1	4995.31	4995.57	0.26	3.1	4995.08	0.50
1511	6795942.6	2122533.9	4995.67	4995.86	0.19	2.3	4995.29	0.57
1512	6795936.3	2122484.2	4995.49	4995.73	0.25	3.0	4995.15	0.58
1513	6795956.8	2122455.8	4994.91	4995.17	0.26	3.1	4994.60	0.56
1514	6795930.0	2122434.7	4995.30	4995.56	0.26	3.1	4995.04	0.52
1515	6795923.8	2122385.1	4995.12	4995.36	0.24	2.9	4994.85	0.51
1516	6795945.2	2122360.9	4994.55	4994.85	0.30	3.6	4994.25	0.60
1517	6795918.0	2122335.6	4994.92	4995.17	0.25	3.0	4994.60	0.58
1518	6795911.4	2122285.7	4994.74	4995.01	0.27	3.3	4994.40	0.61

CRJ 001100

Moab UMTRA Project
Cap Rock Buyoff Form

CLIENT: DOE

PROJECT: Moab UMTRA Project

DATE: 12-12-2011

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

LIFT AREA	LIFT AREA
UCK20	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson - EnergySolutions Construction Manager		12-12-11
Mark Greenhalgh - Nielson Construction Manager		12-12-11
Beachem Bosh - E.S. QA/QC Representative		12-12-11
Kevin Keele - J&T QC Representative		12-12-11

COMMENTS		
Surface was visually inspected and found to be satisfactory. See attached map for area location and square footage.		

RECORD COPY

OP-F-022
Rev 0, June 2011

File Code Index No: ~~4013~~ 01011?
Page 1 of 1

U1921

QA Review: Barbara Boch 12-15-11

Moab UMTRA Crescent Junction Disposal Cell
Rock Layer Survey
Measured by Jason Knowlton -Kevin Keele for JK 12-12-11
Checked by Kevin Keele -Kevin Keele
Johansen & Tuttle Engineering, Inc
Dec. 1, 2011

Lift I.D. UCKZO 12-15 JBB

Average Thickness = 0.6

Point #	Northing	Easting	Design Elevation	Measured Elevation	Difference (feet)	Difference (inches)	Pre-Installation Elevation	Thickness
1300	6794844.8	2122621.4	4990.48	4990.75	0.27	3.2	4990.22	0.52
1301	6794795.0	2122627.6	4989.23	4989.50	0.27	3.2	4988.94	0.56
1302	6794744.8	2122633.8	4987.96	4988.20	0.24	2.9	4987.62	0.58
1303	6794696.0	2122640.7	4986.73	4987.22	0.48	5.8	4986.39	0.82
1304	6794646.5	2122646.1	4985.49	4985.91	0.42	5.1	4985.14	0.76
1305	6794596.9	2122652.7	4984.24	4984.60	0.36	4.3	4983.99	0.61
1306	6794547.0	2122658.8	4982.98	4983.37	0.39	4.7	4982.76	0.61
1307	6794497.3	2122665.2	4981.73	4982.09	0.36	4.3	4981.48	0.61
1308	6794447.6	2122671.2	4980.47	4980.81	0.34	4.1	4980.31	0.50
1309	6794398.2	2122678.1	4979.23	4979.59	0.36	4.3	4979.03	0.56
1310	6794348.6	2122683.8	4977.98	4978.33	0.35	4.2	4977.75	0.59
1311	6794299.3	2122689.7	4976.74	4977.05	0.32	3.8	4976.52	0.54
1312	6794249.8	2122696.8	4975.49	4975.80	0.31	3.7	4975.24	0.56
1313	6794200.7	2122702.4	4974.25	4974.63	0.38	4.5	4973.93	0.70
1314	6794206.2	2122752.5	4974.42	4974.96	0.54	6.5	4974.24	0.72
1315	6794256.1	2122746.1	4975.68	4976.03	0.35	4.2	4975.36	0.67
1316	6794305.4	2122739.4	4976.92	4977.22	0.30	3.6	4976.62	0.60
1317	6794355.0	2122733.2	4978.17	4978.48	0.31	3.8	4977.91	0.57
1318	6794404.9	2122727.3	4979.43	4979.72	0.29	3.5	4979.17	0.54
1319	6794454.4	2122721.2	4980.68	4981.02	0.34	4.1	4980.38	0.64
1320	6794503.9	2122714.6	4981.92	4982.17	0.24	2.9	4981.65	0.51
1321	6794553.7	2122708.4	4983.18	4983.49	0.31	3.7	4982.95	0.54
1322	6794603.2	2122702.1	4984.42	4984.68	0.26	3.1	4984.14	0.54
1323	6794652.4	2122695.8	4985.66	4985.96	0.30	3.6	4985.44	0.52
1324	6794702.1	2122689.6	4986.92	4987.26	0.34	4.1	4986.68	0.58
1325	6794751.8	2122683.6	4988.17	4988.55	0.38	4.6	4987.98	0.57
1326	6794801.7	2122677.4	4989.43	4989.85	0.42	5.0	4989.21	0.63
1327	6794851.5	2122670.9	4990.68	4991.05	0.38	4.5	4990.47	0.59
1328	6794900.8	2122664.9	4991.92	4992.24	0.32	3.9	4991.62	0.62
1329	6794907.0	2122714.5	4992.11	4992.52	0.41	4.9	4991.99	0.53
1330	6794857.5	2122720.7	4990.86	4991.20	0.34	4.0	4990.67	0.52
1331	6794807.8	2122727.0	4989.61	4989.95	0.34	4.1	4989.36	0.60
1332	6794758.4	2122733.4	4988.36	4988.73	0.37	4.4	4988.18	0.55
1333	6794708.7	2122739.5	4987.11	4987.53	0.42	5.0	4986.90	0.63
1334	6794658.9	2122745.6	4985.86	4986.29	0.43	5.2	4985.61	0.68
1335	6794609.3	2122752.0	4984.61	4984.94	0.33	4.0	4984.40	0.54
1336	6794559.8	2122758.4	4983.36	4983.72	0.36	4.4	4983.11	0.61
1337	6794509.8	2122764.3	4982.10	4982.55	0.45	5.4	4981.88	0.67
1338	6794460.2	2122770.6	4980.85	4981.28	0.43	5.1	4980.55	0.73
1339	6794410.7	2122777.1	4979.60	4980.00	0.40	4.8	4979.36	0.65
1340	6794361.1	2122783.2	4978.35	4978.77	0.42	5.0	4978.10	0.67
1341	6794311.7	2122789.5	4977.11	4977.49	0.39	4.6	4976.85	0.64
1342	6794262.0	2122795.4	4975.86	4976.27	0.41	4.9	4975.60	0.67
1343	6794212.3	2122801.7	4974.60	4975.08	0.47	5.7	4974.39	0.69
1344	6794218.6	2122851.6	4974.79	4975.26	0.47	5.6	4974.55	0.71
1345	6794268.5	2122845.4	4976.05	4976.44	0.39	4.7	4975.85	0.59
1346	6794317.8	2122839.1	4977.29	4977.66	0.37	4.4	4977.01	0.65

1 of 4

1347	6794367.8	2122832.7	4978.55	4978.92	0.36	4.4	4978.24	0.68
1348	6794417.2	2122826.6	4979.80	4980.20	0.40	4.9	4979.53	0.67
1349	6794466.8	2122820.3	4981.05	4981.45	0.40	4.8	4980.82	0.63
1350	6794516.4	2122814.1	4982.30	4982.71	0.42	5.0	4982.07	0.65
1351	6794565.8	2122808.1	4983.54	4983.91	0.37	4.5	4983.29	0.62
1352	6794615.6	2122801.4	4984.80	4985.21	0.41	5.0	4984.53	0.68
1353	6794665.2	2122795.3	4986.04	4986.42	0.38	4.5	4985.74	0.69
1354	6794714.8	2122789.2	4987.30	4987.61	0.31	3.7	4987.05	0.56
1355	6794764.4	2122782.8	4988.54	4988.95	0.40	4.8	4988.30	0.65
1356	6794813.8	2122776.5	4989.79	4990.27	0.48	5.8	4989.51	0.76
1357	6794863.7	2122770.4	4991.05	4991.56	0.51	6.1	4990.81	0.74
1358	6794913.4	2122764.0	4992.30	4992.73	0.43	5.1	4992.07	0.66
1359	6794919.7	2122813.5	4992.49	4992.85	0.37	4.4	4992.29	0.56
1360	6794869.9	2122819.8	4991.23	4991.72	0.49	5.9	4990.99	0.73
1361	6794820.0	2122826.3	4989.97	4990.33	0.36	4.3	4989.78	0.55
1362	6794770.6	2122832.3	4988.73	4989.12	0.39	4.7	4988.52	0.60
1363	6794720.8	2122838.6	4987.48	4987.85	0.37	4.5	4987.33	0.52
1364	6794671.3	2122844.6	4986.23	4986.66	0.43	5.1	4986.02	0.63
1365	6794621.9	2122851.0	4984.98	4985.43	0.45	5.4	4984.79	0.65
1366	6794572.4	2122857.2	4983.74	4984.18	0.45	5.4	4983.54	0.64
1367	6794522.6	2122863.7	4982.48	4982.90	0.42	5.1	4982.30	0.60
1368	6794472.9	2122869.7	4981.23	4981.63	0.40	4.8	4981.09	0.54
1369	6794423.3	2122875.7	4979.98	4980.38	0.40	4.9	4979.80	0.58
1370	6794373.7	2122881.9	4978.73	4979.09	0.36	4.3	4978.52	0.57
1371	6794324.1	2122888.7	4977.48	4977.86	0.38	4.6	4977.33	0.52
1372	6794274.5	2122894.9	4976.23	4976.63	0.40	4.8	4976.04	0.59
1373	6794224.6	2122901.2	4974.97	4975.45	0.48	5.8	4974.77	0.68
1374	6794231.2	2122950.9	4975.17	4975.68	0.51	6.1	4974.93	0.74
1375	6794280.4	2122944.6	4976.41	4976.90	0.50	6.0	4976.18	0.73
1376	6794330.6	2122938.0	4977.67	4978.14	0.47	5.6	4977.52	0.62
1377	6794380.1	2122931.8	4978.92	4979.41	0.49	5.9	4978.72	0.69
1378	6794429.6	2122925.3	4980.17	4980.66	0.50	6.0	4979.93	0.74
1379	6794479.0	2122919.1	4981.41	4981.82	0.41	4.9	4981.18	0.64
1380	6794528.9	2122913.1	4982.67	4983.10	0.43	5.2	4982.40	0.70
1381	6794578.3	2122907.1	4983.91	4984.41	0.50	6.0	4983.78	0.63
1382	6794628.1	2122900.7	4985.17	4985.62	0.46	5.5	4984.99	0.63
1383	6794677.5	2122894.1	4986.41	4986.88	0.47	5.6	4986.20	0.69
1384	6794727.4	2122888.3	4987.67	4988.15	0.48	5.7	4987.46	0.68
1385	6794776.7	2122882.0	4988.91	4989.42	0.51	6.2	4988.72	0.70
1386	6794826.5	2122875.7	4990.17	4990.68	0.51	6.1	4990.02	0.66
1387	6794876.0	2122869.5	4991.41	4991.89	0.47	5.7	4991.27	0.62
1388	6794882.3	2122919.4	4991.60	4992.05	0.44	5.3	4991.44	0.60
1389	6794832.6	2122925.3	4990.35	4990.80	0.45	5.4	4990.23	0.57
1390	6794782.9	2122931.6	4989.10	4989.56	0.47	5.6	4988.92	0.64
1391	6794733.6	2122937.8	4987.85	4988.35	0.50	6.0	4987.63	0.72
1392	6794684.2	2122943.7	4986.61	4986.98	0.37	4.4	4986.45	0.53
1393	6794634.1	2122950.2	4985.35	4985.87	0.53	6.3	4985.14	0.74
1394	6794584.7	2122956.6	4984.10	4984.57	0.46	5.6	4983.89	0.68
1395	6794535.0	2122962.8	4982.85	4983.22	0.37	4.4	4982.71	0.51
1396	6794485.0	2122968.9	4981.59	4982.02	0.43	5.1	4981.38	0.64
1397	6794436.0	2122975.3	4980.35	4980.77	0.41	5.0	4980.13	0.64
1398	6794386.3	2122981.3	4979.11	4979.44	0.34	4.0	4978.87	0.57
1399	6794336.6	2122987.9	4977.85	4978.21	0.36	4.3	4977.63	0.58
1400	6794287.1	2122994.0	4976.60	4977.00	0.40	4.8	4976.34	0.66
1401	6794237.4	2123000.2	4975.35	4975.81	0.45	5.4	4975.09	0.71
1402	6794243.4	2123049.8	4975.53	4976.02	0.49	5.8	4975.30	0.72
1403	6794293.1	2123043.4	4976.78	4977.13	0.35	4.2	4976.54	0.59

1404	6794343.1	2123037.6	4978.05	4978.50	0.45	5.5	4977.85	0.65
1405	6794392.3	2123031.1	4979.28	4979.75	0.46	5.5	4979.09	0.65
1406	6794441.9	2123024.9	4980.54	4980.97	0.44	5.3	4980.31	0.66
1407	6794491.7	2123018.5	4981.79	4982.19	0.40	4.8	4981.57	0.62
1408	6794541.3	2123012.5	4983.04	4983.48	0.44	5.3	4982.84	0.63
1409	6794590.8	2123006.1	4984.29	4984.68	0.40	4.7	4984.06	0.62
1410	6794640.4	2123000.1	4985.53	4985.92	0.38	4.6	4985.34	0.58
1411	6794690.3	2122993.8	4986.79	4987.20	0.41	4.9	4986.62	0.58
1412	6794739.7	2122987.4	4988.04	4988.47	0.44	5.3	4987.87	0.61
1413	6794789.5	2122981.2	4989.29	4989.73	0.43	5.2	4989.12	0.60
1414	6794839.0	2122975.0	4990.54	4990.94	0.40	4.8	4990.38	0.55
1415	6794888.5	2122968.8	4991.79	4992.20	0.41	4.9	4991.60	0.59
1416	6794894.8	2123018.4	4991.97	4992.37	0.39	4.7	4991.82	0.55
1417	6794845.1	2123024.6	4990.72	4991.11	0.39	4.7	4990.56	0.56
1418	6794795.6	2123030.7	4989.47	4989.88	0.40	4.8	4989.29	0.59
1419	6794745.9	2123037.1	4988.22	4988.66	0.44	5.3	4988.05	0.61
1420	6794696.2	2123043.0	4986.97	4987.38	0.41	4.9	4986.78	0.60
1421	6794702.5	2123092.7	4987.16	4987.54	0.39	4.6	4986.93	0.61
1422	6794652.7	2123099.1	4985.90	4986.24	0.33	4.0	4985.62	0.62
1423	6794646.9	2123049.5	4985.73	4986.10	0.37	4.5	4985.55	0.56
1424	6794597.0	2123055.7	4984.47	4984.85	0.38	4.5	4984.27	0.57
1425	6794603.8	2123105.4	4984.67	4984.94	0.27	3.2	4984.33	0.61
1426	6794547.5	2123061.9	4983.23	4983.58	0.35	4.2	4982.96	0.62
1427	6794497.9	2123068.3	4981.97	4982.35	0.38	4.5	4981.79	0.56
1428	6794448.3	2123074.5	4980.72	4981.06	0.34	4.0	4980.53	0.53
1429	6794398.5	2123080.8	4979.47	4979.88	0.41	4.9	4979.29	0.58
1430	6794349.3	2123087.0	4978.23	4978.57	0.35	4.1	4977.97	0.60
1431	6794299.5	2123093.1	4976.97	4977.31	0.34	4.1	4976.74	0.58
1432	6794249.8	2123099.4	4975.72	4976.06	0.34	4.0	4975.54	0.52

CMT ENGINEERING LABORATORIES

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering/Testing/Research

September 22, 2009

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions, Crescent Junction Disposal Cell Cap Rock
Project#: 3022
Material: Basalt
Source: Freemont Junction #3

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.670	8.1	9	72.9	90
Absorption %	0.8%	6.1	2	12.2	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.5	7.2	1	7.2	10
Schmidt Hammer	52	6.8	3	20.4	30
Total Score				**222.7**	**260**

Rating = ***85.7***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 179332

Relative Density (oven Dry) = 2.670
Relative Density (SSD) = 2.691
Relative Density (apparent) = 2.727
Absorption (%) = 0.8 %

: formed prior to placement. Durability test is for 2" CapRak.

