APPENDIX E – DRILL LOGS

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-3
Ground Elevation	**Location**	**Page**
812.6 ft. NAVD 88	Neodesha, Kansas Latitude 37.42854304 Longitude -95.68845627	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		21

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	21	0.00	5	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-14-14 To: 10-14-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots.	CLS					0	20.9	0	0		START DRILLING at 1242.
	SANDY CLAY - Very Dark Gray to Black (10YR 3/1-2/1), very fine grain sand, some silt, soft, medium to high plasticity, some roots, damp.										0.5	
1		CL									1	
	CLAY - Light Gray (10YR 7/1-6/1), some silt, trace very fine sand, very stiff, medium plasticity, moderate iron oxide staining (massive mottling), some black organic streaks/inclusions, trace roots, damp.											
2											2.8	
				4.4/ 5	1244	SS1 0 - 5						
3											3.8	
4											14.2	
5	SILTY CLAY - Light Gray (10YR 7/1-6/1), some very fine sand, very stiff, medium plasticity, more iron oxide staining (massive mottling), trace roots, damp.	CL-ML					0	20.9	0	0	0.7	
6											12.4	
											19.1	
7											35.7	
				4.5/ 5	1254	SS2 5 - 10						
8											28.9	
	SANDY CLAY - Light Gray (10YR 7/1-6/1), very fine sand, some silt, medium stiff, medium plasticity, red iron oxide filled root traces, more sandy downward, damp to moist.	CLS										
9											41.2	
10	SANDY CLAY - Light Gray (10YR 7/1-6/1), very fine sand, some silt, soft, medium plasticity, red iron oxide filled root traces, more sandy downward, damp to moist.	CLS					0	20.9	0	0	47.3	
											31.5	
11												
12											33.8	
				3.8/ 5	1305	SS3 10 - 15						
13											15.8	
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number LIF-3
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-14-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	some Dark Bluish Gray (10B 4/1), moderate odor, medium to high plasticity.	CLS				10SS15 –	0	20.9	0	0	47.3 27.5	
15	SANDY CLAY - Bluish Gray to Bluish Black (10B 4/1-2.5/1), very fine to fine grain, soft, high plasticity, strong odor, sheen, moist to WET. More sheen and black downward.	CLS					0	20.9	0	0	98.2	Strong odor
16											285	
17											133	
18				3/ 5	1318	SS4 15 - 20						
19	SANDY GRAVEL - Black, very fine sand, some silt, trace clay, angular to subangular gravel (1/8"-1/4"), moist to WET.	GWS									102	
20	CLAYEY GRAVEL - Light Olive Brown (2.5Y 5/4-5/6), some very fine sand, medium dense, gravel (1/8"-3/4"), WET.	GC					0	20.9	0	0		WET Sleeve
				0.7/ 1	1330	SS5 20 - 21						
21	SILTY CLAY - Strong Brown (7.5YR 5/6), trace very fine sand, medium stiff, medium plasticity	CL-ML									6.8	STOP DRILLING at 21.0 feet bgs. Hit Refusal.
22	Borehole Total Depth = 21.0 feet bgs at Refusal.											
23												
24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-11A
Ground Elevation	**Location**	**Page**
818.3 ft. NAVD 88	Neodesha, Kansas Latitude 37.42852004 Longitude -95.69242089	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		24

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	24	0.00	5	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-14-14 To: 10-14-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots.						0	20.9	0	0		START DRILLING 1124
	CLAY - Very Dark Gray (10YR 3/1), some silt, soft, medium to high plasticity, trace to some roots, more stiff downward (medium stiff), moist.	CL									11.8	
1											30.7	
	CLAY - Gray (10YR 6/1), some silt and very fine sand, medium stiff to stiff, iron oxide staining (mottling) decreases downward, damp to moist.	CL										
2											72	
				5/ 5	1125	SS1 0 - 5						
3											26.2	
4											39.4	
											25.2	
5	CLAY - Same as above (SAA) with some black organic streaks/inclusions, damp to moist.	CL					0	20.9	0	0	27.6	
6											1.2	
											0.6	
7											0	
				/ 5	1139	SS2 5 - 10						
8											0	
9											0.8	Moist to WET
10	No Recovery						0	20.9	0	0	0	No Soil Sample Recovery from 10-15 feet bgs.
11												
12												
				0/ 5	1154	na 10 - 15						
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	LIF-11A
Page	2 of 2
Date	10-14-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	No Recovery					10na15 –	0	20.9	0	0	0	
15	SILTY CLAY - Gray (10YR 6/1), some silt and very fine sand, very stiff, mediumm to high plasticity, more iron oxide staining, moist to WET.	CL-ML		3/ 5	1206	SS3 15 - 20	0	20.9	0	0		WET SLEEVE and Strong Odor
16											0	
16											0	
17											0	
18											0	
18	CLAYEY SAND - Greenish Gray (5GY 5/2), very fine to fine sand, some silt, poorly graded, medium plasticity, soft to medium stiff, moist to WET.	SC										
19	CLAYEY GRAVEL - some very fine to fine sand, some silt, trace medium sand, well graded, angular to subangular (1/8"-1/2"), medium dense to dense, WET.	GC									0	
20							0	20.9	0	0	67	
20	GRAVELLY SAND - Gray (10YR 5/1), very fine to fine grain sand, some silt, trace clay, medium dense to dense, WET.	SPG									14	
22				2.3/ 4	1218	SS4 20 - 24					17	
23											13	
24	SANDY CLAY - Olive (5Y 5/3), very fine to fine grain sand, some silt, some pebbles and gravel, trace hard carbonate concretions, more gravelly downward, damp.	CLS									2.1	STOP DRILLING at 24.0 feet bgs. Hit Refusal.
24	Borehole Total Depth = 24.0 feet bgs at Refusal.											
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-19
Ground Elevation	**Location**	**Page**
823.6 ft. NAVD 88	Neodesha, Kansas Latitude 37.43192334 Longitude -95.68998804	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		28.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	28.3	0.20	6	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-14-14 To: 10-14-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots GRAVEL (subgrade) CLAY - Black, some silt, soft, medium plasticity, some roots, trace iron oxide staining (fine mottling and root traces), damp.	CL					0	20.9	0	0	3.5 5.2	START DRILLING at 1349.
2.5	CLAY - Dark Grayish Brown (10YR 4/2), some silt, medium stiff, medium plasticity, some black organic streaks/inclusions, damp.	CL		4/ 5	1350	SS1 0 - 5					7.7 4.8 2.0	
5	CLAY - Gray (10YR 6/1), some silt, soft to medium stiff, medium plasticity, trace iron oxide staining at top (fine mottling and root traces) to abundant toward bottom (massive mottling), trace hard iron oxide concretions (1/16"-1/8"), some black organic streaks/inclusions, becoming more stiff downard, damp.	CL		4.5/ 5	1401	SS2 5 - 10	0	20.9	0	0	0.6 14 10.2 5 1.6	
9	CLAY - Yellowish Brown (10YR 5/6), some silt, trace very fine sand, medium stiff to stiff, abundant iron oixde staining (massive mottling), some black organic streaks/inclusions, damp to moist.	CL									0.4	
10	CLAY - Yellowish Brown to Dark Yellowish Brown (10YR 5/6-4/6), some silt, trace very fine sand, medium stiff to stiff, medium plasticity, some black organic streaks/inclusions, abundant iron oxide staining (massive mottling), damp.	CL		3.7/ 5	1411	SS3 10 - 15	0	20.9	0	0	0.8 0 0	

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	LIF-19
Page	2 of 2
Date	10-14-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
		CL				10 SS3 15 –	0	20.9	0	0		
15	SILTY CLAY - Yellowish Brown to Dark Yellowish Brown (10YR 5/6-4/6), trace very fine sand, medium stiff, medium plasticity, some black organic streaks/inclusions, abundant iron oxide staining (massive mottling), more sandy downward, damp.	CL					0	20.9	0	0	0.2	
		CL-ML									0.8	
16	SILTY CLAY - Dark Yellowish Brown (10YR 4/2), some very fine sand, medium stiff, medium to high plasticity, trace black organic streaks/inclusions, trace pockets of Light Gray (10R 7/2) silt to very fine sand, damp to moist.										0	
17											0	
				4/ 5	1421	SS4 15 - 20						
18	SANDY CLAY - Dark Yellowish Brown (10YR 4/2), some silt, soft to medium stiff, high plasticity, damp to moist.	CLS									0	
19											0	
20	SANDY CLAY - Yellowish Brown (10YR 5/6-5/8), very fine sand, some silt, soft, high plasticity, moist to WET.	CLS					0	20.9	0	0	0	
21											0	
22											0	
				1.3/ 5	1430	SS5 20 - 25						
23												
24												
25							0	20.9	0	0	0	
26												
				3/ 3.5	1435	SS6 25 - 28.5						
27	GRAVELLY CLAY - Yellowish Brown to Brownish Yellow (10YR 5/6-6/6), dense to very dense, subangular to subrounded gravel (1/8"-3/4"), dry to damp.	GC									0	
28												
	SHALE - Light Gray (10YR 7/1), some silt, trace very fine sand, medium consistenc, low to medium plasticity, dry to damp.											
29	Borehole Total Depth = 28.5 feet bgs (Refusal)											STOP DRILLING - Hit Refusal at 28.5 feet bgs. Bentonite chip borehole.
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-30
Ground Elevation	**Location**	**Page**
814.1 ft. NAVD 88	Neodesha, Kansas Latitude 37.42579958 Longitude -95.6917826	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE Plus (5-gas)		25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	25	0.00	5	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-14-14 To: 10-14-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots											START DRILLING at 818.
	FILL - Clayey Gravel, Black (10YR 2/1) to Dark Grayish Brown (10YR 4/2), soft, medium to high plasticity, subrounded to subangular (1/4"-1/2"), some roots, some iron oxide staining toward bottom, dry to damp.						0	20.9	0	0	0	
1							0	20.9	0	0	0	
	CLAY - Dark Grayish Brown (10YR 4/2), some silt, trace very fine sand, medium stiff to stiff, some iron oxide staining, trace roots, dry to damp.	CL										
2							0	20.9	0	0	0	
				4.3/ 5	819	SS1 0 - 5						
3							0	20.9	0	0	0	
4							0	20.9	0	0	0	
	CLAY - Gray (10YR 6/1), some silt, trace very fine sand, medium stiff to stiff, medium plasticity, some iron oxide staining, some black stained pockets (trace-low odor), trace roots, dry to damp. Heavy black staining with strong odor at 5.5-6.0 feet bgs.	CL					0	20.9	0	0	7.7	
5							4	20.9	0	0	110	
	CLAY - Light Gray (10YR 7/1), stiff, medium to high plasticity, some iron oxide staining, trace black staining (trace-low odor), damp.	CL					20	20.9	0	0	302	
6												
	CLAY - Gray (10YR 6/1), some silt, trace very fine sand, medium stiff to stiff, medium plasticity, some iron oxide staining, some Light Gray (10YR 10YR 7/2) pockets of silty to very fine sand, some black stained pockets (moderate-strong odor), trace roots, dry to damp.	CL					2	20.9	0	0	20.9	
7				4.5/ 5	830	SS2 5 - 10						
8		CL					14	20.9	0	0	200	
	CLAY - Light Gray (10YR 7/1), stiff, medium to high plasticity, some iron oxide staining, trace black staining (moderate odor), damp.											
9							3	20.9	0	0	53	
10												
	CLAY - Light Gray (10YR 7/1-8/1), some silt, trace very fine sand, stiff, medium plasticity, some black staining (moderate to strong odor) and iron oxide staining, damp.	CL					4	20.9	0	0	65	
11							14	20.9	0	0	192	
							15	20.9	0	0	263	
12												
				4.1/ 5	842	SS3 10 - 15	15	20.9	0	0	70	
13							4	20.9	0	0	131	
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	LIF-30
Page	2 of 2
Date	10-14-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Light Gray (10YR 7/1-8/1), some silt, trace very fine sand, stiff, medium plasticity, some black staining (moderate to strong odor) and iron oxide staining, damp.	CL				SS3 15 –	4	20.9	0	0	65	
	more iron oxide staining and becoming more sandy downward.						4	20.9	0	0	166	
16	CLAY - Dark Grayish Brown (10YR 4/2), some silt and very fine sand, soft, medium to high plasticity, damp to moist.	CL					5	20.9	0	0	190	
	SILTY CLAY - Light Gray (10YR 7/1), some very fine sand, soft, high plasticity, trace iron oxide staining, more sandy downward, strong odor, moist to WET.	CL-ML					16	20.9	0	0	269	
17							20	20.9	0	0	396	
				3.2/ 5	855	SS4 15 - 20						
18	GRAVELLY CLAY - Light Gray to Light Brownish Gray (10YR 7/1-6/2), some very fine to fine sand, loose to medium dense, well graded, moist to WET.	GW-GC					na	20.9	0	0	904	Slight Sheen
19												
	SAND - Gray (10YR 5/1), very fine to fine grain, poorly graded, loose to medium dense, strong odor, moist to WET.	SP					na	20.9	0	0	2130	
20	SAND - Grayish Brown (10YR 5/2), very fine to fine grain, trace medium grain, trace pebble to gravel, poorly graded, sheen, WET.	SP										Sheen
21							na	20.9	0	0	120	
22							na	20.9	0	0	787	
				4.7/ 5	925	SS5 20 - 25						
23							na	20.9	0	0	69	
24	SANDY GRAVEL - Light Gray to Light Brownish Gray (10YR 7/1-6/2), very fine to fine grain, some clay, well graded, medium dense to dense, angular to subangular gravel (1/4"-1/2"), strong odor, moist to WET.	SWG					na	20.9	0	0	59	
25	Borehole Total Depth = 25.0 feet bgs											STOP DRILLING at 25.0 feet bgs at Refusal. Bentonite hole.
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-44
Ground Elevation	**Location**	**Page**
813.4 ft. NAVD 88	Neodesha, Kansas Latitude 37.42935909 Longitude -95.68494837	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE Plus (5-gas)		28.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	28.5	0.00	6	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-13-14 To: 10-13-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	ASPHALT											START DRILLING at 1537
	CLAY - Gray (10R 5/1), soft to medium stiff, medium to high plasticity, trace to some black organic inclusions, dry to damp.	CL										
1	CLAY - Pale Brown to Light Brownish Gray (10YR 6/3-6/2), medium stiff to stiff, medium to high plasticity, trace iron oxide staining and black organic inclusions, dry to damp.	CL					0	20.9	0	0	NA	
2				3.8/ 5	1539	SS1 0 - 5	0	20.9	0	0	NA	
3							0	20.9	0	0	NA	
4							0	20.9	0	0	NA	
	CLAY - Brownish Yellow (10YR 6/6), some silt, trace very fine sand, medium stiff, medium to high plasticity, trace roots, dry to damp.	CL										
5							0	20.9	0	0	NA	
6	Medium stiff to stiff	CL					0	20.9	0	0	NA	
7	CLAY - Dark Gray (10YR 4/1), medium stiff to stiff, medium to high plasticity, abundant iron oxide staining at top, dry to damp.	CL					0	20.9	0	0	NA	
	CLAY - Pale Brown (10YR 6/3), some silt, trace very fine sand, medium stiff to stiff, medium to high plasticity, trace iron oxide staining, becoming more sandy downward, dry to damp.	CL		4.2/ 5	1540	SS2 5 - 10						
8							0	20.9	0	0	NA	
9							0	20.9	0	0	NA	
	SANDY CLAY - Light Yellowish Brown (10YR 6/4), soft to medium stiff, high plasticity, some iron oxide staining, damp.	CLS										
10	CLAY - Pale Brown (10YR 6/3), trace to some silt, soft to medium stiff, high plasticity, some iron oxide staining, trace hard carbonate concretions, damp.	CL					0	20.9	0	0	NA	
11												
12				3.7/ 5	1601	SS3 10 - 15	0	20.9	0	0	NA	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number LIF-44
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-13-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
		CL				SS3	0	20.9	0	0	NA	
						10 - 15	0	20.9	0	0	NA	
15	CLAY - Yellowish Brown (20YR 5/4-5/6), some silt and very fine sand, soft, high plasticity, trace hard carbonate concretions, trace odor.	CL										
16	CLAY - Yellowish Brown (10YR 5/6-5/8), some silt, trace very fine sand, soft, high plasticity, abundant iron oxide staining and some mineralized concretions, trace to low odor, moist to damp.f	CL					0	20.9	0	0	NA	
17				4.3/ 5	1615	SS4 15 - 20						
18							0	20.9	0	0	NA	
19												
20							0	20.9	0	0	NA	
21	CLAY - Pale Brown (10YR 6/3) with Light Gray (10YR 7/1) mottling, some silt, trace very fine to fine sand, very soft, high plasticity, trace to low odor, moist.	CL										
22							0	20.9	0	0	NA	
23	becoming more sandy downward, low to moderate odor.			2.1/ 5	1623	SS5 20 - 25						
24							0	20.9	0	0	NA	
25	CLAYEY GRAVEL - Light Greenish Gray (5GY 6/2), some silt and very fine to fine sand, subangular to rounded gravels (0.25"-0.75"), medium dense to dense, trace carbonate concretions, becoming more sandy downward, moist to WET.	GC										
26							0	20.9	0	0	NA	
27				2.1/ 3.5	1637	SS6 25 - 28.5						
28	SAND - Greenish Gray (10YR 6/1), very fine grain, poorly graded, some silt, loose to medium dense, trace weak to medium cemented very fine sandstone to siltstone, dry to damp.	SP					0	20.9	0	0	NA	
29	Borehole Total Depth = 28.5 feet bgs at REFUSAL.											STOP DRILLING at 28.5 feet bgs. Hit Refusal. Bentonite hole and asphalt patch at surface.
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-47
Ground Elevation	**Location**	**Page**
812.9 ft. NAVD 88	Neodesha, Kansas Latitude 37.42569704 Longitude -95.68594757	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE Plus (5-gas)		28

