

**EAST OAK RECYCLING AND DISPOSAL FACILITY
OKLAHOMA COUNTY, OKLAHOMA
ODEQ PERMIT NO. 3555036**

**TIER III PERMIT MODIFICATION
LANDFILL EXPANSION**

VOLUME 2 OF 4

Prepared for

Waste Management of Oklahoma, Inc.

June 2015

Revised January 2016

Revised May 2016



Prepared by

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WCG Project No. 0086-356-11-42-04

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**EAST OAK RECYCLING AND DISPOSAL FACILITY
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APPENDIX E

**SUBSURFACE INVESTIGATION
AND GROUNDWATER STUDY**

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WCG Project No. 0086-356-11-40-08

Appendix E was a collaborative effort by Weaver Consultants Group, LLC (WCG) and Biggs and Mathews Consulting Engineers and Hydrogeologists (B & M). WCG completed portions pertaining to geologic and hydrogeologic information and subsurface investigations and B & M completed and/or reviewed portions pertaining to groundwater patterns and the monitoring system. WCG text is noted in non-italicized text; B&M text is noted in italicized text.

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1 SUBSURFACE INVESTIGATION

1.1 General

Waste Management of Oklahoma, Inc. proposes to expand the existing East Oak Recycling and Disposal Facility (RDF) waste disposal area. The two proposed waste disposal expansion areas (termed the north and south units) will encompass about 41.4 acres combined. This subsurface investigation report supports the proposed lateral expansion of the East Oak RDF as required by Oklahoma Administrative Code (OAC) 252:515-7-1. Fourteen previous subsurface investigations have been conducted which provide information regarding the location and characteristics of the uppermost saturated zone in accordance with 252:515-7-2 at this site. References to these investigations are listed in Section 1.2. Early investigations refer to the East Oak RDF as the Mosley Road II Landfill, which was the name of the facility when it was originally permitted. The name was changed to the East Oak RDF in a 1989 permit amendment that did not involve a subsurface investigation and is not listed below.

The 2014 subsurface characterization of the 41.4-acre lateral expansion of the waste disposal area was completed by Weaver Consultants Group, LLC (WCG) and Terracon Consulting Engineers and Scientists (Terracon or driller). Terracon is licensed to install monitor wells in Oklahoma. To protect all saturated zones encountered in the 2014 subsurface investigation, all drilling equipment was decontaminated before use and all borings not converted to piezometers were plugged with bentonite grout per the Oklahoma Water Resources Board (OWRB) requirements listed in OAC 785:35. In addition, all existing piezometers have stickup (non-flush mount) completions and no multi-zone completions have been used in the 2014 subsurface investigation.

1.2 Summary of Subsurface Investigations

This section summarizes the 16 subsurface investigations that have been completed at the facility. The investigations were completed between 1979 and 2015.

1.2.1 2015 Installation and Decommissioning Report

The report titled “Monitoring Well Installation Report MV-28R, East Oak RDF, Oklahoma County, Oklahoma,” was prepared for Waste Management of Oklahoma, Inc. by Biggs and Mathews Environmental in May 2015. It described the installation of groundwater well MW-28R in May 2015. The report also described the decommissioning of groundwater well MW-28. The purpose of the installation was to

relocate the monitoring well to facilitate the gas-to-liquid (GTL) facility. The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.2 2014 Subsurface Investigation to Support a Combined 47.5-Acre Lateral Expansion of the Waste Disposal Area

In accordance with 252:515-7-4, a WCG subsurface investigation Drilling Plan for characterizing the 41.4-acre area was submitted to ODEQ prior to the subsurface investigation. The plan was submitted to ODEQ on April 2, 2014 and was approved on April 17, 2014. A copy of the ODEQ approval letter is provided in Appendix E-9. It should be noted that the approved Drilling Plan anticipated a 47.5-acre lateral expansion. The expansion footprint has been reduced to 41.4 acres since approval of the Drilling Plan. The drilling activities were supervised by qualified WCG groundwater scientists.

The 2014 subsurface investigation included 10 new exploration borings, 6 piezometer installations, and an associated 7 geophysical logs to aid in characterizing the 41.4-acre expansion areas. The elevation of the deepest waste placement in the proposed expansion areas will be about 1,145.5 feet mean sea level (ft-msl). However, the deepest waste in the existing East Oak RDF is about 1,143.6 ft-msl. All borings were advanced at least 30 feet below deepest waste placement (i.e., 1,143.6 ft-msl).

WCG conducted the subsurface investigation in May and June 2014. Ten borings were advanced using continuous sampling and 6 piezometers were installed (as per the Drilling Plan). Field observations indicated a fining upwards, unconsolidated sand and silt sediments overlying well consolidated sandstone, shale and siltstone bedrock. The piezometers installed by WCG were screened in the uppermost saturated zone to investigate the hydraulic properties of that unit. The results of the 2014 WCG subsurface investigation are presented in the Groundwater Study (Section 3).

1.2.3 2011 Installation and Decommissioning Monitoring Wells Report

The report titled "Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma," was prepared for Waste Management of North America, Inc. by Terracon and Biggs and Mathews Environmental in July 2011. It described the installation of groundwater monitoring well MW-223R1 in June 2011. The report also described the decommissioning of groundwater monitoring well MW-223. The purpose of the installation was to relocate the monitor well to facilitate landfill development. The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.4 2010 Installation and Decommissioning Monitoring Wells Report

The report titled "Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma," was prepared for Waste Management of North America, Inc. by Landtec in October 2010. It described the installation of groundwater monitoring well MW-220R in October 2010. The report also described the decommissioning of groundwater monitoring wells MW-201 and MW-220. The purpose of the installation

and removals was to relocate monitor well MW-220 to facilitate landfill development. The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.5 2010 Installation and Decommissioning Monitoring Wells Report

The report titled “Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma,” was prepared for Waste Management of North America, Inc. by Biggs and Mathews Environmental in May 2010. It described the installation of groundwater monitoring wells MW-204R and MW-207R2 in April 2010. The report also described the decommissioning of groundwater monitoring wells MW-204 and MW-207R. The purpose of the installation and removal was to relocate the monitor well to facilitate landfill development. The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.6 2005 Subsurface Investigation to Support an 44.6-Acre Lateral Expansion of the Waste Disposal Area

A WCG subsurface investigation Drilling Plan for characterizing a 44.6-acre area was submitted to ODEQ in November 2005 and approved on November 23, 2005. WCG conducted the subsurface investigation in November and December 2005. Ten borings were advanced using continuous sampling and 5 piezometers were installed. One additional geophysical logging pilot boring was advanced adjacent to monitoring well MW-225GW.

1.2.7 2003 Installation and Decommissioning Monitoring Wells Report

The report titled “Installation and Decommissioning Monitoring Wells and Gas Probe, East Oak Recycling and Disposal Facility, Oklahoma City, Oklahoma,” was prepared for Waste Management of North America, Inc. by A&M Engineering and Environmental Services in July 2003. It described the installation of groundwater monitoring wells MW-208R, MW-221R, MW-225A, MW-226GW, and landfill gas probe GP-8R in May and June 2003. The report also described the decommissioning of groundwater monitoring wells MW-208, MW-221, and gas probe GP-8. The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.8 2002 Lateral Expansion Permit Application

The permit application titled “Lateral Expansion Permit Application, East Oak RDF, Oklahoma City, Oklahoma, ODEQ Permit Number 3555036” was prepared for the East Oak RDF by TetraTech EM, Inc. in October 1999. The application was revised in November 2000 and then further revised by Cardinal Engineering, Inc. in February 2002. This application provided an East Oak RDF lateral expansion by permitting the placement of waste in the area between the East Oak and Mosley Road Landfills. It also documented the advancement of four soil borings in the expansion area to evaluate the subsurface conditions in that area.

1.2.9 1995 Installation and Decommissioning Monitoring Wells Report

The report titled “Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma,” was prepared for Waste Management of North America, Inc. by Rust Environmental and Infrastructure, Inc. (Rust) in October 1995. It described the installation of groundwater monitoring wells MW-27, MW-28, and MW-29 in August and September 1995. The report also described the decommissioning of groundwater monitoring wells MW-23R, MW-24R, and MW-26. The purpose of the installations was to comply with the Subtitle D groundwater monitoring requirements. The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.10 1994 Gas Probe Installation Report

The report titled “Installation of Gas Monitoring Probes, East Oak Landfill and Recycling Center, Oklahoma City, Oklahoma,” was prepared for Waste Management by Rust in October 1994. It describes the installation of 9 methane gas monitoring probes (EO-01, EO-02, EO-03, EO-04, EO-05, EO-06, EO-07, EO-08, and EO-09) in October 1994. The gas probes were later renamed GP-1, GP-2, GP-3, GP-4, GP-5, GP-6, GP-7, GP-8, and GP-9.

1.2.11 1993 Geotechnical Subsurface Investigation and Subtitle D Report

The report titled “Subtitle D, Part 258, Subpart B, Location Restrictions Demonstrations for East Oak Sanitary Landfill, Oklahoma City, Oklahoma,” was prepared for Waste Management of North America, Inc. by Rust in September 1993. It described 4 borings that were done as part of a geotechnical investigation to evaluate the foundation stability of the site. According to this report, the 4 borings were advanced using hollow stem augers with sampling done in 5-foot intervals. The borings were terminated in the underlying Garber-Wellington Formation which was encountered at depths ranging from 31 to 50.5 feet below ground surface (bgs). The installation report was submitted to ODEQ prior to filing this permit modification.

1.2.12 1991 Minor Amendment to Permit

The report titled “East Oak Sanitary Landfill & Recycling Center, Permit Number 3555036, Minor Amendment to Permit” was prepared by Waste Management of Oklahoma, Inc. in December 1991. It documents the installation of monitoring wells MW-21R, MW-22R, MW-23R, MW-24R, MW-25R, and MW-26 in August 1991. It also documented the concurrent plugging of monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5. The report was submitted to ODEQ prior to filing this permit modification.

1.2.13 1991 Remedial Investigation Report

The report titled “Final Remedial Investigation Report, Mosley Road Sanitary Landfill, Remedial Investigation/Feasibility Study Volumes I, II, & III” was prepared for Waste Management, Inc. by Golder Associates, Inc. in August 1991. The report described

remedial actions taken at the Mosley Road Landfill which included several borings advanced at the landfill to provide subsurface characterization information. The report was submitted to ODEQ prior to filing this permit modification.

1.2.14 1985 Geotechnical Investigation Report

The report titled “Report of Geotechnical Investigation for the Mosley Road #2 Landfill Site, Oklahoma City, Oklahoma,” was prepared for Waste Management of North America, Inc. by Shepherd Engineering Testing Co., Inc. in January 1985. This report described the advancement of 5 borings and the installation of 5 piezometers to determine and analyze the in-situ soil characteristics of the site. According to the report, borings were advanced to depths ranging from 24 to 34 feet below ground surface using hollow stem augers with a CME continuous sampling tube. According to the findings of this report, material encountered during the field exploration generally consisted of silty sand material with occasional lenses of silty clay or clayey silt. The report is presented as an attachment to the report titled “Solid Waste Permit Application, Mosley Road II Sanitary Landfill, Oklahoma City Disposal, Inc., Oklahoma City, Oklahoma.” The report was completed by Waste Management of North America, Inc., in 1986.

1.2.15 1984 Subsurface Exploration Report

The report titled “Subsurface Exploration Mosley Road II Landfill, Midwest City, Oklahoma,” was prepared for Waste Management of North America, Inc. by Western Technologies, Ltd. in November 1984. The report described the advancement of 8 borings and installation of 5 monitoring wells and 3 piezometers as part of a subsurface investigation for the second phase of filling at the Mosley Road II Landfill. According to this report, the borings were advanced to depths ranging from 30 to 50 feet bgs using hollow stem augers with representative samples taken directly from the augers at five-foot intervals. Additional samples for laboratory testing were collected using split-spoon samplers. According to the findings of this report, the subsurface conditions at the site consist of fine grained alluvial soils that coarsen with depth which overlie a red-brown sandstone. According to the findings of this report, groundwater was encountered as shallow as nine feet below ground surface. The report is presented as an attachment to the report titled “Solid Waste Permit Application, Mosley Road II Sanitary Landfill, Oklahoma City Disposal, Inc., Oklahoma City, Oklahoma,” completed by Waste Management of North America, Inc. in 1986.

1.2.16 1979 Report of Soils Investigation

The report, prepared by Shepherd Engineering Testing Co., Inc., documented the October 1978 advancement of 10 boreholes for geotechnical assessment purposes. This report briefly described the materials encountered in the site borings and provides the results of soil classification and permeability tests that were run on select samples. According to the findings of this report, materials encountered were consistent with alluvium sediments. The report is presented as an attachment of the report titled “Solid Waste Permit Application, Mosley Road II Sanitary Landfill, Oklahoma City Disposal, Inc.,

Oklahoma City, Oklahoma,” completed by Waste Management of North America, Inc. in 1986.

1.3 Data Collection

Table 1-1 presents the lithologic log references. The borehole locations are shown on Figure E-1-2.

1.3.1 Lithologic Sample Logs

Subsurface information obtained during the 2014 and previous site investigations have been used to prepare lithologic sample logs at each borehole location in accordance with 252:515-7-33. The lithologic sample logs are presented in Appendix E-2. Table 1-2 is a summary of the WCG borehole data obtained in the 2014 subsurface investigation. Table 1-3 summarizes the previous subsurface investigations’ borehole data.

**Table 1-1
Lithologic Log References**

Borehole Sets	Reference
MW-28R	Monitoring Well Installation Report MV-28R, East Oak RDF, Oklahoma County, Oklahoma. Prepared for WM by Biggs & Mathews in May 2015.
PWB-1, PWB-2, WB-3, WB-4, PWB-5, WB-6, PWB-7, WB-8, PWB-9, and PWB-10.	Appendix E-2 of this Tier III Permit Modification by WCG in April 2014.
MW-223R1	Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Terracon in July 2011.
Monitor well MW-220R and Gas Probes GP-12, GP-13, GP-14, GP-15, GP-16, and GP-17.	Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Landtec in October 2010.
MW-204R and MW-207R2	
PWB-1-2005, PWB-2-2005, PWB-3-2005, PWB-4-2005, PWB-5-2005, WB-6-2005, WB-7-2005, WB-8-2005, WB-9-2005, WB-10-2005, and WB-MW-226GW	Appendix E-2 of this Tier III Permit Modification by WCG in August 2007.
MW-225A, MW-226GW, MW-208R, MW-221R, and GP-8R	Installation of Decommissioning Monitoring Wells and Gas Probes. Prepared by A&M Engineering and Environmental Services in July 2003.
MW-220, MW-221, MW-223, and MW-207R	Remedial Action Completion Report, 3201 Mosley Road, Oklahoma City, Oklahoma. Prepared for WM by TetraTech in October 1999.
MW-27, MW-28, and MW-29	Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Rust in October 1995
Gas Probes EO-1, EO-2, EO-3, EO-4, EO-5, EO-6, EO-7, EO-8, and EO-9	Installation of Gas-Monitoring Probes, East Oak Landfill and Recycling Center, Oklahoma City, Oklahoma. Prepared for WM by Rust in October 1994.
TH-1-SD, TH-2-SD, TH-3-SD, and TH-4-SD	Subtitle D, Part 258, Subpart B, Location Restriction Demonstrations for East Oak Sanitary Landfill, Oklahoma City, Oklahoma. Prepared for WM by Rust in September 1993.
MW-21R (B-1), MW-22R (B-3), and MW-25R (B-4)	East Oak Sanitary Landfill & Recycling Center, Permit Number 3555036, Minor Amendment to Permit. Prepared by WM in December 1991
MW (BH)-12R, MW (BH)-14R, MW (BH)-201, BH-207, BH-208, MW-209, and MW-211	Final Remedial Investigation Report, Mosley Road Sanitary Landfill, Remedial Investigation/ Feasibility Study Volumes I, II, & III. Prepared for WM by Golder in August 1991.
P-A, P-B, P-C, P-D, and P-E	Report of Geotechnical Investigation for the Mosley Road #2 Landfill Site, Oklahoma City, Oklahoma. Prepared for WM by SETCO In January 1985.
B-1, B-2, B-3, MW-1, MW-2, MW-3, MW-4, and MW-5	Subsurface Exploration Mosley Road II Landfill, Midwest City, Oklahoma. Prepared for WM by Western Technologies, Ltd. in November 1984.

**Table 1-2
2014 Subsurface Investigation Borehole Data**

Borehole	Date Drilled	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation (ft-msl)	Top of Garber-Wellington (ft-msl)	Depth Below Deepest Waste Placement (ft)
PWB-1	5/29/2014	1,147.3	49.0	1,098.3	1,107.3	45.3
PWB-2	5/30/2014	1,146.5	50.0	1,096.5	1,107.5	47.1
WB-3	5/31/2014	1,142.6	40.0	1,102.6	1,103.6	41.0
WB-4	5/28/2014	1,143.4	39.0	1,104.4	1,105.4	39.2
PWB-5	6/5/2014	1,145.0	34.0	1,111.0	1,123.0	32.6
WB-6	6/10/2014	1,139.9	32.0	1,107.9	1,117.9	35.7
PWB-7	6/4/2014	1,144.0	32.0	1,112.0	1,122.0	31.6
WB-8	6/11/2014	1,154.0	100.0	1,054.0	1,123.0	86.6
PWB-9	6/2/2014	1,160.7	50.0	1,110.7	1,124.7	32.9
PWB-10	6/4/2014	1,144.7	35.0	1,109.7	1,122.7	33.9

Note: The deepest placement of expansion area waste is approximately 1,145.5 ft-msl. However, the deepest placement of waste in the existing East Oak RDF is approximately 1,143.6 ft-msl.

**Table 1-3
Previous Subsurface Investigation Borehole Data**

Borehole	Date Drilled	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation (ft-msl)	Top of Garber-Wellington (ft-msl)	Depth Below Deepest Waste Placement (ft)
MW-28R	May-15	1,149.6	34	1,115.6	NE	28.0
MW-223R1	Jun-11	1,152.0	107	1,045.0	1,109.0	98.6
MW-220R	Oct-10	1,147.8	111.5	1,036.3	1,114.8	107.3
GP-12	Oct-10	1,148.1	12.0	1,136.1	NE	NA
GP-13	Oct-10	1,147.5	10.0	1,137.5	NE	NA
GP-14	Oct-10	1,149.6	10.0	1,139.6	NE	NA
GP-15	Oct-10	1,149.0	10.0	1,139.0	NE	NA
GP-16	Oct-10	1,147.9	10.0	1,137.9	NE	NA
GP-17	Oct-10	1,146.3	10.0	1,136.3	NE	NA
MW-207R2	Apr-10	1,149.1	32.0	1,117.1	NE	26.5
MW-204R	Apr-10	1,168.0	40.0	1,121.8	NE	21.8
PWB-1-2005	Dec-05	1,143.5	37.0	1,106.5	1,115.5	37.1
PWB-2-2005	Nov-05	1,149.3	40.0	1,109.3	1,119.8	34.3
MW-201R (PWB-3-2005)	Nov-05	1,147.4	40.2	1,107.2	1,115.4	36.4
PWB-4-2005	Dec-05	1,140.1	33.0	1,107.1	1,117.9	36.5
MW-14R2 (PWB-5-2005)	Nov-05	1,148.0	40.0	1,108.0	1,111.8	35.6
WB-6-2005	Dec-05	1,145.2	34.0	1,111.2	1,113.2	32.4
WB-7-2005	Dec-05	1,139.9	33.0	1,106.9	1,121.4	36.7
WB-8-2005	Dec-05	1,142.4	34.0	1,108.4	1,120.4	35.2
WB-9-2005	Dec-05	1,142.4	44.0	1,098.4	1,119.4	45.2
WB-10-2005	Dec-05	1,146.0	43.0	1,103.0	1,118.0	40.6
MW-220	Feb-05	1159.4	160	999.4	1,120.4	144.2
GP-8R	Jun-03	1,156.1	45.0	1,111.1	NE	32.6
MW-221R	Jun-03	1,158.7	110	1,048.7	1,120.7	94.9
MW-208R	Jun-03	1,158.0	125	1,033.0	1,106.0	110.6
MW-225A	May-03	1,148.6	31.0	1,117.6	NE	26.0
MW-226GW	May-03	1,148.6	115	1,033.6	1,117.6	110.0
MW-207R	Feb-02	1,155.0	34.0	1,121.0	1,121.0	22.6
MW (B)-27	Aug-95	1,156.6	24.0	1,132.6	NE	11.0
MW (B)-28	Aug-95	1,155.0	24.0	1,131.0	NE	12.6
MW (B)-29	Aug-95	1,162.3	31.3	1,131.0	NE	12.6

Notes: NA indicates the borehole was completed above the approximate deepest waste placement elevation (1,143.6 ft-msl) in the existing East Oak RDF.
NE indicates that the Garber-Wellington was not encountered in the boring.

**Table 1-3 (Continued)
Previous Subsurface Investigation Borehole Data**

Borehole	Date Drilled	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation (ft-msl)	Top of Garber-Wellington (ft-msl)	Depth Below Deepest Waste Placement (ft)
MW-221	Feb-95	1,156.3	174	982.3	1,120.8	161.3
MW-222	Feb-95	1,168.3	160	1,008.3	Not noted	135.3
MW-223	Feb-95	1,158.0	160	998.0	1,117.0	145.6
MW-219	Feb-90	1,162.0	28	1,134.0	NE	9.6
EO-01 (GP-1)	Oct-94	1,157.6	14.0	1,143.6	NE	NA
EO-02 (GP-2)	Oct-94	1,156.0	13.5	1,142.5	NE	NA
EO-03 (GP-3)	Oct-94	1,153.4	10.0	1,143.4	NE	NA
EO-04 (GP-4)	Oct-94	1,155.9	12.0	1,143.9	NE	NA
EO-05 (GP-5)	Oct-94	1,155.7	13.5	1,142.2	NE	NA
EO-06 (GP-6)	Oct-94	1,158.3	16.0	1,142.3	NE	NA
EO-07 (GP-7)	Oct-94	1,164.6	22.0	1,142.6	NE	NA
EO-08 (GP-8)	Oct-94	1,158.5	17.0	1,141.5	NE	NA
EO-09 (GP-9)	Oct-94	1,155.1	11.0	1,144.1	NE	NA
TH-1-SD	Sep-93	1,161.0	50.5	1,110.4	1,110.5	33.2
TH-2-SD	Sep-93	1,159.0	47.0	1,112.0	1,112.0	31.6
TH-3-SD	Sep-93	1,153.1	34.0	1,119.1	1,119.1	24.5
TH-4-SD	Sep-93	1,152.0	31.0	1,121.0	1,121.0	22.6
MW-21R (B-1)	Aug-91	1,154.9	35.0	1,119.9	1,121.9	23.7
MW-22R (B-3)	Aug-91	1,149.6	37.0	1,112.6	1,116.1	31.0
MW-25R (B-4)	Aug-91	1,155.8	53.5	1,102.3	1,106.7	41.3
MW-209	Apr-90	1,162.3	78.5	1,083.8	1,119.3	59.8
MW (BH)-14R	Apr-90	1,163.3	45	1,118.3	1,120.3	25.3
MW (BH)-201	Apr-90	1,151.9	34.0	1,117.9	1,120.4	25.7
BH-207	Apr-90	1,154.6	39.5	1,115.1	1,120.6	28.5
BH-208	Apr-90	1,154.5	66	1,088.5	1,118.6	55.1
MW (BH)-11R	Apr-90	1,157.3	38.0	1,120.3	1,121.8	23.3
MW-211	Apr-90	1,163.0	42.0	1,121.0	NE	22.6
MW-204	Apr-90	1,163.7	45.1	1,117.6	1,121.7	25.0
MW-210	Apr-90	1,162.2	45.0	1,117.2	1,121.2	26.4
MW (BH)-12R	Mar-90	1,158.3	39.5	1,118.8	1,122.8	24.8

Notes: NA indicates the borehole was completed above the approximate deepest waste placement elevation (1,143.6 ft-msl) in the existing East Oak RDF.

NE indicates that the Garber-Wellington was not encountered in the boring.

**Table 1-3 (Continued)
Previous Subsurface Investigation Borehole Data**

Borehole	Date Drilled	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation (ft-msl)	Top of Garber-Wellington (ft-msl)	Depth Below Deepest Waste Placement (ft)
P-A	Dec-84	1,157.8	24	1,133.8	NE	9.8
P-B	Dec-84	1,153.0	24	1,129.0	NE	14.6
P-C	Dec-84	1,151.8	24	1,127.8	NE	15.8
P-D	Dec-84	1,158.3	24	1,134.3	NE	9.3
P-E	Dec-84	1,161.6	34	1,127.6	NE	16.0
B-1	Aug-84	1,143.9	50.1	1,093.8	1,101.9	49.8
B-2	Aug-84	1,150.0	48.5	1,101.5	1,110.0	42.1
B-3	Aug-84	1,162.9	50	1,112.9	NE	30.7
MW-1	Aug-84	1,152.0	40	1,121.0	1,114.0	22.6
MW-2	Aug-84	1,148.7	30	1,118.7	NE	24.9
MW-3	Aug-84	1,166.3	50	1,116.3	NE	27.3
MW-4	Aug-84	1,162.8	50	1,112.8	NE	30.8
MW-5	Aug-84	1,149.4	35	1,114.4	1,116.4	29.2

Notes: NA indicates the borehole was completed above the approximate deepest waste placement elevation (1,143.6 ft-msl) in the existing East Oak RDF.
NE indicates that the Garber-Wellington was not encountered in the boring.

1.3.2 Geophysical Logs

Online Logging collected gamma ray and resistivity, dual induction, and compensated density geophysical logs from 4 Mosley Road monitoring well borings (MW-220, MW-221, MW-222, and MW-223) in 1994. WCG collected 6 additional geophysical gamma ray and neutron logs from piezometers PWB-1, PWB-2, PWB-3, PWB-4 and PWB-5, and a pilot boring for MW-226GW in 2005. WCG also collected 7 additional geophysical gamma ray and neutron logs from piezometers PWB-1, PWB-2, PWB-5, PWB-7, PWB-9, PWB-10, and boring WB-8 in 2014. The number of geophysical logs exceeds the OAC 252:515-7-34 requirement of 4 geophysical logs for a 41.4-acre lateral expansion. The geophysical logs are presented in Appendix E-2.

The geophysical logs verify the subsurface characteristics presented in the applicable lithologic logs. They indicate the uppermost aquifer occurs in the Alluvium. A general coarsening downward of the sediments is indicated by the increased porosity noted in the neutron logs in the Alluvium. The geophysical logs indicate the Garber-Wellington is saturated and is largely comprised of dense sandstone with thin, intercalated siltstones.

1.3.3 Soil and Rock Sampling

During the subsurface investigation activities by WCG, RUST, Golder, Shepherd, Western and Cardinal, soil samples were collected for lithologic descriptions and geotechnical characterizations. In accordance with OAC 252:515-7-35, WCG characterized the subsurface using continuous thin-walled Shelby tube samplers inside hollow stem augers from surface to first encountered groundwater (2 to 10 feet below ground surface). Once groundwater was encountered, the borings were advanced using split-spoon samplers until the top of the Garber-Wellington was encountered. Wet rotary, core barrel samples were used to recover continuous core samples from the top of the Garber-Wellington to the total depth of the boring. Previous subsurface investigations used both continuous and regular interval sampling methods.

WCG's lithologic samples were wrapped in plastic and placed in core boxes for storage. The samples were used for lithologic log descriptions and subsequent geotechnical laboratory analyses. The geotechnical assessment of the site is included as Appendix N.

2 REGIONAL HYDROGEOLOGIC STUDY

2.1 Regional Structural Geology

The East Oak RDF is located in the Cherokee Platform geologic structural province. The Platform extends northward into Kansas and is bounded to the east by the Ozark Uplift, to the west Nemaha Uplift, and to the south by the Arbuckle Uplift and Arkoma Basin provinces. The Nemaha Uplift is a regional structural feature that extends from central Oklahoma into southern Nebraska (Lawson and Luza, 1995). The uplift is the result of the sharp uplift of small crustal blocks along the uplift axis during the Pennsylvanian age (Lawson and Luza, 1995). The Arkoma Basin and the Ouachita Uplift are part of a foreland basin/fold-and-thrust belt pair that is located at the Pennsylvanian age, southern margin of the North American craton (Hemish and Sunneson, 1994). Deformation in the pair is the product of southward plunging subduction of the southern margin of Laurentia (Texas, Oklahoma, Arkansas, and Mississippi) beneath Amazonia and their eventual collision (McBee, 1995). The deformation began in Late Mississippian time (about 320 million years before present), peaked in Middle Pennsylvanian time (about 295 million years before present), and largely ended in Early Permian time (about 290 million years before present) (McBee, 1995). The Choctaw fault separates the frontal belt of the Ouachita Uplift (which consists of steeply inclined, imbricate thrust-faulted, and complexly folded strata) from the Arkoma Basin (a structural province characterized by broad, open folds) (Hemish and Sunneson, 1997).

The Cherokee Platform is a gently westward dipping homocline (Wood and Burton 1968), as indicated in Figure E-1-5 (Regional Structural Cross Section). At the eastern edge of the Oklahoma City Quadrangle, the regional dip is to the northwest (Bingham and Moore, 1975). In the central area the regional dip is to the west, while at the western edge the regional dip is to the southwest (Bingham and Moore, 1975). The average regional dip of the rocks in the Cherokee Platform in the Oklahoma City Quadrangle is about 40 feet per mile (Bingham and Moore, 1975).

2.2 Regional Stratigraphy

In the Oklahoma City Quadrangle area of the Cherokee Platform, the dominant sediments are the middle to upper Pennsylvanian-age Desmoinesian, Missourian, Virgilian, and Gearyan series, and Permian-age Cimarronian series. Within a 10-mile radius of the site, the Sumner and Hennessey groups are dominant (Bingham and Moore, 1975). The lithologies of these groups are largely reddish-brown to orange brown sandstones, shales,

and siltstones (Bingham and Moore, 1975). The Sumner Group was deposited in a deltaic environment by east to west flowing streams that extended into western Oklahoma and Texas (Carr and Marcher, 1977). In central Oklahoma County, the Sumner Group is approximately 75 percent sandstone, but to the north and south, the ratio of sandstone to shale decreases as the deltaic deposits interfinger with and grade into marine deposits (Carr and Marcher, 1977). The Sumner Group is comprised, from oldest to youngest, of the Wellington and Garber formations. The Hennessey Group overlies the Sumner Group and is comprised, from oldest to youngest, of the Fairmont Shale, Kingman Siltstone, Salt Plains Formation, and Bison Formation (Bingham and Moore, 1975). Underlying the Sumner Group are the early Permian-age, Chase, Council Grove, and Admire groups, while overlying the Hennessey Group is the Cimarronian-age El Reno Group. The landfill is located on an area of mapped Quaternary alluvium along the North Canadian River (Bingham and Moore, 1975).

2.2.1 Regional Facies – Quaternary Alluvium and Terrace Deposits

The alluvial deposits underlying the landfill consist of sand, silt, clay, and lenticular beds of gravel deposited in the recent flood plain of the North Canadian River (Bingham and Moore, 1975; Stanley and Suneson, 1999). The alluvium is Holocene in age and is located approximately 5 to 10 feet above the modern flood plain of the river (Stanley and Suneson, 1999). According to Stanley and Suneson (1999), the thickness of the alluvium is possibly as much as 50 feet. Bingham and Moore (1975) report the thickness of the alluvium to range from 30 to 100 feet. Pleistocene-age terrace deposits are also located immediately above and adjacent to the modern flood plain of the North Canadian River (Bingham and Moore, 1975; Stanley and Suneson, 1999). The terrace deposits consist of lenticular beds of sand, silt, clay and gravel (Bingham and Moore, 1975). According to Bingham and Moore (1975), the terrace deposits have a thickness of up to 100 feet, but average approximately 50 feet. According to Stanley and Suneson (1999), the terrace deposits have a thickness of up to 20 feet.

2.2.2 Regional Facies – Hennessey Group

The Hennessey Group overlies the Garber Formation and acts as a confining unit for the Garber-Wellington Aquifer where the aquifer is fully saturated (Carr and Marcher, 1977). According to Carr and Marcher (1977), confined conditions due to the Hennessey Group generally begin approximately 4 miles west of the Hennessey-Garber contact outcrop. The Hennessey Group is not present at the landfill, but can be encountered on nearby hilltops to the west (Figure E-1-5). The Hennessey group is described as primarily a reddish-brown shale and siltstone with some thin beds of very fine-grained sandstone (Christenson and Parkhurst, 1987). Stanley and Suneson (1999) describe the Hennessey Group as reddish-brown shale and siltstone with local lenticular beds of fine to very fine-grained sandstone and sandstone conglomerate. Stanley and Suneson (1999) also designate the Hennessey as a formation instead of a group due to the inability to map previous group subdivisions on a regional basis. They do acknowledge that the

Hennessey can be subdivided to the west of the Midwest City area. Thickness of the Hennessey Group is reported to range from 0 to 600 feet (Stanley and Suneson, 1999).

2.2.3 Regional Facies – Garber Formation

The Garber Formation is the youngest formation in the Sumner Group. The formations contacts with the underlying Wellington Formation and overlying Hennessey Group, where present, vary from conformable to gradational (Wood and Burton, 1968; Bingham and Moore, 1975). In the vicinity of the landfill, the Garber Formation is unconformably overlain by Quaternary alluvial and terrace deposits. According to Bingham and Moore (1975), the Garber Formation ranges between 150 to 400 feet or more in thickness in the Oklahoma City Quadrangle.

Stanley and Suneson (1999) describe the Garber Formation as a mostly fine-grained, moderate reddish-brown to moderate red sandstone with some shale and siltstone, and minor conglomerate. According to Stanley and Suneson (1999), the sandstone is locally moderate reddish-brown and grayish-yellow-green banded, with large- and small-scale crossbeds and trough crossbeds. Bingham and Moore (1975) describe the Garber Formation as a fine-grained, red-brown to orange-brown sandstone that is irregularly interbedded with shale, and some chert and conglomerate. Christenson and Parkhurst (1987) describe the Garber Formation as a cross-bedded, friable, fine-grained, predominately quartz sandstone that is interbedded with siltstone and shale.

2.2.4 Regional Facies – Wellington Formation

The Wellington Formation underlies the Garber Formation and is the oldest formation in the Sumner Group. Bingham and Moore (1975) describe the Wellington Formation as red-brown to orange-brown shale and fine-grained sandstone with maroon mudstone and chert conglomerate. Stanley and Suneson (1999) describe the Wellington Formation as a mostly fine to very fine-grained, moderate orange pink to moderate reddish-brown sandstone with siltstone, and minor shale, and conglomerate. According to Stanley and Suneson (1999), the sandstone is locally color banded, with large and small scale crossbeds, and trough crossbeds. According to Bingham and Moore (1975), the Wellington Formation ranges between 150 to 500 feet in thickness in the Oklahoma City Quadrangle.

Regionally, the Garber and Wellington formations have very similar lithologies and can be difficult to distinguish from one another in central Oklahoma (Christenson and Parkhurst, 1987). According to Christenson and Parkhurst (1987), they do not differentiate between the two formations because detecting the subsurface contact between the two is virtually impossible. According to Wood and Burton (1968), the Garber and Wellington formations have similar lithologies and water-bearing characteristics, an absence of fossils and key beds, and are therefore mapped as a single unit in their report. According to Stanley and Suneson (1999), the principle difference between the Garber and Wellington formations is grain size. The Wellington Formation is typically finer grained than the Garber Formation; however, the basal section of the

Garber tends to be finer grained than the upper sections of the Garber (Stanley and Suneson, 1999).

2.3 Water Resources and Regional Groundwater Conditions

In accordance with 252:515-3-54(b)(4), 252:515-3-54(b)(6), and 252:515-3-72, a review of the ODEQ and OWRB online water resource databases was completed in April 2015. The ODEQ surface water intake database indicated the nearest downstream surface water intake located on the North Canadian River is near Henryetta, Oklahoma. The nearest surface water supply intake is 9 miles away on Lake Arcadia. Water resources in the area are supplied from groundwater and surface water sources. The City of Oklahoma City obtains its raw water from the North Canadian River at the Draper, Hefner, and Overholser reservoirs (Oklahoma City website).

The OWRB classifies the landfill vicinity as favorable for development of groundwater supplies. According to the OWRB, the groundwater in this area is present in the Garber-Wellington and alluvial aquifers. According to the Oklahoma Geological Survey's Hydrologic Atlas No. 4, typical Garber-Wellington Aquifer yields are 150 to 300 gallons per minute in the landfill area and less than 50 gallons per minute for alluvial aquifers. The Reconnaissance of Water Resources of the Oklahoma City Quadrangle, Central Oklahoma by Bingham and Moore (1975, reprinted 1991) indicates that there are 6 water wells within 5 miles of the East Oak RDF have been utilized for studies regarding the availability and chemical quality of groundwater. The studies' wells range from 200 to 800 feet in depth and are completed in the Garber-Wellington Aquifer. According to Bingham and Moore, these wells typically yield good quality groundwater. The chemical data from these wells indicates the groundwater has slightly elevated calcium, magnesium, and bicarbonate (relative to other measured constituents). In this area, the Garber-Wellington groundwater typically has a total dissolved solids concentration of less than 300 parts per million.

According to ODEQ and OWRB online databases, water wells are common in the area. According to the ODEQ, 26 public water supply wells are located within approximately two miles of the proposed permit boundary. As indicated on Figure E-1-3, the nearest down Garber groundwater gradient public water supply well (OWRB well ID number OK6005547) is located about 4,000 feet from the landfill. The regional Garber Formation groundwater gradient dips toward the southwest.

The OWRB water well database indicates there are 50 private (domestic) water wells within 1.0 miles of the proposed permit boundary (see Figure E-1-3). The drillers' logs for the wells are included in Appendix E-3. Four of these private water wells are located on the WMO landfill property. According to WMO and the results of a WCG walk over of the property, there are no on-site private water wells. These 4 private water wells have been mislocated in the OWRB database.

3 GROUNDWATER STUDY

3.1 Introduction

This section summarizes the groundwater studies that have been previously completed for the landfill. This Groundwater Study is supported by information from seven existing Subtitle D monitoring wells, four existing remedial investigation monitoring wells, and five piezometers in the immediate vicinity of the proposed expansion area. Logs of these borings and monitoring well/piezometer construction diagrams are presented in Appendices E-2 and E-5. The data collection points used in this Groundwater Study are summarized in Table 3-1.

Table 3-1
Groundwater References for Boreholes, Monitoring Wells, and Piezometers

Boreholes, Monitoring Wells, and Piezometers	Reference
MW-28R	Monitoring Well Installation Report MV-28R, East Oak RDF, Oklahoma County, Oklahoma. Prepared for WM by Biggs & Mathews in May 2015
PWB-1, PWB-2, WB-3, WB-4, PWB-5, WB-6, PWB-7, WB-8, PWB-9, and PWB-10	Appendix E-2 of this Tier III Permit Modification by WCG in April 2014
MW-223R1	Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Terracon in July 2011
MW-220R	Groundwater Monitoring Well Installation Report, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Landtec in December 2010
MW-207R2 and MW-204R	Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Biggs & Mathews in May 2010
PWB-1-2005, PWB-2-2005, PWB-3-2005, PWB-4-2005, PWB-5-2005, WB-6-2005, WB-7-2005, WB-8-2005, WB-9-2005, WB-10-2005, and WB-MW-226GW	Tier III Permit Modification by WCG in August 2007
MW-208R, MW-221R, MW-225A, and MW-226A	Installation and Decommissioning Monitoring Wells and Gas Probes Prepared by A&M Engineering and Environmental Services in July 2003
MW-220, MW-221, MW-223, and MW-207R	Remedial Action Completion Report, 3201 Mosley Road, Oklahoma City, Oklahoma. Prepared for WM by TetraTech, in December 2004
MW-27, MW-28, and MW-29	Installation and Decommissioning Monitoring Wells, East Oak RDF, Oklahoma City, Oklahoma. Prepared for WM by Rust in October 1995

Table 3-1 (Continued)
Groundwater References for Boreholes, Monitoring Wells, and Piezometers

Boreholes, Monitoring Wells, and Piezometers	Reference
TH-1-SD, TH-2-SD, TH-3-SD, and TH-4-SD	Subtitle D, Part 258, Subpart B, Location Restrictions Demonstrations for East Oak Sanitary Landfill, Oklahoma City, Oklahoma. Prepared for WM by Rust in September 1993.
MW-21R (B-1), MW-22R (B-3), and MW-25R (B-4)	East Oak Sanitary Landfill & Recycling Center, Permit Number 3555036, Minor Amendment to Permit. Prepared by WM in December 1991.
MW (BH)-12R, MW (BH)-14R, MW (BH)-201, BH-207, BH-208, MW-209, MW-211, and MW-219	Final Remedial Investigation Report, Mosley Road Sanitary Landfill, Remedial Investigation/ Feasibility Study Volumes I, II, & III. Prepared for WM by Golder in August 1991.
P-A, P-B, P-C, P-D, and P-E	Report of Geotechnical Investigation for the Mosley Road #2 Landfill Site, Oklahoma City, Oklahoma. Prepared for WM by SETCO in January 1985.
B-1, B-2, B-3, MW-1, MW-2, MW-3, MW-4, and MW-5	Subsurface Exploration Mosley Road II Landfill, Midwest City, Oklahoma. Prepared for WM by Western in November 1984.
MW-13R, MW-15R, MW-202, MW-203, MW-205, MW-206, MW-213, MW-215, and MW-216	USEPA 1992 Record of Decision Drawings provided by WM.

3.2 Site Structural Geology

Based on regional structural information, the site is located upon a gentle westward dipping homocline known as the Cherokee Platform. The 2014 borehole observations across the proposed expansion area indicated a local paleotopographic high on the eroded top of the Garber-Wellington. Logs from previous borings indicate that this high trends north-south and extends south onto the Mosley Road Landfill property. The highest reported top of the Garber-Wellington elevation was 1,122.8 feet-msl in MW-12R. In the proposed expansion area borings, the highest observed top of the Garber-Wellington occurred in borings PWB-5 and PWB-8 with observed elevations of 1,123.0 feet-msl. From this local structural high, the upper erosional surface of the Garber-Wellington slopes gently to the west-northwest at approximately 1.17 degrees, and to the east at approximately 0.45 degrees. Figure E-1-5 (Regional Structural Cross Section) is adapted from Stanley and Suneson (1999) and indicates regional geologic dips in the landfill vicinity ranging from approximately 32 to 77 feet per mile to the west.

3.3 Fault Areas

The landfill and the surrounding area were examined by a WCG geologist for the presence of Holocene (last 11,000 years) fault displacements. This included a physical inspection of the site and surrounding area, review of previous fault investigations, available literature and maps, and a current aerial photograph. No unusual Holocene scarps, topographic breaks, vegetation changes, or lineations were interpreted within 200 feet of the site. No structural damage to facilities or surface indications of crude oil and/or natural gas accumulations were observed. No apparent Holocene structural influence of stream courses was observed. In addition, no unusual relief or topographic features, such as sag ponds, truncated alluvial spurs, or offset tributary alignments, were observed. The Tectonic Map of Oklahoma (Arbenz, 1956) indicates no faults within Oklahoma County. In summary, there is no evidence of Holocene faulting within 200 feet of the site.

3.4 Site Stratigraphy

According to Figure E-1-6 – Local Surface Geologic Map (Stanley and Suneson, 1999), the landfill is located upon Holocene-age North Canadian River alluvium deposits. These deposits consist of clay, silt, sand and gravel that have been deposited in channels and on modern floodplains to a reported thickness of up to 40 feet. Unconformably underlying the alluvium deposits is the Permian-age Garber Formation. This contact is not exposed at the surface within the proposed permit boundary (Stanley and Suneson, 1999).

The following hydrostratigraphic units were noted for the Groundwater Study.

3.4.1 Alluvium

WCG's subsurface investigation boreholes penetrated 38 to 40 feet of a dark brown to tan Alluvium at the near surface of the northern expansion area and 22 to 36 feet beneath the southern expansion area. The Alluvium consists primarily of unconsolidated, fine to coarse sand that is angular to subrounded quartz and feldspar grains. Seams of clay, sandy clay, and clay clasts are somewhat common within 10 feet of the ground surface, and are uncommon below 10 feet. The clay seams and clasts are typically soft to firm and plastic. The sandy clay seams are typically hard and slightly plastic to non-plastic. A basal fine to very coarse gravel was encountered immediately above the underlying Garber-Wellington in all of the 2014 subsurface investigation boreholes. The gravel is typically angular to subrounded, quartz and feldspar. Grain size typically ranges from fine to coarse gravel, though some cobble-size grains were encountered. Overall, the Alluvium displayed a fining upwards sequence across the expansion areas. The Alluvium is dry at the surface, becoming saturated at a depth of 3 to 16 feet below the surface. This uppermost saturated zone is unconfined in the expansion areas.

3.4.2 Garber-Wellington

The 2014 site exploration boreholes penetrated 1 to 11 feet of the Garber-Wellington beneath the northern expansion area and 10 to 69 feet beneath the southern expansion area. The Garber-Wellington is continuous beneath the landfill property. These formations consist of reddish-brown or reddish-brown and tan-banded sandstone, siltstone, and mudstone/shale. The sandstone is composed of very fine to fine rounded grains and is often silty and/or clayey. The mudstone/shale is silty and/or sandy and varies from plastic to non-plastic. The upper 6 to 10 feet of this unit is weathered. The siltstone and mudstone/shale in this unit are very moist and saturated. In the upper parts of the Garber-Wellington there are shale beds ranging in thickness from 3 to 10 feet over large areas of the site, (Golder, 1991 and Weaver Boos, 2007). Examples of borings in which these shales exist are PWB-1-2005, PWB-2, PWB-1, MW-213, and MW-215. Though saturated, the Garber-Wellington acts as a lower confining unit to the uppermost Alluvium saturated zone due to its lower hydraulic conductivity. Mean hydraulic conductivities derived from slug test and geotechnical laboratory measurements indicate groundwater travels 138 times faster through the Alluvium than the Garber-Wellington (see Section 3.6.4). None of the 2014 subsurface investigation borings penetrated the entire Garber-Wellington thickness. Previous borings have penetrated as much as 139 feet of the unit. Based on available information, none of the site borings have fully penetrated the Garber-Wellington.

3.5 Piezometer Installations

The piezometer locations are shown on Figure E-1-2. All 6 WCG piezometers installed in 2014 have been surveyed for coordinates by an Oklahoma-licensed surveyor. The as-built survey report is included in Appendix E-7.

3.5.1 WCG Piezometer Installations in 2014

In the WCG 2014 subsurface investigation, 6 piezometers (PWB-1, PWB-2, PWB-5, PWB-7, PWB-9, and PWB-10) were installed in June 2014 in accordance with the ODEQ-approved Drilling Plan. All WCG piezometers were completed in accordance with OWRB piezometer requirements. The 2014 completion details included 2.0-inch Schedule 40 PVC casings, 0.01-inch factory-slotted screens, top and bottom caps, 20-40 mesh filter packs, and bentonite chip annular seals with bentonite grout to surface. In accordance with 252:515-7-53(d), all 2014 piezometers were constructed with 5 to 10-foot-length screens and surface completions to facilitate potential conversion to groundwater monitoring wells.

In June 2014, the piezometers were developed by the driller to remove drilling artifacts. A disposable bailer was used to surge/purge the piezometers. The development continued until the discharge water was colorless.

3.5.2 Previous Piezometer Installations

In the WCG 2005 subsurface investigation, five piezometers (PWB-1-2005, PWB-2-2005, PWB-3-2005, PWB-4-2005, PWB-5-2005) were installed in the northeast expansion area in accordance with the approved Drilling Plan requirements. In December 2005, the piezometers were developed to remove drilling artifacts. A disposable bailer and submersible pump were used to surge/purge the piezometers. The development continued until the discharge water was colorless.

In 1990, Golder installed a number of piezometers in the vicinity of the Mosley Road Landfill as part of a remedial investigation. Piezometers and monitoring wells were located on all sides of the Mosley Road Landfill with some being situated in the present expansion area. Many of these piezometers and monitoring wells were installed as pairs, with one shallow well to monitor the Alluvium and the other deeper well to monitor the Garber-Wellington. Golder collected water level measurements from the piezometers, monitoring wells, and surface water stations between June and November 1990. Several of the piezometers and monitoring wells installed by Golder have been used in this Groundwater Study. However, a number of the piezometers and monitoring wells were located greater than 200 feet from the boundary of the proposed expansion area and were not included in the Groundwater Study data set.

In 1984, Shepherd Engineering installed 5 piezometers in the vicinity of the present limits of East Oak RDF waste. Shepherd Engineering's geotechnical investigation report lacked piezometer construction details and no top of casing or groundwater elevation data was presented. Therefore, these groundwater data have not been used in determining static water levels. The lithologic logs have been used in this subsurface investigation.

In 1984, Western installed 3 observation wells and 5 monitoring wells in the vicinity of the present limits of East Oak RDF waste. Western's subsurface exploration report lacked piezometer construction details and no top of casing or groundwater elevation data was presented. The lithologic logs have been used in the subsurface investigation.

3.6 Groundwater Evaluation

Groundwater elevation, rainfall data, and hydraulic conductivity determinations are included in Tables 3-2 through 3-6.

3.6.1 Groundwater Measurements

Table 3-2 contains the groundwater elevation data obtained during Subtitle D monitoring events from June 1994 through April 2015. In accordance with 252:515-7-54(b), WCG and Biggs & Mathews collected water level measurements from a select monitoring wells and expansion piezometers between June 2014 and April May 2015. ~~WCG and Biggs & Mathews will continue to collect water level measurements and will provide the additional water level measurements to ODEQ at a later date.~~ As required by

252:515-7-54(b), WCG installed a continuous data logger in an expansion area piezometer in June 2014. A barometric logger was also installed to correct water levels for barometric pressure changes. Table 3-3 presents the WCG water level measurements from six WCG piezometers utilized in the groundwater study.

The data from the data loggers is presented as a time series graphs on Figures E-1-18 and E-1-19 – Data Logger Groundwater Elevations. Table 3-4 presents the daily and monthly precipitation data for the last two years as recorded at the Oklahoma City East Weather Station. The weather station is located about 3.5 miles southwest of the landfill and is the closest climatological station.

According to the Oklahoma Climatological Survey (OCS), the average annual rainfall in Oklahoma City over the last 15 years is 30.97 inches. OCS rainfall archives indicate the total rainfall in 2014 was 24.02 inches. The total rainfall in 2013 was 45.57 inches.

**Table 3-2
Groundwater Elevations from Subtitle D Monitoring Events**

Well ->	MW-12R	MW-21R	MW-22R	MW-25R	MW-27	MW-28	MW-29	MW-207R
Installation Date:	3/29/90	8/11/91	8/16/91	8/23/91	8/26/95	8/22/95	8/26/95	2/18/02
3/12/1992	NR	1,144.17	NR	NR	NI	NI	NI	NI
3/13/1992	NR	NR	NR	1,142.67	NI	NI	NI	NI
3/16/1992	NR	NR	1,143.30	NR	NI	NI	NI	NI
6/4/1992	NR	NR	1,143.21	1,142.82	NI	NI	NI	NI
6/5/1992	NR	1,144.19	NR	NR	NI	NI	NI	NI
9/22/1992	NR	NR	NR	NR	NI	NI	NI	NI
9/23/1992	NR	1,145.09	1,144.03	NR	NI	NI	NI	NI
12/14/1992	NR	1,145.28	NR	NR	NI	NI	NI	NI
12/15/1992	NR	NR	1,144.68	1,145.38	NI	NI	NI	NI
2/22/1993	NR	1,145.72	NR	NR	NI	NI	NI	NI
2/23/1993	NR	NR	1,144.93	1,144.79	NI	NI	NI	NI
4/28/1993	NR	1,145.81	1,144.81	1,144.16	NI	NI	NI	NI
8/11/1993	NR	1,146.07	1,146.07	1,143.32	NI	NI	NI	NI
11/10/1993	NR	1,144.80	1,144.37	1,142.23	NI	NI	NI	NI
2/16/1994	NR	1,143.81	1,143.31	1,141.68	NI	NI	NI	NI
5/26/1994	NR	1,144.70	1,144.02	1,142.64	NI	NI	NI	NI
8/17/1994	NR	1,142.96	1,141.99	1,140.23	NI	NI	NI	NI
11/15/1994	NR	1,141.94	1,141.58	1,140.41	NI	NI	NI	NI
3/9/1995	NR	1,142.07	1,141.73	1,140.79	NI	NI	NI	NI
5/9/1995	NR	1,142.66	1,143.26	1,142.67	NI	NI	NI	NI
8/9/1995	NR	1,144.75	1,144.32	1,142.74	NI	NI	NI	NI
10/30/1995	NR	1,143.66	1,142.86	1,141.34	1,141.62	1,141.53	1,141.82	NI
2/14/1996	NR	1,142.76	1,142.22	1,141.02	1,141.08	1,141.16	1,141.34	NI
5/13/1996	NR	NR	NR	NR	1,140.75	1,140.63	1,140.69	NI
8/12/1996	NR	1,142.86	1,143.17	1,142.72	1,143.42	1,142.75	1,142.64	NI
11/11/1996	NR	1,143.31	1,143.27	1,142.79	1,143.23	1,142.98	1,143.10	NI
2/11/1997	NR	1,143.12	1,142.73	1,141.75	1,141.80	1,141.96	1,142.17	NI

NR – Not reported.
NI – Not installed by this event.

**Table 3-2 (Continued)
Groundwater Elevations from Subtitle D Monitoring Events**

Well ->	MW-12R	MW-21R	MW-22R	MW-25R	MW-27	MW-28	MW-29	MW-207R
Installation Date:	3/29/90	8/11/91	8/16/91	8/23/91	8/26/95	8/22/95	8/26/95	2/18/02
5/12/1997	NR	1,143.73	1,143.38	1,142.76	1,142.99	1,142.93	1,143.00	NI
8/19/1997	NR	1,142.81	1,142.19	1,141.06	1,141.22	1,141.42	1,142.08	NI
3/23/1998	NR	1,143.35	1,143.88	1,144.81	1,145.27	1,144.87	1,144.50	NI
8/10/1998	NR	1,142.13	1,140.65	1,139.60	1,139.92	1,139.69	1,139.90	NI
2/25/1999	NR	1,140.88	1,140.18	1,139.89	1,139.96	1,139.94	1,139.97	NI
9/8/1999	NR	1,140.87	1,140.11	1,138.94	1,139.38	1,138.88	1,139.02	NI
2/17/2000	NR	1,140.04	1,139.61	1,138.89	1,139.05	1,138.86	1,138.77	NI
3/13/2001	NR	1,141.44	1,140.86	1,140.61	1,140.74	1,140.78	1,140.73	NI
8/21/2001	NR	1,140.17	1,139.27	1,138.22	1,138.71	1,138.15	1,138.08	NI
3/13/2002	1,140.39	1,139.79	1,139.49	1,138.83	1,138.99	1,138.82	1,138.74	NR
8/20/2002	1,139.45	1,138.84	1,138.41	1,137.29	1,138.14	1,137.18	1,137.54	NR
11/7/2002	1,139.69	NR						
12/12/2002	NR	1,138.55	NR	NR	NR	NR	NR	NR
1/29/2003	1,139.45	1,138.54	1,138.41	1,137.58	1,138.41	1,137.52	1,137.28	1,137.29
4/7/2003	1,139.75	NR	NR	NR	NR	NR	NR	1,137.69
7/11/2003	1,138.85	1,138.31	1,138.21	1,136.93	1,137.44	1,136.68	1,136.48	1,136.55
2/16/2004	1,138.77	NR	1,137.95	1,136.99	1,137.42	1,136.94	1,136.72	1,136.73
9/13/2004	1,140.42	NR	1,139.72	1,138.35	NR	1,138.14	1,138.06	1,138.14
11/17/2004	1,141.00	NR	1,140.16	NR	NR	NR	NR	NR
3/15/2005	1,140.72	NR	1,140.83	1,138.49	1,138.92	1,139.73	1,138.30	1,138.39
5/13/2005	NR	NR	NR	NR	NR	1,137.75	NR	NR
8/29/2005	1,140.15	NR	1,139.71	1,137.87	1,138.54	1,137.67	1,137.60	1,136.91
3/7/2006	1,139.23	NR	1,138.86	1,136.74	1,137.84	1,138.18	1,137.83	1,136.18
8/14/2006	1,139.25	NR	1,140.44	1,136.99	1,137.74	1,137.18	1,137.18	1,136.39

NR – Not reported.

NI – Not installed by this event.

**Table 3-2 (Continued)
Groundwater Elevations from Subtitle D Monitoring Events**

Well ->	MW-12R	MW-14R2 (PWB-5-2005)	MW-21R	MW-22R	MW-25R	MW-27	MW-28	MW-29	MW-201R (PWB-3-2005)	MW-207R	MW-207R2	MW-225A
Installation Date:	3/29/90	11/2005	8/11/91	8/16/91	8/23/91	8/26/95	8/22/95	8/26/95	11/2005	2/18/02		
3/15/2007	1,142.29	NR	NR	1,141.47	1,138.65	1,139.33	1,138.28	1,137.98	NR	1,137.94		
9/25/2007	1,145.81	NR	NR	1,143.59	1,143.01	1,142.88	1,143.58	1,143.80	NR	1,143.99		
3/11/2008	1,145.67	NR	NR	1,143.54	1,143.18	1,143.12	1,143.50	1,143.70	NR	1,143.89		
9/23/2008	1,145.07	NR	NR	1,142.36	1,140.92	1,141.09	1,141.03	1,141.38	NR	1,142.09		
3/9/2009	1,143.85	NR	NR	1,141.07	1,140.01	1,140.07	1,140.08	1,140.13	NR	1,140.26		
10/16/2009	1,144.60	NR	NR	1,142.56	1,141.39	1,141.87	1,141.41	1,141.60	NR	1,141.87		
4/23/2010	1,145.38	NR	NR	1,145.89	1,141.89	1,141.99	1,141.06	1,142.18	NR	1,142.11		
10/1/2010	1,146.39	NR	NR	1,142.71	1,140.77	1,140.97	1,140.97	1,141.18	NR	1,141.57	1141.50	
1/1/2011	NR	NR	NR	NR	NR	1,140.49	NR	NR	NR	1,140.71		
4/1/2011	1,143.97	1,141.74	NR	1,141.01	1,139.59	1,139.89	1,139.65	1,139.63	1,139.59	1,139.93	1140.85	
8/1/2011	NR	1,140.09	NR	NR	NR	NR	NR	NR	1,139.63	NR	1138.80	
10/1/2011	1,141.65	1,141.98	NR	1,139.21	1,138.36	1,138.56	1,138.47	1,138.58	1,138.85	NR	1138.86	1138.54
1/1/2012	NR	1,140.83	NR	NR	NR	NR	1,138.42	NR	1,138.77	NR	1138.43	1138.21
4/1/2012	1,142.07	1,141.10	NR	1,140.04	1,139.36	1,139.50	1,139.48	1,139.38	1,140.05	NR	1139.62	1139.43
7/1/2012	NR	1,140.84	NR	NR	NR	NR	NR	NR	1,138.60	NR	1138.42	
10/1/2012	1,140.52	1,140.36	NR	1,138.73	1,138.07	1,138.14	1,138.48	1,138.15	1,137.70	NR	1138.28	1137.83
1/1/2013	1,139.91	1,139.01	NR	NR	NR	NR	1,137.38	NR	1,137.27	NR	1136.85	
4/1/2013	1,140.54	1,139.73	NR	1,138.81	1,137.99	1,139.80	1,137.13	1,137.55	1,138.15	NR	1136.96	1136.89
10/1/2013	1,143.05	1,141.61	NR	1,142.11	1,141.95	1,144.12	1,138.87	1,137.55	1,141.33	NR	1138.68	1137.70
6/14/2014	1,140.97	1,141.36	NR	1,140.61	1,140.25	1,140.13	1,139.00	1,138.03	1,140.13	NR	1137.76	1137.47
10/22/14	1,140.52	1,140.78	NR	1,139.65	1,138.21	1,138.68	1,138.90	1,137.99	1,140.09	NR	1,137.95	1,137.50
12/23/14	1,140.55	1,139.62	NR	1,139.33	1,138.16	1,138.53	1,137.87	1,137.68	1,139.09	NR	1,137.56	1,137.22
4/30/2015	1,140.70	1,140.09	NR	1,139.86	1,140.27	1,139.71	1,138.48	DRY	1,139.33	NR	1,137.02	1,136.71
Maximum:	1,146.39	1,141.98	1,146.07	1,146.07	1,145.38	1,145.27	1,144.87	1,144.50	1,141.33	1,143.99	1141.50	1139.43
Minimum:	1,138.77	1,139.01	1,138.31	1,137.95	1,136.93	1,137.42	1,136.68	1,136.48	1,137.27	1,136.39	1136.96	1136.85
Range:	7.62	2.97	7.76	8.12	8.45	7.85	8.19	8.02	4.06	7.6	4.54	2.58

NR - Not reported.
 NI - Not installed by this event.
 DRY - No Measurable Groundwater On This Date.