D50 = 2.0"

FJ #3

Los Angeles Abrasion ASTM C-131
Lab # 179333

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	6.5 %

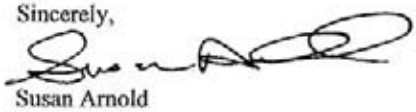
Sodium Soundness ASTM C-88
Lab # 179325

% Loss	=	0.0 %

Schmitt Hammer

Rebound Number	52,52,52	
Average	=	52

Sincerely,



Susan Arnold

CMT ENGINEERING LABORATORIES

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering/Testing/Research

June 30, 2010

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: 2" Cap Rock
Source: Freemont Junction #1

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.677	8.1	9	72.9	90
Absorption %	0.5%	8.0	2	16	20
Sodium Sulfate %	0.1%	10	11	110	110
LA Abrasion	6.3	7.2	1	7.2	10
Schmidt Hammer	37	4.4	3	13.2	30
Total Score				**219.3**	**260**

Rating = ***84.3***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 211600

Relative Density (oven Dry)	=	2.677
Relative Density (SSD)	=	2.689
Relative Density (apparent)	=	2.711
Absorption (%)	=	0.5 %

Performed prior to placement. Durability test is for 2" Cap Rock D50 = 2.0"

Los Angeles Abrasion ASTM C-131
Lab # 211598

100 Revolutions 12 Spheres	Grading A	
% Wear	=	6.3 %

Sodium Soundness ASTM C-88
Lab # 211599

% Loss	=	0.1 %

Schmitt Hammer
213839

Rebound Number		36, 38
Average	=	37

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

CMT ENGINEERING LABORATORIES

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering/Testing/Research

June 30, 2010

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: 2" Cap Rock
Source: Freemont Junction #2

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.675	8.1	9	72.9	90
Absorption %	0.8%	6.2	2	12.4	20
Sodium Sulfate %	0.1%	10	11	110	110
LA Abrasion	6.7	7.0	1	7.0	10
Schmidt Hammer	39	4.9	3	14.7	30
Total Score				**217.0**	**260**

Rating = ***83.5***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 211607

Relative Density (oven Dry) = 2.675
Relative Density (SSD) = 2.698
Relative Density (apparent) = 2.738
Absorption (%) = 0.8 %

Peefoemed plioe to pkeement. Durability testing is For 2" Cap Rock. D50 = 2.0"

Los Angeles Abrasion ASTM C-131
Lab # 211605

100 Revolutions		Grading A
12 Spheres		
% Wear	=	6.7 %

Sodium Soundness ASTM C-88
Lab # 211606

% Loss	=	0.1 %

Schmitt Hammer
213839

Rebound Number		40, 38
Average	=	39

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

CMT ENGINEERING LABORATORIES

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering/Testing/Research

November 10, 2010

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: 2" Cap Rock
Source: Freemont Junction (After Placement)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.685	8.3	9	74.7	90
Absorption %	0.6%	7.5	2	15.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.6	7.1	1	7.1	10
Schmidt Hammer	56	7.3	3	21.9	30
Total Score				228.7	260

Rating = 88.0

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 233040

Relative Density (oven Dry)	=	2.685
Relative Density (SSD)	=	2.701
Relative Density (apparent)	=	2.728
Absorption (%)	=	0.6 %

THIS DURABILITY IS FOR THE 1st 5,000 yd³ PLACED OF 2" Cap Rock.
D50 = 2.0"

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Los Angeles Abrasion ASTM C-131
Lab # 233038

100 Revolutions Grading A
12 Spheres
% Wear = 6.6 %

Sodium Soundness ASTM C-88
Lab # 233039

% Loss = 0.0 %

Schmitt Hammer
234317

Rebound Number 57,57,53

Average = 56

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

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CMT ENGINEERING LABORATORIES

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July 22, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt 2" Cap Rock
Source: Freemont Junction (Stockpile)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.721	9.5	9	85.5	90
Absorption %	0.7%	6.8	2	13.6	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.4	6.5	1	6.5	10
Schmidt Hammer	60	8.0	3	24.0	30
Total Score				**239.6**	**260**

Rating = ***92.1***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 258885

Relative Density (oven Dry)	=	2.721
Relative Density (SSD)	=	2.740
Relative Density (apparent)	=	2.773
Absorption (%)	=	0.7 %

Los Angeles Abrasion ASTM C-131
Lab # 258887

100 Revolutions 12 Spheres		Grading A	
	% Wear	=	7.4 %

Sodium Soundness ASTM C-88
Lab # 258886

% Loss	=	0.1 %

Schmitt Hammer

Rebound Numbers	=	60, 59
Average	=	60

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2951
WEST VALLEY OFFICE: 2800 SOUTH REDWOOD ROAD, WEST VALLEY, UT 84119 (PHONE) 801.908-5859 (FAX) 801.972-9074
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July 22, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt 2" Cap Rock
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.706	9.2	9	82.8	90
Absorption %	0.5%	8.0	2	16.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.1	6.3	1	6.3	10
Schmidt Hammer	64	8.8	3	26.4	30
Total Score				**241.5**	**260**

Rating = ***92.9***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 258881

Relative Density (oven Dry) = 2.706
Relative Density (SSD) = 2.720
Relative Density (apparent) = 2.744
Absorption (%) = 0.5 %

THIS DURABILITY REPRESENTS THE 2ND 5,000 yd³ PLACED of 2" Cap rock.
D50 = 2.0".

Los Angeles Abrasion ASTM C-131
Lab # 258883

100 Revolutions Grading A
12 Spheres
% Wear = 7.1 %

Sodium Soundness ASTM C-88
Lab # 258882

% Loss = 0.0 %

Schmitt Hammer

Rebound Numbers = 64, 64

Average = 64

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 1005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt 2" Cap Rock #8
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.63	7.5	9	67.5	90
Absorption %	0.6%	7.4	2	14.8	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.6	7.1	1	7.1	10
Schmidt Hammer	52	6.8	3	20.4	30
Total Score				**219.8**	**260**

Rating = ***84.5***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287653

Relative Density (oven Dry) = 2.63
Relative Density (SSD) = 2.41
Relative Density (apparent) = 2.67
Absorption (%) = 0.6 %

This durability is for the 3rd 5,000 yd³ placed of 2" Cap rock.
D50 = 2.0"

Los Angeles Abrasion ASTM C-131
Lab # 287651

100 Revolutions 12 Spheres	Grading A	
% Wear	=	6.6 %

Sodium Soundness ASTM C-88
Lab # 287652

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	49,52,54
Average	=	52

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt 2" Cap Rock #7
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.63	7.5	9	67.5	90
Absorption %	0.7%	6.8	2	13.6	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.7	7.0	1	7.0	10
Schmidt Hammer	42	5.3	3	15.9	30
Total Score				**214.0**	**260**

Rating = ***82.3***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287659

Relative Density (oven Dry)	=	2.63
Relative Density (SSD)	=	2.41
Relative Density (apparent)	=	2.67
Absorption (%)	=	0.7 %

This durability is for the 4th 5,000 yd^3 placed of 2" Cap rock.
D50 = 2.0"

Los Angeles Abrasion ASTM C-131
Lab # 287657

100 Revolutions 12 Spheres		Grading A	
	% Wear	=	6.7 %

Sodium Soundness ASTM C-88
Lab # 287658

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	42,42,43
Average	=	42

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt 2" Cap Rock #6
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.62	7.3	9	65.7	90
Absorption %	0.6%	7.4	2	14.8	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.3	7.2	1	7.2	10
Schmidt Hammer	57	7.5	3	22.5	30
Total Score				**220.2**	**260**

Rating = ***84.7***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287656

Relative Density (oven Dry) = 2.62
Relative Density (SSD) = 2.64
Relative Density (apparent) = 2.66
Absorption (%) = 0.6 %

This durability is for the 5th 5,000yd³ placed of 2" cap rock.
D50 = 2.0"

Los Angeles Abrasion ASTM C-131
Lab # 287654

100 Revolutions 12 Spheres		Grading A	
	% Wear	=	6.3 %

Sodium Soundness ASTM C-88
Lab # 287655

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	58,56,56
Average	=	57

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2650 (FAX) 435.753.2651
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CMT ENGINEERING LABORATORIES

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December 12, 2011
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Grey Basalt 2" Cap Rock #5
Source: Freemont Junction (In-Place)

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.62	7.3	9	65.7	90
Absorption %	0.9%	5.8	2	11.6	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.8	6.9	1	6.9	10
Schmidt Hammer	45	5.6	3	16.8	30
Total Score				**211.0**	**260**

Rating = ***81.2***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 287650

Relative Density (oven Dry) = 2.62
Relative Density (SSD) = 2.65
Relative Density (apparent) = 2.69
Absorption (%) = 0.9 %

This durability is for the 6th 5,000yd³ placed of 2" Cap rock.
D50 = 2.0"

Los Angeles Abrasion ASTM C-131
Lab # 287648

100 Revolutions	Grading A	
12 Spheres		
% Wear	=	6.8 %

Sodium Soundness ASTM C-88
Lab # 287649

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	45,44,46
Average	=	45

- Schmitt Hammer test performed on surface of 6" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/12/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 2" Cap rock Grey Basalt Source: Freemont Junction
TESTED BY: KC SAMPLED BY: CLIENT LAB #: 5181

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	9955.3	20.2	80	
2 in. (50mm)	16501.7	33.6	46	40 - 50
1 1/2 in. (37.5mm)	6744.1	17.7	28	20 - 30
1 in. (25mm)	5262.9	10.7	18	10 - 20
3/4 in. (19mm)	3868.1	7.8	10	
1/2 in. (12.5mm)	2416.5	4.9	5	5 - 25
3/8 in. (9.5mm)	219.7	0.7	4	
# 4 (4.75mm)	365.5	1.2	3	0 - 5
# 8 (2.36mm)	184.6	0.6	3	0 - 5
# 16 (1.18mm)	131.4	0.4	2	0 - 5
# 30 (600um)	88.8	0.3	2	
# 50 (300um)	85.8	0.3	1	
#100 (150um)	96.2	0.3	1	
#200 (75um)	80.9	0.3	0.9	0 - 5
-#200 (-75um)	12.6			

Total Sample Aggregate Weight: 49365.0
- 1/2" Aggregate Weight: 1510.1
- 1/2" After Wash Weight: 1265.5

REMARKS: Test performed prior to placement. 11/12/09

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93.

P.O. BOX 427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

A7. Cap Rock and Armoring
Cap Rock Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/16/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 1-6-12 BB 2" Cap rock Grey Basalt Source: Fremont Junction
TESTED BY: KC SAMPLED BY: CLIENT LAB #: 5187

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	10428.8	19.6	80	
2 in. (50mm)	17511.9	32.9	46	40 - 50
1 1/2 in. (37.5mm)	9587.9	18.0	30	20 - 30
1 in. (25mm)	6144.2	11.5	18	10 - 20
3/4 in. (19mm)	4094.4	7.7	10	
1/2 in. (12.5mm)	2512.6	4.7	6	5 - 25
3/8 in. (9.5mm)	312.6	0.8	5	
# 4 (4.75mm)	494.6	1.2	3	0 - 5
# 8 (2.36mm)	270.2	0.8	3	0 - 5
# 16 (1.18mm)	184.4	0.5	2	0 - 5
# 30 (600um)	123.4	0.4	2	
# 50 (300um)	114.8	0.3	1	
#100 (150um)	122.4	0.4	1	
#200 (75um)	95.6	0.3	0.6	0 - 5
-#200 (-75um)	13.8			

Total Sample Aggregate Weight: 53251.4
- 1/2" Aggregate Weight: 1889.6
- 1/2" After Wash Weight: 1642.0

REMARKS: Test performed prior to placement. 1-6-12 BB

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93: John Christensen

P.O. BOX 427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/27/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 1-6-1788 2" Cap rock Grey Basalt Source: Freemont Junction
TESTED BY: JC SAMPLED BY: CLIENT LAB #: 5149

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	18391.3	32.9	67	
2 in. (50mm)	12240.5	21.9	45	40 - 50
1 1/2 in. (37.5mm)	9224.1	16.5	28	20 - 30
1 in. (25mm)	6302.4	11.3	17	10 - 20
3/4 in. (19mm)	3489.2	6.2	11	
1/2 in. (12.5mm)	3034.6	5.4	6	5 - 25
3/8 in. (9.5mm)	278.7	1.0	5	
# 4 (4.75mm)	286.1	1.0	4	0 - 5
# 8 (2.36mm)	142.1	0.5	3	0 - 5
# 16 (1.18mm)	116.7	0.4	3	0 - 5
# 30 (600um)	93.5	0.3	2	
# 50 (300um)	90.4	0.3	2	
#100 (150um)	83.7	0.3	2	
#200 (75um)	83.4	0.3	1.5	0 - 5
-#200 (-75um)	15.1			

Total Sample Aggregate Weight: 55846.3
- 1/2" Aggregate Weight: 1622.7
- 1/2" After Wash Weight: 1200.7

REMARKS: Test performed prior to placement. 1-6-1788

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93. John Charchenko

P.O. BOX 427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/30/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 2" Cap rock Grey Basalt Source: Freemont Junction
TESTED BY: JC SAMPLED BY: CLIENT LAB #: 5150

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	15530.4	31.4	69	
2 in. (50mm)	11130.6	22.3	46	40 - 50
1 1/2 in. (37.5mm)	8286.6	16.6	30	20 - 30
1 in. (25mm)	5995.6	12.0	18	10 - 20
3/4 in. (19mm)	3312.4	6.6	11	
1/2 in. (12.5mm)	2692.1	5.4	6	5 - 25
3/8 in. (9.5mm)	308.4	0.9	5	
# 4 (4.75mm)	365.9	1.1	4	0 - 5
# 8 (2.36mm)	168.3	0.5	3	0 - 5
# 16 (1.18mm)	139.5	0.4	3	0 - 5
# 30 (600um)	119.2	0.4	2	
# 50 (300um)	112.9	0.3	2	
#100 (150um)	105.2	0.3	2	
#200 (75um)	92.9	0.3	1.3	0 - 5
-#200 (-75um)	16.3			

Total Sample Aggregate Weight: 49852.3
- 1/2" Aggregate Weight: 1858.3
- 1/2" After Wash Weight: 1428.6

REMARKS: Test performed prior to placement: 1-6-12 BB

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93. John Christensen

P.O. BOX 427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

A7. Cap Rock and Armoring
Cap Rock Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/04/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 2" Cap rock Grey Basalt Source: Freemont Junction
TESTED BY: JC SAMPLED BY: CLIENT LAB #: 5159

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	16522.8	29.6	70	
2 in. (50mm)	11645.5	21.2	49	40 - 50
1 1/2 in. (37.5mm)	10767.4	19.3	30	20 - 30
1 in. (25mm)	5876.2	10.5	18	10 - 20
3/4 in. (19mm)	3618.9	6.5	13	
1/2 in. (12.5mm)	3344.9	6.0	7	5 - 25
3/8 in. (9.5mm)	277.6	1.2	6	
# 4 (4.75mm)	334.2	1.5	4	0 - 5
# 8 (2.36mm)	146.8	0.7	4	0 - 5
# 16 (1.18mm)	125.4	0.5	3	0 - 5
# 30 (600um)	101.4	0.4	3	
# 50 (300um)	98.7	0.4	2	
#100 (150um)	97.4	0.4	2	
#200 (75um)	88.5	0.4	1.4	0 - 5
-#200 (-75um)	12.7			

Total Sample Aggregate Weight: 55898.7
- 1/2" Aggregate Weight: 1597.6
- 1/2" After Wash Weight: 1285.7

REMARKS: Test performed prior to placement, 1-6-12 BB

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93. John Christen

P.O. BOX 427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CENTRAL UTAH TESTING & TRUCKING

SIEVE ANALYSIS: AGGREGATES (ASTM C136-95 AASHTO T27-93)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-95 AASHTO T11-91)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/10/09
PROJECT: MISC. QC
SAMPLE LOCATION: FREMONT PIT - OFF BELT
MATERIAL TYPE: ~~RIPRAP~~ 1-6-12BB 2" Cap rock Grey Basalt Source: Fremont Junction
TESTED BY: DB SAMPLED BY: CLIENT LAB #: 5175

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
4 in. (100mm)		0.0	100	100
3 in. (75mm)	23676.8	21.7	78	
2 in. (50mm)	32329.4	29.6	49	40 - 50
1 1/2 in. (37.5mm)	20629.6	18.9	30	20 - 30
1 in. (25mm)	14090.4	12.9	17	10 - 20
3/4 in. (19mm)	5302.9	4.9	12	
1/2 in. (12.5mm)	5537.1	5.1	7	5 - 25
3/8 in. (9.5mm)	253.2	1.1	6	
# 4 (4.75mm)	399.0	1.7	4	0 - 5
# 8 (2.36mm)	239.1	1.0	3	0 - 5
# 16 (1.18mm)	172.0	0.7	3	0 - 5
# 30 (600um)	117.8	0.5	2	
# 50 (300um)	101.0	0.4	2	
#100 (150um)	105.0	0.4	1	
#200 (75um)	84.9	0.4	0.8	0 - 5
-#200 (-75um)	15.8			