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	27.5	0.50	6	NA	NA	

Drilling Company	RAZEK Environmental, LLC.	Drillers (s)	Tony Poulter and Paul Sundquist
Drilling Rig	Geoprobe 6620DT track-mounted	Type of Sampler	Macro-Core (MC5)
Date 10-13-14	To 10-13-14	Field Observer (s)	C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASHALT						0	20.9	0	0	NA	START DRILLING at 1340
	BRICK (former road surface) with gravel subgrade.	CL										
1	CLAY - Very Pale Brown (10YR 7/3), trace to some silt, soft, medium to high plasticity, becoming more silty to sandy and medium stiff downward, trace iron oxide staining, trace odor, dry to damp.						0	20.9	0	0	NA	
2				4/ 5	1347	SS1 0 - 5	0	20.9	0	0	NA	
3							0	20.9	0	0	NA	
4							0	20.9	0	0	NA	
5	Stiff to Very Stiff	CL					0	20.9	0	0	NA	
6	CLAY - Yellowish Brown (10YR 5/6), stiff to very stiff, medium plasticity, abundant iron oxide staining, dry to damp.	CL					0	20.9	0	0	NA	
7				4.6/ 5	1352	SS2 5 - 10	0	20.9	0	0	NA	
8							0	20.9	0	0	NA	
9	Gray (10R 6/1-5/1) mottling	CL					0	20.9	0	0	NA	
10	CLAY - Yellowish Brown (10YR 5/6), stiff to very stiff, medium plasticity, abundant iron oxide staining, dry to damp.	CL					0	20.9	0	0	NA	lost some soil core recovery while tripping out of hole.
11												
12				2.3/ 5	1406	SS3 10 - 15	0	20.9	0	0	NA	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number LIF-47
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-13-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Yellowish Brown (10YR 5/6), stiff to very stiff, medium plasticity, abundant iron oxide staining, dry to damp.	CL				SS3	0	20.9	0	0	NA	
	trace silt, very fine sand, and gravel at bottom	CL				10 - 15	0	20.9	0	0	NA	
16	CLAY - Gray to Dark Gray (10YR 5/1-4/1), trace silt and very fine sand, soft to medium stiff, medium to high plasticity, trace iron oxide staining, trace odor, dry to damp.	CL					0	20.9	0	0	NA	
17				1.2/ 5	1416	SS4 15 - 20						
18							0	20.9	0	0	NA	
19												
20	CLAY - Same as above (SAA); very soft, high plasticity, low to moderate odor, WET.	CL					0	20.9	0	0	NA	
21												
22	some silt and very fine sand	CL					0	20.9	0	0	NA	
23				3.4/ 5	1424	SS5 20 - 25						
24	CLAYEY GRAVEL - Light Olive Gray (5Y 6/2-5/4), some silt to fine sand, dense, angular to subrounded gravels (0.25"-0.75"), moderate odor, damp to moist.	GC					0	20.9	0	0	NA	
25	CLAY - Gray to Light Gray (10YR 6/1-7/1), some silt, soft to medium stiff, medium to high plasticity, some iron oxide staining at bottom, damp to WET.	CL										
26							0	20.9	0	0	NA	
27	CLAYEY GRAVEL - Light Olive Gray (5Y 6/2-5/4), some silt to fine sand, dense, angular to subrounded gravels (0.25"-0.75"), strong odor, moist to WET.	GC		4.2/ 3	1438	SS6 25 - 28						
	WEATHERED SHALE - Light Greenish Gray (5GY 6/2), some silt and very fine to fine sand, trace to some gravel, strong odor, damp to moist.											
28	Borehole Total Depth = 28.0 feet bgs at REFUSAL.						0	20.9	0	0	NA	STOP DRILLING at 28.0 feet bgs. Hit Refusal. Backfill with bentonite and asphalt patch at surface.
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-54
Ground Elevation	**Location**	**Page**
812.5 ft. NAVD 88	Neodesha, Kansas Latitude 37.42365858 Longitude -95.6838481	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE Plus (5-gas)		27

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	26	1.00	6	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-13-14 To: 10-13-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	ASPHALT						0	20.9	0	0	0	START DRILLING at 1143
	BRICK (former road)											
1	CLAY - Gray to Light Brownish Gray (10YR 6/1-6/2), medium stiff, high plastic, trace iron oxide staining becoming more abundant downward, trace black organic inclusions, and becoming more stiff downward, Dry.	CL					0	20.9	0	0	0	
2							0	20.9	0	0	0	
3				5/ 5	1146	SS1 0 - 5	0	20.9	0	0	0	
4							0	20.9	0	0	0	
5	SAND - very fine to fine grain, poorly graded, loose, subrounded to subangular, Dry.	SP										
	CLAY - Gray to Light Brownish Gray (10YR 6/1-6/2), medium stiff, high plastic, trace iron oxide staining becoming more abundant downward, trace black organic inclusions, and becoming more stiff downward, Dry-Damp.	CL					0	20.9	0	0	0	
6							0	20.9	0	0	1	
	CLAY - Same as above (SAA), stiff to very stiff, low to medium plasticity, low to moderate weathering (iron oxide staining), Dry to Damp.	CL										
7	CLAY - Grayish Brown (10YR 5/2), trace silt, stiff to very stiff, low to medium plasticity, black organic inclusions, trace odor, Damp.			3.5/ 5	1154	SS2 5 - 10	0	20.9	0	0	1.1	
8							0	20.9	0	0	1.6	
9	Damp to Moist - trace odor.	CL					0	20.9	0	0	1.6	
10	CLAY - Very Pale Brown (10YR 7/4), trace silt and very fine sand, trace gravel and coal fragments, soft, medium to high plasticity, trace odor, Moist to WET.	CL					0	20.9	0	0	2.7	
11							0	20.9	0	0	2.7	
12	CLAY - Light Brownish Gray (10YR 6/2), some silt, trace very fine sand, medium stiff, low to medium plasticity, Damp to Moist.	CL										
	CLAY - Light Brownish Gray (10YR 6/2), some sand and silt, trace subrounded gravel, medium stiff, high plasticity, some Brownish Yellow (10YR 6/6) iron oxide staining, trace odor.	CL		4.2/ 5	1203	SS3 10 - 15						
13							0	20.9	0	0	1.6	
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	LIF-54
Page	2 of 2
Date	10-13-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Light Brownish Gray (10YR 6/2), some sand and silt, trace subrounded gravel, medium stiff, high plasticity, some Brownish Yellow (10YR 6/6) iron oxide staining, trace odor.	CL				SS3 15 –	0	20.9	0	0	2.7	
							3	20.9	0	0	5.5	
16	CLAYEY GRAVEL - some silt and very fine sand, well graded, medium dense, angular to subrounded gravel (0.25-0.75 inch), low odor, WET.	GC										WET
17				3.3/ 5	1219	SS4 15 - 20						
18							7	20.9	0	0	18.2	
19	CLAYEY GRAVEL - SAA, moderate to strong odor, Damp.	GC					20	20.9	0	0	307	
20	CLAYEY GRAVEL - more sandy than above, well graded, medium dense, angular to subrounded gravel (0.25-0.75 inch), moderat to strong odor, Damp.	GC										
21							31	20.9	0	0	428	
22				3.2/ 5	1237	SS5 20 - 25						
23							29	20.9	0	0	379	
24												
25	SAND - Pale Brown (10YR 6/3), very fine to fine grain, trace gravel, poorly graded, loose to medium density, moderate odor, WET.	SP					17	20.9	0	0	52	
26	WEATHERED SHALE - Grayish Olive (10YR 5/2), some silt and very fine sand, trace gravel, dry to damp			3.2/ 2	1243	SS6 25 - 27						
27	Borehole Total Depth = 27.0 feet bgs at REFUSAL.						1	20.9	0	0	47	STOP DRILLING at 27.0 feet bgs. Hit Refusal. Backfill hole with bentonite and asphalt patch hole at surface.
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	LIF-56
Ground Elevation	**Location**	**Page**
810.4 ft. NAVD 88	Neodesha, Kansas Latitude 37.42819855 Longitude -95.69431405	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE Plus (5-gas)		18

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	18	0.00	4	NA	NA	

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-14-14 To: 10-14-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots.											START DRILLING at 1012.
	SILTY CLAY - Dark Grayish Brown (10YR 4/2), some very fine sand, trace pebble, soft, high plasticity, dry to damp.	CL-ML					0	20.9	0	0	0	
1							0	20.9	0	0	0	
2							0	20.9	0	0	0	
				3.3/ 5	1013	SS1 0 - 5						
3							0	20.9	0	0	0	
4	CLAY - Brown (10YR 4/3), some silt, trace very fine to medium sand, trace pebble and gravel, very stiff, trace roots, trace iron oxide pockets (hard consistency), damp.	CL					0	20.9	0	0	0	
5	CLAY - Yellowish Brown (10YR 5/4-5/6), some silt, trace very fine sand, very stiff, medium plasticity, iron oxide staining, trace carbonate concretions (1/8"-1/4"), trace to some black MnO concretions, dry to damp.	CL					0	20.9	0	0	0	
							0	20.9	0	0	0	
6							0	20.9	0	0	0	
7							0	20.9	0	0	0	
				4.5/ 5	1025	SS2 5 - 10						
8	more silty, damp to moist.	CL-ML					0	20.9	0	0	0	
9							0	20.9	0	0	0	
	SILTY CLAY - Yellowish Brown (10YR 5/6-5/8) to Dark Yellowish Brown (10YR 4/6), some very fine sand, more iron oxide staining, damp to moist.	CL-ML										
10		CL-ML										Damp to Moist
	SILTY CLAY - Dark Yellowish Brown (10YR 4/6), trace very fine sand, medium stiff, trace hard carbonate concretions (1/8"-1/4"), damp.						0	20.9	0	0	0	
11	more sandy (very fine grain) and moist downward.											
12				4.2/ 5	1040	SS3 10 - 15						
13							0	20.9	0	0	0	
14		CLS										

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number LIF-56
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-14-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SANDY CLAY - Dark Yellowish Brown (10YR 4/6), very fine sand, some silt, trace hard carbonate concretions (1/8"-1/4"), soft, medium to high plasticity, some black organic streaks/inclusions, moist. moist to WET, trace black organic streaks/inclusions	CLS				15 - 15	0	20.9	0	0	0	Moist to WET
16				1.8/ 3	1050	SS4 15 - 18	0	20.9	0	0	0	
17	SILTY CLAY - Pale Brown (10YR 6/3), some very fine sand, medium stiff, medium to high plasticity, some iron oxide staining, moist.	CL-ML					0	20.9	0	0	0	
18	GRAVELLY CLAY - some very fine sand, trace medium sand, well graded, medium dense to dense, damp to moist. Borehole Total Depth - 18.0 feet bgs at Refusal.	GW-GC					0	20.9	0	0	0	STOP DRILLING. Hit Refusal at 18.0 feet bgs. Bentonite hole.
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-144
Ground Elevation	**Location**	**Page**
792.7 ft. NAVD 88	Neodesha, Kansas Latitude 37.41387798 Longitude -95.68925602	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		23

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	23	0.00	5	NA	1.64	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-21-14 To: 10-21-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL											START DRILLING at 1643.
	CLAY - Very Dark Gray to Grayish Brown (10YR 3/2), some silt, trace very fine to fine sand, soft, high plasticity, some roots, damp.	CL					0	20.9	0	0	0	
1												Damp to Moist.
2	CLAY - Gray to Grayish Brown (10YR 5/1-5/2), some silt, trace very fine sand, soft, trace to some Dark Yellowish Brown (10YR 4/6) iron oxide mottling (fine root traces), damp.	CL		4.7/ 5	1645	SS1 0 - 5	0	20.9	0	0	0	
3							0	20.9	0	0	0	
4	SILTY CLAY - Gray to Grayish Brown (10YR 5/1-5/2), trace very fine sand, soft, trace to some Dark Yellowish Brown (10YR 4/6) iron oxide mottling (fine root traces), trace hard white carbonate concretions (1/8"-1/4"), damp.	CL-ML					0	20.9	0	0	0	
5	SILTY CLAY - Gray to Light Gray (10YR 6/1-7/1), trace very fine sand, soft to medium stiff, some Dark Yellowish Brown (10YR 4/6) iron oxide mottling (fine root traces), trace hard white carbonate concretions (1/8"-1/4"), trace to some hard black iron and manganese oxide concretions (1/8"-1/4"), damp.	CL-ML					0	20.9	0	0	0	Damp to Moist. Swollen Clays.
6							0	20.9	0	0	0	
7				4.8/ 5	1649	SS2 5 - 10	0	20.9	0	0	0	
8							0	20.9	0	0	0	
9							0	20.9	0	0	0	
10	SILTY CLAY - Gray (10YR 6/1), trace very fine to fine sand, soft to medium stiff, medim to high plasticity, some iron oxide mottling (fine to moderate), trace hard carbonate (white), manganese oxide (black) and iron oxide (reddish orange) concretions (1/16"-1/8"), damp to moist.	CL-ML					0	20.9	0	0	0	
11												
12				4.5/ 5	1657	SS3 10 - 15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-144
Page	2 of 2
Date	10-21-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Gray (10YR 6/1), trace to some silt, soft to medium stiff, medium to high plasticity, trace iron oxide mottling, damp to moist. Bottom consists of some silt, trace very fine sand, soft, high plasticity, and moist.	CL				SS3 10 - 15	0	20.9	0	0	0	
16	SILTY CLAY - Gray (10YR 5/1), some very fine to fine sand, trace pebble, soft to medium stiff, medium to high plasticity, some iron oxide mottling (fine), damp to moist.	CL-ML					0	20.9	0	0	0	
17												
18				4/ 5	1706	SS4 15 - 20	0	20.9	0	0	0	
19	moderate to massive iron and manganese oxide mottling, trace Pale Yellow (5Y 8/4) very fine to fine grain sand pockets.											
20	CLAY - Gray to Yellowish Brown (10YR 5/1-5/4), some silt, very fine sand, and gravel, soft, high plasticity, moist.	CL										
21	SANDY GRAVEL - Light Yellowish Brown to Light Olive Brown (2.5Y 6/3-5/4), very fine to fine sand, some pebbles, trace silt and clay, medium dense, rounded to subangular gravel, WET.	GWS					0	20.9	0	0	0	WET
22				1.7/ 3	1713	SS5 20 - 23	0	20.9	0	0	0	
23	SILTY SAND - Olive Yellow to Gray (2.5Y 6/6-5/1), very fine grain sand, weakly cemented (brittle), thinly laminated/bedded, trace hard Siltstone lenses.	SM										STOP DRILLING at 23.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-144. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 17.94 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
24	Borehole Total Depth = 23.0 feet bgs at Refusal.											
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-145
Ground Elevation	**Location**	**Page**
792.7 ft. NAVD 88	Neodesha, Kansas Latitude 37.40928521 Longitude -95.68890581	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		28