**Table 3-3
WCG Groundwater Elevation Measurements**

Well	6/13/14	7/10/14	8/10/14	9/10/14	10/22/14	11/10/14	12/23/14	1/10/15	2/10/15	3/10/15	4/30/15	5/6/15
MW-29	1,138.05	NM	NM	NM	1,137.99	NM	1,137.68	NM	NM	DRY	DRY	DRY
PWB-1	1,137.39	1,137.95	1,138.78	1,138.04	1,137.92	1,137.92	1,137.59	1,138.27	1,136.87	1,136.47	1,136.32	1,136.56
PWB-2	1,137.65	1,139.04	1,139.55	1,138.83	1,137.81	1,138.68	1,138.41	1,138.73	1,138.18	1,137.79	1,136.94	1,138.33
PWB-5	1,140.65	1,140.46	1,140.66	1,139.90	1,140.07	1,139.72	1,139.67	1,140.36	1,140.36	1,140.14	1,140.17	1,140.39
PWB-7	1,139.69	1,139.49	1,139.52	1,138.20	1,138.76	1,138.13	1,137.90	1,135.17	1,135.13	1,135.02	1,139.57	1,139.35
PWB-9	1,141.61	1,141.25	1,141.38	1,139.92	1,140.46	1,139.82	1,139.85	1,140.59	1,140.60	1,140.50	1,141.37	1,141.31
PWB-10	1141.22	1141.14	1140.84	1138.52	1139.30	1,138.70	1,138.68	1,139.78	1,139.24	1,139.42	1,141.07	1,140.87

Notes: All elevations (in feet) listed above are above the mean sea level (ft-msl).
 NM – Not Measured.
 DRY – No Measurable Groundwater On This Date.

**Table 3-4
Oklahoma City East Weather Station Precipitation Data**

Month	May 2013	June 2013	July 2013	August 2013	Sept. 2013	Oct. 2013	Nov. 2013	Dec. 2013	Jan. 2014	Feb. 2014	March 2014	April 2014	May 2014	June 2014	July 2014	Aug. 2014	Sept. 2014	Oct. 2014	Nov. 2014	Dec. 2014	Jan. 2015	Feb. 2015	March 2015	April 2015	May 2015
Day																									
1	0.07	2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.19	0.00
2	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.00	0.15	0.36	0.00	0.00	0.21	0.00	0.19	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.01	0.13	0.00	0.00	0.00	0.00
4	0.00	0.91	0.00	0.00	0.00	0.54	0.02	0.00	0.00	0.19	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	0.12	0.00	0.00	0.00	0.00	0.00
5	0.00	1.37	0.04	0.00	0.00	0.25	0.58	0.00	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.14	0.31	0.00	0.02	0.00	0.00	0.10	0.04	1.32
6	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.21	0.00	0.55	0.00	0.00	1.17	0.01	0.00	0.01	0.00	0.00	0.00	0.01	5.02
7	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	2.39	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
8	0.52	0.46	0.00	1.77	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.11	1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.08
9	0.14	0.06	0.00	0.20	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.26	3.91	0.61	0.00	0.00	0.00	0.01	0.00	0.00	0.90	0.00	0.40
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.90	0.00	0.00	0.00	0.00	0.01	0.00	0.07
11	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.02	0.00	0.00	0.15	0.00
12	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.06	0.79	0.00	0.00	0.13	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.34	1.41	0.89
14	0.00	0.00	1.55	0.01	0.00	1.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.00	0.00	0.00	0.01	0.00
15	0.58	0.17	1.11	0.23	0.00	0.17	0.05	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79
16	0.08	0.00	1.22	0.11	0.05	0.01	0.02	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.19
17	0.01	0.85	0.27	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.87	0.00	0.00	0.00	0.06	0.33	0.00	0.15	0.00	0.04	0.00
18	0.59	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.04	0.00	0.00	0.12	0.01	0.00
19	0.29	0.00	0.00	0.00	0.38	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	1.06
20	2.37	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
21	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.31	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	NDR	0.89	0.00	0.45	0.00	0.00	0.66	0.54
23	1.14	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.11	0.22	2.22	0.00	0.00	0.00	NDR	0.06	0.00	0.00	0.00	0.00	0.00	3.17
24	0.00	0.00	1.14	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.02	0.15	0.00	0.00	0.00	0.00	NDR	0.00	0.00	0.00	0.14	0.00	0.00	0.56
25	0.00	0.00	0.04	0.00	0.00	0.00	0.07	0.14	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	NDR	0.00	0.00	0.00	0.00	0.56	0.00	0.17
26	0.00	0.00	2.00	0.00	0.00	0.06	0.12	0.16	0.00	0.00	0.35	0.00	0.46	0.00	0.00	0.00	0.00	NDR	0.00	0.00	0.00	0.00	0.00	0.20	0.12
27	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.30	0.70	0.00	0.00	0.00	0.00	NDR	0.00	0.09	0.00	0.00	0.00	2.12	0.08
28	0.00	0.00	0.00	0.00	1.49	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.08	0.00	0.02	0.00	NDR	0.00	0.08	0.00	0.00	0.00	0.03	0.24
29	1.13	0.00	0.22	0.00	0.00	0.27	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.00	ND	0.00	0.00	0.03
30	0.01	0.00	0.59	0.00	0.00	0.06	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	2.04	0.00	0.00	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00
31	5.04	ND	0.00	0.00	ND	0.18	ND	0.00	0.00	ND	0.00	ND	0.01	ND	0.08	0.00	ND	0.00	ND	0.00	0.52	ND	0.84	ND	0.00
Total	12.35	5.87	8.18	3.59	1.98	3.14	1.03	1.03	0.10	0.33	1.89	1.38	4.17	7.03	8.55	0.72	1.62	2.93	2.35	0.81	1.64	0.35	3.49	5.19	16.10

Note:
 ND = Not a calendar date this month.
 NDR= No precipitation data recorded.

3.6.2 Groundwater Contour Maps

A highest measured groundwater contour map is presented in Figure E-1-7. This map represents the highest measured historical groundwater elevations recorded at any Subtitle D monitoring well or piezometer as of April May 2015. The elevations have been contoured for comparison purposes and do not represent a potentiometric surface. As such, no flow direction can be interpreted from these contours. ~~Once additional water level measurements are collected through June 2015, Figure E-1-8 will be updated and provided to ODEQ.~~

Three potentiometric surface maps are presented in this study. Figures E-1-8, E-1-9a, and E-1-9b present the groundwater elevation contours of the potentiometric surface from June 2014, October 2014, and December 2014, respectively.

3.6.3 Horizontal and Vertical Groundwater Flow Directions

Groundwater flow in the shallow Alluvium is typically from the south and southeast toward the north and northwest toward the Canadian River valley which is the dominant hydrogeologic feature in the area (Figures E-1-8 through E-1-9b). During temporary high surface water conditions in the Canadian River normal groundwater flow directions may be temporarily interrupted and on the southeastern part of the site may be temporarily reversed resulting in flow to the east toward Crutch Creek. This temporary flow reversal was identified by Golder, 1991. When groundwater levels return to normal however the normal groundwater flow is to the northwest. The potentiometric surfaces depicted appear to mirror the Garber-Wellington topography. The variations in groundwater flow direction are consistent with historical interpretations by others.

Vertical hydraulic gradients between the alluvial and Garber-Wellington aquifers were calculated based on information collected by Golder in the RI/FS. Vertical gradients ranged between 0.002 ft/ft in the vicinity of MW-14R/MW-203 to 0.18 ft/ft in the vicinity of PZ-109-A3/PZ-107-G. Measurements obtained as part of October 2013 monitoring event identified vertical gradients between the two permeable zones as 0.11 (MW-225A/MW-226GW) to 0.21 (MW-25R-MW-208R). These calculations are based on head differential only and do not take into account seasonal variability based on river stage and local precipitation. However, the data collected during the RI/FS as well as recent data from paired wells represent hydraulic separation between the permeable zones across most if not all of the site.

**Table 3-5
Vertical Groundwater Gradient Computation**

Piezometer	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Cluster Screen Difference ¹ (ft)	Geometric Mean Potentiometric Surface ² (ft msl)	Potentiometric Head Difference ³ (ft)	Vertical Gradient ⁴ (ft/ft)
MW-225A	1134.6	1117.6	54.0	1136.89	9.99	0.185
MW-226GW	1063.6	1033.6		1126.90		

¹ Cluster screen difference is the distance between the bottom of the upper screen (filter pack) and the top of the lower screen (filter pack).

² MW-225A and MW-226GW geometric mean of potentiometric surfaces computed from groundwater gauging data collected between December 2005 and January 2007.

³ Geometric mean potentiometric head difference computed by subtracting geometric mean potentiometric surface of MW-226GW from MW-225A (MW225A – MW-226GW).

⁴ A positive gradient value indicates downward flow.

3.6.4 Permeability of the Stratigraphic Units

In 2014, WCG completed slug tests in the 6 WCG expansion area piezometers. In 2005, WCG completed slug tests in the five WCG piezometers and two existing monitor wells. An In-Situ Pressure Transducer/Data Loggers recorded water level verses time responses. Water level displacements were achieved using new disposable bailers and the groundwater responses to slug withdrawal (rising head) were recorded. Solutions for hydraulic conductivity were obtained using the Bouwer-Rice method in the Aqtesolv[®] aquifer testing computer application. The Aqtesolv[®] reports for each tested 2014 location are presented in Appendix E-4.

As noted in Table 3-6, the computed hydraulic conductivities (K) from the 2014 WCG slug tests in the Alluvium yield a geometric mean K of 2.00×10^{-3} cm/s. WCG slug test data from monitoring well MW-226GW and geotechnical laboratory K measurements indicated a geometric mean K of 2.92×10^{-6} cm/s for the Garber-Wellington. These hydraulic conductivity values are reasonable for the stratigraphic unit materials encountered during the subsurface investigation.

The site's hydraulic gradient measured in June 2014 in the vicinity of monitoring well MW-29 and expansion piezometer PWB-1 (north expansion area) is 0.00093 ft/ft. The hydraulic gradient measured in the vicinity of expansion piezometers PWB-7 and PWB-10 (south expansion area) is 0.0011 ft/ft. These gradients are based on the potentiometric surface presented on Figure E-1-8. The hydraulic gradient between Garber-Wellington monitor wells MW-221R and MW-208R on Figure E-1-20a is 0.0034 ft/ft. An effective porosity in the Garber-Wellington has been estimated at 22 percent (Christenson, Parkhurst, and Breit, 1998) and in the Alluvium at 35 percent (after Driscoll, 1986). In Table 3-6, the linear velocity calculations use a hydraulic gradient of 0.00093 or 0.0011 ft/ft, the hydraulic conductivity values computed from the slug tests

and geotechnical laboratory measurements, and an effective porosity (n_e) of 0.22 or 0.35 (as appropriate) for the screened stratigraphic unit.

The following equation was used to calculate mean linear velocity:

$$V = K * i * 1,034,646 / n_e,$$

Where:

V = mean linear velocity (feet per year)

K = hydraulic conductivity (in cm/s)

i = hydraulic gradient (0.00093 ft/ft or 0.0011 ft/ft)

1,034,646 = scalar to convert from cm/s to feet per year

n_e = effective porosity (0.22) or (0.35)

Using the preceding equation, the mean linear velocities for the site are 5.50 feet per year through the north expansion area Alluvium, 6.50 feet per year through the south expansion area Alluvium, and 0.047 feet per year through the Garber-Wellington. These velocities indicate groundwater flows through the south expansion area Alluvium about 138 times faster than it flows through the Garber-Wellington.

**Table 3-6
Hydraulic Conductivity (K) Measurements**

Alluvium Hydraulic Conductivity		
Location	Hydraulic Conductivity (K) (cm/sec)	Computed Linear Groundwater Velocity (ft/yr)
PWB-1	2.90E-03	8.06
PWB-2	5.75E-03	15.98
PWB-5	4.02E-03	14.26
PWB-7	8.62E-04	3.06
PWB-9	1.07E-03	3.80
PWB-10	6.65E-04	2.36
PWB-1-2005	3.06E-03	8.59
PWB-2-2005	4.66E-03	13.09
PWB-3-2005	1.73E-03	4.89
PWB-4-2005	3.43E-03	9.63
PWB-5-2005	1.08E-03	3.03
MW-225A (2005)	1.10E-03	3.09
Maximum:	5.75E-03	15.98
Minimum:	6.65E-04	2.36
Geometric Mean:	2.00E-03	6.70

Garber-Wellington Hydraulic Conductivity		
Location	Hydraulic Conductivity (K) (cm/sec)	Computed Linear Groundwater Velocity (ft/yr)
PWB-1 ¹	1.10E-05	4.86E-02
PWB-2 ¹	2.70E-07	1.19E-03
PWB-7 ¹	7.10E-07	4.01E-03
PWB-7 ¹	4.70E-07	2.65E-03
WB-8 ¹	1.20E-05	6.77E-02
PWB-9 ¹	5.90E-08	3.33E-04
PWB-10 ¹	5.20E-07	2.93E-03
MW-226GW	2.22E-04	9.81E-01
PWB-2-2005 ¹	3.00E-04	1.33E+00
PWB-4-2005 ¹	8.50E-08	3.76E-04
WB-7-2005 ¹	2.40E-06	1.06E-02
WB-8-2005 ¹	5.40E-04	2.39E+00
WB-9-2005 ¹	1.40E-06	6.19E-03
WB-10-2005 ¹	2.00E-04	8.84E-01
WB-10-2005 ¹	1.30E-08	5.75E-05
Maximum:	5.40E-04	2.39E+00
Minimum:	1.30E-08	5.75E-05
Geometric Mean:	2.92E-06	1.40E-02

Notes ¹ Vertical K values measured by geotechnical laboratory.

3.7 Hydrogeology

Measurements of static groundwater elevations in monitoring wells and subsurface investigation piezometers yield a potentiometric surface that largely indicates groundwater flow from the south and southeast toward to the north and northwest toward the Canadian River valley beneath the site (Figures E-1-8 through E-1-9b). As discussed in Section 3.6.3, during temporary high surface water conditions in the Canadian River normal groundwater flow directions may be temporarily interrupted and on the southeastern part of the site may be temporarily reversed resulting in flow to the east toward Crutch Creek. This temporary flow reversal was identified by Golder, 1991. When groundwater levels return to normal however the normal groundwater flow is to the northwest toward the Canadian River valley.

Subsurface samples from the 2014 site exploration indicate the uppermost saturated zone within the Alluvium extends beneath the entire proposed expansion areas. The poorly consolidated Alluvium lies unconformably upon the eroded paleotopographic surface of the top of the Garber-Wellington. Underlying the Alluvium is a saturated Garber-Wellington that also underlies the entire proposed expansion areas. Field observations and groundwater observations during drilling of the proposed expansion area boreholes indicate the Alluvium's groundwater is unconfined. During drilling of the proposed expansion area boreholes, a siltstone layer was encountered in seven of the ten WCG boreholes at or near the top of the Garber-Wellington. Field observations (e.g., variations in thickness, elevations, lack of continuity) indicate the siltstone layer is not a confining layer and the Garber-Wellington's groundwater is also unconfined. In the upper parts of the Garber-Wellington there are shale beds ranging in thickness from 3 to 10 feet over large areas of the site (Golder, 1991 and Weaver Boos, 2007).

Mean groundwater velocities derived from slug tests and geotechnical laboratory measurements shown in Table 3-6 indicate groundwater flows laterally 138 times faster through the south expansion area Alluvium than it does through the Garber-Wellington. This indicates the uppermost saturated zone in the Alluvium is not only the appropriate unit for detection monitoring because it is immediately beneath the proposed waste cells, but also because it provides the most rapid lateral transport of a potential release to the down gradient detection monitor wells.

Measured groundwater levels also indicated that the potentiometric surface of the Garber-Wellington is typically 10 or more feet above the top of the Garber-Wellington, but is below the Alluvium's potentiometric surface. Previous investigations indicate that the Garber-Wellington consists of sandstone with lenticular beds of mudstone, shale, and siltstone. These beds are intercalated (Wood and Burton, 1968) which provides a tortuous vertical migration pathway for groundwater. Increased friction in the more compacted Garber-Wellington results in a loss of hydraulic head as groundwater moves slowly through the Garber-Wellington. For this reason, the Garber-Wellington's potentiometric surface is above the top of the Garber-Wellington, but below the Alluvium's potentiometric surface.

Recharge to the Alluvium occurs via infiltration of precipitation and surface run-off that accumulates on the unit. The Garber-Wellington recharges via infiltration of precipitation on the outcrop and from downward migration of groundwater from the uppermost saturated zone in the Alluvium.

3.8 Shallow Saturated Zone Investigation

As no perched groundwater zones were observed above the uppermost saturated zone in the Alluvium, no shallow saturated zone investigation was needed.

3.9 Surface Penetration Plugging

Upon approval of the proposed groundwater monitoring system and in accordance with 252:515-7-71(b), all installed piezometers not converted to groundwater monitoring wells will be plugged and abandoned within one year of approval. Plugging reports for WCG borings WB-3, WB-4, WB-6, and WB-8 are presented in Appendix E-8.

4 GROUNDWATER MONITORING

4.1 Existing Groundwater Monitoring Systems

4.1.1 East Oak RDF System

The existing East Oak RDF Subtitle D groundwater monitoring system consists of 9 10 monitor wells. Logs of the East Oak monitoring wells are presented in Appendix E-5. The existing monitoring wells MW-12R and MW-22R are designated up gradient wells that provide background groundwater data that has not been affected by the landfill. The existing, previously designated, downgradient monitoring wells are MW-14R2, MW-25R, MW-27, MW-28R, MW-29, MW201R, MW-207R2, and MW-225A. The down gradient wells provide data regarding groundwater quality after the water has passed beneath the landfill. All of the existing East Oak groundwater monitoring wells are screened across the uppermost saturated zone in the Alluvium, which is continuous beneath the permit boundary area. The locations of the existing East Oak monitoring wells are shown on Figure E-1-20.

4.1.2 Mosley Road Landfill System

The existing Mosley Road monitoring system is comprised of Alluvium monitor well MW-11R and MW-204R. In addition, five existing monitor wells monitor both sites (dual site wells) in the Alluvium. These wells include MW-12R, MW-14R2, MW-201R, MW-207R2, and MW-225A. Monitor wells MW-11R and MW-12R are considered up gradient Alluvium monitor wells. The Garber-Wellington is monitored by seven existing Mosley Road monitor wells including MW-208R, MW-209, MW-220R, MW-221R, MW-222, MW-223R1, and MW-226GW. Monitor wells MW-209 and MW-221R are considered up gradient wells. Former monitoring wells MW-201R, MW-204R, MW-210, and MW-219 are now observation wells that are no longer routinely monitored.

4.2 Proposed Groundwater Sampling and Analysis Plan (GWSAP)

In accordance with 252:515-9-3(a), the proposed GWSAP is submitted as Appendix F in Volume 3.

4.3 Proposed Groundwater Monitoring Systems

The proposed expansion of the East Oak RDF groundwater monitoring system includes the incorporation of the Mosley Road Landfill groundwater monitoring system. As discussed in previous portions of this Tier III Permit Modification, the expansion of the East Oak RDF permit boundary includes the incorporation of the Mosley Road Landfill permit boundary. Therefore, by combining the two landfill permits into one permit, the two groundwater monitoring systems will be combined into one groundwater monitoring system. The groundwater monitoring system will monitor two units – the Alluvium and the Garber-Wellington. These units are described in Section 3.4. The monitoring wells dedicated to each unit are discussed below.

4.3.1 Alluvium

The Alluvium will be monitored by 10 monitoring wells, ~~three~~ 4 upgradient monitoring wells (MW-14R3, MW-22R, ~~and~~ MW-31 (currently PWB-10) and MW-204R, and 7 downgradient wells MW-27, MW-25R, MW-28R, MW-29R1 (currently PWB-1), MW-207R3 (currently PWB-2), MW-225A, and MW-230. The monitoring system's configuration is presented in Figures E-1-20 and E-1-21. Existing monitor wells MW-22R, MW-25R, MW-27, MW-28R, ~~and~~ MW-225A, and MW-204R will remain in-place. Former monitoring wells MW-210 and MW-219 are now observation wells that are no longer routinely monitored and are proposed to be plugged. Monitoring wells MW-201R and ~~MW-204R~~ will be converted into upgradient observation wells and will no longer be monitored.

The following summarizes the proposed groundwater monitoring system changes in the Alluvium:

- In the northern expansion area, existing monitor well MW-29 will be relocated to the subsurface investigation piezometer PWB-1 location and will be named MW-29R1. This piezometer was constructed at the time of installation to meet the OWRB OAC 785:35 and 252:515-7-3 requirements (in anticipation of being converted into a monitor well). This change is necessary due to northern expansion area waste disposal cell construction.
- Also in the northern expansion area, existing monitor well MW-207R2 will be relocated to the subsurface investigation piezometer PWB-2 location and will be named MW-207R3. This piezometer was constructed at the time of installation to meet the OWRB OAC 785:35 and 252:515-7-3 requirements (in anticipation of being converted into a monitor well). This change is necessary due to northern expansion area waste disposal cell construction.
- Also in the expansion area, one monitoring well, MW-230, will be added east of MW-225A. This well will be constructed in accordance with the requirements of OWRB OAC 785:35 and 252:515-7-3.

- Also in the southern expansion area, a new upgradient monitor well MW-31 will be created by converting existing subsurface investigation piezometer PWB-10 to a monitor well. This piezometer was constructed at the time of installation to meet the OWRB OAC 785:35 and 252:15-7-3 requirements (in anticipation of being converted into a monitor well). This addition is necessary to provide a point of compliance in this location.
- Also in the southern expansion area, MW-11R and MW-12R will be decommissioned. This change is necessary due to southern expansion area waste disposal cell construction.
- Due to operational changes on the east side of the landfill, existing monitor well MW-14R2 will be relocated east of its present location and will be named MW-14R3. The new well will be constructed to meet the OWRB OAC 785:35 and 252:515-7-3 requirements.
- Also east of the southern expansion area, MW-210 and MW-219 will be decommissioned. These monitoring wells are currently observation wells and are no longer needed. Therefore, for borrow area operational purposes, they will be decommissioned.

Monitor wells MW-11R, MW-12R, MW-14R2, MW-29, and MW-207R2 and subsurface investigation piezometers PWB-5, PWB-7, and PWB-9 and observation wells MW-210 and MW-219 will be decommissioned in accordance with the requirements of OAC 785:35-11, 252:515-7-3, and 252:515-7-71(b). The construction details of the proposed Alluvium monitoring well system are included in the existing monitor well lithologic logs/construction diagrams in Appendix E-5 and Figure E-1-21.

4.3.2 Garber-Wellington

The Garber Wellington will be monitored by 6-7 monitoring wells. The Supplemental Groundwater Monitoring Program for Effectiveness of Remedy (EOR) in the Garber Wellington Aquifer is included as Attachment F-A of Appendix F. The monitoring system's configuration is presented in Figures E-1-20a and E-1-21. Existing monitoring wells MW-208R, MW-220R, and MW-226GW will remain in-place.

The following summarizes the proposed groundwater monitoring system changes in the Garber-Wellington:

- In the northern expansion area, existing monitor well MW-223R1 will be relocated near existing piezometer PWB-2 (MW-207R3) and will be named MW-223R2. The new well will be constructed to meet the OWRB OAC 785:35

and 252:515-7-3 requirements. This change is necessary due to northern expansion area waste disposal cell construction.

- Also in the southern expansion area, existing monitor well MW-221R will be relocated to the west of its present location. The new well will be screened in the same interval as the original well and will be named MW-221R2. The new well will be constructed to meet the OWRB OAC 785:35 and 252:515-7-3 requirements. This change is necessary due to southern expansion area waste disposal cell construction.
- Also east of the southern expansion area, MW-209 will be decommissioned. This upgradient well is unnecessary based on the installation of MW-221R2 and is no longer needed. Therefore, for borrow area operational purposes, it will be decommissioned.
- Also, on the east side of the facility, existing monitoring well MW-222 will be relocated near GP-19 and will be named MW-222R. The new well will be constructed to meet the OWRB OAC 785:35 and 252:515-7-3 requirements. This change is necessary due to proposed road improvements. These proposed improvements are to allow access to the southern expansion area.
- Also, in the northwest corner of the facility, one monitoring well, MW-32GW, will be added near MW-28R. The new well will be constructed to meet the OWRB OAC 785:35 and 252:515-7-3 requirements.

Monitoring wells MW-221R, MW-222 and MW-223R1 and observation well MW-209 will be decommissioned in accordance with requirements of OAC 785:35-11, 252:515-7-7 and 252:515-7-71(b). The construction details of the proposed Garber Wellington monitoring well system are included in the existing monitoring well lithologic logs/construction diagrams in Appendix E-5 and Figure E-1-21.

4.3.3 Site-Specific Design Considerations

A review of previous site characterization information was conducted to determine the number, spacing, and depths of the proposed groundwater monitoring system. The facility will install the proposed expanded Subtitle D monitoring system following ODEQ approval of the Tier III Permit Modification. The following items have been considered in the selection of groundwater monitoring well locations:

- The hydrogeologic characteristics of the facility and surrounding area have been discussed and evaluated in Sections 2 and 3.
- The quantity, quality, and direction and flow rate of groundwater have been discussed and evaluated in Sections 2 and 3.

- As noted in Section 2.3, the City of Oklahoma City provides municipal water resources for the East Oak RDF.
- The proposed groundwater monitoring systems are consistent with the previously installed systems and are, therefore, protective of health, safety, and the environment.

4.4 ODEQ Approval

The proposed expansion of the East Oak RDF groundwater monitoring system will commence following ODEQ approval of the Tier III Permit Modification. The existing piezometers not converted to groundwater monitoring wells will be plugged and abandoned in accordance with 252:515-7-3.

4.5 Performance Levels

The groundwater monitoring wells have been, and will continue to be, operated and maintained such that they perform to their design specifications throughout the life of the groundwater monitoring program and the post-closure period.

5 REFERENCES

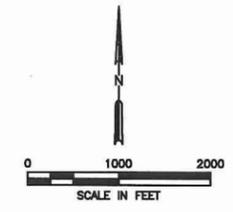
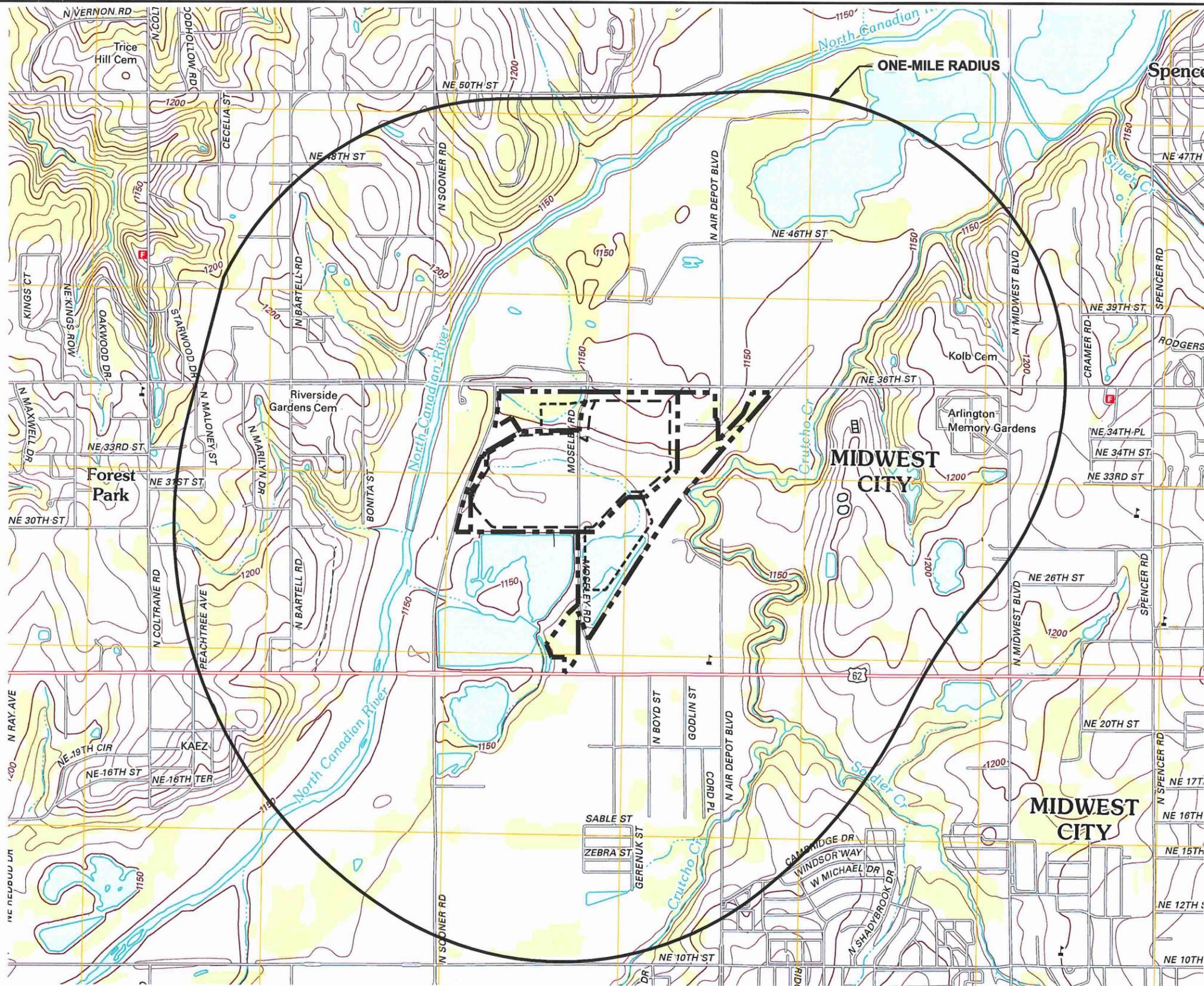
- Arbenz, J. K., 1956, Tectonic Map of Oklahoma, Showing Surface Structural Features. Oklahoma Geological Survey.
- Bingham, R. H. and Moore, R. L., 1975, Reconnaissance of the Water Resources of the Oklahoma City Quadrangle, Central Oklahoma. Oklahoma Geological Survey (revised 1991).
- Carr, J. E. and Marcher, M. V., 1977, A Preliminary Appraisal of the Garber-Wellington Aquifer, Southern Logan and Northern Oklahoma Counties, Oklahoma. United States Geological Survey, Open File Report 77-238.
- Christenson, S. C., Morton, R. B., and Mesander, B. A., 1992, Hydrogeologic Maps of the Central Oklahoma Aquifer, Oklahoma. United States Geological Survey.
- Christenson, S. C. and Parkhurst, D. L., 1987 Ground-Water Quality Assessment of the Central Oklahoma Aquifer, Oklahoma. United States Geological Survey, Open File Report 87-235.
- Driscoll, F. G., 1986 reprinted 1995 Groundwater and Wells, Second Edition. U.S. Filter/Johnson Screens, St. Paul, Minneapolis 55112.
- Golder Associates Inc., 1991, Final Remedial Investigation Report, Mosley Road Landfill RI/FS.
- Johnson, K. S., 1983, Maps showing Principal Ground-Water Resources and Recharge Areas in Oklahoma. Oklahoma State Department of Health (reprinted 1993).
- Lawson, J. L., Jr., and Luza, K. L., 1995, Oklahoma Earthquake Catalog. Oklahoma Geological Survey, Map GM-35.
- Mogg, J. L., Schoff, S. L., and Reed, E. W., 1960, Ground Water Resources of Canadian County, Oklahoma. Oklahoma Geological Survey, Bulletin 87.
- Parkhurst, D. L., Christenson, S., and Breit, G. N., 1992, Ground-water quality assessment of the Central Oklahoma Aquifer, Oklahoma: Geochemical and geohydrologic investigations. United States Geological Survey, Open File Report 92-642.

- Stanley, T. M. and Suneson, N. H., 1999, Geologic Map of the Midwest City and Choctaw 7.5' Quadrangles, Oklahoma and Cleveland Counties, Oklahoma. Oklahoma Geological Survey, Open File Report 4-2000.
- Stanley, T. M. and Suneson, N. H., 1999, Geologic Map of the Spencer and Jones 7.5' Quadrangles, Oklahoma County, Oklahoma. Oklahoma Geological Survey, Open File Report 3-99.
- Tetra Tech EM, Inc., 1998, Groundwater Monitoring Plan – Mosley Road Sanitary Landfill, modified by Waste Management of Oklahoma, Inc., March 2003.
- Weight, W. D., and Sonderegger, J. L., 2001, Manual of Applied Field Hydrogeology, McGraw-Hill.
- Wood, P. R., and Burton, L. C., 1968, Ground-Water Resources Cleveland and Oklahoma Counties. Oklahoma Geological Survey, Circular 71.

APPENDIX E-1

FIGURES

Includes pages E-1-1 through E-1-21



LEGEND

- EXISTING PERMIT BOUNDARY
- PROPOSED PERMIT BOUNDARY
- EXISTING LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- BUILDING OR RESIDENCE

SPENCER, OK
2012

MIDWEST CITY, OK
2012

NOTES:

1. ADAPTED FROM USGS 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP (SPENCER AND MIDWEST CITY, OKLAHOMA, 2012).
2. THE MAP AREA SHOWN IS WITHIN TOWNSHIP 12 NORTH, RANGE 2 WEST.
3. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY LEMKE LAND SURVEYING, INC.

<input type="checkbox"/> DRAFT	PREPARED FOR
<input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY	WASTE MANAGEMENT OF OKLAHOMA, INC.
<input type="checkbox"/> ISSUED FOR CONSTRUCTION	
DATE: 06/2015	DRAWN BY: VRS
FILE: 0086-356-11	DESIGN BY: RSF
CAD: E-1-1 QUAD TOPO.DWG	REVIEWED BY: JVK
Weaver Consultants Group CA 3804 PE-06/30/2015	

REVISIONS		
NO.	DATE	DESCRIPTION

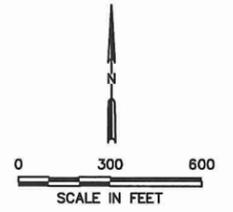
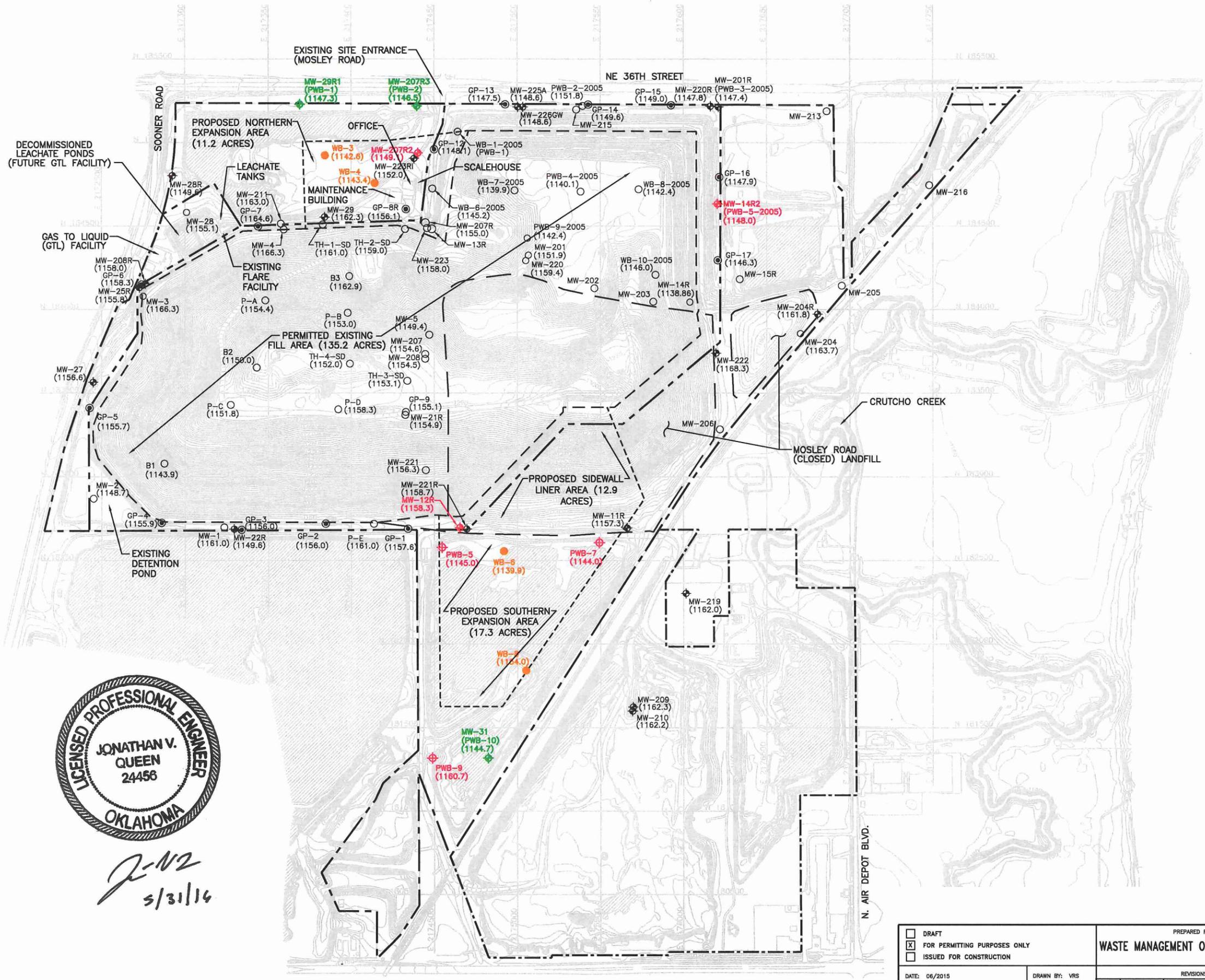
**TIER III PERMIT MODIFICATION
QUADRANGLE TOPOGRAPHIC MAP**

EAST OAK RDF
OKLAHOMA COUNTY, OKLAHOMA

WWW.WCGRP.COM **FIGURE E-1-1**

0:\0086\356\EXPANSION 2013\APPENDIX E\F-1-1 USGS QUAD.dwg, uecholomu, 1:2

O:\0086\356\EXPANSION 2013\APPENDIX E-1-2 BOREHOLE LOCATION MAP.dwg, r.morris, 1:2



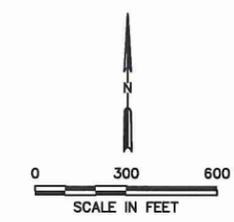
- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE
 - N 183000 STATE PLANE GRID COORDINATE
 - EXISTING CONTOUR
 - ◆ MW-27 (1156.5) EXISTING GROUNDWATER/OBSERVATION MONITORING WELL (SURFACE ELEVATION IN FT-MSL)
 - GP-15 (1149.0) EXISTING LANDFILL GAS PROBE BOREHOLE (SURFACE ELEVATION IN FT-MSL)
 - B1 (1143.9) BOREHOLE/GROUNDWATER WELL/GAS PROBE PREVIOUSLY PLUGGED OR ABANDONED (SURFACE ELEVATION IN FT-MSL)
 - ◆ MW-207R2 (1149.1) EXISTING GROUNDWATER MONITORING WELL (TO BE ABANDONED) (APPROX. SURFACE ELEVATION IN FT-MSL)
 - ◆ PWB-7 (1144.0) 2014 SOIL BORING AND PIEZOMETER LOCATION (TO BE ABANDONED) (APPROX. SURFACE ELEVATION IN FT-MSL)
 - WB-6 (1139.9) 2014 SOIL BORING LOCATION (ABANDONED) (APPROX. SURFACE ELEVATION IN FT-MSL)
 - ◆ MW-31 (PWB-10) (1144.7) 2014 SOIL BORING, PIEZOMETER, AND PROPOSED GROUNDWATER WELL LOCATION (APPROX. SURFACE ELEVATION IN FT-MSL)

- NOTES:**
1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.
 2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY LEMKE LAND SURVEYING, INC.
 3. PERMITTED LIMITS OF WASTE AND MOSLEY ROAD LANDFILL (CLOSED LANDFILL) LIMITS OF WASTE PROVIDED BY WASTE MANAGEMENT OF OKLAHOMA, INC.
 4. SURFACE ELEVATION FOR GROUNDWATER MONITORING WELLS/LANDFILL GAS PROBES/BORINGS BASED ON HISTORIC BORING LOGS AND/OR CURRENT SURVEY DATA. PRESENT SURFACE ELEVATIONS MAY VARY FROM HISTORICAL ELEVATIONS DUE TO CONSTRUCTION ACTIVITIES.
 5. LOCATIONS FOR MONITOR WELLS MW-13R, MW-15R, MW-202, MW-203, MW-205, MW-206, MW-213, MW-215, AND MW-216 WERE DIGITIZED FROM USEPA 1992 RECORD OF DECISION DRAWINGS PROVIDED BY WMO. BOREHOLE LOGS OR CONSTRUCTION DETAILS WERE UNAVAILABLE IN WMO RECORDS.



J-V2
5/31/14

<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.	TIER III PERMIT MODIFICATION BOREHOLE LOCATION MAP							
DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-2 BOREHOLE MAP.DWG	DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVQ	REVISIONS <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">NO.</th> <th style="width: 10%;">DATE</th> <th style="width: 85%;">DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">05/2016</td> <td>REVISED WELL LAYOUT</td> </tr> </tbody> </table>		NO.	DATE	DESCRIPTION	1	05/2016	REVISED WELL LAYOUT
NO.	DATE	DESCRIPTION							
1	05/2016	REVISED WELL LAYOUT							
Weaver Consultants Group CA 3804 PE - 06/30/2015		WWW.WCGRP.COM	FIGURE E-1-2						



- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE
 - STATE PLANE GRID COORDINATE
 - EXISTING CONTOUR
 - 1140 --- APPROXIMATE HIGHEST MEASURED GROUNDWATER ELEVATION CONTOUR IN FT-MSL (SEE NOTE 6)
 - ◆ MW-225A (1139.43) EXISTING GROUNDWATER MONITORING WELL (APPROXIMATE GROUNDWATER ELEVATION IN FT-MSL) (SEE NOTE 5)
 - MW-207R (1143.99) GROUNDWATER WELL PREVIOUSLY PLUGGED OR ABANDONED (APPROXIMATE GROUNDWATER ELEVATION FT-MSL) (SEE NOTE 5)
 - ◆ MW-207R2 (1149.50) EXISTING GROUNDWATER MONITORING WELL (TO BE ABANDONED) (APPROXIMATE GROUNDWATER ELEVATION IN FT-MSL) (SEE NOTE 5)
 - ◆ PWB-7 (1139.69) 2014 PIEZOMETER LOCATION (TO BE ABANDONED) (APPROXIMATE GROUNDWATER ELEVATION IN FT-MSL) (SEE NOTE 4 AND 5)
 - ◆ MW-31 (PWB-10) (1141.22) 2014 PIEZOMETER AND PROPOSED GROUNDWATER WELL LOCATION (APPROXIMATE GROUNDWATER ELEVATION IN FT-MSL) (SEE NOTE 4 AND 5)

- NOTES:**
- EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.
 - PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY LEMKE LAND SURVEYING, INC.
 - PERMITTED LIMITS OF WASTE AND MOSLEY ROAD LANDFILL (CLOSED LANDFILL) LIMITS OF WASTE PROVIDED BY WASTE MANAGEMENT OF OKLAHOMA, INC.
 - HIGHEST MEASURED GROUNDWATER ELEVATIONS FROM GROUNDWATER LEVEL MEASUREMENTS TAKEN FROM JUNE 2014 TO MAY 2015.
 - MAXIMUM HISTORICAL GROUNDWATER ELEVATION MEASUREMENTS POSTED IN FT-MSL. CONTOURS SHOWN FOR MAXIMUM GROUNDWATER ELEVATION COMPARISONS AND DO NOT REPRESENT A POTENTIOMETRIC SURFACE. AS SUCH, NO FLOW DIRECTION CAN BE INTERPOLATED FROM THESE CONTOURS.
 - THIS MAP REPRESENTS THE HIGHEST MEASURED HISTORICAL GROUNDWATER ELEVATIONS RECORDED AT ANY SUBTITLE D MONITORING WELL OR PIEZOMETER AS OF APRIL 2015. THE ELEVATIONS HAVE BEEN CONTOURED FOR COMPARISON PURPOSES AND DO NOT REPRESENT A POTENTIOMETRIC SURFACE. AS SUCH, NO FLOW DIRECTION CAN BE INTERPRETED FROM THESE CONTOURS.

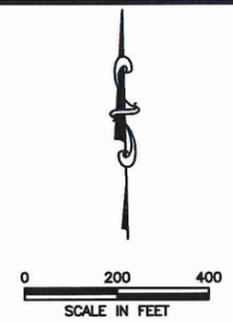
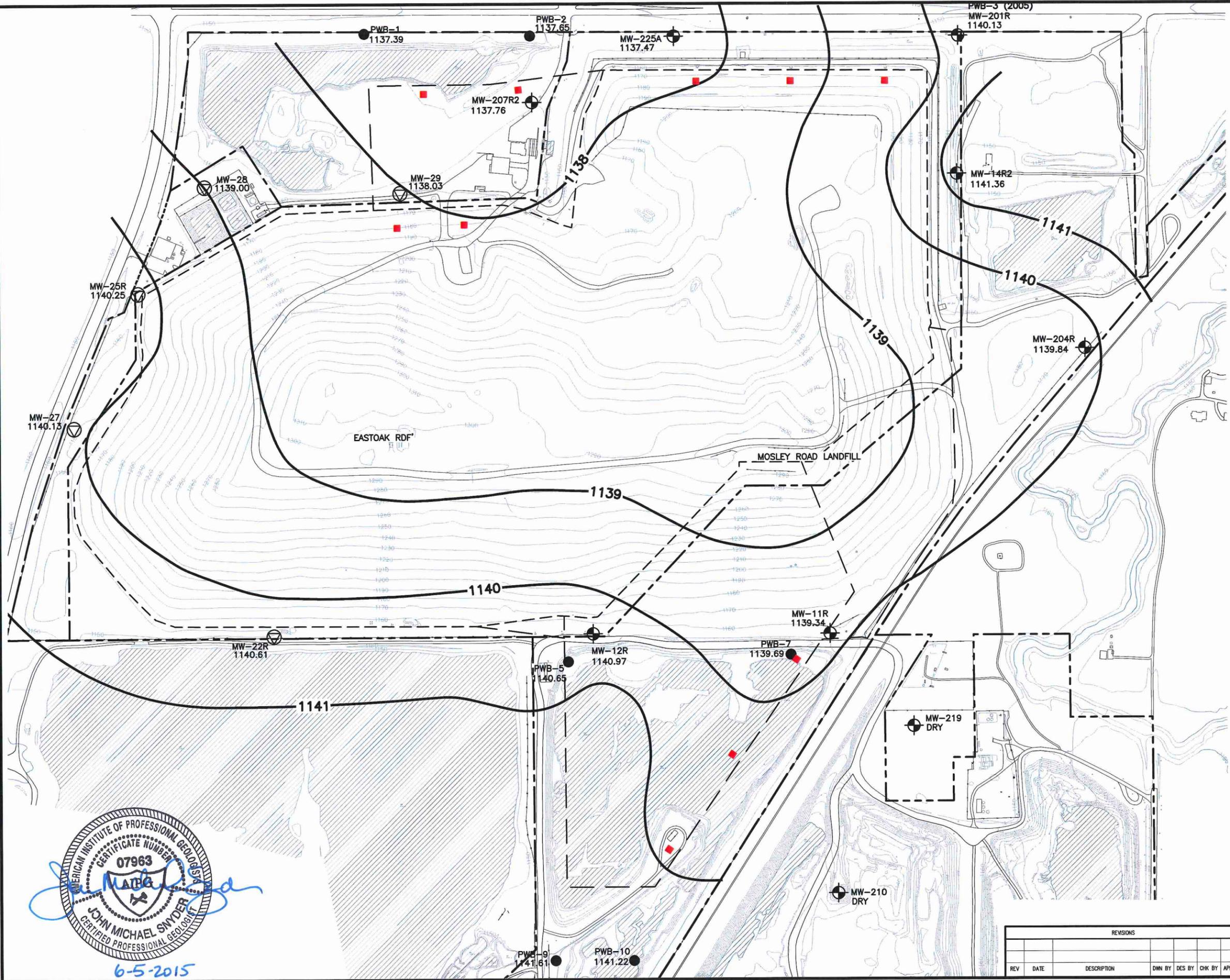
Highest Measured Groundwater Information
(See Note 6)

MW/PWB ID	Elev.	Date
MW-29R (PWB-1)	1138.78	8/10/14
MW-207R3 (PWB-2)	1139.55	8/10/14
MW-225A	1139.43	4/1/12
MW-207R2	1141.50	10/1/10
MW-28	1144.87	3/23/98
MW-29	1144.50	3/23/98
MW-207R	1143.99	9/25/07
PWB-5	1140.66	8/10/14
PWB-7	1139.69	6/13/14
PWB-9	1141.61	6/13/14
MW-31 (PWB-10)	1141.22	6/13/14

<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.	TIER III PERMIT MODIFICATION HIGHEST MEASURED GROUNDWATER ELEVATION CONTOUR MAP							
	DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-7-HIGHEST GW.dwg	DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVQ	EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA						
Weaver Consultants Group CA 3804 PE - 06/30/2017		REVISIONS <table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>01/2016</td> <td>ADDED MW-207R TO TABLE</td> </tr> </tbody> </table>	NO.	DATE	DESCRIPTION	1	01/2016	ADDED MW-207R TO TABLE	WWW.WCGRP.COM FIGURE E-1-7
NO.	DATE	DESCRIPTION							
1	01/2016	ADDED MW-207R TO TABLE							

O:\0086\356\EXPANSION 2013\APPENDIX E\E-1-7 HIGHEST GROUNDWATER.dwg, r.morr.is, 1:2

J:\101\103\Potent 06-14.dwg Layout: Layout1 User: bboles



- LEGEND**
- Existing Permit Boundary
 - - - Proposed Permit Boundary
 - Existing Limits of Waste
 - - - Proposed Limits of Waste
 - MW-29 East Oak RDF Groundwater Monitoring Well
 - MW-219 Mosley Rd LF Groundwater Monitoring Well
 - PWB-1 2014 PIEZOMETERS
 - 1138 Alluvial Groundwater Contour (dashed where inferred)
 - LCS SUMP
- GROUNDWATER CONTOUR INTERVAL - 1'

NOTE:

- EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.



**JUNE 2014 POTENTIOMETRIC MAP
ALLUVIAL WELLS**

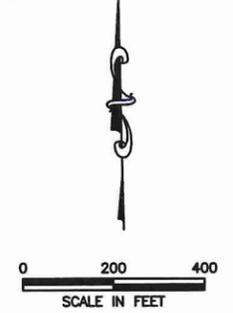
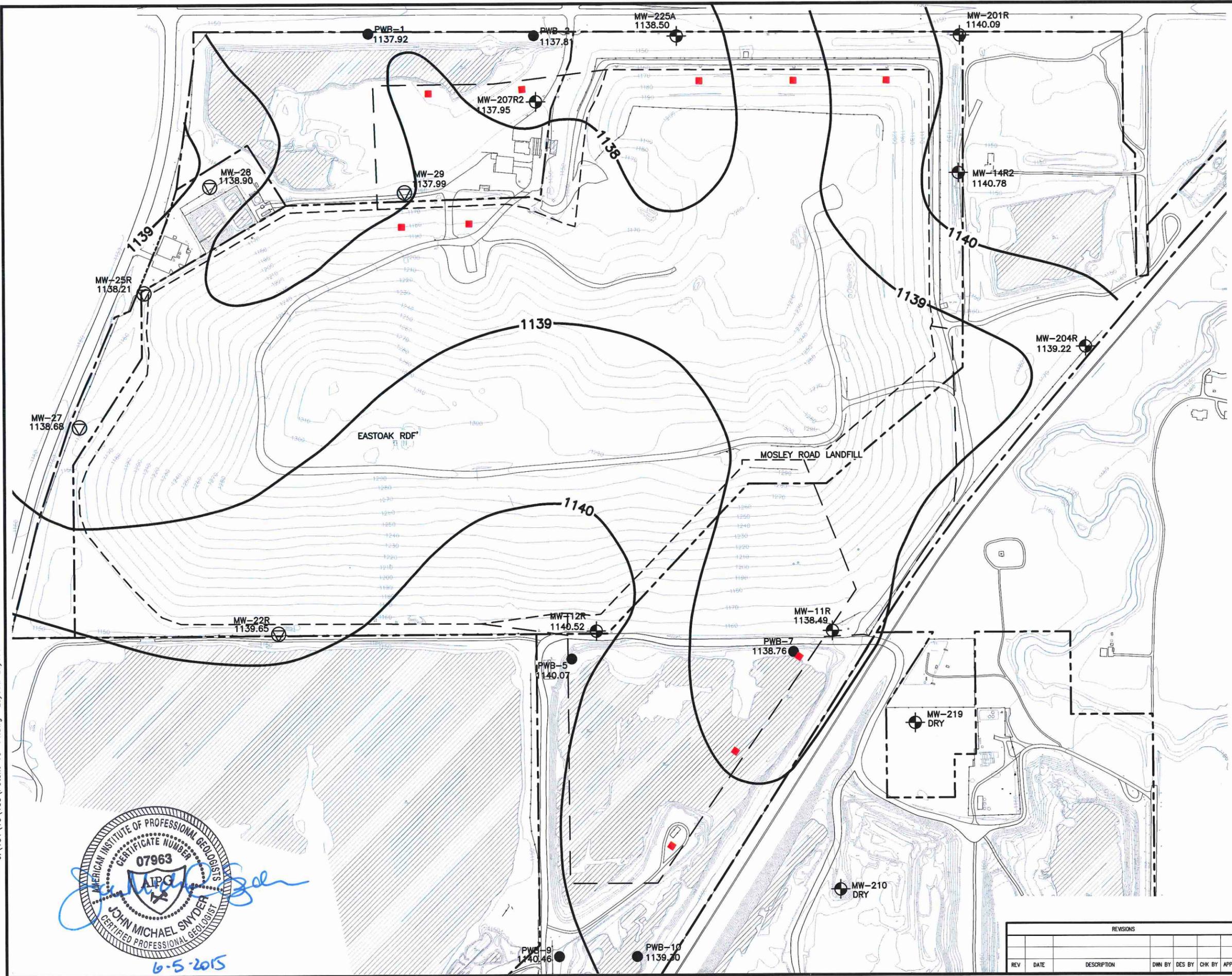
WM
**EAST OAK / MOSELY ROAD
WASTE MANAGEMENT OF OKLAHOMA
MAJOR PERMIT AMENDMENT**

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS			
REV	DATE	DESCRIPTION	

DSN. ESF	DATE : 06/15	FIGURE
DWN. BBB	SCALE : GRAPHIC	E-1-8
CHK. EAS	DWG : Potent 06-14.dwg	

J:\101\10\103\Potent 10-14.dwg Layout: Layout1 User: bboles



- LEGEND**
- Existing Permit Boundary
 - Proposed Permit Boundary
 - Existing Limits of Waste
 - Proposed Limits of Waste
 - MW-29 East Oak RDF Groundwater Monitoring Well
 - MW-219 Mosley Rd LF Groundwater Monitoring Well
 - PWB-1 2014 PIEZOMETERS
 - 1138 Alluvial Groundwater Contour (dashed where inferred)
 - LCS SUMP
- GROUNDWATER CONTOUR INTERVAL - 1'

NOTE:

- EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.



OCTOBER 2014 POTENTIOMETRIC MAP ALLUVIAL WELLS

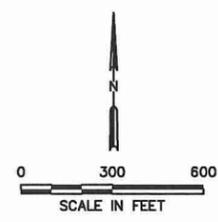
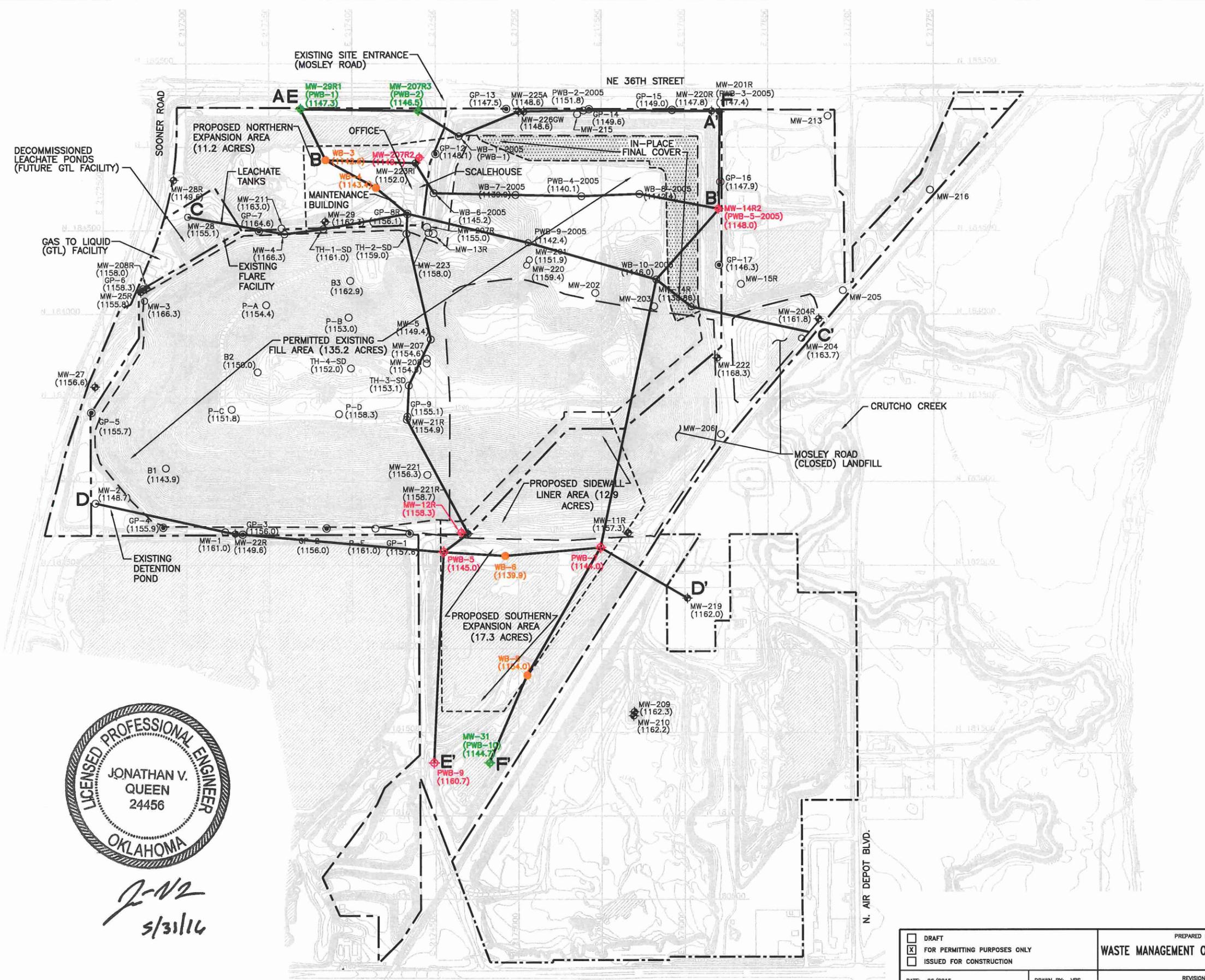
WM
EAST OAK / MOSELY ROAD
WASTE MANAGEMENT OF OKLAHOMA
MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS
ENVIRONMENTAL
 CONSULTING ENGINEERS
 6031 I-20 WEST, SUITE 242
 ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. ESF	DATE : 06/15	FIGURE E-1-9a
DWN. BBB	SCALE : GRAPHIC	
CHK. EAS	DWG : Potent 10-14.dwg	

O:\0086\356\EXPANSION 2013\APPENDIX E-E-1-10 CROSS SECTION LOCATIONS.dwg, r.morris, 1:2



- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE
 - STATE PLANE GRID COORDINATE
 - EXISTING CONTOUR
 - ⊕ MW-27 (1156.6) EXISTING GROUNDWATER MONITORING WELL (SURFACE ELEVATION IN FT-MSL)
 - ⊙ GP-15 (1149.0) EXISTING LANDFILL GAS PROBE BOREHOLE (SURFACE ELEVATION IN FT-MSL)
 - B1 (1143.9) BOREHOLE/GROUNDWATER WELL/GAS PROBE PREVIOUSLY PLUGGED OR ABANDONED (SURFACE ELEVATION IN FT-MSL)
 - ⊕ MW-207R2 (1149.1) EXISTING GROUNDWATER MONITORING WELL (TO BE ABANDONED) (APPROX. SURFACE ELEVATION IN FT-MSL)
 - ⊕ PWB-7 (1144.0) 2014 SOIL BORING AND PIEZOMETER LOCATION (TO BE ABANDONED) (APPROX. SURFACE ELEVATION IN FT-MSL)
 - WB-6 (1139.9) 2014 SOIL BORING LOCATION (ABANDONED) (APPROX. SURFACE ELEVATION IN FT-MSL)
 - ⊕ MW-31 (PWB-10) (1144.7) 2014 SOIL BORING, PIEZOMETER, AND PROPOSED GROUNDWATER WELL LOCATION (APPROX. SURFACE ELEVATION IN FT-MSL)
 - A-----A' GEOLOGIC CROSS SECTION LOCATION

- NOTES:**
1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.
 2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY LEMKE LAND SURVEYING, INC.
 3. PERMITTED LIMITS OF WASTE AND MOSLEY ROAD LANDFILL (CLOSED LANDFILL) LIMITS OF WASTE PROVIDED BY WASTE MANAGEMENT OF OKLAHOMA, INC.
 4. SURFACE ELEVATION FOR GROUNDWATER MONITORING WELLS/LANDFILL GAS PROBES/BORINGS BASED ON HISTORIC BORING LOGS AND/OR CURRENT SURVEY DATA. PRESENT SURFACE ELEVATIONS MAY VARY FROM HISTORICAL ELEVATIONS DUE TO CONSTRUCTION ACTIVITIES.
 5. LOCATIONS FOR MONITOR WELLS MW-13R, MW-15R, MW-202, MW-203, MW-205, MW-206, MW-213, MW-215, AND MW-216 WERE DIGITIZED FROM USEPA 1992 RECORD OF DECISION DRAWINGS PROVIDED BY WMO. BOREHOLE LOGS OR CONSTRUCTION DETAILS WERE UNAVAILABLE IN WMO RECORDS.