Total Sample Aggregate Weight: 109298.2
- 1/2" Aggregate Weight: 1653.7
- 1/2" After Wash Weight: 1487.8

REMARKS: Test performed prior to placement. 1-6-12 BB

I certify that this test was performed in accordance with ASTM C117-95 & C136-95/AASHTO T11-91 & T27-93. John Christensen

P.O. BOX 427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 12/07/10
PROJECT: MISC. QC
SAMPLE LOCATION: LIFT AREA IN PLACE SAMPLE 1 (lot#1) UCA01101124-00
MATERIAL TYPE: ~~COVER TOP~~ 2" Cap Rock Grey Basalt Source: Freemont Junction
TESTED BY: JC 1-6-12 BB SAMPLED BY: KC/KH LAB #: 5997

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	19098.8	9.8	90.2	
2 in. (50mm)	70262.4	36.1	54.1	40 - 50
1 1/2 in. (37.5mm)	48295.0	24.8	29.3	20 - 30
1 in. (25mm)	24182.1	12.4	16.9	10 - 20
3/4 in. (19mm)	7462.6	3.8	13.1	
1/2 in. (12.5mm)	2702.1	6.7	6.4	5 - 15
3/8 in. (9.5mm)	454.4	1.1	5.3	
# 4 (4.75mm)	558.2	1.4	3.9	0 - 5
# 8 (2.36mm)	238.0	0.6	3.3	0 - 5
# 16 (1.18mm)	138.4	0.3	3.0	0 - 5
# 30 (600um)	99.4	0.2	2.7	
# 50 (300um)	111.0	0.3	2.4	
#100 (150um)	151.5	0.4	2.1	
#200 (75um)	208.4	0.5	1.6	0 - 5
-#200 (-75um)	43.4			

Total Sample Aggregate Weight: 194733.2
- 3/4" Aggregate Weight: 5290.9 - 3/4" After Wash Weight: 4704.8

REMARKS: 3 in place samples were taken in lot #1 & combined to represent lot area. Test performed for 1st 5,000 yd³ placed. 1-6-12 BB

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 John Christensen

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT/ AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT/ AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 12/07/10
PROJECT: MISC. QC UMTRA
SAMPLE LOCATION: LIFT AREA IN PLACE SAMPLE 2 (lot #2) UCA0110124-00
MATERIAL TYPE: ~~COVER~~ TOP 2" Cap rock Grey Basalt Source: Freemont Junction
TESTED BY: JC 12-12-10 SAMPLED BY: KC/KH LAB #: 5998

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	14576.0	7.9	92.1	
2 in. (50mm)	70135.6	37.8	64.4	40 - 50
1 1/2 in. (37.5mm)	38522.6	20.8	33.6	20 - 30
1 in. (25mm)	22213.5	12.0	21.6	10 - 20
3/4 in. (19mm)	13677.7	7.4	14.2	
1/2 in. (12.5mm)	3008.1	8.2	6.1	5 - 15
3/8 in. (9.5mm)	443.1	1.2	4.9	
# 4 (4.75mm)	535.4	1.5	3.4	0 - 5
# 8 (2.36mm)	215.2	0.6	2.9	0 - 5
# 16 (1.18mm)	124.4	0.3	2.5	0 - 5
# 30 (600um)	79.5	0.2	2.3	
# 50 (300um)	88.5	0.2	2.1	
#100 (150um)	117.0	0.3	1.7	
#200 (75um)	148.5	0.4	1.3	0 - 5
#200 (-75um)	29.0			

Total Sample Aggregate Weight 185567.9
-3/4" Aggregate Weight 5255.6
-3/4" After Wash Weight 4788.5

REMARKS: 3 in place samples were taken in lot #2 & combined to represent lot area. Test performed for 24k 5,000 yds placed.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/26/11
PROJECT: MISC. QC
SAMPLE LOCATION: LIFT AREA IN PLACE SAMPLE 1 UCD01110809-00
MATERIAL TYPE: GREY BASALT: ~~COVER TOP~~ 2nd Cap rock Source: Freemont Junction
TESTED BY: KC 10/26/11 SAMPLED BY: KC/KH LAB #: 6532

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	46944.7	12.7	87.3	
2 in. (50mm)	139534.8	38.0	49.3	40 - 50
1 1/2 in. (37.5mm)	70248.3	19.1	30.2	20 - 30
1 in. (25mm)	55494.7	15.1	15.1	10 - 20
3/4 in. (19mm)	23351.5	6.4	8.8	
1/2 in. (12.5mm)	2852.8	4.6	4.2	5 - 15
3/8 in. (9.5mm)	370.8	0.6	3.6	
# 4 (4.75mm)	391.6	0.6	3.0	0 - 5
# 8 (2.36mm)	160.0	0.3	2.7	0 - 5
# 16 (1.18mm)	124.2	0.2	2.5	0 - 5
# 30 (600um)	89.3	0.1	2.4	
# 50 (300um)	111.0	0.2	2.2	
#100 (150um)	142.3	0.2	2.0	
#200 (75um)	270.0	0.4	1.5	0 - 5
-#200 (-75um)	38.8			

Total Sample Aggregate Weight: 367512.5
- 3/4" Aggregate Weight: 5465.3
- 3/4" After Wash Weight: 4550.3

REMARKS: Test performed for 3rd 5,000 yd³ placed
Test passed due to in place tolerances.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 John Christensen

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/26/11
PROJECT: MISC. QC
SAMPLE LOCATION: LIFT AREA IN PLACE SAMPLE 2 UCDOT10809-00
MATERIAL TYPE: GREY BASALT: ~~COVER TOP~~ 2" Cap rock Source: Fremont Junction Grey Basalt
TESTED BY: KC SAMPLED BY: KC/KH LAB #: 6533

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	58023.4	20.8	79.2	
2 in. (50mm)	98590.5	34.8	44.6	40 - 60
1 1/2 in. (37.5mm)	48078.0	16.9	27.5	20 - 30
1 in. (25mm)	31549.6	11.1	16.4	10 - 20
3/4 in. (19mm)	15732.6	5.5	10.9	
1/2 in. (12.5mm)	2100.9	4.3	6.6	5 - 15
3/8 in. (9.5mm)	393.7	0.8	5.7	
# 4 (4.75mm)	446.8	0.9	4.8	0 - 5
# 8 (2.36mm)	202.8	0.4	4.4	0 - 5
# 16 (1.18mm)	156.2	0.3	4.1	0 - 5
# 30 (600um)	111.5	0.2	3.9	
# 50 (300um)	129.0	0.3	3.6	
#100 (150um)	159.5	0.3	3.3	
#200 (75um)	291.4	0.6	2.7	0 - 5
-#200 (-75um)	32.8			

Total Sample Aggregate Weight: 283728.8
- 3/4" Aggregate Weight: 5304.7
- 3/4" After Wash Weight: 4026.6

REMARKS: Test performed for 4th 5,000 yd³ placed.
Test passed.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 John Christensen

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/02/11
PROJECT: MISC. QC
SAMPLE LOCATION: LOT 3 - IN PLACE SAMPLE UCDO1110809-00
MATERIAL TYPE: ~~COVER TOP~~ 2" Cap Rock Source: Freemont Junction Grey Basalt
TESTED BY: KC 1-6-1200 SAMPLED BY: KH LAB #: 6540

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	30473.3	10.6	89.4	
2 in. (50mm)	120322.3	42.0	47.3	40 - 50
1 1/2 in. (37.5mm)	54892.2	19.2	28.1	20 - 30
1 in. (25mm)	38368.8	13.4	14.7	10 - 20
3/4 in. (19mm)	15498.2	5.4	9.3	
1/2 in. (12.5mm)	2426.9	4.2	5.1	5 - 15
3/8 in. (9.5mm)	452.0	0.8	4.3	
# 4 (4.75mm)	489.6	0.9	3.5	0 - 5
# 8 (2.36mm)	222.3	0.4	3.1	0 - 5
# 16 (1.18mm)	179.7	0.3	2.8	0 - 5
# 30 (600um)	129.2	0.2	2.6	
# 50 (300um)	144.7	0.3	2.3	
#100 (150um)	178.6	0.3	2.0	
#200 (75um)	245.3	0.4	1.6	0 - 5
-#200 (-75um)	47.9			

Total Sample Aggregate Weight: 286271.0
- 3/4" Aggregate Weight: 5367.1 - 3/4" After Wash Weight: 4516.2

REMARKS: Test performed for the 5th 5,000 yd^3 placed.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 John Charlesworth

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 12/02/11
PROJECT: MISC. QC
SAMPLE LOCATION: LOT 2 - IN PLACE SAMPLE
MATERIAL TYPE: ~~COVER TOP~~ 7" Cap Rock Grey Basalt Source: Freemont Junction
TESTED BY: KC SAMPLED BY: KH LAB #: 6541

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	49200.7	14.0	86.0	
2 in. (50mm)	112239.6	31.9	54.1	40 - 50
1 1/2 in. (37.5mm)	68755.2	19.5	34.6	20 - 30
1 in. (25mm)	56324.9	16.0	18.6	10 - 20
3/4 in. (19mm)	23660.8	6.7	11.8	
1/2 in. (12.5mm)	1912.2	4.5	7.3	5 - 15
3/8 in. (9.5mm)	385.6	0.9	6.4	
# 4 (4.75mm)	514.9	1.2	5.2	0 - 5
# 8 (2.36mm)	313.1	0.7	4.4	0 - 5
# 16 (1.18mm)	242.4	0.6	3.9	0 - 5
# 30 (600um)	170.9	0.4	3.4	
# 50 (300um)	195.7	0.5	3.0	
#100 (150um)	228.5	0.5	2.4	
#200 (75um)	267.1	0.6	1.8	0 - 5
-#200 (-75um)	56.6			

Total Sample Aggregate Weight: 351819.3
- 3/4" Aggregate Weight: 4992.4 - 3/4" After Wash Weight: 4287.0

REMARKS: This gradation represents the 6th 5,000 yd3 placed.
Test passed due to in place testing tolerance.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 John Christensen

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 12/02/11
PROJECT: MISC. QC
SAMPLE LOCATION: LOT 1 - IN PLACE SAMPLE
MATERIAL TYPE: COVER TOP
TESTED BY: KC SAMPLED BY: KH LAB #: 6540

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)		0.0	100.0	
6 in. (150mm)		0.0	100.0	
4 in. (100mm)		0.0	100.0	100
3 in. (75mm)	55221.9	13.7	86.3	
2 in. (50mm)	139025.2	34.6	51.7	40 - 60
1 1/2 in. (37.5mm)	75829.8	18.9	32.8	20 - 30
1 in. (25mm)	69035.1	17.2	15.6	10 - 20
3/4 in. (19mm)	28858.6	7.2	8.4	
1/2 in. (12.5mm)	2258.4	3.7	4.7	5 - 15
3/8 in. (9.5mm)	387.6	0.6	4.1	
# 4 (4.75mm)	526.1	0.9	3.2	0 - 5
# 8 (2.36mm)	321.8	0.5	2.7	0 - 5
# 16 (1.18mm)	262.9	0.4	2.3	0 - 5
# 30 (600um)	178.9	0.3	2.0	
# 50 (300um)	192.5	0.3	1.7	
#100 (150um)	217.7	0.4	1.3	
#200 (75um)	235.2	0.4	0.9	0 - 5
-#200 (-75um)	34.0			

Total Sample Aggregate Weight: 401968.5
-3/4" Aggregate Weight: 5158.3 -3/4" After Wash Weight: 4615.1

REMARKS: This gradation represents the 7th & 8th 5,000 yd³ placed.
Test passed due to in place testing tolerance.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 Josh Christensen

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A7. Cap Rock and Armoring
Armoring Lift Approval Summaries

Apron Armoring

Date	Lift ID	# of Gradation Tests Required	# of Passing Gradation Tests	# of Passing Durability Tests	Quantity Approved (yd^3)	Required Thickness (in.)	Actual Thickness (in.)	Required D50* (in.)	Area (ft^2)	Northing	Easting
12/14/11	West Slope Apron Armoring	1 Riprap	1 Riprap	1 Riprap	Riprap = 1,757	Riprap = 16	Riprap = 18	5.0	31,622	6795875	2121989
12/27/11	North Apron and Bedding	1 Riprap 1 Bedding	2 Riprap 2 Bedding	1 Riprap	Riprap = 2,005 Bedding = 477	Riprap = 24 Bedding = 4	Riprap = 25.2 Bedding = 6	8.0	25,777	6796031	2122122
12/27/11	South Apron and Bedding	1 Riprap 1 Bedding	1 Riprap 3 Bedding	1 Riprap	Riprap = 4,325 Bedding = 676	Riprap = 36 Bedding = 4	Riprap = 38.4 Bedding = 6	11.8	36,492	6794035	2122212

Total # of Bedding Gradation Tests = 5

Total # of Riprap Gradation Tests = 4

Total # of Durability Tests = 3

Total Bedding Material Approved (yd^3) = 1,153

Total Riprap Material Approved (yd^3) = 8,087

Bedding per Gradation Test (yd^3) = 231

Riprap per Gradation Test (yd^3) = 2,022

Quantity per Durability Test (yd^3) = 2,696

1. The D50 measurement is the median particle size.

Side Slope Armoring

Date	Lift ID	# of Passing Gradation Tests	# of Passing Durability Tests	Quantity Approved (yd^3)	Required Thickness (in.)	Actual Thickness (in.)	Area (ft^2)	Northing	Easting
12/14/11	West Slope Riprap Armoring	1	1	4,828	6	7.2	217,273	6795872	2122008
12/20/11	North Slope Riprap Armoring	1	1	840	8	9.6	28,352	6796063	2122116
12/29/11	South Slope Riprap Armoring	1	1	4,247	12	13.2	104255	6794126	2122237

Total # of Gradation Tests Performed = 3

Total # of Durability Tests Performed = 3

Total Quantity Approved (yd^3) = 9,915

Quantity per Gradation Test (yd^3) = 3,305

Quantity per Durability Test (yd^3) = 3,305

Moab UMTRA Project
Riprap Buyoff Form

CLIENT: DOE

PROJECT: MOAB UMTRA

DATE: 02/01/2012

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

LIFT AREA	LIFT AREA
North Edge and North Apron Riprap	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson/ Construction Manager	Brent Anderson	02/01/2012
Beachem Bosh/ QA/QC Rep.		02/01/2012
Mitch Hogan/ QA/QC Rep.		02/01/2012

COMMENTS		
Attached is the As-built and Thickness verification survey's		

OP-F-023
Rev 0, June 2011

File Code Index No: 10.1.3
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Crescent Junction Disposal Site Phase 1 Cell North Slope and Apron As-built Survey Johansen & Tuttle Engineering, Inc.			Date: Dec 27 thru 29 2011	
Point #	Northing	Easting	Elev.	Description
2000	6796010	2122599	4994.6	EDGE ARMOR
2001	6796062	2122595	4984.3	EDGE ARMOR
2002	6796072	2122603	4982.9	EDGE ARMOR
2003	6796091	2122600	4983.5	EDGE ARMOR
2004	6796091	2122564	4984.8	EDGE ARMOR
2005	6796121	2122565	4995.0	EDGE ARMOR
2006	6796091	2122583	4984.8	A
2007	6796086	2122587	4985.0	A
2008	6796042	2122589	4989.7	A
2009	6796030	2122591	4990.6	B
2010	6796009	2122594	4994.9	B
2011	6795998	2122595	4995.3	B
2012	6795988	2122546	4995.1	B
2013	6796001	2122544	4994.9	B
2014	6796022	2122542	4990.8	B
2015	6796035	2122540	4989.7	A
2016	6796060	2122537	4984.8	A
2017	6796086	2122534	4985.0	A
2018	6796096	2122532	4988.0	B
2019	6796111	2122530	4993.3	B
2020	6796116	2122530	4994.7	B
2021	6796109	2122480	4994.6	B
2022	6796103	2122481	4992.7	B
2023	6796084	2122484	4986.0	B
2024	6796080	2122484	4984.8	A
2025	6796052	2122488	4984.6	A
2026	6796031	2122490	4989.1	A
2027	6796017	2122492	4990.0	B
2028	6795995	2122495	4994.7	B
2029	6795982	2122496	4994.9	B
2030	6795976	2122447	4994.7	B
2031	6795989	2122445	4994.5	B
2032	6796012	2122442	4989.8	B
2033	6796026	2122440	4989.0	A
2034	6796047	2122438	4984.6	A
2035	6796072	2122434	4984.3	A
2036	6796077	2122434	4985.4	B
2037	6796096	2122431	4992.1	B
2038	6796104	2122431	4994.4	B
2039	6796087	2122381	4994.2	B
2040	6796080	2122383	4988.4	B
2041	6796069	2122384	4984.7	B
2042	6796068	2122385	4984.4	A
4986	6796041	2122388	4984.4	A
4987	6796020	2122391	4988.6	A
4988	6796007	2122392	4989.5	B
4989	6795983	2122395	4994.2	B
4990	6795970	2122397	4994.7	B
4991	6795963	2122347	4994.4	B
2043	6795977	2122346	4994.1	B
2044	6796002	2122343	4988.9	B