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	25.5	2.50	6	NA	10.86	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-16-14 To: 10-16-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL											START DRILLING at 1345.
	CLAY - Dark Grayish Brown (10YR 4/2), some silt, trace very fine sand, soft, medium plasticity, some roots.	CL										
1	SILTY CLAY - Brown (10YR 4/3), soft to medium stiff, medium plastic, trace roots, damp.	CL-ML					0	20.9	0	0	1.5	
2	SILTY CLAY - Very Dark Grayish Brown (10YR 3/2), trace very fine sand, medium stiff, trace roots, damp. Grades to Dark Brown (7.5YR 3/2), medium stiff to stiff, medium to high plasticity with increasing depth.	CL-ML		5/ 5	1346	SS1 0 - 5	0	20.9	0	0	1.4	
3							0	20.9	0	0	5.8	
4	trace iron oxide mottling (fine root traces), trace medium to coarse grain sand, trace hard carbonate, iron oxide, and manganese oxide concretions (1/8"-1/4"), damp.						0	20.9	0	0	26.1	
5	SILTY CLAY - Very Dark Grayish Brown (10YR 3/2), trace very fine sand, medium stiff to very stiff, trace roots, trace iron oxide mottling (fine root traces), trace carbonate, iron oxide, manganese oxide concretions (1/8"-1/4"), damp to moist.	CL-ML					0	20.9	0	0	37.8	WET Sleeve.
6							0	20.9	0	0	45.4	
7				4.1/ 5	1350	SS2 5 - 10	0	20.9	0	0	34.8	
8							0	20.9	0	0	101	
9							0	20.9	0	0	63.1	
10	CLAY - Strong Brown (7.5YR 5/6), some silt, medium stiff, medium plasticity, some iron oxide mottling (medium), trace carbonate concretions (1/16"-1/4"), damp to moist.	CL					0	20.9	0	0	234	WET Sleeve. Swollen Clay.
11												
12				4/ 5	1358	SS3 10 - 15	0	20.9	0	0	117	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-145
Page	2 of 2
Date	10-16-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15		CL				10SS3 5 –	0 0	20.9 20.9	0 0	0 0	234 194	
16	CLAY - Gray to Brown (7.5YR 6/2-5/2), some silt, trace very fine sand, soft to medium stiff, trace to some iron oxide mottling (fine to medium root traces), trace iron and manganese oxide mineralization, root traces, and concretions (1/8"-1/4"), trace hard carbonate concretions (1/8"-1/4"), moist.	CL					0	20.9	0	0	59	
17				1/ 5	1416	SS4 15 - 20						
18							0	20.9	0	0		
19												
20							0	20.9	0	0		
21	CLAY - Brown (7.5YR 5/4), some silt, soft to medium stiff, medium to high plasticity, abundant iron oxide mottling (medium to massive), trace black organic inclusions (coaly), trace hard carbonate concretions (1/8"-1/4"), moist.	CL										
22				4/ 5	1420	SS5 20 - 25	0	20.9	0	0	52	
23												
24	SILTY CLAY - Brown (7.5YR 5/4), some very fine sand, soft, high plasticity, abundant iron oxide mottling (medium to massive), trace black organic inclusions (coaly), trace hard carbonate concretions (1/8"-1/4"), moist to WET.	CL-ML					0	20.9	0	0	490	
25	SANDY GRAVEL - Olive Yellow to Light Olive Brown (2.5Y 6/6-5/4), very fine to fine grain sand, some silt, trace clay, well graded, medium dense to dense, rounded to subangular gravel, WET.	GWS										
26	SHALE - weathered Yellowish Brown to Gray (10YR 5/4), fresh Light Gray to Gray (GLEY 1 N 7/-5/), some silt, thinly bedded horizontal plates, dry to damp.			2.5/ 3	1423	SS6 25 - 28	0	20.9	0	0	64	
27												
28	SILTY SHALE - White to Light Gray (GLEY 1 N 8/-7/), trace very fine sand, very weak (brittle), dry. Bottom consist of SILT (fine plates).						0	20.9	0	0	79	STOP DRILLING at 28.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-145. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 22.96 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
29	Borehole Total Depth = 28.0 feet bgs at Refusal.											
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-146
Ground Elevation	**Location**	**Page**
793.4 ft. NAVD 88	Neodesha, Kansas Latitude 37.4093031 Longitude -95.69117714	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		24.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	24.5	0.00	5	NA	10.17	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-16-14 To: 10-16-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	O2	H2S	CO	PID	Remarks/ Water Levels
0	TOPSOIL											START DRILLING at 1620.
	CLAY - Very Dark Gray (10YR 3/1), some silt, trace very fine sand, medium stiff, medium plasticity, some roots, damp.	CL					0	20.9	0	0	31	
2							0	20.9	0	0	112	
	medium stiff to stiff			4.5/ 5	1621	SS1 0 - 5						
3							0	20.9	0	0	19	
	trace Dark Yellowish Brown (10YR 4/4-4/6) iron oxide mottling (fine root traces)											
4							0	20.9	0	0	4.8	
5	CLAY - Very Dark Grayish Brown (10YR 3/2), some silt, trace very fine to fine sand, medium stiff to stiff, trace to some iron oxide mottling (fine root traces), damp. More iron oxide mottling with increasing depth.	CL					0	20.9	0	0	1.2	Damp to Moist. Swollen Clays.
6							0	20.9	0	0	179	
	SILTY CLAY - Dark Grayish Brown to Dark Yellowish Brown (10YR 4/2-4/4), trace very fine to fine sand, stiff, medium plasticity, some iron oxide mottling (moderate), trace black organic inclusions/streaks, damp.	CL-ML					0	20.9	0	0	77.2	
7				5/ 5	1626	SS2 5 - 10						
8	Moist, soft, high plasticity.						0	20.9	0	0	71.5	
9							0	20.9	0	0	107	
	Moist, soft to medium stiff, trace roots.											
10	CLAY - Dark Grayish Brown to Dark Yellowish Brown (10YR 4/2-4/4), some silt, trace very fine sand, stiff, medium plasticity, trace iron and manganse oxide mottling and concretions (1/16"-1/8"), damp to moist.	CL					0	20.9	0	0	225	
11												
12							0	20.9	0	0	157	
				4.6/ 5	1630	SS3 10 - 15						
13												
14		CL										

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-146
Page	2 of 2
Date	10-16-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Gray (10YR 5/1), some silt, stiff, trace roots, trace iron oxide mottling (fine root traces) and concretions (1/16"-1/8"), damp to moist.	CL				SS3 15 –	0 0	20.9 20.9	0 0	0 0	225 187	
16	SILTY CLAY - Brown to Dark Yellowish Brown (10YR 4/3-4/4), soft, medium to high plasticity, moist.	CL-ML										Moist
17	SILTY CLAY - Dark Grayish black (10YR 4/2), soft, high plasticity, WET.	CL-ML					0	20.9	0	0	90	
18	SILTY CLAY - Gray (10YR 6/1), soft, medium plasticity, trace very fine sand, trace iron oxide mottling (medium root traces), trace black mottling, moist to WET.	CL-ML		4.1/ 5	1635	SS4 15 - 20						
19	More abundant iron oxide mottling, trace pebble, trace manganese oxide (black) concretions (1/16"-1/8")						0	20.9	0	0	230	
20	More Clayey Silt, soft, high plasticity, moist to WET.						0	20.9	0	0	22	Moist to WET
21												
22				3.2/ 4.5	1641	SS5 20 - 24.5	0	20.9	0	0	2.3	
23	GRAVELLY SAND - Light Olive Brown (2.5Y 5/3), very fine to fine sand, trace medium to coarse sand, trace silt and clay, well graded, medium dense to dense, rounded to subangular gravel, WET.	SWG										WET
24	SILTY CLAY - Strong Brown (7.5YR 5/8), some very fine sand and gravel, iron oxide mottling (medium to massive), WET.	CL-ML					0	20.9	0	0	0.9	
25												STOP DRILLING at 24.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-146. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 18.9 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
26	Borehole Total Depth = 24.5 feet bgs at Refusal.											
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-147
Ground Elevation	**Location**	**Page**
794.1 ft. NAVD 88	Neodesha, Kansas Latitude 37.4092806 Longitude -95.6926588	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		26.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	26.5	0.00	6	NA	10.38	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-21-14 To: 10-21-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL CLAY - Very Dark Grayish Brown (10YR 3/2), some silt, soft, medium plasticity, some roots, trace iron oxide mottling (fine root traces with some silt to very fine sand filled root traces). Grades ot Very Dark Brown (10YR 2/2) with increasing depth, dry to damp.	CL		4.6/ 5	1418	SS1 0 - 5	0	20.9	0	0	0	START DRILLING at 1413.
1							0	20.9	0	0	0	
2							0	20.9	0	0	0	
3							0	20.9	0	0	0	
4							0	20.9	0	0	0	
5	CLAY - Dark Grayish Brown to Brown (10YR 4/2-4/3), some silt, some very fine sand, trace fine to medium sand, soft to medium stiff, trace roots, some iron oxide mottling (fine to moderate root trace; some silt to very fine sand filled root traces), damp.	CL		4.7/ 5	1422	SS2 5 - 10	0	20.9	0	0	0	
6							0	20.9	0	0	0	
7							0	20.9	0	0	0	
8							0	20.9	0	0	0	
9	SILTY CLAY - Dark Grayish Brown to Brown (10YR 4/2-4/3), some very fine sand, soft to medium stiff, medium to high plasticity, some iron oxide mottling (fine to moderate root trace; some silt to very fine sand filled root traces), damp.	CL-ML					0	20.9	0	0	0	
10							0	20.9	0	0	0	Damp to Moist. Swollen Clays.
11	SILTY CLAY - Dark Grayish Brown to Dark Yellowish Brown (10YR 4/2-4/4), trace very fine to fine sand, medium stiff to stiff, medium to high plasticity, some moderate iron oxide mottling (some silt to very fine sand filled root traces), damp to moist.	CL-ML		4.8/ 5	1433	SS3 10 - 15	0	20.9	0	0	0	
12												
13		CL-ML										
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-147
Page	2 of 2
Date	10-21-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SILTY CLAY - Grayish Brown to Gray (10YR 5/2-5/1), trace very fine sand, medium stiff, medium to high plasticity, trace roots, trace iron oxide mottling (fine root traces), damp to moist.	CL-ML				SS3	0	20.9	0	0	0	
16	SILTY CLAY - Light Brownish Gray (10YR 6/2), some fine sand, medium stiff, medium to high plasticity, trace roots, trace iron oxide mottling (fine root traces), damp to moist.	CL-ML					0	20.9	0	0	0	
17	SILTY CLAY - Light Gray to Gray (10YR 7/1-6/1), some very fine sand, soft to medium stiff, medium to high plasticity, some iron oxide mottling (fine to moderate root traces; some silt to very fine sand filled root traces), damp to moist. Becoming more sandy with increasing depth.			3.7/ 5	1440	SS4 15 - 20						
18	SANDY CLAY - Yellowish Brown (10YR 5/4-5/6), very fine to fine sand, some silt, soft, medium to high plasticity, massive iron oxide mottling (trace Light Gray to Gray clay filled root traces).	CLS					0	20.9	0	0	0	
19												
20							0	20.9	0	0	0	WET
21	CLAYEY GRAVEL - Pale Brown to Grayish Brown (10YR 6/3-5/2), some very fine to fine sand, mosit to WET.	GC GWS										
22	SANDY GRAVEL - Light Yellowish Brown (10YR 6/3), very fine to fine sand, some silt, trace clay, well graded, medium dense, rounded to subangular gravel, WET. Trace Greenish Gray (GLEY 2 10BG 6/1) clay clasts.			2.9/ 5	1449	SS5 20 - 25	0	20.9	0	0	0	
23												
24							0	20.9	0	0	0	
25	GRAVEL - small gravel with pebbles, poorly graded, rounded to subrounded, WET.	GP GWS										
26	SANDY GRAVEL - Light Yellowish Brown (10YR 6/3), very fine to fine sand, some silt, trace clay, well graded, medium dense, rounded to subangular gravel, WET. Trace Greenish Gray (GLEY 2 10BG 6/1) clay clasts.			1.6/ 1.5	1454	SS6 25 - 26.5	0	20.9	0	0	0	
27	Borehole Total Depth = 26.5 feet bgs at Refusal.											STOP DRILLING at 26.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-147. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 20 foot of 0.02 slot screen with 0.46 foot end cap. Stick-up well surface completion.
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-148
Ground Elevation	**Location**	**Page**
828.8 ft. NAVD 88	Neodesha, Kansas Latitude 37.43227081 Longitude -95.692029	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		27.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	26.5	1.00	5	NA	5.55	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-17-14 To: 10-17-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	TOPSOIL											START DRILLING at 1435.
1	FILL - Asphalt, Red Brick, some gravel. Black gravelly sand (very fine to medium grain) at bottom.											
	CLAY - Very Dark Gray to Black (10YR 3/1-2/1), some silt, soft, medium to high plasticity, trace roots, trace iron oxide concretions (1/8"-1/4"), damp.	CL					0	20.9	0	0	9.4	Collect MW-148 SS1 soil sample from 1.0'-1.5' bgs.
2							0	20.9	0	0	2.7	
				/ 5	1436	SS1 0 -_5						
3	SILTY CLAY - Brown (10YR 5/3), some very fine sand, soft to medium stiff, medium to high plasticity, trace iron oxide mottling (fine root traces), damp.	CL-ML					0	20.9	0	0	7.3	
4							0	20.9	0	0	4.4	
5							0	20.9	0	0	3.2	Collect MW-148 SS2 soil sample from 5'-10' bgs.
	CLAY - Gray (10YR 6/1), some silt, trace very fine sand, stiff to medium stiff, mediung to high plasticity, trace to some iron oxide mottling (fine to moderate root traces), damp.	CL										
6							0	20.9	0	0	3.4	
	CLAY - Gray (10YR 6/1), some silt, trace very fine sand, stiff to medium stiff, mediung to high plasticity, massive iron oxide mottling, trace iron oxide concretions (1/8"-1/4"), damp.	CL										
7							0	20.9	0	0	12	
				/ 5	1450	SS2 5 -_10						
8							0	20.9	0	0	3.3	
9							0	20.9	0	0	3.4	
10	CLAY - Brownish Yellow (10YR 6/6), soft, medium to high plasticity, massive iron oxide mottling, some black inclustions/streaks, trace hard carbonate concretions (gravel size), damp.	CL					0	20.9	0	0	5.7	
11												
12							0	20.9	0	0	8.8	
				/ 5	1454	SS3 10 -_15						
13		CL										
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-148
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-17-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Brownish Yellow (10YR 6/6), some silt, trace very fine sand, soft, medium to high plasticity, massive iron oxide mottling, some black inclustions/streaks, trace hard carbonate concretions (gravel size), damp to moist.	CL				10 SS3 15 –	0	20.9	0	0	5.7	
							0	20.9	0	0	11.2	
16							0	20.9	0	0	NA	
17				/ 5	1500	SS4 15 - 20						
18							0	20.9	0	0	5.7	
19	CLAY - Brownish Yellow (10YR 6/6), some silt, trace very fine sand, soft, medium to high plasticity, massive iron oxide mottling, some black inclustions/streaks, trace hard carbonate concretions (gravel size), moist.	CL										
20	No Recovery						0	20.9	0	0	0	
21												
22				0/ 5	1509	SS5 20 - 25	0	20.9	0	0	1.6	
23												
24							0	20.9	0	0	0	
25	SILT - Olive Yellow (2.5Y 6/6), trace very fine sand, trace clay (low plasticity), medium dense, trace black inclusions/streaks, dry to damp.	ML					0	20.9	0	0	4.4	
26				/ 2.5	1520	SS6 25 - 27.5						
27	SHALE - Pale Brown to Yellow (2.5Y 7/4-6/6), weak, dry to damp.						0	20.9	0	0	3	STOP DRILLING at 27.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-148. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 22.41 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
28	Borehole Total Depth = 27.5 feet bgs at Refusal.											
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-149
Ground Elevation	**Location**	**Page**
822.8 ft. NAVD 88	Neodesha, Kansas Latitude 37.43193417 Longitude -95.68596723	1 of 3
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	30	0.00	6	NA	25.68	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-22-14 To: 10-22-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASHALT											START DRILLING at 1357.
	FILL - Gravel top that grades downward into silty clay with some gravel.											
1	SILTY CLAY - Very Dark Gray (10YR 3/1), soft, high plasticity, trace Yellowish Brown (10YR 5/8), iron oxide mottling (fine root traces), damp.	CL-ML					0	20.9	0	0	0	
2							0	20.9	0	0	0	
				4.8/ 5	1358	SS1 0 - 5						
3							0	20.9	0	0	0	
	SILTY CLAY - Light Gray (10YR 7/1), trace very fine sand, soft to medium stiff, medium to high plasticity, trace iron oxide mottling (fine root traces), trce iron and manganese oxide concretions (1/8"-1/4"), trace black organic inclusions/streaks. Some very fine sand toward bottom with moderate iron oxide mottling.	CL-ML										
4							0	20.9	0	0	0	
5							0	20.9	0	0	0	
	CLAY - Light Gray (10YR 7/1), some silt, trace very fine sand, medium stiff, medium to high plasticity, becoming more weathered than above with some fine to moderate iron oxide mottling, damp.	CL										
6							0	20.9	0	0	0	
7	CLAY - Yellowish Brown to Dark Yellowish Brown (10YR 5/6-4/6), some silt, trace very fine sand, soft to medium stiff, medium to high plasticity, trace black organic inclusions/streaks, trace hard iron and manganese oxide and carbonate concretions (1/8"-1/4"), damp.	CL					0	20.9	0	0	0	
				4.2/ 5	1401	SS2 5 - 10						
8							0	20.9	0	0	0	
9							0	20.9	0	0	0	
10	medium stiff to stiff						0	20.9	0	0	0	Damp to Moist. Swollen Clays.
11												
12							0	20.9	0	0	0	
				4.6/ 5	1406	SS3 10 - 15						
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-149
Page	2 of 3
Date	10-22-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Strong Brown (2.5Y 5/6), some silt, trace very fine sand, medium plasticity, stiff, trace hard carbonate concretions (1/8"-1/2"), trace hard iron and manganese oxide concretions (1/16"-1/8"), trace black organic inclusions/streaks, damp. Trace mechanical shear plane breaks (~35-45 degrees) with smooth slick surfaces.	CL				SS3 15 - 20	0	20.9	0	0	0	
16							0	20.9	0	0	0	
17				4.4/ 5	1416							
18							0	20.9	0	0	0	
19												
20	Abundant hard white carbonate concretions (pebble to gravel size). CLAY - Strong Brown (7.5YR 5/6-4/6), some silt, soft to medium stiff, medium to high plasticity, trace to some hard carbonate concretions (1/8"-1/4"), trace white silt to ver fine sand filled root traces, damp. Becoming more silty with increasing depth.	CL					0	20.9	0	0	0	
21												
22				3.5/ 5	1428	SS5 20 - 25	0	20.9	0	0	0	
23	SILTY CLAY - Strong Brown 2.5Y 5/6-4/4), trace very fine sand, soft, high plasticity, some fine to moderate iron oxide mottling, damp to moist. More very fine sand at bottom and most.	CL-ML										
24							0	20.9	0	0	0	
25	SILTY CLAY - Reddish Yellow (7.5YR 6/6), some very fine sand, very soft, high plasticity.	CL-ML										Moist to WET
26							0	20.9	0	0	0	
27				3.5/ 5	1435	SS6 25 - 30						
28							0	20.9	0	0	0	
29	CLAYEY SAND - Light Gray (GLEY 1 N 7/) grading to Light Greenish Gray (GLEY 1 10Y 6/1), very fine to fine grain sand, trace medium sand, very soft, medium to high plasticity, mosit to WET.	SC GWS										Low to Moderate Odor. WET.
30							0	20.9	0	0	52.4	STOP DRILLING at 30.0 feet bgs. Hit Refusal.
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-149
Page	3 of 3
Date	10-22-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
32	SANDY GRAVEL - Greenish Gray (GLEY 1 10Y 5/1- 5GY 5/1), very fine to medium sand, some silt, some pebbles, trace clay, well graded, medium dense to dense, rounded to angular gravels, moist to WET.											Advance 8.25" HSA to install Monitoring Well MW-149. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.96 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
33	Borehole Total Depth = 30.0 feet bgs at Refusal.											
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-150
Ground Elevation	**Location**	**Page**
818.8 ft. NAVD 88	Neodesha, Kansas Latitude 37.43139456 Longitude -95.68484338	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		28