J-VQ
5/31/14

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DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-10 SEC. LOCATIONS.DWG	DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JWQ	

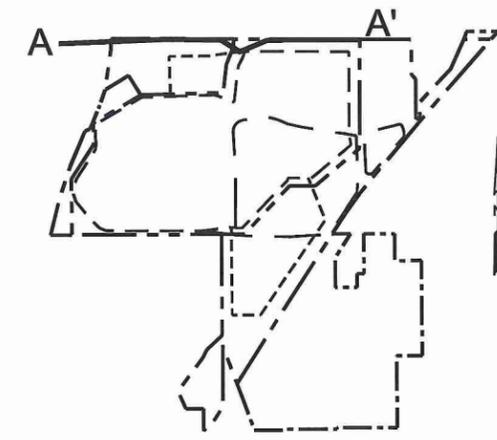
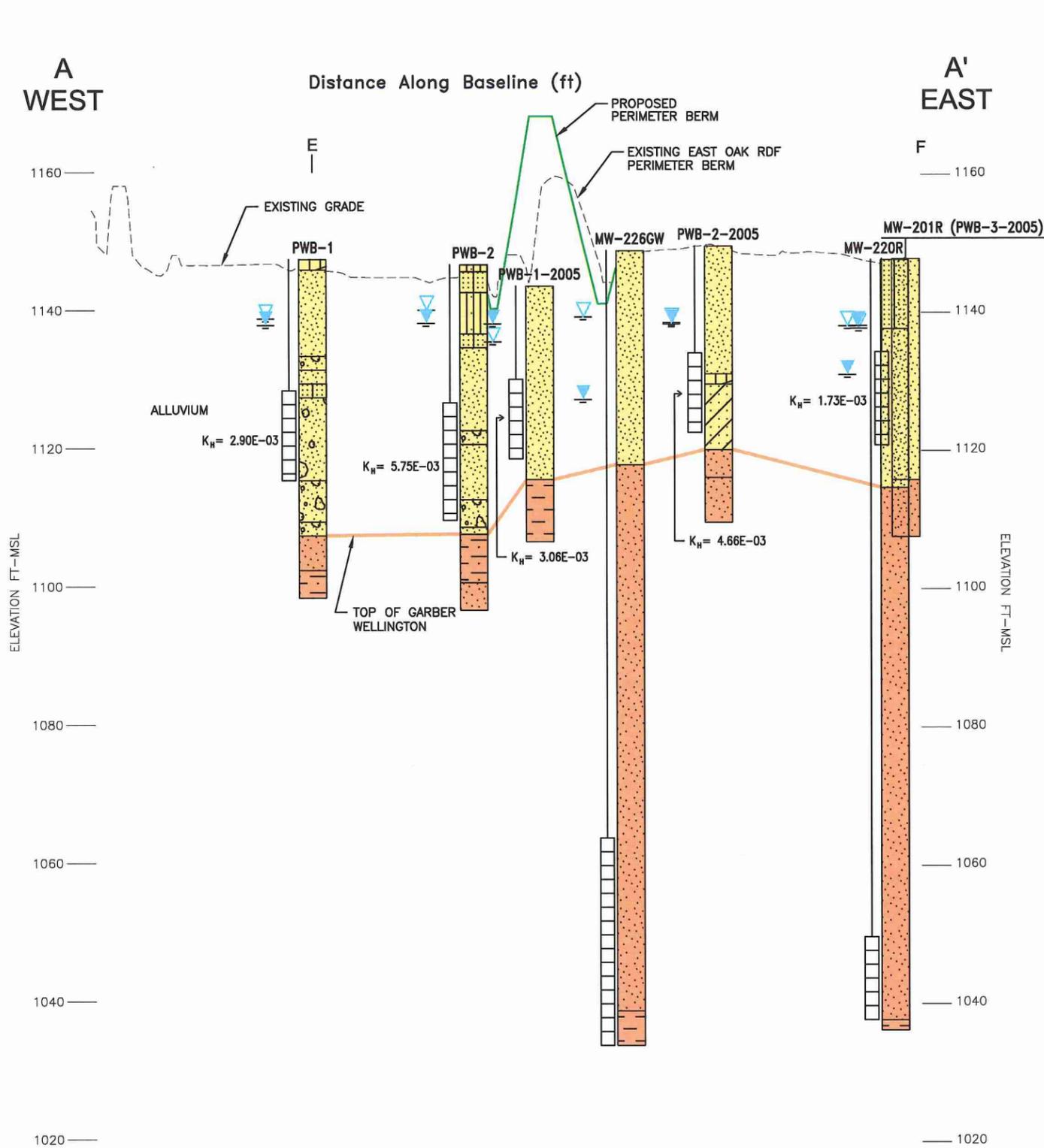
PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.		
REVISIONS		
NO.	DATE	DESCRIPTION
1	05/2016	REVISED WELL LAYOUT

**TIER III PERMIT MODIFICATION
GEOLOGIC CROSS SECTION
LOCATION MAP**

EAST OAK RDF
OKLAHOMA COUNTY, OKLAHOMA

WWW.WCGRP.COM **FIGURE E-1-10**

O:\0086\356\EXPANSION 2013\APPENDIX E\E-1-11 - E-1-16 (SEC-A-F).dwg, jqueen, 1:2

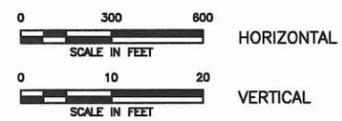


- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE

- LEGEND**
- SILTY CLAY
 - SANDY SILT
 - SILT
 - SAND
 - SANDY GRAVEL
 - SILTY SAND
 - SHALE
 - SANDSTONE
 - SILTSTONE
- Alluvium**
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)
 - STATIC GROUNDWATER ELEVATION (FT-MSL)
 - GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- Garber Wellington**

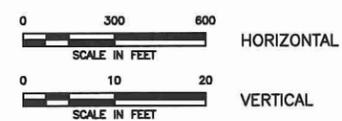
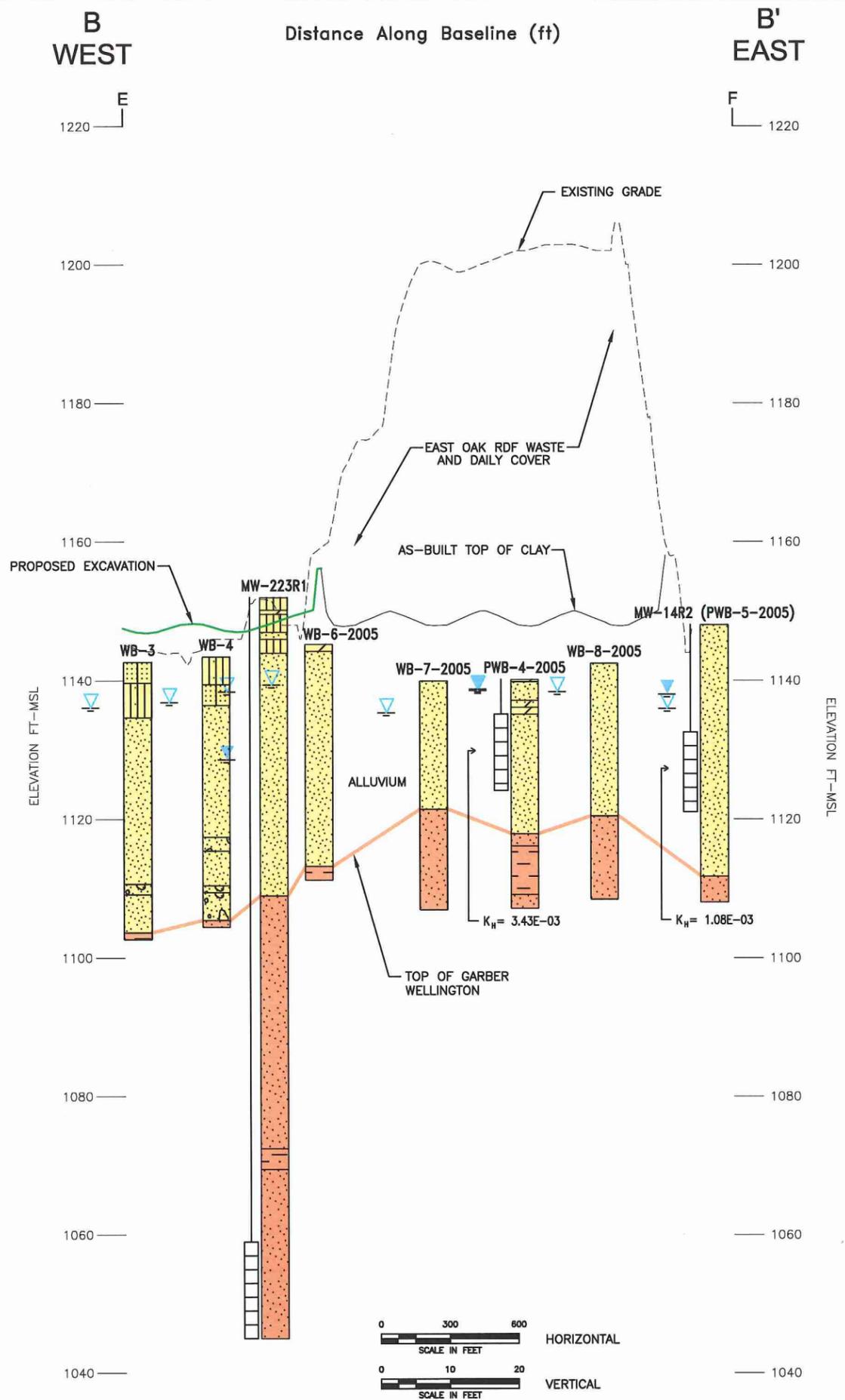


- NOTES:**
- CROSS SECTION INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
 - CROSS SECTION LOCATION SHOWN ON FIGURE E-1-10.
 - HYDRAULIC CONDUCTIVITY VALUES FROM RISING HEAD SLUG TESTS (K_H) AND GEOTECHNICAL LABORATORY MEASUREMENTS (K_v) LISTED IN CM/S.
- JVQ*
3/31/16



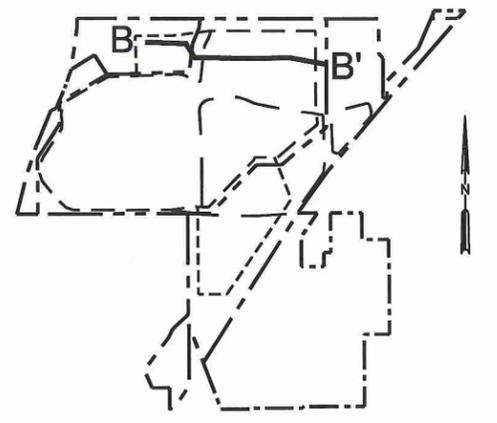
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	DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-11-SEC-A-A.dwg		EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA	
DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVQ	REVISIONS		WWW.WCGRP.COM	
Weaver Consultants Group CA 3804 PE - 06/30/2015		NO. DATE DESCRIPTION		FIGURE E-1-11

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- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE

- LEGEND**
- Clay
 - SANDY SILT
 - SILT
 - SAND
 - SANDY GRAVEL
 - SILTY SAND
 - SANDY CLAY
 - SHALE
 - SANDSTONE
 - SILTSTONE
- Garber Wellington**
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)
 - STATIC GROUNDWATER ELEVATION (FT-MSL)
 - GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)



- NOTES:**
- CROSS SECTION INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
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 - HYDRAULIC CONDUCTIVITY VALUES FROM RISING HEAD SLUG TESTS (K_H) AND GEOTECHNICAL LABORATORY MEASUREMENTS (K_V) LISTED IN CM/S.



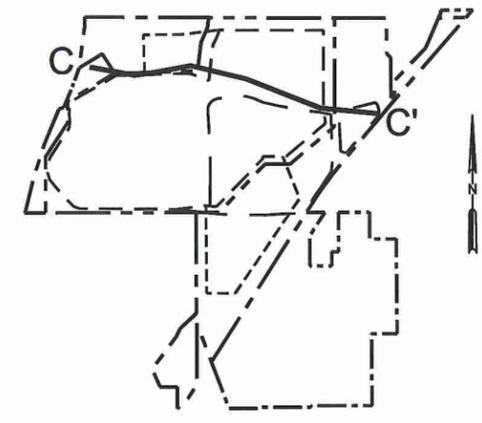
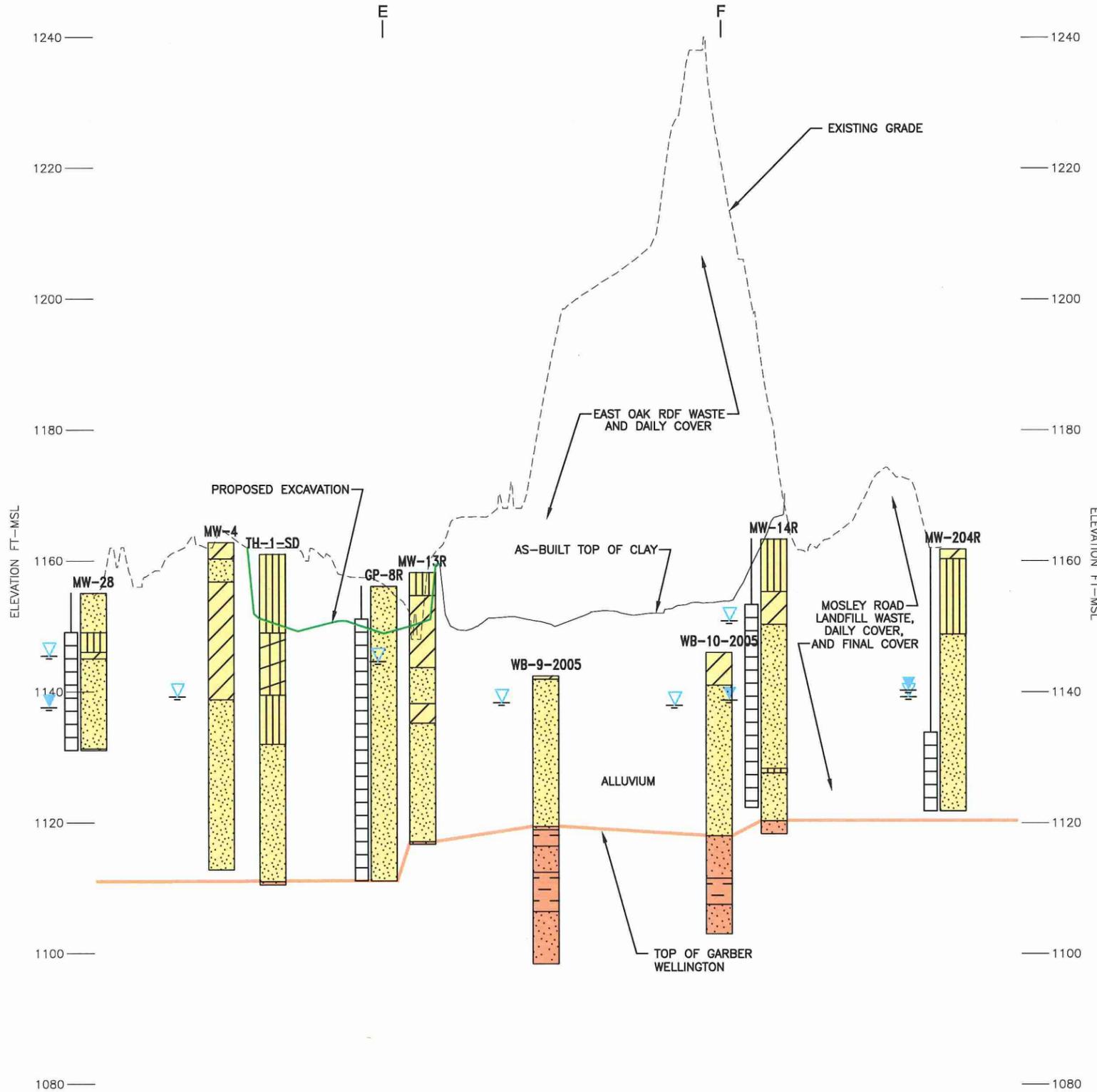
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3/31/14

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	DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-12 SEC-B-B.DWG		EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA	
DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVO	REVISIONS		WWW.WCGRP.COM	
Weaver Consultants Group CA 3804 PE - 06/30/2015		FIGURE E-1-12		

C WEST

Distance Along Baseline (ft)

C' EAST



KEY MAP (NTS)

LEGEND

- PROPERTY BOUNDARY
- EXISTING PERMIT BOUNDARY
- PROPOSED PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- MOSLEY ROAD LANDFILL LIMITS OF WASTE

Legend for Stratigraphy and Wells:

- Clay
- SILTY CLAY
- SILT
- SAND
- SHALE
- SANDSTONE

Legend for Wells:

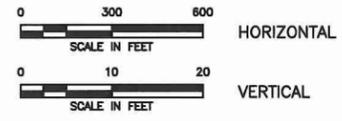
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL)
- GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

NOTES:

1. CROSS SECTION INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
2. CROSS SECTION LOCATION SHOWN ON FIGURE E-1-10.
3. HYDRAULIC CONDUCTIVITY VALUES FROM RISING HEAD SLUG TESTS (K_H) AND GEOTECHNICAL LABORATORY MEASUREMENTS (K_V) LISTED IN CM/S.



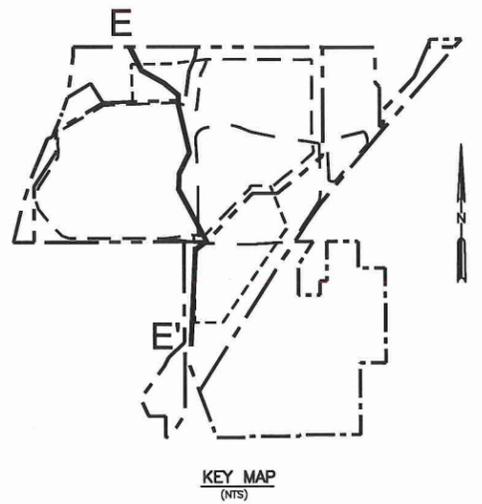
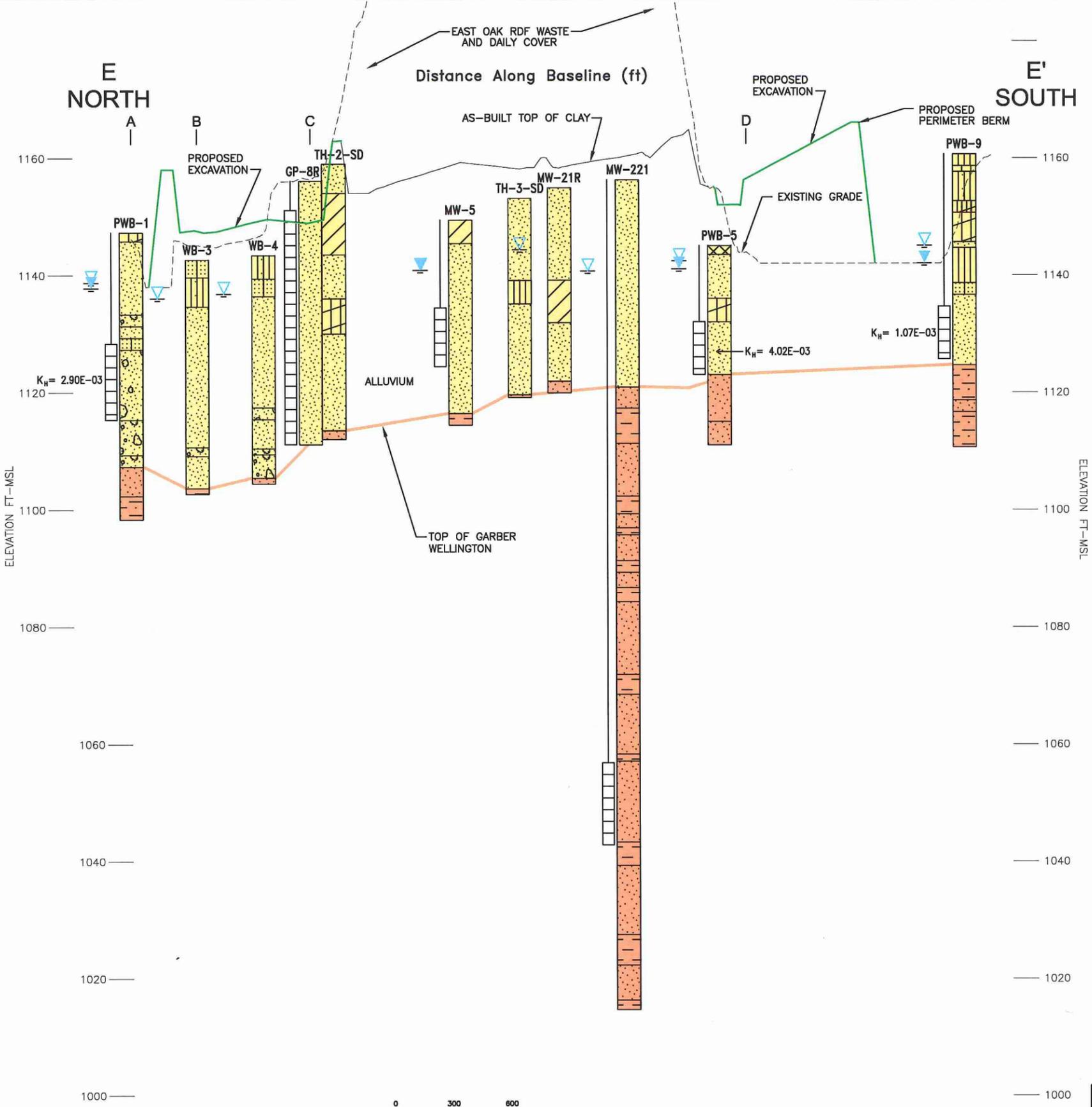
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DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVQ	REVISIONS		WWW.WCGRP.COM	
	NO.	DATE	DESCRIPTION	
Weaver Consultants Group CA 3804 PE - 06/30/2015		FIGURE E-1-13		

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O:\0086\356\EXPANSION 2013\APPENDIX E\E-1-11 - E-1-16 (SEC-A-F).dwg, r.morris, 1:2



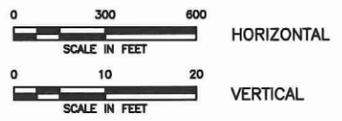
- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE

- Soil Legend:**
- EARTHEN FILL
 - Clay
 - SANDY SILT
 - SILT
 - SAND
 - SILTY CLAY
 - SILTY SAND
 - SANDY GRAVEL
- Garber Wellington Legend:**
- SHALE
 - SANDSTONE
 - SILTSTONE
- Well Symbols:**
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)
 - STATIC GROUNDWATER ELEVATION (FT-MSL)
 - GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

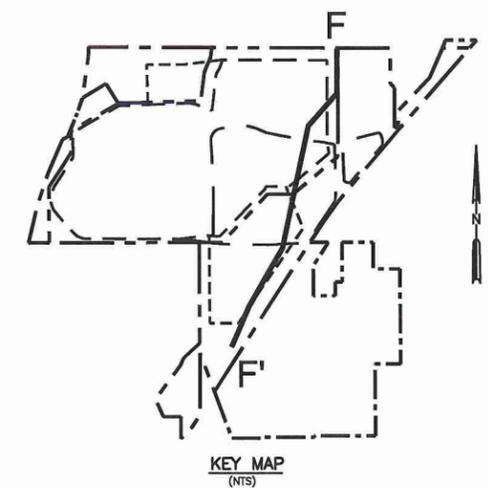
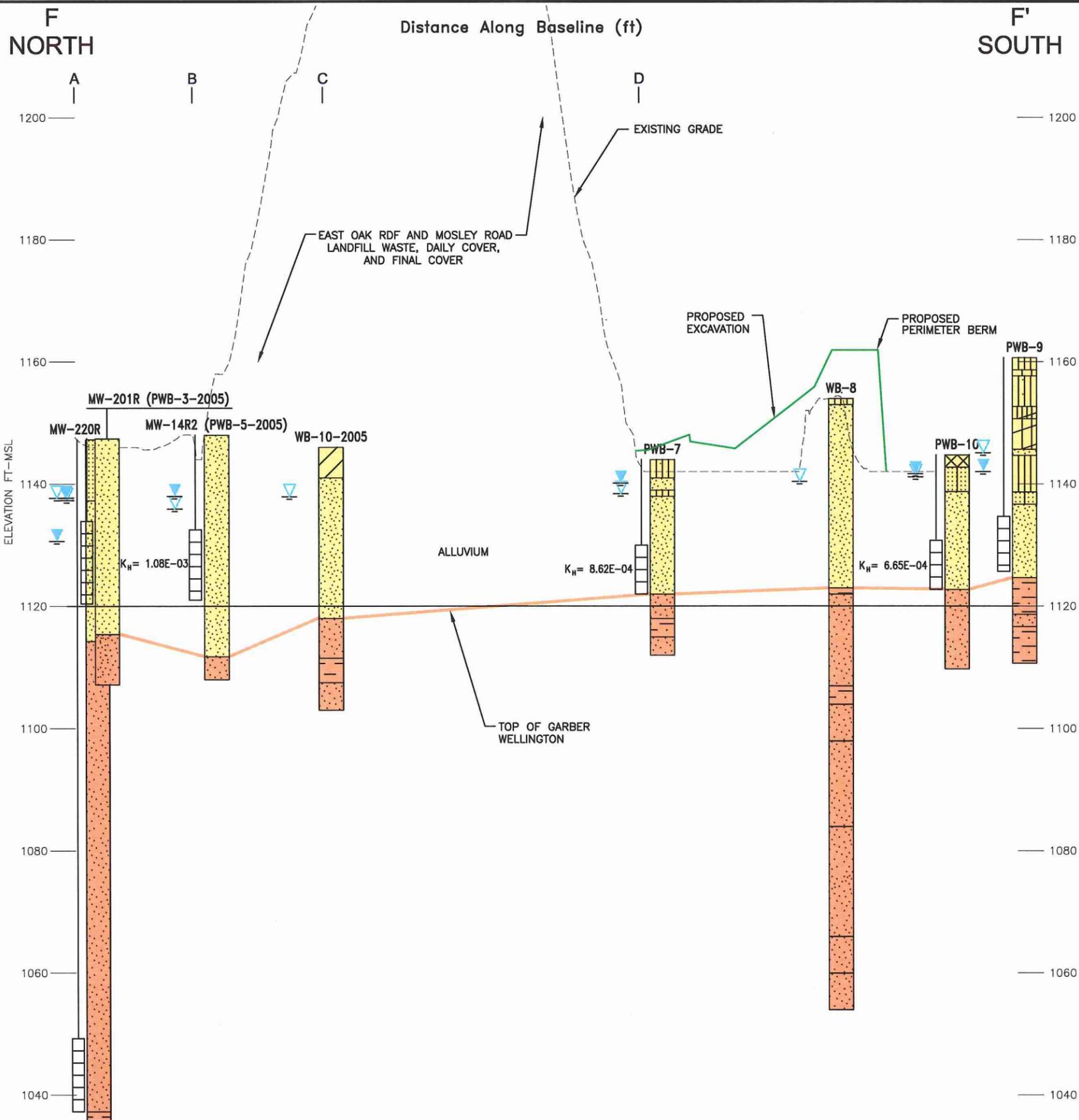
- NOTES:**
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 - CROSS SECTION LOCATION SHOWN ON FIGURE E-1-10.
 - HYDRAULIC CONDUCTIVITY VALUES FROM RISING HEAD SLUG TESTS (K_h) AND GEOTECHNICAL LABORATORY MEASUREMENTS (K_v) LISTED IN CM/S.



JVQ
5/31/16



<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.		TIER III PERMIT MODIFICATION GEOLOGIC CROSS SECTION E-E'	
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		REVISIONS		
		NO.	DATE	DESCRIPTION
Weaver Consultants Group CA 3804 PE-06/30/2015		WWW.WCGRP.COM		FIGURE E-1-15



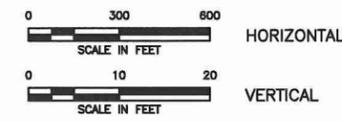
- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE

- LEGEND**
- EARTHEN FILL
 - Clay
 - SANDY SILT
 - SILT
 - SAND
 - SILTY SAND
 - SHALE
 - SANDSTONE
 - SILTSTONE
- Legend for Wells and Elevation:**
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)
 - STATIC GROUNDWATER ELEVATION (FT-MSL)
 - GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

- NOTES:**
- CROSS SECTION INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
 - CROSS SECTION LOCATION SHOWN ON FIGURE E-1-10.
 - HYDRAULIC CONDUCTIVITY VALUES FROM RISING HEAD SLUG TESTS (K_H) AND GEOTECHNICAL LABORATORY MEASUREMENTS (K_v) LISTED IN CM/S.

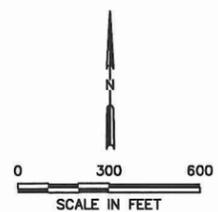
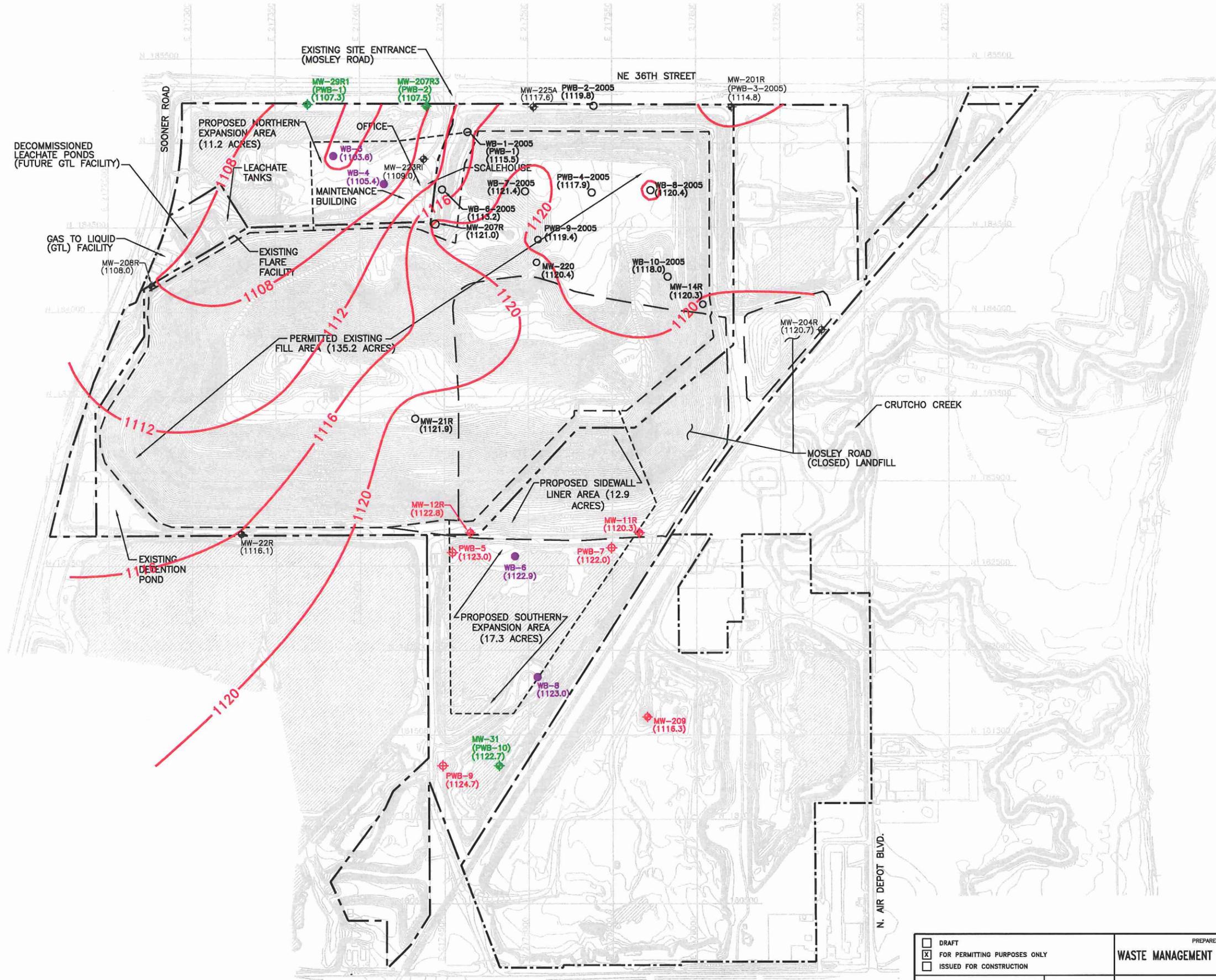


JVQ
5/31/16



<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.		TIER III PERMIT MODIFICATION GEOLOGIC CROSS SECTION F-F'	
	DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-16 SEC-F-F.DWG		EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA	
DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVQ	REVISIONS		WWW.WCGRP.COM	
Weaver Consultants Group CA 3804 PE-06/30/2015		NO. DATE DESCRIPTION		FIGURE E-1-16

O:\0086\356\EXPANSION 2013\APPENDIX E\E-1-16 (SEC-A-F).dwg, r.morris, 1:2



- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PERMIT BOUNDARY
 - PROPOSED PERMIT BOUNDARY
 - PERMITTED LIMITS OF WASTE
 - PROPOSED LIMITS OF WASTE
 - MOSLEY ROAD LANDFILL LIMITS OF WASTE
 - STATE PLANE GRID COORDINATE
 - EXISTING CONTOUR
 - 1120 ----- TOP OF GARBER WELLINGTON ELEVATION CONTOUR (FT-MSL)
 - ◆ MW-201R (1114.8) EXISTING GROUNDWATER MONITORING WELL (TOP OF GARBER WELLINGTON ELEVATION IN FT-MSL)
 - MW-21R (1121.9) BOREHOLE/GROUNDWATER WELL/GAS PROBE PREVIOUSLY PLUGGED OR ABANDONED (TOP OF GARBER WELLINGTON ELEVATION IN FT-MSL)
 - ◆ PWB-7 (1122.0) 2014 SOIL BORING AND PIEZOMETER LOCATION (TO BE ABANDONED) (TOP OF GARBER WELLINGTON ELEVATION IN FT-MSL)
 - WB-6 (1122.9) 2014 SOIL BORING LOCATION (ABANDONED) (TOP OF GARBER WELLINGTON ELEVATION IN FT-MSL)
 - ◆ MW-31 (PWB-10) (1122.7) 2014 SOIL BORING, PIEZOMETER, AND PROPOSED GROUNDWATER WELL LOCATION (TOP OF GARBER WELLINGTON ELEVATION IN FT-MSL)

- NOTES:**
1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.
 2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY LEMKE LAND SURVEYING, INC.
 3. PERMITTED LIMITS OF WASTE AND MOSLEY ROAD LANDFILL (CLOSED LANDFILL) LIMITS OF WASTE PROVIDED BY WASTE MANAGEMENT OF OKLAHOMA, INC.

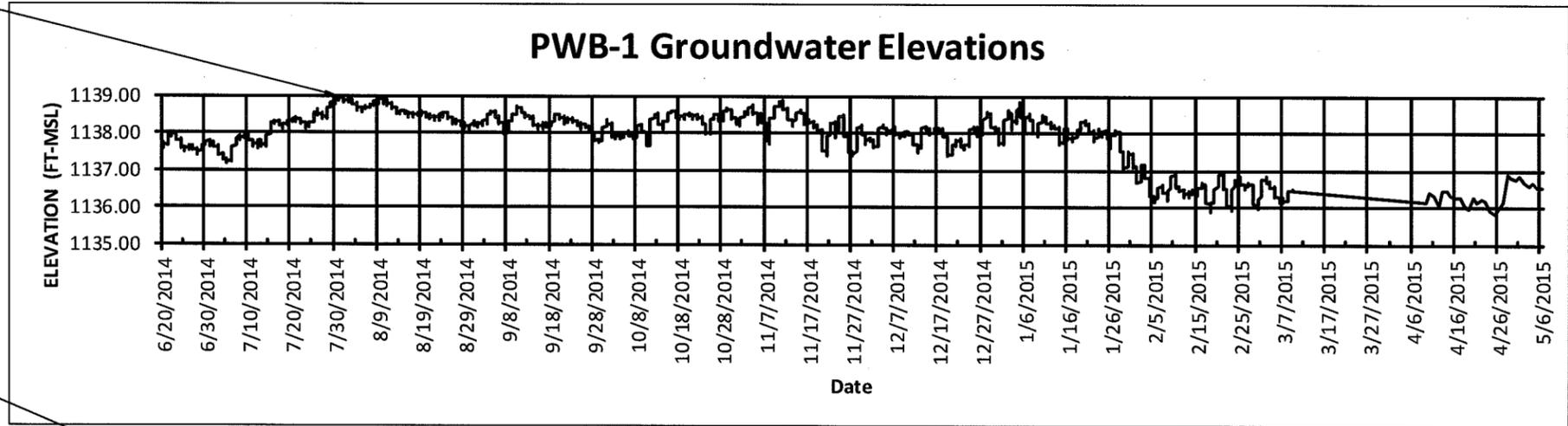
<input type="checkbox"/> DRAFT	PREPARED FOR	WASTE MANAGEMENT OF OKLAHOMA, INC.	TIER III PERMIT MODIFICATION TOP OF GARBER WELLINGTON CONTOUR MAP
<input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY			
<input type="checkbox"/> ISSUED FOR CONSTRUCTION			
DATE: 06/2015	DRAWN BY: VRS	REVISIONS	
FILE: 0086-356-11	DESIGN BY: RSF	NO.	DATE
CAD: E-1-17-GARBER WELLINGTON.DWG	REVIEWED BY: JVQ	1	05/2016
			REVISED WELL LAYOUT
Weaver Consultants Group CA 3804 PE - 06/30/2015		WWW.WCGRP.COM	

EAST OAK RDF
OKLAHOMA COUNTY, OKLAHOMA

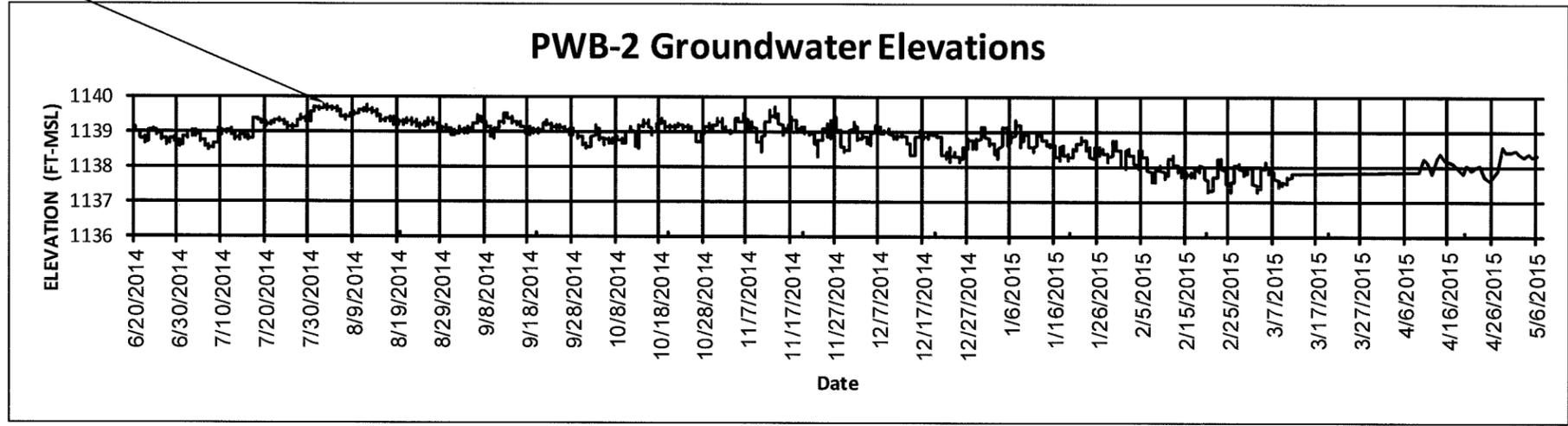
FIGURE E-1-17

O:\0086\356\EXPANSION 2013\APPENDIX E\E-1-17 TOP OF GARBER WELLINGTON.dwg, r.morris, 1:2

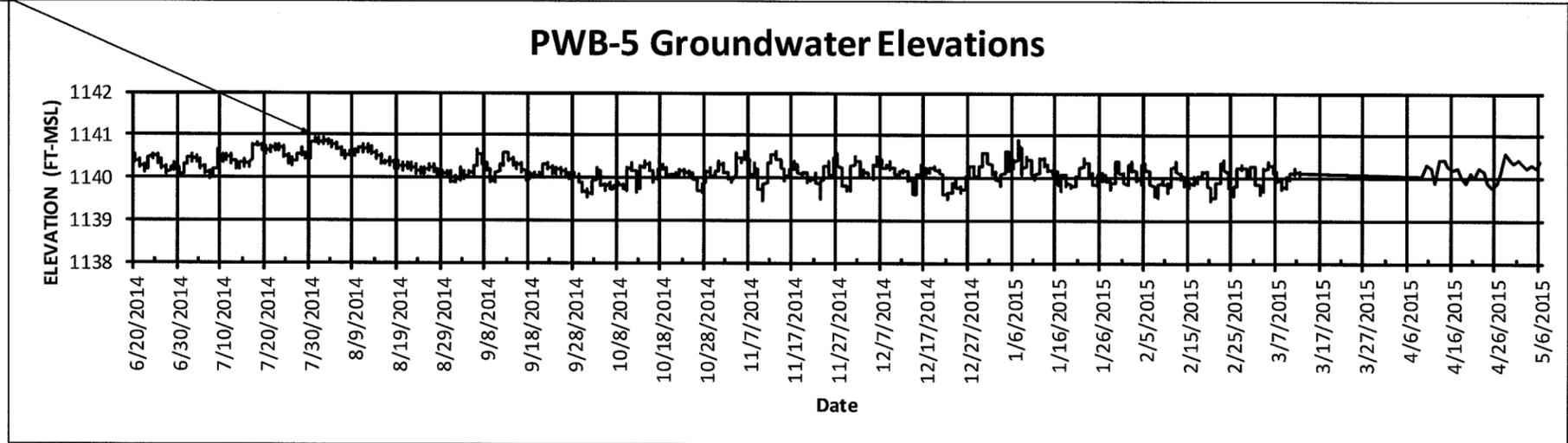
HIGHEST MEASURED
GROUNDWATER ELEVATION
1138.96 FT-MSL (08-03-14)



HIGHEST MEASURED
GROUNDWATER ELEVATION
1139.75 FT-MSL (08-03-14)



HIGHEST MEASURED
GROUNDWATER ELEVATION
1140.93 FT-MSL (08-02-14)



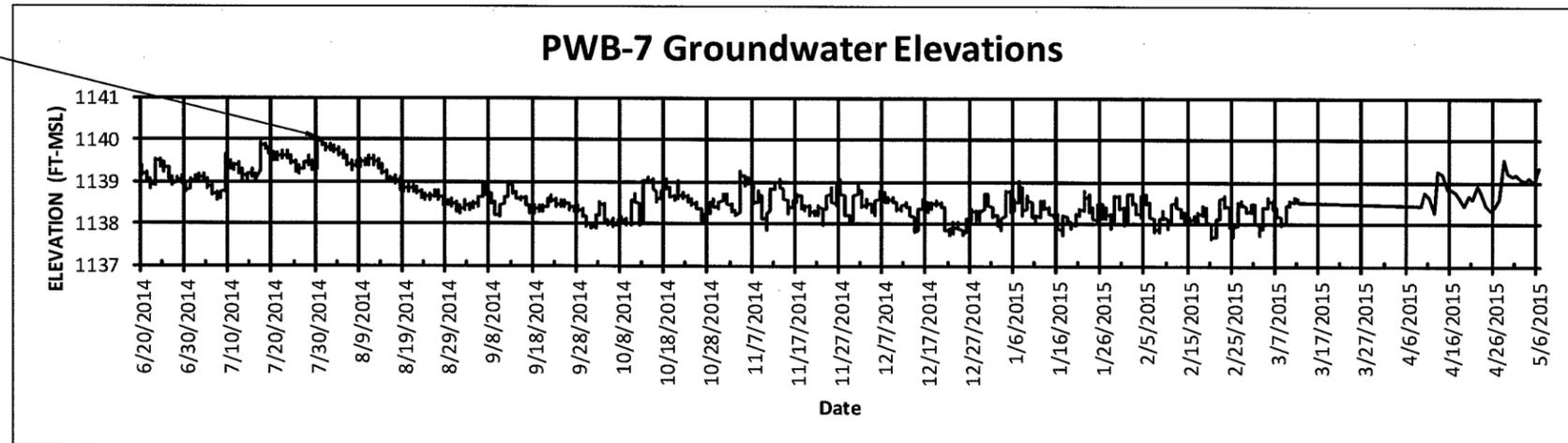
NOTES:

1. NO GROUNDWATER DATA RECORDED BETWEEN 3-13-15 AND 4-9-15 CAUSES STRAIGHT LINE ON ELEVATION GRAPHS.
2. GROUNDWATER ELEVATIONS RECORDED PRIOR TO 3-13-15 ARE MEASURED ON AN HOURLY BASIS.
3. GROUNDWATER ELEVATIONS RECORDED FROM 4-9-15 TO 5-6-15 ARE MEASURED DAILY.

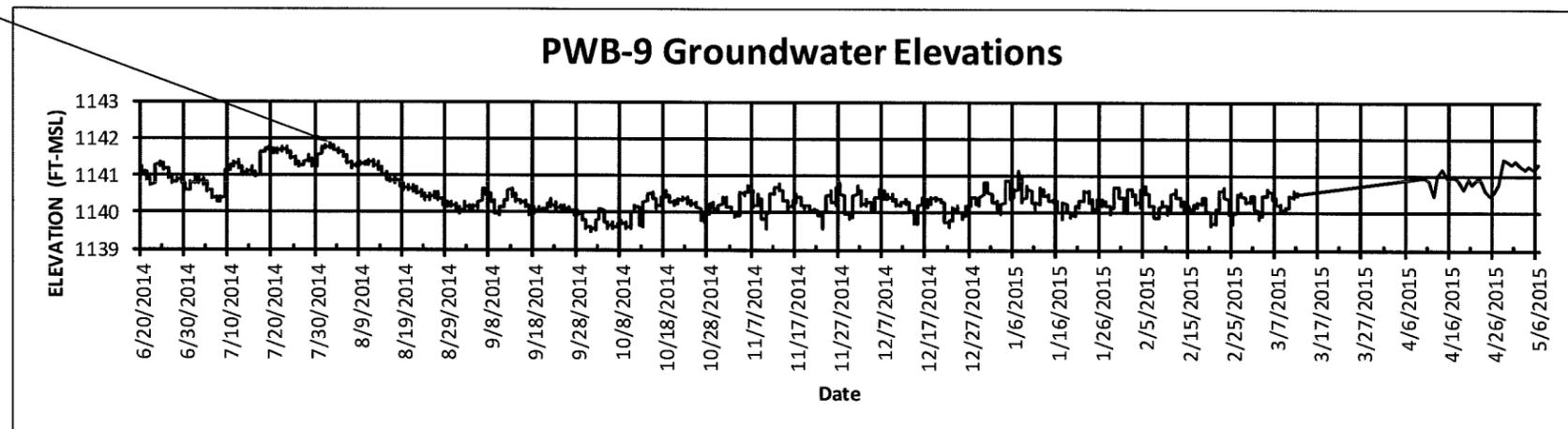
<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.	
DATE: 06/2015 FILE: 0086-356-11 CAD: E-1-18 DATA LOGGER GW ELEV.DWG	DRAWN BY: VRS DESIGN BY: RSF REVIEWED BY: JVG	
REVISIONS		
NO.	DATE	DESCRIPTION
1	01/2016	ADDED ADDITIONAL DATA
Weaver Consultants Group CA 3804 PE - 06/30/2017		

PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.		
TIER III PERMIT MODIFICATION DATA LOGGER GROUNDWATER ELEVATIONS		
EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA		
WWW.WCGRP.COM		FIGURE E-1-18

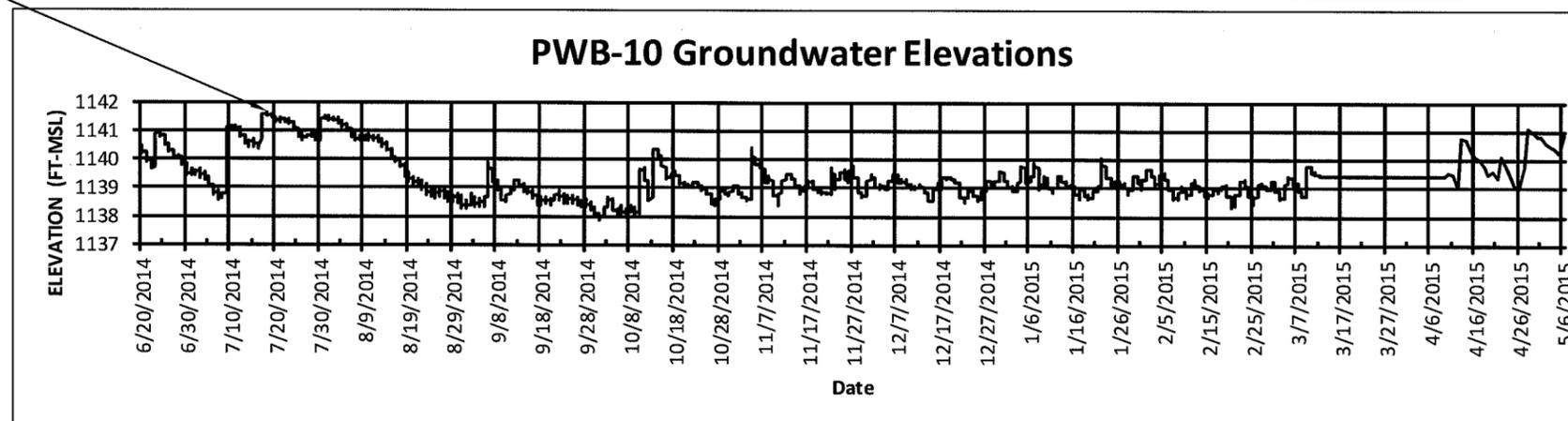
HIGHEST MEASURED
GROUNDWATER ELEVATION
1139.99 FT-MSL (07-31-14)



HIGHEST MEASURED
GROUNDWATER ELEVATION
1141.84 FT-MSL (08-02-14)



HIGHEST MEASURED
GROUNDWATER ELEVATION
1141.61 FT-MSL (07-18-14)



NOTES:

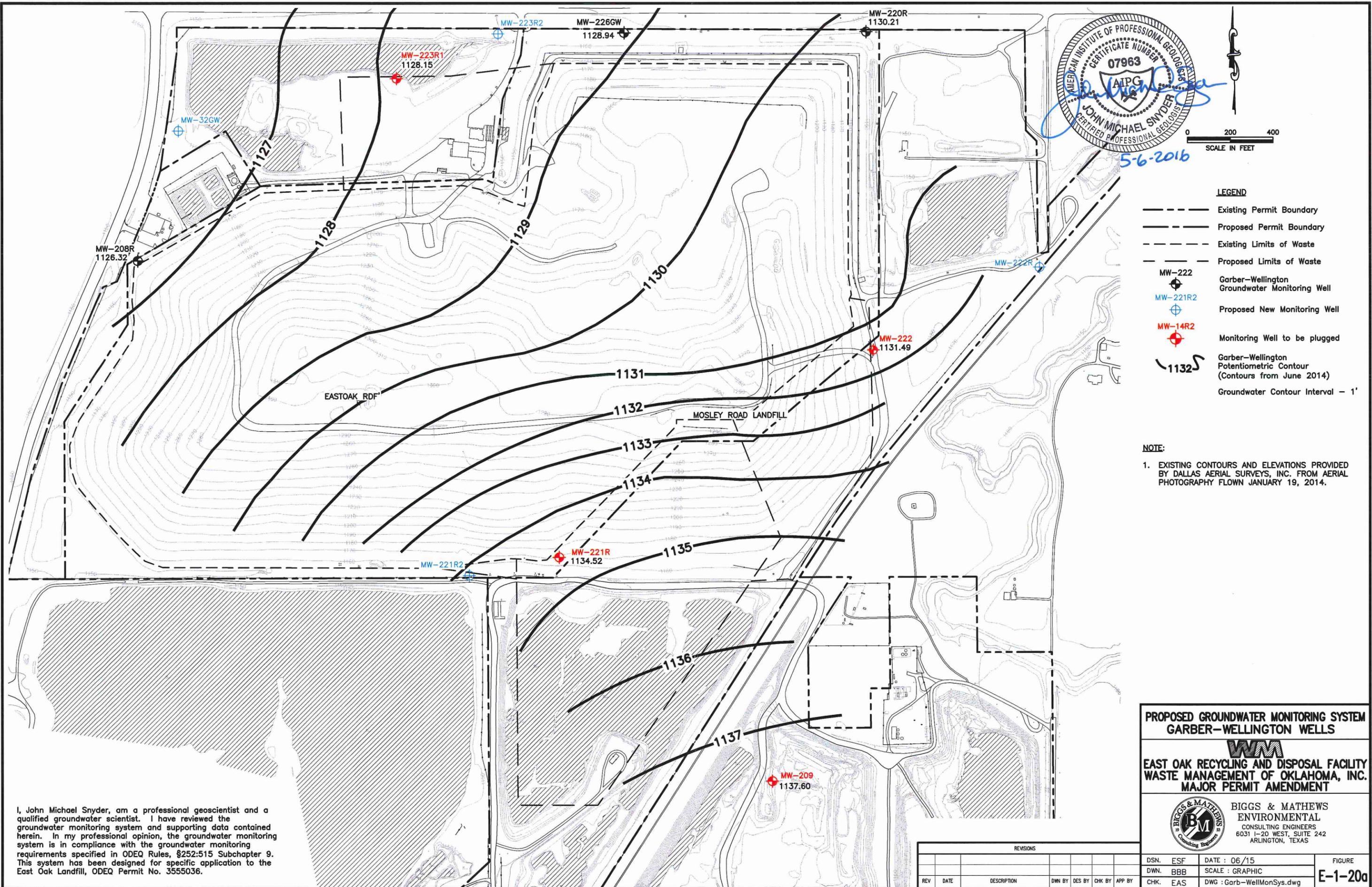
1. NO GROUNDWATER DATA RECORDED BETWEEN 3-13-15 AND 4-9-15 CAUSES STRAIGHT LINE ON ELEVATION GRAPHS.
2. GROUNDWATER ELEVATIONS RECORDED PRIOR TO 3-13-15 ARE MEASURED ON AN HOURLY BASIS.
3. GROUNDWATER ELEVATIONS RECORDED FROM 4-9-15 TO 5-6-15 ARE MEASURED DAILY.

<input type="checkbox"/> DRAFT	PREPARED FOR
<input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY	WASTE MANAGEMENT OF OKLAHOMA, INC.
<input type="checkbox"/> ISSUED FOR CONSTRUCTION	
DATE: 06/2015	DRAWN BY: VRS
FILE: 0086-356-11	DESIGN BY: RSF
CAD: E-1-19 DATA LOGGER GW ELEV.DWG	REVIEWED BY: JVG
Weaver Consultants Group CA 3804 PE - 06/30/2017	

REVISIONS		
NO.	DATE	DESCRIPTION
1	01/2016	ADDED ADDITIONAL DATA

TIER III PERMIT MODIFICATION DATA LOGGER GROUNDWATER ELEVATIONS EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA	WWW.WCGRP.COM	FIGURE E-1-19
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J:\101\10\103\Garb-WellMonSys.dwg Layout: Layout1 User: bboles



5-6-2016



- LEGEND**
- Existing Permit Boundary
 - - - Proposed Permit Boundary
 - - - Existing Limits of Waste
 - - - Proposed Limits of Waste
 - MW-222 Garber-Wellington Groundwater Monitoring Well
 - MW-221R2 Proposed New Monitoring Well
 - MW-14R2 Monitoring Well to be plugged
 - 1132 Garber-Wellington Potentiometric Contour (Contours from June 2014)
 - Groundwater Contour Interval - 1'

NOTE:
 1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.

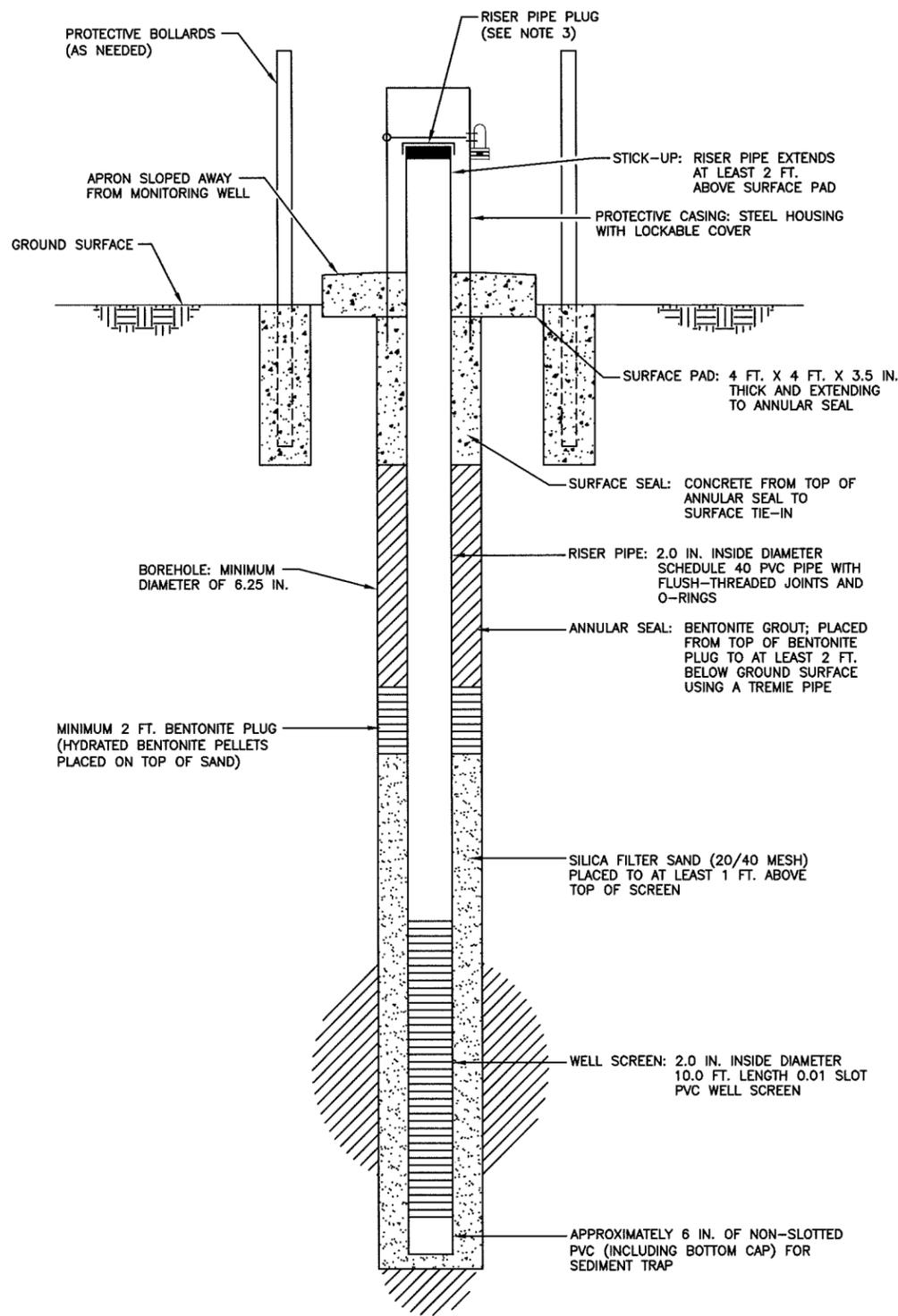
I, John Michael Snyder, am a professional geoscientist and a qualified groundwater scientist. I have reviewed the groundwater monitoring system and supporting data contained herein. In my professional opinion, the groundwater monitoring system is in compliance with the groundwater monitoring requirements specified in ODEQ Rules, §252:515 Subchapter 9. This system has been designed for specific application to the East Oak Landfill, ODEQ Permit No. 3555036.