A7. Cap Rock and Armoring
Armoring Buyoff Surveys

2045	6796014	2122341	4988.3	A
2046	6796033	2122339	4984.1	A
2047	6796044	2122337	4984.3	A
2048	6796061	2122335	4984.0	A
2049	6796065	2122335	4985.3	B
2050	6796083	2122333	4991.6	B
2051	6796091	2122332	4993.9	B
2052	6796085	2122282	4993.7	B
2053	6796080	2122282	4992.5	B
2054	6796057	2122285	4984.3	B
2055	6796055	2122286	4983.8	A
2056	6796028	2122289	4984.1	A
2057	6796009	2122291	4988.1	A
2058	6795995	2122293	4988.8	B
2059	6795971	2122296	4993.9	B
2060	6795958	2122298	4994.1	B
2061	6795954	2122248	4993.8	B
2062	6795965	2122246	4993.7	B
2063	6795990	2122243	4988.4	B
2064	6796001	2122242	4987.9	A
2065	6796019	2122240	4984.3	A
2066	6796048	2122236	4983.9	A
2067	6796050	2122236	4984.2	B
2068	6796073	2122233	4992.1	B
2069	6796078	2122232	4993.5	B
2070	6796073	2122183	4993.5	B
2071	6796065	2122183	4991.2	B
2072	6796044	2122186	4984.0	B
2073	6796042	2122186	4983.4	A
2074	6796015	2122190	4984.1	A
2075	6795997	2122192	4987.8	A
2076	6795983	2122194	4988.4	B
2077	6795960	2122197	4993.3	B
2078	6795942	2122199	4993.6	B
2079	6795939	2122149	4993.5	B
2080	6795934	2122136	4993.4	B
2081	6795952	2122134	4992.9	B
2082	6795967	2122132	4989.8	B
4992	6795975	2122131	4988.8	B
4993	6795984	2122130	4988.2	A
4994	6795990	2122129	4987.2	A
4995	6796006	2122127	4983.9	A
4996	6796033	2122124	4983.5	A
4997	6796035	2122123	4983.6	B
4998	6796054	2122121	4990.3	B
4999	6796062	2122120	4992.8	B
2083	6796032	2122114	4983.2	N/W
2084	6796002	2122118	4983.8	N/W

A7. Cap Rock and Armoring
Armoring Buyoff Surveys

Slope Elevation Survey

Average lift thickness=	0.8	Bounding Box	Northing	Easting		
Grid Size=	N/A	Lower Left	N			
Lift ID:	North Slope Riprap Armoring	Upper Right		A		

Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6796100	2122493	4990.0	6796100	2122493	4990.8	0.8	OK
6796094	2122418	4990.9	6796094	2122418	4991.6	0.7	OK
6796077	2122254	4991.6	6796077	2122254	4992.4	0.7	OK
6796068	2122207	4990.6	6796068	2122207	4991.4	0.9	OK
6796064	2122149	4991.4	6796064	2122149	4992.2	0.8	OK
6796092	2122527	4986.2	6796092	2122527	4987.0	0.8	OK
6796098	2122463	4990.5	6796098	2122463	4991.4	0.9	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
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						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK

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Slope Elevation Survey

Average lift thickness=	2.1	Bounding Box	Northing	Easting
Grid Size=	N/A	Lower Left	N	
Lift ID:	North Slope Apron Riprap	Upper Right		A

Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6796062	2122478	4982.56	6796062	2122478	4984.60	2.04	OK
6796037	2122533	4986.87	6796037	2122533	4988.95	2.08	OK
6796041	2122580	4987.96	6796041	2122580	4989.97	2.01	OK
6796081	2122574	4982.88	6796081	2122574	4984.97	2.09	OK
6796022	2122205	4981.70	6796022	2122205	4984.12	2.42	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
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						0.0	OK
						0.0	OK
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						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK

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Moab UMTRA Project
Riprap Buyoff Form

CLIENT: DOE

PROJECT: MOAB UMTRA

DATE: 2-1-2012

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

LIFT AREA	LIFT AREA
South Apron and South Edge	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson / Construction Manager		2-1-2012
Beachem Bosh / QA/QC Rep		2-1-2012
Mitch Hogan / QA/QC Rep		2-1-2012

COMMENTS		
Attahced is the As built survey and Thickness Verification survey's.		

OP-F-023
Rev 0, June 2011

File Code Index No: 10.1.3
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A7. Cap Rock and Armoring
Armoring Buyoff Surveys

Crescent Junction Disposal Site Phase 1 Cell South Slope and Apron As-built Survey Johansen & Tuttle Engineering, Inc.			Date: Dec 27 thru 29 2011	
Point #	Northing	Easting	Elev.	Description
2174	6794156	2122203	4967.6	EDG RK
2175	6794148	2122201	4969.0	EDG RK
2176	6794141	2122210	4966.1	EDG RK
2177	6794131	2122213	4965.6	EDG RK/RIPRAP
2178	6794132	2122231	4967.0	EDG RK/RIPRAP
2179	6794103	2122236	4966.4	EDG RK/RIPRAP
2180	6794080	2122237	4962.1	EDG RK/RIPRAP
2181	6794057	2122238	4957.1	EDG RK/RIPRAP
2182	6794038	2122238	4953.1	EDG RK/RIPRAP
2183	6794042	2122223	4953.4	EDG RK/RIPRAP
2184	6794032	2122207	4952.7	EDG RK/RIPRAP
2185	6794046	2122213	4955.0	EDG RIPRAP
2186	6794067	2122218	4959.0	EDG RIPRAP
2187	6794095	2122213	4964.7	EDG RIPRAP
2188	6794118	2122212	4966.6	EDG RIPRAP
2189	6794023	2122201	4950.1	END RK
2190	6794002	2122202	4951.3	END RK
2191	6793994	2122212	4953.4	EDG RK
2192	6794050	2123101	4950.4	EDGE RK
2193	6794065	2123105	4945.6	EDGE RK
2194	6794132	2123101	4955.8	EDGE RK
2195	6794221	2123086	4974.1	EDGE RK
2196	6794232	2123050	4975.7	B
2197	6794220	2123052	4976.0	B
2198	6794211	2123052	4973.6	B
2199	6794143	2123059	4960.0	B
2200	6794102	2123063	4951.5	B
2201	6794091	2123065	4949.9	A
2202	6794073	2123066	4948.7	A
2203	6794060	2123067	4948.8	A
2204	6794052	2123068	4950.5	A
2205	6794046	2122969	4950.7	A
2206	6794056	2122967	4948.8	A
2207	6794072	2122966	4948.7	A
2208	6794083	2122965	4949.8	A
2209	6794096	2122964	4951.9	B
2210	6794146	2122958	4962.1	B
2211	6794200	2122953	4973.1	B
2212	6794209	2122952	4974.8	B
2213	6794223	2122951	4975.4	B
2214	6794212	2122851	4975.0	B
2215	6794202	2122852	4974.5	B
2216	6794190	2122854	4972.5	B
2217	6794131	2122860	4960.6	B
2218	6794084	2122864	4951.4	B
2219	6794075	2122865	4949.9	A
2220	6794062	2122866	4949.0	A
2221	6794049	2122868	4948.7	A
2222	6794040	2122869	4950.7	A
2223	6794036	2122869	4951.1	A
2224	6794028	2122769	4951.2	A
2225	6794033	2122769	4950.9	A
2226	6794038	2122768	4949.7	A
2227	6794053	2122767	4949.1	A

2228	6794068	2122765	4950.4	A
2229	6794077	2122764	4951.9	B
2230	6794125	2122759	4961.1	B
2231	6794171	2122755	4970.5	B
2232	6794187	2122753	4973.7	B
2233	6794197	2122752	4974.5	B
2234	6794204	2122752	4974.7	B
2235	6794194	2122652	4974.3	B
2236	6794181	2122653	4973.8	B
2237	6794169	2122655	4972.0	B
2238	6794113	2122660	4960.5	B
2239	6794066	2122665	4951.1	B
2240	6794059	2122666	4950.8	A
2241	6794046	2122667	4949.4	A
2242	6794034	2122668	4949.7	A
2243	6794024	2122669	4951.1	A
2244	6794017	2122569	4951.0	A
2245	6794028	2122568	4949.8	A
2246	6794043	2122567	4950.1	A
2247	6794055	2122566	4951.3	A
2248	6794077	2122563	4954.9	B
2249	6794108	2122560	4961.3	B
2250	6794153	2122556	4970.4	B
2251	6794167	2122554	4973.1	B
2252	6794183	2122553	4974.0	B
2253	6794170	2122454	4973.3	B
2254	6794159	2122455	4973.2	B
2255	6794153	2122455	4972.1	B
2256	6794100	2122461	4961.3	B
2257	6794059	2122465	4952.9	B
2258	6794048	2122466	4951.3	A
2259	6794036	2122467	4950.4	A
2260	6794020	2122469	4950.2	A
2261	6794011	2122469	4951.7	A
2262	6794006	2122369	4951.8	A
2263	6794016	2122368	4950.2	A
2264	6794028	2122367	4950.5	A
2265	6794041	2122366	4951.6	A
2266	6794053	2122365	4953.6	B
2267	6794090	2122361	4961.0	B
2268	6794134	2122357	4970.0	B
2269	6794146	2122356	4972.3	B
2270	6794160	2122354	4973.0	B
2271	6794153	2122282	4972.7	B
2272	6794134	2122268	4972.0	B
2273	6794106	2122247	4967.0	B
2274	6794092	2122236	4964.6	B
2275	6794080	2122228	4960.4	B
2276	6794073	2122222	4959.3	B
2277	6794069	2122218	4959.7	B
2278	6794036	2122249	4952.7	A
2279	6794013	2122251	4952.2	A
2280	6794000	2122252	4952.7	A
2281	6793998	2122210	4953.2	A
2282	6794016	2122210	4952.9	A
2283	6794030	2122211	4952.9	A

Slope Elevation Survey

Average lift thickness=	1.1	Bounding Box	Northing	Easting	
Grid Size=	N/A	Lower Left	N		
Lift ID:	South Slope Riprap Armoring	Upper Right		A	

Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6794051	2122296	4953.32	6794051	2122296	4954.71	1.39	OK
6794080	2122294	4959.31	6794080	2122294	4960.78	1.47	OK
6794059	2122389	4953.13	6794059	2122389	4954.14	1.01	OK
6794091	2122388	4959.48	6794091	2122388	4960.63	1.15	OK
6794098	2122503	4959.07	6794098	2122503	4960.08	1.01	OK
6794067	2122505	4952.81	6794067	2122505	4953.82	1.01	OK
6794076	2122643	4952.43	6794076	2122643	4953.46	1.03	OK
6794119	2122639	4960.86	6794119	2122639	4962.09	1.23	OK
6794082	2122719	4952.28	6794082	2122719	4953.38	1.08	OK
6794132	2122714	4962.35	6794132	2122714	4963.38	1.03	OK
6794170	2122709	4969.87	6794170	2122709	4970.93	1.06	OK
6794164	2122617	4970.29	6794164	2122617	4971.31	1.02	OK
6794149	2122531	4968.71	6794149	2122531	4969.85	1.14	OK
6794141	2122450	4968.49	6794141	2122450	4969.60	1.11	OK
6794134	2122329	4969.21	6794134	2122329	4970.85	1.64	OK
6794079	2122252	4960.20	6794079	2122252	4961.50	1.30	OK
6794089	2122799	4952.24	6794089	2122799	4953.25	1.01	OK
6794129	2122797	4960.36	6794129	2122797	4961.36	1.00	OK
6794171	2122794	4968.54	6794171	2122794	4969.63	1.09	OK
6794181	2122897	4969.00	6794181	2122897	4970.10	1.10	OK
6794133	2122898	4959.48	6794133	2122898	4960.49	1.01	OK
6794093	2122902	4951.53	6794093	2122902	4952.57	1.04	OK
6794038	2122304	4951.16	6794038	2122304	4952.24	1.08	OK
6794043	2122402	4950.22	6794043	2122402	4951.47	1.24	OK
6794051	2122514	4950.01	6794051	2122514	4951.06	1.05	OK
6794059	2122620	4949.78	6794059	2122620	4950.99	1.21	OK
6794066	2122732	4949.54	6794066	2122732	4950.58	1.04	OK
6794108	2123018	4952.34	6794108	2123018	4953.38	1.04	OK
6794149	2123016	4960.77	6794149	2123016	4961.81	1.03	OK
6794193	2123016	4969.31	6794193	2123016	4970.34	1.03	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
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						0.0	OK
						0.0	OK

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A7. Cap Rock and Armoring
Armoring Buyoff Surveys

Slope Elevation Survey

Average lift thickness=	3.2	Bounding Box	Northing	Easting
Grid Size=	N/A	Lower Left	N	
Lift ID:	South Slope Apron Armoring	Upper Right		A

Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6794015	2122258	4949.3	6794015	2122258	4952.3	3.01	OK
6794009	2122301	4948.2	6794009	2122301	4951.2	3.01	OK
6794027	2122351	4948.0	6794027	2122351	4951.1	3.01	OK
6794023	2122402	4947.5	6794023	2122402	4950.5	3.01	OK
6794018	2122462	4947.4	6794018	2122462	4950.4	3.05	OK
6794037	2122514	4947.0	6794037	2122514	4950.1	3.09	OK
6794032	2122565	4947.1	6794032	2122565	4950.1	3.05	OK
6794043	2122621	4946.7	6794043	2122621	4949.7	3.03	OK
6794004	2122212	4949.8	6794004	2122212	4952.9	3.10	OK
6794019	2122213	4949.7	6794019	2122213	4952.8	3.09	OK
6794012	2122247	4949.4	6794012	2122247	4952.5	3.04	OK
6794044	2122806	4945.8	6794044	2122806	4948.9	3.11	OK
6794051	2122806	4945.7	6794051	2122806	4949.1	3.43	OK
6794057	2122876	4945.5	6794057	2122876	4948.8	3.32	OK
6794056	2122952	4945.5	6794056	2122952	4948.6	3.13	OK
6794064	2122952	4945.4	6794064	2122952	4949.2	3.83	OK
6794065	2123017	4945.3	6794065	2123017	4948.4	3.13	OK
6794074	2123091	4945.2	6794074	2123091	4948.5	3.30	OK
6794069	2123063	4945.1	6794069	2123063	4948.8	3.69	OK
6794065	2122991	4945.4	6794065	2122991	4948.7	3.30	OK
6794060	2122917	4945.4	6794060	2122917	4948.9	3.48	OK
6794055	2122845	4945.6	6794055	2122845	4948.9	3.31	OK
						0.0	OK
						0.0	OK
						0.0	OK
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						0.0	OK

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Moab UMTRA Project
Riprap Buyoff Form

CLIENT: DOE

PROJECT: MOAB UMTRA

DATE: 02/01/2012

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

LIFT AREA	LIFT AREA
West Edge and West Apron Riprap	

APPROVER NAME/TITLE	SIGNATURE	SIGN DATE
Brent Anderson/ Construction Manager		02/01/2012
Beachem Bosh/ QA/QC Rep.		02/01/2012
Mitch Hogan/ QA/QC Rep.		02/01/2012

COMMENTS		
Attached is the As-built and Thickness verification survey's		

OP-F-023
Rev 0, June 2011

File Code Index No: 10.1.3
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A7. Cap Rock and Armoring
Armoring Buyoff Surveys