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	28	0.00	6	NA	21.82	10-29-14

Drilling Company	RAZEK Environmental, LLC.	Drillers (s)	Tony Poulter and Paul Sundquist
Drilling Rig	Geoprobe 6620DT track-mounted	Type of Sampler	Macro-Core (MC5)
Date	10-22-14 To 10-22-14	Field Observer (s)	C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
1	CLAY - Dark Yellowish Brown (10YR 4/4), soft to medium stiff, medium to high plasticity, damp. Some gravel at bottom.	CL										START DRILLING at 1638.
							0	20.9	0	0	0	
2	SILTY CLAY - Brown (10YR 5/3), trace very fine to medium sand, soft, medium to high plasticity, trace roots, some fine to moderate iron oxide mottling (root traces), trace hard carbonate concretions (1/8"-1/4"), trace black mottling, damp.	CL-ML										
							0	20.9	0	0	0	
3				3.5/ 5	1643	SS1 0 - 5						
							0	20.9	0	0	0	
4												
							0	20.9	0	0	0	
5	CLAY - Yellowish Brown (10YR 5/6), some silt, stiff, massive iron oxide mottling/staining, trace black mottling (organics and/or manganse oxide), damp.	CL										
							0	20.9	0	0	0	
6												
							0	20.9	0	0	0	
7				4/ 5	1646	SS2 5 - 10						
							0	20.9	0	0	0	
8												
							0	20.9	0	0	0	
9												
10	SILTY CLAY - Yellowish Brown (10YR 5/6) massive iron oxide mottling, trace very fine sand, stiff, medium plasticity, trace white hard carbonate concretions (1/4"-1"), trace black mottling (organics and/or manganese oxide), damp.	CL-ML					0	20.9	0	0	0	
11												
12				3.9/ 5	1656	SS3 10 - 15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-150
Page	2 of 2
Date	10-22-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SILTY CLAY - Yellowish Brown (10YR 5/6) massive iron oxide mottling, trace very fine sand, stiff, medium plasticity, trace white hard carbonate concretions (1/4"-1"), trace black mottling (organics and/or manganese oxide), damp.	CL-ML				10SS15 –	0 0	20.9 20.9	0 0	0 0	0 0	
16							0	20.9	0	0	0	Damp to Moist. Swollen Clays.
17				3.4/ 5	1706	SS4 15 - 20						
18							0	20.9	0	0	0	
19	Hard white carbonate concretionary zone at bottom 0.4 feet.											
20	SILTY CLAY - Yellowish Brown (10YR 5/6), trace very fine sand, soft, medium plasticity, some iron and manganese oxide mottling, trace black organics, damp to moist.	CL-ML					0	20.9	0	0	0	
21	SILTY CLAY - Light Brownish Gray (10YR 6/2), soft, medium to high plasticity, some iron oxide mottling, trace black mottling, trace hard carbonate concretions (1/4"-1/2").											
22							0	20.9	0	0	0	
23				2.3/ 5	1715	SS5 20 - 25						
24							0	20.9	0	0	0	
25												
26	CLAY - Light Gray to Gray (GLEY 1 N 7/ - 5/), some silt, trace pebbles to hard carbonate concretions (1/8"-1/4"), soft, medium plasticity, trace fine iron oxide mottling, damp to moist.	CL		2.4/ 3	1723	SS6 25 - 28	0	20.9	0	0	0	
27	SANDY GRAVEL - very fine to medium sand, some pebbles, trace silt and clay, well graded, subrounded to angular gravel, moist to WET.	GWS										STOP DRILLING at 28.0 feet bgs. Hit Refusal.
28	Borehole Total Depth = 28.0 feet bgs at Refusal.						0	20.9	0	0	0	Advance 8.25" HSA to install Monitoring Well MW-150. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.92 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-151
Ground Elevation	**Location**	**Page**
820.4 ft. NAVD 88	Neodesha, Kansas Latitude 37.43019929 Longitude -95.6859823	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		29.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	29.5	0.00	5	NA	23.51	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-22-14 To: 10-22-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASHPALT											START DRILLING at 1130.
	FILL - Gravel	CL										
1	CLAY - Very Dark Gray (10YR 3/1), some silt, trace very fine sand, soft, high plasticity, trace roots, damp.	CL-ML					0	20.9	0	0	0	
2	SILTY CLAY - Grayish Brown to Dark Grayish Brown (10YR 5/2 - 4/2), trace very fine sand, soft, trace plasticity, trace roots, trace iron oxide mottling (fine root traces consisting of clay and silt with trace very fine sand). Becoming more sandy with increasing depth.			4.3/ 5	1133	SS1 0 - 5	0	20.9	0	0	0	
3							0	20.9	0	0	0	
4	SILTY CLAY - Gray to Dark Grayish Brown (10YR 5/1-4/2), soft, medium to high plasticity, trace to some iron oxide mottling (fine root trace consisting of silt and very fine sand). Grades to more Gray (GLEY 1 N 6/) with increasing depth.	CL-ML					0	20.9	0	0	0	
5	CLAY - Ligth Gray (GLEY 1 N7/), some silt, soft to medium stiff, medium to high plasticity, some Strong Brown (7.5YR 5/6) iron oxide fine mottling (clay and silt filled root traces), trace hard iron and manganese oxide concretions (1/8"-1/4"), damp.	CL					0	20.9	0	0	0	
6							0	20.9	0	0	0	
7				4.2/ 5	1137	SS2 5 - 10	0	20.9	0	0	0	
8							0	20.9	0	0	0	
9	Grades to Light Grayish Brown (2.5Y 6/2), more iron oxide mottling than above, medium stiff to stiff, trace black organic inclustions/streaks.						0	20.9	0	0	0	
10	CLAY - Light Brownish Gray to Light Yellowish Brown (2.5Y 6/2-6/3), some silt, medium stiff to stiff, medium to high plasticity, trace roots, some fine to medium iron oxide mottling (clay to silt filled root traces), trace iron, manganese, and carbonate concretions (1/16" to 1/8"), trace black organic inclusions/streaks, damp.	CL					0	20.9	0	0	0	Swollen Clays
11												
12				4.2/ 5	1143	SS3 10 - 15	0	20.9	0	0	0	
13	More weathering with massive iron oxide mottling. Yellowish Brown to Dark Yellowish Brown (10YR 5/6-4/4).											
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-151
Page	2 of 2
Date	10-22-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Light Brownish Gray to Light Yellowish Brown (2.5Y 6/2-6/3), some silt, medium stiff to stiff, medium to high plasticity, trace roots, some fine to medium iron oxide mottling (clay to silt filled root traces), trace iron, manganese, and carbonate concretions (1/16" to 1/8"), trace black organic inclusions/streaks, damp.	CL				SS3 10 - 15	0 0	20.9 20.9	0 0	0 0	0 0	Swollen Clays
16	CLAY - Same as above; Hard carbonate concretionary zone (1/8" to 1") at bottom 0.4 feet.	CL					0	20.9	0	0	0	
17	CLAY - Brown to Dark Yellowish Brown (10YR 4/3-4/4), some silt, trace very fine sand, medium stiff to stiff, medium to high plasticity, trace hard carbonate concretions at top (1/8" to 1/4"), some moderate to massive iron oxide mottling (silt to very fine sand filled root traces), damp.			4.2/ 5	1151	SS4 15 - 20						
18	Grades to Light Gray (GLEY N 7/)						0	20.9	0	0	0	
19	soft to medium stiff											
20	medium stiff						0	20.9	0	0	0	
21												
22				1.8/ 5	1205	SS5 20 - 25	0	20.9	0	0	0	
23												
24							0	20.9	0	0	0	
25	damp to moist											
26	CLAY - Gray (GLEY 1 N7/) some silt, trace very fine sand, medium to high plasticity, moderate to massive Yellowish Brown (10YR 5/6) iron oxide mottling, trace root traces and hard carbonate concretions (1/8"-1/4"), damp to moist.	CL					0	20.9	0	0	0	Moist
27				2.6/ 4.5	1210	SS6 25 - 29.5						STOP DRILLING at 29.5 feet bgs. Hit Refusal.
28							0	20.9	0	0	0	Advance 8.25" HSA to install Monitoring Well MW-151. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.86 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
29	SANDY GRAVEL - very fine to fine sand, some pebbles, trace medium sand and clay, well graded, damp to moist.	GWS										
30	Borehole Total Depth = 29.5 feet bgs at Refusal.											
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-152
Ground Elevation	**Location**	**Page**
815.2 ft. NAVD 88	Neodesha, Kansas Latitude 37.4297179 Longitude -95.6879446	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		23

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	23	0.00	5	NA	17.96	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-17-14 To: 10-17-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL											START DRILLING at 1206.
	FILL - Topsoil, clay with some gravel											
1	CLAY - Dark Gray to Very Dark Gray (10YR 4/1-3/1), some silt, trace very fine to fine sand, soft, high plasticity , trace roots, some iron oxide mottling (fine root traces), damp. Grades to Yellowish Brown (10YR 5/6) with more iron oxide mottling (medium).	CL					0	20.9	0	0	1.3	Collect MW-152 SS1 Soil Sample 1.0'-1.5' bgs.
2							0	20.9	0	0	0.8	
				4.3/ 5	1207	SS1 0 - 5						
3							0	20.9	0	0	0.5	
4	CLAY - Gray (10YR 6/1), some silt, soft to medium stiff, medium to high plasticity, trace roots, some iron oxide mottling (medium), damp.	CL					0	20.9	0	0	0.7	
5	CLAY - Gray (10YR 6/1), some silt, trace very fine to fine sand, medium stiff to stiff, medium to high plasticity, trace roots, some iron oxide mottling (medium), damp. Grades to Dark Gray (10YR 4/1) and becoming more silty with some very fine sand with increasing depth.	CL					0	20.9	0	0	0.4	
6							0	20.9	0	0	0.3	Collect MW-152 SS2 Soil Sample 6'-10' bgs.
7							0	20.9	0	0	0.5	
				4.1/ 5	1221	SS2 5 - 10						
8							0	20.9	0	0	2.4	
9							0	20.9	0	0	0.5	
10	SILTY CLAY - Bluish Gray (GLEY 2 5B 6/1), trace very fine sand, stiff, some iron oxide mottling (fine to medium root traces), trace black organic inclusions/streaks, damp.	CL-ML					0	20.9	0	0	0.2	
11												
12	some very fine sand						0	20.9	0	0	26.2	Low to Moderate Odor. Slight Sheen.
				3.9/ 5	1230	SS3 10 - 15						
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-152
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-17-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
		CL-ML				10SS3	0	20.9	0	0	0.2	
						15	0	20.9	0	0	35.7	
	SILTY CLAY - Bluish Gray (GLEY 2 5B 6/1), some very fine sand, trace pebble, soft to medium stiff, some iron oxide mottling (fine to medium root traces), trace black organic inclusions/streaks, damp.	CL-ML				–						
15												Moist to WET. Moderate to Strong Odor. Slight Sheen.
16	GRAVELLY CLAY - some silt and very fine sand, rounded to angular gravel, moist to WET.	CLG					0	20.9	0	0	23.7	
17												
	SAND - Grayish Brown (2.5Y 5/2), very fine to fine grain sand, some silt, trace clay, and pebble, poorly graded, moist to WET.	SP		4.6/ 5	1235	SS4 15 - 20						
18	SANDY SILT - Dark Grayish Brown (2.5Y 4/2), very fine sand, trace clay, medium plasticity, poorly graded, medium dense, moist to WET.	MLS					0	20.9	0	0	144	
19	SANDY GRAVEL - Light Yellowish Brown (2.5Y 6/4), very fine to fine grain sand, trace clay, dense, subrounded to subangular gravel, dry to damp. Moist to WET.	GWS										WET. Very Strong Odor.
20							0	20.9	0	0	375	
21				1.3/ 3	1240	SS5 20 - 23						
22							0	20.9	0	0	280	
	Dry to Damp Bottom. Loose quartzite gravel (subangular).											
23	Borehole Total Depth = 23.0 feet bgs at Refusal.											STOP DRILLING at 23.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-152. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 12.88 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-153
Ground Elevation	**Location**	**Page**
800.4 ft. NAVD 88	Neodesha, Kansas Latitude 37.42185135 Longitude -95.68207211	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		18

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	18	0.00	4	NA	8.27	10-29-14

Drilling Company	RAZEK Environmental, LLC.	Drillers (s)	Tony Poulter and Paul Sundquist
Drilling Rig	Geoprobe 6620DT track-mounted	Type of Sampler	Macro-Core (MC5)
Date 10-24-14	To 10-24-14	Field Observer (s)	C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASPHALT BRICK FILL - Sandy Gravel with some Silt.											START DRILLING at 0953.
1	CLAY - Brown (10YR 5/3), some silt, trace very fine to coarse sand, soft, high plasticity, damp.	CL					0	20.9	0	0	0	
2	SILTY CLAY - Pale Brown (10YR 6/3), some very fine to fine grain sand, soft, high plasticity, trace to some Yellowish Brown (10YR 56/) iron oxide mottling (root traces), trace white carbonate concretions (1/16"-1/8"), damp.	CL-ML		4.6/ 5	956	SS1 0 - 5	0	20.9	0	0	0	
3							0	20.9	0	0	0	
4							0	20.9	0	0	0	
5							0	20.9	0	0	0	
6	CLAYEY SILT - Pale Brown (10YR 6/3), some very fine sand, trace clay, soft to medium stiff, low to medium plasticity, trace iron oxide mottling (fine root traces), trace white silty carbonate concretions/pockets, damp. Becoming more sandy with increasing depth. Trace gravel at bottom.	MH					0	20.9	0	0	0	
7				3.5/ 5	1001	SS2 5 - 10	0	20.9	0	0	0	
8							0	20.9	0	0	0	▼
9	CLAYEY GRAVEL - Yellowish Brown to Dark Yellowish Brown (10YR 6/6-4/4), some very fine to fine grain sand, some silt and pebbles, well graded, rounded to angular gravel, trace, damp to moist. Pale Olive (5Y 6/3) well cemented siltstone seam at bottom	GC					0	20.9	0	0	0	
10	SANDY GRAVEL - Pale Brown to Yellowish Brown (10YR 6/3-5/6), very fine to medium grain sand, some silt, trace clay, well graded, loose to medium dense, rounded to subangular gravel, moist to WET.	GWS					0	20.9	0	0	0	Moist to WET
11												WET
12				2.2/ 5	1006	SS3 10 - 15	0	20.9	0	0	0	
13												
14												Driller said void between 13.5-14.5