**PROPOSED GROUNDWATER MONITORING SYSTEM
 GARBER-WELLINGTON WELLS**

WM
 EAST OAK RECYCLING AND DISPOSAL FACILITY
 WASTE MANAGEMENT OF OKLAHOMA, INC.
 MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS
 ENVIRONMENTAL
 CONSULTING ENGINEERS
 6031 I-20 WEST, SUITE 242
 ARLINGTON, TEXAS

REVISIONS							DSN.	ESF	DATE : 06/15	FIGURE
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	DWN.	BBB	SCALE : GRAPHIC	E-1-20a
CHK.	EAS	DWG : Garb-WellMonSys.dwg								



TYPICAL MONITORING WELL DETAIL
NOT TO SCALE

MONITORING WELL NO.	NORTHING	EASTING	LONGITUDE	LATITUDE	GROUND ELEVATION	TOTAL WELL DEPTH	FILTER PACK ELEVATIONS		WELL SCREEN ELEVATIONS		APPROXIMATE POTENTIOMETRIC SURFACE ELEVATION
							TOP	BOTTOM	TOP	BOTTOM	
ALLUVIAL MONITORING WELLS-UPGRADIENT											
MW-14R3*	184663	2176953	-97°17'58.82"	35°30'18.80"	1145.0	24.5	1133.5	1120.5	1131.5	1121.5	1143.0
MW-204R	183973	2176806	-97°24'21.66"	35°30'14.11"	1161.8	40.0	1133.8	1121.8	1131.8	1121.8	1142.5
MW-22R	182687	2173295	-97°18'43.22"	35°29'59.52"	1149.6	37.3	1129.6	1112.3	1122.3	1112.3	1139.3
MW-31* (PWB-10)	181316	2174822	-97°18'24.87"	35°29'45.85"	1144.7	22.0	1130.7	1122.7	1128.7	1123.7	1141.2
ALLUVIAL MONITORING WELLS-DOWNGRADIENT											
MW-207R3* (PWB-2)	185217	2174396	-97°18'29.69"	35°30'24.46"	1146.5	37.0	1126.5	1109.5	1120.5	1110.5	1137.5
MW-225A	185213	2175034	-97°18'21.97"	35°30'24.38"	1148.6	31.0	1134.6	1117.6	1132.6	1117.6	1137.2
MW-230*	185210	2175734	-97°18'13.51"	35°30'24.30"	1146.0	30.5	1128.5	1115.5	1126.5	1116.5	1138.0
MW-25R	184132	2172726	-97°18'50.14"	35°30'13.91"	1158.4	52.0	1123.4	1106.4	1116.9	1106.9	1138.2
MW-27	183562	2172449	-97°18'53.30"	35°30'08.26"	1156.6	24.0	1150.6	1132.6	1148.6	1133.6	1138.5
MW-28R	184802	2172925	-97°18'08.54"	35°30'22.54"	1149.6	34.0	1128.1	1115.6	1125.6	1115.6	1137.5
MW-29R1* (PWB-1)	185227	2173692	-97°18'28.20"	35°30'24.61"	1147.3	32.0	1128.3	1115.3	1126.3	1116.3	1137.4
GARBER WELLINGTON MONITORING WELLS-UPGRADIENT											
MW-221R2*	182692	2174311	-97°18'30.93"	35°29'59.50"	1156.0	100.0	1069.0	1056.0	1067.0	1057.0	1135.0
MW-222R*	184124	2176971	-97°17'58.64"	35°30'13.47"	1162.0	103.0	1072.0	1059.0	1070.0	1060.0	1133.0
GARBER WELLINGTON MONITORING WELLS-DOWNGRADIENT											
MW-208R	184155	2172762	-97°17'55.12"	35°30'13.76"	1158.0	125.0	1068.0	1033.0	1043.0	1033.0	1126.3
MW-220R	115218	2176163	-97°18'08.32"	35°30'24.35"	1147.8	111.5	1049.8	1136.3	1046.8	1036.8	1130.2
MW-223R2*	185208	2174447	-97°18'29.07"	35°30'24.37"	1152.0	100.0	1065.0	1052.0	1063.0	1053.0	1128.0
MW-226GW	185213	2175004	-97°18'22.34"	35°30'24.38"	1148.6	115.0	1063.6	1033.6	1043.6	1033.6	1128.9
MW-32GW*	184802	2172925	-97°18'08.54"	35°30'22.54"	1150.0	60.0	1102.0	1090.0	1100.0	1090.0	1126.0

* PROPOSED WELL-ALL DATA IS APPROXIMATE, FINAL ELEVATION TO BE DETERMINED BASED ON ACTUAL ELEVATION OF GARBER-WELLINGTON. TOP OF SCREEN TO BE AT 10 FEET BELOW TOP OF GARBER WELLINGTON.

NOTES:

- ELEVATIONS LISTED ABOVE IN FEET ABOVE MEAN SEA LEVEL, EXCEPT TOTAL DEPTH LISTED IN FEET BELOW GROUND SURFACE.
- POTENTIOMETRIC SURFACE ELEVATIONS MEASURED IN JUNE 2014.
- ALL PROPOSED WELLS ARE 2-INCH DIAMETER.
- MONITORING WELL MW-201R WILL BE CONVERTED INTO A OBSERVATION WELL AND WILL NO LONGER BE MONITORED.
- WELL DETAILS CONSISTENT WITH MONITORING SYSTEM DESIGN CERTIFIED BY JOHN MICHAEL SNYDER, CPG, BIGGS AND MATHEWS ENVIRONMENTAL AS SHOWN IN APPENDIX F DATED MAY, 2016.



JVQ
5/31/16

<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION		PREPARED FOR WASTE MANAGEMENT OF OKLAHOMA, INC.		TIER III PERMIT MODIFICATION GROUNDWATER MONITORING WELL DETAIL										
DATE: 05/2016 FILE: 0066-356-11 CD: E-1-10 WELL DTL.DWG		DRAWN BY: RDW DESIGN BY: JYQ REVIEWED BY: JYQ		EAST OAK RDF OKLAHOMA COUNTY, OKLAHOMA										
		REVISIONS		WWW.WCGRP.COM										
		<table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>05/2016</td> <td>CHANGED TITLE BLOCK</td> </tr> <tr> <td>2</td> <td>05/2016</td> <td>UPDATED GW SYSTEM</td> </tr> </tbody> </table>		NO.	DATE	DESCRIPTION	1	05/2016	CHANGED TITLE BLOCK	2	05/2016	UPDATED GW SYSTEM	FIGURE E-1-21	
NO.	DATE	DESCRIPTION												
1	05/2016	CHANGED TITLE BLOCK												
2	05/2016	UPDATED GW SYSTEM												
Weaver Consultants Group CA 3804 PE - 06/30/2017														

APPENDIX E-2
LITHOLOGIC AND GEOPHYSICAL LOGS

Includes pages E-2-1 through E-2-244

CONTENTS

Western Technologies Lithologic Logs 1984	E-2-1
SETCO Lithologic Logs 1984	E-2-17
Golder Lithologic Logs 1990	E-2-24
Waste Management Lithologic Logs 1991	E-2-48
Rust Lithologic Logs 1993	E-2-60
Rust Gas Probe Lithologic Logs 1994	E-2-68
Rust Lithologic Logs 1995	E-2-80
TetraTech Lithologic Logs 1999	E-2-94
Cardinal Lithologic Log 2002	E-2-122
A&M Engineering Lithologic Logs 2003	E-2-124
WBC Lithologic Logs 2005	E-2-139
Geophysical Logs by RCA (1993), WBC 2005 and WBC 2014	E-2-165
Biggs & Mathews Lithologic Logs 2010	E-2-198
Landtec Gas Probe Lithologic Logs 2010	E-2-200
Landtec Monitor Well Lithologic Log 2010	E-2-207
Terracon Monitor Well Lithologic Log 2011	E-2-212A
WBC Lithologic Logs 2014	E-2-218
Biggs and Mathews Lithologic Logs 2015	E-2-242

**WESTERN TECHNOLOGIES
LITHOLOGIC LOGS
1984**

LOG OF BORING NO. B-1

Project SCA Mosley Road II Landfill Job No. 7224J015

Elevation 1143.9 Datum _____

Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/25/84

Groundwater Conditions 12.0' upon completion

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				17.7	SP	5	Brown to light brown SAND, fine to medium grain, dry	
						10	(10.0') Moist below 6.0 ft.	
					SM/ SP	15	Brown fine to medium SAND, trace silt, loose, wet	
						20	(20.0') Changing to gray brown at 17.0 ft.	
				18.0	SP/ SW	25	Gray fine to coarse SAND, trace gravel, medium dense, wet	1128.4
							Trace silt and clay seams below 25 ft.	1127.4
								1123.4
								1118.4
						30		

Continued on sheet #2

LOG OF BORING NO. B-1 CONTINUED

Project SCA Mosley Road II Landfill

Job No. 7224J015

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description
		N/R					
HS				17.4	SW	30	Continued from sheet #1 Gray fine to coarse <u>SAND</u> , with gravel, dense, wet
				14.8		35	
						(42.0)	
						45	Reddish brown weathered <u>SANDSTONE</u> , cemented, friable, moist
						50	(50.1)
SS		50/1"		14.4			Bottom of Boring

LOG OF BORING NO. B-2

Project SCA Mosley Road II Landfill Job No. 7224J015

Elevation 1150.0 Datum _____

Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/25/84

Groundwater Conditions 12.0' upon completion

Sample Type	Unconfined Compressive Strength, paf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS					CL	5 (5.5')	Brown sandy silty <u>CLAY</u> , stiff, damp	
					SM	10 (15.0')	Brown silty fine <u>SAND</u> , with clay seams, loose, wet	1136.0 1135.0
			20.9		SM	20 (20.0')	Brown silty fine to medium <u>SAND</u> , loose, wet	1131.5
				16.9	SM/ SP	25	Gray brown fine to coarse <u>SAND</u> , trace silt Medium dense, wet	1126.5
						30		

Continued on sheet #2

LOG OF BORING NO. B-2 CONTINUED

Project SCA Mosley Road II Landfill Job No. 7224J015

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description
		N/R					
							Continued from sheet #1
HS					SM/SP	30	Gray brown fine to coarse <u>SAND</u> , trace silt medium dense, wet
						35	
					SW	(37.0')	Gray medium to coarse <u>SAND</u> with gravel dense, wet
						40	(40.0')
				20.9			Reddish brown weathered <u>SANDSTONE</u> , cemented, friable, moist
SS		50/0"				45	
HS							(48.5)
						50	Bottom of boring Drilled to auger refusal at 48.5 ft.

Project SCA Mosley Road II Landfill Job No. 7224J015

Elevation 1162.9 Datum _____

Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/25/84

Groundwater Conditions 37.0 feet while drilling (?)

Sample Type	Unconfined Compressive Strength, psf	Blows/Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS					CL	3.0	Dark brown silty <u>CLAY</u> stiff, damp, low plasticity	[Patterned]
						8.0	Brown silty fine <u>SAND</u> loose, damp	
						15.0	Dark brown silty <u>CLAY</u> stiff, moist, plastic	
ST					CL	15.0	Wet below 15 feet	
HS					CL	21.5		[Patterned]
						25.0	Light brown clayey fine to medium <u>SAND</u> , medium dense, wet	
						30.0	Light brown silty fine to medium <u>SAND</u> , with clay seams medium dense, wet	

Continued on sheet #2

LOG OF BORING NO. B-3 CONTINUED

Project SCA Mosley Road II Landfill

Job No. 7224J015

Sample Type	Unconfined Compressive Strength, psf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS					SM	35 (38.0')	Light brown silty fine to medium SAND, medium dense, wet grading to gray brown	1124.4
					SP	40 (45.0')	Gray fine to medium SAND, trace silt, medium dense, wet	1119.4
					SW	45 (50.0')	Gray fine to coarse SAND, trace gravel dense, wet	
						50	Bottom of boring	

LOG OF BORING NO. MW1

Project SCA Mosley Road II Landfill Job No. 7224J015

Elevation 1161.0 Datum _____

Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/25/84

Groundwater Conditions 25.0' upon completion

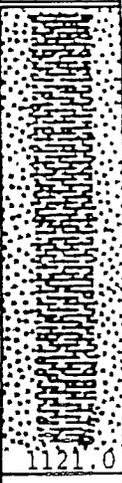
Sample Type	Unconfined Compressive Strength, pcf	Blows/Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				3.4	SP	5	Brown fine SAND, trace silt loose, dry	[Patterned Area]
				4.4		10	Damp below 6 feet	
						(10.0')		
				3.9	SM	15	Light brown silty fine SAND, loose dry	
				17.1		20	Moist with occasional clay seams below 16.5 feet	1142.5
						(20.0')		1141.5
				16.4	SP/SW	25	Brown fine to coarse SAND, trace silt medium dense, wet	
						30	grading to gray in color	1131.0
						(30.0')		

Continued on sheet #2

LOG OF BORING NO. MW1 CONTINUED

Project SCA Mosley Road II Landfill

Job No. 7224J015

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				22.0	SW	30	M-C sand Gray fine to coarse <u>SAND</u> , trace gravel, dense, wet	
				16.1		(38.0')	Reddish brown highly weathered <u>SANDSTONE</u> Poorly cemented, friable, moist	
						40 (40.0')	Bottom of boring	1121.0

LOG OF BORING NO. MW2

Project SCA Mosley Road II Landfill Job No. 7224J015

Elevation 1148.7 Datum _____

Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/24/84

Groundwater Conditions 9.0' upon completion

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				10.8	SP	5 (5.5')	Light brown fine SAND, trace silt loose, dry	
				18.3		10	Light brown silty fine to medium SAND, loose, moist	1141.7 1140.7
				16.2	SM	15	Grading to gray brown	
				17.3		20 (21.0')		1129.7
				17.4	SP/SW	25	Gray fine to coarse SAND medium dense, moist	
						30 (30.0')		1119.7

Bottom of boring

LOG OF BORING NO. MW3

Project SCA Mosley Road II Landfill Job No. 7224J015
 Elevation 1166.3 Datum _____
 Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/23/84
 Groundwater Conditions 28.5' upon completion

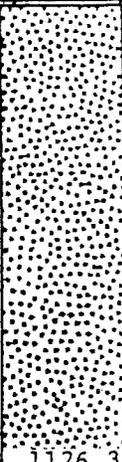
Sample Type	Unconfined Compressive Strength, pcf	Blows/Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				3.8	SP	5	Brown fine <u>SAND</u> , trace silt loose, dry (8.0')	[Patterned Area]
					CL	10	Dark brown silty <u>CLAY</u> , trace sand soft, moist (10.0')	
					SP		Brown fine <u>SAND</u> , trace silt medium dense, moist (12.5')	
				17.8	CL/SC	15	Brown sandy silty <u>CLAY</u> , with sand seams, soft, moist (15.0')	
					CL	20	Brown sandy clayey <u>SILT</u> stiff, moist, plastic (27.0')	
				33.3	SC	30	Brown clayey <u>SAND</u> medium dense, wet	1139.8 1138.8

Continued on sheet #2

LOG OF BORING NO. MW3 CONTINUED

Project SCA Mosley Road II Landfill

Job No. 7224J015

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
				24.6	SM	30	Continued from sheet #1 Gray silty fine <u>SAND</u> medium dense, wet Occasional clay seams	
HS				26.6	SM	35		
				18.1	SM	40		
						45 (45.0')		
SS		26			SP		Light gray fine <u>SAND</u> , trace silt medium dense, wet	
HS					SP	50 (50.0')		
							Bottom of boring	

LOG OF BORING NO. MW4

Project SCA Mosley Road II Landfill Job No. 7224J015

Elevation 1162.8 Datum _____

Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/22/84

Groundwater Conditions 27.0' while drilling

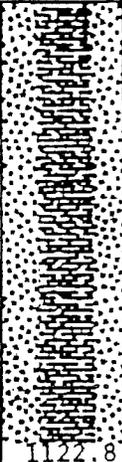
Sample Type	Unconfined Compressive Strength, psf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				11.3	CL	(2.5')	Dark brown silty <u>CLAY</u> , trace organics stiff, dry	1139.8 1138.8 1132.8
					SP	(6.0')	Brown fine to medium <u>SAND</u> , loose, damp	
					CL	(11.5')	Brown silty <u>CLAY</u> , trace sand stiff, moist	
					CL	(17.0')	Light brown sandy silty <u>CLAY</u> , stiff, moist	
					CL/CH	(24.0')	Brown silty <u>CLAY</u> , trace sand stiff, moist, plastic	
				24.4	SM	(30.0')	Light brown, silty fine <u>SAND</u> , medium dense, wet	

Continued on sheet #2

LOG OF BORING NO. MW4 CONTINUED

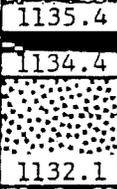
Project SCA Mosley Road II Landfill

Job No. 7224J015

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
							Continued from sheet #1	
HS					SP/ SW	30	Gray fine to coarse <u>SAND</u> , medium dense, moist	
SS		15		17.0	SP	35		
HS				13.9	SP			
SS		22		14.5	SP	40		
						(43.0')		
HS				13.8	SM/ SP	45	Gray silty medium to coarse <u>SAND</u> , medium dense, moist	
						(50.0')		
							Bottom of boring	

LOG OF BORING NO. MW5

Project SCA Mosley Road II Landfill Job No. 7224J015
 Elevation 1149.4 Datum _____
 Type/Size Boring 8" Hollow Stem Rig Type CME 450 Date 8/22/84
 Groundwater Conditions 9.0' upon completion

Sample Type	Unconfined Compressive Strength, paf	Blows/Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
HS				6.8	CL	4.0	Dark brown silty <u>CLAY</u> , trace organics stiff, moist	
				10.0	SP	5	Light brown fine to medium <u>SAND</u> loose, moist	
				23.0	SM	10	Brown silty fine <u>SAND</u> , loose, wet	
						15	Medium grained below 15 feet	
SS	15		18.4	SP	20	Gray fine to medium <u>SAND</u> , trace silt medium dense, wet	 1135.4 1134.4 1132.1	
HS				SP	25			
SS		27		16.9	SP			
HS					SP	30		1122.1

Continued on sheet #2

LOG OF BORING NO. MW5 CONTINUED

Project SCA Mosley Road II Landfill

Job No. 7224J015

Sample Type	Unconfined Compressive Strength, pcf	Blows/ Foot	Dry Density pcf	Moisture Content, %	Unified Classification	Depth, feet	Description	Monitoring Well Details
		N/R						
SS		17		12.6	SP/ SW	30	Continued from sheet #1 Gray medium to coarse <u>SAND</u> , trace silt (33.0') medium dense, wet Reddish brown sandy <u>CLAY</u> , (35.0') stiff, moist Bottom of boring	
					SP/ SW			
HS					CL	35		

SETCO
LITHOLOGIC LOGS
1984

LOG OF BORING NO. P-A

Project Mosley Road No. 2 Landfill site Job. No. G84-230
 Elevation 1157.8 Datum _____ Date 12/19/84
 Type/Size Boring H.S./6" Rig Type CME 750 Logged By LM
 Groundwater Conditions Free water at 14'

Depth, feet	Unconfined Comp. Str. Kips/ft. 2	Piezometer	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
			BS	15	17.8	SM	Brown, silty sand, moist, slightly dense, fine grained (1.5')
5			BS		17.1	SM	Light brown-tan, silty sand, moist, slightly dense, fine grained (5.5')
			BS	95	26.1	CL-ML	Brown, clayey silt layers 2" to 5" thick, moist, slightly stiff (6.5')
10			BS		10.4	SM	Light brown-tan, silty sand, moist slightly dense, fine grained (11.0')
			BS			CL-ML	Brown, clayey silt layers 1" to 6" thick moist, slightly stiff (12.0')
15			BS				Light brown-tan, sand moist, slightly dense, fine grained
							Water entered at 14' at time of drilling
20			BS		23.7	SP-SM	
							(24.0')
25							Termination of boring
30							

SHEPHERD ENGINEERING Testing Co., Inc.
 GEOTECHNICAL CONSULTANTS

LOG OF BORING NO. P-B

Project Mosley Road No. 2 Landfill Site Job. No. G84-230
 Elevation 1153.0 Datum _____ Date 12/19/84
 Type/Size Boring H.S./6" Rig Type CME 750 Logged By LM
 Groundwater Conditions Free water at 12'

Depth, feet	Unconfined Comp. Str. Kips/ft. 2	Piezometer	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
			BS				Brown, silty sand, moist, slightly dense fine grained (1.0')
5			BS	22.2		SM-ML	Light brown-tan, silty sand, moist, slightly dense, fine grained (9.0')
10			BS				Brown, clayey silt lenses 1" to 2" thick, moist, slightly stiff (9.5')
15			BS	17.6		SP-SM	Brown, sand, moist, slightly dense, fine grained
							Water entered at 13' at time of drilling
20			BS				
							(24.0')
25							Termination of boring
30							

SHEPHERD ENGINEERING Testing Co., Inc.
 GEOTECHNICAL CONSULTANTS

LOG OF BORING NO. P-C

Project Mosley Road No. 2 Landfill Site Job. No. G84-230
 Elevation 1151.8 Datum _____ Date 12/19/84
 Type/Size Boring H.S./6" Rig Type CME 750 Logged By LM
 Groundwater Conditions Free water at 10.5'

Depth, feet	Unconfined Comp. Str. Kips/ft. 2	Piezometer	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
0			BS				Brown, silty sand, moist, slightly dense, fine grained (1.5')
5			BS		16.2	SM-ME	
10			BS	101	26.4	SM	
15			BS		22.8	SP-SM	Light brown-tan, silty sand, moist, fine grained with silt layers
13							Water entered at 13' at time of drilling
20			BS				
23.0							(23.0')
24.0							Brown, silty sand, moist, slightly dense, fine grained (24.0')
24.0							Termination of boring
30							

SHEPHERD ENGINEERING Testing Co., Inc.
 GEOTECHNICAL CONSULTANTS

LOG OF BORING NO. P-D

Project Mosely Road No. 2 Landfill Site Job. No. G84-230
 Elevation 1158.3 Datum _____ Date 12/18/84
 Type/Size Boring H.S. /6" Rig Type CME 750 Logged By LM
 Groundwater Conditions _____

Depth, feet	Unconfined Comp. Str. Kips/ft. 2	Piezometer	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
0			BS		12.1	SM-MT	Brown, sandy silty, very moist, slightly dense (2.0')
5			BS			SM	Tan sand, moist, slightly dense, fine grained
10			BS	101	11.2	SM-MT	Light brown, clayey sand, moist, soft (13.0')
15							(14.0')
20			BS		8.1	SP	Tan sand, moist, slightly dense, fine grained
25							Water entered at 18' at time of drilling (24.0')
30							Termination of boring

SHEPHERD ENGINEERING Testing Co., Inc.
 GEOTECHNICAL CONSULTANTS

Project Mosley Road No. 2 Landfill Site Job. No. G84-230
 Elevation 1161.6 Datum _____ Date 12/18/84
 Type/Size Boring H.S./6" Rig Type CME 750 Logged By LM
 Groundwater Conditions _____

Depth, feet	Unconfined Comp. Str. Kips/ft. 2	Piezometer	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
0			BS				Dark brown, silty sand, moist, slightly dense, fine grained (2.0')
5			BS				
10			BS				
15			BS		7.7	SM	Light brown-tan sand, moist, slightly dense, fine grained
20			BS				
24.0			86				(24.0')
25			BS 86		12.1	CL	Brown and black silty clay layers, moist, slightly stiff (25.0')
30							Light brown sand, very moist, slightly dense, fine grained with silt lenses

LOG OF BORING NO. P-E

Project Mosley Road No. 2 Landfill Site Job No. G84-230

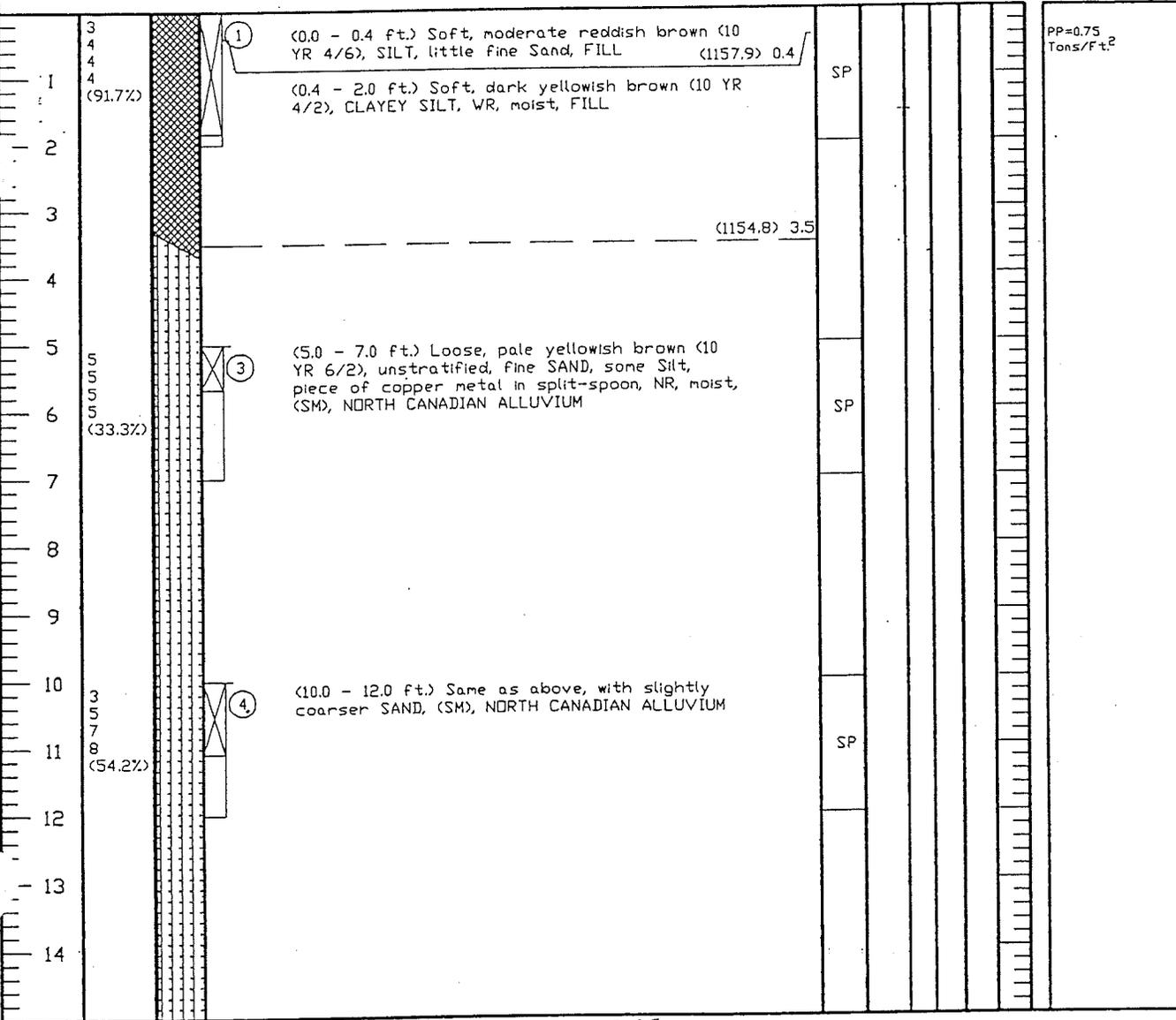
Depth, feet	Unconfined Comp. Str. Kips/ft. ²	Piezometer	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
30			BS				Light brown sand, very moist, slightly dense, fine grained with silt lenses
							(34.0')
35							Termination of boring
40							

GOLDER
LITHOLOGIC LOGS
1990

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 182,692.67 Ft. EASTING: 2,174,653.58 Ft. DATUM NGVD ELEVATION 1158.30'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger				BORING NO. BH-12R	
					SHEET 1 OF 3	
	SAMPLING METHOD: 2-Inch Split Spoon (SP)				DRILLING	
					START TIME 1215	FINISH TIME 1615
					DATE 3/29/90	DATE 3/29/90
DRILL RIG CME 75		SURFACE CONDITIONS Gently sloping, wet, muddy.				
ANGLE Vertical BEARING						
SAMPLE HAMMER 140 lbs., 30 inch drop						

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. DN SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	



DRILLING CONTR Terracon Environmental, Inc.
 R. Smally/ L. Carlson
 LOGGED BY M. Longenfeld
 CHK'D BY SHM
 DATE 6/20/90
 JOB NO.: 903-2223.361
 FILENAME: BH-12R.DWG

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

MOSLEY ROAD SANITARY LANDFILL
OKLAHOMA CITY, OK

NORTHING: 182,692.67 Ft.
EASTING: 2,174,653.58 Ft.

DATUM NGVD ELEVATION 1158.30'

DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD
Hollow Stem Auger

BORING NO.
BH-12R

SAMPLING METHOD: 2-Inch Split Spoon (SP)

SHEET
2 OF 3

DRILLING			
START	FINISH	TIME	TIME
		1215	1615
DATE	DATE	DATE	DATE
		3/29/90	3/29/90

DRILL RIG CME 75

SURFACE CONDITIONS Gently sloping, wet, muddy.

ANGLE Vertical BEARING

SAMPLE HAMMER 140 lbs., 30 inch drop

DEPTH IN FEET (ELEVATION)	BLOW/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	

16	3 6 9 11 (75.0%)	(5)	(15.0 - 17.0 ft.) Same as above, wet, (SM), NORTH CANADIAN ALLUVIUM	SP					
20	8 9 11 (58.3%)	(6)	(20.0 - 21.0 ft.) Same as above, (SM), NORTH CANADIAN ALLUVIUM	SP					
21			(21.0 - 22.0 ft.) Loose to compact, moderate yellowish brown (10 YR 5/4), stratified, fine to medium SAND, little SILT, NR, wet, (SP-SM), NORTH CANADIAN ALLUVIUM.	SP					
25	2 3 6 8 (100.0%)	(8)	(25.0 - 26.0 ft.) Same as above, wet, (SP-SM), NORTH CANADIAN ALLUVIUM	SP	18.9		7%		
26			(26.0 - 27.0 ft.) Firm, dark yellowish brown (10 YR 4/2), SILTY CLAY, interbedded 1'-2' medium sand layers, NR, wet, (CL), NORTH CANADIAN ALLUVIUM	SP	33.4	39	26		
29			See next page for description						

DRILLING CONTR Terracon Environmental, Inc.

R. Smalley / L. Carson

LOGGED BY M. Langenfeld

JOB. NO.: 903-2223.361

DATE 6/20/90

CHK'D BY SHM

FILENAME: BH-12R.DWG

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger		BORING NO. BH-12R
	SAMPLING METHOD: 2-Inch Split Spoon (SP)		SHEET 3 OF 3
NORTHING: 182,692.67 Ft. EASTING: 2,174,653.58 Ft.	DATUM NGVD ELEVATION 1158.30'		DRILLING START TIME: 1215 FINISH TIME: 1615
	DRILL RIG CME 75		DATE: 3/29/90
ANGLE Vertical BEARING	SURFACE CONDITIONS Gently sloping, wet, muddy.		DATE: 3/29/90
SAMPLE HAMMER 140 lbs., 30 inch drop			

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. DN SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	
31	5 7 8 10 (100.0%)	⑩	(30.0 - 32.0 ft.) Loose, dark yellowish brown (10 YR 4/2), stratified, medium SAND, clay interbeds, NR, wet, (SC), NORTH CANADIAN ALLUVIUM	SP					
35	24 50/5' (100.0%)	⑪	(35.0 - 35.5 ft.) Same as above, (SC), NORTH CANADIAN ALLUVIUM (1122.8) 35.5	SP					
36			(35.5 - 36.0 ft.) Moderate reddish brown (10 R 4/6), fine grained SANDSTONE, trace Silt, NR, wet, GARBER-WELLINGTON FORMATION						
39.5			(1118.8) 39.5						
40			Total depth 39.5 feet						

DRILLING CONTR Terracon Environmental, Inc.

R. Snelly/ L. Carson

JOB NO.: 903-2223361 LOGGED BY M. Langenfeld

FILENAME: BH-12R.DWG CHK'D BY SHM DATE 6/20/90

Well No. MW-12R

Boring No. X-Ref: BH-12R

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 182,692.67 ft.
Easting: 2,174,653.58 ft.

Elevation Ground Level 1158.30 ft. NGVD
Top of PVC Casing 1160.85 ft. NGVD

Drilling Summary:

Total Depth 39.5 ft.
 Borehole Diameter 10.25 in.
 Casing Stickup Height 2.55 ft.
 Driller Terracon Environmental, Inc.
Oklahoma City, OK

Rig CME 75
 Bit(s) 6.25 in. I.D. Hollow Stem Auger

Drilling Fluid None

Protective Casing 6 in. I.D. Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log x Geophysical Log _____
Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2.55 - 14.5	C1	1160.85 - 1143.80
14.5 - 29.5	S1	1143.80 - 1128.80
29.5 - 32.5	C1	1128.80 - 1125.80
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 PVC
flush threaded/ tellon tape

Screen: S1 2" diameter SCH 40 PVC
Machine slotted (0.010-in.)

Filler Pack: Primary Sand: 34.5-12.5 ft.
Secondary Sand: 12.5-10.5 ft., 5.0-4.0 ft.

Grout Seal: Sacrete: 4.0-+0.5 ft.

Bentonite Seal: Chipped Bentonite: 37.0-34.5 ft.
10.5-5.0 ft.

Comments:

(39.5-37.0 ft.) overdrilled into Garber Wellington; sand and silt sloughed into rathole
Top of Garber Wellington Formation at 35.5 ft.

Construction Time log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	3-29-90	1215	3-29-90	1550
Geophys. Logging	N/A			
Casing:				
PVC	3-30-90	0812	3-30-90	0950
6" aluminum	3-30-90	1020	3-30-90	1030
Filter Placement:	3-30-90	0812	3-30-90	0950
Cementing:				
Development	5-13-90	0750	5-13-90	1220

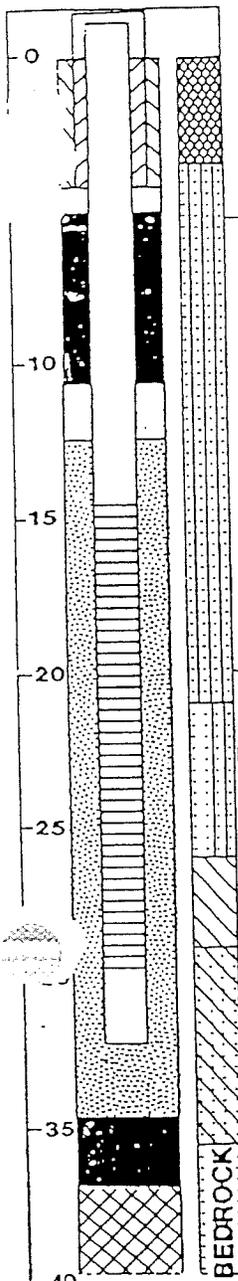
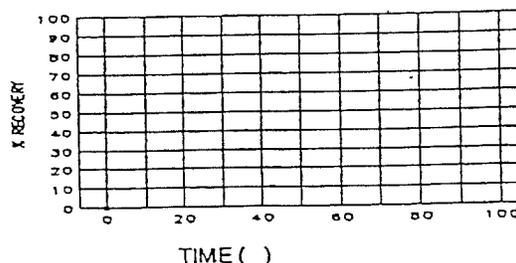
Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:

Q= _____ S₀= _____



Supervised by Matt Langenfeld

Site Mosley Road Sanitary Landfill

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,045.51 Ft. EASTING: 2,176,039.40 Ft.	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Sten Auger				BORING NO. BH-14R	
	SAMPLING METHOD: 2-Inch Split Spoon (SP) Shelby tube from 12.0-14.0'(SH)				SHEET 1 OF 4	
					DRILLING	
					START TIME 0915	FINISH TIME 1310
DATUM NGVD ELEVATION 1163.30'				WATER LEVEL 12.9'		
				TIME 1220		
				DATE 4/10/90		
				CASING DEPTH	DATE 4/10/90	

DRILL RIG CME 75	SURFACE CONDITIONS Dry, gently sloping grass and weeds.
ANGLE Vertical BEARING	
SAMPLE HAMMER 140 lbs., 30 inch drop	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	

1	66.7%	①	(0.0 - 0.3 ft.) Soft, moderate reddish orange (10 R 6/6), mottled, SILTY CLAY, little roots, WR, damp, FILL (1163.0) 0.3	SP					
2			(0.3 - 2.0 ft.) Very stiff, pale yellowish brown (10 YR 6/2), weakly stratified, mottled, CLAYEY SILT, trace Sand, trace roots, clay partings, WR, damp, (ML), NORTH CANADIAN ALLUVIUM						
3									
4									
5	45.8%	②	(5.0-7.0) Soft, dark yellowish brown (10 YR 4/2), mottled little to some roots, weakly stratified, clayey SILT, trace sand, WR, damp, (ML), NORTH CANADIAN ALLUVIUM	SP					
6									
7									
8									
9									
10	95.8%	③	(10.0 - 12.0 ft.) Very stiff, dark yellowish brown (10 YR 4/2), unstratified, grey mottling, SILTY CLAY, trace Gravel, trace roots, NR, damp to moist, (CH), NORTH CANADIAN ALLUVIUM	SP	37.7	76	57	86%	PP=4.5 Tons/Ft. ² pH
11									
12	100.0%	④		SH	38.3	74	56		CEC DCE Organic Matter PERH
13									
14									

DRILLING CONTR Terracon Environmental, Inc.

R. Smalley/ L. Carson

JOB NO.: 903-2223-361 LOGGED BY E. Pottorff

FILENAME: BH-14R.DWG CHK'D BY SHM DATE 6/20/90

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,045.51 Ft. EASTING: 2,176,039.40 Ft.	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch DD			BORING NO. BH-14R	
	Hollow Stem Auger			SHEET 2 OF 4	
	SAMPLING METHOD: 2-Inch Split Spoon (SP)			DRILLING	
	Shelby tube from 12.0-14.0'(SH)			START	FINISH
	WATER LEVEL	12.9'		TIME	TIME
	TIME	1220		0915	1310
	DATE	4/10/90		DATE	DATE
	CASING DEPTH			4/10/90	4/10/90

DATUM NGVD	ELEVATION 1163.30'	SURFACE CONDITIONS Dry, gently sloping grass and weeds.
DRILL RIG CME 75		
ANGLE Vertical	BEARING	
SAMPLE HAMMER 140 lbs., 30 inch drop		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	

16	6 8 8 8 (37.5%)	⑤	(15.0 - 17.0 ft.) Very stiff, moderate yellowish brown (10 YR 5/4), weakly stratified, slightly mottled, CLAYEY SILT, trace Sand, trace clay partings, NR, moist to wet, (ML), NORTH CANADIAN ALLUVIUM	SP					
18			(1145.3) 18.0						
20	2 3 6 (75.0%)	⑥	(20.0 - 22.0 ft.) Compact, moderate yellowish brown (10 YR 5/4), stratified, mottled, fine SAND, some silt, interbedded clay lenses and partings, NR, wet, (SM), NORTH CANADIAN ALLUVIUM	SP	22.7		22		
25	4 7 10 10 (50.0%)	⑦	(25.0 - 27.0 ft.) Same as above, becoming fine to coarse grained, (SM), NORTH CANADIAN ALLUVIUM	SP					
26									
27									
28									
29									

DRILLING CONTR Terracon Environmental, Inc.
 R. Snalley/ L. Carlson
 LOGGED BY E. Pottorff
 CHK'D BY SHM
 DATE 6/20/90
 JOB NO.: 903-2223.361
 FILENAME: BH-14R.DWG

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,045.51 Ft. EASTING: 2,176,039.40 Ft. DATUM NGVD ELEVATION 1163.30'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger			BORING NO. BH-14R	
	SAMPLING METHOD: 2-Inch Split Spoon (SP) Shelby tube from 12.0-14.0'(SH)			SHEET 3 OF 4	
	WATER LEVEL 12.9'			DRILLING START FINISH TIME TIME 0915 1310	
	TIME 1220			DATE DATE 4/10/90 4/10/90	
	DATE 4/10/90			CASING DEPTH	
	DRILL RIG CME 75			SURFACE CONDITIONS Dry, gently sloping grass and weeds.	

ANGLE Vertical BEARING	SAMPLE HAMMER 140 lbs., 30 inch drop
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DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	

31	7 17 27 30 (33.3%)	⑧	(30.0 - 32.0 ft.) Same as above, becoming pale yellowish brown (10 YR 6/2), predominantly fine to medium grained, fine clay lenses, (SM), NORTH CANADIAN ALLUVIUM	SP					
32									
33									
34									
35	3 15 35 50 (58.3%)	⑨	(35.0 - 35.2 ft.) Same as above, (SM), NORTH CANADIAN ALLUVIUM (1128.1) 35.2 (35.2 - 35.7 ft.) CLAYEY SILT, (ML), NORTH CANADIAN ALLUVIUM (1127.6) 35.7	SP	9.7	9%			
36									
37			(35.7 - 37.0 ft.) Very dense, dark yellowish brown (10 YR 4/2) to light olive grey (5 Y 5/2), fine to coarse SAND, little Silt, trace to little fine Gravel, NR, wet, (SW-SM), NORTH CANADIAN ALLUVIUM						
38									
39									
40	10 8 7 20 (50.0%)	⑩	(40.0 - 42.0 ft.) Same as above, (SW-SM), NORTH CANADIAN ALLUVIUM	SP					
41									
42									
43									
44			(45.0 - 45.2 ft.) Very dense, moderate reddish orange (10 R 6/6), unstratified, fine SANDSTONE and Clayey Siltstone, trace Gravel, NR, wet, (GARBER-WELLINGTON FORMATION) (1120.3) 43.0						

DRILLING CONTR Terracon Environmental, Inc.

R. Smalley/ L. Carson

JOB NO.: 903-2223.361 LOGGED BY E. Pottorff

FILENAME: BH-14R.DWG CHK'D BY SHM DATE 6/20/90

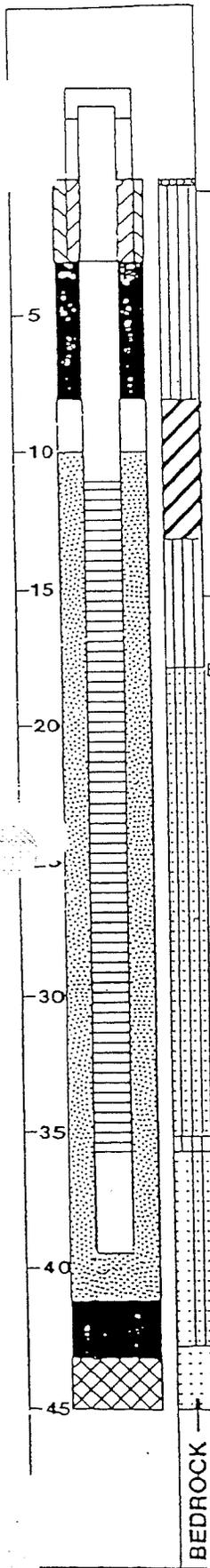
Well No. MW-14R

Boring No. X-Ref: BH-14R

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 184,045.51 ft.
Easting: 2,176,039.40 ft.

Elevation Ground Level 1163.30 ft. NGVD
Top of PVC Casing 1166.09 ft. NGVD



Drilling Summary:

Total Depth 45.2 ft.; Caved to 43.5 ft.
Borehole Diameter 10.25 in.
Casing Stickup Height 2.79 ft.
Driller Terracon Environmental, Inc.
Oklahoma City, OK
R. Smalley/ L. Carson
Rig CME 75
Bit(s) 6.25 I.D. Hollow Stem Auger
Drilling Fluid Potable Water
Protective Casing 6 in. I.D. Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log _____
Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2.79 - 11.2	C1	1166.09 - 1152.10
11.2 - 35.7	S1	1152.10 - 1127.60
35.7 - 39.0	C1	1127.60 - 1124.30
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 Johnson PVC
flush threaded/ teflon tape

Screen: S1 2" diameter SCH 40 Johnson PVC
Machine slotted (0.010-in.)

Filter Pack: Primary Sand: 41.1-10.0 ft.

Secondary Sand: 10.0-8.0 ft.

Grout Seal: Cement: 3.5-0.0 ft.

Bentonite Seal: Chipped Bentonite: 43.5-41.1 ft.,
8.0-3.5 ft.

Comments:

Level D protection.
Chipped bentonite was used as grout seal because
the sand pack was so shallow

Construction Time log:

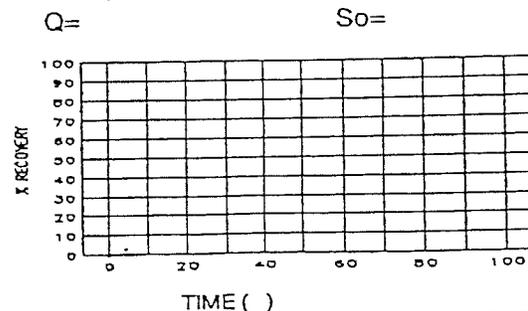
Task	Start		Finish	
	Date	Time	Date	Time
Drilling	4-10-90	0915	4-10-90	1310
Geophys. Logging	N/A			
Casing:				
PVC	4-10-90	1333	4-10-90	1341
6" aluminum	4-10-90	1500	4-10-90	1530
Filter Placement:	4-10-90	1310	4-10-90	1500
Cementing:	See Comments			
Development	5-6-90	1500	5-6-90	1425

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:



Supervised by Ed Pottorff Site Mosley Road Sanitary Landfill

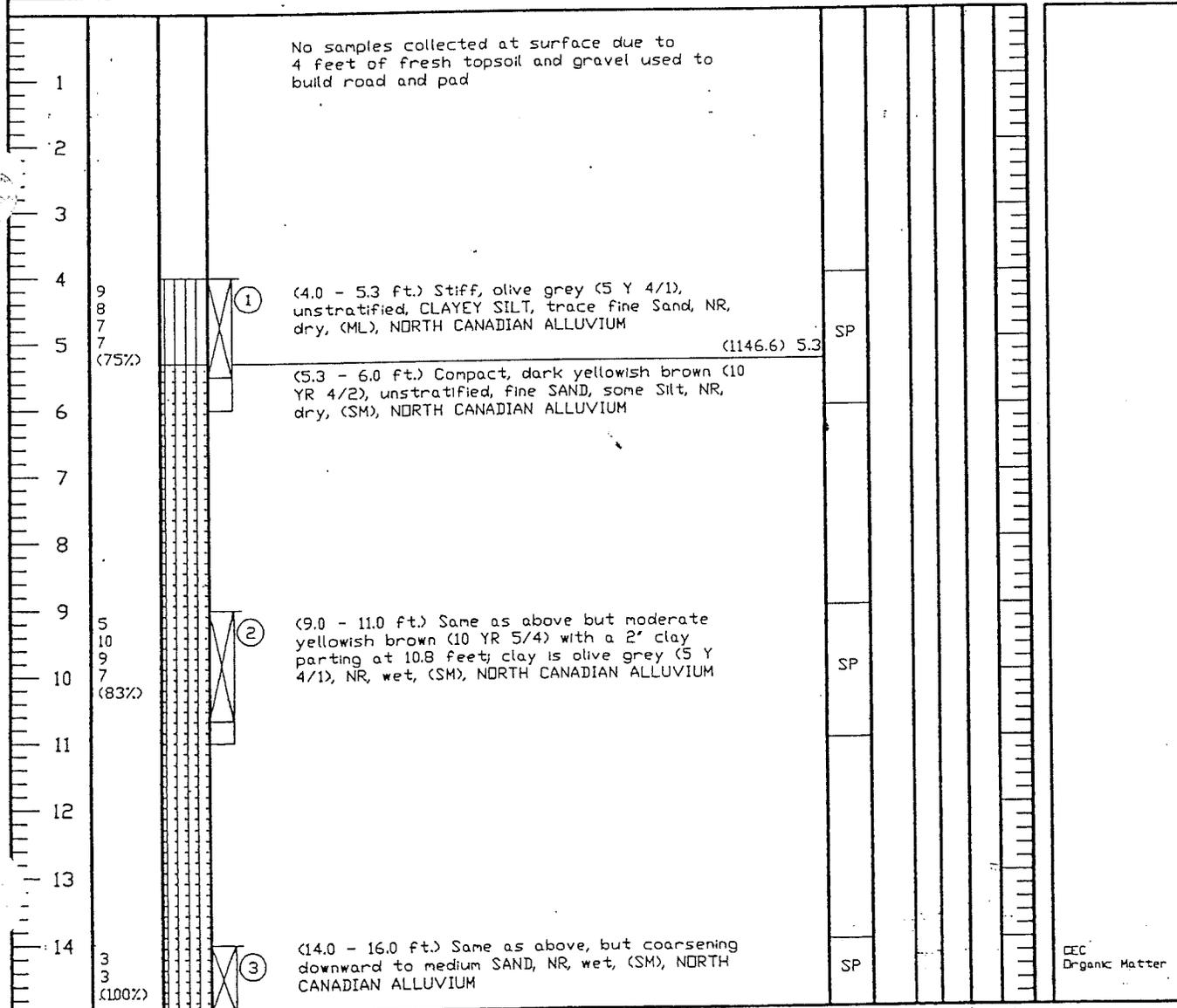
SOIL BOREHOLE LOG

MW-201

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,325.52 Ft. EASTING: 2,175,066.62 Ft. DATUM NGVD ELEVATION 1151.90'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger			BORING NO. BH-201	
	SAMPLING METHOD: 2-Inch Split Spoon (SP)			SHEET 1 OF 3	
	WATER LEVEL 8.4'			DRILLING START TIME 1600 FINISH TIME 0945	
	TIME 1630			DATE 4/19/90	
	DATE 4/19/90			CASING DEPTH 4/19/90 4/20/90	
DRILL RIG CHE 75		SURFACE CONDITIONS Muddy, flat area north side of landfill.			
ANGLE Vertical BEARING					
SAMPLE HAMMER 140 lbs., 30 inch drop					

DRILLING CONTR Terracon Environmental, Inc.
 R. Kelly/B. Ritchie

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN NO. 200	



LOGGED BY P. Griesedieck
 CHK'D BY E. Pottorff DATE 6/20/90
 JOB NO: 903-2223.361
 FILENAME: BH-201.DWG

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,325.52 Ft. EASTING: 2,175,066.62 Ft. DATUM NGVD ELEVATION 1151.90'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger			BORING NO. BH-201	
	SAMPLING METHOD: 2-Inch Split Spoon (SP)			SHEET 3 OF 3	
	WATER LEVEL 8.4'			DRILLING START TIME 1600 FINISH TIME 0945	
	TIME 1630			DATE 4/19/90	
DATE 4/19/90			CASING DEPTH		

DRILL RIG CME 75 ANGLE Vertical BEARING SAMPLE HAMMER 140 lbs., 30 inch drop	SURFACE CONDITIONS Muddy, flat area north side of landfill.
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DEPTH IN FEET (ELEVATION)	BLOW/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	

31	5 6 (45.8%)	(6)		SP					
32	50/5" (100%)	(7)	(1120.4) 31.5 (32.0 - 32.5 ft.) Very dense, pale reddish brown (10 R 5/4), completely weathered, unstratified, fine grained SANDSTONE, NR, wet, GARBER-WELLINGTON FORMATION	SP					
34			(1117.9) 34.0						
35			Total depth of 34.0 feet						
36									
37									
38									
39									
40									
41									
42									
43									
44									

DRILLING CONTR Terracon Environmental, Inc.
 R. Kelly/B. Ritchie
 LOGGED BY P. Grimesdleck
 CHK'D BY E. Pottorff
 DATE 6/20/90
 JOB NO.: 903-2223.361
 FILENAME: BH-201.DWG

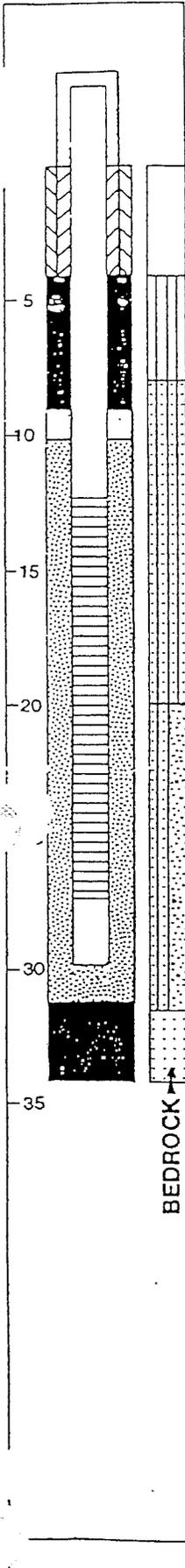
Well No. MW-201

Boring No. X-Ref: BH-201

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 184,325.52 ft.
Easting: 2,175,066.62 ft.

Elevation Ground Level 1151.90 ft. NGVD
Top of PVC Casing 1154.73 ft. NGVD



Drilling Summary:

Total Depth 34.0 ft.
Borehole Diameter 8.25 in.
Casing Stickup Height 2.83 ft.
Driller Terracon Environmental, Inc.
Oklahoma City, OK
R. Kelly
Rig CME 75
Bit(s) 6.25 in. I.D. Hollow Stem Auger
Drilling Fluid Potable water to wash hole
Protective Casing 6 in. I.D. Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2.83 - 12.0	C1	1154.73 - 1139.90
12.0 - 27.0	S1	1139.90 - 1124.90
27.0 - 30.0	C1	1124.90 - 1121.90
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 Johnson PVC
Flush threaded/ teflon tape
Screen: S1 2" diameter SCH 40 Johnson PVC
Machine slotted (0.010-in.)

Filter Pack: Primary Sand: 31.0-10.0 ft.
Secondary Sand: 10.0-9.0 ft.

Grout Seal: Cement: 4.0-0.0 ft.

Bentonite Seal: Bentonite Gravel: 9.0-4.0 ft.

Comments:

All work done in "Level D."
Augers had to be advanced to 34.0 ft. (Garber Wellington contact at 31.5 ft.)
to get an adequate "seal" to wash out sands.

Construction Time log:

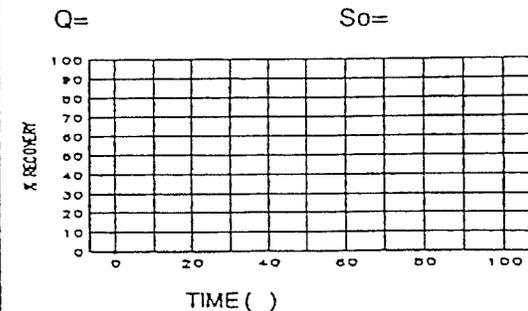
Task	Start		Finish	
	Date	Time	Date	Time
Drilling	4-19-90	1600	4-19-90	1730
	4-20-90	0730	4-20-90	0930
Geophys. Logging	N/A			
Casing:	4-20-90	1000	4-20-90	1010
6" protective casing	4-20-90	1130	4-20-90	1135
Filter Placement:	4-20-90	0945	4-20-90	1115
Cementing:	4-20-90	1135	4-20-90	1150
Development	5-16-90	1340	5-16-90	1645

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:



Supervised by Paul Griesedieck Site Mosley Road Sanitary Landfill

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK		DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD				BORING NO. BH-207			
		Hollow Stem Auger				SHEET 1 OF 3			
NORTHING: 183,734.02 FT. EASTING: 2,174,447.08 FT.		SAMPLING METHOD: 2-Inch Split Spoon (SP)				DRILLING			
						START	FINISH		
DATUM NGVD ELEVATION 1154.60'		WATER LEVEL	8.0'			TIME 0830	TIME 1710		
		TIME	1710			DATE 3/27/90	DATE 3/27/90		
		CASING DEPTH							
DRILL RIG CME 75		SURFACE CONDITIONS Flat, grassy area on west side of landfill.							
ANGLE Vertical BEARING									
SAMPLE HAMMER 140 lbs., 30 inch drop									
DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	
1 5 (63%)		①	(0.0 - 2.0 ft.) Stiff, moderate brown (5 YR 3/4), SILTY CLAY, NR, damp, FILL	SP					
2 6 (63%)		②	(5.0 - 7.0 ft.) Stiff, moderate brown (5 YR 3/4), SILTY CLAY, some Sand, NR, FILL	SP					
3 7 (83%)		③	(10.0 - 12.0 ft.) Compact, pale yellowish brown (10 YR 6/2), fine to medium SAND, little Silt, upwards fining, NR, wet, (SM), NORTH CANADIAN ALLUVIUM	SP					
4 8 (1146.6)			8.0						

DRILLING CONTR Terracon Environmental, Inc.

R. Kelly/R. Lawver

JOB NO.: 903-2223.321 LOGGED BY P. Grisesdieck

FILENAME: BH-207.DWG CHK'D BY E. Pottorff DATE 6/20/90

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 183,734.02 FT. EASTING: 2,174,447.08 FT. DATUM NGVD ELEVATION 1154.60'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger			BORING NO. BH-207	
	SAMPLING METHOD: 2-Inch Split Spoon (SP)			SHEET 2 OF 3	
	WATER LEVEL 8.0' TIME 1710 DATE 3/27/90			DRILLING START TIME 0830 FINISH TIME 1710 DATE 3/27/90	
	CASING DEPTH			DATE 3/27/90	

DRILL RIG CME 75 ANGLE Vertical BEARING SAMPLE HAMMER 140 lbs., 30 inch drop	SURFACE CONDITIONS Flat, grassy area on west side of landfill.
--	--

DEPTH IN FEET (ELEVATION)	BLOW/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	

16	9 3 9 (88%)	④	(15.0 - 15.6 ft.) Very loose, pale yellowish brown (10 YR 6/2), unstratified, fine to medium SAND, little Silt, NR, wet, (SM), NORTH CANADIAN ALLUVIUM (1139.0) 15.6	SP	28.7	48	33	
17			(15.6 - 16.9 ft.) Stiff, dark yellowish brown (10 YR 4/2), SILTY CLAY, some fine to medium Sand, NR, wet, (CL), NORTH CANADIAN ALLUVIUM (1137.7) 16.9					
18			(16.9 - 17.0 ft.) Compact, greenish grey (5 Y 6/1), unstratified, fine to medium SAND, some Silt, WR, wet, (SM), NORTH CANADIAN ALLUVIUM					
20	5 7 9 (100%)	⑤	(20.0 - 22.0 ft.) Compact, dark yellowish brown (10 YR 4/2), unstratified, fine to medium SAND, some Silt, NR, wet, (SM), NORTH CANADIAN ALLUVIUM	SP	20.4		14	
25	1 2 4 3 (79%)	⑥	(25.0 - 27.0 ft.) Loose, pale yellowish brown (10 YR 6/2), moderately stratified, fine to coarse SAND, some Silt, NR, wet, (SM), NORTH CANADIAN ALLUVIUM	SP				

DRILLING CONTR Terracon Environmental, Inc.