Crescent Junction Disposal Site Phase 1 Cell West Slope and Apron As-built Survey Johansen & Tuttle Engineering, Inc.			Date: Dec 27 thru 29 2011	
Point #	Northing	Easting	Elev.	Description
2111	6795864	2121962	4989.8	W
2112	6795864	2121969	4987.7	W
2113	6795865	2121985	4982.5	W
2114	6795866	2121990	4981.0	W
2115	6795867	2122007	4981.3	W
2116	6795870	2122036	4987.0	W
2117	6795871	2122060	4991.8	W
2118	6795872	2122071	4994.1	W
2119	6795873	2122084	4994.2	W
2120	6795808	2122088	4995.5	W
2121	6795808	2122078	4995.4	W
2122	6795806	2122062	4992.2	W
2123	6795804	2122037	4987.2	W
2124	6795801	2122002	4980.0	W
2125	6795800	2121984	4980.2	W
2126	6795799	2121980	4981.2	W
2127	6795798	2121966	4986.1	W
2128	6795798	2121959	4988.1	W
2129	6795747	2121958	4986.5	W
2130	6795748	2121966	4983.7	W
2131	6795749	2121977	4980.0	W
2132	6795749	2121980	4979.2	W
2133	6795750	2121992	4978.8	W
2134	6795751	2121997	4979.3	W
2135	6795753	2122030	4986.0	W
2136	6795754	2122058	4991.3	W
2137	6795757	2122081	4996.2	W
2138	6795758	2122091	4996.4	W
2139	6795708	2122095	4997.5	W
2140	6795707	2122085	4997.2	W
2141	6794760	2122029	4964.8	EDG RK
2142	6794730	2122033	4964.4	EDG RK
2143	6794707	2122035	4964.3	EDG RK
2144	6794678	2122031	4964.4	EDG RK
2145	6794657	2122024	4964.7	EDG RK
2146	6794651	2122023	4965.9	EDG RK
2147	6794637	2122023	4965.9	EDG RK
2148	6794621	2122031	4966.4	EDG RK
2149	6794607	2122045	4967.8	EDG RK
2150	6794595	2122066	4970.3	EDG RK
2151	6794588	2122094	4974.0	EDG RK
2152	6794588	2122109	4976.1	EDG RK
2153	6794595	2122125	4977.0	EDG RK
2154	6794598	2122129	4976.3	EDG RK
2155	6794625	2122131	4976.0	EDG RK
2156	6794659	2122138	4976.2	EDG RK
2157	6794680	2122143	4976.6	EDG RK
2158	6794696	2122142	4977.0	EDG RK
2159	6794709	2122148	4978.0	EDG RK
2160	6794689	2122154	4977.6	EDG RK
2161	6794659	2122159	4977.1	EDG RK

A7. Cap Rock and Armoring
Armoring Buyoff Surveys

2162	6794607	2122160	4976.0	EDG RK
2163	6794579	2122166	4975.4	EDG RK
2164	6794559	2122165	4975.2	EDG RK
2165	6794507	2122172	4974.0	EDG RK
2166	6794452	2122180	4972.2	EDG RK
2167	6794398	2122187	4970.9	EDG RK
2168	6794343	2122192	4969.7	EDG RK
2169	6794288	2122199	4968.5	EDG RK
2170	6794236	2122205	4967.5	EDG RK
2171	6794193	2122207	4966.7	EDG RK
2172	6794166	2122210	4966.0	EDG RK
2173	6794156	2122209	4965.9	EDG RK
2284	6794157	2122266	4972.8	W
2285	6794155	2122233	4968.5	W
2286	6794154	2122222	4966.6	W
2287	6794153	2122211	4965.9	W
2288	6794213	2122207	4967.0	W
2289	6794215	2122218	4967.3	W
2290	6794218	2122250	4973.9	W
2291	6794319	2122243	4976.9	W
2292	6794316	2122223	4972.9	W
2293	6794314	2122209	4969.8	W
2294	6794313	2122196	4969.1	W
2295	6794412	2122185	4971.3	W
2296	6794414	2122197	4971.6	W
2297	6794416	2122213	4975.4	W
2298	6794418	2122232	4979.2	W
2299	6794511	2122170	4974.2	W
2300	6794513	2122184	4974.4	W
2301	6794515	2122203	4978.4	W
2302	6794517	2122220	4981.9	W
2303	6794616	2122207	4984.2	W
2304	6794614	2122184	4979.6	W
2305	6794611	2122166	4975.9	W
2306	6794602	2122167	4976.1	END A
2307	6794716	2122196	4986.8	W
2308	6794712	2122168	4981.3	W
2309	6794710	2122148	4978.1	W
2310	6794709	2122142	4977.5	W
2311	6794705	2122113	4971.4	W
2312	6794699	2122062	4960.9	W
2313	6794697	2122045	4960.6	W
2314	6794695	2122033	4964.4	W
2315	6794795	2122023	4965.9	W
2316	6794796	2122033	4962.3	W
2317	6794798	2122048	4962.0	W
2318	6794802	2122080	4968.6	W
2319	6794809	2122133	4979.5	W
2320	6794815	2122182	4989.2	W
2321	6794914	2122170	4991.7	W
2322	6794909	2122126	4983.1	W
2323	6794901	2122068	4971.3	W
2324	6794897	2122033	4963.9	W
2325	6794895	2122018	4964.1	W
2326	6794894	2122007	4967.4	W

A7. Cap Rock and Armoring
Armoring Buyoff Surveys

2327	6794992	2121891	4969.7	W
2328	6794994	2122002	4966.0	W
2329	6794996	2122016	4966.0	W
2330	6795002	2122067	4976.1	W
2331	6795009	2122122	4987.2	W
2332	6795014	2122159	4994.4	W
2333	6795113	2122146	4996.9	W
2334	6795108	2122108	4989.5	W
2335	6795100	2122043	4976.3	W
2336	6795095	2122005	4968.3	W
2337	6795093	2121987	4967.7	W
2338	6795091	2121976	4971.4	W
2339	6795190	2121961	4973.0	W
2340	6795191	2121970	4970.0	W
2341	6795194	2121987	4969.7	W
2342	6795198	2122025	4977.7	W
2343	6795206	2122087	4989.9	W
2344	6795212	2122133	4999.4	W
2345	6795311	2122122	5001.9	W
2346	6795304	2122065	4990.6	W
2347	6795298	2122021	4981.7	W
2348	6795293	2121974	4972.1	W
2349	6795290	2121955	4971.6	W
2350	6795289	2121944	4975.3	W
2351	6795395	2121937	4977.6	W
2352	6795396	2121950	4973.4	W
2353	6795397	2121965	4973.7	W
2354	6795402	2122026	4986.1	W
2355	6795406	2122074	4996.2	W
2356	6795409	2122110	5003.4	W
2357	6795508	2122102	5001.4	W
2358	6795504	2122052	4991.2	W
2359	6795501	2122011	4982.7	W
2360	6795498	2121977	4975.8	W
2361	6795497	2121959	4974.9	W
2362	6795496	2121943	4980.4	W
2363	6795596	2121948	4982.8	W
2364	6795598	2121966	4976.9	W
2365	6795599	2121984	4976.8	W
2366	6795603	2122036	4987.5	W
2367	6795608	2122094	4999.4	W
2368	6795708	2122086	4997.3	W
2369	6795704	2122047	4989.4	W
2370	6795700	2121994	4978.7	W
2371	6795699	2121975	4978.4	W
2372	6795697	2121954	4985.3	W
2085	6795935	2122115	4993.4	W
2086	6795945	2122111	4993.1	W
2087	6795958	2122104	4990.6	W
2088	6795977	2122095	4986.0	W
2089	6795995	2122086	4982.0	W
2090	6796018	2122076	4982.1	W
2091	6796039	2122065	4990.8	W
2092	6796044	2122063	4992.3	W
2093	6795991	2122001	4991.4	W

2094	6795987	2122007	4989.0	W
2095	6795977	2122020	4982.7	W
2096	6795973	2122024	4981.5	W
2097	6795961	2122039	4981.5	W
2098	6795959	2122041	4982.0	W
2099	6795937	2122070	4989.6	W
2100	6795926	2122084	4992.9	W
2101	6795923	2122087	4993.3	W
2102	6795916	2122096	4993.5	W
2103	6795891	2122086	4993.8	W
2104	6795895	2122073	4993.6	W
2105	6795898	2122059	4990.9	W
2106	6795905	2122029	4984.6	W
2107	6795908	2122013	4981.6	W
2108	6795913	2121995	4981.4	W
2109	6795916	2121983	4985.4	W
2110	6795918	2121970	4990.4	W

ENERGYSOLUTIONS

Slope Elevation Survey

Average lift thickness=	0.6	Bounding Box	Northing	Easting	
Grid Size=	N/A	Lower Left	N		
Lift ID:	West Slope Riprap Armoring	Upper Right		A	

Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6795731	2122069	4993.0	6795731	2122069	4993.5	0.5	OK
6795668	2122069	4993.3	6795668	2122069	4993.8	0.5	OK
6795623	2122085	4996.7	6795623	2122085	4997.3	0.6	OK
6795536	2122041	4988.3	6795536	2122041	4988.8	0.5	OK
6795536	2122090	4998.2	6795536	2122090	4998.8	0.6	OK
6795436	2122099	5000.3	6795436	2122099	5001.0	0.7	OK
6795433	2122064	4993.4	6795433	2122064	4993.9	0.5	OK
6795429	2122035	4987.3	6795429	2122035	4987.8	0.5	OK
6795365	2122022	4984.6	6795365	2122022	4985.2	0.6	OK
6795371	2122060	4992.4	6795371	2122060	4993.0	0.6	OK
6795370	2122107	5001.4	6795370	2122107	5002.0	0.6	OK
6795299	2122111	4998.6	6795299	2122111	4999.3	0.7	OK
6795294	2122076	4991.7	6795294	2122076	4992.3	0.6	OK
6795286	2122034	4983.1	6795286	2122034	4983.6	0.5	OK
6795283	2122009	4978.1	6795283	2122009	4978.6	0.5	OK
6795206	2122022	4976.8	6795206	2122022	4977.4	0.6	OK
6795213	2122068	4986.2	6795213	2122068	4986.9	0.7	OK
6795220	2122114	4995.4	6795220	2122114	4995.9	0.5	OK
6795111	2122138	4994.7	6795111	2122138	4995.2	0.5	OK
6795103	2122078	4982.5	6795103	2122078	4983.2	0.7	OK
6795096	2122031	4973.2	6795096	2122031	4973.7	0.5	OK
6795021	2122056	4974.3	6795021	2122056	4974.9	0.6	OK
6795026	2122102	4983.5	6795026	2122102	4984.1	0.6	OK
6794956	2122159	4991.2	6794956	2122159	4991.7	0.5	OK
6794948	2122105	4980.1	6794948	2122105	4980.7	0.6	OK
6794883	2122082	4972.5	6794883	2122082	4973.2	0.6	OK
6794893	2122130	4982.4	6794893	2122130	4983.0	0.6	OK
6794833	2122175	4988.1	6794833	2122175	4988.7	0.6	OK
6794825	2122115	4976.1	6794825	2122115	4976.7	0.6	OK
6794758	2122096	4969.1	6794758	2122096	4969.6	0.5	OK
6794762	2122138	4977.4	6794762	2122138	4977.9	0.5	OK
6794740	2122171	4982.6	6794740	2122171	4983.3	0.7	OK
6794711	2122124	4972.9	6794711	2122124	4973.8	0.9	OK
6794691	2122091	4985.8	6794691	2122091	4986.4	0.6	OK
6794647	2122093	4967.2	6794647	2122093	4968.0	0.8	OK
6794654	2122193	4982.7	6794654	2122193	4983.4	0.7	OK
6794652	2122171	4978.3	6794652	2122171	4978.9	0.6	OK
6794619	2122089	4967.4	6794619	2122089	4968.2	0.8	OK
6794625	2122123	4974.0	6794625	2122123	4974.7	0.7	OK
6794658	2122136	4975.6	6794658	2122136	4976.1	0.5	OK
6794695	2122188	4983.7	6794695	2122188	4984.2	0.5	OK
6794578	2122205	4981.2	6794578	2122205	4981.8	0.6	OK
6794573	2122176	4975.3	6794573	2122176	4976.0	0.7	OK
6794510	2122200	4976.8	6794510	2122200	4977.4	0.6	OK
6794441	2122194	4972.1	6794441	2122194	4972.8	0.7	OK
6794443	2122222	4977.8	6794443	2122222	4978.4	0.6	OK
6794365	2122213	4972.3	6794365	2122213	4972.8	0.5	OK
6794313	2122239	4975.1	6794313	2122239	4975.7	0.6	OK
6794251	2122229	4970.5	6794251	2122229	4971.1	0.6	OK
6794183	2122251	4971.9	6794183	2122251	4972.7	0.8	OK
6794138	2122240	4968.3	6794138	2122240	4968.8	0.5	OK
						0.0	OK

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A7. Cap Rock and Armoring
Armoring Buyoff Surveys

ENERGYSOLUTIONS

Slope Elevation Survey

	Average lift thickness=		1.5	Bounding Box	Northing	Easting	
	Grid Size=	N/A		Lower Left	N		
Lift ID:	West Slope Apron - Southern Ditch			Upper Right		A	

Last Lift Elevations			Lift Approval Elevations			Lift Thickness	
Northing	Easting	Elevation	Northing	Easting	Elevation	Thickness	
6794308	2122204	4967.900	6794308	2122204	4969.243	1.343	OK
6794229	2122209	4966.0	6794229	2122209	4967.5	1.5	OK
6794342	2122197	4968.3	6794342	2122197	4969.9	1.6	OK
6794448	2122185	4970.8	6794448	2122185	4972.4	1.6	OK
6794549	2122172	4973.4	6794549	2122172	4975.0	1.7	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
						0.0	OK
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						0.0	OK
						0.0	OK
						0.0	OK

EnergySolutions

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CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: RIPRAP
ASTM D5519-CURRENT

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 10/19/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: ON SITE GRADATION TEST # 1
MATERIAL TYPE: GREY BASALT: D50 - 8.2 INCHES
TESTED BY: KC DALLEY

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
	0.00	0.00	100.0	
12 in.	114.62	4.09	95.9	90 - 100
10 in.	329.36	11.74	84.2	45 - 90
8 in.	1254.41	44.72	39.4	35 - 50
6 in.	873.23	31.13	8.3	
4 in.	214.62	7.65	0.7	
- 4 in.	18.51	0.66		

Total Sample Aggregate Weight: 2804.74

REMARKS: This test is for North Apron Armoring.

I certify that this test was performed in accordance with the current version(s) of ASTM D5519.

P.O. BOX 220427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CMT ENGINEERING LABORATORIES

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering/Testing/Research

March 23, 2011

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Gray Basalt 8-10"
Source: Freemont Junction

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.681	8.1	9	72.9	90
Absorption %	0.52%	7.9	2	15.8	20
Sodium Sulfate %	0.4%	10	11	110	110
LA Abrasion	6.2	7.2	1	7.2	10
Schmidt Hammer	57	7.5	3	22.5	30
Total Score				**228.4**	**260**

Rating = ***87.8***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 241270

Relative Density (oven Dry) = 2.681
Relative Density (SSD) = 2.695
Relative Density (apparent) = 2.720
Absorption (%) = 0.52 %

Durability test is for North Apron. D50 = 8.0"

Los Angeles Abrasion ASTM C-131
Lab # 241268

100 Revolutions Grading A
12 Spheres
% Wear = 6.2 %

Sodium Soundness ASTM C-88
Lab # 241269

% Loss = 0.4 %

Schmitt Hammer

Rebound Number 54,54,60,58

Average = 57

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

A7. Cap Rock and Armoring
Armoring Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: RIPRAP
ASTM D5519-CURRENT

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 08/02/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: STOCKPILE FOR ~~TYPE B RIPRAP~~ South Apron Armoring
MATERIAL TYPE: GREY BASALT: RIPRAP TYPE B
TESTED BY: DAN D.

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
30 in.	2597	11.3	88.7	
25 in.	3586	15.6	73.2	
22 in.	7072	30.7	42.5	
18 in.	6011	26.1	16.5	
15 in.	1917	8.3	8.1	
10 in.	1062	4.6	3.5	
- 10 in.	816	3.5		

Total Sample Aggregate Weight: 23061

REMARKS: This test is for South Apron Armoring.

I certify that this test was performed in accordance with the current version(s) of ASTM D5519.