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-153
Page	2 of 2
Date	10-24-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SANDY GRAVEL - Pale Brown to Yellowish Brown (10YR 6/3-5/6), very fine to medium grain sand, some silt, trace clay, well graded, loose to medium dense, rounded to subangular gravel, moist to WET.	GWS				SS3 15 –	0	20.9	0	0	0	feet bgs.
16							0	20.9	0	0	0	
17				1.5/ 3	1012	SS4 15 - 18	0	20.9	0	0	0	
18	SAND - Pale Olive (5Y 6/3), very fine to fine grain, some silt, poorly graded, trace weakly cemented sandstone concretions, WET.	SP					0	20.9	0	0	0	STOP DRILLING at 18.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-153. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 11.90 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
19	Borehole Total Depth = 18.0 feet bgs at Refusal.											
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.			Boring Number
Former Neodesha Refinery	80435			MW-154
Ground Elevation	**Location**	**Latitude**	**Longitude**	**Page**
807.7 ft. NAVD 88	Neodesha, Kansas	37.42379268	-95.68750118	1 of 2
Air Monitoring Equipment				**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)				20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25-inch	20	0.00	4	NA	14.76	10-29-14

Drilling Company	RAZEK Environmental, LLC.	Drillers (s)	Tony Poulter and Paul Sundquist
Drilling Rig	Geoprobe 6620DT track-mounted	Type of Sampler	Macro-Core (MC5)
Date 10-23-14	To 10-23-14	Field Observer (s)	C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL											START DRILLING at 0759.
	SILTY CLAY - Very Dark Gray (10YR 3/2), trace very fine sand, very soft, high plasticity, trace to some roots, trace Dark Yellowish Brown (10YR 4/6) iron oxide mottling (fine root traces), damp to moist.	CL-ML					0	20.9	0	0	0	
2							0	20.9	0	0	0	
				2.6/ 5	801	SS1 0 - 5						
3							0	20.9	0	0	0	
4							0	20.9	0	0	0	
	CLAY - Gray (10YR 6/1-7/1), some silt, soft, high plasticity, trace roots, trace iron oxide mottling (fine root traces).	CL										
5	CLAY - Light Gray (10YR 7/1), some silt, some iron oxide mottling (fine to moderate; root traces), trace black organic and MnO root traces.	CL					0	20.9	0	0	0	Swollen Clays
6							0	20.9	0	0	0	
7	CLAY - Same as above, more Yellowish Brown (10YR 5/6) iron oxide and black MnO weathering/mottling than above, trace very fine sand, some gravel (subangular to subrounded), trace pebble, Moist.	CL					0	20.9	0	0	0	
		SC		4.8/ 5	805	SS2 5 - 10						
8	CLAYEY SAND - Light Gray (2.5Y 7/2), very fine to fine sand, some silt, low to medium plasticity, some iron and manganese oxide mottling toward bottom (fine to moderate), damp to moist.	CL-ML					0	20.9	0	0	0	
9							0	20.9	0	0	0	
10	SILTY CLAY - Dark Yellowish Brown (10YR 4/6), some very fine to fine sand, some pebble to gravel (rounded to subangular), soft, medium to high plasticity, Moist. Becoming more sandy with trace pebble to gravel with increased depth.						0	20.9	0	0	0	Swollen Clays
11												
12				3.2/ 5	811	SS3 10 - 15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-154
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-23-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	SAND - Brownish Yellow (10YR 6/6), trace silt, loose, poorly graded, Moist.	SP				SS3	0	20.9	0	0	0	
	GRAVELLY SAND - Yellowish Brown (10YR 5/6), very fine to medium grain sand, trace silt and clay, well graded, medium dense, Moist to WET.	SWG					0	20.9	0	0	0	
15	SANDY GRAVEL - Light Yellowish Brown (2.5Y 6/3), very fine to coarse grain sand, some pebbles, rounded to angular gravel, medium dense, well graded, MOIST-WET.	GWS										
16							0	20.9	0	0	0	
17												trace to low odor
				2.2/ 5	818	SS4 15 - 20						
18							0	20.9	0	0	500	low to moderate odor
19												
20							0	20.9	0	0	5.0	STOP DRILLING at 20.0 feet bgs. Hit Refusal.
	Borehole Total Depth = 20.0 feet bgs at Refusal.											Advance 8.25" HSA to install Monitoring Well MW-154. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.92 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
21												
22												
23												
24												
25												
26												
27												
28												
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31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-155
Ground Elevation	**Location**	**Page**
811.3 ft. NAVD 88	Neodesha, Kansas Latitude 37.42264383 Longitude -95.68628953	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		24.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	24.5	0.00	5	NA	18.85	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-23-14 To: 10-23-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASHALT											START DRILLING at 915.
	FILL - trace brick, sandy gravel, Wet at top, dry to moist downward.						0	20.9	0	0	0	
1												
2							0	20.9	0	0	0	
	CLAY - Gray to Dark Gray (10YR 5/1-6/1), soft, medium plasticity, trace Dark Red (10R 3/6) iron oxide mottling (fine root traces), damp.	CL		3.4/ 5	917	SS1 0 - 5						
3		CL					0	20.9	0	0	0	
	CLAY - Light Gray to Gray (10YR 7/1-6/1), some silt, trace very fine sand, soft to medium stiff, medium plasticity, trace to some Dark Red (10R 3/6) to Yellowish Brown (10YR 5/6) iron oxide mottling (fine to moderate, root traces), trace Dark Gray clay filled root traces, damp.											
4							0	20.9	0	0	0	
5							0	20.9	0	0	0	
	CLAY - Light Yellowish Brown (10YR 6/4), some silt, trace very fine to fine sand, soft to medium stiff, medium plasticity, massive Strong Brown (7.5YR 5/8) iron oxide mottling, trace black mottling and roots, damp. Becoming more silty with increased depth.	CL										
6							0	20.9	0	0	0	
7				4.6/ 5	920	SS2 5 - 10	0	20.9	0	0	0	
8							0	20.9	0	0	0	
	SILTY CLAY - Pale Brown to Brown (10YR 6/3-5/3), some very fine sand, trace fine to medium sand, trace pebble, medium stiff to stiff, trace to some iron oxide mottling (fine to moderate, root traces), trace black mottling (manganese oxide and organics), damp.	CL-ML										
9							0	20.9	0	0	0	
10	Damp to moist at bottom (soft with medium to high plasticity).	CLS					0	20.9	0	0	0	Damp to Moist. Swollen Clays.
	SANDY CLAY - Pale Brown to Brown (10YR 6/3-5/3), very fine to fine grain sand, some silt, medium stiff, trace iron oxide mottling (root traces), some Pale Brown (2.5Y 8/3) silt filled root traces and pockets, damp. Becoming more sandy with increased depth.											
11												
12												
	SAND - Light Gray (2.5Y 7/2), very fine to fine grain sand, trace silt and clay, poorly graded, loose, trace pebbles, trace Strong Brown (7.5YR 5/6) iron oxide mottling (fine root traces), damp to moist. More iron oxide mottling toward bottom.	SP		4.3/ 5	925	SS3 10 - 15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-155
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-23-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SANDY CLAY - Light Yellowish Brown (10YR 6/4), very fine to fine grain sand, some silt, some pebble to gravel, soft, medium to high plasticity, subrounded to subangular gravel, moist. At 15.6 ft bgs - trace pebble to gravel	CLS				SS3 15 - 15	0	20.9	0	0	0	
16							0	20.9	0	0	0	
17	GRAVELLY SAND - Light Brownish Gray to Yellowish Brown (10YR 6/4-5/4), very fine to medium grain sand, some pebble to gravel, well graded, medium dense, angular to rounded gravel, moist to WET.	SWG		4.2/ 5	931	SS4 15 - 20						
18		GWS					0	20.9	0	0	0	
19	SANDY GRAVEL - Light Yellowish Brown to Yellowish Brown (10YR 6/4-5/6), trace clay (soft) and silt, well graded, medium dense, angular to rounded gravel, moist to WET.											
20	WET						0	20.9	0	0	0	WET
21												
22				3/ 4.5	939	SS5 20 - 24.5	0	20.9	0	0	0	
23	trace silty to sandy clay layers (0.1'-0.2' thick)											
24							0	20.9	0	0	0	Driller said void at 23.5 feet bgs.
25	Borehole Total Depth = 24.5 feet bgs at Refusal.											STOP DRILLING at 24.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-155. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.46 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-156
Ground Elevation	**Location**	**Page**
809.1 ft. NAVD 88	Neodesha, Kansas Latitude 37.421113 Longitude -95.68686319	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		22.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	22.4	0.10	5	NA	16.36	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-23-14 To: 10-23-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	FILL - Gravelly Silt (loose).											START DRILLING at 1238.
1	CLAY - Very Dark Grayish Brown (10YR 3/2), some silt, soft, medium to high plasticity, trace iron oxide mottling (fine root traces), damp.	CL					0	20.9	0	0	0	
2							0	20.9	0	0	0	
3				3.5/ 5	1240	SS1 0 _5	0	20.9	0	0	0	
4	CLAY - Light Gray to Light Brownish Gray (10YR 7/2-6/2), some silt, trace very fine sand, soft, high plasticity, trace iron oxide mottling (fine to medium root traces), trace black mottling, trace roots, damp.	CL					0	20.9	0	0	0	
5							0	20.9	0	0	0	
6	CLAY - Light Gray to Light Brownish Gray (10YR 7/2-6/2), some silt, trace very fine sand, soft to medium stiff, some Dark Yellowish Brown (10YR 4/6) iron oxide mottling (fine to moderate, root traces), trace iron oxide concretions and carbonate concretions/crystals (1/8"-1/4"), damp.	CL					0	20.9	0	0	0	
7							0	20.9	0	0	0	
8	SILTY CLAY - Light Gray to Light Brownish Gray (10YR 7/2-6/2), trace to some very fine sand, medium stiff to stiff, some Dark Yellowish Brown (10YR 4/6) iron oxide mottling (fine to moderate, root traces), trace iron oxide concretions and carbonate concretions/crystals (1/8"-1/4"), damp.	CL-ML		4.1/ 5	1244	SS2 5 -_10	0	20.9	0	0	0	Damp to Moist. Swollen Clays
9							0	20.9	0	0	0	
10							0	20.9	0	0	0	
11	SILTY CLAY - Dark Greenish Gray (GLEY 1 10GY 6/1), some very fine sand, medium stiff, medium to high plasticity, some iron oxide mottling (moderate, root traces), damp.	CL-ML										
12				4.2/ 5	1249	SS3 10 _15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-156
Page	2 of 2
Date	10-23-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SILTY CLAY - Greenish Gray (GLEY 1 5_G1 6/1) to Grayish Brown (2.5Y 5/2), soft, high plasticity, trace to some white hard carbonate concretions (coarse sand to pebble in size), more silty downward, moist to WET.	CL-ML				10SS15 –	0 0	20.9 20.9	0 0	0 0	0 0	
16	SILT - Grayish Brown (2.5Y 5/2), trace clay, soft, trace to low plasticity, damp to moist. Bottom 0.5 feet has some gravel to pebbles with some very fine sand and trace fine sand.	ML										Moist. Low to Moderate Odor.
17	SILTY SAND - very fine to fine grain sand, trace clay, some gravel, poorly graded, moist to WET.	SM					0	20.9	0	0	135	
18	GRAVELLY SAND - very fine to coarse grain sand, well graded, trace weakly cemented siltstone, subrounded to angular gravel, moist to WET.	SWG		3.8/ 5	1256	SS4 15 - 20	0	20.9	0	0	1840	WET. Strong Odor.
19												
20	Bottom 0.3 feet is CLAYEY SILT - Light Brownish Gray (2.5Y 6/2), soft, medium to high plasticity, moist to WET.						0	20.9	0	0	192	
21	SANDY GRAVEL - Light Brownish Gray (2.5Y 6/2), very fine to medium grain sand, trace silt, medium dense, rounded to subangular gravel, trace black staining, WET. Bottom consists of Greenish Gray (GLEY 1 5G_1 5/1) SILTSTONE (weakly cemented), moist to WET.			1.7/ 2.5	1308	SS5 20 - 22.5						
22							0	20.9	0	0	31.7	
23	Borehole Total Depth = 22.5 feet bgs at Refusal.											STOP DRILLING at 22.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-156. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 12.40 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-157
Ground Elevation	**Location**	**Page**
812.5 ft. NAVD 88	Neodesha, Kansas Latitude 37.42054442 Longitude -95.68503695	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		24.75

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	24.75	0.00	5	NA	20.10	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-23-14 To: 10-23-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASPHALT BRICK FILL - Gravel											START DRILLING at 1401.
1	CLAY - Light Gray (10YR 7/2), some silt, trace very fine sand, soft, medium to high plasticity, some Yellowish Brown (10YR 5/6) iron oxide mottling (fine root traces), trace roots, damp. More silt to very fine sand with increasing depth.	CL		2/ 5	1403	SS1 0 - 5	0	20.9	0	0	0	
2							0	20.9	0	0	0	
3							0	20.9	0	0	0	
4							0	20.9	0	0	0	
5	SILTY CLAY - Light Gray (10YR 7/2), some very fine to fine sand, soft to medium stiff, medium to high plasticity, trace to some Yellowish Brown (10YR 5/6) iron oxide mottling (fine root traces), trace roots, damp.	CL-ML					0	20.9	0	0	0	Damp to Moist. Swollen Clays.
6							0	20.9	0	0	0	
7	SILTY CLAY - Strong Brown (7.5YR 5/6), some very fine to fine grain sand, trace pebble, soft to medium stiff, medium to high plasticity, massive iron oxie mottling, trace roots, trace black mottling and organics, damp to moist.	CL-ML		4.3/ 5	1407	SS2 5 - 10	0	20.9	0	0	0	
8							0	20.9	0	0	0	
9							0	20.9	0	0	0	
10							0	20.9	0	0	0	
11	SANDY CLAY - Reddish Yellow to Strong Brown (7.5YR 6/6-5/6), very fine to fine grain sand, some silt, soft, medium plasticity, trace black mottling (root traces), damp to moist.	CLS										
12				2.3/ 5	1411	SS3 10 - 15	0	20.9	0	0	0	
13		MLS										
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-157
Page	2 of 2
Date	10-23-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SANDY SILT - Light Brown to Strong Brown (7.5YR 6/4-5/6), trace clay, soft, low to medium plasticity, massive iron oxide mottling, some black organic debris, damp to moist. trace pebble to gravel near bottom, moist.	MLS				SS3	0	20.9	0	0	0	
16							0	20.9	0	0	0	
16	SANDY GRAVEL - Light Brown to Strong Brown (7.5YR 6/3-5/6), some silt and pebbles, trace clay, medium dense, well graded, rounded to subangular gravel, moist to WET.	GWS										
17				3.9/ 5	1417	SS4 15 - 20						
18							0	20.9	0	0	0	
19												
20	SANDY CLAY - Light Brown (7.5YR 6/3), very fine to fine sand, trace gravel, soft, high plasticity.	CLS					0	20.9	0	0	0	
20	SANDY GRAVEL - Light Brown (7.5YR 6/3), very fine to fine sand, some silt, well graded, medium dense, damp to moist.	GWS										
21	SAND - Pale Yellow (5Y 7/4), very fine sand, some silt, poorly graded, loose, some weakly cemented sandstone, damp to moist.	SP										WET
22	SANDY GRAVEL - Light Brown (7.5YR 6/3), very fine to fine sand, some silt, well graded, medium dense, damp to moist.	GWS					0	20.9	0	0	0	
23	SANDY GRAVEL - Gray to Light Olive Gray (5y 6/1-6/2), very fine to coarse grain sand, some silt and pebbles, trace clay, medium dense, well graded, rounded to angular gravel, WET.	GWS		3/ 4.75	1425	SS5 20 - 24.75						
24							0	20.9	0	0	0	
25	Borehole Total Depth = 24.75 feet bgs at Refusal.											STOP DRILLING at 24.75 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-157. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.92 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-158
Ground Elevation	**Location**	**Page**
812.3 ft. NAVD 88	Neodesha, Kansas Latitude 37.41957448 Longitude -95.6847863	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		26.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	26.4	0.10	6	NA	19.84	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-23-14 To: 10-23-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASPHALT BRICK FILL											START DRILLING at 1712.
1	SILTY CLAY - Gray (10YR 6/1), trace very fine sand, soft, trace hard carbonate concretions (pebble in size), some Yellowish Brown to Dark Yellowish Brown (10YR 5/6-4/6) iron oxide mottling (fine root traces), damp.	CL-ML					0	20.9	0	0	0	
2	soft to medium stiff			2.2/ 5	1714	SS1 0 - 5	0	20.9	0	0	0	
3							0	20.9	0	0	0	
4							0	20.9	0	0	0	
5							0	20.9	0	0	0	
6							0	20.9	0	0	0	
7	CLAY - Light Brownish Gray, some silt, trace very fine sand, medium to high plasticity, massive weathering of Dark Yellowish Brown (10YR 4/6) iron oxide mottling, some black mottling and organic debris, damp.	CL										Swollen Clays.
8	SILTY CLAY - Light Grayish Brown (10YR 6/2), some very fine sand, medium stiff, medium plasticity, massive iron oxide mottling, trace black mottling (fine root traces), damp. More silty to sandy with increasing depth.	CL-ML		4.5/ 5	1719	SS2 5 - 10	0	20.9	0	0	0	
9							0	20.9	0	0	0	
10	trace to some hard carbonate concretions (1/8"-1/4").											
11	SANDY SILT - Strong Brown (7.5YR 5/6), very fine sand, trace clay, poorly graded, soft, low plasticity, trace black mottling and organic inclusions, damp to moist.	MLS					0	20.9	0	0	0	Damp to Moist. Swollen Clays.
12				3.7/ 5	1725	SS3 10 - 15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-158
Page	2 of 2
Date	10-23-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	moist to WET	MLS				SS3 15 –	0	20.9	0	0	0	
	SAND - Strong Brown (7.5YR 5/6), very fine to fine grain sand, some silt, poorly graded, loose to medium dense, moist. Trace seams/layers of CLAYEY SAND with some silt, very soft, high plasticity, moist to WET.	SP										Moist
16							0	20.9	0	0	0	
17				3.5/ 5	1731	SS4 15 - 20						
18							0	20.9	0	0	0	WET
19												
20							0	20.9	0	0	0	
21	WET											
22				3.7/ 5	1739	SS5 20 - 25	0	20.9	0	0	0	
23	SANDY CLAY - Gray (GLEY 1 N 5/), very fine to fine grain sand, soft, high plasticity, moist to WET.	CLS										
	SAND - Olive (5Y 5/4), very fine to fine grain sand, trace medium to coarse grain sand, poorly graded, loose, WET. At 24.0 ft bgs CLAYEY SILT (0.3' thick) medium stiff.	SP										
24							0	20.9	0	0	0	
25				1.5/ 1.5	1748	SS6 25 - 26.5						
26	GRAVEL - some pebbles, trace very fine sand to silt, poorly graded, rounded to subangular gravel, WET.	GP					0	20.9	0	0	0	
27	SILTSTONE - Greenish Gray to Bluish Gray (GLEY 2 5BG 5/1- 5B 5/1), weakly cemented, brittle.											STOP DRILLING at 26.5 feet bgs. Hit Refusal.
	Borehole Total Depth = 26.5 feet bgs at Refusal.											Advance 8.25" HSA to install Monitoring Well MW-158. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.90 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-159
Ground Elevation	**Location**	**Page**
808.1 ft. NAVD 88	Neodesha, Kansas Latitude 37.41957704 Longitude -95.68626612	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		19.8