R. Kelly/R. Lawler

LOGGED BY P. Griesedieck

CHK'D BY E. Pottorff DATE 6/20/90

JOB NO.: 903-2223.321

FILENAME: BH-207.DWG

ROCK BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK	DRILLING METHOD: NX-Core, then reamed to 5 7/8 inch	BORING NO. BH-208
NORTHING: 183,705.46 FT. EASTING: 2,174,447.64 FT.	SAMPLING METHOD: 10' Split Core Barrel	SHEET 2 OF 3
DATUM NGVD ELEVATION 1154.50'	WATER LEVEL TIME DATE	DRILLING START TIME 0830 FINISH TIME 1200 DATE 4/2/90
DRILL RIG CME 75	SURFACE CONDITIONS Flat, muddy landfill	
ANGLE Vertical BEARING NA		
SAMPLE HAMMER NA		

DEPTH IN FEET (ELEVATION)	LENGTH OF RUN (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	TEST RESULTS				OTHER TESTS
				DISCONTINUITY DESCRIPTION	DISCONTINUITY DIP	ROCK QUALITY DESCRIPTION	FRACTURES PER FOOT	

46	8.8/9.8' (89.8%)		(46.4 - 47.3 ft.) Core loss	 	62%	
47			(47.3 - 57.3 ft.) Highly to moderately weathered, finely laminated to massive with calcite stringers parallel to bedding, locally cross-bedded, pale red (10 R 6/2) to moderate reddish brown (10 R 4/6), well sorted, fine grained SANDSTONE, GARBER-WELLINGTON FORMATION	J,C,LI 72	72	0
48				B,S,M,LI 82	82	2
49						0
50						0
51			50.4 - 52.5 ft.: Cross-bedding more apparent with localized limonite staining (57.3 - 57.7) As above	B,SM 86	86	1
52	9.7/10.0' (97.0%)			B,S,M,LI 85	85	91%
53						1
54						0
55						0
56			(1096.8) 57.7			0
57			(57.7 - 58.3 ft.) Moderately weathered, brecciated with sub-rounded clasts up to 1/2" in diameter (sandstone), jointed, with calcite stringers and surficial coating on clasts, greyish brown (5 YR 3/2) due to limonite staining with pale red (10 R 6/2) clasts, poorly sorted, sandstone clasts in fine grained SANDSTONE BRECCIA, GARBER-WELLINGTON FORMATION	B,S,M,LI 88	88	1
58			(1096.2) 58.3	J,I,LI 86	86	1
59	8.7/8.7' (100.0%)		(58.3 - 66.0 ft.) Moderately weathered, finely laminated to massive with calcite stringers parallel to bedding, localized cross bedding, pale red (10 R 6/2) to moderate reddish brown (10 R 4/6), well sorted, fine grained SANDSTONE, GARBER-WELLINGTON FORMATION	B,I,R,LI 86	86	89%
						1
						0

DRILLING CONTR Terracon Environmental, Inc.
 R. Kelly/R. Lawver
 LOGGED BY P. Griesedieck
 CHK'D BY E. Pottorff
 DATE 7/5/90
 JOB NO.: 903-2223.361
 FILENAME: BH-208.DWG

ROCK BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 183,705.46 FT. EASTING: 2,174,447.64 FT. DATUM NGVD ELEVATION 1154.50'	DRILLING METHOD: NX-Core, then reamed to				BORING NO. BH-208	
	5 7/8 inch				SHEET	
	SAMPLING METHOD: 10' Split Core Barrel				3 OF 3	
					DRILLING	
	WATER LEVEL				START TIME	FINISH TIME
	TIME				0830	1200
DATE				DATE	DATE	
CASING DEPTH				4/2/90	4/2/90	
DRILL RIG CME 75			SURFACE CONDITIONS Flat, muddy landfill			
ANGLE Vertical BEARING NA						
SAMPLE HAMMER NA						

DEPTH IN FEET (ELEVATION)	LENGTH OF RUN (%RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	TEST RESULTS				OTHER TESTS
				DISCONTINUITY DESCRIPTION	DISCONTINUITY DIP	ROCK QUALITY DESCRIPTION	FRACTURES PER FOOT	
61							0	
62							0	
63	8.7/8.7' (100.0%)	Core Run 4	63.3 - 63.9 ft: area of prominent calcite stringers	B,SM,	82	89%	1	
64							0	
65							0	
66			(1088.5) 66.0				0	
			Total depth of 66.0 feet					
67								
68								
69								
70								
71								
72								
73								
74								

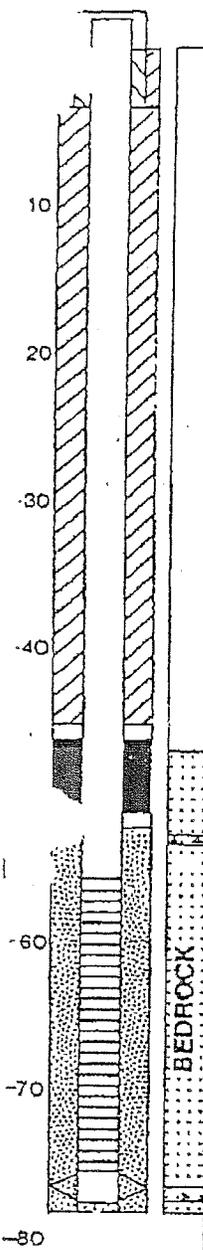
DRILLING CONTR Terracon Environmental, Inc.
 R. Kelly/R. Lawver
 LOGGED BY P. Griesedieck
 CHK'D BY E. Pottorff DATE 7/5/90
 JOB NO.: 903-2223.361
 FILENAME: BH-208.DWG

Boring No. X-Ref: BH-209

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 181,823.04 ft.
Easting: 2,175,696.36 ft.

Elevation Ground Level 1162.30 ft. NGVD
Top of PVC Casing 1165.45 ft. NGVD



Drilling Summary:

Total Depth 78.5 ft.
Borehole Diameter 10.25 in.
Casing Stickup Height 3.15 ft.
Driller Terracon Environmental, Inc.
Oklahoma City, OK
R. Kelly
Rig CME 75
Bit(s) 6.25 in. I.D. Hollow Stem Auger
Drilling Fluid Potable Water
Protective Casing 8 in. I.D. Anodized aluminum

Construction Time log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling				
Coring	4-8-00	0900	4-8-00	1220
Geophys. Logging	N/A			
Casing:				
PVC	4-9-00	1710	4-9-00	1725
4" Protective	4-10-00	0900	4-10-00	0920
Filter Placement:	4-9-00	1700	4-9-00	1845
Cementing:	4-10-00	0750	4-10-00	0840
Development	5-16-00	0910	5-16-00	1100

Well Design & Specifications

Basis: Geologic Log Geophysical Log

Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 1.30 - 47.0	C1	1163.50 - 1115.30
+ 3.15 - 55.5	C2	1165.45 - 1106.80
55.5 - 75.5	S1	1106.80 - 1086.80
75.5 - 78.5	C2	1086.80 - 1083.80

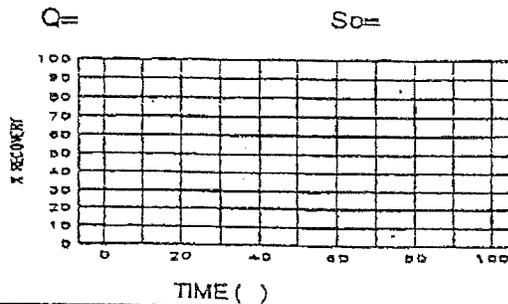
Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Casing: C1 6" steel surface casing.
C2 2" diameter, SCH 40 Brainard-Kilman PVC flush threaded/ tallon tape
Screen: S1 2" diameter, SCH 40 Brainard-Kilman Machine slotted (0.010-in.) PVC

Recovery Data:



Filter Pack: Primary Sand: 78.5-52.0 ft.
Secondary Sand: 52.0-51.3 ft., 46.0-45.0 ft.
Grout Seal: 45.0-+ 1.3 ft.
Bentonite Seal: Holeplug: 51.3-46.0 ft.

Comments:

4-arm stainless steel centralizer placed at bottom of screen.

Supervised by Paul Gristeddeck
Job number 02-223,361

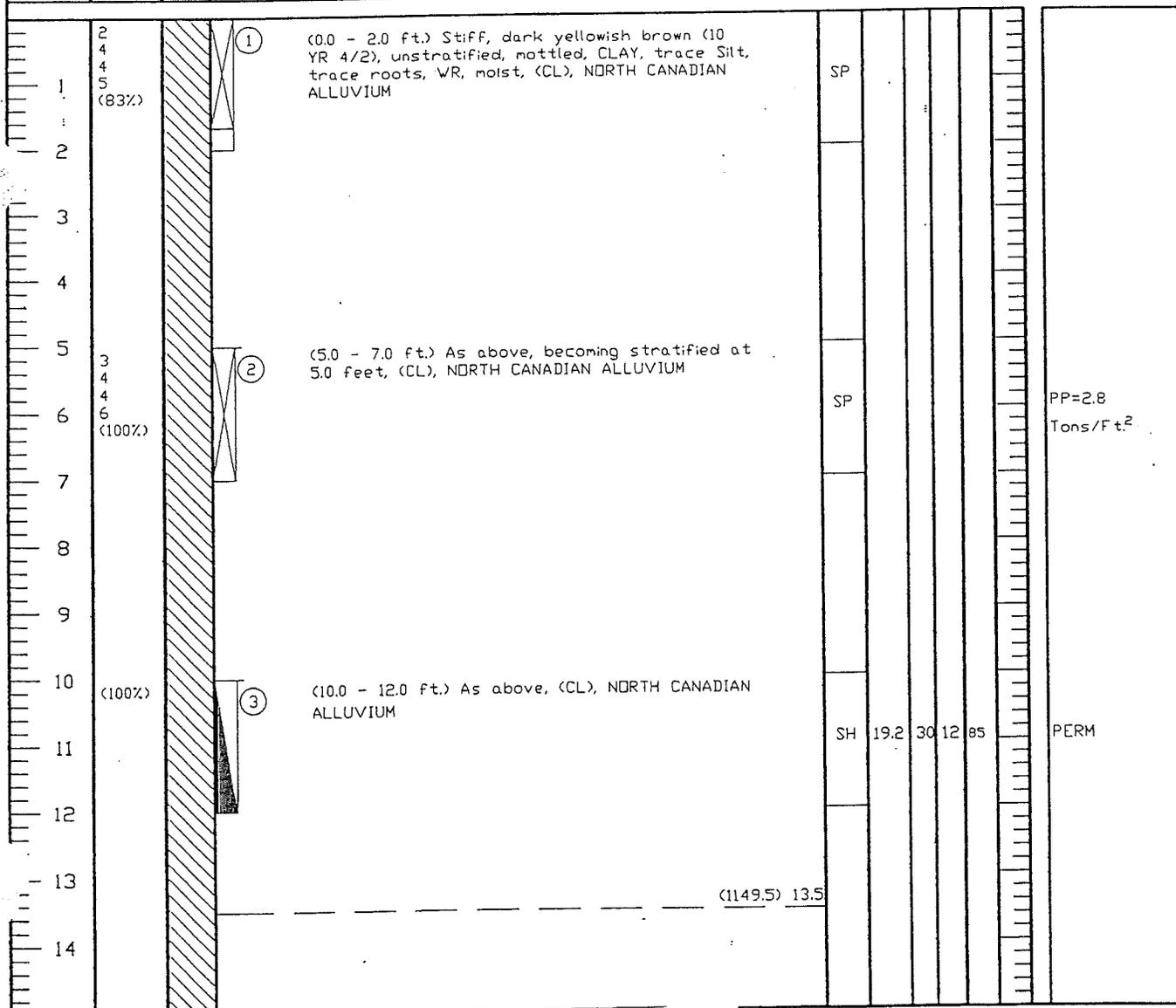
Site Mosley Road Sanitary Landfill
Filename MYL-209

SOIL BOREHOLE LOG

mw-211

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK. NORTHING: 184,514.18 Ft. EASTING: 2,173,576.00 Ft. DATUM NGVD ELEVATION 1163.00'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch DD			BORING NO.		
	Hollow Stem Auger			BH-211		
	SAMPLING METHOD: 2-Inch Split Spoon (SP)			SHEET		
	2-Inch Shelby Tube (SH)			1 OF 4		
				DRILLING		
			WATER LEVEL	15.5'	START TIME	0910
			TIME	1435	FINISH TIME	1430
			DATE	4/9/90	DATE	4/9/90
			CASING DEPTH	Auger to 59.0'	DATE	4/9/90
DRILL RIG CME 75			SURFACE CONDITIONS Flat, dry grass and weeds.			
ANGLE Vertical BEARING						
SAMPLE HAMMER 140 lbs., 30 inch drop						

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN NO. 200	



SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,514.18 Ft. EASTING: 2,173,576.00 Ft. DATUM NGVD ELEVATION 1163.00'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD Hollow Stem Auger			BORING NO. BH-211	
	SAMPLING METHOD: 2-Inch Split Spoon (SP) 2-Inch Shelby Tube (SH)			SHEET 2 OF 4	
	WATER LEVEL 15.5'			DRILLING START TIME 0910	
	TIME 1435			FINISH TIME 1430	
	DATE 4/9/90			DATE 4/9/90	
	CASING DEPTH Auger to 59.0'			DATE 4/9/90	
DRILL RIG CME 75		SURFACE CONDITIONS Flat, dry grass and weeds.			
ANGLE Vertical BEARING					
SAMPLE HAMMER 140 lbs., 30 inch drop					

DEPTH IN FEET (ELEVATION)	BLOW/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS			OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX LESS THAN No. 200	

4			(15.0 - 16.1 ft.) Stiff, moderate yellowish brown (10 YR 5/4), mottled, SILTY CLAY, WR, moist, (CH), NORTH CANADIAN ALLUVIUM (1146.9) 16.1	SP	21.5	66	47	PP=2.5 Tons/Ft. ²
16	6 (100%)	④	(16.1 - 17.0 ft.) Stiff, moderate yellowish brown (10 YR 5/4), mottled, SILTY CLAY, trace Sand, trace fine Gravel, NR, moist to wet, (CL), NORTH CANADIAN ALLUVIUM					
17								
18								
19								
20	4 (83%)	⑤	(20.0 - 22.0 ft.) Same as above, (CL), NORTH CANADIAN ALLUVIUM	SP				
21								
22								
23								
24								
25	3 7 11 (92%)	⑥	(25.0 - 27.0 ft.) Very stiff, moderate yellowish brown (10 YR 5/4), weakly stratified, slight mottling, CLAYEY SILT, trace to little Sand, trace clay partings, NR, wet, (ML), NDRTH CANADIAN ALLUVIUM	SP				
26								
27								
28								
29								

DRILLING CONTR Terracon Environmental, Inc.

R. Snally/ L. Carson

JOB NO.: 903-2223.361 LOGGED BY E. Pottorff

FILENAME: BH-211.DWG CHK'D BY E. Pottorff DATE 6/20/90

SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK NORTHING: 184,514.18 Ft. EASTING: 2,173,576.00 Ft. DATUM NGVD ELEVATION 1163.00'	DRILLING METHOD: 6.25-Inch ID, 10.25-Inch DD Hollow Stem Auger SAMPLING METHOD: 2-Inch Split Spoon (SP) 2-Inch Shelby Tube (SH)	BORING NO. BH-211 SHEET 3 OF 4 DRILLING START FINISH TIME TIME 0910 1430 DATE DATE 4/9/90 4/9/90
DRILL RIG CME 75 ANGLE Vertical BEARING SAMPLE HAMMER 140 lbs., 30 inch drop	SURFACE CONDITIONS Flat, dry grass and weeds.	

DEPTH IN FEET (ELEVATION)	BLOW/6 IN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS			OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX LESS THAN No. 200	
31	4 7 11 15 (100%)	⑦	(30.0 - 32.0 ft.) Compact, moderate yellowish brown (10 YR 5/4), weakly stratified, fine SAND, some Silt, trace clay partings, NR, wet, (SM), NORTH CANADIAN ALLUVIUM	SP	20.7	13		
33			(1130.0) 33.0					
36	3 4 7 7 (79%)	⑧	(35.0 - 37.0 ft.) Compact, pale yellowish brown (10 YR 6/2) and light olive grey (5 Y 5/2), weakly stratified, mottled, fine to coarse SAND, trace Silt, trace Gravel, 1" silt layer at 36.5', NR, wet, (SP), NORTH CANADIAN ALLUVIUM	SP				
41	7 17 17 22 (50%)	⑨	(40.0 - 42.0 ft.) Same as above, (SP), NORTH CANADIAN ALLUVIUM	SP	16.8	3		

DRILLING CONTR. Terracon Environmental, Inc.
 R. Smally/ L. Carson
 LOGGED BY E. Pottorff
 CHK'D BY E. Pottorff DATE 6/20/90
 JOB NO.: 903-2223.361
 FILENAME: BH-211.DVG

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

MOSLEY ROAD SANITARY LANDFILL
OKLAHOMA CITY, OK

NORTHING: 184,514.18 Ft.
EASTING: 2,173,576.00 Ft.

DATUM NGVD

ELEVATION 1163.00'

DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD

Hollow Stem Auger

BORING NO.

BH-211

SAMPLING METHOD: 2-Inch Split Spoon (SP)

2-Inch Split Spoon (SP)

SHEET

4 OF 4

DRILLING

WATER LEVEL 15.5'

TIME 1435

DATE 4/9/90

CASING DEPTH Auger to 59.0'

START FINISH

TIME TIME

0910 1430

DATE DATE

4/9/90 4/9/90

DRILL RIG CME 75

SURFACE CONDITIONS Flat, dry grass and weeds.

ANGLE Vertical BEARING

SAMPLE HAMMER 140 lbs., 30 inch drop

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN NO. 200	

46	(54%)	(10)	(45.0 - 47.0 ft.) Compact, pale yellowish brown (10 YR 6/2) and light olive grey (5 Y 5/2), weakly stratified, mottled, fine to coarse SAND, trace Silt, trace Gravel, NR, wet, (SP) NORTH CANADIAN ALLUVIUM	SP					
50	47 11 17 (0%)	(NS)	(50.0 - 52.0 ft.) Same as above, (SP), NORTH CANADIAN ALLUVIUM	SP					
55	47 7 20 11 73%	(11)	(55.0 - 56.9 ft.) Same as above, (SP), NORTH CANADIAN ALLUVIUM						
57			(1106.1) 56.9						
58			(56.9 - 57.5 ft.) Very dense, moderate reddish orange (10 R 6/6), unstratified, fine SANDSTONE, trace Gravel, NR, wet, GARBER-WELLINGTON FORMATION						
59			(1104.0) 59.0						
			Total depth of 59.0 feet						

DRILLING CONTR Terracon Environmental, Inc.

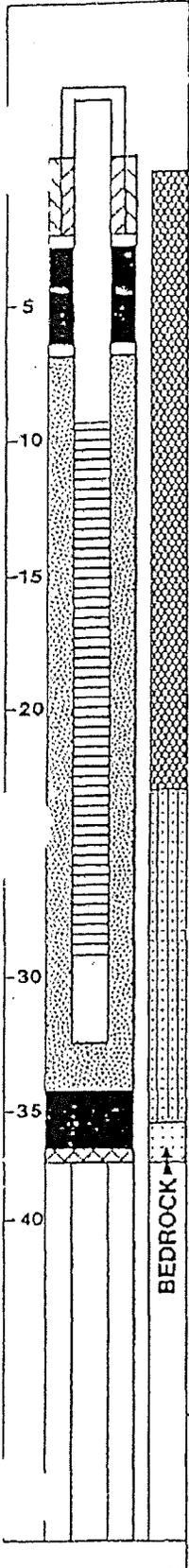
R. Smally/ L. Carson

LOGGED BY E. Pottorff

JOB NO.: 903-2223.361

CHK'D BY E. Pottorff DATE 6/20/90

FILENAME: BH-211.DVG



Well No. MW-11R

Boring No. X-Ref: BH-11R

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 182,692.62 ft.
Eastng: 2,175,660.06 ft.

Elevation Ground Level 1157.30 ft. NGVD
 Top of PVC Casing 1159.82 ft. NGVD

Drilling Summary:

Total Depth 37.0 ft.
 Borehole Diameter 10.25 in.
 Casing Slickup Height 2.52 ft.
 Driller Terracon Environmental, Inc.
Oklahoma City, OK

Rig CME 76
 Bit(s) 6.25 in. I.D. Hollow Stem Auger

Drilling Fluid None

Protective Casing 6 in. I.D. Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log

Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2.52 - 9.0	C1	1159.82 - 1148.30
9.0 - 29.0	S1	1148.30 - 1128.30
29.0 - 32.0	C1	1128.30 - 1125.30
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 PVC
flush threaded/ teflon tape

Screen: S1 2" diameter SCH 40 PVC
Machine slotted (0.010-in.)

Filter Pack: Primary Sand: 34.0-7.0 ft.
Secondary Sand: 7.0-6.5 ft., 3.0-2.5 ft.

Grout Seal: Sacrete: 2.5-+0.5 ft.

Bentonite Seal: Chipped Bentonite: 36.5-34.0 ft.
6.5-3.0 ft.

Comments:

Hole sloughed from 37.0 to 36.5 feet.

Construction Time log:

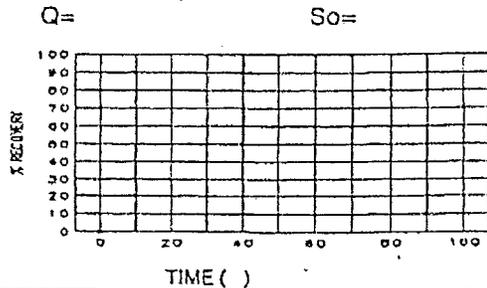
Task	Start		Finish	
	Date	Time	Date	Time
Drilling	4-3-90	0740	4-3-90	1030
Geophys. Logging	N/A			
Casing:				
PVC	4-3-90	1205	4-3-90	1400
6" aluminum	4-3-90	1400	4-3-90	1430
Filter Placement:	4-3-90	1100	4-3-90	1330
Cementing:	4-3-90	1400	4-3-90	1430
Development	5-13-90	1240	5-13-90	1635

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:



Supervised by Matt Langenfeld

Site Mosley Road Sanitary Landfill

Replaced by MW-204R in 2010.

Well No. MW-204

Boring No. X-Ref: BH-204

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 183,856.77 ft.
 Easting: 2,176,702.62 ft.

Elevation Ground Level 1163.70 ft. NGVD
 Top of PVC Casing 1166.63 ft. NGVD

Drilling Summary:

Total Depth 45.1 ft.
 Borehole Diameter 10.25 in.
 Casing Stickup Height 2.93 ft.
 Driller Terracon Environmental, Inc.
 Oklahoma City, OK
 R. Smalley/ L. Carson
 Rig CME 75
 Bit(s) 6.25 in. I.D. Hollow Stem Auger
 Drilling Fluid Potable Water
 Protective Casing 6 in. I.D. Anodized Aluminum

Construction Time log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	4-11-90	1005	4-11-90	1430
Geophys. Logging	N/A			
Casing:				
PVC	4-11-90	1520	4-11-90	1540
6" aluminum	4-11-90	1705	4-11-90	1720
Filter Placement:	4-11-90	1430	4-11-90	1705
Cementing:				
Development	5-9-90	0830	5-9-90	1538

Well Design & Specifications

Basis: Geologic Log x Geophysical Log
 Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2.93 - 25.0	C1	1166.63 - 1138.70
25.0 - 34.0	S1	1138.70 - 1129.70
34.0 - 37.3	C1	1129.70 - 1126.40
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 Johnson PVC
 flush threaded/ teflon tape

Screen: S1 2" diameter SCH 40 Johnson PVC
 Machine slotted (0.010-in.)

Filter Pack: Primary Sand: 41.1-22.0 ft.

Secondary Sand: 22.0-20.0 ft.

Grout Seal: Cement: 3.5-0.0 ft.

Bentonite Seal: Chipped Bentonite: 45.1-41.1 ft.,
 20.0-3.5 ft.

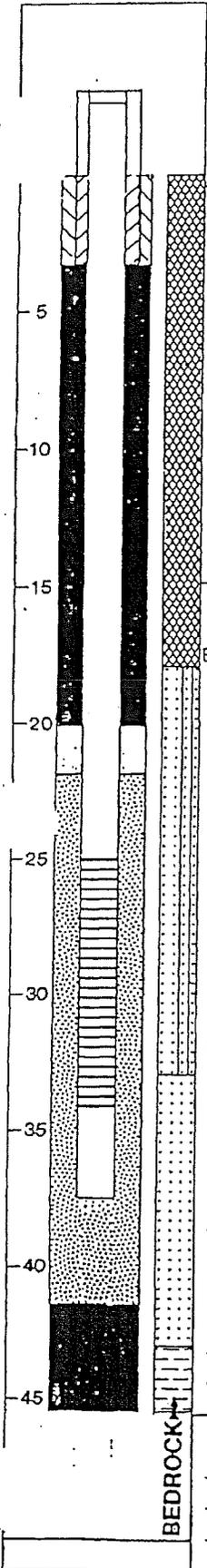
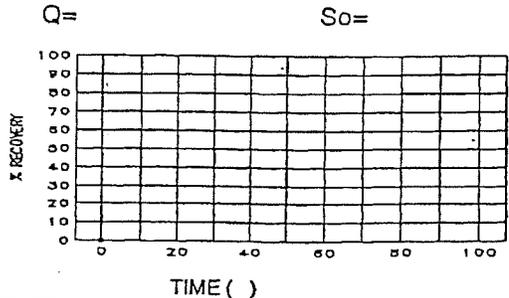
Comments:
 Level D protection.

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:



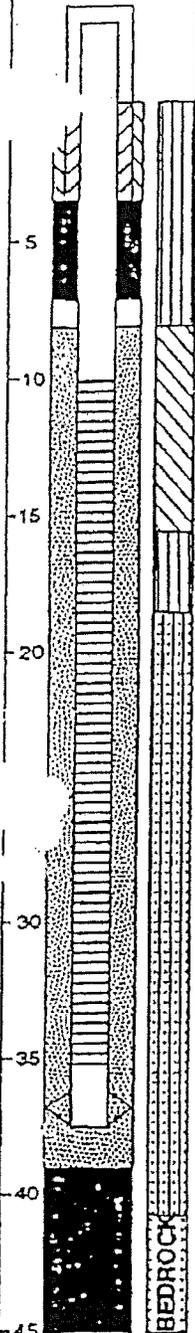
Supervised by Ed Pottorff Site Mosley Road Sanitary Landfill

Boring No. X-Ref: BH-210

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 181,598.69 ft.
Easting: 2,175,692.76 ft.

Elevation Ground Level 1162.20 ft. NGVD
Top of PVC Casing 1165.15 ft. NGVD



Drilling Summary:

Total Depth 45.0 ft.
Borehole Diameter 6.25 in.
Casing Stickup Height 2.95 ft.
Driller Terracon Environmental, Inc.
Oklahoma City, OK
R. Kelly
Rig CME 75
Bit(s) 6" Tri-cone for wash-bit
Drilling Fluid Potable Water
Protective Casing 6 in. I.D. Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
2.95 - 10.0	C1	1165.15 - 1152.20
10.0 - 35.0	S1	1152.20 - 1127.20
35.0 - 38.0	C1	1127.20 - 1124.20
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter, SCH 40 Brainard-Kilman
PVC flush threaded/ teflon tape

Screen: S1 2" diameter, SCH 40 Brainard-Kilman
Machine slotted (0.010-in.) PVC

Filter Pack: Primary Sand: 39.0-8.0 ft.
Secondary Sand: 8.0-7.0 ft.

Grout Seal: Screte: 3.5-0.0 ft.

Bentonite Seal: Holeplug: 45.0-39.0 ft., 7.0-3.5 ft.

Construction Time log:

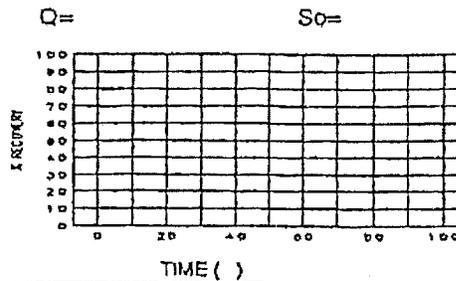
Task	Start		Finish	
	Date	Time	Date	Time
Drilling				
Coring	3-21-00	1400	3-21-00	1700
Geophys. Logging	N/A			
Casing:				
PVC	4-1-00	1130	4-1-00	1145
Filter Placement:	4-1-00	1100	4-1-00	1140
Cementing:	4-1-00	1540	4-1-00	1620
Development	5-14-00	0850	5-14-00	1655

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (*C)

Recovery Data:



Comments:

Flowing sands a problem.
Drilled 45 ft. to get good seal. Water level at 12.3 ft.
Stainless steel centralizer 37.0-36.0 ft.

Supervised by Paul Gilsedick Site Mcclellan Road Sanitary Landfill
Job number P03-2220-061 File name 11W-210

**WASTE MANAGEMENT
LITHOLOGIC LOGS
1991**

Well No. MW-2IR

Boring No. X-Ref: B-1

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: _____ Elevation Ground Level 1154.95
Top of Casing 1158.25 (C2)

Drilling Summary:

Total Depth 35.0
Borehole Diameter 7-7/8"
Casing Stick-up Height: 3.0'
Driller Dan Dubray
Helper Don Plumb
Rig CME-55
Bit(s) 6 1/2" I.D. Auger
Drilling Fluid 0 - 35 None
Protective Casing 7' x 4" ID Aluminum

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	8/19/91	9:30	8/10/91	14:50
Well Construct	8/11/91	8:35	8/11/91	13:30
Well Cover	8/11/91	13:30	8/11/91	14:15
Geophys. Logging:	8/9/91	9:30	8/9/91	14:50
Casing:	8/11/91	8:35	8/11/91	11:30
Filter Placement:	8/11/91	8:45	8/11/91	11:30
Cementing:	8/11/91	12:00	8/11/91	13:30
Development:	10/19/91	8:15	10/19/91	12:20

Well Design & Specifications

Basis: Geologic Log Geophysical Log _____
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
+3.5' - -3.5	C1	1158.80-1151.8
+3.0 - -25.0	C2	1158.2 -1130.2
-25.0 - -35.0	S1	1130.2 1120.2
-	-	-
-	-	-

Casing: C1 4" Diameter Aluminum
Well Protector
C2 2" Schedule 40 PVC
Flush Threaded
Screen: S1 2" Schedule 40 PVC
0.010 Slot Flush Threaded
S2 _____

Filter Pack: 35' - 22' 20-40 Silica sand;
22' - 20' Fine Silica sand

Grout Seal: 14.6' - 0.0' Ionestar
Type 1 Portland & Bentonite Grout

Bentonite Seal: 20' - 14.6' Bentonite
Pellets - Pel Plug

Well Development:

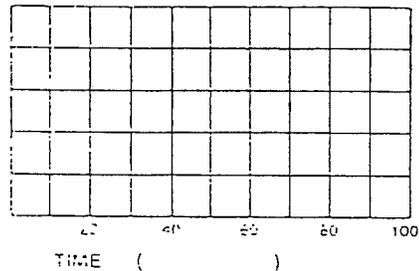
Air discharge until stabilization

Stabilization Test Data:

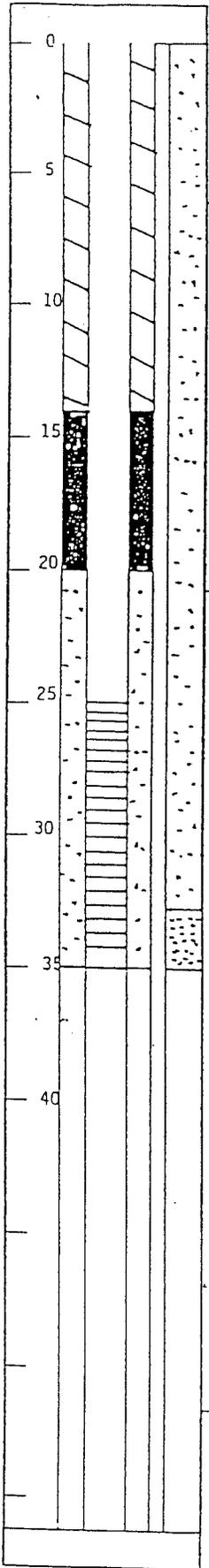
Time	pH	Spec. Cond:	Temp (C)
8:15	7.20	2.31E3	16.6
8:45	7.17	2.48E3	15.2
9:15	7.18	2.40E3	14.8
10:15	7.27	2.40E3	15.7
12:15	7.32	2.48E3	17.7

Recovery Data:

Q = _____ S₀ = _____



Comments:



SITE NAME East Oak Land Fill

LOCATION Oklahoma City, OK

WC (12-9-91)

SUPERVISED BY Robert P. Bayer, II

DATE 8/11/91

4" ANODIZED ALUMINIUM PROTECTIVE CASING w/ CAP & LOCK

TOP OF CASING (Cap Open)
EL. 1158.80 FT.
LENGTH ABOVE G.L. 3.85 FT.

CAP

PEA GRAVEL

TOP OF RISER EL. 1158.25 FT.
LENGTH ABOVE G.L. 3.30 FT.

CONCRETE PAD
EL. NA

DEPTH (Ft.)
ELEV. (Ft.)

GROUND SURFACE

0 1154.95

3.1 FT.

3.1 1151.80

GROUT: CEMENT & BENTONITE

11.5 FT.

2-INCH SCH.40 PVC RISER

14.6 1140.35

7-7/8-INCH NOMINAL DIAMETER BOREHOLE

5.4 FT.

BENTONITE PELLET SEAL

20.0 1134.95

SECONDARY FILTER PACK:
FINE SILICA SAND

2.0 FT.

22.0 1132.95

PRIMARY FILTER PACK:
20/40 WASHED SILICA SAND

2.75 FT.

24.75 1130.20

WELL SCREEN

MATERIAL: Sch.40 PVC
SLOT WIDTH: 0.010 inches
LENGTH: 10 feet
I.D.: 2.0 inches

10 FT.

34.75 1120.20

THREADED BOTTOM CAP

35.0 TD 1119.95

0.25 FT.

TD = TOTAL DEPTH

DATE DRILLED: 8-11-91

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 68147.100

CADD File:/68147SW/8147W21R.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

MONITORING WELL MW-21R

SOIL BOREHOLE LOG

SITE NAME AND LOCATION East Oak Landfill

DRILLING METHOD: Rotary with
6-1/4" ID Augers - Hollow Stem

BORING NO.
B-3 (MW-22R)

SAMPLING METHOD: 2" Split Spoon

SHEET
1 OF 1

DRILLING

START FINISH

WATER LEVEL 6.51

TIME TIME

TIME 15:59

15:30 10:15

DATE 8/14/91

DATE DATE

CASING DEPTH

8/14/91 8/15/91

DATUM ELEVATION 1149.6

DRILL RIG CME-55

SURFACE CONDITIONS Dry, Sandy Clay Soil in Drainage Channel

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS							
							WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS			
0		SP	1. SAND, Fine Medium Grain, Quartz, Round, Poorly Graded, Mod-Well Sorted, Brownish Yellow (10YR 6/6) Loose.	6 1/4 HS										
5	3,5,10 100%	SP	2. SAND, Coarse to Fine Grained, Quartz, Poor Sorted, Mod. to Well Graded, Brownish Yellow Becoming Grayish Brown (10YR 5/2) Rounded-Subrounded, Saturated, Loose.	2" SS										
10	11,4 100%	SP CH	3. SAND, As Above with Silty Clay Stringer @ 14.3' Low Plasticity, Dark gray (10YR 4/1) Wet, Soft, Homogeneous. @ 15.2' SAND, Fine to Medium Grained, Quartz, Round, Poorly Graded, Moderate to Well Sorted, Gray (10YR 6/1) Saturated, Loose.	2" SS										
15	2,2,9 100%	SP	4. SAND, Medium to Very Coarse Grained, with Pebbles, Quartz, Round, Moderate Sorting, Poorly Graded, Gray (10YR 5/1) Saturated Loose.	6 1/4 HS										
20	1,1,1 100%			2" SS										
25				6 1/4 HS										
30														
35		SS	33.5' Shale											
			35.0' Garber-Wellington											
			Total Depth 37'											

E-2-53

DRILLING CONTR Terracon

LOGGED BY Robert P. Bayer, II

DATE 8/14/91 CHK'D BY GPL/SJC

SL 11239

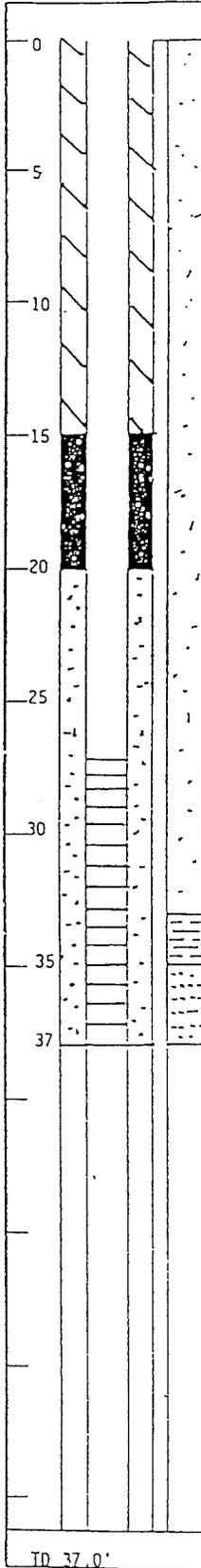
Well No. MH-22R

Boring No. X-Ref: 8-3

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords _____ Elevation Ground Level 1149.57

Top of Casing 1152.31 (C2)



Drilling Summary:

Total Depth 37.0
 Borehole Diameter 7-7/8"
 Casing Stick up Height: 3.0
 Driller Dan Dubray
 Helper - Don Plumb
 Rig CMF-55
 Bits: 6 1/2" ID Auger

Drilling Fluid 0' - 33' None
33' - 37' Clean H₂O
 Protective Casing 7'x 4" ID Aluminum

Well Design & Specifications

Basis Geologic Log X Geophysical Log _____
 Casing String (s) C = Casing S = Screen.

Depth	String(s)	Elevation
+ 3.5' - -3.5'	C1	1152.87 - 1145.87
+3.0' - 27.0'	C2	1152.31 - 1122.31
-27.0' - 37.0'	S1	1122.31 - 1112.31
-	-	-
-	-	-

Casing: C1 4" Dia. Aluminum
Well Protector
 C2 2" Schedule 40 PVC
Flush-Threaded
 Screen S1 2" Sch 40 PVC 0.010
Slot flush Threaded
 S2 _____

Filter Pack: 37.0 - 22.0' 20-40 Colorado
Silica Sand; 22.0' - 20.0' Fine Sand

Grout Seal 15.0 - 0.0' Lonestar
Type 1 Portland & Bentonite
Grout

Bentonite Seal 20.0' - 15.0' Pel-Plug
Bentonite Pellets

Comments: _____

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	8/14/91	15:30	8/15/91	10:15
Well Const.	8/15/91	10:15	8/15/91	14:40
Well Cover	8/16/91	14:30	8/16/91	15:00
Geophys. Logging:	8/14/91	15:40	8/15/91	10:15
Casing:	8/15/91	10:15	8/15/91	10:30
Filter Placement:	8/15/91	10:30	8/15/91	12:00
Cementing:	8/15/91	13:30	8/15/91	14:40
Development:	10/17/91	15:30	10/18/91	8:50

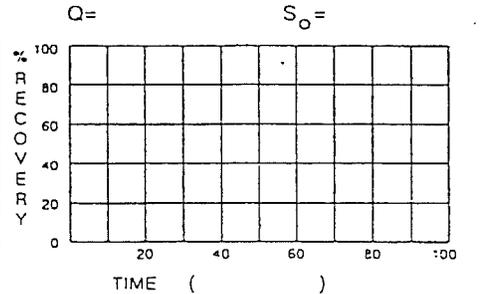
Well Development:

Air discharge until stabilization

Stabilization Test Data:

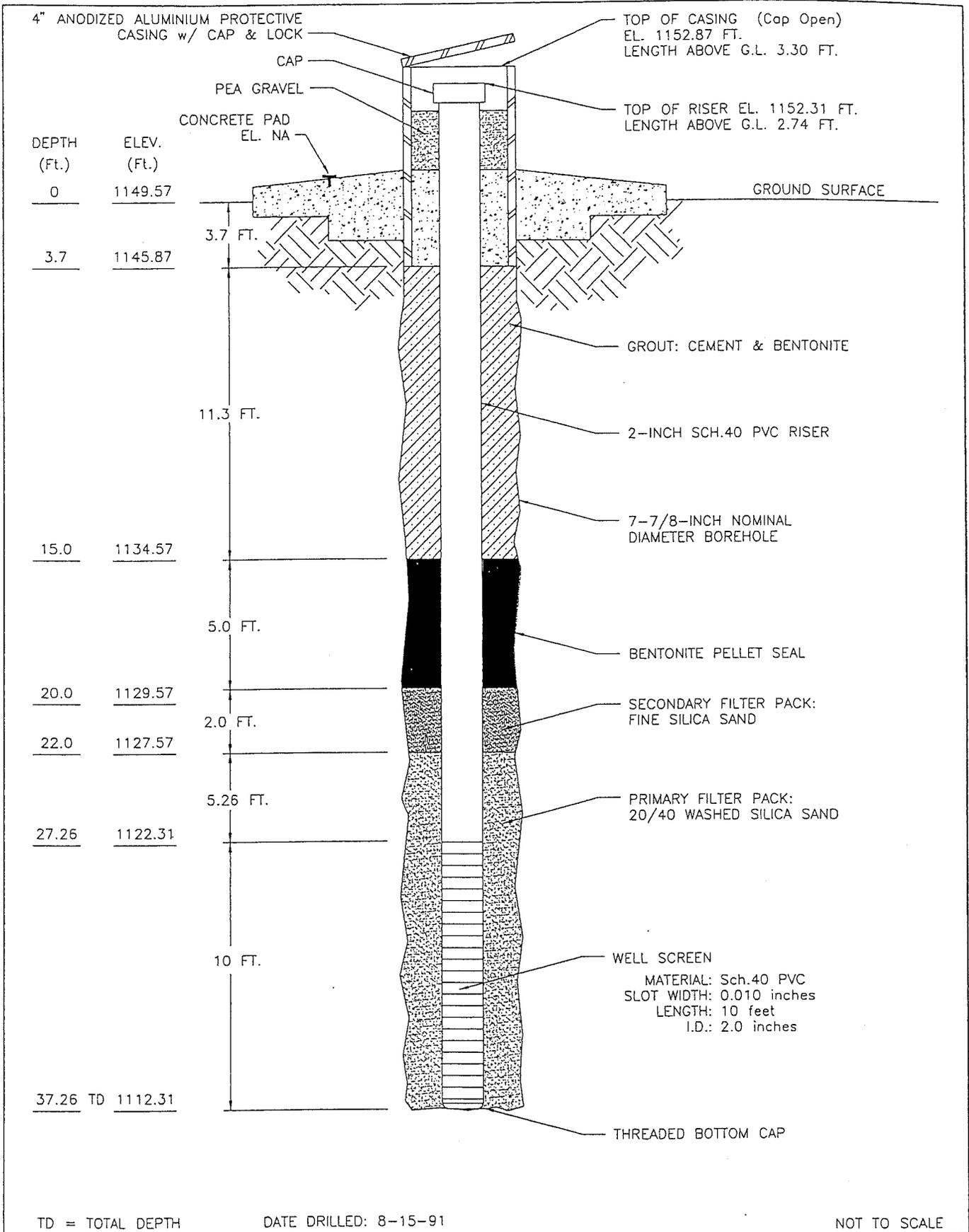
Time	pH	Spec. Cond.	Temp (C)
15:30	7.96	0.91E3	18.5
16:00	7.84	0.84E3	17.9
16:30	7.77	0.83E3	17.7
17:00	7.76	0.81E3	17.6
18:00	7.72	0.78E3	17.4

Recovery Data:



SITE NAME East Oak Landfill

SUPERVISED BY Robert P. Bayer, II



TD = TOTAL DEPTH

DATE DRILLED: 8-15-91

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 68147.100

CADD File: /68147SW/8147W22R.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

MONITORING WELL MW-22R

SOIL BOREHOLE LOG

MW-25R

SITE NAME AND LOCATION <u>East Oak Landfill</u> <div style="text-align: center;"> <p style="margin: 0;">● NORTHWEST CORNER B-4</p> </div>	DRILLING METHOD: <u>Rotary with 6 1/2" Hollow Stem Augers</u> SAMPLING METHOD: <u>2" Split Spoon</u>	BORING NO. <u>B-4</u> SHEET <u>1</u> OF <u>2</u> DRILLING START TIME <u>15:50</u> FINISH TIME <u>08:20</u> DATE <u>8/13/91</u> DATE <u>8/17/91</u>
DATUM <u>ELEVATION 1155.8</u>		WATER LEVEL <u>14.5'</u> TIME <u>16:15</u> DATE <u>8/13/91</u>
DRILL RIG <u>CME-55</u>		SURFACE CONDITIONS <u>Dry - Sandy Silty Soil.</u>
ANGLE <u>Vertical</u> BEARING _____		SAMPLE HAMMER TORQUE _____ FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/BLIN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS				
							WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0		SP	1. <u>SAND, V.F. Grained, Some Silt, Poor Graded, Well Sorted Round, Quartz, Yellowish Brown (10YR 6/6) Loose, North Canadian Alluvium.</u>	6 1/2" HS							
5	4,4,6 100%	SP	2. <u>SAND, Silty, V.F. Grained XXX Well Sorted Quartz, Reddish Brown, (2.5 YR 4/4) Round Loose.</u>	2" SS 6 1/2" HS							
10	5,5,4 100%	SP	3. <u>SAND, V.F. to Fine Grain, Round, Poorly Graded Well Sorted, Quartz, Little to Trace Silt, Reddish Brown (2.5YR 5/4) Moist, Loose N. Canadian Alluvium.</u>	2" SS 6 1/2" HS							
15	5,1,1 100%	SP	4. <u>SAND, Fine Grained, Well Sorted, Poorly Graded Round, Quartz, Yellowish Red (5YR 5/6) Saturated, Loose.</u>	2" SS 6 1/2" HS							
20	1,1,6 100%	SP	5. <u>SAND, Fine to Medium Grained, Occasionally Coarse Grained, Quartz, Moderate Graded Moderate to Poorly Sorted, Round, Gray (10YR 6/1) Saturated Loose.</u>	2" SS 6 1/2" HS							
25	1,1,2 100%			2" SS 6 1/2" HS							
30											
35											

E-2-56

DRILLING CONTR Terracon

 LOGGED BY Robert P. Bayer, II
 DATE 8/15/91 CHK'D BY GPL/ SJC

SL 11242

Well No. MW-25 R

Boring No. X-Ref: B-4

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: _____ Elevation Ground Level 1155.82
Top of Casing 1158.80 (C2)

Drilling Summary:

Total Depth 53.5'
 Borehole Diameter 7-7/8"
 Casing Stick-up Height: 3.0'
 Driller Dan Dubray
 Helper Don Plumb
 Geologist Rob Bayer
 Rig CMF-55
 Bit(s) 6 1/2" ID Auger

Drilling Fluid 0' - 43.5' None
43.5' - 53.5' Clean H₂O
 Protective Casing 4" ID Aluminum x 7'

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	8/15/91	15:00	8/17/91	8:20
Well Cover	8/23/91	8:00	8/23/91	8:15
Geophys. Logging:	8/15/91	15:50	8/17/91	8:20
Casing:	8/17/91	8:20	8/17/91	8:30
Filter Placement:	8/17/91	8:30	8/17/91	10:45
Cementing:	8/17/91	11:30	8/17/91	12:40
Development:	10/16/91	16:10	10/17/91	9:00

Well Design & Specifications

Basis: Geologic Log y Geophysical Log _____
 Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
+3.5' - -3.5'	C1	1159.35 - 1142.35
+3.0' - 41.5'	C2	1158.80 - 1114.30
-41.5' - 51.5'	S1	1114.30 - 1104.30
-	-	-
-	-	-

Well Development:

Air discharge until stabilization.

Casing: C1 4" ID Aluminum
Protective Cover
 C2 2" Sch. 40 PVC Riser

Screen: S1 2" Sch. 40 PVC
0.010 Slot
 S2 _____

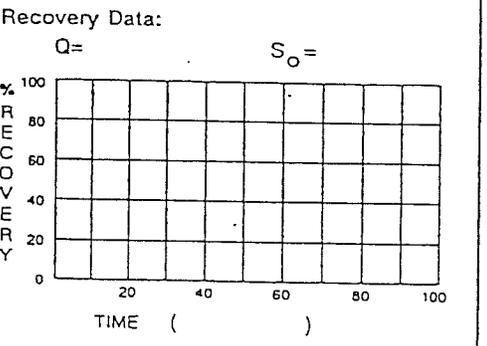
Filter Pack: Colorado Silica 20-40
-52' to -37'; fine sand -37' to -35'

Grout Seal: Lonestar Type 1 Portland
-25' to 0'

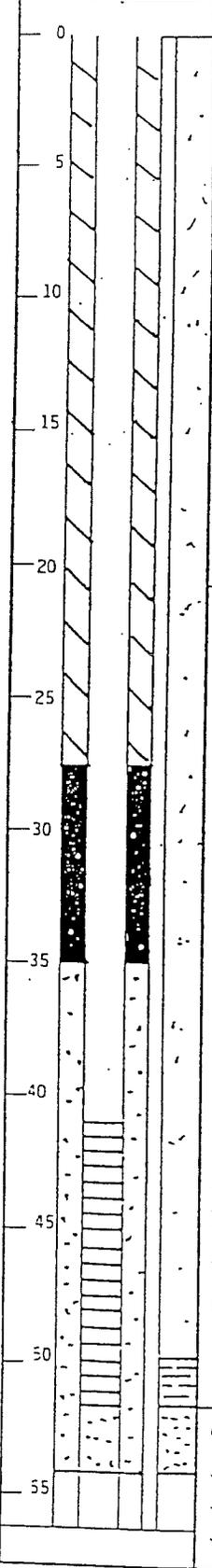
Bentonite Seal: Pel Plug - Bentonite
Pellets -35' to -25'

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
16:10	7.11	0.79E3	20.4
16:45	7.42	0.77E3	20.1
17:30	7.50	0.74E3	17.8
8:30	7.53	0.70E3	15.7
9:00	7.59	0.70E3	16.0



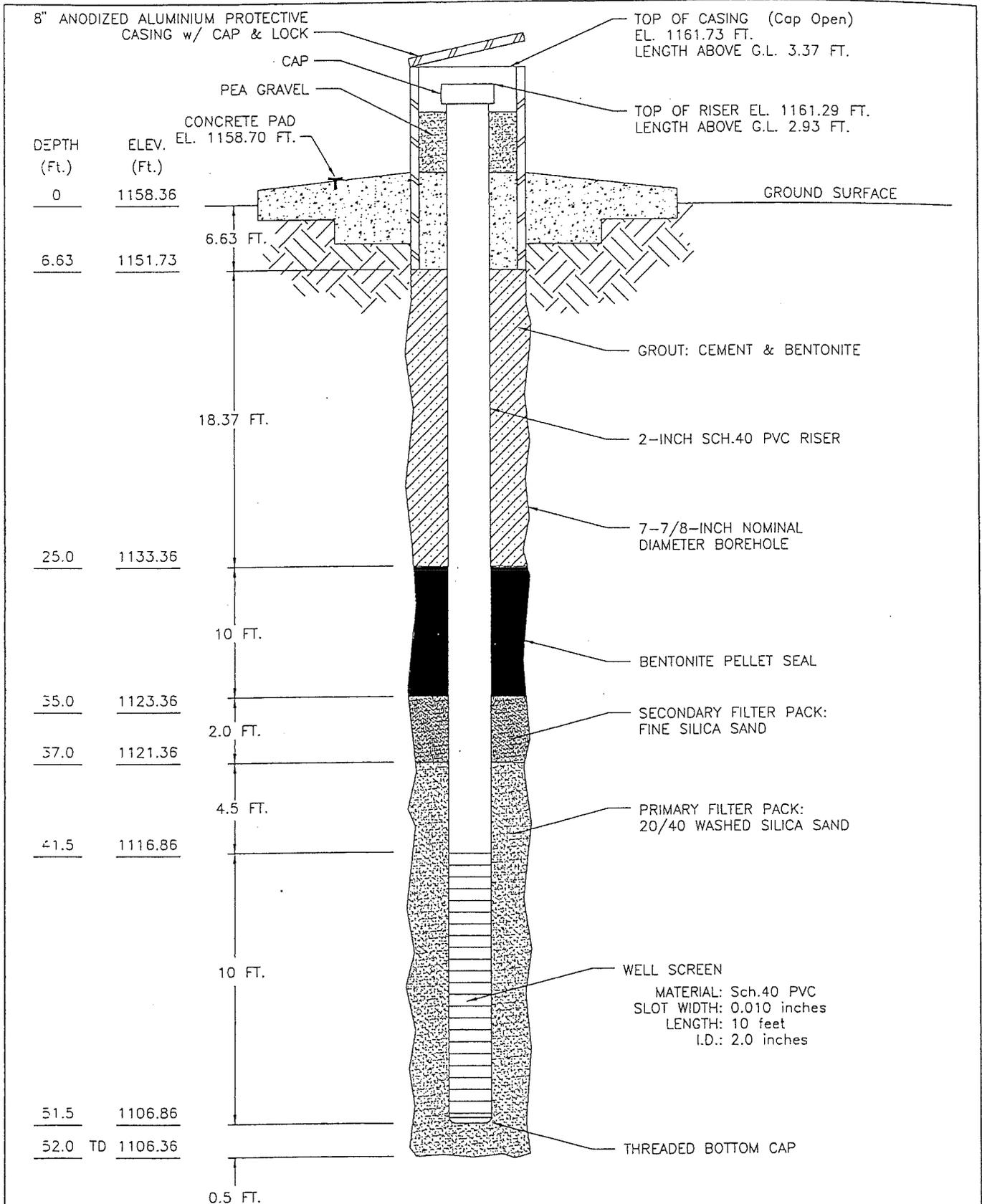
Comments: Screened interval, on MWCS is 41.5' - 51.5'
hole raved to 51.5'



SITE NAME East Oak Landfill
LOCATION Oklahoma City, OK

WC 03384

SUPERVISED BY Robert P. Bayer, II
DATE 8/15/91



TD = TOTAL DEPTH

DATE DRILLED: 8-17-91

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 68147.100

CADD File:/68147SW/8147W25R.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

MONITORING WELL MW-25R

**RUST LITHOLOGIC LOGS
1993**

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary				BORING NUMBER: TH-1-SD	
	SAMPLING METHOD: Split-spoon (SS) with 2" diameter and 3" dia. Shelby tube (ST)				Sheet 1 of 2	
	WATER LEVEL				12.11	7.23
	TIME				12:59	15:15
DATE				8/10/83	8/10/83	
CASING DEPTH						
DRILLING				START	FINISH	
TIME				12:30	15:00	
DATE				9/10/83	8/10/83	

DATUM: ft. MSL	ELEVATION: 1180.89	SURFACE CONDITIONS: Damp, slightly Muddy
DRILL RIG: Badger 1200	ANGLE: Vertical	BEARING: Ø
SAMPLE HAMMER TORQUE: 140 ft.-lbs.	N = 184508.5	E = 2173829.7

DEPTH IN FEET (ELEVATION)	BLOWS/B' ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE		
2	6,8,4			Firm, brown CLAYEY SILT (ML) Sand @ 0 - 0.5 ft. Soft @ 2 - 3.5 ft.	SS									
4	3,6,2			sand partings @ 4.5 - 5.0 ft. Mostly quartz, medium to fine grained below 5 ft.	SS									
	2,4,6				SS									
	100%				ST				24.8			0.18		
8	3,8,10				SS									
10	1,3,6				SS									
12	3,6,5				SS									
14	2,2,5			Firm, brown, SILTY CLAY (CL)	SS									
16	2,3,3			Trace of silt @ 15.5 ft., silt content increases w/ depth to 45.0 ft. - silt @ 15.5 - 17 ft.	SS					34	15		68	
18	2,4,7				SS	NONE								
20	2,3,4				SS									
22	4,5,8				SS									
24	2,3,3				SS									
26	2,2,2			Loose, brown SANDY SILT (ML)	SS									
28	3,5,5			mostly quartz @ 24.5 - 45 ft. w/ silt partings - WET	SS									
30	3,3,3				Loose, tan SILTY SAND (SM) color gray @ 30 ft.	SS					21	1	70	
32													68	

DRILLING CONTRACTOR
 A. M. Pool Inc.
 Clinton, Ok.

LOGGED BY R. C. Bond
 DATE 08/10/83
 CHECKED BY M.M. Rappold

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary	BORING NUMBER: TH-1-SD																												
		Sheet 2 of 2																												
	SAMPLING METHOD: Split-spoon (SS) with 2" diameter and 3" dia. Shelby tube (ST)	DRILLING																												
		START FINISH																												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">WATER LEVEL</td> <td style="width: 12.5%;">12.11</td> <td style="width: 12.5%;">7.23</td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;">TIME</td> <td style="width: 12.5%;">TIME</td> </tr> <tr> <td>TIME</td> <td>12:59</td> <td>15:15</td> <td></td> <td></td> <td>12:30</td> <td>15:00</td> </tr> <tr> <td>DATE</td> <td>8/10/93</td> <td>8/10/93</td> <td></td> <td></td> <td>DATE</td> <td>DATE</td> </tr> <tr> <td>CASING DEPTH</td> <td></td> <td></td> <td></td> <td></td> <td>8/10/93</td> <td>8/10/93</td> </tr> </table>	WATER LEVEL	12.11	7.23			TIME	TIME	TIME	12:59	15:15			12:30	15:00	DATE	8/10/93	8/10/93			DATE	DATE	CASING DEPTH					8/10/93	8/10/93	
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CASING DEPTH					8/10/93	8/10/93																								
DATUM: 1t. MSL	ELEVATION: 1180.89																													

DRILL RIG: Badger 1200	SURFACE CONDITIONS: Damp, slightly Muddy
ANGLE: Vertical BEARING: Ø	N = 184509.5
SAMPLE HAMMER TORQUE: 140 ft.-lbs.	E = 2173828.7

DEPTH IN FEET (ELEVATION)	BLOWS/Ø' ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS							
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE			
34				- medium dense below 35 ft - sand becomes coarser w/ depth Gray, brown quartz sand, coarse to very coarse grained sand @ 45-50.5 ft dense @ 45.8 ft		NONE									
36	8,8,9				SS										
44	10,11,14				SS										
50	17,49			SS											
52				TD @ 50.5 to auger refusal: boring terminated in the Garber - Wellington Sandstone.											
54															
56															
58															
60															
62															
64															

 DRILLING CONTRACTOR A. K. Pool Inc.
Clinton, Ok.

 LOGGED BY R. C. Bond
 DATE 08/10/93 CHECKED BY M.M. Reppold

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary	BORING NUMBER: TH-2-SD
		Sheet 1 of 2
	SAMPLING METHOD: Split-spoon (SS) with 2" diameter and 3" dia. Shelby tube (ST)	DRILLING
		START FINISH
	WATER LEVEL 9.78 8.54	TIME TIME 08:15 11:15
	TIME 08:27 11:30	DATE DATE 9/10/93 9/10/93
DATUM: ft. MSL ELEVATION: 1159.00	CASING DEPTH	9/10/93 9/10/93

DRILL RIG: Badger 1200	SURFACE CONDITIONS: V. muddy, very soft
ANGLE: Vertical BEARING: Ø	N = 184482.1
SAMPLE HAMMER TORQUE: 140 ft.-lbs.	E = 2174328.3

DEPTH IN FEET (ELEVATION)	BLOWS/ft ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE		
2	3,5,5			Medium dense, brown SAND (SP) w/ silt partings	SS									
4	4,6,8			loose @ 3.5 - 5 ft	SS									
	2,4,4			Clay partings @ 4.6 ft.	SS									
	P=L2			Firm, brown, CLAY (CH), w/ silt partings	ST			24.1	71	43			88	
8	3,12,8			- very silty clay, moist below 7.0 ft	SS									
10	4,2,3				SS									
12	2,2,4				SS									
14	1,1,2			soft @ 12.5 ft	SS			41.5	57	37	0.15			
	P=2.5				ST									
16	2,4,5				SS								81	
18	2,2,3			Loose, brown, FINE SAND (SP) w/ clay partings	SS	NONE								
20	2,3,4			Medium dense @ 18.5 - 21.5 ft	SS									
22	5,5,8			Sand w/ out clay partings below 20 ft.	SS									
24	6,8,14				SS									
	3,2,8				SS									
26	4,4,6			Stiff, brown Very SILTY CLAY (CL-ML)	SS			22		8			78	
28														
30	4,13,8			Medium dense brown SILTY SAND (SM-SP) - coarse sand w/ silt partings @ 29 ft	SS								14	
32														

DRILLING CONTRACTOR: A. K. Pool, Inc. Clinton, Ok.
 LOGGED BY: R. C. Bond CHECKED BY: M.M. Reppold
 DATE: 09/10/93

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary	BORING NUMBER: TH-2-SD Sheet 2 of 2																														
	SAMPLING METHOD: Split-spoon (SS) with 2" diameter and 3" dia. Shelby tube (ST)	DRILLING																														
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DATE	DATE																															
8/10/93	8/10/93																															
DATUM: 1t. MSL ELEVATION: 1159.00																																

DRILL RIG: Badger 1200	SURFACE CONDITIONS: V. muddy, very soft
ANGLE: Vertical BEARING: Ø	N = 184482.1
SAMPLE HAMMER TORQUE: 140 ft.-lbs.	E = 2174328.3

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS											
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE							
34																			
36	8,8,8			Coarse to very coarse sand @ 35.6 ft w/ clay partings	SS														
38																			
40	8,7,8			Very coarse grained sand w/ gravel @ 40.5 ft	SS	NONE													
42																			
44																			
46	45,50,47			Very dense, tan-gray. gravel w/ coarse grained sand @ 45.5 ft	SS														
48				TD @ 47.0 ft, auger refusal; boring terminated in the Garber-Wellington Sandstone.															
50																			
52																			
54																			
56																			
58																			
60																			
62																			
64																			

DRILLING CONTRACTOR A. H. Pool Inc.
Clinton, Ok.