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CMT ENGINEERING LABORATORIES

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March 23, 2011

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Gray Basalt 10-12"
Source: Freemont Junction

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.659	8.0	9	72.0	90
Absorption %	1.35%	4.5	2	9.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.1	6.7	1	6.7	10
Schmidt Hammer	54	7.0	3	21.0	30
Total Score				**218.7**	**260**

Rating = ***84.1***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 241273

Relative Density (oven Dry)	=	2.659
Relative Density (SSD)	=	2.695
Relative Density (apparent)	=	2.759
Absorption (%)	=	1.35 %

Durability test is for the South Apron. D50 = 11.8"

Los Angeles Abrasion ASTM C-131
Lab # 241271

100 Revolutions Grading A
12 Spheres
% Wear = 7.1 %

Sodium Soundness ASTM C-88
Lab # 241272

% Loss = 0.0 %

Schmitt Hammer

Rebound Number 52,56,52,54

Average = 54

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

A7. Cap Rock and Armoring
Armoring Durability and Gradation Test Results

D50 - 4.7

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 05/11/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: STOCKPILE
MATERIAL TYPE: COVER S EDGE, E & W APRON ARMOR RIP RAP (6-8" GREY BASALT)
TESTED BY: SF SAMPLED BY: SF LAB #: 2

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
8 in. (200mm)	0.00	0.0	100.0	90 - 100 ✓
6 in. (150mm)	1150.60	20.4	79.6	35 - 90 ✓
5 1/2 in. (137.5mm)	1587.50	28.1	51.6	–
5 in. (125mm)	918.48	16.3	35.3	35 - 55 ✓
4 in. (100mm)	1076.85	19.1	16.3	–
3 in. (75mm)	424.78	7.5	8.7	–
2 in. (50mm)	42.55	0.8	8.0	–
1 1/2 in. (37.5mm)	81.23	1.4	6.5	0 - 30 ✓
1 in. (25mm)	132.53	2.3	4.2	–
3/4 in. (19mm)	57.17	1.0	3.2	–
1/2 in. (12.5mm)	880.2	1.1	2.1	0 - 30 ✓
3/8 in. (9.5mm)	253.2	0.3	1.8	0 - 30 ✓
#4 (4.75mm)	171.3	0.2	1.6	0 - 15 ✓
#8 (2.36mm)	90.3	0.1	1.5	0 - 15 ✓
#16 (1.18mm)	65.7	0.1	1.4	0 - 15 ✓
#30 (600um)	51.6	0.1	1.3	0 - 15 ✓
#50 (300um)	70.4	0.1	1.2	0 - 15 ✓
#100 (150um)	108.7	0.1	1.1	0 - 15 ✓
#200 (75um)	189.9	0.2	0.9	
-#200 (-75um)	46.7			

Total Sample Aggregate Weight: 5652.13 - 3/4" After Wash Weight: 1925.0
- 3/4" Aggregate Weight: 2567.7

REMARKS: This test is for West Apron Armoring.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 Jake Christensen

P.O. BOX 220427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CMT ENGINEERING LABORATORIES

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering/Testing/Research

January 18, 2012
Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022 4.7 Apron
Material: ~~2"-4"~~ D50 @ ~~2.7 Slope~~ Armoring
Source: Freemont Junction

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.64	7.9	9	71.1	90
Absorption %	1.0%	5.0	2	10.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	7.3	6.7	1	6.7	10
Schmidt Hammer	42	5.3	3	15.9	30
Total Score				**213.7**	**260**

Rating = ***82.2***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 295294

Relative Density (oven Dry) = 2.64
Relative Density (SSD) = 2.65
Relative Density (apparent) = 2.66
Absorption (%) = 1.0 %

Los Angeles Abrasion ASTM C-131
Lab # 295292

100 Revolutions 12 Spheres		Grading A	
	% Wear	=	7.3 %

Sodium Soundness ASTM C-88
Lab # 295293

% Loss	=	0.0 %

Schmitt Hammer

Rebound Numbers	=	42,43,42
Average	=	42

- Schmitt Hammer test performed on surface of 5" cobbles

Sincerely,

Susan Arnold

LOGAN LAB: 2005 NORTH 600 WEST UNIT A LOGAN, UT 84321 (PHONE) 435.753.2850 (FAX) 435.753.2851
WEST VALLEY OFFICE: 2800 SOUTH REDWOOD ROAD, WEST VALLEY, UT 84119 (PHONE) 801.908-5859 (FAX) 801.972-9074
WEST VALLEY CITY LAB: 2688 SOUTH REDWOOD RD, STE E WEST VALLEY CITY, UT 84119 (PHONE) 801.887.0086 (FAX) 801.887.0087

A7. Cap Rock and Armoring
Armoring Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/03/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: ON SITE STOCKPILE - BLENDED SAMPLE
MATERIAL TYPE: GREY BASALT: COVER N. EDGE RIPRAP D50 - 4.0
TESTED BY: KC SAMPLED BY: KC LAB #: 6541

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
12 in. (300mm)	0.0	0.0	100.0	
10 in. (250mm)	0.0	0.0	100.0	
8 in. (200mm)	0.0	0.0	100.0	
6 in. (150mm)	206991.3	10.4	89.6	90 - 100
4 in. (100mm)	946860.5	47.7	41.9	35 - 50
3 in. (75mm)	240412.0	12.1	29.8	
2 in. (50mm)	315738.9	15.9	13.9	10 - 35
1 1/2 in. (37.5mm)	126169.0	6.4	7.5	
1 in. (25mm)	52613.6	2.7	4.8	5 - 30
3/4 in. (19mm)	41449.6	2.1	2.8	
1/2 in. (12.5mm)	2554.8	1.3	1.4	0 - 30
3/8 in. (9.5mm)	445.2	0.2	1.2	
# 4 (4.75mm)	301.8	0.2	1.1	0 - 5
# 8 (2.36mm)	124.2	0.1	1.0	
# 16 (1.18mm)	128.3	0.1	0.9	
# 30 (600um)	113.7	0.1	0.9	
# 50 (300um)	157.8	0.1	0.8	
#100 (150um)	222.0	0.1	0.7	
#200 (75um)	296.2	0.2	0.5	
-#200 (-75um)	89.1			

Total Sample Aggregate Weight: 1984863.1
- 3/4" Aggregate Weight: 5336.0
- 3/4" After Wash Weight: 4402.8

REMARKS: Test is for North Slope Rip Rap

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 Josh Christensen

P.O. BOX 220427 CENTERFIELD, UT. 84622 (435) 528-5711 FAX (435) 528-5710

CMT ENGINEERING LABORATORIES

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March 23, 2011

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Gray Basalt 4-6"
Source: Freemont Junction

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.674	8.2	9	73.8	90
Absorption %	0.79%	6.1	2	12.2	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.6	7.0	1	7.0	10
Schmidt Hammer	54	7.0	3	21.0	30
Total Score				**224.0**	**260**

Rating = ***86.2***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 241264

Relative Density (oven Dry) = 2.674
Relative Density (SSD) = 2.695
Relative Density (apparent) = 2.732
Absorption (%) = 0.79 %

Durability test is for North Edge Rip Rap. D50= 4.0".

Los Angeles Abrasion ASTM C-131
Lab # 241262

100 Revolutions Grading A
12 Spheres
% Wear = 6.6 %

Sodium Soundness ASTM C-88
Lab # 241263

% Loss = 0.0 %

Schmitt Hammer

Rebound Number 50, 48,58,58

Average = 54

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

A7. Cap Rock and Armoring
Armoring Durability and Gradation Test Results

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 11/11/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: IN PLACE SAMPLE
MATERIAL TYPE: GREY BASALT: 6-8" ROCK Cover, South Edge Riprap
TESTED BY: KC SAMPLED BY: KC LAB #: 6565

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target
10 in. (250mm)	0.0	0.0	100.0	
8 in. (200mm)	101308.2	6.5	93.5	90 - 100
7 in. (175mm)	310503.1	20.0	73.5	45 - 80
6 in. (150mm)	314201.6	20.2	53.2	35 -55
4 in. (100mm)	604703.1	38.9	14.3	10 - 40
3 in. (75mm)	62007.0	4.0	10.3	
2 in. (50mm)	59144.2	3.8	6.5	
1 1/2 in. (37.5mm)	29441.2	1.9	4.6	5 - 30
1 in. (25mm)	28742.9	1.9	2.7	
3/4 in. (19mm)	15427.7	1.0	1.7	
1/2 in. (12.5mm)	1779.9	0.6	1.1	0 - 30
3/8 in. (9.5mm)	547.9	0.2	0.9	
# 4 (4.75mm)	320.8	0.1	0.8	0 - 5
# 8 (2.36mm)	123.5	0.0	0.8	
# 16 (1.18mm)	103.2	0.0	0.7	
# 30 (600um)	87.9	0.0	0.7	
# 50 (300um)	140.1	0.0	0.7	
#100 (150um)	206.2	0.1	0.6	
#200 (75um)	367.4	0.1	0.5	
-#200 (-75um)	71.7			

Total Sample Aggregate Weight: 1552655.4 - 3/4" After Wash Weight: 3748.6
- 3/4" Aggregate Weight: 8121.0

REMARKS: This test is for South Slope Rip Rap.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 Jake Christensen

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March 23, 2011

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: Gray Basalt 6-8"
Source: Freemont Junction

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.706	9.0	9	81.0	90
Absorption %	0.67%	7.0	2	14.0	20
Sodium Sulfate %	0.0%	10	11	110	110
LA Abrasion	6.0	7.3	1	7.3	10
Schmidt Hammer	57	7.5	3	22.5	30
Total Score				**234.8**	**260**

Rating = ***90.3***

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 241267

Relative Density (oven Dry)	=	2.706
Relative Density (SSD)	=	2.724
Relative Density (apparent)	=	2.754
Absorption (%)	=	0.67 %

Durability test is for South Edge RipRap. D50 = 5.8"

Los Angeles Abrasion ASTM C-131
Lab # 241265

100 Revolutions		Grading A
12 Spheres		
% Wear	=	6.0 %

Sodium Soundness ASTM C-88
Lab # 241266

% Loss	=	0.0 %

Schmitt Hammer

Rebound Number		54,57,58,58
Average	=	57

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

A7. Cap Rock and Armoring
Armoring Durability and Gradation Test Results

D50 - 2.3

CENTRAL UTAH TESTING & INSPECTION

SIEVE ANALYSIS: AGGREGATES (ASTM C136-CURRENT AASHTO T27-CURRENT)
MATERIALS FINER THAN No. 200 SCREEN (ASTM C117-CURRENT AASHTO T11-CURRENT)

CLIENT: NIELSON CONSTRUCTION JOB#: 1357 DATE: 05/11/11
PROJECT: ENERGY SOLUTIONS
SAMPLE LOCATION: STOCKPILE
MATERIAL TYPE: COVER X, E, & W EDGE RIPRAP (4"-6" GREY BASALT) West Slope RipRap
TESTED BY: SF SAMPLED BY: SF LAB #: 1

Sieve Size	Weight Retained	Percent Retained	Percent Passing	Band/Target	
10 in. (250mm)	0.00	0.0	100.0		
9 in. (200mm)	0.00	0.0	100.0		
6 in. (150mm)	0.00	0.0	100.0	90 - 100	✓
4 in. (100mm)	1140.03	39.4	60.6	35 - 90	✓
3 1/2 in. (87.5mm)	291.94	10.1	50.5	—	
3 in. (75mm)	426.13	14.7	35.7	20 - 60	✓
2 in. (50mm)	777.24	26.9	8.9	8 - 45	✓
1 1/2 in. (37.5mm)	196.50	6.8	2.1	—	
1 in. (25mm)	28.60	1.0	1.1	0 - 30	✓
3/4 in. (19mm)	7.10	0.2	0.8	—	
1/2 in. (12.5mm)	1157.8	0.2	0.6	0 - 30	✓
3/8 in. (9.5mm)	322.3	0.1	0.6	—	
# 4 (4.75mm)	248.8	0.0	0.5	0 - 15	✓
# 8 (2.36mm)	114.1	0.0	0.5	0 - 15	✓
# 16 (1.18mm)	100.2	0.0	0.5	0 - 15	✓
# 30 (600um)	119.0	0.0	0.5	—	
# 50 (300um)	215.5	0.0	0.5	—	
#100 (150um)	370.9	0.1	0.4	—	
#200 (75um)	541.1	0.1	0.3	0 - 15	✓
-#200 (-75um)	160.8				

Total Sample Aggregate Weight: 2991.29
- 3/4" Aggregate Weight: 5152.0
- 3/4" After Wash Weight: 3350.5

REMARKS: Test is for the West Slope RipRap.

I certify that this test was performed in accordance with the current version(s) of ASTM C117 & C136/AASHTO T11 & T27 [signature]

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June 30, 2010

Neilson Construction
P.O. Box 620
Huntington, Utah 84528

Project: Energy Solutions
Project#: 3022
Material: ~~2" Cap Rock~~ 2.3"
Source: Freemont Junction #4

Laboratory Test	Average Test Value	Score	Weight	Score & Weight	Max Score
Mineral Type			Igneous		
Specific Gravity	2.716	9.0	9	81.0	90
Absorption %	0.6%	7.3	2	14.6	20
Sodium Sulfate %	0.1%	10	11	110	110
LA Abrasion	7.3	6.5	1	6.5	10
Schmidt Hammer	43	5.3	3	15.9	30
Total Score				228.0	260

Rating = *87.9*

TEST RESULTS

Specific Gravity and Absorption ASTM C-127
Lab # 211613

Relative Density (oven Dry) = 2.716
Relative Density (SSD) = 2.731
Relative Density (apparent) = 2.758
Absorption (%) = 0.6 %

Performed prior to placement. Durability is for West Edge Rip Rap.
D50 = 2.3".

Los Angeles Abrasion ASTM C-131
Lab # 211611

100 Revolutions — Grading A
12 Spheres
% Wear = 7.3 %

Sodium Soundness ASTM C-88
Lab # 211612

% Loss = 0.1 %

Schmitt Hammer
213839

Rebound Number 42, 44

Average = 43

- Schmitt Hammer test performed on sawed surface of 6" cobbles

Sincerely,

Susan Arnold

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A8. Spoils Embankment

Standard Proctor Test Results Summary

Lift Approval Summary

Lift Approval Package

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A8. Spoils Embankment
Standard Proctor Test Results Summary

Proctor ID #	Date Sampled	Date Approved	Maximum Dry Density (lb/ft^3)	Optimum Moisture Content (%)	Soils Description
Top Soil #1	01/04/10	02/08/10	115.6	12.3	Gray in color consist of mostly fines
Top Soil #2	01/15/10	02/08/10	116.6	13.9	Grayish-red in color
Top Soil #3	01/21/10	02/08/10	113.5	13.9	Grayish in color consist of mostly fines
Top Soil #4	02/12/10	02/18/10	110.3	14.5	Grayish in color consist of mostly fines
Top Soil #5	03/12/10	03/30/10	114.1	13.5	Grayish in color consist of mostly fines
Top Soil #6	03/25/10	03/30/10	116.7	13.0	Grayish in color consist of mostly fines
Top Soil #7	04/01/10	06/08/10	117.2	12.3	Brownish-gray in color consists mostly fines
Top Soil #8	04/07/10	06/08/10	117.3	12.9	Brownish-gray in color consists mostly fines
Top Soil #9	04/15/10	06/08/10	118.4	11.9	Brownish-gray in color consists mostly fines
Top Soil #10	04/20/10	06/08/10	119.9	11.7	Material contains a small amount of shale and is gray in color
Top Soil #11	04/27/10	06/08/10	118.2	12.2	Material contains a small amount of shale and is gray in color
Top Soil #12	05/03/10	06/08/10	117.8	13.1	Gray in color consist of mostly fines
Top Soil #13	05/06/10	06/08/10	115.7	13.8	Gray in color consist of mostly fines
Top Soil #14	05/12/10	06/08/10	116.1	12.6	Gray in color consist of mostly fines
Top Soil #15	05/18/10	06/08/10	115.0	13.9	Gray in color consist of mostly fines
Top Soil #16	05/24/10	06/08/10	118.2	12.0	Gray in color consist of mostly fines
Top Soil #17	05/27/10	06/08/10	120.3	10.8	Gray in color consist of mostly fines
Top Soil #18	06/03/10	06/14/10	116.1	11.0	Grayish-yellow in color consist of mostly fines
Top Soil #19	06/08/10	06/14/10	120.2	11.4	Grayish-yellow in color consist of mostly fines
Top Soil #20	06/14/10	06/30/10	117.6	13.0	Gray in color consist of mostly fines
Top Soil #21	06/17/10	06/30/10	119.7	13.1	Gray in color consist of mostly fines
Top Soil #22	06/23/10	06/30/10	119.5	12.3	Gray in color consist of mostly fines
Top Soil #23	07/07/10	07/29/10	115.0	11.2	Gray in color consist of mostly fines
Top Soil #24	07/19/10	07/29/10	117.0	10.8	Grayish-yellow in color consist of mostly fines
Top Soil #25	07/26/10	07/29/10	117.3	10.9	Gray in color consist of mostly fines
Top Soil #26	08/02/10	08/26/10	115.7	11.7	Gray in color consist of mostly fines
Top Soil #27	08/12/10	08/26/10	117.1	11.8	Gray in color consist of mostly fines
Top Soil #28	08/24/10	09/07/10	119.4	11.4	Gray in color consist of mostly fines
Top Soil #29	08/30/10	09/07/10	118.8	10.7	Gray in color consist of mostly fines
Top Soil #30	09/09/10	09/24/10	119.6	11.2	Gray in color consist of mostly fines
Top Soil #31	09/13/10	10/04/10	119.4	11.3	Gray in color consist of mostly fines
Top Soil #32	09/15/10	10/04/10	118.0	11.4	Gray in color consist of mostly fines
Top Soil #33	09/16/10	10/04/10	119.6	11.3	Gray in color consist of mostly fines
Top Soil #34	09/20/10	10/04/10	118.0	11.9	Gray in color consist of mostly fines
Top Soil #35	09/21/10	10/04/10	116.8	12.4	Reddish in color consist of mostly fines
Top Soil #36	09/23/10	10/05/10	117.8	12.0	Grayish in color consist of mostly fines
Top Soil #37	09/27/10	10/05/10	118.7	11.9	Grayish in color consist of mostly fines
Top Soil #38	09/29/10	10/06/10	119.7	11.6	Grayish in color consist of mostly fines
Top Soil #39	10/04/10	10/15/10	118.1	12.0	Grayish in color consist of mostly fines
Top Soil #40	10/07/10	10/15/10	118.8	11.8	Grayish in color consist of mostly fines
Top Soil #41	10/12/10	11/01/10	118.1	11.7	Grayish in color consist of mostly fines