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	19.8	0.00	4	NA	15.33	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-24-14 To: 10-24-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	ASPHALT BRICK FILL - Gravel											START DRILLING at 817.
1	SILTY CLAY - Very Dark Gray (10YR 3/1), soft to medium stiff, medium plasticity, dry to damp.	CL-ML		5/ 5	819	SS1 0 - 5	0	20.9	0	0	0	
2							0	20.9	0	0	0	
3	SILTY CLAY - Gray to Dark Gray, some very fine to fine sand, trace medium to coarse sand, soft, trace black organic inclusions, trace gypsum/carbonate crystals (very fine to fine), damp.	CL-ML					0	20.9	0	0	0	
4		CL-ML										
5	SILTY CLAY - Light Gray to Gray (10YR 7/1-6/1), some very fine to fine grain sand, soft to medium stiff, medium to high plasticity, trace Yellowish Brown (10YR 5/6) iron oxide mottling (fine root traces), damp.						0	20.9	0	0	0	Swollen Clays
6	some fine to moderate iron oxide mottling (root traces)						0	20.9	0	0	0	
7	medium to massive iron oxide mottling, medium stiff			4.7/ 5	824	SS2 5 - 10	0	20.9	0	0	0	
8							0	20.9	0	0	0	
9	trace white carbonate mineralization/concretions, medium stiff to stifff											Damp to Moist
10	SILTY CLAY - Light Gray to Gray (10YR 7/1-6/1), some very fine to fine grain sand, trace medium grain sand, soft, high plasticity, trace iron oxide mottling (fine root traces), damp to moist.	CL-ML					0	20.9	0	0	0	
11												
12				3.6/ 5	829	SS3 10 - 15	0	20.9	0	0	0	
13		ML										
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-159
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-24-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SILT - Light Greenish Gray (GLEY 1 10GY 7/1), trace very fine to fine grain sand, some clay (soft, low to medium plasticity), trace to some iron oxide mottling (trace to moderate), damp.	ML				SS3 15 –	0 0	20.9 20.9	0 0	0 0	0 0	Moist Moist to WET
16	SILT - Light Gray (GLEY 1 N 7/), some very fine grain sand, trace pebble, soft, high plasticity, some iron oxide mottling (fine to moderate), moist to WET. More sandy with increasing depth.	ML					0	20.9	0	0	0	
17	SILTY SAND - Light Olive Brown (2.5Y 5/4), very fine grain sand, trace clay (soft, medium to high plasticity), poorly graded, moist to WET.	SM		4.1/ 4.8	835	SS4 15 - 19.8						Strong odor. WET
18	SILTY SAND - Light Olive Brown (2.5Y 5/4), very fine grain sand, trace gravel and clay (soft, medium to high plasticity), poorly graded, moist to WET.	SM					0	20.9	0	0	291	
19	SANDY GRAVEL - Light Yellowish Brown (2.5Y 6/3), very fine to medium grain sand, some silt and pebbles, trace clay, well graded, rounded to subrounded gravel, trace black staining, WET.	GWS										
20	Borehole Total Depth = 19.8 feet bgs at Refusal.											STOP DRILLING at 19.8 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-159. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 10 foot of 0.02 slot screen with 0.46 foot end cap. Flush-mount well surface completion.
21												
22												
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31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-160
Ground Elevation	**Location**	**Page**
808.0 ft. NAVD 88	Neodesha, Kansas Latitude 37.41989675 Longitude -95.68843699	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		20.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	20.5	0.00	5	NA	11.89	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-15-14 To: 10-15-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - moss and roots. FILL - Gravelly Clay, some silt and very fine sand, medium stiff to stiff, angular to subangular gravel (1/8"-3/4"), damp.						0	20.9	0	0		START DRILLING at 0845.
1	SILTY CLAY - Very Dark Gray (10YR 3/1), some very fine sand, medium stiff, medium to high plasticity, some Light Gray (10YR 7/1) very find sand to silt pockets, damp to moist.	CL-ML									19	
2											3.8	
3				4.4/ 5	846	SS1 0 - 5					9.9	
4												
5	CLAY - Light Brownish Gray (10YR 6/2), some silt, trace very fine sand, very soft, high plasticity, moist.	CL					0	20.9	0	0	3.1	
6	SILTY CLAY - Light Gray (10YR 6/1), some very fine sand, soft to medium stiff, high plasticity, some finely mottled black orgnaic inclusions/pockets, damp to moist.	CL-ML									10.4	
7	SILTY CLAY - Light Gray (10YR 6/1), some very fine sand, stiff to very stiff, medium to high plasticity, trace finely mottled black orgnaic inclusions/pockets, trace iron oxide staining, trace carbonate/siltstone nodules (1/8"-1/4", weakly cemented), damp.	CL-ML									3.8	
8				4.8/ 5	848	SS2 5 - 10					4.1	
9												
10	more abundant iron oxide mottling toward bottom.						0	20.9	0	0	1.1	trace to low odor
11	SILTY CLAY - Light Gray (10YR 6/1), some very fine sand, trace pebble to gravel, stiff to very stiff, medium to high plasticity, trace finely mottled black orgnaic inclusions/pockets, some iron oxide mottling, trace carbonate/siltstone nodules (1/8"-1/4", weakly cemented), slight sheen, damp to moist. Becoming more sandy downward.	CL-ML										
12											95.8	strong odor
13				3.8/ 5	854	SS3 10 - 15						
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-160
Page	2 of 2
Date	10-15-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SILTY CLAY - Light Gray (10YR 6/1), some very fine sand, trace pebble to gravel, stiff to very stiff, medium to high plasticity, trace finely mottled black orgnaic inclusions/pockets, some iron oxide mottling, trace carbonate/siltstone nodules (1/8"-1/4", weakly cemented), slight sheen, damp to moist. Becoming more sandy downward.	CL-ML				10 SS3 15 –	0	20.9	0	0	1.1	
16							0	20.9	0	0	43.7	
17				4.4/ 5	900	SS4 15 - 20					520	
18	SILTY CLAY - Same as above, more Yellowish Brown (10YR 5/6) iron oxide mottling (moderate to massive).	CL-ML										
19	SANDY CLAY - Bluish Gray (5B 6/1), medium stiff, medium to high plasticity, very fine to fine grain sand, some silt, some iron oxide mottling (fine),strong odor, sheen, moist.	CLS									116	
20	GRAVELLY SAND - very fine to fine grain sand, some silt, poorly graded, trace clay, rounded to subangular gravel, trace siltstone to very fine grain sandstone (weakly cemented), moist to WET.	SPG SC					0	20.9	0	0	125	
				0.35/ 1	910	SS5 20 - 21						
21	CLAYEY SAND - Light Bluish Gray (5B 7/1), very fine to fine grain sand, loose, soft clay, sheen, moist-WET. CLAYEY GRAVEL - Greenish Gray (5G_1 6/1), sandy clay (very fine to fine grain sand, soft, medium to high plasticity), loose to medium dense, some silt, well graded, WET. Borehole Total Depth - 21.0 feet bgs at Refusal.	GW-GC									186	STOP DRILLING at 21.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-160. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.88 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
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23												
24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-161
Ground Elevation	**Location**	**Page**
807.8 ft. NAVD 88	Neodesha, Kansas Latitude 37.41983831 Longitude -95.68953042	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		20.4

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	20.4	0.00	5	NA	11.52	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-15-14 To: 10-15-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots, damp to moist.						0	20.9	0	0		START DRILLING at 1052.
1	FILL - Black, silty clay, some very fine sand, soft, medium to high plasticity, some pebbles to gravel, some roots, damp to moist.										0.8	
2	SILTY CLAY - Very Dark Gray (10YR 3/1), some very fine sand, soft to medium stiff, medim to high plasticity, trace roots, trace iron oxide mineralization (root traces), damp. Becoming more sandy downward.	CL-ML		4.8/ 5	1053	SS1 0 -_5					1.1	
3											4	
4	SANDY CLAY - Gray (10YR 6/1), soft to medium stiff, medium plasticity, very fine to fine grain sand, some silt, trace medium grain sand, some black orgnaic pockets at bottom, trace silt to very fine sand filled root traces, damp to moist.	SC									143	sheen spots on soil, strong odor
5							0	20.9	0	0	219	
6	SANDY CLAY - Same as above, trace black organic pockets/inclusions, medium stiff to stiff.	SC									57	
7											158	
8	SILTY CLAY - Light Gray (10YR 6/1), some very fine to fine grain sand, soft to medium stiff, high plasticity, some iron oxide mottling (fine to moderate), some iron oxide and black organic filled root traces, trace Light Gray (10YR 7/1) silt to very fine sand pockets, trace pebble and carbonate concretions (1/8"-1/4"), damp to moist.	CL-ML		4/ 5	1057	SS2 5 -_10					151	swelled clay (moist)
9											466	sheen, strong odor
10							0	20.9	0	0	130	
11	SILTY CLAY - some very fine to fine sand, some silt, medium stiff to stiff, medium to high plasticity, moderate iron oxide mottling, trace black organic spots and filled root traces, sheen, damp to moist.	CL-ML										
12											361	sheen, strong odor
13	SILTY CLAY - same as above, trace iron oxide mottling (medium).	CL-ML		4.2/ 5	1103	SS3 10 -_15						
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-161
Page	2 of 2
Date	10-15-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SILTY CLAY - same as above, trace iron oxide mottling (medium).	CL-ML				SS3 15 –	0	20.9	0	0	130	
	SILTY CLAY - soft, medium plasticity, trace very fine sandstone to siltstone fragments (1/8"-1/4"), some iron oxide mottling (medium), moist. Becoming more sandy downward (very fine to fine grain sand).	CL-ML					0	20.9	0	0	871	strong odor
16												
17											373	
18				4.1/ 5	1109	SS4 15 - 20						
19	GRAVELLY SAND - very fine to fine grain sand, trace medium grain sand, poorly graded, medium dense, subangular to subrounded gravel, WET.	SPG										
	SANDY GRAVEL - Light Olive Brown (2.5Y 5/4), very fine to fine grain sand, some medium grain sand and silt, well graded, trace clay (soft, medium plasticity), subangular to rounded gravel, damp. Olive (5Y 5/4) sandstone (very fine grain), weakly cemented at bottom.	GWS										WET, strong odor
20				0.4/ 0.4	1113	SS5 20 - 20.4	0	20.9	0	0	363	
											420	STOP DRILLING at 20.4 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-161. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.90 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
21	Borehole Total Depth = 20.4 feet bgs at Refusal.											
22												
23												
24												
25												
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27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-162
Ground Elevation	**Location**	**Page**
805.5 ft. NAVD 88	Neodesha, Kansas Latitude 37.41945229 Longitude -95.69101483	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		16.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	16.5	0.00	4	NA	9.78	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-21-14 To: 10-21-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL FILL - Black, sandy (very fine to fine grain), some silt and coal/asphalt (pebble to gravel in size), loose, moist to WET at bottom.						0	20.9	0	0	0	START DRILLING at 0857.
2	CLAY - Gray (10YR 5/1), some silt, trace very fine sand, soft, high plasticity, damp.	CL		2.3/ 5	858	SS1 0 - 5	0	20.9	0	0	0	
4							0	20.9	0	0	0	
5	CLAY - Light Gray to Gray (10YR 7/1-6/1), some silt, trace very fine sand, medium stiff, medium to high plasticity, some Yellowish Brown (10YR 5/6) iron oxide mottling (fine to moderate, root traces), trace iron oxide silt filled root traces, trace black mottling (fine), damp.	CL					0	20.9	0	0	0	
6							0	20.9	0	0	0	
8				2.8/ 5	902	SS2 5 - 10	0	20.9	0	0	0	
9	SILTY CLAY - Light Gray to Gray (10YR 7/1-6/1), some very fine sand, soft, medium to high plasticity, massive iron oxide mottling, damp to moist. Becoming more sandy with increasing depth.	CL-ML					0	20.9	0	0	0	
10							0	20.9	0	0	0	
11	SANDY GRAVEL - Brownish Yellow to Yellowish Brown (10YR 6/6-5/6), very fine to fine grain sand, some silt, trace clay, well graded, rounded to subangular gravel, moist to WET.	GWS										
12				2.1/ 5	910	SS3 10 - 15	0	20.9	0	0	0	
13												Moist to WET
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-162
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-21-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SANDY GRAVEL - Brownish Yellow to Yellowish Brown (10YR 6/6-5/6), very fine to fine grain sand, some silt, trace clay, well graded, rounded to subangular gravel, moist to WET.	GWS				15 -	0	20.9	0	0	0	
15						SS3 15 -	0	20.9	0	0	0	
15												WET
16				1.5/ 1.5	918	SS4 15 - 16.5	0	20.9	0	0	0	
17												STOP DRILLING at 16.5 feet bgs. Hit Refusal.
18												Advance 8.25" HSA to install Monitoring Well MW-162. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 11.4 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
19												
20												
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24												
25												
26												
27												
28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-163
Ground Elevation	**Location**	**Page**
805.2 ft. NAVD 88	Neodesha, Kansas Latitude 37.42090572 Longitude -95.69144425	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		16.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	16.2	0.30	4	NA	9.44	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-21-14 To: 10-21-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	TOPSOIL											START DRILLING at 1037.
1	CLAY - Gray to Grayish Brown (10YR 5/1-5/2), trace very fine sand, silt, and pebbles, soft, medium to high plasticity, trace roots, some Yellowish Brown (10YR 5/6) iron oxide mottling (root traces), damp.	CL					0	20.9	0	0	0	
2							0	20.9	0	0	0	
				4.2/ 5	1039	SS1 0 - 5						
3	CLAY - Light Gray to Gray (10YR 7/1-6/1), some silt, trace very fine sand, soft to medium stiff, medium to high plasticity, trace white to light gray silt to very fine sand filled root traces and pockets, damp.	CL					0	20.9	0	0	0	
4							0	20.9	0	0	0	
5							0	20.9	0	0	0	Damp to Moist. Swollen Clays
6	CLAY - Gray (10YR 6/1-5/1), some silt, trace very fine sand, soft to medium stiff, medium to high plasticity, moderate to massive iron oxide mottling, damp.	CL					0	20.9	0	0	0	
7							0	20.9	0	0	0	
				4.4/ 5	1043	SS2 5 - 10						
8							0	20.9	0	0	0	trace to slight odor
9	SILTY CLAY - Bluish Gray (GLEY 2 10B 6/1), trace very fine sand, trace pebble, soft, moderate iron oxide mottling, damp to moist.	CL-ML					0	20.9	0	0	0	medium to strong odor, slight sheen, moist to WET
10	CLAYEY SAND - Gray to Dark Gray (2.5Y 5/1-4/1), very fine to fine grain sand, trace to some gravel (rounded to subangular), soft, medium to high plasticity, WET.	SC					0	20.9	0	0	0	
11	SANDY GRAVEL - Dark Gray to Light Brownish Gray (2.5Y 4/1-6/2), very fine to fine grain sand, some silt, trace clay, well graded, medium dense, rounded to subangular gravel, trace to some black staining (moderat to strong odor), WET. Bottom 1.0 foot grades to Light Yellowish Brown (2.5Y 6/3) with Greenish Gray (GLEY 1 10GY 6/1) mottling (fine to moderate), WET.	GWS										
12				2.5/ 5	1048	SS3 10 - 15	0	20.9	0	0	0	moderate to strong odor
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-163
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-21-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15		GWS				15 SS15 –	0	20.9	0	0	0	
							0	20.9	0	0	0	
16	SILTSTONE - some very fine sand, weak to moderately cemented, breaks into thin plates, dry to damp.			0.75/ 1.5	1055	SS4 15 - 16.5	0	20.9	0	0	0	WET, moderate odor, slight sheen STOP DRILLING at 16.5 feet bgs. Hit Refusal.
17	Borehole Total Depth = 16.5 feet bgs at Refusal.											Advance 8.25" HSA to install Monitoring Well MW-163. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 10.8 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
18												
19												
20												
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26												
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28												
29												
30												
31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-164
Ground Elevation	**Location**	**Page**
807.5 ft. NAVD 88	Neodesha, Kansas Latitude 37.42130431 Longitude -95.69096108	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		19.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	19.5	0.00	4	NA	11.66	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-15-14 To: 10-15-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots FILL - Black, sandy clay (very fine to medium grain sand), some gravel, well graded, very soft, high plasticity, moist.	CL					0	20.9	0	0		START DRILLING at 1526.
1	CLAY - Very Dark Grayish Brown to Very Dark Gray (10YR 3/2-3/1), some silt, trace very fine sand, soft, medium plasticity, trace white carbonate mineralization (filled root traces), some roots, damp.										8.1	
2											0.7	
3	CLAY - Gray (10YR 6/1), some silt, trace very fine sand, medium stiff, medium to high plasticity, trace iron oxide stain/mineralization along root traces, trace black organic inclusions/streaks, trace roots, damp.	CL		4.2/ 5	1527	SS1 0 - 5					7.5	
4											2.5	
5							0	20.9	0	0	0.7	Swelling clay (moist)
6	CLAY - Gray (10YR 6/1), some silt, trace very fine sand, medium stiff to stiff, medium to high plasticity, trace iron oxide stain/mineralization along root traces, trace black organic inclusions/streaks, trace roots, some Yellowish Brown (10YR 5/6) moderate mottling, damp-moist. Becoming more silty downward.	CL									45.4	
7				4.1/ 5	1532	SS2 5 - 10					2.3	
8											10.6	
9											32.8	
10	SILTY CLAY - Bluish Gray (GLEY 2 5B 6/1), trace very fine sand, soft to medium stiff, some Yellowish Brown (10YR 5/6) mottling, damp to moist.	CL-ML					0	20.9	0	0	170	
11	SILTY CLAY - Same as above, some very fine sand, low plastic, medium stiff, trace Yellowish Brown (10YR 5/6) mottling.	CL-ML										moderate to strong odor
12											99.1	
13				4/ 5	1537	SS3 10 - 15						Sheen spots on soil
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Boring Number MW-164
Project Name Former Neodesha Refinery
Page 2 of 2
Project Number 80435
Date 10-15-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
		CL-ML				SS3	0	20.9	0	0	170	
15	SILTY CLAY - Bluish Gray (GLEY 2 5B 6/1), trace very fine sand, soft, medium to high plasticity, trace Yellowish Brown (10YR 5/6) mottling, moist to WET.	CL-ML					0	20.9	0	0	297	Strong odor with sheen on soil
16											105	
17	SANDY GRAVEL - Pale Olive (5Y 6/3), some very fine to medium grain sand, trace silt and clay, medium dense to dense, rounded to subangular gravel, well graded, moist to WET. Siltstone (weakly cemented) fragments at bottom.	GWS		3.2/ 4.5	1544	SS4 15 - 19.5						
18											390	
19												
20	Borehole Total Depth = 19.5 feet bgs at Refusal.										37.8	STOP DRILLING at 19.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-164. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 12.90 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
21												
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-165
Ground Elevation	**Location**	**Page**
810.3 ft. NAVD 88	Neodesha, Kansas Latitude 37.42160192 Longitude -95.6898797	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		22