 CHECKED BY M.M. Reddick
 DATE 08/10/83

 LOGGED BY R. C. Bond
 DATE 08/10/83

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary SAMPLING METHOD: Split-spoon (SS) with 2" diameter and 3" dia. Shelby tube (ST)	BORING NUMBER: TH-3-SD Sheet 1 of 2
DATUM: ft. MSL ELEVATION: 1153.10		DRILLING START FINISH TIME TIME 11:45 14:30 DATE DATE 8/08/83 8/08/83

DRILL RIG: Badger 1200 ANGLE: Vertical BEARING: Ø SAMPLE HAMMER TORQUE: 140 ft.-lbs.	SURFACE CONDITIONS: Very muddy and boggy due to three inches of rain overnight - unable to move rig N = 183573.8 E = 2174338.1
---	---

DEPTH IN FEET (ELEVATION)	BLOWS/ft ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE		
2				Medium dense brown SAND (SP) w/ silt partings @ 0.5 - 8.0 ft. fine grained, coarsens w/ depth Clay fill @ 0 - 0.5 ft. MEDIUM DENSE 2 - 3.5 ft.	ST									
4	12,17,19				SS									
6	12,7,14				SS									
8	7,10,11				SS									
10	4,4,10				SS									
12	4,4,6			- brown clay layer @ 8.0 - 8.5 ft - firm fl. brown sand @ 8.5 - 17 ft w/ clay partings, fine to medium grained sand	SS									
14	2,2,4				SS									
16	5,5,7				SS									
18	2,2,4				SS									
20	2,3,2			Firm, brown, CLAYEY SILT (ML) Sand coarse grained @ 15 ft	SS				19	5			80	
22	10,1			- Brown sandy clay @ 17 - 17.5 ft., seam w/ sand partings	SS	NONE								
24					ST									
26	6,8,10			Dense brown medium SAND (SP)	SS									
28	3,4,11				SS									
30	8,12,14				SS									
32	2,5,5			coarse sand below 24 ft.	SS									17
34														
36	8,13,12			Medium dense brown SILTY SAND (SM-SP)	SS				14	2			18	

DRILLING CONTRACTOR
 A. H. Pool Inc.
 Clinton, Ok.

LOGGED BY R. C. Bond
 DATE 08/08/83
 CHECKED BY M.M. Reppold

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary				BORING NUMBER: TH-3-SD	
	SAMPLING METHOD: Split-spoon (SS) w/ 2" diameter and 3" dia. Shelby tube (ST)				Sheet 2 of 2	
					DRILLING	
	WATER LEVEL		9.85	8.97	START TIME	FINISH TIME
	TIME		12:07	15:15	11:45	14:30
DATE		8/08/83	8/08/83	DATE	DATE	
CASING DEPTH				8/08/83	8/08/83	

DATUM: ft. MSL	ELEVATION: 1153.10	SURFACE CONDITIONS: Very muddy and boggy due to three inches of rain overnight - unable to move rig
DRILL RIG: Badger 1200	ANGLE: Vertical	BEARING: 0
SAMPLE HAMMER TORQUE: 140 ft.-lbs.	N = 183573.8 E = 2174339.1	

DEPTH IN FEET (ELEVATION)	BLOWS/B' ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE

34	34.42, 48			- Very dense below 32 ft. 1/4 in. gravel w/ sand @ 32.3 ft. TD @ 34.0 ft, auger refusal; boring terminated in the Garber-Wellington Sandstone.	SS	NONE									
36															
38															
40															
42															
44															
46															
48															
50															
52															
54															
56															
58															
60															
62															
64															

DRILLING CONTRACTOR
 A. H. Pool Inc.
 Clinton, Ok.

LOGGED BY R. C. Bond
 DATE 08/08/83
 CHECKED BY M.M. Reppold

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill, Oklahoma City, Ok. Geotech. Study, Subtitle D Siting Criteria RUST E & I Project No. 85307.100	DRILLING METHOD: Wet rotary				BORING NUMBER: TH-4-SD	
					Sheet 1 of 1	
	SAMPLING METHOD: Split-spoon (SS) with 2" diameter and 3" dia. Shelby tube (ST)				DRILLING	
	WATER LEVEL	9.33	5.41		START TIME	FINISH TIME
TIME	14:58	17:35		14:30	17:30	
DATE	9/07/83	9/07/83		DATE	DATE	
DATE				8/07/83	8/07/83	
DATUM: 1ft. MSL			ELEVATION: 1152.03			
CASING DEPTH						

DRILL RIG: Badger 1200	SURFACE CONDITIONS: Clay soil, grassy area, boggy in places
ANGLE: Vertical	BEARING: 0
N = 183678.5	
SAMPLE HAMMER TORQUE: 140 ft.-lbs.	E = 2173982.7

DEPTH IN FEET (ELEVATION)	BLOKS/B' ON SAMPLER	RECOVERY	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	UNCF. COMPR. (KSF)	OTHER TESTS (-) 200 SEIVE		
2	100%			Brown clayey silt @ 0 - 0.5 ft	ST									
	6,10,8			Medium dense, yellow & brown SILTY SAND (SM) fine grained	SS									
4	4,14,36				SS									
6	4,11,16				SS									12
8	4,9,9				SS									
	2,2,8				SS									
10	3,8,8			w/ silt partings @ 10 - 16 ft.	SS									
	3,2,2			loose @ 11 - 12.5ft	SS									
12	2,8,8				SS									
14	2,2,5				SS									
	3,8,8				SS	NONE								
16	P=1.25			Firm, brown, CLAYEY SILT (ML)	ST									
18	P=1.25			Loose, brown, sand w/ silt partings @ 18 - 28 ft.	ST									
20	5,7,7			Coarse to v. coarse quartz sand - WET	ST									
22	6,8,8				SS									
	7,12,8				SS									
24				Medium dense slightly Clayey SILTY SAND (SM)	SS							14	3	39
26														
28														
J	18,18,23			Dense red & brown SAND (SP) Coarse to very coarse grained sand	SS							44	30	
32				TD @ 31.0 ft, auger refusal; boring terminated in the Garber - Wellington Sandstone.										

DRILLING CONTRACTOR: A. H. Pool Inc.
 Clinton, Ok.

LOGGED BY: R. C. Bond
 DATE: 09/07/83
 CHECKED BY: M.M. Reppold

RUST GAS PROBE
LITHOLOGIC LOGS
1994

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-01	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 1	
	INI		STATIC		START	FINISH
	WATER LEVEL				TIME	TIME
	TIME				12:08	12:37
	DATE				DATE	DATE
DATUM: ft. MSL		ELEVATION: 1157.58		CASING DEPTH		
DRILL RIG: Truck Mounted - CME-75				SURFACE CONDITIONS: Graded area at southeastern corner of		
ANGLE: Vertical				BEARING: ---		
SAMPLE HAMMER TORQUE: ft.-lbs.				N 182889.0348 E 2174343.051		

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Graded area at southeastern corner of
ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.	N 182889.0348 E 2174343.051

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1			•••••	FILL: sandy clay, firm, moderate brown (5YR 3/4)											
2			•••••	TOPSOIL: sandy, laminated, moderate yellowish brown (10YR 5/4) and black	000										
3			•••••												
4			•••••	SAND, Silty (SM): v. fine-grained, subangular to rounded, dark yellowish orange (10 YR 6/6), homogeneous, well-compacted, dense											
5			•••••												
6			•••••	: laminated w/black lenses	001										
7			•••••												
8			•••••	: increase in black staining											
9			•••••	: light brown (5YR 5/6) and dk yellowish orange (10YR 6/6) homogeneously mixed											
10			•••••												
11			•••••	: semi-lithified and stratified zones @ 10.5' (2") and 11.6' (2"), dk yellowish brown (10YR 4/2) and moderate brown (5YR 4/4)	002										
12			•••••	: stratified from 12 to 13 ft.											
13			•••••												
14			•••••	SAND (SP): fine-grained, subangular to rounded, grayish orange (10YR 7/4) and dark yellowish orange (10YR 6/6) homogeneously blended	003										
15			•••••	: very moist @ 13.6 ft.											
16			•••••	END OF BORING @ 14 FEET											

DRILLING CONTRACTOR Terracon Consultants, Inc.
 Oklahoma City, Oklahoma

LOGGED BY Karen Gallup
 DATE 10/07/94
 CHECKED BY Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32288.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-02	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 1	
	INI		STATIC		START	FINISH
	WATER LEVEL				TIME	TIME
	TIME				10:08	10:38
				DATE	DATE	
				10/05/94	10/05/94	
DATUM: ft. MSL		ELEVATION: 1158.00				CASING DEPTH

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Graded area along southern property boundary
ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.	N 182719.5710 E 2173846.149

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
							WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1		•••••	FILL: sandy clay, moderate brown (5YR 4/4) and moderate yellowish brown (10YR 5/4) mottled w/some black staining			000								
2		•••••												
3		•••••	: grayish brown (5YR 3/2) clay, firm											
4		•••••												
5		•••••	SAND, Silty (SM): v. fine-grained, angular to subrounded, light brown (5YR 5/6) w/moderate reddish brown (10R 4/6) clay lenses											
6		•••••	: laminated w/some black staining											
7		•••••	: grayish orange (10YR 7/4) and moderate yellowish brown (10YR 5/4) mottled, stratified			001								
8		•••••	: fine-grained sand lense, very pale orange (10YR 8/2), subangular to rounded											
9		•••••	: dark yellowish brown (10YR 4/2)											
10		•••••	: moderate yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/2) mottled											
11		•••••	: v. fine- to fine-grained, subangular to subrounded, dense, laminated, grayish orange (10YR 7/4) w/dark yellowish brown (10YR 4/2) mottling											
12		•••••	: fine-grained, laminated			002								
13		•••••	: very moist											
14		•••••	END OF BORING @ 13.5 FEET											
15		•••••												
16		•••••												

DRILLING CONTRACTOR: Terracon Consultants, Inc.
Oklahoma City, Oklahoma
 LOGGED BY: Karen Gallup
 DATE: 10/17/94 CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-03	
					Sheet 1 of 1	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube					
	INI		STATIC		START	FINISH
	WATER LEVEL				TIME	TIME
TIME				07:39	07:59	
DATE				DATE	DATE	
CASING DEPTH				10/05/94	10/05/94	

DATUM: ft. MSL ELEVATION: 1153.39	SURFACE CONDITIONS: Built-up area along southern property
DRILL RIG: Truck Mounted - CME-75	ANGLE: Vertical BEARING: ---
	boundary, vegetation on either side
SAMPLE HAMMER TORQUE: ft.-lbs.	N 182682.4993 E 2173340.004

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1			•••••	FILL: dark yellowish orange (10YR 6/6) sandy topsoil and grayish brown (5YR 3/2) clay															
2			•••••	TOPSOIL: very fine-grained sand and some silt, loose, moderate brown (5YR 3/4), live green grass @ 1', some roots	000														
3			•••••																
4			•••••	: fissured, horizontal plates, dry, scarce roots, loose															
5			•••••																
6			•••••	: grayish orange (10YR 7/4) and moderate brown (5YR 4/4) mottled, hard, consolidated	001														
7			•••••																
8			•••••	SAND (SP): very fine-grained, subangular to subrounded, unconsolidated, homogeneous, little fines, dark yellowish orange (10YR 6/6) matrix w/very pale orange (10YR 8/2) grains, scarce roots															
9			•••••	: laminated, some black staining, moist	002														
10			•••••	: some iron staining, friable															
11				END OF BORING @ 10 FEET															
12																			
13																			
14																			
15																			
16																			

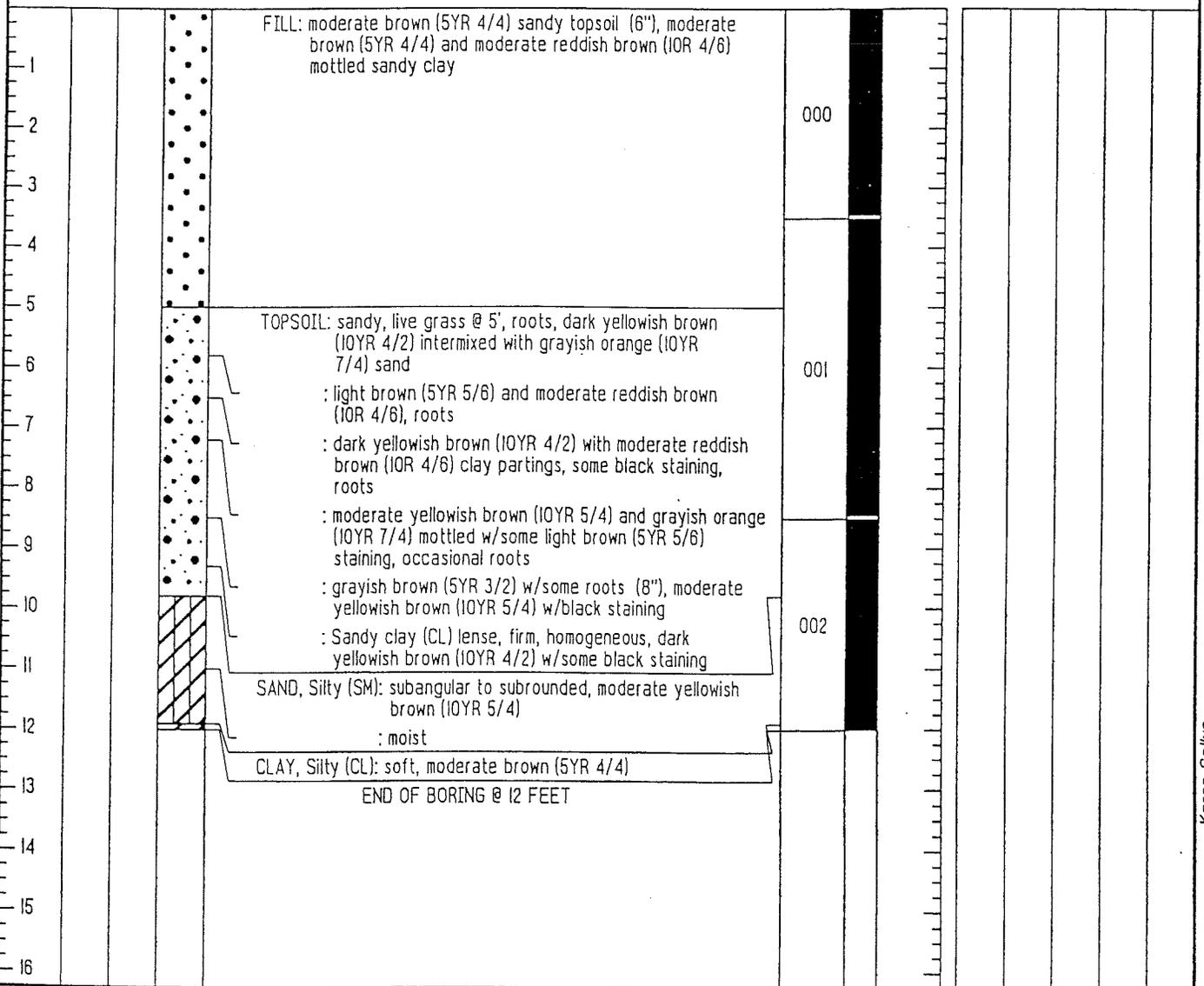
DRILLING CONTRACTOR Terracon Consultants, Inc.
Oklahoma City, Oklahoma
 LOGGED BY Karen Gallup
 DATE 10/17/94 CHECKED BY Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-04	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 1	
	INI		STATIC		START	FINISH
	WATER LEVEL				TIME	TIME
	TIME				9:04	8:25
DATE				DATE	DATE	
DATUM: ft. MSL	ELEVATION: 1155.90			CASING DEPTH	10/05/94	10/05/94

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Built-up area along southern property boundary
ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.	N 182724.4525 E 2172858.665

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS



DRILLING CONTRACTOR Terracon Consultants, Inc.
 Oklahoma City, Oklahoma

LOGGED BY Karen Gallup
 DATE 10/20/94
 CHECKED BY Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-05		
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 1		
	INI		STATIC		START	FINISH	
	WATER LEVEL				TIME	TIME	
	TIME				12:44	13:09	
	DATE				DATE	DATE	
DATUM: ft. MSL	ELEVATION: 1155.74			CASING DEPTH		10/04/94	10/04/94

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Built-up area along western property
ANGLE: Vertical	BEARING: --- line
SAMPLE HAMMER TORQUE: ft.-lbs.	N 183411.7531 E 2172427.321

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS		
1			•••••	FILL: moderate brown (5YR 4/4) sandy topsoil										
2			•••••	: intermixed w/some dark yellowish brown (10YR 5/4) and moderate reddish brown (10R 4/6) mottled sandy clay	000									
3			•••••											
4			•••••	: intermixed w/grayish orange (10YR 7/4) sand, v. fine-grained, some roots, well compacted by dozer										
5			•••••	: dark yellowish brown (10YR 4/2) silty clay intermixed w/some very fine-grained sand										
6			•••••		001									
7			•••••											
8			•••••	TOPSOIL: sandy, abundant roots, live grass @ 7.5', very pale orange (10YR 8/2) sand in clay/topsoil matrix, some decayed roots										
9			•••••											
10			•••••	SAND (SP): subangular to rounded, little fines, very pale orange (10YR 8/2) grains w/pale yellowish orange (10YR 8/6) matrix										
11			•••••	: subangular to subrounded, very pale orange (10YR 8/2) and grayish orange (10YR 7/4)	002									
12			•••••											
13			•••••	: unconsolidated, moist										
14			•••••	END OF BORING @ 13.5 FEET										
15			•••••											
16			•••••											

DRILLING CONTRACTOR: Terracon Consultants, Inc.
 Oklahoma City, Oklahoma

 LOGGED BY: Karen Gallup
 DATE: 10/20/94
 CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-06	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 1	
	INI				STATIC	
	WATER LEVEL	15.00			START	FINISH
	TIME	9:17			TIME	9:17
DATE	10/4/94			DATE	DATE	
DATUM: ft. MSL ELEVATION: 1158.29				10/04/94 10/04/94		

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Graded area along northwestern property boundary
ANGLE: Vertical BEARING: ---	
SAMPLE HAMMER TORQUE: ft.-lbs.	N 184150.3079 E 2172739.912

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS		
1			●	TOPSOIL: sandy, moderate yellowish brown (10YR 5/4), some roots										
2			●	: intermixed w/dark yellowish brown (10YR 4/2) and moderate yellowish brown (10YR 5/4) sandy clay and fine- to medium-grained, subangular to rounded sand	000									
3			●											
4			●	SAND, Silty (SM): v. fine-grained, subangular to subrounded, poorly graded and consolidated, some silt, dark yellowish orange (10YR 6/6)										
5			●											
6			●	SAND (SP): v. fine- to fine-grained, subangular to subrounded, poorly graded, little fines, loose, very pale orange (10YR 8/2) and grayish orange (10YR 7/4), moist	001									
7			●											
8			●											
9			●	SAND, Silty (SM): very fine-grained, well compacted, dark yellowish orange (10YR 6/6), moist										
10			●	: subangular to subrounded, moderate yellowish brown (10YR 5/4)	002									
11			●											
12			●											
13			●											
14			●	: poorly graded, well compacted, dark yellowish orange (10YR 6/6), pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) mottled	003									
15			●	: moist										
16			●	: rapid dilatancy										

DRILLING CONTRACTOR: Terracon Consultants, Inc.
 Oklahoma City, Oklahoma

 LOGGED BY: Karen Gallup
 DATE: 10/21/94
 CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32288.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: EO-07	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 2	
	INI				STATIC	
	WATER LEVEL	21.00			TIME	TIME
	TIME	15:13			14:28	15:15
DATE	10/4/94			DATE	DATE	
DATUM: ft. MSL				ELEVATION: 1184.58		
CASING DEPTH				10/04/94	10/04/94	

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Graded area along northern perimeter
ANGLE: Vertical	BEARING: --- ditch
SAMPLE HAMMER TORQUE: ft.-lbs.	N 184498.4421 E 2173438.941

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1			•••••	TOPSOIL/FILL: sandy, top 6"														
2			•••••	FILL: hard, highly compacted, disturbed sample of grayish brown (5YR 3/2) silty clay	000													
3			•••••															
4			/ / / /	CLAY, Silty (CL): undisturbed, intermixed w/very fine-grained, very pale orange (10YR 8/2) sand														
5			•••••	SAND, Silty (SM): subangular to subrounded, loose, grayish orange (10YR 7/4)														
6			•••••	: more compacted, moderate yellowish brown (10YR 5/4)	001													
7			/ / / /	CLAY, Sandy (CL): dark yellowish brown (10YR 4/2) w/stringers of very pale orange (10YR 8/2) sand														
8			/ / / /	CLAY, Silty (CL): firm to hard, some slickensided surfaces, dusky yellowish brown (10YR 2/2)														
9			/ / / /	CLAY, Silty to Sandy (CL): slickensided														
10			/ / / /	: dark yellowish brown (10YR 4/2), small caliche nodules, slickensides														
11			/ / / /	: dark yellowish orange (10YR 6/6) and dusky yellowish brown (10YR 2/2) mottled, some black staining, small iron and scarce caliche nodules, slickensided	002													
12			/ / / /															
13			/ / / /	CLAY, Sandy (CL): hard, dusky brown (5YR 2/2), small roots, small caliche nodules, slickensides														
14			/ / / /	CLAY, Silty (CL) to CLAY (CH): hard, moderate yellowish brown (10YR 5/4) w/some black staining, slickensided														
15			/ / / /	: dk yellowish brown (10YR 4/2), small caliche nodules	003													
16			/ / / /															

DRILLING CONTRACTOR: Terracon Consultants, Inc.
 Oklahoma City, Oklahoma

LOGGED BY: Karen Gallup
 DATE: 10/21/94
 CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: EO-07	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 2 of 2	
	INI				STATIC	
	WATER LEVEL	21.00			START	FINISH
	TIME	15:13			TIME	TIME
	DATE	10/4/94			DATE	DATE
DATUM: ft. MSL		ELEVATION: 1184.58		DRILLING		
		CASING DEPTH		10/04/94	10/04/94	

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Graded area along northern perimeter
ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.	N 184498.4421 E 2173438.941

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

17			▽	SAND, Clayey (SC): very fine-grained, friable, some silt, moderate brown (5YR 4/4)															
18				SAND, Silty (SM): very fine-grained, subangular to subrounded, light brown (5YR 5/6) to moderate yellowish brown (10YR 5/4)	003														
19				: subrounded to rounded, dark yellowish orange (10YR 6/6) and grayish orange (10YR 7/4), moist															
20					004														
21				: wet, effervesces															
22				END OF BORING @ 22 FEET															
23																			
24																			
25																			
26																			
27																			
28																			
29																			
30																			
31																			
32																			

DRILLING CONTRACTOR: Terracon Consultants, Inc.
 Oklahoma City, Oklahoma

LOGGED BY: Karen Gallup
 DATE: 10/21/94
 CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-08	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 2	
	INI		STATIC		START	FINISH
	WATER LEVEL				TIME	TIME
	TIME				13:51	14:25
	DATE				DATE	DATE
DATUM: ft. MSL	ELEVATION: 1158.50			CASING DEPTH	10/05/94	10/05/94
DRILL RIG: Truck Mounted - CME-75			SURFACE CONDITIONS: Graded area at northeastern corner of property			
ANGLE: Vertical			BEARING: ---			
SAMPLE HAMMER TORQUE: ft.-lbs.			N 184529.9304 E 2174385.013			

DEPTH IN FEET (ELEVATION)	BLOWS/8" ON SAMPLER RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
							WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1		•••••	TOPSOIL/FILL: sandy, dark yellowish orange (10YR 6/6)			000								
2														
3		/ / / / /	CLAY, Sandy (CL): grayish brown (5YR 3/2), slickensided, intermixed w/very fine-grained, grayish orange (10YR 7/4) sand											
4		/ / / / /	CLAY (CH): firm, grayish brown (5YR 3/2) w/some black staining, slickensides											
5		/ / / / /	: moderate brown (5YR 4/4) w/black and dark yellowish orange (10YR 6/6) staining, occ. small caliche nodules, slickensides											
6		/ / / / /	: becoming slightly siltier, firm			001								
7		/ / / / /	CLAY, Sandy (CL): firm to hard, dark yellowish brown (10YR 4/2) with black staining, inc in caliche, occasional small iron nodules											
8		/ / / / /												
9		/ / / / /	CLAY, Silty (CL): firm to hard, slickensides, small iron nodules											
10		/ / / / /	: SILT seam (1"), grayish orange (10YR 7/4)											
11		/ / / / /	CLAY (CH): dk yellowish brown (10YR 4/2), light brown (5YR 5/6) and light olive gray (5Y 6/1) mottled, some black staining, caliche nodules, slickensided			002								
12		/ / / / /												
13		/ / / / /	CLAY, Silty (CL): soft, dark yellowish brown (10YR 4/2), slickensides											
14		/ / / / /	: SILT seam (2"), moderate yellowish brown (10YR 5/4)											
15		/ / / / /	: moderate yellowish brown (10YR 5/4) and light brown (5YR 5/6) mottled, black staining			003								
16		/ / / / /	: transition from 15.8-16.2 ft. to a Sandy CLAY											

DRILLING CONTRACTOR: Terracon Consultants, Inc. Oklahoma City, Oklahoma
 LOGGED BY: Karen Gallup
 CHECKED BY: Karen Gallup
 DATE: 10/21/94

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill & Recycling Center Oklahoma City, Oklahoma Installation of Gas-Monitoring Probes 32286.100	DRILLING METHOD: Hollow-Stem Auger				BORING NUMBER: E0-09	
	SAMPLING METHOD: Continuous 5-foot Shelby Tube				Sheet 1 of 1	
	INI		STATIC		START	FINISH
	WATER LEVEL				TIME	TIME
	TIME				17:05	17:31
	DATE				DATE	DATE
DATUM: ft. MSL		ELEVATION: 1155.12		CASING DEPTH		
				10/04/94	10/04/94	

DRILL RIG: Truck Mounted - CME-75	SURFACE CONDITIONS: Grassy area south of landfill main entrance
ANGLE: Vertical	BEARING: ---
on east side of property next to Mosley Rd.	
SAMPLE HAMMER TORQUE: ft.-lbs.	N 183387.8157 E 2174330.359

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1			•••••	TOPSOIL: sandy, some roots and gravel, dark yellowish orange (10YR 6/8) and moderate yellowish brown (10YR 5/4), angular to subrounded sand grains intermixed												
2			//	CLAY, Sandy (CL): firm to hard, dense, dusky yellowish brown (10YR 2/2) w/some moderate reddish brown (10R 4/6) staining, grayish orange (10YR 7/4) sand grains	000											
3			•••••	SAND, Silty (SM): v. fine-grained, subangular to subrounded, grayish orange (10YR 7/4) matrix w/very pale orange (10YR 8/2) grains, friable, poorly graded, laminated												
4			•••••													
5			•••••													
6			•••••		001											
7			•••••	: Clayey SILT seam												
8			•••••	: colors as above w/some black grains, moist												
9			•••••													
10			•••••	SAND (SP): fine-grained, subangular to subrounded, same colors as above, poorly graded	002											
11			•••••	END OF BORING @ 11 FEET												
12			•••••													
13			•••••													
14			•••••													
15			•••••													
16			•••••													

DRILLING CONTRACTOR: Terracon Consultants, Inc.
 Oklahoma City, Oklahoma
 LOGGED BY: Karen Gallup
 DATE: 10/21/94
 CHECKED BY: Karen Gallup

**RUST LITHOLOGIC LOGS
1995**



SOIL BOREHOLE LOG

mw-27

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)				BORING NUMBER: B-27	
	SAMPLING METHOD: Split Spoon (SS)				Sheet 1 of 2	
	Sampler (2-foot)				DRILLING	
	INI	STATIC		START	FINISH	
WATER LEVEL	12.5		16.77	TIME	TIME	
TIME	1431		0932	1358	1502	
DATE	8/21/95		8/24/95	DATE	DATE	
CASING DEPTH				8/21/95	8/21/95	
DATUM: ft. MSL			ELEVATION: 1156.60			
DRILL RIG: CME-75			SURFACE CONDITIONS: Dry.			
ANGLE: Vertical			BEARING: ---			
SAMPLE HAMMER TORQUE: ft.-lbs.						

DRILLING CONTRACTOR: Terracon Consultants
Oklahoma City, OK

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS								
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS				
1	100		•••••	FILL: Silty SAND, fine-grained, pale yellowish brown (10YR 6/2), dry, rooted	000	X										
2																
3	100		•••••	: medium-grained, same colors w/some moderate yellowish brown (10YR 5/4), dry	001	X										
4																
5	100		•••••	: all moderate yellowish brown (10YR 5/4), dry to moist	002	X										
6				: slightly clayey												
7	100		•••••	: firm, some dark yellowish brown (10YR 4/2), moist	003	X										
8																
9	100		/ / / / /	CLAY, Sandy (CL): firm to hard, 2.5 (PP), greenish black (5GY 2/1)	004	X										
10																
11	100		•••••	SAND, Silty (SM): fine to medium-grained, grayish orange (10YR 7/4)	005	X										
12																
13	100		•••••	: wet, rapid dilatancy : silt seam @ 12.75-13 feet	006	X										
14				: medium-grained												
15	50		•••••	: no recovery from 14-15 feet	007	X										

E-2-81

LOGGED BY: Jeff Austin
DATE: 8/21/95
CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: ast Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)			BORING NUMBER: B-27		
	SAMPLING METHOD: Split Spoon (SS)			Sheet 2 of 2		
	Sampler (2-foot)			DRILLING		
	INI		STATIC		START	FINISH
	WATER LEVEL	12.5		16.77	TIME	TIME
TIME	1431		0932	1358	1502	
DATE	8/21/95		8/24/95	DATE	DATE	
CASING DEPTH				8/21/95	8/21/95	

DATUM: ft. MSL ELEVATION: 1156.60

DRILL RIG: CME-75 SURFACE CONDITIONS: Dry.

ANGLE: Vertical BEARING: ---

SAMPLE HAMMER TORQUE: ft.-lbs.

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

16	50			: carbonaceous material	007	X														
17	100		▼	: coarse-grained, grayish orange (10YR 7/4), moist	008	X														
19	100				009	X														
21	100				010	X														
23	100			: fine to medium-grained, dark yellowish brown (10YR 4/2)	011	X														
24	BOTTOM @ 24 FEET																			
25																				
26																				
27																				
29																				
30																				

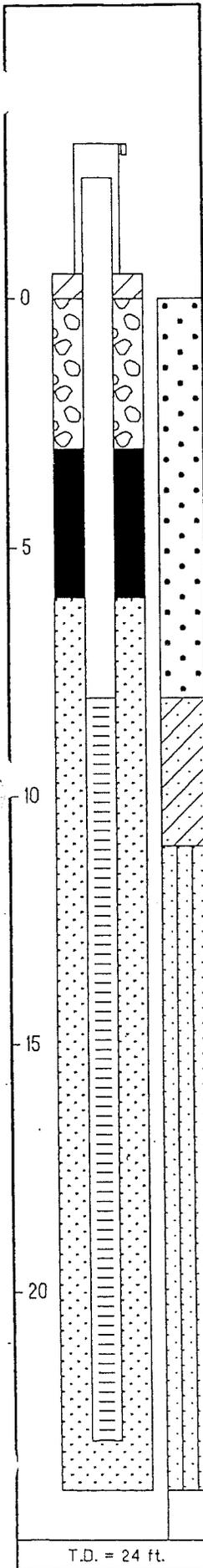
E-2-82

TERRACON CONSULTANTS
 DRILLING CONTRACTOR
 Oklahoma City, OK
 LOGGED BY Jeff Austin
 DATE 8/21/95
 CHECKED BY Karen Gallup

WELL No. MW-27
 Boring No X-Ref. B-27

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords E 2,172,448.21, N 183,564.61 Elevation Ground Level 1156.60
 Pin Elevation 1156.68 Top of Casing 1159.04



Drilling Summary

Total Depth (ft): 24
 Borehole Diameter (in): 8-inch
 Casing Stickup Height (ft): 2.44
 Driller: Terracon Consultants
 Driller-Don Plumb

Rig: CME-75
 Bit (s): HSA

Drilling Fluid: NONE w/HSA

Protective Casing: 5-foot Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String (s): C = Casing S = Screen

Depth (ft)	String (s)	Elevation (MSL)
+2.83 - 2.17	C ₁	1159.43 1154.43
+2.44 - 8.00	C ₂	1159.04 1148.60
8.00 - 23.00	S ₁	1148.60 1133.60
-	-	-
-	-	-

Casing: C1 6" Anodized Aluminum (square)
 (+3.14-1.86 feet)

Casing: C2 2" PVC, Sch.40, Flush Joint
 (+2.44-8 feet)

Screen: S1 2" PVC, Sch.40, .010-inch slotted
 (8-23 feet)

Screen: S2

Grout Seal: Bentonite Grout
 (0-3 feet)

Bentonite Seal: Bentonite Pel-Plug, fine-grained
 (3-6 feet)

Filter Pack: 20/40 Silica Sand
 (6-24 feet)

Comments

Drilled and sampled with HSA; very fast recovering well, therefore couldn't get many data points for recovery test.

Construction Time Log 8/21/95-8/26/95

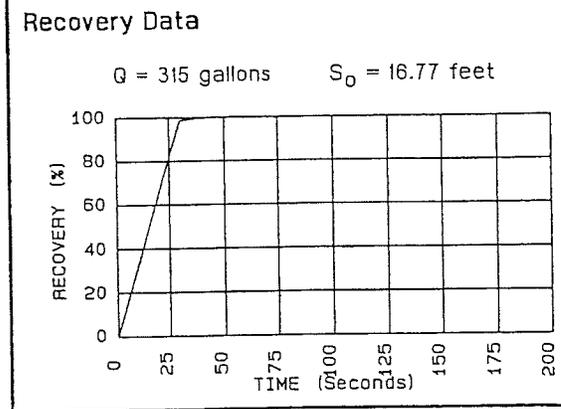
Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	8/21/95	1358	8/21/95	1502
Casing:				
C ₁ Prot.:	8/26/95	1021	8/26/95	1025
S ₁ /C ₂ 2" PVC:	8/21/95	1520	8/21/95	1524
Bentonite Seal:	8/21/95	1558	8/21/95	1601
Grout Seal:	8/21/95	1601	8/21/95	1606
Filter Placement:	8/21/95	1505	8/21/95	1557
Cementing:	8/26/95	1001	8/26/95	1137
Development:	8/24/95	1509	8/25/95	0836

Well Development 8/25/95

Removed 270 gallons on 8/24/95 with grundfos pump.
 Removed 45 gallons on 8/25/95 with grundfos pump.
 Total gallons removed = 315 gallons.

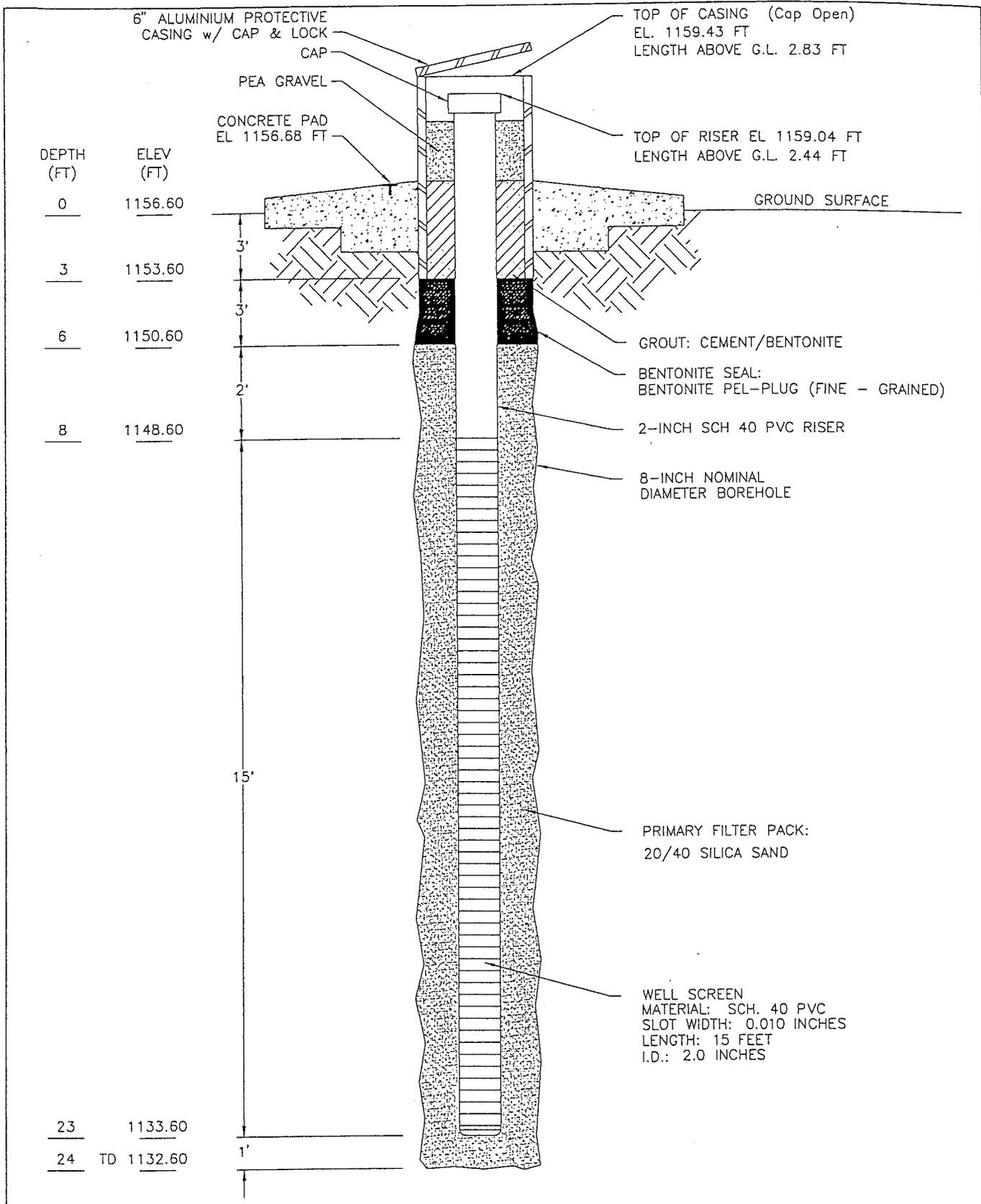
Stabilization Test Data 8/25/95

Time	pH	Spec. Cond.	Temp (C)
1631	7.7	660	25.5
1635	7.7	440	23.9
1638	7.7	431	21.4
1640	7.6	433	21.4



SITE NAME East Oak RFD
 LOCATION Oklahoma City, Oklahoma
 SUPERVISED BY Jeff Austin
 DATE 8/21/95-8/26/95 CHECKED BY Karen Gallup

T.D. = 24 ft.



TD = TOTAL DEPTH

DATE DRILLED: 8-21-95

NOT TO SCALE

RUST ENVIRONMENT &
INFRASTRUCTURE

OCTOBER 1995

Project: 68147.100

CADD File:/68147SW/8147MW27.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

MONITORING WELL MW-27

SOIL BOREHOLE LOG

mw-28

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)				BORING NUMBER: B-28	
	SAMPLING METHOD: Split Spoon (SS)				Sheet 1 of 2	
	Sampler (2-foot)				DRILLING	
	INI		STATIC		START	FINISH
WATER LEVEL	12.0			15.14	TIME	TIME
TIME	1148			0929	1122	1226
DATE	8/21/95			8/25/95	DATE	DATE
CASING DEPTH					8/21/95	8/21/95

DATUM: ft. MSL ELEVATION: 1155.05

DRILL RIG: CME-75	SURFACE CONDITIONS: Grassy and dry.
ANGLE: Vertical BEARING: ---	
SAMPLE HAMMER TORQUE: ft.-lbs.	

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1	100	100	•••••	TOPSOIL: Sandy, grayish orange (10YR 7/4), rooted	000	X								
2	100	100	•••••	SAND, Silty (SM): fine-grained, moderate yellowish brown (10YR 5/4), dry, friable, some roots : moist to dry	001	X								
4	100	100	•••••	: no recovery @ 4-5 feet	002	X								
5	100	100	•••••	: pale yellowish brown (10YR 6/2), some roots, increase in silt content	003	X								
6	100	100	•••••	SILT, Sandy (ML): soft, grayish orange pink (5YR 7/2), friable, dry to moist	004	X								
7	100	100	•••••	: no recovery @ 8-9 feet	005	X								
8	100	100	•••••	CLAY, Silty (CL): soft to firm, 2.0 (PP), moderate yellowish brown (10YR 5/4), dry to moist, : some dark yellowish orange (10YR 6/6) staining	006	X								
9	50	50	•••••	SAND, Silty (SM): fine-grained, moderate yellowish brown (10YR 5/4), wet : very fine to fine-grained @ 11.5-12 feet : fine to medium-grained @ 12-16 feet	007	X								
10	100	100	•••••		008	X								
11	100	100	•••••		009	X								
12	100	100	•••••		010	X								
14	50	50	•••••		011	X								
15	50	50	•••••		012	X								

Terracon Consultants
 DRILLING CONTRACTOR
 Oklahoma City, OK

LOGGED BY Jeff Austin
 DATE 8/21/95
 CHECKED BY Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)				BORING NUMBER: B-28	
	SAMPLING METHOD: Split Spoon (SS)				Sheet 2 of 2	
	Sampler (2-foot)				DRILLING	
	INI		STATIC		START	FINISH
	WATER LEVEL	12.0		15.14	TIME	TIME
	TIME	1148		0929	1122	1226
DATE	8/21/95		8/25/95	DATE	DATE	
DATUM: ft. MSL		ELEVATION: 1155.05		CASING DEPTH	8/21/95 8/21/95	

DRILL RIG: CME-75	SURFACE CONDITIONS: Grassy and dry.
ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.	

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

16	50		•••••	: medium-grained, rapid dilatancy, wet	007	X								
17	100		•••••	: fine-grained, pale yellowish brown (10YR 6/2)	008	X								
19	100		•••••	: some light brown (5YR 6/4)	009	X								
21	100		•••••	: some light brown (5YR 6/4)	010	X								
23	100		•••••	: coarse-grained, dark greenish gray (5GY 4/1)	011	X								
24	CLAY (CH): firm to hard, 2.5 (PP), dark yellowish brown (10YR 4/2), moist to wet BOTTOM @ 24 FEET													
25			•••••											
26			•••••											
27			•••••											
29			•••••											
30			•••••											

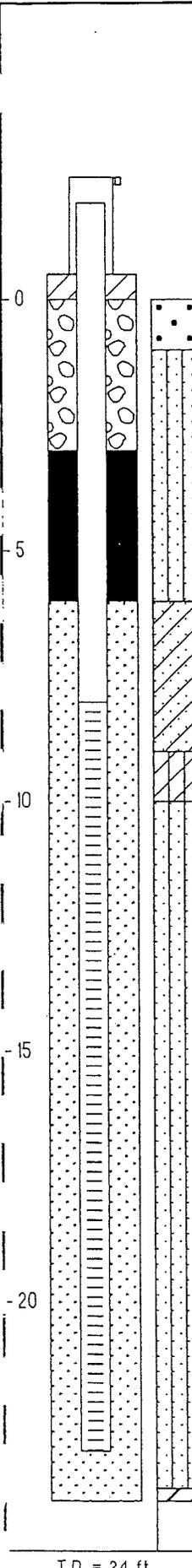
Terracon Consultants
 DRILLING CONTRACTOR
 Oklahoma City, OK

LOGGED BY Jeff Austin
 DATE 8/21/95 CHECKED BY Karen Gallup

WELL No. MW-28
 Boring No X-Ref. B-28

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords E 2,173,009.61, N 184,581.61 Elevation Ground Level 1155.05
 Pin Elevation 1155.11 Top of Casing 1156.98



Drilling Summary

Total Depth (ft): 24
 Borehole Diameter (in): 8-inch
 Casing Stickup Height (ft): 1.93
 Driller: Terracon Consultants
 Driller-Don Plumb
 Rig: CME-75
 Bit (s): HSA
 Drilling Fluid: NONE w/HSA
 Protective Casing: 5-foot Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String (s): C = Casing S = Screen

Depth (ft)	String (s)	Elevation (MSL)
+2.46 - 2.54	C ₁	1157.51 1152.51
+1.93 - 8.00	C ₂	1156.98 1147.05
8.00 - 23.00	S ₁	1147.05 1132.05
-	-	-
-	-	-

- Casing: C1 4" Anodized Aluminum (circular)
(+2.46-2.54 feet)
- Casing: C2 2" PVC, Sch.40, Flush Joint
(+1.93-8.00 feet)
- Screen: S1 2" PVC, Sch.40, .010-inch slotted
(8-23 feet)
- Screen: S2
- Grout Seal: Bentonite Grout
(0-3 feet)
- Bentonite Seal: Bentonite Pel-Plug, fine-grained
(3-6 feet)
- Filter Pack: 20/40 Silica Sand
(6-24 feet)

Comments

Drilled and sampled with HSA; very fast recovering well, therefore couldn't get many data points for recovery test.

Construction Time Log 8/21/95-8/22/95

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	8/21/95	1122	8/21/95	1226
Casing:				
C ₁ Prot.:	8/22/95	1557	8/22/95	1610
S ₁ /C ₂ 2" PVC:	8/21/95	1250	8/21/95	1300
Bentonite Seal:	8/21/95	1340	8/21/95	1345
Grout Seal:	8/21/95	1553	8/21/95	1555
Filter Placement:	8/21/95	1240	8/21/95	1337
Cementing:	8/22/95	1552	8/22/95	1635
Development:	8/25/95	0929	8/25/95	1052

Well Development 8/25/95

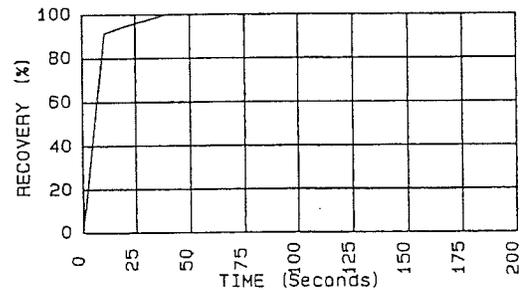
Removed 205 gallons on 8/25/95 with Grundfos pump.
 Total gallons removed = 205 gallons.

Stabilization Test Data 8/25/95

Time	pH	Spec. Cond.	Temp (C)
1042	7.6	524	25.9
1044	7.6	486	24.3
1047	7.6	485	24.1

Recovery Data

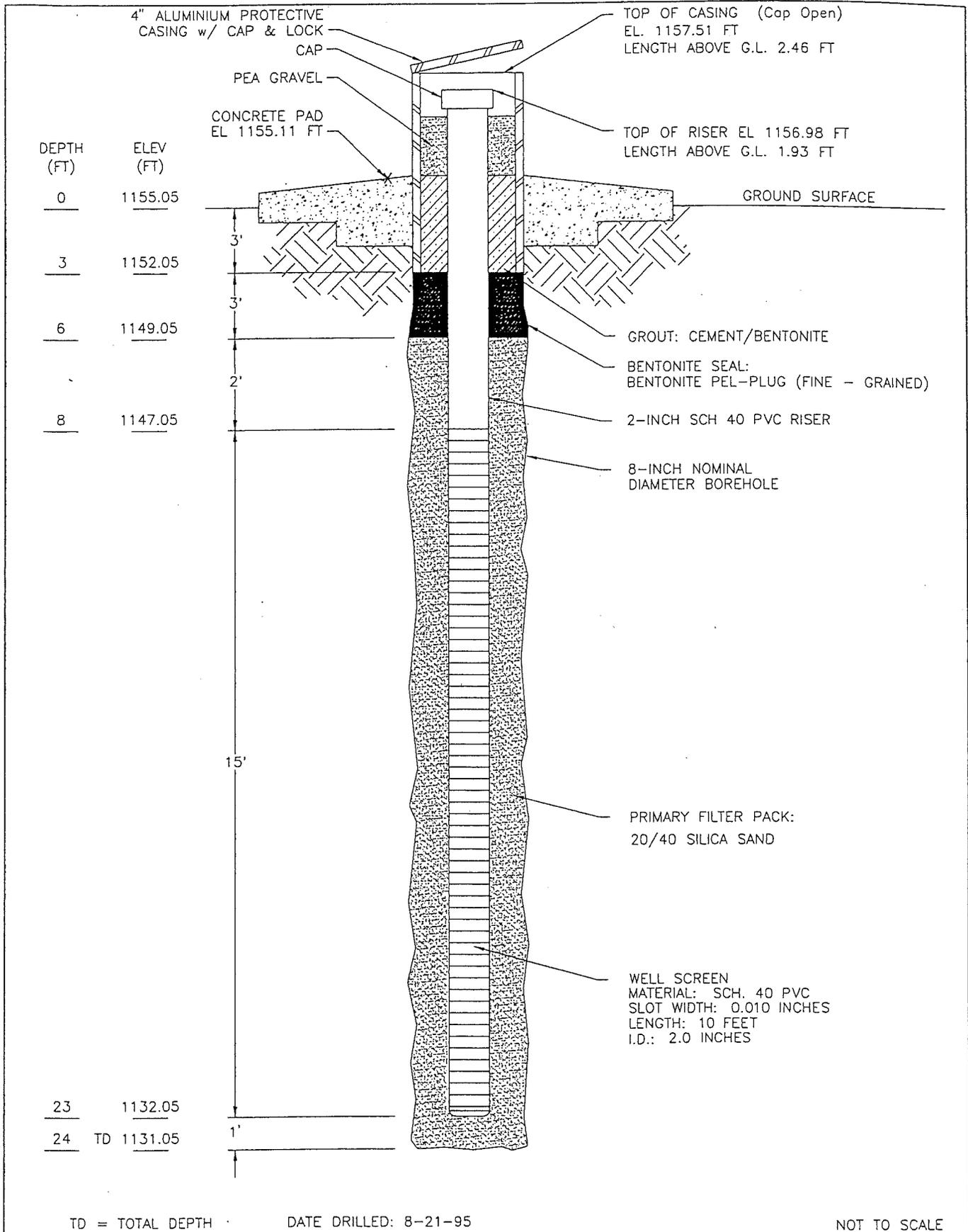
Q = 205 gallons S₀ = 15.14 feet



T.D. = 24 ft.

SITE NAME East Oak Rdf
 LOCATION Oklahoma City, Oklahoma

SUPERVISED BY Jeff Austin
 DATE 8/21/95-8/26/95 CHECKED BY Karen Gallup



RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995
Project: 68147.100
CADD File: /68147SW/8147MW28.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

MONITORING WELL MW-28

SOIL BOREHOLE LOG

mw-29

SITE NAME AND LOCATION:

East Oak RDF
Oklahoma City, Oklahoma
Monitoring Well Installation
68174.100

DRILLING METHOD: Hollow Stem Auger (HSA)

BORING NUMBER:

B-29

SAMPLING METHOD: Split Spoon (SS)

Sheet 1 of 3

Sampler (2-foot)

DRILLING

DATUM: ft. MSL

ELEVATION: 1162.30

INI

STATIC

START

FINISH

WATER LEVEL

20.0

22.75

TIME

TIME

TIME

0958

1032

0838

1250

DATE

8/23/95

8/24/95

DATE

DATE

CASING DEPTH

8/23/95

8/23/95

DRILL RIG: CME-75

SURFACE CONDITIONS: Grassy and dry.

ANGLE: Vertical

BEARING: ---

SAMPLE HAMMER TORQUE: ft.-lbs.

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS									
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS					
0				No recovery from 0-3 feet.	000												
50				CLAY, Silty (CL): firm to hard, 3.0 (PP), dark yellowish brown (10YR 4/2)	001												
3.5-4				: silt seam from 3.5-4 feet, soft, <1.5 (PP), dark yellowish brown (10YR 4/2), dry to moist													
100				: firm to hard, 2.5 (PP), dark yellowish brown (10YR 4/2), dry to moist, pliable	002												
6-7				: no recovery from 6-7 feet													
50				: hard, 4.0 (PP), olive black (5Y 2/1) w/ some moderate brown (5YR 4/4)	003												
100				CLAY (CH): hard, 3.5 (PP), moderate brown (5YR 4/4) w/ some black (N1) staining	004												
100				CLAY, Sandy (CL): hard, 3.5 (PP), dark yellowish brown (10YR 4/2), w/ dark yellowish orange (10YR 6/6) staining, moist	005												
100				CLAY, Silty (CL): hard, 3.5 (PP), dark yellowish brown (10YR 4/2)													
				: increase in sand content													
100				SILT, Sandy (ML): soft, grayish orange (10YR 7/4), moist to wet	006												
50				CLAY, Silty (CL): firm, 2.5 (PP), grayish orange (10YR 7/4), moist to wet	007												

Terracon Consultants
DRILLING CONTRACTOR
Oklahoma City, OK

LOGGED BY Jeff Austin
DATE 8/21/95
CHECKED BY Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)			BORING NUMBER: B-29	
	SAMPLING METHOD: Split Spoon (SS)			Sheet 2 of 3	
	Sampler (2-foot)			DRILLING	
	INI		STATIC		START
WATER LEVEL	20.0		22.75	TIME	TIME
TIME	0958		1032	0838	1250
DATE	8/23/95		8/24/95	DATE	DATE
CASING DEPTH				8/23/95	8/23/95

DRILL RIG: CME-75	SURFACE CONDITIONS: Grassy and dry.
ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.	

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

16	50		/		007	X								
17	100		/	: hard, 4.0 (PP)	008	X								
18	100		/	: firm, 2.5 (PP)	009	X								
19	100		/		010	X								
20	100		/		011	X								
21	100		/		012	X								
22	100		/	SAND, Clayey (SC): fine-grained, grayish orange (IOYR 7/4)	013	X								
23	100		/	SAND (SW): medium-grained, grayish orange (IOYR 7/4), moist to wet, friable	014	X								
24	100		/	: no recovery from 24-25 feet	015	X								
25	50		/		016	X								
26	100		/	: no recovery from 26-27 feet	017	X								
27	50		/	: rapid dilatancy	018	X								
28	100		/	: no recovery from 28-29 feet	019	X								
29	50		/		020	X								
30	50		/		021	X								

DRILLING CONTRACTOR: Terracon Consultants
 Oklahoma City, OK

LOGGED BY: Jeff Austin
 DATE: 8/21/95
 CHECKED BY: Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)				BORING NUMBER: B-29	
	SAMPLING METHOD: Split Spoon (SS)				Sheet 3 of 3	
	Sampler (2-foot)				DRILLING	
	INI		STATIC		START	FINISH
WATER LEVEL	20.0			22.75	TIME	TIME
TIME	0958			1032	0838	1250
DATE	8/23/95			8/24/95	DATE	DATE
CASING DEPTH					8/23/95	8/23/95

DATUM: ft. MSL ELEVATION: 1162.30

DRILL RIG: CME-75 SURFACE CONDITIONS: Grassy and dry.

ANGLE: Vertical BEARING: ---

SAMPLE HAMMER TORQUE: ft.-lbs.

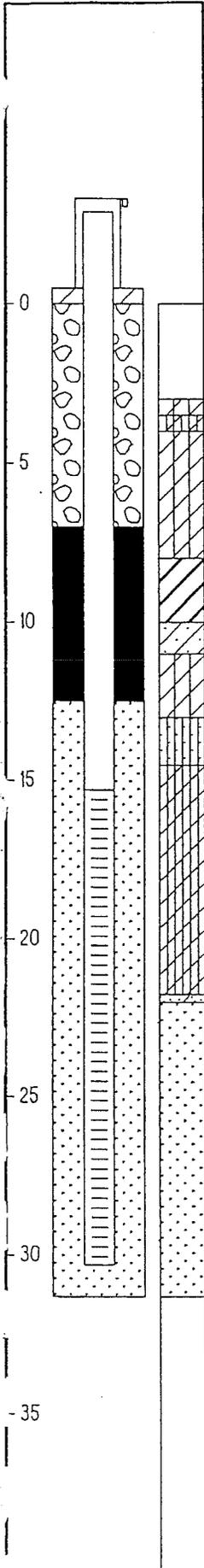
DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS		
31	100		•••••	: medium to coarse-grained, pale yellowish brown (10YR 6/2)	015	X								
32				BOTTOM @ 31.3 FEET										
34														
35														
36														
37														
38														
39														
40														
41														
42														
43														
45														

Terracon Consultants
 DRILLING CONTRACTOR
 Oklahoma City, OK
 LOGGED BY: Jeff Austin
 DATE: 8/21/95
 CHECKED BY: Karen Gallup

WELL No. MW-29
 Boring No X-Ref. B-29

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords E 2,173,839.75, N 184,554.05 Elevation Ground Level 1162.30
 Pin Elevation 1162.22 Top of Casing 1165.18



Drilling Summary

Total Depth (ft): 31.3
 Borehole Diameter (in): 8-inch
 Casing Stickup Height (ft): 2.88
 Driller: Terracon Consultants
 Driller-Don Plumb
 Rig: CME-75
 Bit (s): HSA
 Drilling Fluid: NONE w/HSA
 Protective Casing: 5-foot Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String (s): C = Casing S = Screen

Depth (ft)	String (s)	Elevation (MSL)
+3.30 - 1.70	C ₁	1165.60 1160.60
+2.88 - 15.3	C ₂	1165.18 1147.00
15.3 - 30.3	S ₁	1147.00 1132.00
-	-	-
-	-	-

Casing: C1 6" Anodized Aluminum (square)
 (+3.30-1.70 feet)
 Casing: C2 2" PVC, Sch.40, Flush Joint
 (+2.88-15.3 feet)
 Screen: S1 2" PVC, Sch.40, .010-inch slotted
 (15.3-30.3 feet)
 Screen: S2
 Grout Seal: Bentonite Grout
 (0-7 feet)
 Bentonite Seal: Bentonite Pel-Plug, fine-grained
 (7-12.5 feet)
 Filter Pack: 20/40 Silica Sand
 (12.5-31.3 feet)

Comments

Drilled and sampled with HSA; very fast recovering well.

Construction Time Log 8/23/95-8/26/95

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	8/23/95	0838	8/23/95	1250
Casing:				
C ₁ Prot.:	8/26/95	1150	8/26/95	1155
S ₁ /C ₂ 2" PVC:	8/23/95	1251	8/23/95	1253
Bentonite Seal:	8/23/95	1352	8/23/95	1356
Grout Seal:	8/23/95	1358	8/23/95	1410
Filter Placement:	8/23/95	1253	8/23/95	1352
Cementing:	8/26/95	1150	8/26/95	1223
Development:	8/26/95	1442	8/26/95	1610

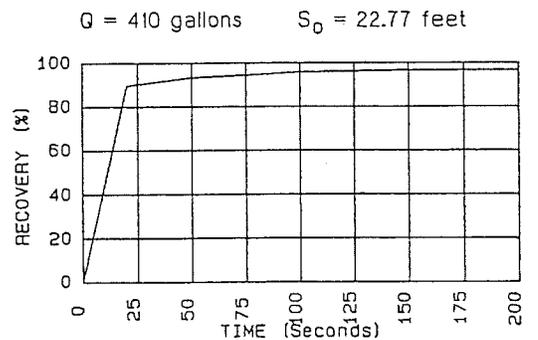
Well Development 8/26/95

Removed 410 gallons on 8/26/95 with grundfos pump.
 Total gallons removed = 410 gallons.

Stabilization Test Data 8/26/95

Time	pH	Spec. Cond.	Temp (C)
1535	7.5	1412	22.2
1540	7.1	1291	21.8
1544	7.1	1267	20.2
1551	7.0	1229	19.1

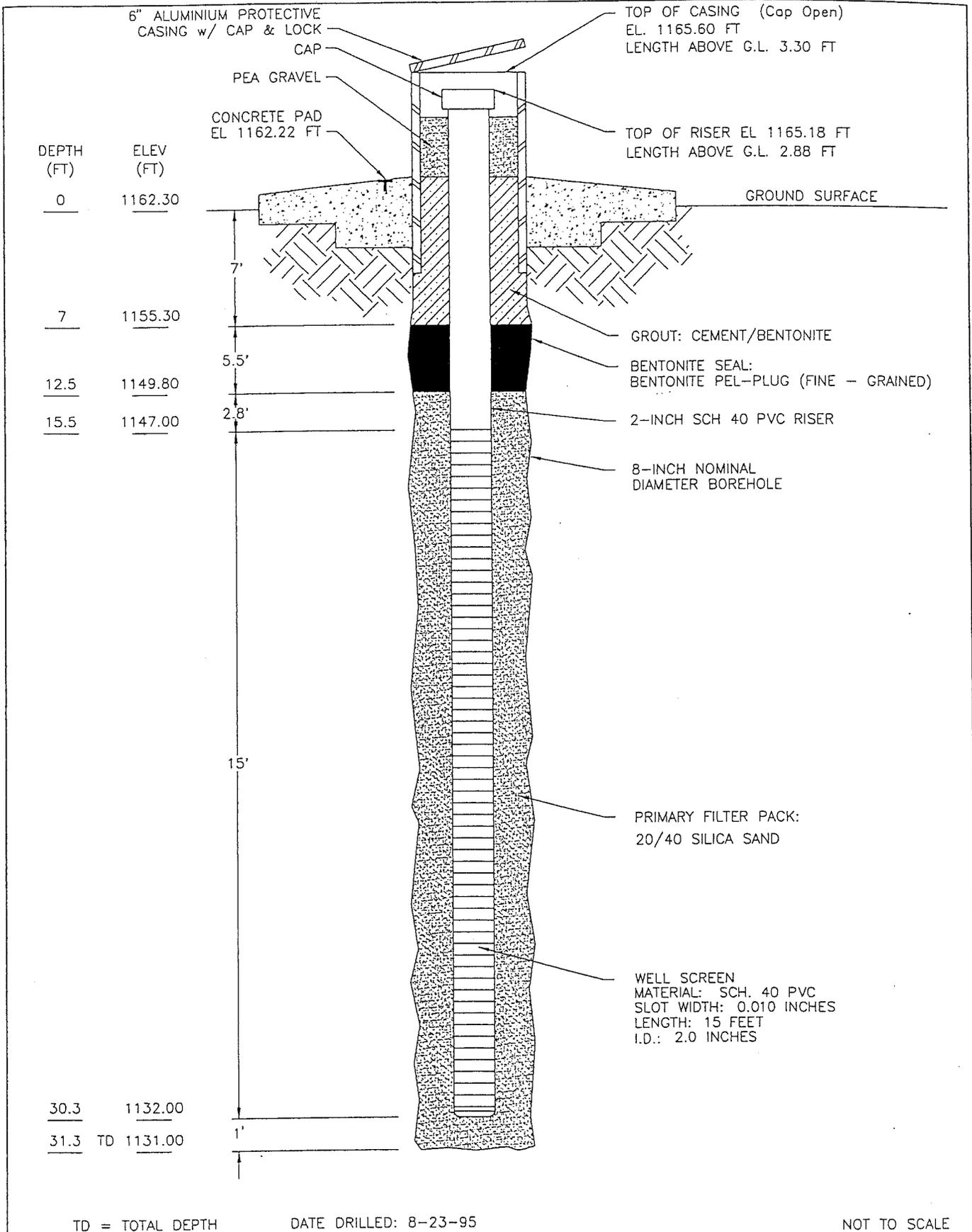
Recovery Data



SITE NAME East Oak Rdf
 LOCATION Oklahoma City, Oklahoma

SUPERVISED BY Jeff Austin
 DATE 8/23/95-8/26/95 CHECKED BY Karen Gallup

T.D. = 31.3 ft.



RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 68147.100

CADD File:/68147SW/8147MW29.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

MONITORING WELL MW-29

**TETRA TECH
LITHOLOGIC LOGS
1999**

		LOG OF BORING MW-220			Geologist: Tetra Tech		Page 1 of 6											
		Project Title: East Oak Landfill Expansion			Driller: Terracon													
		Project No: 0086-356-11-02-07			Field Tests		Geotechnical Laboratory Results											
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/21/2005 Northing: 184292.91		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content										
			Boring End Date: 2/21/2005 Easting: 2175051.193															
		Ground Elevation: 1159.4 ft-msl T.O.C.: 1162.01 ft-msl		Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index											
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.																
		▽ = Water Level at Time of Drilling: Not Observed ▽ = Static Water Level: 1122.7 ft-msl		Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail													
		Description	FT MSL															
			Fill, topsoil and gravel for road base.	1155.4														
5			CLAYEY SILT, olive grey, with trace sand.	1154.1														
			SAND, fine to coarse grain, poorly sorted, angular to subrounded grains, moderate yellowish brown, with trace clay and silt.															

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-95

LOG OF BORING MW-220

Project Title: East Oak Landfill Expansion

Project No: 0086-356-11-02-07

Geologist: Tetra Tech

Driller: Terracon

Depth (ft)	Samples	Graphic Log	Description		Field Tests		Geotechnical Laboratory Results						Well Detail	
				FT MSL	Hand Penetrometer Test (tsf)	Penetration Blows/in	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index		Permeability (cm/s) and Unconfined Compressive Strength (tsf)
			Boring Start Date: 2/21/2005 Northing: 184292.91 Boring End Date: 2/21/2005 Easting: 2175051.193 Ground Elevation: 1159.4 ft-msl T.O.C.: 1162.01 ft-msl											
			Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006. ▽ = Water Level at Time of Drilling: Not Observed ▼ = Static Water Level: 1122.7 ft-msl											
35			SAND (continued).		1120.4									
40			SANDSTONE, silty clayey, reddish brown to reddish brown and tan banded, with some interbedded shale.											
45														
50														
55														

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-96

		LOG OF BORING MW-220			Geologist: Tetra Tech		Driller: Terracon		Page 3 of 6							
		Project Title: East Oak Landfill Expansion														
		Project No: 0086-356-11-02-07			Field Tests		Geotechnical Laboratory Results									
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/21/2005		Northing: 184292.91		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 2/21/2005		Easting: 2175051.193											
		Ground Elevation: 1159.4 ft-msl		T.O.C.: 1162.01 ft-msl												
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.														
		▽ = Water Level at Time of Drilling: Not Observed														
		▽ = Static Water Level: 1122.7 ft-msl														
		Description		FT MSL												
		SANDSTONE (continued).														
65																
70																
75																
80																
85																

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-97

LOG OF BORING MW-220

Project Title: East Oak Landfill Expansion

Project No: 0086-356-11-02-07

Geologist: Tetra Tech

Driller: Terracon

Field Tests

Geotechnical Laboratory Results

Boring Start Date: 2/21/2005 Northing: 184292.91
 Boring End Date: 2/21/2005 Easting: 2175051.193
 Ground Elevation: 1159.4 ft-msl T.O.C.: 1162.01 ft-msl

Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.

▽ = Water Level at Time of Drilling: Not Observed
 ▼ = Static Water Level: 1122.7 ft-msl

Depth (ft)	Samples	Graphic Log	Description		FT MSL	Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^o /No. 40 ^o	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
		SANDSTONE (continued).													
95															1064.9
															1061.4
100															1057.4
105															
110															1047.4
															1045.9
															1045.4
115															

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-98

		LOG OF BORING MW-220		Geologist: Tetra Tech		Page 5 of 6								
		Project Title: East Oak Landfill Expansion		Driller: Terracon										
		Project No: 0086-356-11-02-07		Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/21/2005 Northing: 184292.91		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200* /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 2/21/2005 Easting: 2175051.193											
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.												
		▽ = Water Level at Time of Drilling: Not Observed ▼ = Static Water Level: 1122.7 ft-msl												
		Description		FT MSL										
125			SANDSTONE (continued).											
130														
135														
140														
145														

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-99

		LOG OF BORING MW-220			Geologist: Tetra Tech		Page 6 of 6											
		Project Title: East Oak Landfill Expansion			Driller: Terracon													
		Project No: 0086-356-11-02-07			Field Tests		Geotechnical Laboratory Results											
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/21/2005 Northing: 184292.91		Hand Penetrometer Test (tsf)	Penetration Blows/in	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content										
			Boring End Date: 2/21/2005 Easting: 2175051.193															
		Ground Elevation: 1159.4 ft-msl T.O.C.: 1162.01 ft-msl		FT MSL				Dry Density (pcf)										
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.							Description				Liquid Limit					
		▽ = Water Level at Time of Drilling: Not Observed ▼ = Static Water Level: 1122.7 ft-msl						Plastic Limit										
														Plasticity Index				
															Permeability (cm/s) and Unconfined Compressive Strength (tsf)			
														Well Detail				
155			SANDSTONE (continued).		999.4													
160																		
165																		
170																		
175																		

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-100

WELL No. MW-220
 Boring No X-Ref. MW-220

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords N.E 184,292.906
2,175,051.193

Elevation Ground Level 1159.410
 Top of Casing 1162.007

Drilling Summary

Total Depth: 160'
 Borehole Diameter: 5 7/8"
 Casing Stickup Height: 3'
 Driller: Terracon Consultants Inc.
 Russ Smalley, Bill Vick

Rlg: FAILING
 Bits: 5 7/8" ROLLER

Drilling Fluid: natural mud

Protective Casing: 6-inch Aluminium

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
112.0 - 113.5	sump	-
102.0 - 112.0	screen	-
+3 - 102.0	C ₁ (riser)	-
-	-	-
-	-	-

Casing: C1 102' bgl to 3' bgl

Casing: C2

Screen: S1 10' 0.010 slot

Screen: S2 0.1' to slot from base,
 0.5' to slot from top

Filter Pack:

20/40 114-99
 40/60 99-98

Grout Seal:

Bentonite/Cement slurry

Bentonite Seal: 98-94.5

Comments

5 bags 20/40, 1/2 bag blasting, 1 bucket pellets for seal
 Grout 7 bags cement, 1/2 bag bentonite
 ~ 12 buckets of bentonite to backfill
 55' of 6" steel casing

Construction Time Log

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:		4:00 P	2/21/95	8:50
Casing:				
C ₁ Prot.:				
C ₂ 2' PVC:		4:10		4:20
S ₁ 2' PVC				
Filter Placement:		4:20 P		5:10
Bentonite Seal:		5:10		5:20
Cementing:				
Development:				

Well Development

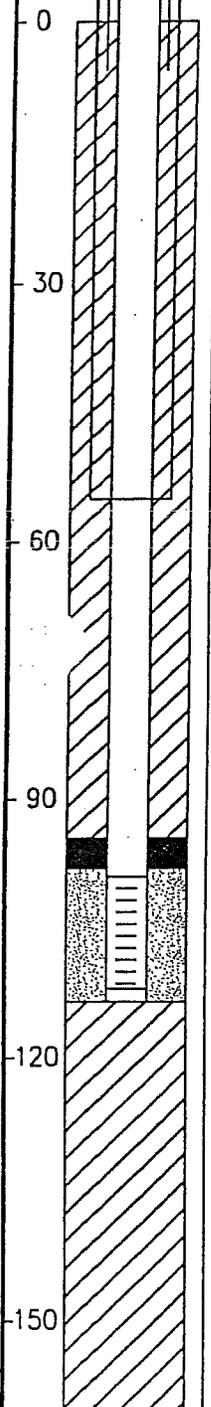
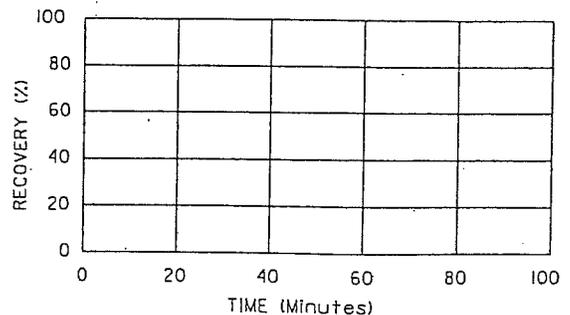
Stabilization Test Data

2/23/95

Time	pH	Spec. Cond.	Temp (C)

Recovery Data

Q = S₀ =



T.D. = 160 ft.

SITE NAME Mosley Road
 LOCATION Oklahoma City, Oklahoma
 WL 000-1
 SUPERVISED BY A. Hink
 DATE 2/17/95
 CHECKED BY _____

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: Mosley Road Oklahoma City, Oklahoma	DRILLING METHOD: Hollow stem Auger				BORING NUMBER: MW-221	
	SAMPLING METHOD: Split spoon				Sheet 2 of 12	
	INI				STATIC	
	WATER LEVEL	16			START TIME	FINISH TIME
	TIME	9:10			9:10A	9:10
	DATE	2/13/95			DATE	DATE
DATUM: Ground Level		ELEVATION:		2/13/95	2/15/95	
DRILL RIG: CME			SURFACE CONDITIONS: Dry, Flat field adjacent to Mosely Road			
ANGLE: Vertical			BEARING:			
SAMPLE HAMMER TORQUE: ft.-lbs.						

DEPTH IN FEET (ELEVATION)	BLOWS/6 ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OVA (PPM)

15	75		[Symbol]	SAND; soft pale yellow (10YR6/2), saturated, massive homogeneous, non-cohesive, fine with small medium grains, moderately well sorted	8	X														
16																				0
17	100					9	X													
18																				2
19	100				Sharp	10	X													
20			[Symbol]	Clayey, SAND; soft, brownish gray (5YR 4/1) saturated, laminated, non cohesive, sand fine - course grains, poorly sorted ferrous nodules																1
21	100			SAND; soft pale yellow brown (10YR 6/2), saturated, massive, homogeneous, non-cohesive, fine grain		11	X													
22			[Symbol]	Clayey, SAND; soft, brown gray (5YR 4/1) saturated, laminated, non-cohesive, sand fine-medium, moderately sorted,																0
23	100			: increase clay, becoming sandy clay?		12	X													
24				: decreasing clay																1
25	100			Clayey, SAND; soft, lt olive gray (5Y 5/2), saturated, massive, homogeneous, non-cohesive, well sorted, sand is very fine to fine grain, well sorted		13	X													
26			[Symbol]																	0
28	60					14	X													
29	100				Sharp	15	X													0

 DRILLING CONTRACTOR *Terracon Consultants, Inc.*

 SUPERVISED BY A. Hink
 DATE 2/13/95 CHECKED BY _____

SOIL BOREHOLE LOG

SITE NAME AND LOCATION:

Mosley Road
Oklahoma City, Oklahoma

DRILLING METHOD: Hollow stem Auger

BORING NUMBER:

MW-221

SAMPLING METHOD: Split spoon, Blind Drill, XN

Sheet 3 of 12

DRILLING

INI

STATIC

START

FINISH

WATER LEVEL

TIME

DATE

CASING DEPTH

9:10

2/13/95

TIME

9:10A

DATE

2/13/95

TIME

9:10A

DATE

2/15/95

DATUM: Ground Level

ELEVATION:

DRILL RIG: CME

SURFACE CONDITIONS: Dry flat field adjacent to Mosley Road

ANGLE: Vertical

BEARING:

SAMPLE HAMMER TORQUE: ft.-lbs.

DEPTH IN FEET (ELEVATION)	BLOWS/6 ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS								
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OVA (PPM)				
30	75			SAND; soft, medium light gray (NG) saturated, massive, homogeneous, non-cohesive, fine -course grain, poorly sorted, sub angular- sub round some red brown grains : with rare gravel, ~5mm												
31							16									
32	100			: grain size decreasing, fine-medium with some course												
33							17									
34	100															
35				: with rare gravel ~8mm Sharp			18									
36	100			SANDSTONE; soft, pale reddish brown (10YR 5/4) moist massive homogeneous, fine grain, well sorted, sub round, friable												
37							19									
38	100															
39																
40	100			Sandy, CLAYSTONE; soft med, med. reddish brown (10YR 4/6) saturated, with sandier laminate, and light gray (N7) siltstone Laminae <2cm. sand is fine grain												
41				MINERALIZED ZONE, 39.0-39.1, hard, black siltstone layers are calcareous												
42	60															
43	100															
44																

DRILLING CONTRACTOR: Terracon Consultants, Inc.

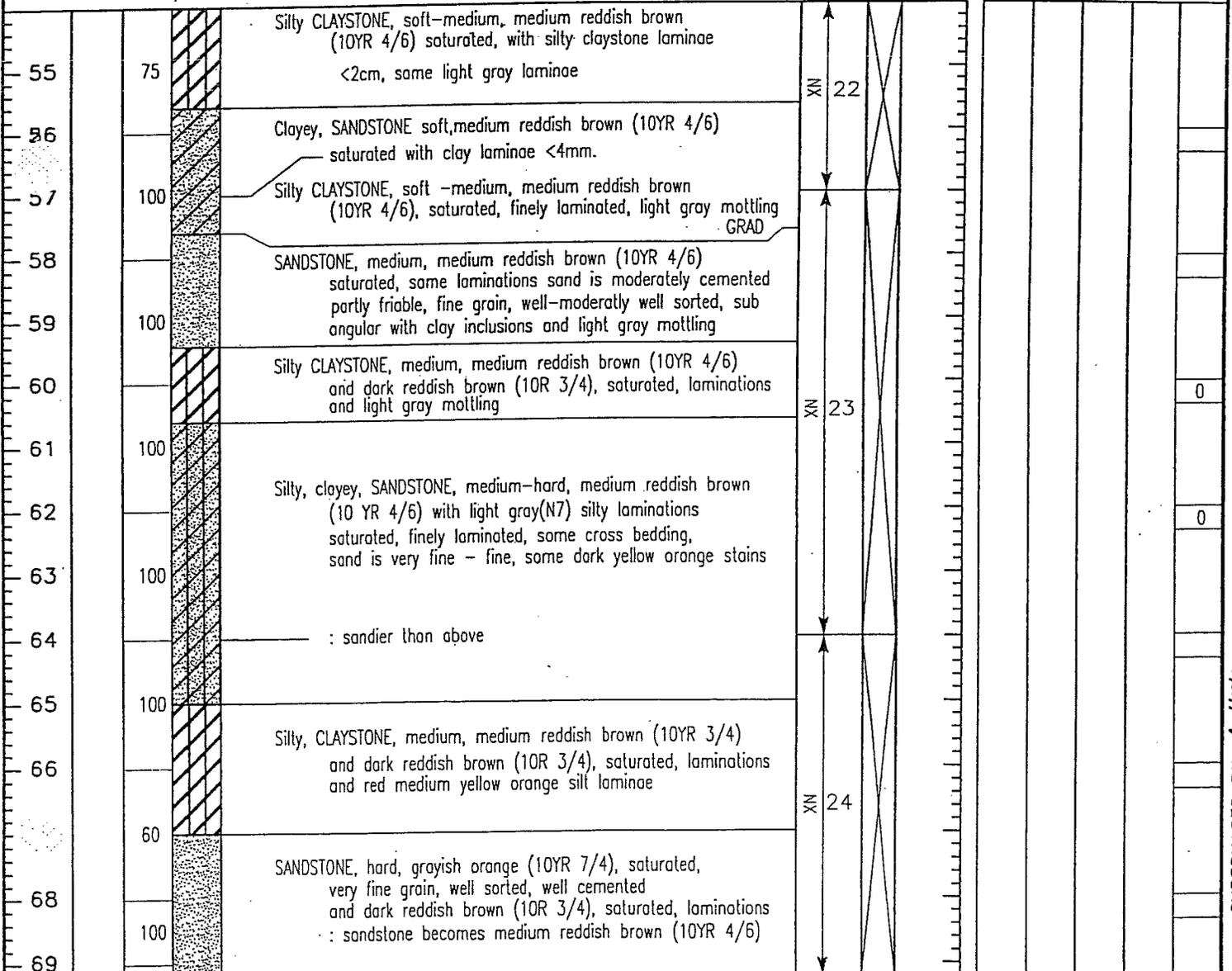
SUPERVISED BY A. Hinks
DATE 2/13/95 CHECKED BY _____

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: Mosley Road Oklahoma City, Oklahoma	DRILLING METHOD: Hollow stem Auger				BORING NUMBER: MW-221	
	SAMPLING METHOD: Split spoon				Sheet 5 of 12	
	INI				STATIC	
	WATER LEVEL	16			START TIME	FINISH TIME
	TIME	9:10			9:10A	9:10A
	DATE	2/13/95			DATE	DATE
DATUM: Ground Level	ELEVATION:	CASING DEPTH	20	2/13/95	2/15/95	

DRILL RIG: CME	SURFACE CONDITIONS: Dry, flat field adjacent to Mosely Road
ANGLE: Vertical	BEARING:
SAMPLE HAMMER TORQUE: ft.-lbs.	

DEPTH IN FEET (ELEVATION)	BLOWS/6 ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OWA (PPM)



DRILLING CONTRACTOR: Terracon Consultants, Inc.

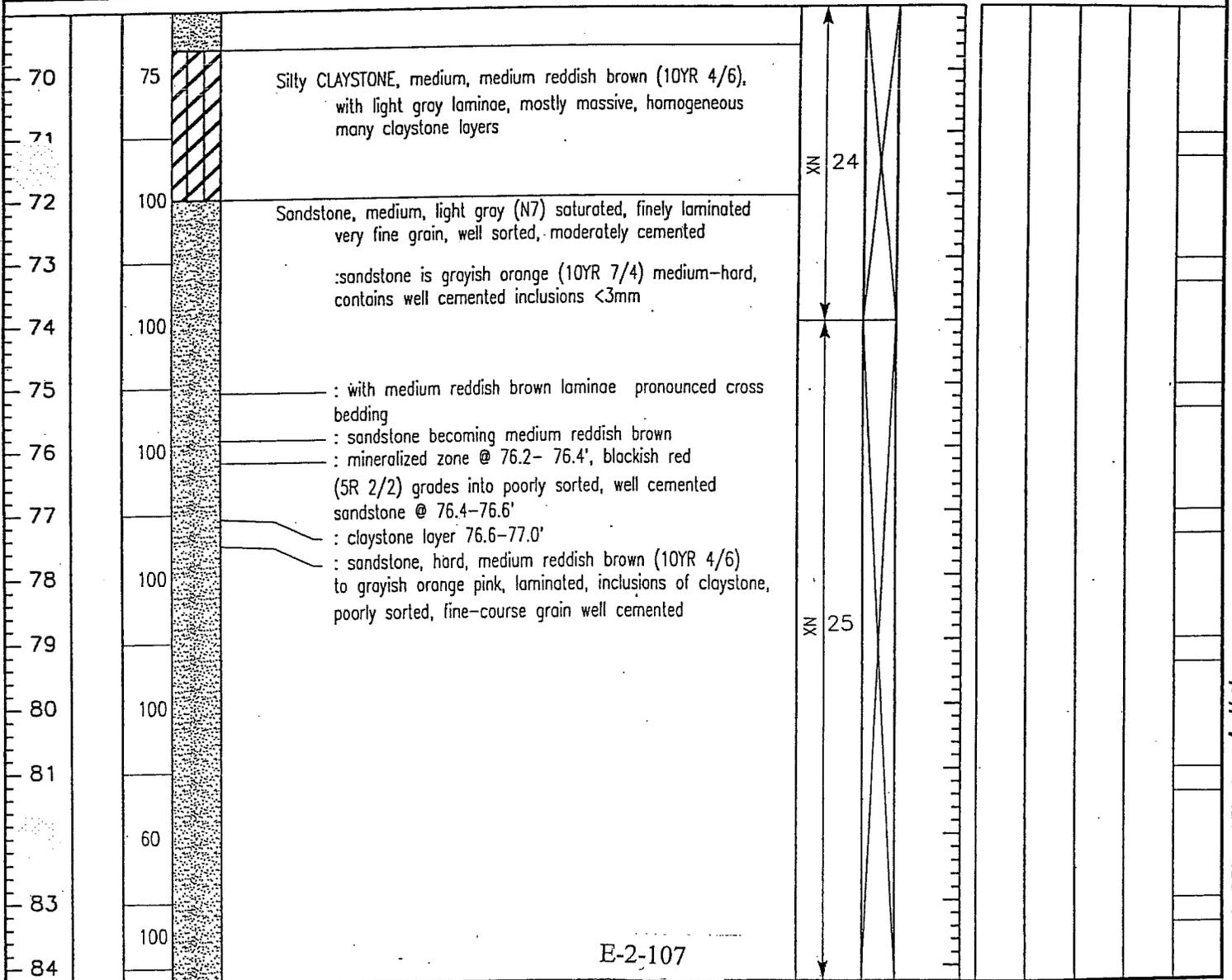
SUPERVISED BY: A. Hims
DATE: 2/13/95
CHECKED BY: _____

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: Mosley Road Oklahoma City, Oklahoma	DRILLING METHOD: Hollow stem Auger				BORING NUMBER: MW-221	
	SAMPLING METHOD: Split spoon				Sheet 6 of 12	
					DRILLING	
			INI	STATIC	START	FINISH
	WATER LEVEL	16			TIME	TIME
	TIME	9:10			9:10A	9:10A
DATE	2/13/95			DATE	DATE	
CASING DEPTH	20			2/13/95	2/15/95	

DATUM: Ground Level	ELEVATION:	SURFACE CONDITIONS: Dry, flat field adjacent to Mosely Road
DRILL RIG: CME	ANGLE: Vertical	BEARING:
SAMPLE HAMMER TORQUE: ft.-lbs.		

DEPTH IN FEET (ELEVATION)	BLOWS/ft ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/ft ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OVA (PPM)



E-2-107

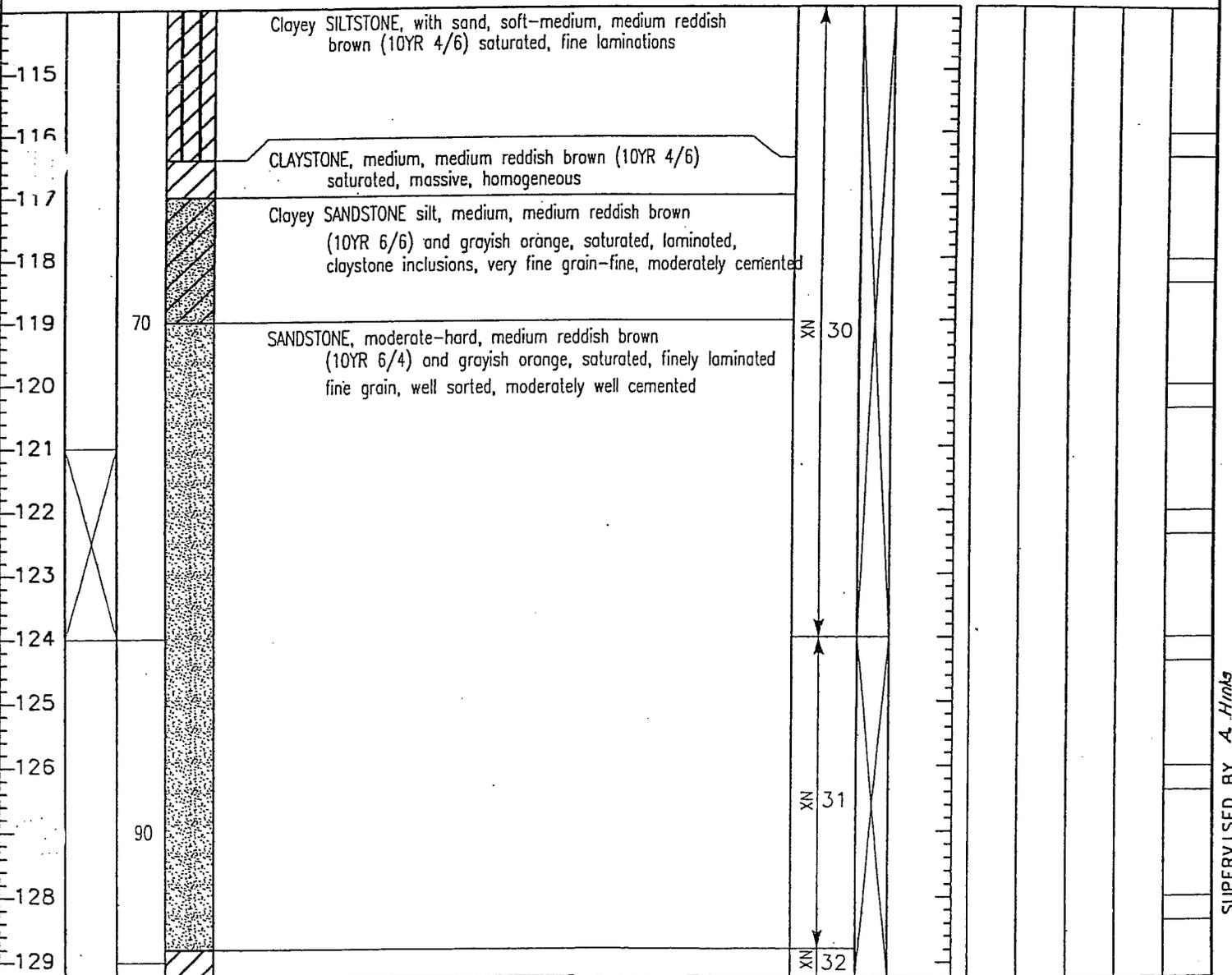
DRILLING CONTRACTOR Terracon Consultants, Inc.
 SUPERVISED BY A. Hinks
 DATE 2/13/95 CHECKED BY _____

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: Mosley Road Oklahoma City, Oklahoma	DRILLING METHOD: Hollow stem Auger				BORING NUMBER: MW-221		
	SAMPLING METHOD: XN				Sheet 9 of 12		
	INI				STATIC		
	WATER LEVEL	16			START TIME	FINISH TIME	
	TIME	9:40			9:10	9:10	
	DATE	2/10/95			DATE	DATE	
DATUM: Ground Level		ELEVATION:		CASING DEPTH	20	2/13/95	2/18/95

DRILL RIG: CME	SURFACE CONDITIONS: Dry, flat field adjacent to Mosely Road
ANGLE: Vertical	BEARING:
SAMPLE HAMMER TORQUE: ft.-lbs.	

DEPTH IN FEET (ELEVATION)	BLOWS/6 ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OVA (PPM)



DRILLING CONTRACTOR Terracon Consultants, Inc.

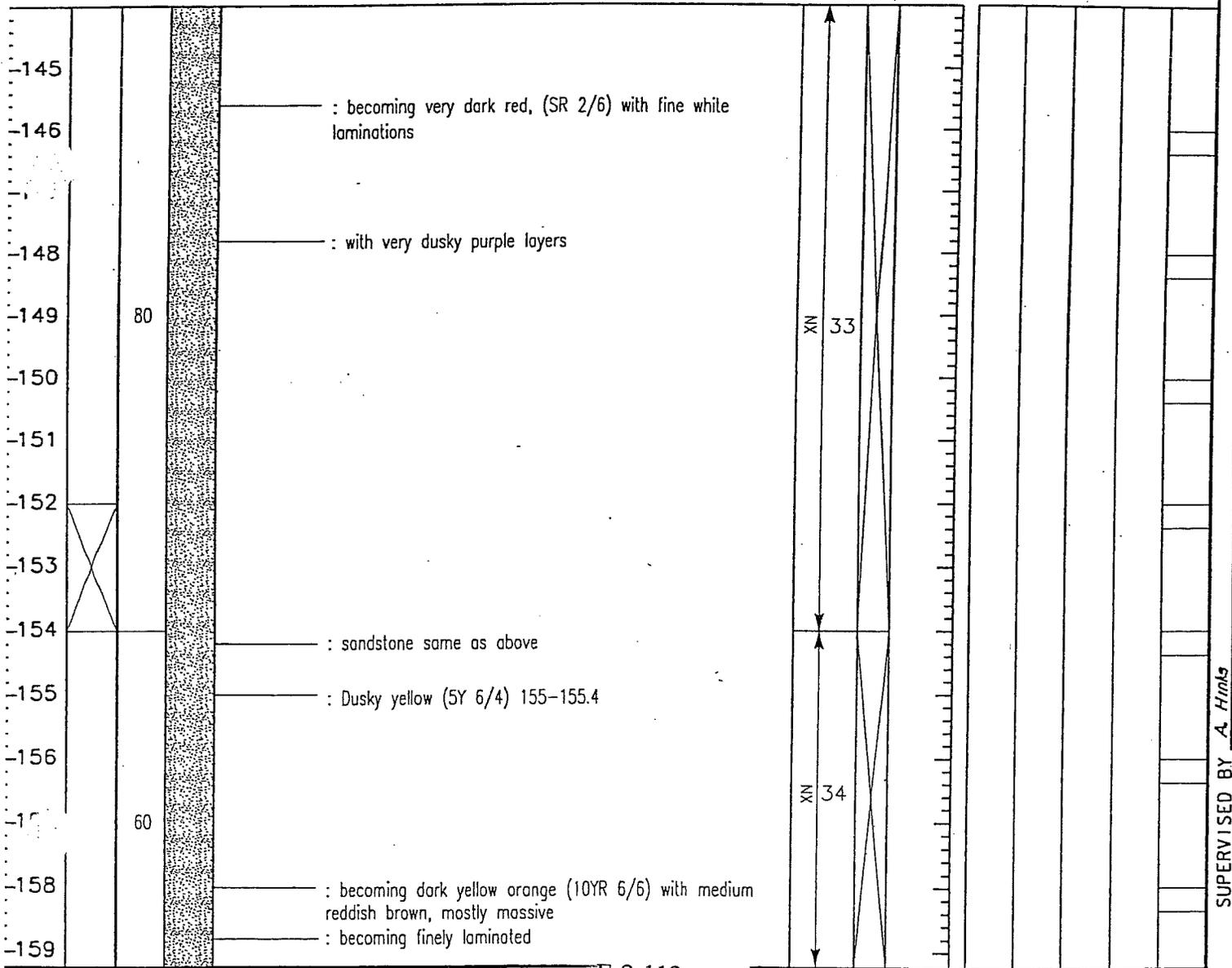
SUPERVISED BY A. Hinds CHECKED BY _____
DATE 2/13/95

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: Mosley Road Oklahoma City, Oklahoma	DRILLING METHOD: Hollow stem Auger				BORING NUMBER: MW-221	
	SAMPLING METHOD: XN				Sheet 11 of 12	
	INI				STATIC	
	WATER LEVEL		16		START TIME	FINISH TIME
	TIME		9:10		9:10	9:10
	DATE		2/13/95		DATE	DATE
DATUM: Ground Level	ELEVATION:	CASING DEPTH	20	2/13/95	2/15/95	

DRILL RIG: CME	SURFACE CONDITIONS: Dry, flat field adjacent to Mosely Road
ANGLE: Vertical	BEARING:
SAMPLE HAMMER TORQUE: ft.-lbs.	

DEPTH IN FEET (ELEVATION)	BLOWS/6 ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OVA (PPM)



DRILLING CONTRACTOR Terracon Consultants, Inc.

SUPERVISED BY A. Hink
DATE 2/13/95 CHECKED BY _____

WELL No. MW-221
 Boring No X-Ref. MW-221

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords N.E 183,039.304 Elevation Ground Level 1156.287
2,174,450.133 Top of Casing 1158.739

Drilling Summary

Total Depth: 174'
 Borehole Diameter: 5 7/8 48-174, 9 7/8 0-48'
 Casing Stickup Height: 3
 Driller: Terracon Consultants Inc.
 Russ Smalley, Bill Vick

 Rig: CME, FAILING 1250
 Bit(s): 9 7/8 TO 43 5 7/8 43-174'
 NX INITIALLY 43-174
 Drilling Fluid: natural mud

 Protective Casing: 6-inch Aluminium

Construction Time Log

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	2/13/95	9:10 A	2/15/95	9:45 A
	2/17/95	8:45		
Casing:				
C ₁ Prot.:				
C ₂ 2" PVC:	2/22/95	10:15	2/22/95	11:00A
S ₁ 2" PVC	2/23/95	8:20	2/23/95	8:25
Filter Placement:	2/23/95	9:10 A	2/23/95	10:10A
Bentonite Seal:	2/23/95	10:05A	2/23/95	10:20
Cementing:				
Development:				

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
113.5 - 112.0	sump	-
112.0 - 102.0	screen	-
102.0 - +3'	C ₁ (riser)	-
-		-
-		-

Casing: C1 2" PVC sch 40 riser
 102.0- +3'

Casing: C2

Screen: S1 10' 0.010 slot

Screen: S2

Filter Pack:

20/40 from 114-101

40/60 from 101-99.5

Grout Seal:

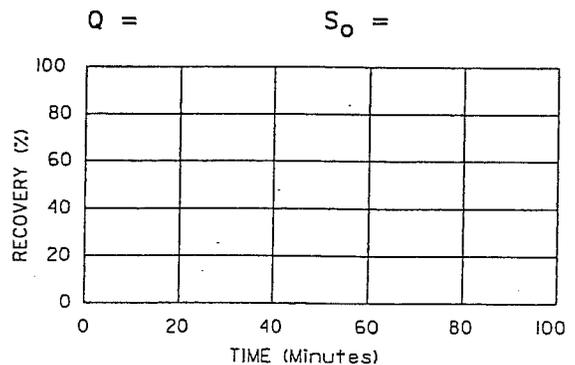
Bentonite Seal: 99.5-95', 1/4" pellets

Well Development

Stabilization Test Data

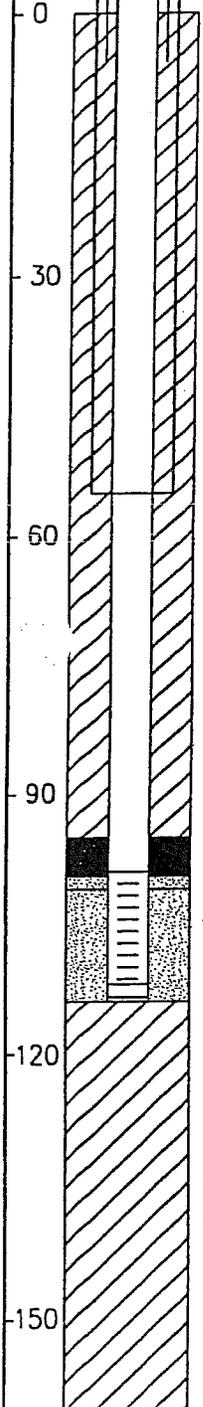
Time	pH	Spec. Cond.	Temp (C)

Recovery Data



Comments

4 bags 20/40, 1/2 bag blasting, 1 bucket bentonite pellets for seal
 8 bags of cement, 1/2 bog of bentonite for slurry
 ~ 12 buckets of bentonite to backfill
 55' of steel casing



T.D. = 160 ft.

E-2-114

SITE NAME Mosley Road
 LOCATION Oklahoma City, Oklahoma

WL 000--1

SUPERVISED BY A. Hinks
 DATE 2/23/95 CHECKED BY _____

		LOG OF BORING MW-223			Geologist: Tetra Tech		Page 1 of 6	
		Project Title: East Oak Landfill Expansion			Driller: Terracon			
		Project No: 0086-356-11-02-07			Field Tests		Geotechnical Laboratory Results	
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/13/1995 Northing: 184487.30		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content
			Boring End Date: 2/17/1995 Easting: 2174458.66					
		Ground Elevation: 1158.0 ft-msl T.O.C.: 1160.62 ft-msl		FT MSL				
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.						
		▽ = Water Level at Time of Drilling: Not Observed ▽ = Static Water Level: 1122.3 ft-msl		Description				
			CLAYEY SILT, moderate brown.	1154.5				
5			SILTY CLAY, moderate yellowish brown.					
10								
15			SAND, fine to coarse grain, poorly sorted, angular to subrounded grain, moderate yellowish brown with some clay and gravel.	1143.5				
20								
25								

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-115

LOG OF BORING MW-223

Project Title: East Oak Landfill Expansion

Project No: 0086-356-11-02-07

Geologist: Tetra Tech

Driller: Terracon

Depth (ft)	Samples	Graphic Log	Boring Data		Field Tests		Geotechnical Laboratory Results						Well Detail		
			Boring Start Date	Northing	Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index		Permeability (cm/s) and Unconfined Compressive Strength (tsf)	
			Boring Start Date: 2/13/1995	Northing: 184487.30											
			Boring End Date: 2/17/1995	Easting: 2174458.66											
			Ground Elevation: 1158.0 ft-msl	T.O.C.: 1160.62 ft-msl											
			Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.												
			▽ = Water Level at Time of Drilling: Not Observed												
			▼ = Static Water Level: 1122.3 ft-msl												
			Description	FT MSL											
35			SAND (continued).												
40				1117.0											
45			SANDSTONE, silty, clayey, reddish brown to reddish brown and tan banded, with some interbedded shale.												
50															
55															

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-116

		LOG OF BORING MW-223		Geologist: Tetra Tech		Page 3 of 6	
		Project Title: East Oak Landfill Expansion		Driller: Terracon			
		Project No: 0086-356-11-02-07		Field Tests		Geotechnical Laboratory Results	
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/13/1995 Northing: 184487.30		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200* /No. 40 ^b
			Boring End Date: 2/17/1995 Easting: 2174458.66				
		Ground Elevation: 1158.0 ft-msl T.O.C.: 1160.62 ft-msl		Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.					
		▽ = Water Level at Time of Drilling: Not Observed ▼ = Static Water Level: 1122.3 ft-msl		Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail		
		Description	FT MSL				
65		SANDSTONE (continued).					
70							
75							
80							
85							

EO-V2 EAST OAK-BF-GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-117

		LOG OF BORING MW-223			Geologist: Tetra Tech		Page 4 of 6			
		Project Title: East Oak Landfill Expansion			Driller: Terracon					
		Project No: 0086-356-11-02-07			Field Tests		Geotechnical Laboratory Results			
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/13/1995 Northing: 184487.30		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content		
			Boring End Date: 2/17/1995 Easting: 2174458.66						Dry Density (pcf)	Liquid Limit
		Ground Elevation: 1158.0 ft-msl T.O.C.: 1160.62 ft-msl		Description	FT MSL			Well Detail		
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.								
		▽ = Water Level at Time of Drilling: Not Observed ▽ = Static Water Level: 1122.3 ft-msl								
			SANDSTONE (continued).							
95										1062.3 1062.0
100										1056.0
105										1046.0
110										1044.5
115										

EO-V2 EAST OAK-BF.GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-118

		LOG OF BORING MW-223		Geologist: Tetra Tech		Page 5 of 6	
		Project Title: East Oak Landfill Expansion		Driller: Terracon			
		Project No: 0086-356-11-02-07		Field Tests		Geotechnical Laboratory Results	
Depth (ft)	Samples	Graphic Log	Boring Start Date: 2/13/1995 Northing: 184487.30		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^o /No. 40 ^o
			Boring End Date: 2/17/1995 Easting: 2174458.66				
		Ground Elevation: 1158.0 ft-msl T.O.C.: 1160.62 ft-msl		Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit
		Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006.					
		▽ = Water Level at Time of Drilling: Not Observed ▼ = Static Water Level: 1122.3 ft-msl		Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail		
		Description	FT MSL				
125		SANDSTONE (continued).					
130							
135							
140							
145							

EO-V2 EAST OAK-BF-GPJ SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-119

LOG OF BORING MW-223

Project Title: East Oak Landfill Expansion

Project No: 0086-356-11-02-07

Geologist: Tetra Tech

Driller: Terracon

Depth (ft)	Samples	Graphic Log	Boring Data		Field Tests		Geotechnical Laboratory Results								
			Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring Start Date: 2/13/1995 Northing: 184487.30 Boring End Date: 2/17/1995 Easting: 2174458.66 Ground Elevation: 1158.0 ft-msl T.O.C.: 1160.62 ft-msl												
			Remarks: Log prepared by WBC from driller's report, geophysical log, and nearby boring logs. Well is part of the Mosley Road Landfill monitoring system. Static water level measured August 2006. ▽ = Water Level at Time of Drilling: Not Observed ▽ = Static Water Level: 1122.3 ft-msl												
			SANDSTONE (continued).	998.0											
155															
160															
165															
170															
175															

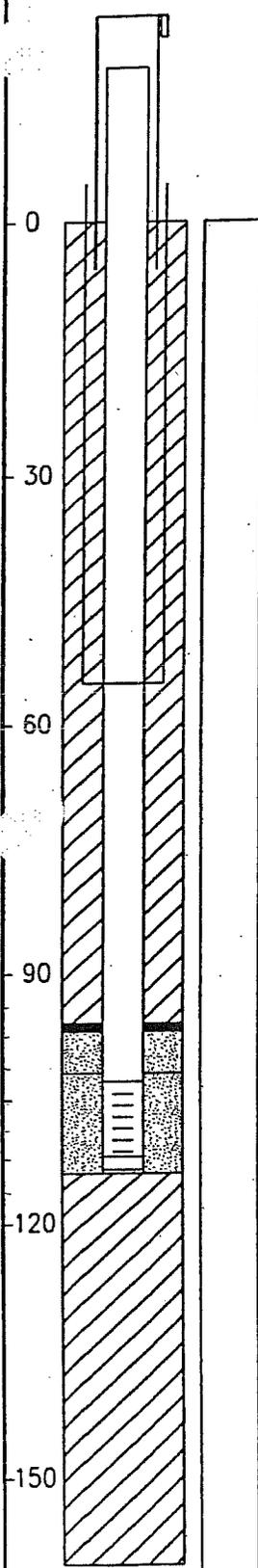
EO-V2 EAST OAK-BF.GPJ_SW2-TEMPLATE.GDT 4/13/07

FIGURE E-2-120

WELL No. MW-223
 Boring No X-Ref. MW-223

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords N, E 184,487.300 Elevation Ground Level 1157.997
2,174,458.659 Top of Casing 1160.621



Drilling Summary

Total Depth: 160'
 Borehole Diameter: 5 7/8 50'-160'
 Casing Stickup Height: 3
 Driller: Terracon Consultants Inc.
 Russ Smalley, Bill Vick

Rig: CME, falling
 Bits(s):

Drilling Fluid: natural mud

Protective Casing:

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
112.0 - 113.5	sump	-
102.0 - 112.0	screen	-
+3 - 102.0	C ₁ (riser)	-
-	-	-
-	-	-

Casing: C1 Sch. 80

Casing: C2

Screen: S1 0.01 slot, 10' PVC

Screen: S2

Filter Pack:

97'-114 20/40
 96'-97' Blasting Sand

Grout Seal:

Cement/Bentonite slurry

Bentonite Seal: 1/4 in. bentonite pellets

Comments

5 bags 20/40, 1/2 bag blasting, 1 bucket pellets for seal
 7 bags cement, 1/2 bag bentonite
 - 12 buckets of bentonite to backfill
 50' of 6" surface casing

Construction Time Log

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	2/13/95	12:00P		
Casing:	2/16/95	10:15	2/16/95	10:30
C ₁ Prot.:				
C ₂ 2' PVC:	2/17/95	10:30	2/17/95	12:00P
S ₁ 2' PVC				
Filter Placement:	2/17/95	3:20 P	2/17/95	3:55
Bentonite Seal:	2/17/95	3:55	2/17/95	4:09
Cementing:				
Development:		6:15P	2/24/95	9:57 A

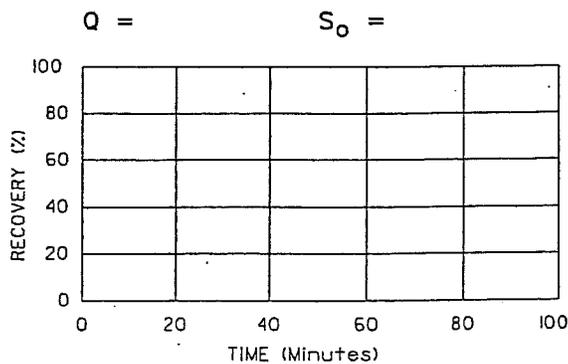
Well Development

495 gal removal with airlift, SEE REPORT

Stabilization Test Data

Time	pH	Spec. Cond.	Temp (C)
SEE REPORT			

Recovery Data



T.D. = 160 ft.

E-2-121

SITE NAME Mosley Road
 LOCATION Oklahoma C/N, Oklahoma

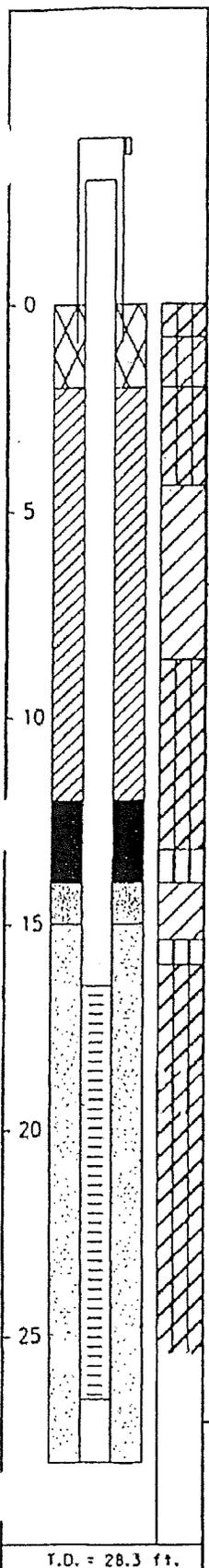
WL 000-1

SUPERVISED BY A. Hinks
 CHECKED BY _____
 DATE 2/17/95

WELL No. MW-219
 Boring No X-Ref. MW-219

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords N, E 182,302.846 Elevation Ground Level 1162.024
2,176,015.054 Top of Casing 1164.712



Drilling Summary
 Total Depth: 28.3
 Borehole Diameter: 10.25
 Casing Stickup Height: 3
 Driller: Terracon Consultants Inc.
 Russ Smalley
 Rig: CME
 Bits: 6.25-in. hollowstem
 10.25-in.
 Drilling Fluid: natural mud
 Protective Casing: 6-inch Aluminium

Construction Time Log

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	2/9/95	16:35		
Casing:				
C ₁ Prot.:				
C ₂ 2" PVC:	2/10/95	11:05		
S ₁ 2" PVC				
Filter Placement:	2/10/95	11:15		
Bentonite Seal:	2/10/95	12:20		
Cementing:				
Development:	2/23/95	15:30		

Well Design & Specifications
 Basis: Geologic Log Geophysical Log
 Casing String(s): C = Casing S = Screen

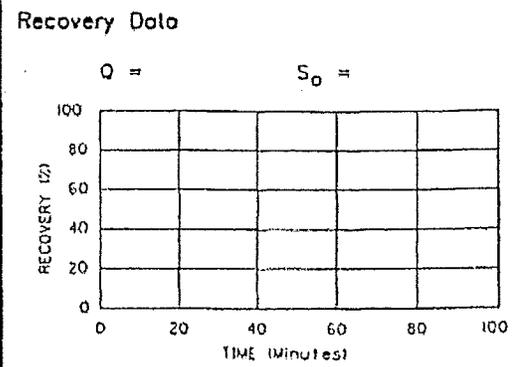
Depth	String(s)	Elevation
+3 - 6.5	C ₁ riser	-
6.5 - 16.5	C ₁ riser	-
16.5 - 26.5	S ₁	-
26.5 - 28	sump	-

Well Development 2/23/95

Casing: C₁
 Casing: C₂ 2" dia. PVC, Sch. 40, Flush Joint
 16.5 - +3 ft.
 Screen: S₁ 2" PVC, Sch. 40,
 0.010-inch Slot
 Screen: S₂
 Filter Pack:
 20/40 Silica Sand: 28 - 15 ft. BGS
 40/60 silica Sand: 15 - 14 ft. BGS
 Grout Seal: 95% Portland, 5% bentonite grout
 0 - 12 ft. BGS
 Bentonite Seal: 1/4 in. bentonite pellets
 14 - 12 ft. BGS

Stabilization Test Data 2/23/95

Time	pH	Spec. Cond.	Temp (C)



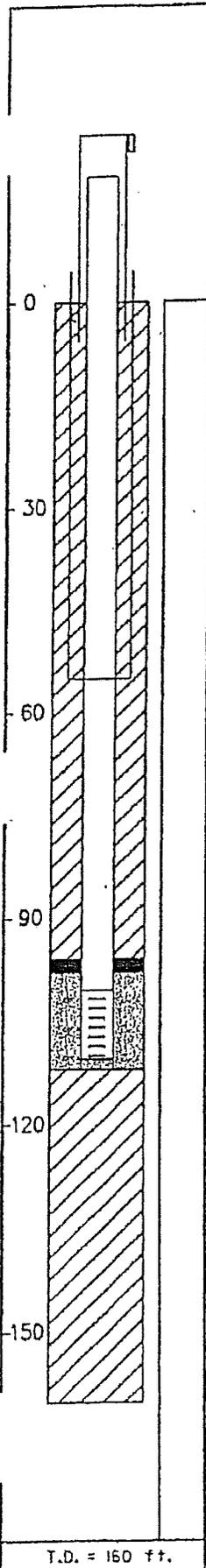
Comments
 Cave-in @ 24 ft. while putting riser in. Had to wash out hole to clear sand before filterpack installed. 50 gallons of water used.

SITE NAME Harley Road
 LOCATION Oklahoma City, Oklahoma
 WL 000-1
 SUPERVISED BY A. H/m/s
 DATE 2/10/95 CHECKED BY _____

WELL No. MW-222
 Boring No X-Ref. MW-222

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords N, E 183,775.897 Elevation Ground Level 1168.302
2,176,175.481 Top of Casing 1170.760



Drilling Summary

Total Depth: 161'
 Borehole Diameter: 5 7/8"
 Casing Stickup Heights: 3'
 Driller: Terracon Consultants Inc.
 Bill Vlack

Rig: falling 1250
 Bit: 5 1/8" ROLLER, 3 1/8" TO 5 1/8"

Drilling Fluid: natural mud

Protective Casing:

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String(s) C = Casing S = Screen

Depth	String(s)	Elevation
112.0 - 110.5	sump	-
110.5 - 100.5	screen	-
100.5 - +3	C ₁ (riser)	-
-	-	-
-	-	-

Casing: C₁ schedule 80 2" PVC

Casing: C₂

Screen: S₁ schedule 80 2" PVC
 0.010 SLOT

Screen: S₂

Filter Pack:

98'-112' WITH 20/40
 96-98 WITH 40/60

Grout Seal:

Bentonite Seal:

Comments

5 bags 20/40, 1/2 bag blasting, 1 bucket of Bentonite for plug
 7 bags of cement in slurry, 1/2 bag
 ~ 12 buckets of bentonite to backfill, 6 bags of sakrete to plug trash
 55' of 6" steel casing

Construction Time Log

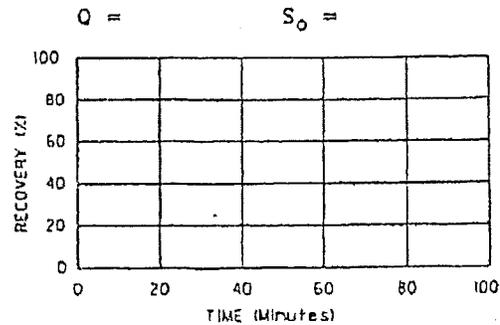
Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	2/10/95	9:45		
Casing:				
C ₁ Prot.:	2/23/95	7:45	2/23/95	7:55
C ₂ 2" PVC:				
S ₁ 2" PVC:				
Filter Placement:	2/23/95	7:55		
Bentonite Seal:				
Cementing:				
Development:				

Well Development

Stabilization Test Data

Time	pH	Spec. Cond.	Temp (C)

Recovery Data



SITE NAME Woolley Road
 LOCATION Oklahoma City, Oklahoma

WL 000-1

SUPERVISED BY A. Hanks CHECKED BY _____
 DATE 2/23/95

T.D. = 160 ft.

**CARDINAL LITHOLOGIC LOG
2002**

LOG OF BORING NO.

OWNER Waste Management East Oak Landfill

SITE MW 207R

PROJECT

GRAPHIC LOG	DESCRIPTION	DEPTH (FT)	SAMPLES				TESTS	
			USGS SYMBOL	NUMBER	TYPE	RECOVERY	BLOWS/FT	FIELD VAPOR TESTS (PPM)
	GROUND SURFACE ELEV. Top of Casing Elev. 1157.39 Ground Elev. 1155.00							
	Clay; silty, red-brown, plastic moist to wet. CL	0						
	Sand: silty, med-fine grain, loose, saturated. SP	15						
	Garber-Wellington Sandstone at 34. ft. BLS.	34						
Logged by Dave Tedford								

The Stratification Lines Represent the Approximate Boundary Lines Between Soil and Rock Types. The Transitions May be Gradual.

BOREHOLE DIA: 8" ϕ

WELL DIA: 0.01" ϵ lot - 2" PVC

WATER LEVEL OBSERVATIONS

wl	
wl	
wl	



BORING STARTED: 2-18-02
 BORING COMPLETED: 2-18-02
 RIG Mohawk | FORMAN Bret Montie
 APPROVED | JOB 00071

**A&M ENGINEERING LITHOLOGIC LOGS
2003**

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-208R

SITE NAME AND LOCATION
 East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET
 1 OF 4
 DRILLING

WEATHER: SUNNY / RAIN TEMP: 83 F

WATER LEVEL

START TIME
 15:40

G.L. ELEV. 1,158.00 FT.

DATE

FINISH TIME
 15:00

DATUM: NAVD88

TOC ELEV. 1,160.62 FT.