A8. Spoils Embankment
Standard Proctor Test Results Summary

Proctor ID #	Date Sampled	Date Approved	Maximum Dry Density (lb/ft^3)	Optimum Moisture Content (%)	Soils Description
Top Soil #42	10/14/10	11/01/10	116.7	11.7	Grayish in color consist of mostly fines
Top Soil #43	10/19/10	11/16/10	118.4	11.0	Grayish in color consist of mostly fines
Top Soil #44	11/15/10	12/08/10	118.7	12.0	Light tan in color and consists mostly of fines
Top Soil #45	11/18/10	12/08/10	118.8	12.7	Light tan in color and consists mostly of fines
Top Soil #46	11/23/10	12/08/10	117.7	12.1	Light tan in color and consists mostly of fines
Top Soil #47	11/29/10	12/08/10	115.3	12.6	Light tan in color and consists mostly of fines
Top Soil #48	12/06/10	12/21/10	117.4	11.6	Light tan in color and consists mostly of fines
Top Soil #49	12/08/10	12/21/10	118.7	11.8	Light tan in color and consists mostly of fines
Top Soil #50	12/13/10	12/21/10	115.4	12.0	Grayish in color consist of mostly fines
Top Soil #51	3/10/11	4/06/11	117.3	12.6	Grayish in color consist of mostly fines
Top Soil #52	3/16/11	4/06/11	116.9	12.5	Grayish in color consist of mostly fines
Top Soil #53	6/06/11	6/14/11	115.6	13.9	Grayish in color consist of mostly fines
Top Soil #54	6/21/11	7/08/11	114.9	14.4	Grayish in color consist of mostly fines
Top Soil #55	11/02/11	11/28/11	116.0	14.0	Grayish in color consist of mostly fines
Top Soil #56	11/08/11	11/28/11	116.3	14.8	Grayish in color consist of mostly fines
Top Soil #57	11/28/11	12/05/11	117.3	15.0	Grayish in color consist of mostly fines

A8. Spoils Embankment
Lift Approval Summary

Date	Placement Location (stations)	Area Tested (ft^2)	# of Nuclear Density Gauge Tests	# of Passing Moisture Tests	# of Passing Sandcone Tests
07/16/08	56+00 - 35+00	273,000	5	0	0
07/17/08	56+00 - 35+00	156,000	4	0	0
07/21/08	56+00 - 35+00	220,500	3	0	0
07/22/08	56+00 - 35+00	315,000	3	0	0
07/23/08	56+00 - 35+00	157,500	3	0	0
07/24/08	56+00 - 35+00	346,500	4	1	0
08/08/08	56+00 - 51+00	200,000	3	1	0
08/14/08	56+00 - 44+00	440,000	6	1	1
08/18/08	56+00- 44+00	440,000	6	0	0
08/26/08	56+00 - 44+00	440,000	6	1	1
09/03/08	56+00 - 44+00	460,000	8	1	1
09/04/08	56+00 - 44+50	306,000	8	1	0
09/05/08	50+00 - 44+50	154,000	3	0	0
09/18/08	56+00 - 44+50	460,000	10	1	0
09/24/08	56+00 - 50+00	240,000	4	0	1
09/25/08	56+00 - 44+00	440,000	9	0	0
09/26/08	56+00 - 44+50	440,000	9	1	1
09/26/08	56+00 - 44+50	137,500	3	0	0
09/29/08	56+00 - 44+50	82,500	2	0	0
09/29/08	56+00 - 44+50	337,500	7	1	1
09/30/08	50+00 - 44+50	71,500	2	1	0
09/30/08	56+00 - 51+00	200,000	4	0	0
10/01/08	50+00 - 44+50	220,000	3	1	0
10/02/08	56+00 - 51+00	378,000	4	1	0
10/02/08	56+00 - 44+50	95,000	2	0	0
10/03/08	56+00 - 51+00	85,000	2	0	0
10/03/08	50+00 - 45+75	198,000	2	1	0
10/06/08	56+00 - 44+50	414,000	5	1	0
10/09/08	56+00 - 49+50	234,000	4	1	0
10/15/08	51+00 - 44+50	234,000	3	0	0
10/15/08	56+00- 51+00	180,000	2	0	1
10/23/08	56+00 - 44+50	414,000	5	1	0
10/24/08	56+00 - 44+50	414,000	5	0	0
10/25/08	50+00 - 44+50	198,000	3	1	1
10/25/08	56+00 - 44+50	414,000	5	0	0
10/28/08	56+00 - 44+50	414,000	5	1	0
10/29/08	56+00 - 44+50	414,000	5	0	0
10/31/08	56+00 - 44+50	414,000	5	0	0

A8. Spoils Embankment
Lift Approval Summary

Date	Placement Location (stations)	Area Tested (ft^2)	# of Nuclear Density Gauge Tests	# of Passing Moisture Tests	# of Passing Sandcone Tests
11/03/08	56+00 - 44+50	414,000	5	1	0
11/05/08	44+50 - 35+00	460,000	6	1	0
11/06/08	44+50 - 35+00	460,000	5	0	0
11/07/08	44+50 - 35+00	460,000	5	1	0
11/10/08	44+50 - 35+00	460,000	5	1	1
11/12/08	44+50 - 35+00	460,000	5	1	1
11/13/08	44+50 - 35+00	460,000	5	1	0
11/14/08	44+50 - 35+00	460,000	5	1	0
11/08/08	44+50 - 35+00	460,000	5	1	0
11/20/08	44+50 - 35+00	380,000	5	1	0
11/24/08	44+50 - 35+00	380,000	5	1	1
12/02/08	47+00 - 42+00	400,000	5	1	0
01/14/10	107+00 - 114+00	245,000	4	0	0
01/19/10	107+00- 114+00	245,000	4	1	0
01/21/10	107+00- 114+00	245,000	4	1	0
01/27/10	107+00- 114+00	122,500	2	0	0
02/02/10	107+00- 114+00	122,500	2	0	0
02/03/10	107+00- 114+00	122,500	2	1	1
02/09/10	107+00- 114+00	122,500	4	0	0
02/04/10	107+00- 114+00	122,500	2	0	0
02/05/10	107+00- 114+00	122,500	2	0	0
02/10/10	107+00- 114+00	122,500	4	1	1
02/11/10	107+00- 114+00	122,500	2	0	0
02/12/10	107+00- 114+00	245,000	4	1	0
02/12/10	107+00- 114+00	168,750	2	0	0
02/17/10	107+00- 114+00	122,500	2	1	0
02/17/10	107+00- 114+00	168,750	1	0	0
02/18/10	107+00- 114+00	122,500	2	0	0
02/19/10	107+00 - 113+00	168,750	2	0	0
02/19/10	107+00- 114+00	168,750	2	0	0
02/23/10	106+50 - 114+00	337,500	6	1	1
02/24/10 - 02/25/10	106+50 - 114+00	168,750	2	0	0
02/25/10	106+50 - 114+00	168,750	3	0	0
03/01/10	106+50 - 114+00	168,750	3	0	0
03/02/10	106+50 - 114+00	168,750	2	1	0
03/03/10	106+50 - 114+00	168,750	3	0	0
03/04/10	106+50 - 114+00	153,750	2	0	0
03/08/10	106+50 - 114+00	153,750	2	0	0

A8. Spoils Embankment
Lift Approval Summary

Date	Placement Location (stations)	Area Tested (ft^2)	# of Nuclear Density Gauge Tests	# of Passing Moisture Tests	# of Passing Sandcone Tests
03/09/10	106+50 - 114+00	153,750	2	0	0
03/09/10	106+50 - 114+00	153,750	2	0	1
03/10/10	106+50 - 114+00	153,750	2	0	0
03/11/10 - 03/15/10	106+50 - 114+00	153,750	2	0	0
03/15/10	106+50 - 114+00	153,750	2	0	0
03/17/10 - 03/18/10	106+50 - 114+00	153,750	2	0	1
03/18/10	106+50 - 114+00	153,750	2	0	0
03/19/10	25+00 - 34+00	135,000	2	0	0
03/19/10	107+50 - 114+00	153,750	2	0	0
03/22/10	107+50- 114+00	153,750	2	0	0
03/22/10	25+00 - 34+00	135,000	2	1	0
03/22/10	25+00 - 34+00	180,000	2	0	0
03/23/10	25+00 - 34+00	180,000	2	0	0
03/23/10	25+00 - 34+00	180,000	2	0	0
03/24/10	25+00 - 34+00	225,000	5	0	1
03/24/10 - 03/25/10	25+00 - 34+00	225,000	3	0	0
03/25/10	25+00 - 34+00	225,000	3	0	0
03/29/10	35+00 - 34+00	225,000	3	1	0
03/29/10	25+00 - 36+00	105,000	4	0	0
03/29/10 - 03/30/10	25+00 - 36+00	330,000	4	0	0
03/30/10 - 03/31/10	25+00 - 36+00	330,000	4	0	1
03/31/10 - 04/01/10	25+00 - 36+00	330,000	4	0	0
04/01/10 - 04/05/10	25+00 - 36+00	385,000	4	1	0
04/06/10 - 04/07/10	25+00 - 38+00	455,000	5	0	1
04/08/10 - 04/12/10	25+00 - 38+00	520,000	6	1	0
04/13/10	19+00 - 38+00	475,000	5	1	0
04/15/10 - 04/19/10	25+00 - 38+00	520,000	6	0	1
04/20/10	25+00 - 38+00	494,000	5	1	0
04/19/10	107+50 - 114+00	153,750	3	0	0
04/20/10	107+50 - 114+00	153,750	3	0	0
04/27/10 - 04/29/10	25+00 - 38+00	292,500	6	0	0
04/29/10 - 05/03/10	24+00 - 38+00	595,000	6	0	0
05/04/10 - 05/05/10	24+00 - 38+00	630,000	7	0	1
05/06/10 - 05/10/10	24+00 - 38+00	630,000	7	2	0
05/12/10 - 05/18/10	24+00 - 38+00	685,000	8	0	0
05/19/10 - 05/20/10	21+00 - 38+00	730,000	8	1	0
05/25/10 - 05/26/10	21+00 - 38+00	730,000	8	1	1
05/27/10 - 06/01/10	21+00 - 38+00	730,000	8	0	1

A8. Spoils Embankment
Lift Approval Summary

Date	Placement Location (stations)	Area Tested (ft^2)	# of Nuclear Density Gauge Tests	# of Passing Moisture Tests	# of Passing Sandcone Tests
06/02/10 - 06/07/10	20+00 - 38+00	775,000	9	1	0
06/07/10 - 06/08/10	21+00 - 38+00	730,000	8	0	1
06/09/10	25+00 - 38+00	455,000	5	0	0
06/10/10 - 06/14/10	20+00 - 38+00	750,000	8	1	0
06/15/10 - 06/16/10	20+00 - 38+00	775,000	9	0	1
06/17/10 - 06/22/10	20+00 - 38+00	775,000	9	1	1
06/23/10 - 06/24/10	22+00 - 38+00	685,000	8	0	1
07/06/10	20+00 - 38+00	775,000	9	1	0
07/06/10 - 07/07/10	20+00 - 38+00	775,000	9	0	1
07/08/10 - 07/09/10	20+00 - 38+00	802,500	9	1	0
07/09/10 - 07/19/10	20+00 - 38+00	802,500	9	0	1
07/19/10 - 07/26/10	20+00 - 38+00	802,500	9	1	0
07/26/10 - 07/27/10	20+00 - 38+00	802,500	9	0	1
07/29/10 - 08/04/10	20+00 - 38+00	400,000	5	0	0
08/05/10	20+00 - 38+00	440,000	6	1	0
08/09/10	20+00 - 38+00	660,000	9	0	1
08/23/10	20+00 - 38+00	450,000	5	1	0
08/26/10	20+00 - 38+00	802,500	9	0	1
08/31/10	20+00 - 28+00	802,500	9	1	0
09/01/10	20+00 - 28+00	627,500	7	0	0
09/13/10	20+00 - 38+00	802,500	9	0	1
09/21/10	20+00 - 38+00	802,500	9	1	0
09/27/10	20+00 - 38+00	802,500	9	0	1
09/28/10	20+00 - 26+50	341,250	4	1	0
09/29/10	20+00 - 26+50	341,250	4	0	0
09/30/10	20+00 - 26+50	341,250	4	0	0
10/04/10	20+00 - 26+50	341,250	4	0	1
10/05/10	20+00 - 26+50	341,250	4	0	0
10/05/10	20+00 - 26+50	341,250	4	1	0
10/06/10 - 10/07/10	20+00 - 26+50	341,250	4	0	0
10/07/10 - 10/08/10	20+00 - 26+50	341,250	4	0	0
10/12/10	20+00 - 26+50	341,250	4	0	1
10/12/10 - 10/13/10	20+00 - 26+50	341,250	4	0	0
10/13/10	20+00 - 26+50	341,250	4	1	0
10/14/10	20+00 - 26+50	341,250	4	0	0
10/18/10	20+00 - 26+50	341,250	4	0	0
10/18/10	21+50 - 26+50	218,750	3	0	0
10/19/10	21+50 - 26+50	218,750	3	1	0

A8. Spoils Embankment
Lift Approval Summary

Date	Placement Location (stations)	Area Tested (ft^2)	# of Nuclear Density Gauge Tests	# of Passing Moisture Tests	# of Passing Sandcone Tests
10/20/10	24+00 - 26+50	106,250	2	0	0
11/01/10 - 11/09/10	26+50 - 38+00	603,750	7	0	1
11/15/10 - 11/17/10	26+50 - 38+00	603,750	7	1	0
11/18/10 - 11/22/10	26+50 - 38+00	603,750	7	0	1
11/23/10 - 11/24/10	26+50 - 38+00	603,750	7	0	0
11/29/10 - 12/06/10	26+50 - 38+00	603,750	7	1	0
12/07/10 - 12/09/10	26+50 - 39+00	656,250	8	0	1
12/16/10 - 06/06/11	26+50 - 39+00	656,250	8	1	0
06/21/11	26+50 - 34+00	393,750	4	1	0
10/13/11	26+50 - 34+00	393,750	4	0	1
11/02/11	26+50 - 34+00	382,500	4	1	0
11/04/11	26+50 - 34+00	382,500	4	0	0
11/09/11	26+50 - 34+00	382,500	4	0	0
11/22/11	26+50 - 34+00	375,000	4	1	0
11/29/11	26+50 - 34+00	367,500	4	0	0
12/01/11	26+50 - 34+00	367,500	4	0	0
12/05/11	26+50 - 34+00	367,500	4	0	0
12/08/11	26+50 - 34+00	378,000	4	1	1
12/12/11	26+50 - 34+00	359,250	1	0	0
12/14/11	26+50 - 34+00	359,250	4	1	0
12/30/11	25+00 - 34+00	359,250	4	0	0

Total Quantity Approved (yd^3) = 1,881,556

Total Area Approved (ft^2) = 63,502,500

Total # of Nuclear Density Gauge Tests = 803

Total # of Moisture Tests = 69

Total # of Sandcone Tests = 41

Quantity Approved per Nuclear Density Gauge Test (ft^2) = 79,082

# of Nuclear Density Gauge Tests per Moisture Test = 12

# of Nuclear Density Gauge Tests per Sandcone Test = 20

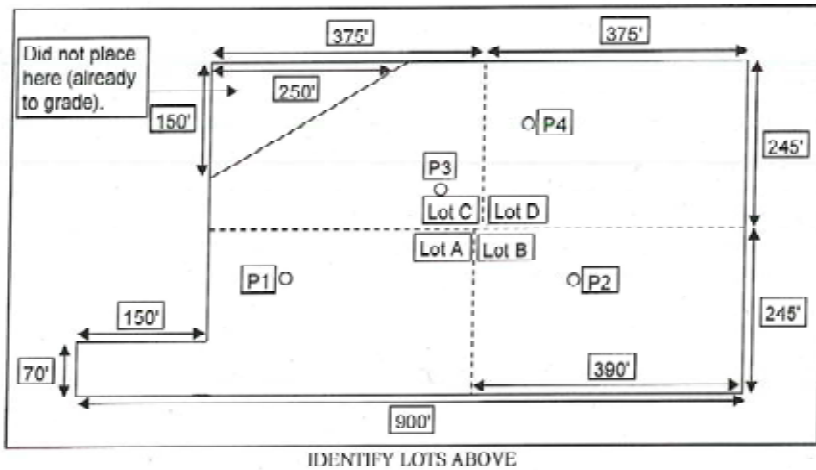
CES 001783

ENERGYSOLUTIONS

LIFT APPROVAL FORM

PROJECT: Moab UMTRA OTHER

NW CORNER DATE: 12/19/2011



P 1	Lot A			
EW:	510	X	0.463	= 236
NS:	245	X	0.745	= 183
P 2	Lot B			
EW:	390	X	0.335	= 131
NS:	245	X	0.733	= 180
P 3	Lot C			
EW:	375	X	0.837	= 314
NS:	245	X	0.268	= 66
P 4	Lot D			
EW:	375	X	0.200	= 75
NS:	245	X	0.610	= 149
P 5				
EW:		X		=
NS:		X		=

Page 2 attached: Y N

IDENTIFY LOTS ABOVE

LIFT ID: South Lift - (20th) NW CORNER: N/A

Uncompacted Thickness: 0.7 Compacted Thickness: N/A Debris Insp. By: N/A Date: N/A Time: N/A

NW CORNER of debris placement: N/A EW Dimension N/A NS Dimension N/A

Lift Area (ft²): 359,250 Lift Volume (yd³): 9,314

Comments: Test # 1 taken at 27+35, 185' north of south slope
Test # 2 taken at 31+40, 180' north of south slope
Test # 3 taken at 29+65, 310' north of south slope
Test # 4 taken at 31+00, 395' north of south slope

This lift was placed on the Spoils Wedge from stations 29+00 to 34+00 on the north end, 26+50 to 34+00 in the middle, and from stations 25+00 to 34+00 on the south end of the lift. Nielsons did not place material in the NW corner of this lift because that area is already to grade. The NS of this lift is 490' from the top of the south slope to the top of the north slope. QC visually verified that no frost or frozen material was present on the underlying lift area prior to placement and that no frost or frozen material was placed on this lift. During placement operations QC visually verified that the loose lift placed did not exceed 12". Starting points are in the SW corner of each lot.