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	22	0.00	5	NA	12.85	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-15-14 To: 10-15-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	SANDY GRAVEL (FILL) - very fine to fine grain sand, well graded, loose, dry.						0	20.9	0	0		START DRILLING at 1345.
	CLAYEY GRAVEL (FILL) - stiff clay, medium plasticity, well graded, loose to medium dense, moist.										0.2	
2	SILTY CLAY - Very Dark Gray (10YR 3/1), some very fine sand, medium stiff, medium to high plasticity, trace iron oxide mottling and root traces, trace roots, damp. Grades downward to Dark Gray (10YR 4/1).	CL-ML		4.4/ 5	1346	SS1 0 - 5					0.7	
3											1.1	
4											4.9	trace odor
5	SILTY CLAY - Gray (10YR 5/1), some very fine sand, trace fine to coarse sand, medium stiff, medium to high plasticity, some black organic streaks, trace iron oxide filled root traces, damp.	CL-ML					0	20.9	0	0	20.4	
6											40.2	Yellowish Brown (10YR 5/6) sheen spots on soil, low to moderate odor
7				4.2/ 5	1350	SS2 5 - 10						
8	SILTY CLAY - Same as above, Grayish Olive (10Y 5/2), more iron oxide mottling and filled root traces, damp.	CL-ML									22.3	
9												
10	CLAY - Bluish Gray (GLEY 2 5B 5/1), some silt, medium stiff, medium to high plasticity, moderate iron oxide mottling, trace black organic streaks, trace sheen spots on soil, damp to moist.	CL					0	20.9	0	0	36.8	sheen, strong odor
11												
12				3.9/ 5	1355	SS3 10 - 15					203	
13												swelled clay (moist)
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-165
Page	2 of 2
Date	10-15-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAY - Bluish Gray (GLEY 2 5B 5/1), some silt, trace very fine sand, soft to medium stiff, medium to high plasticity, moderate iron oxide mottling, trace black organic streaks, trace sheen spots on soil, damp to moist.	CL				SS3 15 –	0	20.9	0	0	36.8 167	sheen, strong odor, moist
16	SANDY CLAY - Grayish Blue (5B 6/1), very fine to fine grain sand, some silt, soft to medium stiff, high plasticity, trace iron oxide and black organic mottling, moist.	CLS					0	20.9	0	0	40.2	
17	SANDY CLAY - Light Brownish Gray (2.5Y 6/2), very fine to fine grain sand, some silt, soft to medium stiff, high plasticity, some iron oxide mottling, trace black organic mottling, moist.	CLS		3.6/ 5	1405	SS4 15 - 20						
18											28.2	
19	SANDY CLAY - Grayish Brown (2.5Y 5/2), very fine to fine grain sand, trace medium grain sand, very soft to soft, high plasticity, sheen, trace iron oxide mottling, moist to WET. Bluish Gray (GLEY 2 5B 6/1) siltstone (weakly cemented) at bottom.	CLS									21.8	
20							0	20.9	0	0		sheen, moist to WET
21				2/ 2	1410	SS5 20 - 22						
22	Borehole Total Depth = 22.0 feet bgs at Refusal.										48.2	STOP DRILLING at 22.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-165. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 14.90 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-166
Ground Elevation	**Location**	**Page**
809.2 ft. NAVD 88	Neodesha, Kansas Latitude 37.4224429 Longitude -95.68841207	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		19

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	19	0.00	4	NA	11.23	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-17-14 To: 10-17-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	O2	H2S	CO	PID	Remarks/ Water Levels
	TOPSOIL											START DRILLING at 1030.
1	FILL - Gravelly Clay, Gray (10YR 5/1)						0	20.9	0	0	3.1	
	FILL - Silty Clay, some very fine sand, some gravel, soft, high plasticity, damp.											
2	FILL - Red Brick						0	20.9	0	0	10.2	
	FILL SAND - very fine to medium grain, trace gravel, loose, dry.			2.6/ 5	1034	SS1 0 - 5						Hard Drilling at 2.5 feet bgs. Brick.
3							0	20.9	0	0	15	
4	FILL - Red Brick						0	20.9	0	0	27.5	
	FILL - Concrete, dusty, dry.											
5	FILL- Sandy Clay to Sandy Gravel - soft, medium to high plasticity, well graded, WET.						0	20.9	0	0	5.2	WET
6	CLAY - Light Gray (10YR 7/1), some silt, trace very fine sand, soft, medium to high plasticity, some iron oxide mottling (fine root traces), some black inclusions/streaks, damp to moist.	CL					0	20.9	0	0	18.9	Collect MW-166 SS1 Soil Sample 6.0'-6.5' bgs.
7				4.2/ 5	1038	SS2 5 - 10	0	20.9	0	0	25.8	
8							0	20.9	0	0	30.2	
9	medium stiff to stiff, more iron oxide mottling (moderate)						0	20.9	0	0	33.5	
10							0	20.9	0	0	48.2	
11	SILTY CLAY - Light Bluish Gray (10B 7/1), trace very fine sand, medium stiff, medium plasticity, trace iron oxide mottling, damp.	CL-ML										
12	CLAYEY GRAVEL - Light Bluish Gray (10B 7/1), medium stiff to stiff, medium to high plasticity, rounded to subsrounded gravel, some iron oxide mottling (fine), moist.	GC		4.2/ 5	1043	SS3 10 - 15	0	20.9	0	0	46.8	Collect MW-166 SS2 Soil Sample 12.0'-15.0' bgs.
13	Grades to Bluish Gray (10B 5/1).											
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-166
Page	2 of 2
Date	10-17-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
		GC				SS15	0	20.9	0	0	48.2	
							0	20.9	0	0	43.8	
15	CLAY - Light Bluish Gray (GLEY 2 10B 7/1), some silt, soft, medium to high plasticity, some iron oxide mottling (fine root traces), moist. More very fine sand and very soft with increasing depth.	CL										
16							0	20.9	0	0	29.8	
17	CLAYEY GRAVEL - Greenish Gray (GLEY 2 5BG 6/1), soft, medium to high plasticity, moist to WET. Grades to Dark Gray and more sandy with increasing depth.	GC		/ 4	1053	SS4 15 - 19						
18	SANDY GRAVEL - very fine to fine sand, some medium sand, dense.	GWS					0	20.9	0	0	80.9	
19	Borehole Total Depth = 19.0 feet bgs at Refusal.											STOP DRILLING at 19.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-166. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 13.94 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-167
Ground Elevation	**Location**	**Page**
804.3 ft. NAVD 88	Neodesha, Kansas Latitude 37.42329858 Longitude -95.68964069	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		14

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	14	0.00	3	NA	4.44	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-16-14 To: 10-16-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	O2	H2S	CO	PID	Remarks/ Water Levels
0	TOPSOIL											START DRILLING at 0833.
	CLAY - Very Dark Grayish Brown (10YR 3/2), some silt, trace very fine sand, soft, medium to high plasticity, abundant Yellowish Brown (10YR 5/6) iron oxide mottling, some roots, damp.	CL					0	20.9	0	0	385	
2	SANDY CLAY - Gray (10YR 6/1-5/1), very fine to fine sand, some silt, soft, trace iron oxide mottling (root traces), some black organic staining at bottom (odor), damp to moist.	CLS		4/ 5	836	SS1 0 - 5	0	20.9	0	0	300	
3							0	20.9	0	0	156	Moist to WET. Strong Odor.
4	SANDY CLAY - Very Dark Gray (10YR 3/1), very fine to medium sand, very soft, high plasticity, slight sheen, strong odor, moist.	CLS					0	20.9	0	0	133	
5	SILTY CLAY - Dark Grayish Brown (10YR 4/2), some very fine sand, soft, high plasticity, trace iron oxide mottling, some black staining.	CL-ML					0	20.9	0	0	85.6	
6	SILTY CLAY - Very Dark Gray to Black (10YR 3/1-2/1), some very fine sand, soft, very high plasticity, some sheen, strong odor, mosit to WET.	CL-ML					0	20.9	0	0	645	Slight Sheen Visable on Soil.
7				4.4/ 5	841	SS2 5 - 10	0	20.9	0	0	168	
8							0	20.9	0	0	157	
9	SILTY CLAY - Dark Grayish Brown to Very Dark Grayish Brown (10YR 4/2-3/2), some very fine sand, medium stiff, medium plasticity, trace iron oxide mottling (fine), damp.	CL-ML					0	20.9	0	0	113	
10	SILTY CLAY - Greenish Gray (10GY 6/1), some very fine sand, trace medium sand to pebble, medium stiff, trace iron oxide mottling (root traces), damp.	CL-ML					0	20.9	0	0	121	WET. Slight Sheen and Product Visable.
11												
12				3.8/ 4	850	SS3 10 - 14	0	20.9	0	0	486	
13	SANDY CLAY - some gravel, very soft, high plasticity, rounded to subangular gravel, moist to WET.	CLS										
14		SP										

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-167
Page	2 of 2
Date	10-16-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SAND - Light Greenish Gray (5GY 7/1), very fine grain sand, some silt, poorly graded, loose to medium dense, trace weakly cemented partings/seams, moist.						0	20.9	0	0	130	STOP DRILLING at 14.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-167. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 8.9 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
	Borehole Total Depth = 14.0 feet bgs at Refusal.											
16												
17												
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-168
Ground Elevation	**Location**	**Page**
806.1 ft. NAVD 88	Neodesha, Kansas Latitude 37.42409752 Longitude -95.68842566	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		17