KEYING IN NOTES: [N] E S [W] Satisfactory MOISTURE/ DENSITY TESTS ID # (S): 1 thru 4

LIFT APPROVED BY: Kevin Keele / Kevin Keele DATE: 12/19/2011 TIME: 17:00

QA/QC APPROVAL 12.20.2011 DATE

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ENERGY SOLUTIONS

FIELD DENSITY TEST

PROJECT: Moab UMTRA Project **OTHER** _____

LIFT IDENTIFICATION: South Lift - (20th) DATE: 12/19/2011

TEST ID NUMBER(S): 1

TEST LOCATION: P1 TEST METHOD: N/A D1556 X D6938

ASTM D6938 (DENSITY DETERMINATION)

Make/Model Troxler 3430 Gauge Serial # 25142

Last Calibration Date: 3/7/11

Daily Standard Counts: *Off-Cell Standard*

Density 2388 Moisture 645

Method A (Direct Transmission)

Depth Setting 8 *(inches)* Count Time 1 *(minutes)*

Moisture Count 141 Density Count 1479

Wet Density (ρ_m) 121.2 *(lbs/ft³)* Dry Density 108.9 *(lbs/ft³)*

Moisture Density 12.3 *(lbs/ft³)* Moisture Fraction 11.3 *(%)*

MOISTURE DETERMINATION

_____ ASTM D2216 @ 110° C or _____ ASTM D4643

Container ID _____

Mass of container & wet specimen (M_{cms})		g
Mass of container & dry specimen (M_{cs})		g
Mass of water (M_w) $M_w = M_{cms} - M_{cs}$		g
Mass of container (M_c)		g
Mass of dry specimen (M_s) $M_s = M_{cs} - M_c$		g
Moisture content (w) $w = (M_w / M_s) \times 100$	0.0	%

Dry Density $(\rho_d) = (100 \times \rho_m)/(100 + w)$

$\rho_d = (\ 100 \times$ N/A $\ ) / (100 +$ N/A $) =$ 108.9 *lbs/ft³*

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

108.9 / 117.3 x 100 = 92.8 %

ASTM D1556 (DENSITY DETERMINATION)

Testing Apparatus _____ Calibrated Vol. *(lbs/ft³)* _____

Bulk Density of sand (ρ_1) _____ *g/cm³* _____ *lbs/ft³*

Mass of Sand to Fill Cone & Plate (M_2) _____ *g*

Mass of bottle & cone **before** filling cone, plate & hole		g
Mass of bottle & cone **after** filling cone, plate & hole		g
Mass of sand to fill cone, plate, & hole (M_1)		g
Mass of sand to fill hole		g
Mass of wet soil & container		g
Mass of container		g
Mass of wet soil (M_t)		g

Test Hole Volume $V = (M_1 - M_2) / \rho_1$ _____ *cm³*

Dry Mass of soil $M_d = 100\ M_t / (w + 100)$ _____ *g*

Wet Density $\rho_m = (M_t / V) \times 62.43$ _____ *lbs/ft³*

Dry Density $\rho_d = M_d / V$ _____ *g/cm³*

Dry Unit Weight $\gamma_d = \rho_d \times 62.43$ _____ *lbs/ft³*

Soil Description: Greyish in color and consists of mostly fines

Proctor ID: Top Soil # 7 2011 (Spoils Wedge)

Standard Proctor (ASTM D698)

Maximum Dry Density ($\gamma_d max$) 117.3 (lbs/ft³)

Optimum Moisture (w_{opt}) 15.0 (%)

Required Moisture: 10.0 % to 20.0 %

Required Percent Compaction: 90.0 (%)

Comments:

TEST RESULTS:

X Pass Date: 12/19/11

_____ Failed Moisture

_____ Failed Compaction Time: 11:15

By: Kevin Keele (print) / Kevin Keele (signature)

QA/QC APPROVAL 12-30-2011 DATE

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ENERGY SOLUTIONS

FIELD DENSITY TEST

PROJECT: Moab UMTRA Project **OTHER** _____

LIFT IDENTIFICATION: South Lift - (20th) DATE: 12/19/2011

TEST ID NUMBER(S): 2

TEST LOCATION: P2 TEST METHOD: N/A D1556 X D6938

ASTM D6938 (DENSITY DETERMINATION)

Make/Model Troxler 3430 Gauge Serial # 25142

Last Calibration Date: 3/7/11

Daily Standard Counts: *Off/Cell Standard*

Density 2388 Moisture 645

Method A (Direct Transmission)

Depth Setting 8 *(inches)* Count Time 1 *(minutes)*

Moisture Count 162 Density Count 1115

Wet Density (ρ_m) 132.1 *(lbs/ft³)* Dry Density 117.7 *(lbs/ft³)*

Moisture Density 14.4 *(lbs/ft³)* Moisture Fraction 12.3 *(%)*

MOISTURE DETERMINATION

_____ASTM D2216 @ 110° C or _____ ASTM D4643

Container ID _____

Mass of container & wet specimen (M_{cws})		g
Mass of container & dry specimen (M_{cds})	N/A	g
Mass of water (M_w) $M_w = M_{cws} - M_{cds}$		g
Mass of container (M_c)		g
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$		g
Moisture content (w) $w = (M_w / M_s) \times 100$	0.0	%

Dry Density $(\rho_d) = (100 \times \rho_m)/(100 + w)$

$\rho d = (\ 100 \times$ N/A $\ ) / (100 +$ N/A $) =$ 117.7 *lbs/ft³*

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

117.7 / 117.3 x 100 = 100.3 %

ASTM D1556 (DENSITY DETERMINATION)

Testing Apparatus _____ Calibrated Vol. *(lbs/ft³)* _____

Bulk Density of sand (ρ_1) _____ *g/cm³* _____ *lbs/ft³*

Mass of Sand to Fill Cone & Plate (M_1) _____ g

Mass of bottle & cone **before** filling cone, plate & hole		g
Mass of bottle & cone **after** filling cone, plate & hole		g
Mass of sand to fill cone, plate, & hole (M_1)		g
Mass of sand to fill hole		g
Mass of wet soil & container	N/A	g
Mass of container		g
Mass of wet soil (M_2)		g

Test Hole Volume
$V = (M_1 - M_2) / \rho_1$ _____ cm^3

Dry Mass of soil
$M_d = 100\ M_2 / (w + 100)$ _____ g

Wet Denisty
$\rho_m = (M_2 / V) \times 62.43$ _____ lbs/ft^3

Dry Denisty
$\rho_d = M_d / V$ _____ g/cm^3

Dry Unit Weight
$\gamma_d = \rho_d \times 62.43$ _____ lbs/ft^3

Soil Description: Greyish in color and consists of mostly fines

Proctor ID: Top Soil # 7 2011 (Spoils Wedge)

Standard Proctor (ASTM D698)

Maximum Dry Density ($\gamma_d max$) 117.3 (lbs/ft^3)

Optimum Moisture (w_{opt}) 15.0 (%)

Required Moisture: 10.0 % to 20.0 %

Required Percent Compaction: 90.0 (%)

Comments:

TEST RESULTS:

X Pass Date: 12/19/11

_____ Failed Moisture

_____ Failed Compaction Time: 11:20

By: Kevin Keele / Kevin Keele
(print) *(signature)*

QA/QC APPROVAL 12-30-2011 DATE

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ENERGYSOLUTIONS

FIELD DENSITY TEST

PROJECT: Moab UMTRA Project OTHER

LIFT IDENTIFICATION: South Lift - (20th) DATE: 12/19/2011

TEST ID NUMBER(S): 3

TEST LOCATION: P3 TEST METHOD: N/A D1556 X D6938

ASTM D6938 (DENSITY DETERMINATION)

Make/Model Troxler 3430 Gauge Serial # 25142

Last Calibration Date: 3/7/11

Daily Standard Counts: *Off-Cell Standard*

Density 2388 Moisture 645

Method A (Direct Transmission)

Depth Setting 8 *(inches)* Count Time 1 *(minutes)*

Moisture Count 154 Density Count 1534

Wet Density (ρ_m) 119.8 *(lbs/ft³)* Dry Density 106.1 *(lbs/ft³)*

Moisture Density 13.6 *(lbs/ft³)* Moisture Fraction 12.8 *(%)*

ASTM D1556 (DENSITY DETERMINATION)

Testing Apparatus ____ Calibrated Vol. *(lbs/ft³)* ____

Bulk Density of sand (ρ_1) ____ g/cm³ ____ lbs/ft³

Mass of Sand to Fill Cone & Plate (M_2) ____ g

Mass of bottle & cone **before** filling cone, plate & hole		g
Mass of bottle & cone **after** filling cone, plate & hole		g
Mass of sand to fill cone, plate, & hole (M_1)		g
Mass of sand to fill hole		g
Mass of wet soil & container		g
Mass of container		g
Mass of wet soil (M_3)		g

Test Hole Volume

$V = (M_1 - M_2) / \rho_1$ ____ cm³

Dry Mass of soil

$M_d = 100\ M_3 / (w + 100)$ ____ g

Wet Denisty

$\rho_m = (M_3 / V) \times 62.43$ ____ lbs/ft³

Dry Denisty

$\rho_d = M_d / V$ ____ g/cm³

Dry Unit Weight

$\gamma_d = \rho_d \times 62.43$ ____ lbs/ft³

MOISTURE DETERMINATION

____ ASTM D2216 (a) 110° C or ____ ASTM D4643

Container ID ____

Mass of container & wet specimen (M_{cms})		g
Mass of container & dry specimen (M_{cs})		g
Mass of water (M_w) $M_w = M_{cms} - M_{cs}$		g
Mass of container (M_c)		g
Mass of dry specimen (M_s) $M_s = M_{cs} - M_c$		g
Moisture content (w) $w = (M_w / M_s) \times 100$	0.0	%

Soil Description: Greyish in color and consists of mostly fines

Proctor ID: Top Soil # 7 2011 (Spoils Wedge)

Standard Proctor (ASTM D698)

Maximum Dry Density (γ_{dmax}) 117.3 (lbs/ft³)

Optimum Moisture (w_{opt}) 15.0 (%)

Required Moisture: 10.0 % to 20.0 %

Required Percent Compaction: 90.0 (%)

Dry Density $\rho_d = (100 \times \rho_m)/(100 + w)$

$\rho_d = (100 \times$ N/A $) / (100 +$ N/A $) =$ 106.1 lbs/ft³

Note: Wet Density from ASTM D 1556 (ρ_m) takes precidence over ASTM D 6938 (ρ_m)

Percent Compaction = ρ_d / $\gamma_d max \times 100$

106.1 / 117.3 x 100 = 90.5 %

Comments:

TEST RESULTS:

X Pass Date: 12/19/11

Failed Moisture

Failed Compaction Time: 16:55

By: Kevin Keele (print) / Kevin Keele (signature)

12-20-2011

QA/QC APPROVAL DATE

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ENERGY SOLUTIONS

FIELD DENSITY TEST

PROJECT: Moab UMTRA Project **OTHER** _____

LIFT IDENTIFICATION: South Lift - (20th) DATE: 12/19/2011

TEST ID NUMBER(S): 4

TEST LOCATION: P4 TEST METHOD: N/A D1556 X D6938

ASTM D6938 (DENSITY DETERMINATION)

Make/Model Troxler 3430 Gauge Serial # 25142

Last Calibration Date: 3/7/11

Daily Standard Counts: *Off/Cell Standard*

Density 2388 Moisture 645

Method A (Direct Transmission)

Depth Setting 8 *(inches)* Count Time 1 *(minutes)*

Moisture Count 124 Density Count 1685

Wet Density (ρ_w) 116.3 *(lbs/ft³)* Dry Density 105.7 *(lbs/ft³)*

Moisture Density 10.6 *(lbs/ft³)* Moisture Fraction 10.1 *(%)*

ASTM D1556 (DENSITY DETERMINATION)

Testing Apparatus _____ Calibrated Vol. *(lbs/ft³)* _____

Bulk Density of sand (ρ_1) _____ *g/cm³* _____ *lbs/ft³*

Mass of Sand to Fill Cone & Plate (M_2) _____ *g*

Mass of bottle & cone **before** filling cone, plate & hole		g
Mass of bottle & cone **after** filling cone, plate & hole		g
Mass of sand to fill cone, plate, & hole (M_1)		g
Mass of sand to fill hole		g
Mass of wet soil & container	N/A	g
Mass of container		g
Mass of wet soil (M_t)		g

Test Hole Volume
$V = (M_1 - M_2) / \rho_1$ _____ cm^3

Dry Mass of soil
$M_d = 100\ M_t / (w + 100)$ _____ g

Wet Density
$\rho_w = (M_t / V) \times 62.43$ _____ lbs/ft^3

Dry Density
$\rho_d = M_d / V$ _____ g/cm^3

Dry Unit Weight
$\gamma_d = \rho_d \times 62.43$ _____ lbs/ft^3

MOISTURE DETERMINATION

_____ ASTM D2216 @ 110° C or _____ ASTM D4643

Container ID _____

Mass of container & wet specimen (M_{cws})		g
Mass of container & dry specimen (M_{cs})	N/A	g
Mass of water (M_w) $M_w = M_{cws} - M_{cds}$		g
Mass of container (M_c)		g
Mass of dry specimen (M_s) $M_s = M_{cds} - M_c$		g
Moisture content (w) $w = (M_w / M_s) \times 100$	0.0	%

Soil Description: Greyish in color and consists of mostly fines

Proctor ID: Top Soil # 7 2011 (Spoils Wedge)

Standard Proctor (ASTM D698)

Dry Density $(\rho_d) = (100 \times \rho_m)/(100 + w)$

$\rho d = (\ 100\ \times$ N/A $)\ /\ (100 +$ N/A $) =$ 105.7 *lbs/ft³*

Note: Wet Density from ASTM D 1556 (ρ_w) takes precedence over ASTM D 6938 (ρ_m)

Percent Compaction = ρ_d / $\gamma_d max$ x 100

105.7 / 117.3 x 100 = 90.1 %

Maximum Dry Density ($\gamma_d max$) 117.3 (lbs/ft³)

Optimum Moisture (w_{opt}) 15.0 (%)

Required Moisture: 10.0 % to 20.0 %

Required Percent Compaction: 90.0 (%)

Comments:

TEST RESULTS:

X Pass Date: 12/19/11

Failed Moisture

Failed Compaction Time: 17:00

By: Kevin Keele (print) / Kevin Keele (signature)

12-30-2011
QA/QC APPROVAL DATE

Density Testing
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A8. Spoils Embankment
Lift Approval Package


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