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	17	0.00	4	NA	7.39	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-14-14 To: 10-14-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL - grass and roots.						0	20.9	0	0		START DRILLING at 1618.
	FILL - Black to Very Dark Grayish Brown (10YR 2/1-3/2), silty clay, some very fine sand and gravel, medium stiff, medium plasticity, damp.	SC									0.2	
1	CLAYEY SAND - Black (10YR 2/1), very fine to fine grain, low plasticity, poorly graded, medium dense, abundant coal fragments, damp.	CL										
2	CLAY - Dark Grayish Green (5GY 4/2), some silt, trace very fine sand, medium stiff, medium plasticity, damp.	CL-ML		3.6/ 5	1620	SS1 0 - 5					0.4	
	SILTY CLAY - Black (10YR 4/1), some very fine sand, soft, medium to high plasticity, damp.										5.8	
3												
4												
5	low to moderate odor						0	20.9	0	0	27.9	
	CLAYEY SAND - Yellowish Brown (10YR 5/4), very fine sand, some silt, poorly graded, dense, low to moderate odor, damp. Becoming Light Gray (10YR 7/1) downward with stronger odor and more sandy.	SC									3.4	Strong odor and WET.
6				3.3/ 5	1623	SS2 5 - 10						
7												
8	slight sheen										58.2	Moist to WET
9											199	
10	CLAYEY SAND - Light Gray (10YR 7/1), very fine to fine grain, high plasticity clay, medium dense, strong odor, damp to moist.	SC					0	20.9	0	0		Strong odor
11												
12				2/ 5	1627	SS3 10 - 15					58.3	Strong odor
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-168
Page	2 of 2
Date	10-14-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	CLAYEY/SANDY GRAVEL - very fine to medium sand, well graded, medium dense, angular to subrounded gravel (1/8"-3/4"), damp to moist.	GWS				SS3 15 –	0	20.9	0	0	85.7	
16	SANDY GRAVEL - Yellowish Brown (10YR 5.4), very fine to fine grain, trace gravel, well graded, WET (soupy texture).	GC-GWS		1.7/ 2	1631	SS4 15 – 17	0	20.9	0	0	81.4	Sleeve WET
17	SAND - Olive Yellow (2.5Y 6/6) and Gray (2.5Y 6/1), trace gravel, very fine to fine grain, poorly graded, dense, dry to damp.	SP										
18	SILT - Light Olive Brown (2.5Y 5/6), dense, dry to damp.	ML										STOP DRILLING at 17.0 feet bgs. Hit Refusal.
19	Borehole Total Depth = 17.0 feet bgs at Refusal.											Advance 8.25" HSA to install Monitoring Well MW-168. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 10 foot of 0.02 slot screen with 0.45 foot end cap. Flush-mount well surface completion.
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-169
Ground Elevation	**Location**	**Page**
804.0 ft. NAVD 88	Neodesha, Kansas Latitude 37.42423519 Longitude -95.69294219	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		14.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	14.5	0.00	3	NA	3.54	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-20-14 To: 10-20-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	FILL - Silty Clay, some very fine sand and gravel.											START DRILLING at 0915.
1	CLAY - Gray (10YR 5/1), some silt, trace very fine sand, soft to medium stiff, medium plasticity, trace Brownish Yellow (10YR 6/6) iron oxide mottling (fine), dry to damp.	CL					0	20.9	0	0	111	Moderate Odor.
2	SILTY CLAY - Gray (10YR 5/1), some very fine sand, soft to medium stiff, medium plasticity, dry to damp. Trace pebble to gravel toward bottom.	CL-ML		5/ 5	916	SS1 0 - 5	0	20.9	0	0	182	
3							0	20.9	0	0	263	
4							0	20.9	0	0	1129	Strong Odor.
5	Damp to Moist						0	20.9	0	0	358	Damp to Moist.
6							0	20.9	0	0	253	
7				4.7/ 5	923	SS2 5 - 10	0	20.9	0	0	485	
8	SAND - fine grain sand, poorly graded, medium dense, rounded to subrounded, moist.	SP					0	20.9	0	0	1464	
9	SANDY CLAY - Grayish Brown to Brown (10YR 5/2-4/3), soft, medium plasticity.	CLS					0	20.9	0	0	589	WET
10	GRAVELLY SAND - Grayish Brown to Brown, very fine to fine grain sand, trace clay, well graded, rounded to subangular gravel, WET. Bottom grades to Dark Bluish Gray (GLEY 2 5B 4/1).	SWG					0	20.9	0	0	217	
11	GRAVELLY SAND - Gray (10YR 5/1), very fine to fine grain sand, trace clay, well graded, rounded to subangular gravel, WET.	SWG										Sheen
12				2/ 4.5	931	SS3 10 - 14.5	0	20.9	0	0	228	Product visable - Yellowish Brown (10YR 5/8) liquid
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-169
Page	2 of 2
Date	10-20-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SAND - Gray to Greenish Gray (GLEY 1 N 5/- 10GY 6/1), some gravel, poorly graded, medium dense, trace weak cementation, dry to damp.	SP					0	20.9	0	0	217	
							0	20.9	0	0	317	
	Borehole Total Depth = 14.5 feet bgs at Refusal.											STOP DRILLING at 14.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-169. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 9.5 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-170
Ground Elevation	**Location**	**Page**
805.1 ft. NAVD 88	Neodesha, Kansas Latitude 37.42507256 Longitude -95.69376966	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		14.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	14.5	0.00	3	NA	2.94	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-17-14 To: 10-17-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	SILT - Dark Grayish Brown (10YR 4/2), trace very fine sand and clay, soft, medium plasticity, dry to damp.	ML										START DRILLING at 0849.
1	FILL - Asphalt, Coal (vitreous and brittle), some gravel, dry to damp. Red Brick at bottom.						0	20.9	0	0	13.1	
2							0	20.9	0	0	13.7	
3				3.5/ 5	850	SS1 0 - 5	0	20.9	0	0	15.2	
4	FILL SAND - Light Gray (10YR 7/1), fine to medium grain sand, trace to some gravel, poor to moderately graded, loose to medium dense, WET. Grades to Black at bottom.						0	20.9	0	0	29.2	WET. Moderate to Strong Odor.
5							0	20.9	0	0	48.7	
6	SILTY CLAY - Very Dark Gray (10YR 3/1), soft, moist, high plasticity, WET.	CL-ML					0	20.9	0	0	24.9	Collect MW-170 SS1 Soil Sample 6'-6.5' bgs.
7				/ 5	900	SS2 5 - 10	0	20.9	0	0	25	
8	SILTY CLAY - Very Dark Gray (10YR 3/1), trace very fine sand, trace pebble, medium stiff, high plasticity, trace iron oxide mottling (fine root traces), WET.	CL-ML					0	20.9	0	0	22.8	
9							0	20.9	0	0	28	
10	SILTY CLAY - Gray (10YR 5/1), soft, medium to high plasticity, some iron oxide mottling (fine to medium root traces), moist.	CL-ML					0	20.9	0	0	31.2	
11												
12	medium stiff to stiff			2.5/ 4.5	919	SS3 10 - 14.5	0	20.9	0	0	12.1	Collect MW-170 SS2 Soil Sample 12'-14' bgs.
13	SILT - Yellowish Brown (10YR 5/6), some gravel, trace very fine sand, medium dense to dense, damp to moist.	ML										
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-170
Page	2 of 2
Date	10-17-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	SILT - Yellowish Brown (10YR 5/6), some gravel, trace very fine sand, dense to very dense, dry.	ML					0 0	20.9 20.9	0 0	0 0	31.2 10.2	
15	Borehole Total Depth = 14.5 feet bgs at Refusal.											STOP DRILLING at 14.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-170. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 9.45 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
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17												
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-171
Ground Elevation	**Location**	**Page**
804.8 ft. NAVD 88	Neodesha, Kansas Latitude 37.42691918 Longitude -95.69426374	1 of 1
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		10.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	10.5	0.00	3	NA	2.52	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-17-14 To: 10-17-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
	TOPSOIL											START DRILLING at 1640. Collect MW-171 SS1 Soil Sample 0'-0.5' bgs.
1	SILTY CLAY - Grayish Brown (10YR 5/1), very soft, high plasticity, trace roots, some red iron oxide mottling (fine to medium root traces), moist.	CL-ML					0	20.9	0	0	0	
2	SILTY CLAY - Brownish Yellow (10YR 6/6), some very fine sand, soft to medium stiff, massive iron oxide mottling, some black mottling (decayed roots), trace hard carbonate concretions (1/16"-1/8"), moist.	CL-ML		4.6/ 5	1641	SS1 0 - 5	0	20.9	0	0	0	
3							0	20.9	0	0	1.4	
4							0	20.9	0	0	2	
5							0	20.9	0	0	1	Collect MW-171 SS2 Soil Sample 5'-10' bgs.
6	CLAYEY GRAVEL - Light Yellowish Brown to Yellowish Brown (10YR 6/4-5/6), some very fine to fine sand, trace medium sand, well graded, soft, high plasticity, medium dense, moist to WET.	GC					0	20.9	0	0	0	
7				4.1/ 5	1649	SS2 5 - 10	0	20.9	0	0	0	
8	SANDY CLAY - Bluish Gray to Dark Bluish Gray (GLEY 2 10B 5/1-3/1), very fine to fine sand, some gravel, very soft, high plasticity, strong odor, moist to WET.	CLS					0	20.9	0	0	2.6	WET. Moderate Odor.
9	SANDY CLAY - Olive Gray, very fine to fine sand, some gravel, very soft, WET.	CLS					0	20.9	0	0	20.8	
10				0.5/ 0.5	1652	SS3 10 - 10.5	0	20.9	0	0	2.4	STOP DRILLING at 10.5 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-171. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 5.41 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
11	Borehole Total Depth = 10.5 feet bgs at Refusal.											
12												
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-172
Ground Elevation	**Location**	**Page**
821.4 ft. NAVD 88	Neodesha, Kansas Latitude 37.43131633 Longitude -95.69271604	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		23

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	22.7	0.30	5	NA	4.79	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-20-14 To: 10-20-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL CLAY - Very Dark Gray (10YR 3/1), some silt, soft, high plasticity, some roots, damp.	CL										START DRILLING at 1435.
1	CLAY - Brown (10YR 5/3), some silt, trace very fine sand, soft, medium to high plasticity, trace roots, trace iron and manganese oxide mottling (fine root traces), damp.	CL					0	20.9	0	0	0	
2							0	20.9	0	0	0	
3				3.3/ 5	1437	SS1 0 - 5	0	20.9	0	0	0	
4	SILTY CLAY - Brown (10YR 5/3), some very fine sand, trace pebbles, soft, high plasticity, trace roots, trace hard carbonate concretions (1/8"-3/4"), dampt to moist. Grades to Yellowish Brown (10YR 5/4-5/6).	CL-ML					0	20.9	0	0	0.5	
5	CLAY - Light Gray to Gray (10YR 7/1-6/1), some silt, soft to medium stiff, medium to high plasticity, some iron oxide mottling (moderate to massive), trace roots, damp to moist. Grading to Strong Brown (7.5YR 5/6-5/8), soft with some black mottling (fine root traces)	CL					0	20.9	0	0	0.3	Damp to Moist. Swollen Clays.
6							0	20.9	0	0	0.1	
7				4.5/ 5	1441	SS2 5 - 10	0	20.9	0	0	0.3	
8							0	20.9	0	0	0.1	
9							0	20.9	0	0	0	
10	CLAY - Brown to Strong Brown (7.5YR 4/4-4/6), some silt, trace very fine sand, soft to medium stiff, medium to high plasticity, some iron oxide mottling (moderate to massive), trace to some black mottling (fine), damp to moist. Becoming more stiff with increasing depth.	CL					0	20.9	0	0	0	
11												
12				3.2/ 5	1450	SS3 10 - 15	0	20.9	0	0	0	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

Burns & McDonnell SINCE 1898

Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-172
Page	2 of 2
Date	10-20-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15		CL				SS3 15 –	0	20.9	0	0	0	
							0	20.9	0	0	0	
15	CLAY - Brown to Strong Brown (7.5YR 4/4-4/6), some silt, trace very fine sand, soft, medium to high plasticity, some iron oxide mottling (moderate to massive), trace to some black mottling (fine), damp to moist. Becoming more silty and sandy with increasing depth.	CL										
16							0	20.9	0	0	0	
17				3.8/ 5	1504	SS4 15 - 20						
18	SILTY CLAY - Brown to Strong Brown (7.5YR 5/4-5/6), some very fine sand, soft, high plasticity, some iron oxide mottling (moderate to massive), some black mottling (fine root traces)	CL-ML					0	20.9	0	0	0.3	
19												
20	SILT - Bluish Gray to Dark Bluish Gray (GLEY 2 5B 6/1-4/1), trace clay, soft, medium to high plasticity, moist.	ML										
	SILT - Light Gray to Light Bluish Gray (2.5Y 7/1-6/2), trace to some clay, soft, high plasticity, trace black staining (moderate to strong odor), moist to WET.	ML					0	20.9	0	0	1.3	Moist to WET. Moderate to Strong Odor.
21				2.3/ 3	1513	SS5 20 - 23						WET. Moderate to Strong Odor.
22							0	20.9	0	0	52.4	
23	SILTY MUDSTONE - Light Yellowish Brown to Brownish Yellow (10YR 6/4-6/6), some very fine sand, very dense to hard, dry.											STOP DRILLING at 23.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-172. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 17.91 foot of 0.02 slot screen with 0.15 foot end cap. Flush-mount well surface completion.
	Borehole Total Depth = 23.0 feet bgs at Refusal.											
24												
25												
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31												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log

Project Name	Project No.	Boring Number
Former Neodesha Refinery	80435	MW-173
Ground Elevation	**Location**	**Page**
806.6 ft. NAVD 88	Neodesha, Kansas Latitude 37.4191686 Longitude -95.68892032	1 of 2
Air Monitoring Equipment		**Total Footage**
MultiRAE 200 (PID) + VRAE (4-Gas)		19

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
Direct Push	2.25 inch	19	0.00	4	NA	10.68	10-29-14

Drilling Company: RAZEK Environmental, LLC.	Drillers (s): Tony Poulter and Paul Sundquist
Drilling Rig: Geoprobe 6620DT track-mounted	Type of Sampler: Macro-Core (MC5)
Date: 10-16-14 To: 10-16-14	Field Observer (s): C.Hoglund

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
0	TOPSOIL FILL - Clayey Gravel FILL - Sand, white to light gray, very fine to fine grain, some pebble to gravel, loose.											START DRILLING at 1016.
1	FILL - Black Sand (Asphalt?), loose, very fine to coarse grain sand. Trace pebble to gravel, loose to medium dense.	CL-ML					0	20.9	0	0	22.1	
2	SILTY CLAY - Dark Grayish Brown (10YR 4/2), trace very fine sand, soft, high plasticity, trace roots, some iron oxide mottling (fine root traces), damp to moist.	CL-ML		4.2/ 5	1017	SS1 0 -_5	0	20.9	0	0	17.2	
3	SILTY CLAY - Dark Grayish Brown (10YR 4/2), trace very fine sand, soft, high plasticity, some abudnant black mottling/streaks (moderate odor), damp to moist.						0	20.9	0	0	33.2	
4	some very ine to medium sand, soft to medium stiff						0	20.9	0	0	18.2	
5	CLAY - Gray (10YR 6/1-4/1), some silt, trace very fine sand, soft, medium to high plasticity, some iron oxide mottling (root traces), trace black organic inclusions/streaks, trace carbonate filled/mineralized root traces. Becoming medium stiff to stiff with increasing depth.	CL					0	20.9	0	0	18	Damp to Moist. Swollen Clays.
6							0	20.9	0	0	45	
7				4.3/ 5	1022	SS2 5 -_10	0	20.9	0	0	18.6	
8	CLAY - Bluish Gray (5B 6/1), some silt, trace very fine sand, medium stiff to stiff, medium to high plasticity, some iron oxide mottling (root traces), trace black organic inclusions/streaks, trace carbonate filled/mineralized root traces.	CL					0	20.9	0	0	20	
9							0	20.9	0	0	24.0	
10	SILT CLAY - Bluish Gray (5B 6/1), some very fine sand, trace pebble, medium stiff, medium to high plasticity, some iron oxide mottling (root traces).	CL-ML					0	20.9	0	0	48.8	
11												
12				/ 5	1028	SS3 10 -_15	0	20.9	0	0	125	
13												
14												

ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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Drilling Log, continued

Project Name	Former Neodesha Refinery
Project Number	80435
Boring Number	MW-173
Page	2 of 2
Date	10-16-14

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	5-Gas CH4	5-Gas O2	5-Gas H2S	5-Gas CO	5-Gas PID	Remarks/ Water Levels
15	SANDY CLAY - Bluish Gray (5B 6/1), very fine sand, some silt, soft, medium to high plasticity, abundant iron oxide mottling (massive), damp to moist.	CLS				SS3	0	20.9	0	0	48.8	
						15 –	0	20.9	0	0	110	
	SILT CLAY - Bluish Gray (5B 6/1), some very fine sand, trace pebble, medium stiff, medium to high plasticity, some iron oxide mottling (root traces).	CL-ML										
16	SANDY CLAY - Grayish Brown (2.5Y 5/2), very fine to medium sand, soft, medium to high plasticity, WET.	CLS					0	20.9	0	0	136	
17				/ 4	1037	SS4 15 – 19						
18	SANDY CLAY - Brownish Gray (2.5Y 5/2), very fine sand, some silt, very soft, high plasticity. Gravelly zone at 18.5 feet bgs.	CLS					0	20.9	0	0	13.8	
19	SAND - Olive Yellow (2.5Y 6/6), very fine to fine sand, trace medium sand to pebble, loose, poorly graded, rounded to subrounded grains, WET.	SP					0	20.9	0	0	3.5	STOP DRILLING at 19.0 feet bgs. Hit Refusal. Advance 8.25" HSA to install Monitoring Well MW-173. 2-inch Schedule 40 PVC with threaded joints. Well constructed with 12.75 foot of 0.02 slot screen with 0.15 foot end cap. Stick-up well surface completion.
20	Borehole Total Depth = 19.0 feet bgs at Refusal.											
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ENVIRONMENTAL LOG - 5 GAS NEODESHA, KS FORMER REFINERY INVESTIGATION DRILL LOGS.GPJ WILLIAMS.GDT 1/20/15

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