CASING DEPTH

DATE
 6/2/03

DATE
 6/4/03

DRILL RIG: CME

SURFACE CONDITIONS: DRY CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN DIV SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
0-1'				TOPSOIL, TAN SILTY SAND FINE GRAIN, WELL SORTED, VEGETATION, DRY				0'-4' CONCRETE
1'-2.5'				CLAY LOAM VERY FINE GRAIN, WELL SORTED, DRY				
2.5'-6'				SILTY SAND, FINE GRAIN, WELL SORTED, DRY				
6'-14'				SAND FINE GRAIN, TAN, WELL SORTED, DRY				
14'-15'				SAND, FINE GRAIN, BROWN, CLAY SPECS <5%, DRY				
15'-24'				SAND, FINE GRAIN, BROWN, WELL SORTED, DRY, BECOMING MORE COARSE GRAINED				
24'-25'				SAND, FINE GRAIN, BROWN, MOIST				4'-50' BENTONITE GROUT
25'-30'								

DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULTZE

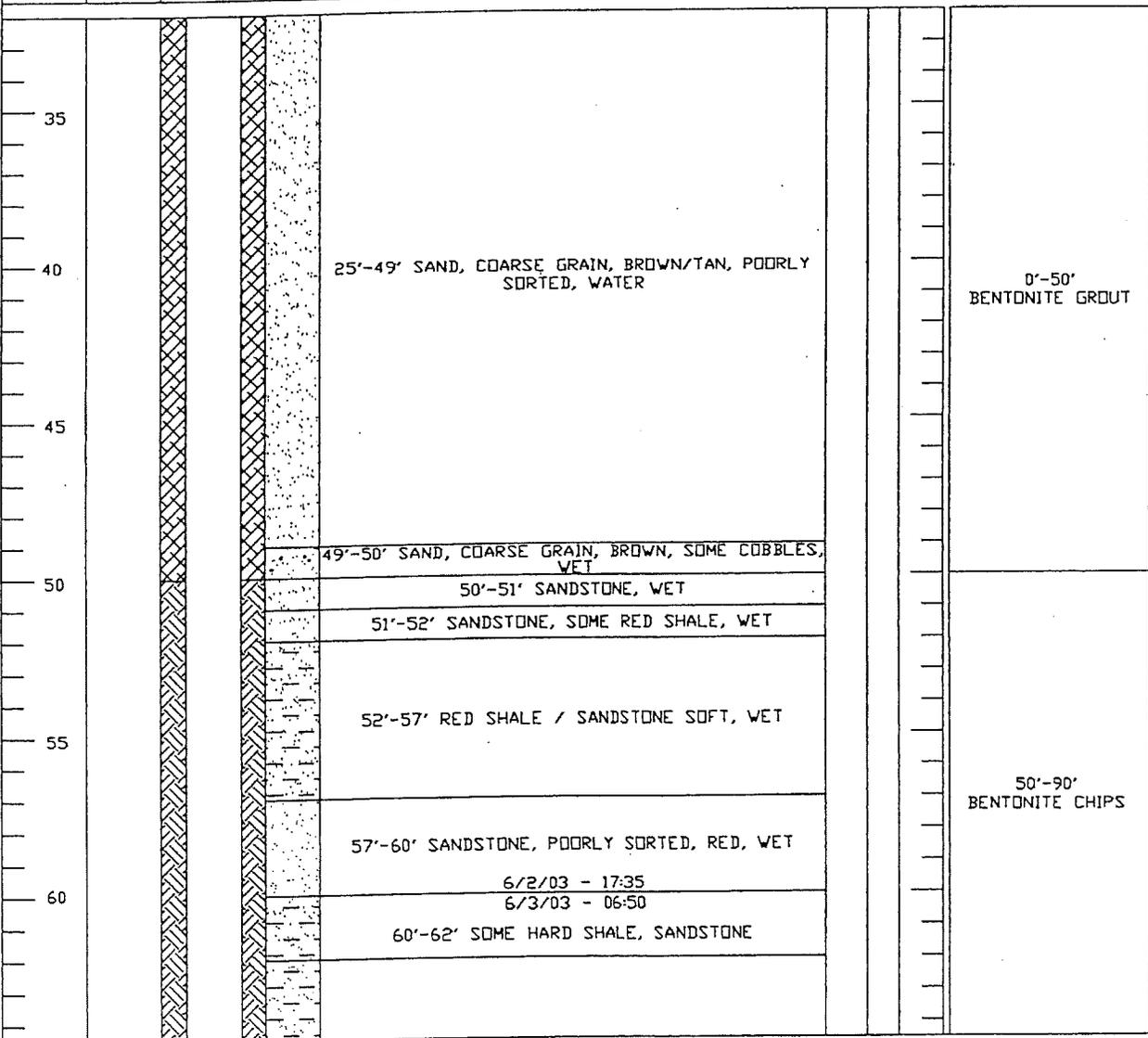
DATE 6/2/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

M A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG		BORING NUMBER		
	HOLLOW STEM AUGER		MW-208R		
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W		SAMPLING METHOD: N/A		SHEET	
				2 OF 4	
WEATHER: SUNNY / RAIN		TEMP: 83 F		DRILLING	
		TIME		START	FINISH
		DATE		TIME	TIME
				15:40	15:00
DATUM: NAVD88		GL. ELEV. 1,158.00 FT.		DATE	DATE
		TOC ELEV. 1,160.62 FT.		6/2/03	6/4/03
DRILL RIG: CME		SURFACE CONDITIONS: DRY		CASING DIA: 2"	
ANGLE: VERTICAL		BEARING:		SCREEN DIA: 2"	
SAMPLE HAMMER TORQUE		FT.-LBS		TYPE GRAVEL: SILICA SAND 0.45-0.48MM	
				TYPE BENTONITE: PUREGOLD MEDIUM CHIPS	
				SLOT SIZE: .010	

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
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DRILLING CONTR Mohawk Drilling
 DRILLER ALAN BRANTLEY

LOGGED BY PETER SCHULTZE
 DATE 6/2/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

M A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG		BORING NUMBER	
	HOLLOW STEM AUGER		MW-208R	
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W	SAMPLING METHOD: N/A		SHEET	
			3 OF 4	
			DRILLING	
	WATER LEVEL		START	FINISH
WEATHER: SUNNY / RAIN	TEMP: 83 F	TIME	TIME	
	G.L. ELEV. 1,158.00 FT.	DATE	DATE	
DATUM: NAVD88	TOC ELEV. 1,160.62 FT.	CASING DEPTH	6/2/03	6/4/03
DRILL RIG: CME	SURFACE CONDITIONS: DRY		CASING DIA: 2"	SCREEN DIA: 2"
ANGLE: VERTICAL	BEARING:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: .010
SAMPLE HAMMER TORQUE		FT.-LBS		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
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65				62'-66' RED SHALE AND SANDSTONE WET, SAND FLOODED THE HOLE				
70				66'-75' RED/BROWN SHALE, SANDSTONE, WET WATER @ 74 FT.				
75				75'-80' RED/BROWN SHALE, SILTSTONE, WATER.				50'-90' BENTONITE CHIPS
80				80'-85 COARSE GRAINED SAND AND GRAVEL LAYER, BROWN SORTED SILICA, LOTS OF WATER				
85				6/3/03 - 18:00 6/4/03 - 07:30				
90				85'-94' HARD SANDSTONE, FINE GRAIN, WHITE TO RED BROWN, BREAKS IN CONICAL SHAPE, WATER				
95								90'-125' GRAVEL PACK

DRILLING CONTR Mohawk Drilling
 DRILLER: ALAN BRANTLEY

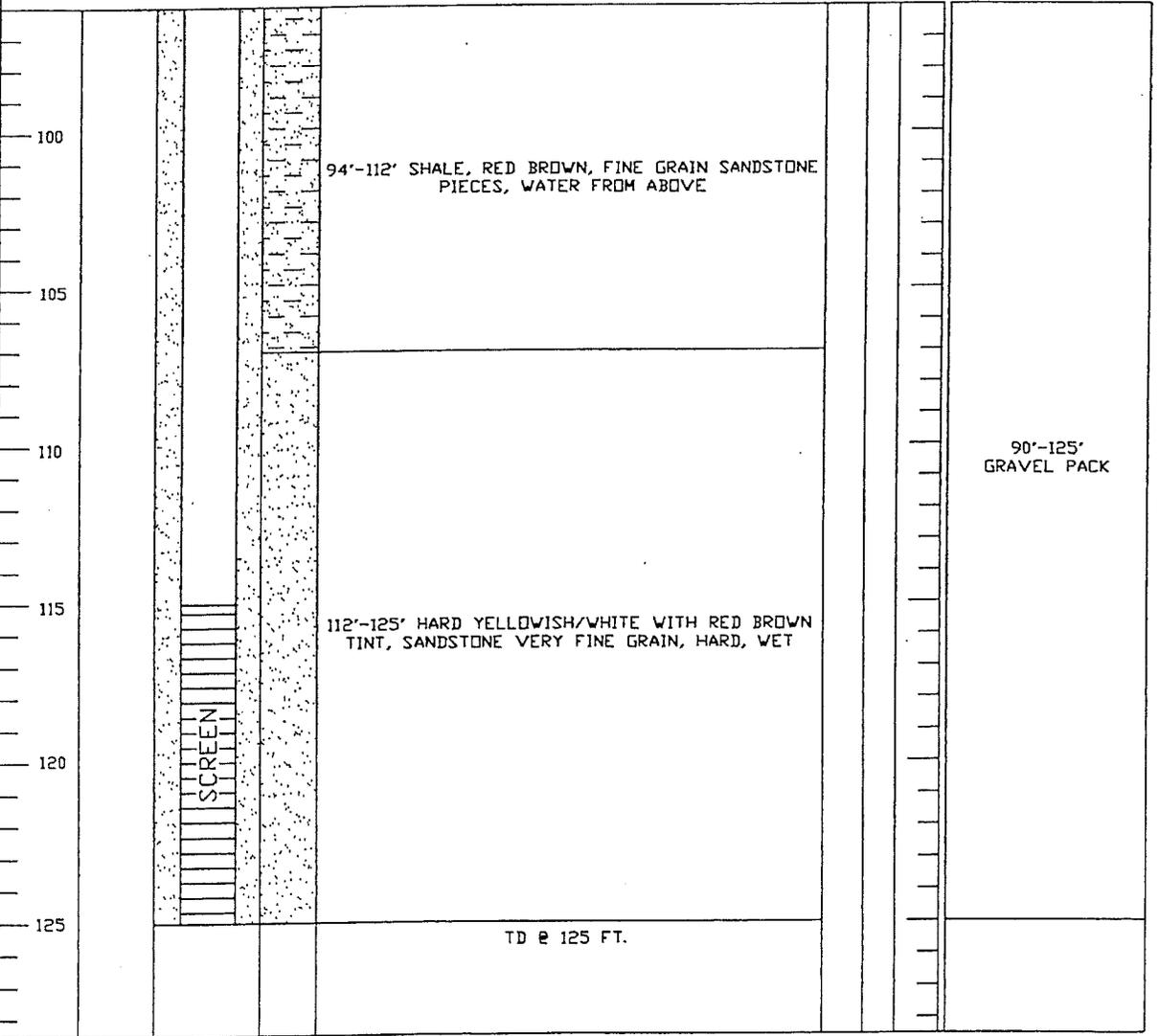
LOGGED BY PETER SCHULTZE
 DATE 6/2/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

M A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG HOLLOW STEM AUGER		BORING NUMBER MW-208R	
	SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W		SAMPLING METHOD: N/A	
WEATHER: SUNNY / RAIN TEMP: 83 F		WATER LEVEL		SHEET 4 OF 4
G.L. ELEV. 1,158.00 FT.		DATE		DRILLING START TIME FINISH TIME 15:40 15:00
DATUM: NAVD88 TOC ELEV. 1,160.62 FT.		CASING DEPTH		DATE DATE 6/2/03 6/4/03
DRILL RIG: CME		SURFACE CONDITIONS: DRY		SCREEN DIA: 2"
ANGLE: VERTICAL BEARING:		TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: .010
SAMPLE HAMMER TORQUE FT.-LBS		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		

DEPTH IN FEET (ELEVATION)	BLOWS / 6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
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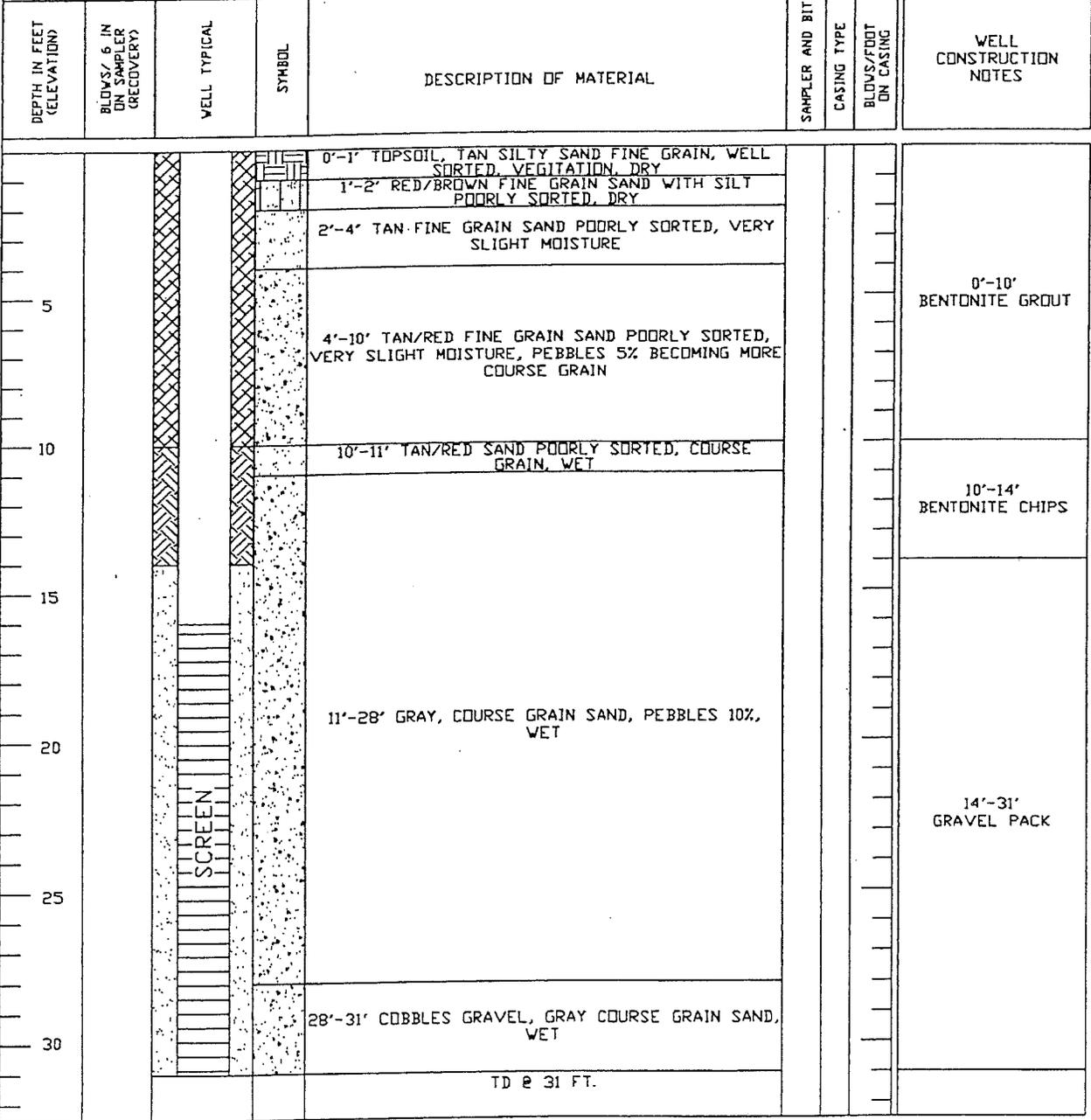


DRILLING CONTR Mohawk Drilling
 DRILLER: ALAN BRANTLEY
 LOGGED BY PETER SCHULTZE
 DATE 6/2/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

M A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG		BORING NUMBER	
	HOLLOW STEM AUGER		MW-225A	
SITE NAME AND LOCATION East Dak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R2W	SAMPLING METHOD: N/A		SHEET	
			1 OF 1	
			DRILLING	
WEATHER: SUNNY	TEMP: 85 F	WATER LEVEL	TIME	FINISH
			12:00	14:05
DATUM: NAVD88	G.L. ELEV. 1,148.60 FT.	DATE	DATE	DATE
			5/29/03	5/29/03
DRILL RIG: CME	TDC ELEV. 1,151.31 FT.	CASING DEPTH		
ANGLE: VERTICAL	BEARING:	SURFACE CONDITIONS: DRY	CASING DIA: 2"	SCREEN DIA: 2"
SAMPLE HAMMER TORQUE	FT.-LBS	TYPE GRAVEL: SILICA SAND 0.45-0.48MM	SLOT SIZE: .010	
		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		



DRILLING CONTR: Mohawk Drilling
 DRILLER: ALAN BRANTLEY

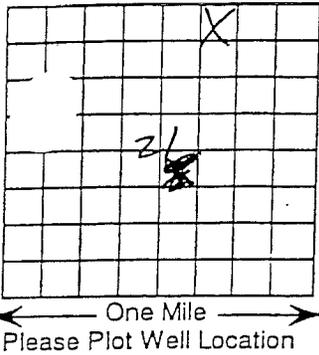
LOGGED BY: PETER SCHULTZE
 DATE: 5/29/2003
 CHK'D BY: PLS



Ten Acres

MULTI-PURPOSE COMPLETION REPORT MONITORING WELLS

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800



Do Not Write In This Space
Well Log ID Number _____

LEGAL DESCRIPTION

Do Not Write In This Space
____ 1/4 ____ 1/4 ____ 1/4

of Sec. 21 Township T 12 N S Range 2W WIM
 EIM
 ECM

Optional Information

Latitude _____ Longitude _____

Number of wells in 10 acre tract 2 Well No. (if applicable) ~~8R~~ MN225A
County Oklahoma Variance Request No. (if applicable) _____
Well Owner WMI, Inc Phone (918) 439-7829
Address/City/State 4041 N. 141st E. Ave. Tulsa OK Zip 74116
Well Location Waste Management East ok Landfill Oklahoma City, OK

TYPE OF WORK

Geotechnical Boring
 Monitoring Well
 Plugging

USE OF WELL

Site Assessment Observation Vapor Extraction
 Unsaturated Zone Monitoring Water Quality
 Air Sparge Recovery Other _____

NEW BOREING OR WELL CONSTRUCTION DATA

Application for a variance must be requested and obtained before any changes are made to the minimum construction standards for any well.

Date Started 5/29/03 Date Completed 6/5/03
Well Diameter 8.5 inches From 0 feet to 34 feet
Well Diameter _____ inches From _____ feet to _____ feet

CASING RECORD:

Surface Pipe (Casing) Diameter _____ inches From _____ feet to _____ feet
1st Casing Diameter 2 inches From +3 feet to 24 feet
2nd Casing Diameter _____ inches From _____ feet to _____ feet

SCREEN OR PERFORATION RECORD:

Screen and Slot Size .020 From 24 feet to 34 feet
Screen and Slot Size _____ From _____ feet to _____ feet

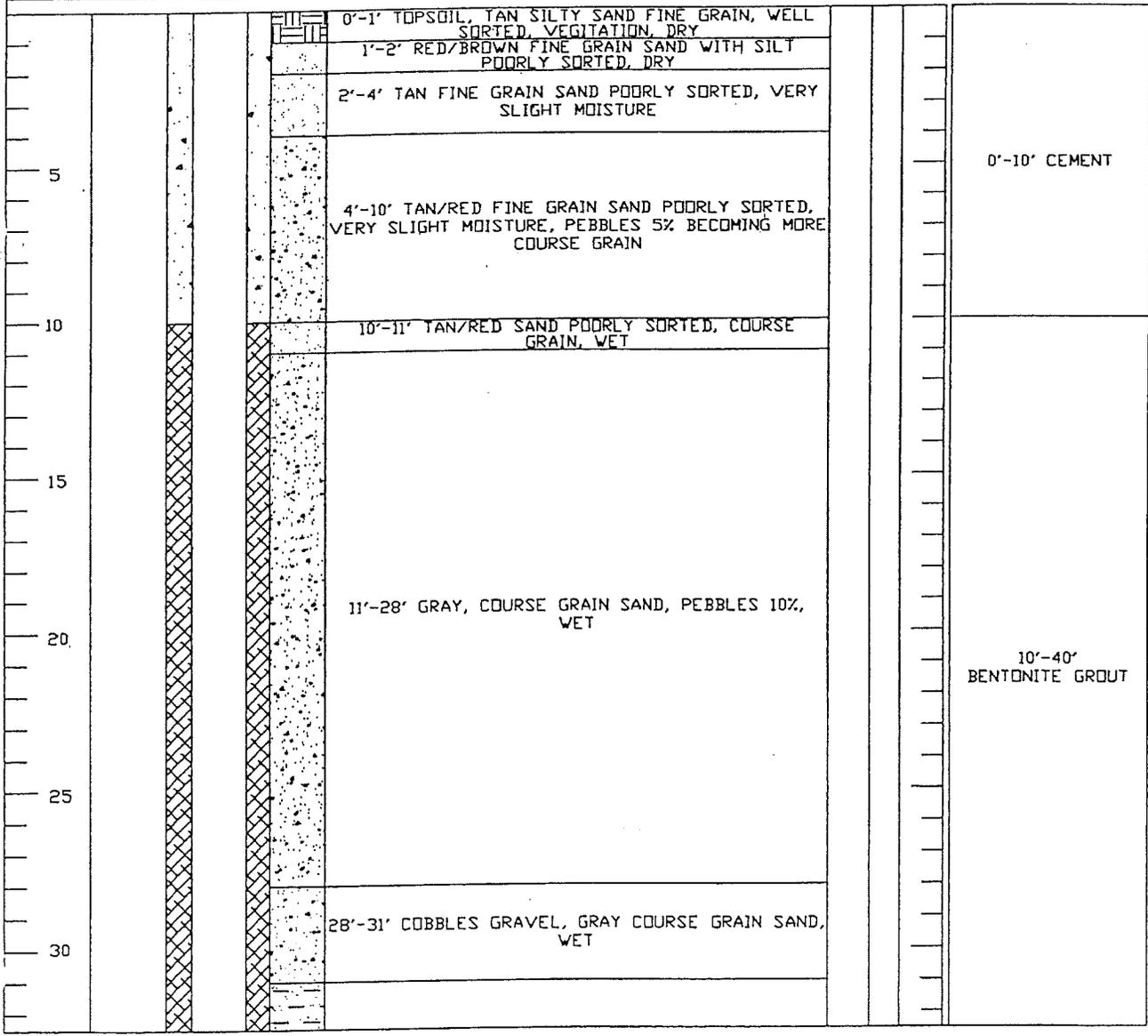
TI BACK:

Screen and Slot Size .020 SILICA From 22 feet to 34 feet
Screen and Slot Size _____ From _____ feet to _____ feet

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

M A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG				BORING NUMBER			
	HOLLOW STEM AUGER				MW-226GW			
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W				SAMPLING METHOD: N/A		SHEET		
						1 OF 4		
				DRILLING				
WEATHER: SUNNY				TEMP: 85 F	START	FINISH		
				TIME	TIME			
				DATE	DATE			
DATUM: NAVD88				G.L. ELEV. 1,148.60 FT.	5/29/03	6/2/03		
				TOC ELEV. 1,151.24 FT.	CASING DEPTH			
DRILL RIG: CME				SURFACE CONDITIONS: DRY	CASING DIA: 2"	SCREEN DIA: 2"		
ANGLE: VERTICAL				BEARING:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM			
SAMPLE HAMMER TORQUE				FT.-LBS	TYPE BENTONITE: PUREGOLD MEDIUM CHIPS			
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES



DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE

DATE 5/29/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-226GW

SITE NAME AND LOCATION
 East Dak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R2W

SAMPLING METHOD: N/A

SHEET
 2 OF 4

WEATHER: SUNNY TEMP: 85 F

WATER LEVEL TIME DATE

DRILLING
 START FINISH
 TIME TIME
 14:18 13:00

GL. ELEV. 1,148.60 FT.

DATE DATE

DATE DATE
 5/29/03 6/2/03

DATUM: NAVD88

TDC ELEV. 1,151.24 FT.

CASING DEPTH

DRILL RIG: CME

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
35								10'-40' BENTONITE GROUT
40								
45				32'-63' HARD RED/BROWN SANDSTONE & SHALE				
50								40'-85' BENTONITE CHIPS
55								
60								

DRILLING CONTR Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE

DATE 5/29/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG

HOLLOW STEM AUGER

BORING NUMBER

MW-226GW

SITE NAME AND LOCATION

East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET

3 OF 4

DRILLING

START TIME

14:18

FINISH TIME

13:00

WEATHER: SUNNY

TEMP: 85 F

WATER LEVEL

DATE

DATE

5/29/03

DATE

6/2/03

DATUM: NAVD88

TDC ELEV. 1,151.24 FT.

CASING DEPTH

DRILL RIG: CME

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
65								
70				63'-75' SANDSTONE AND SHALE, RED/BROWN, FINE GRAIN, SORTED				40'-85' BENTONITE CHIPS
75								
80								
85				75'-100' SANDSTONE WITH SHALE SEAMS, LOTS OF WATER, RED, BROWN TO MAROON				
90								85'-115 GRAVEL PACK
95								

DRILLING CONTR Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE

DATE 5/29/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-226GW

SITE NAME AND LOCATION

East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET

4 OF 4

DRILLING

START TIME	FINISH TIME
14:18	13:00

DATE	DATE
5/29/03	6/2/03

WEATHER: SUNNY TEMP: 85 F

TIME

DATE

DATE

GL. ELEV. 1,148.60 FT.

DATE

DATE

DATE

DATUM: NAVD88

TDC ELEV. 1,151.24 FT.

CASING DEPTH

DATE

DATE

DRILL RIG: CME

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

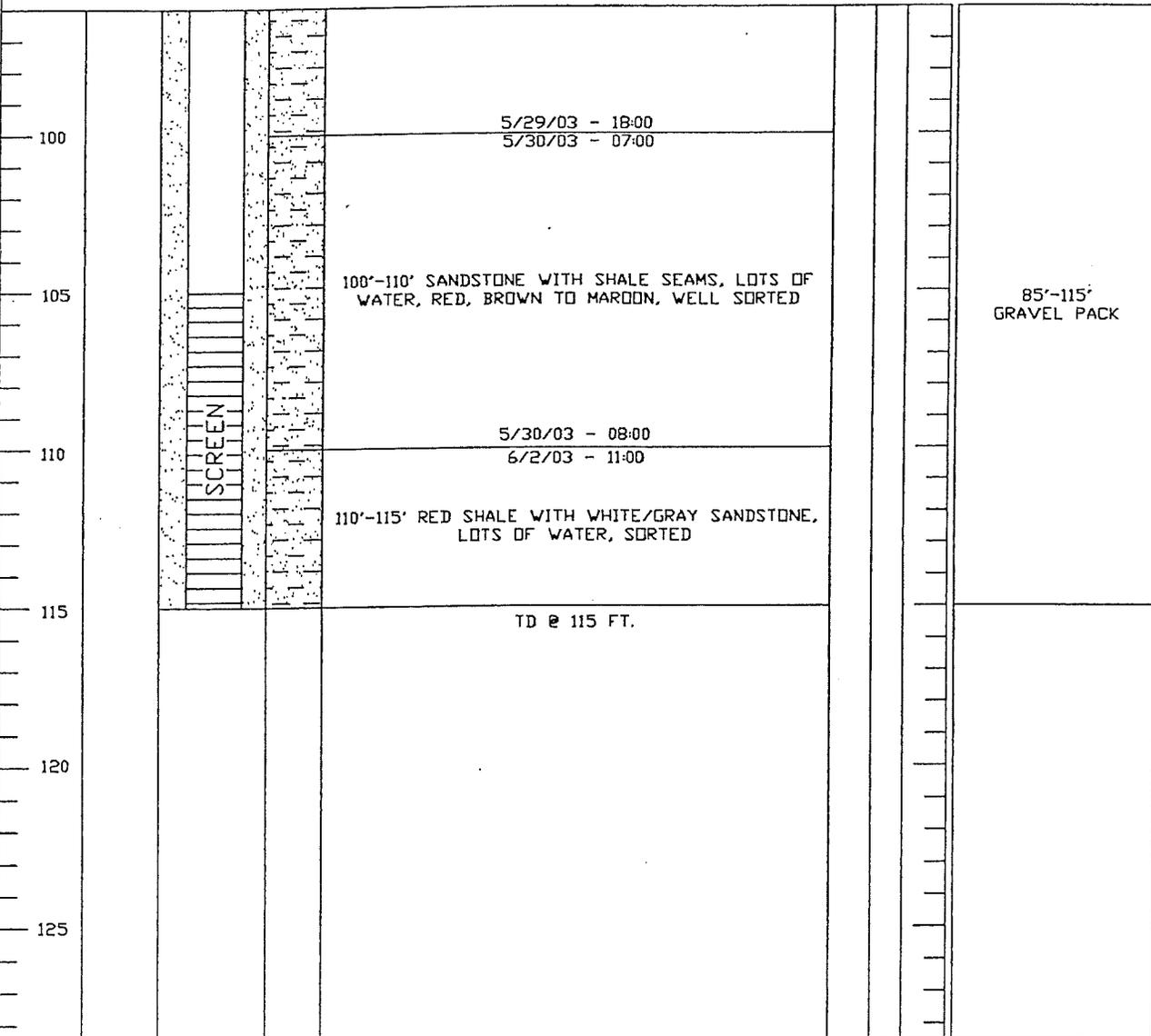
TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
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DRILLING CONTR Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE

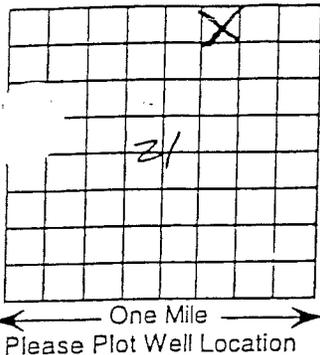
DATE 5/29/2003 CHK'D BY PLS



Ten Acres

MULTI-PURPOSE COMPLETION REPORT MONITORING WELLS

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800



Do Not Write In This Space

Well Log ID Number _____

LEGAL DESCRIPTION

Do Not Write In This Space

____ 1/4 ____ 1/4 ____ 1/4

of Sec. 21 Township T.12.

N

S

Range 2 W.

WIM

EIM

ECM

Optional Information

Latitude _____ Longitude _____

Number of wells in 10 acre tract 2 Well No. (if applicable) ~~221R~~ MN 226GW
County Oklahoma Variance Request No. (if applicable) _____
Well Owner WMI, Inc Phone (918) 439-7629
Address/City/State 4041 N 141st E. Ave Zip 74116
Final Location Waste Management East OK Landfill Oklahoma City, OK

TYPE OF WORK

- Geotechnical Boring
- Monitoring Well
- Plugging

USE OF WELL

- Site Assessment Observation
- Unsaturated Zone Monitoring
- Air Sparge
- Vapor Extraction
- Water Quality
- Recovery

Other _____

NEW BOREING OR WELL CONSTRUCTION DATA

In application for a variance must be requested and obtained before any changes are made to the minimum construction standards for any well.

Date Started 5/29/03 Date Completed 6/15/03

hole Diameter ~~11~~ 11 inches From 0 feet to 45 feet

hole Diameter 6.25 inches From 45 feet to 115 feet

CASING RECORD:

Surface Pipe (Casing) Diameter _____ inches From _____ feet to _____ feet

Well Casing Diameter 2 inches From +3 feet to 105 feet

Well Casing Diameter _____ inches From _____ feet to _____ feet

SCREEN OR PERFORATION RECORD:

Screen Type and Slot Size 10/20 PVC From 105 feet to 115 feet

Screen Type and Slot Size _____ From _____ feet to _____ feet

LOG PACK:

Log Type and Size 10/20 silica From ~~105~~ 90 feet to 115 feet

Log Type and Size _____ From _____ feet to _____ feet

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 M & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG				BORING NUMBER	
	HOLLOW STEM AUGER				GP-8R	
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R2W				SAMPLING METHOD: N/A		SHEET
						1 OF 2
				DRILLING		
WEATHER: SUNNY				TEMP: 85 F	START TIME	FINISH TIME
				GL. ELEV. 1,156.10 FT.	DATE	DATE
				TOC ELEV. 1,159.03 FT.	6/4/03	6/4/03
DATUM: NAVD88				CASING DEPTH		
DRILL RIG: CME			SURFACE CONDITIONS: DRY		CASING DIA: 2"	SCREEN DIA: 2"
ANGLE: VERTICAL BEARING:			TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: .010	
SAMPLE HAMMER TORQUE			FT.-LBS		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS	

DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
0								0'-2' CEMENT
2								2'-3' BENTONITE CHIPS
5								
10								
15				0'-45' SILTY SAND				
20								3'-45' GRAVEL PACK
25								
30								
35								
40								
45								

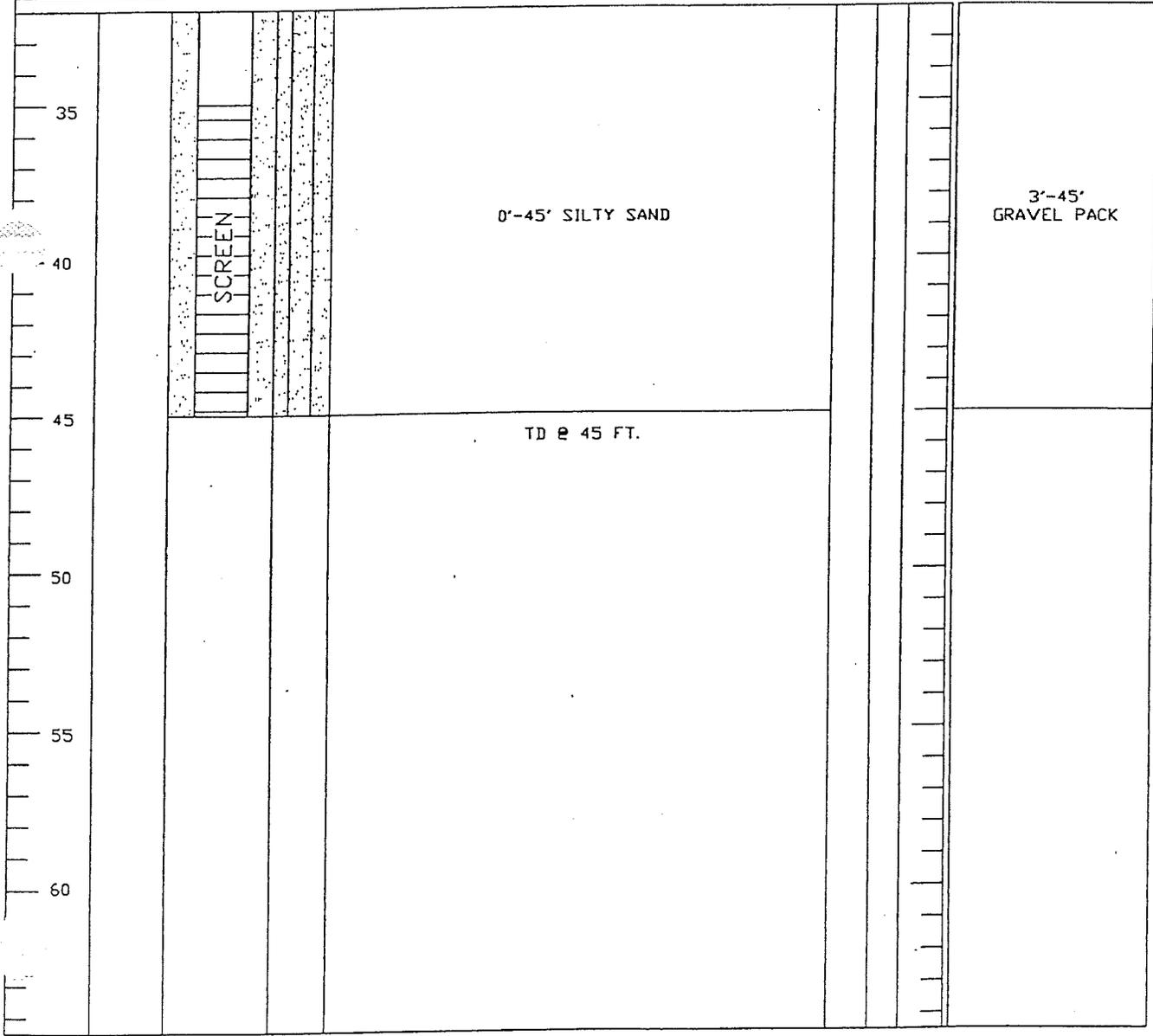
LOGGED BY PETER SCHULTZE

DATE 6/4/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG				BORING NUMBER			
	HOLLOW STEM AUGER				GP-8R			
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W				SAMPLING METHOD: N/A		SHEET		
						2 OF 2		
				DRILLING				
WEATHER: SUNNY				TEMP: 85 F	TIME			
G.L. ELEV. 1,158.70 FT.				DATE				
DATUM: NAVD88				TOC ELEV. 1,161.52 FT.	CASING DEPTH			
DRILL RIG: CME				SURFACE CONDITIONS: DRY	CASING DIA: 2"	SCREEN DIA: 2"		
ANGLE: VERTICAL BEARING:				TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: .010		
SAMPLE HAMMER TORQUE				FT.-LBS	TYPE BENTONITE: PUREGOLD MEDIUM CHIPS			
DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN DN SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES



DRILLING CONTR Mohawk Drilling
 DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE
 DATE 5/29/2003 CHK'D BY PLS



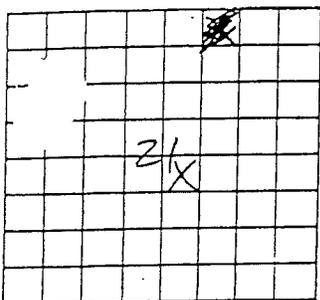
Ten Acres

MULTI-PURPOSE COMPLETION REPORT MONITORING WELLS

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Do Not Write In This Space

Well Log ID Number _____



One Mile

Please Plot Well Location

LEGAL DESCRIPTION

Do Not Write In This Space

____ 1/4 ____ 1/4 ____ 1/4

of Sec. 21 Township T12

N

S

Range 2W

WIM

EIM

ECM

Optional Information

Latitude _____ Longitude _____

Number of wells in 10 acre tract _____ Well No. (if applicable) GP8R

County Oklahoma Variance Request No. (if applicable) _____

Well Owner WMI, Inc Phone (918) 439-7829

Address City/State 4041 N 141st E. Ave. Zip 74116

Location Waste Management East Oak Landfill Oklahoma City, OK

TYPE OF WORK

- Geotechnical Boring
- Monitoring Well
- Plugging

USE OF WELL

- Site Assessment Observation
- Unsaturated Zone Monitoring
- Air Sparge

- Vapor Extraction
- Water Quality
- Recovery

Other _____

NEW BOREING OR WELL CONSTRUCTION DATA

Application for a variance must be requested and obtained before any changes are made to the minimum construction standards for any well.

Date Started 6/4/03 Date Completed 6/5/03

Well Diameter 8.5 inches From 0 feet to 45 feet

Well Diameter _____ inches From _____ feet to _____ feet

LOGGING RECORD:

Surface Pipe (Casing) Diameter _____ inches From _____ feet to _____ feet

Well Casing Diameter 1 inches From +3 feet to 5 feet

Well Casing Diameter _____ inches From _____ feet to _____ feet

SCREEN OR PERFORATION RECORD:

Screen and Slot Size 1020 From 5 feet to 45 feet

Screen and Slot Size _____ From _____ feet to _____ feet

Well Back: 3 From 3 feet to 45 feet

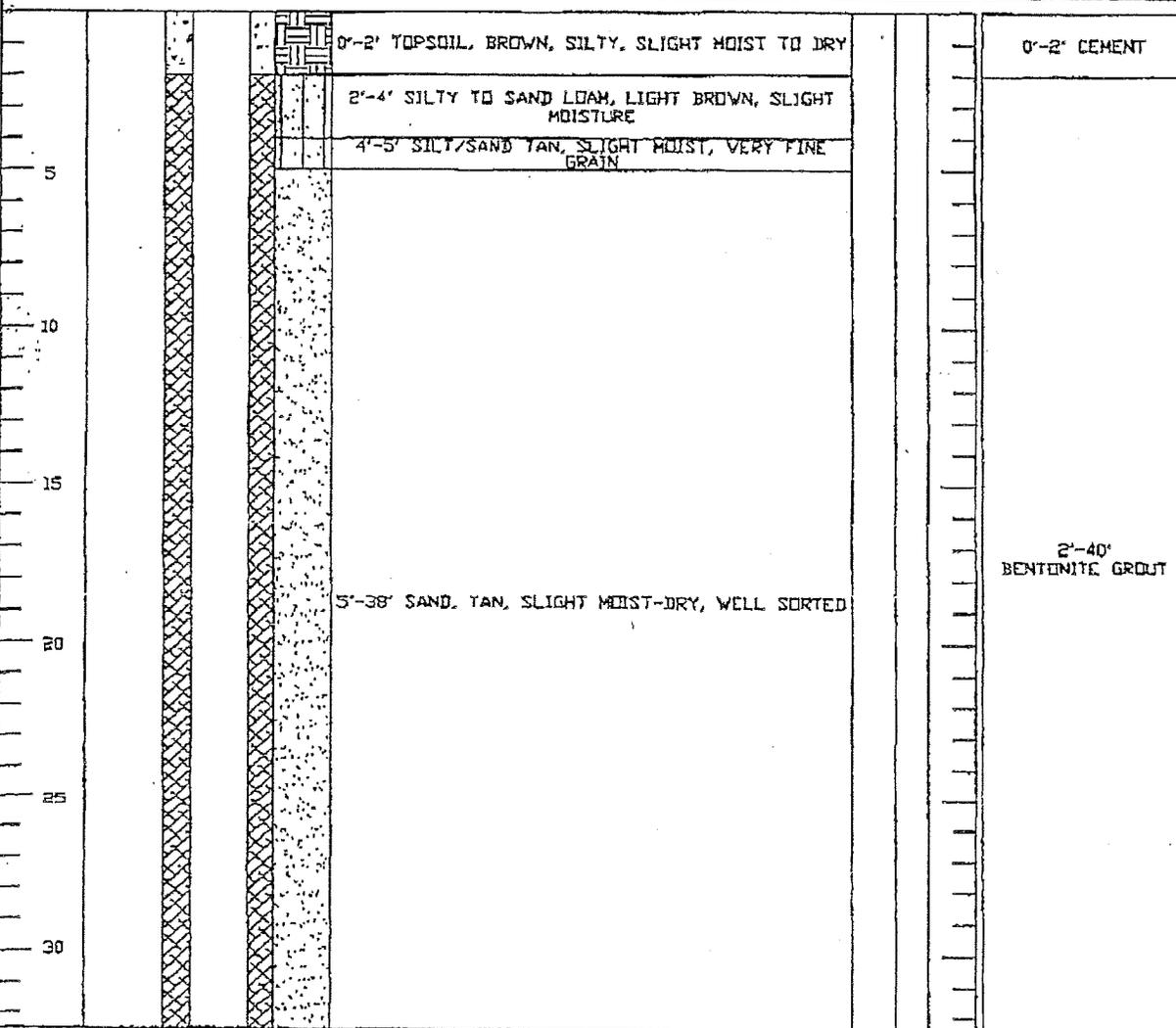
Well Back: _____ From _____ feet to _____ feet

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4047 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG HOLLOW STEM AUGER		BORING NUMBER: MW-221R	
	SITE NAME AND LOCATION: East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R2W		SHEET: 1 OF 4 DRILLING:	
WEATHER: SUNNY TEMP: 85 F		WATER LEVEL:		START TIME: 15:43
GL. ELEV.: 1,158.70 FT.		DATE:		FINISH TIME:
DATUM: NAVD88 TUC ELEV.: 1,161.52 FT.		CASING DEPTH:		DATE: 6/4/03 6/4/03
DRILL RIG: CHE		SURFACE CONDITIONS: DRY		CASING DIA: 2" SCREEN DIA: 2"
ANGLE: VERTICAL BEARING:		TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: .010
SAMPLE HAMMER TORQUE: FT.-LBS:		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		

DEPTH IN FEET (ELEVATION)	BLDVS./ 6 IN DIA SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLDVS./FOOT DIA CASING	WELL CONSTRUCTION NOTES
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DRILLING CONTR: Hohawk Drilling
 DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULZIE
 DATE: 6/4/2003 CHK'D BY: PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-221R

SITE NAME AND LOCATION
 East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET
 2 OF 4

WATER LEVEL

DRILLING
 START TIME
 FINISH TIME

WEATHER: SUNNY

TEMP: 85 F

TIME

DATE

DATE

GL. ELEV. 1,158.70 FT.

DATE

DATE

DATE

DATUM: NAD83

TOC ELEV. 1,161.52 FT.

CASING DEPTH

DATE

DATE

DRILL RIG: CME

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

TYPE GRAVEL: SILICA SAND 0.45-0.8MM

SLOT SIZE: #10

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULTZE

DATE: 6/4/2003 CHK'D BY: PLS

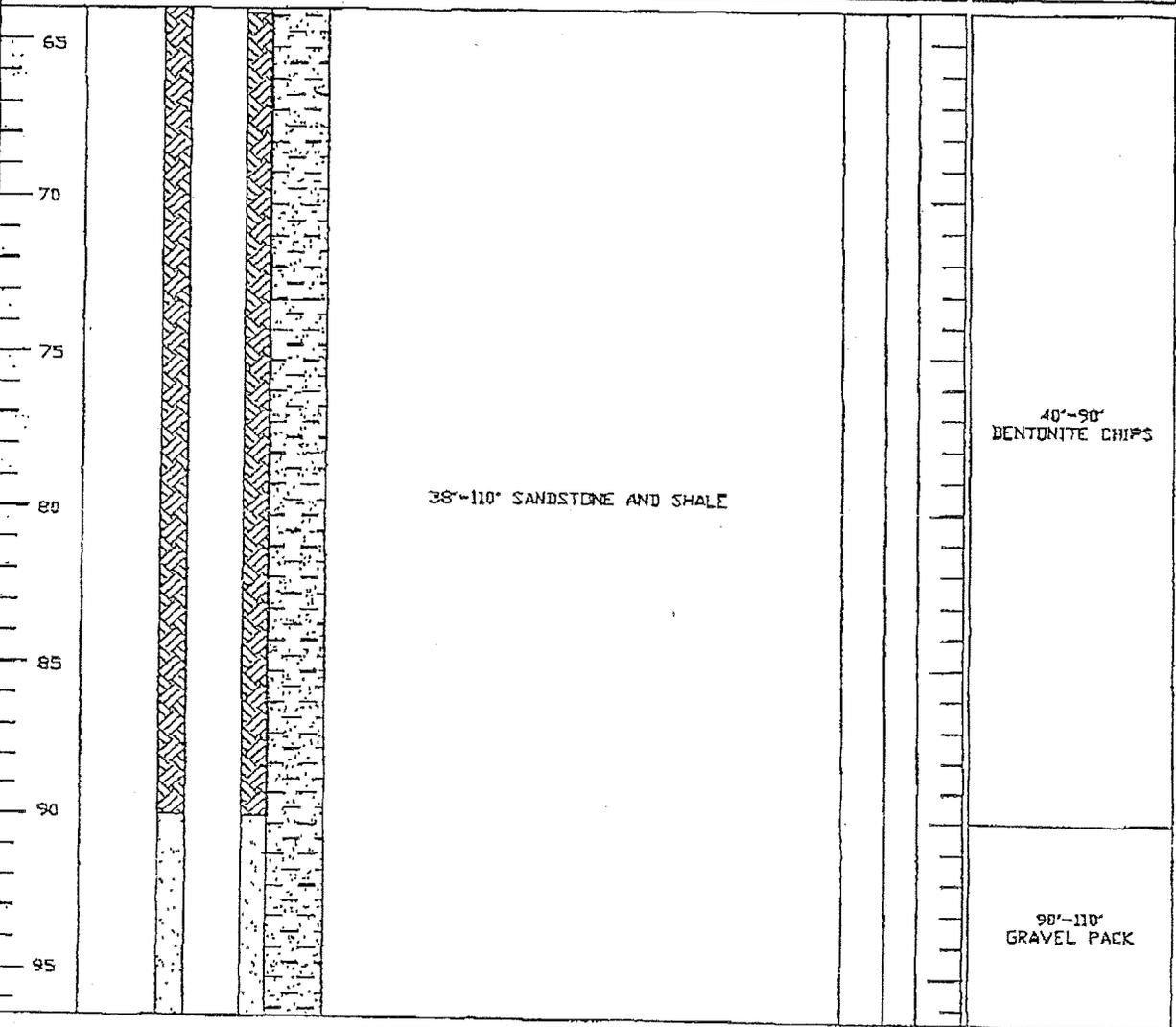
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN DS SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT OR CASING	WELL CONSTRUCTION NOTES
35				5'-38' SAND, TAN, SLIGHT MOIST-DRY, WELL SORTED				2'-40" BENTONITE GROUT
40								
45								
50				38'-110' SANDSTONE AND SHALE				40'-90" BENTONITE CHIPS
55								
60								

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG			BORING NUMBER	
	HOLLOW STEM AUGER			MW-221R	
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W	SAMPLING METHOD: N/A			SHEET	
				3 OF 4	
				DRILLING	
WEATHER: SUNNY	TEMP: 85 F	WATER LEVEL	TIME	START TIME	FINISH TIME
	GL. ELEV. 1,158.70 FT.			15:43	
DATUM: NAVD88	TDC ELEV. 1,161.52 FT.	DATE	CASING DEPTH	DATE	DATE
				6/4/03	6/4/03
DRILL RIG: CME	SURFACE CONDITIONS: DRY		CASING DIA: 2"	SCREEN DIA: 2"	
ANGLE: VERTICAL	BEARING:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: .010	
SAMPLE HAMMER TORQUE		FT.-LBS	TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		

DEPTH IN FEET (ELEVATION)	BLOWS/5 IN OF SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
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DRILLING CONTR: Mahawk Drilling
 DRILLER: ALAN BRANTLEY

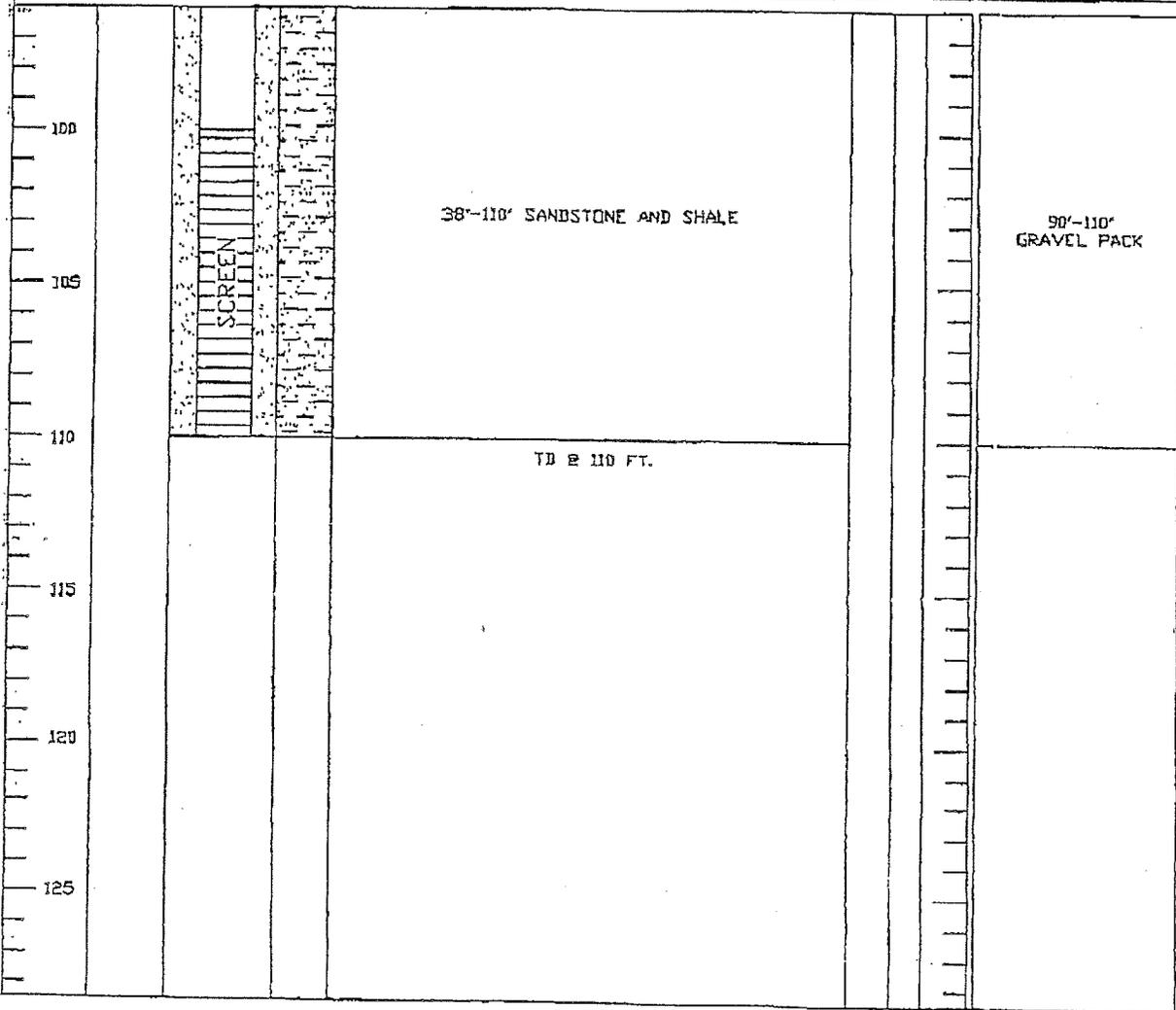
LOGGED BY: PETER SCHULTZE
 DATE: 6/4/2003
 CHK'D BY: PLS

Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.		DRILLING METHOD: ROTARY RIG HOLLOW STEM AUGER		BORING NUMBER MW-221R	
SITE NAME AND LOCATION East Dak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R2W		SAMPLING METHOD: N/A		SHEET 4 OF 4	
WEATHER: SUNNY TEMP: 85 F		WATER LEVEL		START TIME 15:43	FINISH TIME
GL. ELEV. 1,158.70 FT.		DATE		DATE 6/4/03	DATE 6/4/03
DATUM: NAVD88 TDC ELEV. 1,161.52 FT.		CASING DEPTH		DRILLING	
DRILL RIG: CME		SURFACE CONDITIONS: DRY		CASING DIA: 2" SCREEN DIA: 2"	
ANGLE: VERTICAL BEARING:		TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: #10	
SAMPLE HAMMER TORQUE FT.-LBS		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		WELL CONSTRUCTION NOTES	

DRILLING CONTR: Mohawk Drilling
 DRILLER: ALAN BRANTLEY



LOGGED BY: PETER SCHWITZE
 DATE: 6/4/2003 CHK'D BY: PLS

**WEAVER BOOS CONSULTANTS, LLC-SOUTHWEST (WBC)
LITHOLOGIC LOGS
2005**

KEY TO LITHOLOGIC LOGS

East Oak Landfill Expansion

SAMPLING METHODS:		RELATIVE DENSITY OF COARSE GRAINED SOILS:	
Symbol:	Sampling Method:	Penetration Resistance: (Blows/Foot)	Relative Density:
U	Thin Walled Shelby Tube	0 - 4	Very Loose
S	Split Spoon Barrel	4 - 10	Loose
C	Double Tube Core Barrel	10 - 30	Medium Dense
P	Pitcher Barrel	30 - 50	Dense
A	Auger Sample	Over 50	Very Dense
W	Rotary Wash Sample		

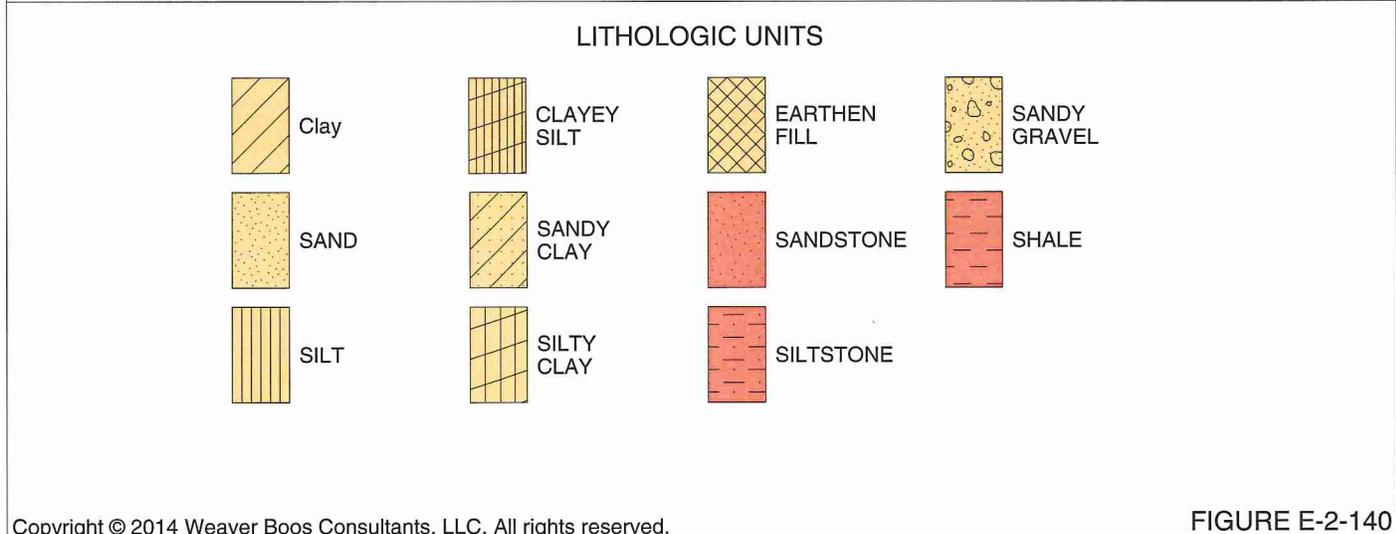
CONSISTENCY OF FINE-GRAINED SOILS:		
Unconfined Compressive Strength: (Tons per Square Foot)	Consistency:	Field Criteria:
Less than 0.25	Very Soft	Squeezes between fingers when fist is closed.
0.25 to 0.50	Soft	Easily molded by fingers.
0.50 to 1.00	Firm	Molded by strong pressure of fingers.
1.00 to 2.00	Stiff	Imprinted very slightly by finger pressure.
2.00 to 4.00	Very Stiff	Cannot imprint with finger pressure / can penetrate w/ pencil.
4.00 and Up	Hard	Imprinted only slightly by pencil point.

MOISTURE:		PLASTICITY	
Description:	Criteria:	Description:	Criteria:
Dry	Absence of moisture.	Non-plastic	1/8" Thread Can't Be Rolled.
Moist	Damp, but no visible water.	Low	1/8" Thread Difficult to Roll / No Lump.
Wet	Very damp to visible water.	Medium	1/8" Thread Easy to Roll / No reroll / No Lump.
Water Bearing	Water drains freely.	High	Long time to 1/8" Thread at Plastic Limit.

STRATIFICATION:		SEDIMENTARY TEXTURES:	
Description:	Thickness:	Description:	Definition:
Massive Bedding	> 10 ft.	Slickensides	Polished fracture surface seen in stiff clay.
Very Thickly Bedded	3 ft. to 10 ft.	Fractures	Failure plane, commonly w/ mineralization.
Thickly Bedded	1 ft. to 3 ft.	Blocky	Angular lumps that resist further breakdown.
Moderately Bedded	3 in. to 1 ft.	Brecciated	Angular fragments commonly due to faulting.
Thinly Bedded	1.2 in. to 3 in.	Fissures	Cracks from shrinkage and frost w/ definite fracture plane.
Very Thinly Bedded	3/8 in. to 1.2 in.	Weathered	Irregular discoloration and diminished soil structure.
Laminated	< 3/8 in.	Calcareous	Contains calcium carbonate, commonly as cement.

SUBSURFACE CONDITIONS:

The lithologic log soil and rock descriptions are based on visual field observations and, where indicated on the logs, geotechnical testing. The geotechnical classifications are based only on the samples analyzed. Where no geotechnical classification or analysis is indicated, the stratum classifications are based on visual field classifications only. USCS classifications based on field observations are shown in parenthesis on WBC logs. The lithologic unit contacts shown on the logs indicate approximate boundaries between materials. The actual contacts may be gradational and vary between borehole locations. The visual/manual procedures used for the field classification of soils were performed in general accordance with ASTM Standard D-2488. Soil classifications based on geotechnical laboratory results were performed in general accordance with ASTM Standard D-2487. Water level observations were made at the time of drilling and at subsequent times, as indicated. Future water levels may vary significantly from those indicated due to climatic factors, construction activity, or other factors.



WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-1-2005			Geologist: AS/BF		Driller: Total Support - Spaust		Page 1 of 2										
			Project Title: East Oak Landfill Expansion																	
			Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results												
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/1/2005 Northing: 185064.91		Boring End Date: 12/1/2005 Easting: 2174641.64		Ground Elevation: 1143.5 ft-msl T.O.C.: 1146.60 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200° /No. 40°	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail		
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.		▽ = Water Level at Time of Drilling: 1135.0 ft-msl		▼ = Static Water Level: 1137.56 ft-msl													
			Description	FT MSL																
	U		SAND (SW), slightly moist, unconsolidated, fine to medium grain, poorly sorted, light brown to tan, with trace clay.		0.0															
	U					0.0														
5	U			- fine to coarse grain, poorly sorted.		0.0														
	U					0.0														
	U			- wet @ 8.5'.		0.0														
	A																			
	S			- grain size increases, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	4/6"	6/6"	12/6"											
15	A																			
	S			- clay seam, soft, plastic, brown, 1.5" thick.		0.0	1/6"	1/6"	3/6"											
20	S			- sandy clay seam, soft, plastic, brown, 1" thick.																
	A																			
	S																			
25	S																			
	A		- grain size increases, medium sand to coarse gravel, poorly sorted, angular to subrounded grain.																	
	A																			
	C		SHALE (CL), slightly moist, plastic, hard, weathered, reddish brown and tan banded.	1115.5																

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-1-2005			Geologist: AS/BF		Page 2 of 2							
		Project Title: East Oak Landfill Expansion			Driller: Total Support - Spaust									
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.											
			Boring Start Date: 12/1/2005 Northing: 185064.91 Boring End Date: 12/1/2005 Easting: 2174641.64 Ground Elevation: 1143.5 ft-msl T.O.C.: 1146.60 ft-msl											
			∇ = Water Level at Time of Drilling: 1135.0 ft-msl ▼ = Static Water Level: 1137.56 ft-msl											
35	C		SHALE (continued).		1106.5	4.5								
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-2-2005		Geologist: AS/BF		Driller: Total Support - Spaust		Page 1 of 2						
			Project Title: East Oak Landfill Expansion												
			Project No: 0086-356-11-40-02												
Depth (ft)	Samples	Graphic Log	Boring Start Date: 11/29/2005 Northing: 185219.53		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 11/29/2005 Easting: 2175393.02												Ground Elevation: 1149.3 ft-msl T.O.C.: 1151.79 ft-msl
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.												
			▽ = Water Level at Time of Drilling: 1137.8 ft-msl												
			▼ = Static Water Level: 1137.54 ft-msl												
			Description	FT MSL											
	U		SAND (SP), dry, unconsolidated, fine to medium rounded to subangular quartz and feldspar grains, light brown to tan.		0.0										
	U					0.0									
5	U			- scattered fine gravel (< 5%) in sand.		0.0									
	U					0.0									
	U			- sand becomes moist @ 8.0'.		0.0									
10	U					0.0									
	U			- becomes wet @ 11.5', non-plastic, unconsolidated medium to fine grain, poorly sorted.		0.0									
	U					0.0									
15	U					0.0									
	S			- sand sample flows @ 16.0'.		0.0	1/6"								
	S					2/6"									
	S					2/6"									
	A			1130.8		1/6"									
	S		CLAY (CH), silty, sandy, very moist, plastic, soft to firm, very fine grain sand, dark brown.		1.5	1/6"									
	S					2/6"									
20	A			1129.3											
	S		SAND (SP-SM), clayey, silty, wet, slightly plastic, very soft, very fine grain, dark brown.		0.5	1/6"									
	S					2/6"									
	S					2/6"									
	A					1/6"									
	S					14/6"									
	S		- grain size increases, fine to medium grain, no longer clayey.			23/6"									
	A					10/6"									
	S		- no longer silty, well rounded and sorted grains, color changes to medium brown.			21/6"									
25	S					17/6"									
	A					8/6"									
	S		- becomes silty, grain size increases, fine to coarse grain.			8/6"									
	S					10/6"									
	A														
	S					10/6"	8 ^a								
	S		- grain size changes, medium sand to fine gravel, poorly sorted, angular to subrounded grain.			14/6"	52 ^b								
	S				1119.8	17/6"									
	S					50/4"									
	A		SANDSTONE (SP), silty, clayey, moist, very weathered.												

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-2-2005			Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 11/29/2005	Northing: 185219.53										
			Ground Elevation: 1149.3 ft-msl T.O.C.: 1151.79 ft-msl											
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.											
			▽ = Water Level at Time of Drilling: 1137.8 ft-msl											
			▼ = Static Water Level: 1137.54 ft-msl											
			Description	FT MSL										
	S		stiff, very fine, well-sorted, rounded grain, reddish brown.		1.0									
	C			1115.8	4.5			15.0	114.1				40.0 (tsf)	
35	C		SANDSTONE, silty, moist, hard, unweathered, very fine rounded grain, cemented, reddish brown and tan banded.										3.0x10 ⁻⁴ (cm/s)	
40			- becomes stiff, color changes to dark reddish brown.	1109.3	1.5									
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: MW-201R (PWB-3-2005)		Geologist: AS/BF Driller: Total Support - Spaust		Page 1 of 2						
			Project Title: East Oak Landfill Expansion										
			Project No: 0086-356-11-40-02										
Depth (ft)	Samples	Graphic Log	Boring Data		Field Tests		Geotechnical Laboratory Results					Well Detail	
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^b /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit		Plasticity Index
			Boring Start Date: 11/29/2005 Northing: 185217.39 Boring End Date: 11/30/2005 Easting: 2176210.85 Ground Elevation: 1147.4 ft-msl T.O.C.: 1150.05 ft-msl										
			▽ = Water Level at Time of Drilling: 1136.9 ft-msl ▽ = Static Water Level: 1137.31 ft-msl										
			Description	FT MSL									
	U		SAND (SP), clayey, slightly moist, soft to firm, fine to medium grain, unconsolidated, brown to tan.		2.5								
	U		- color changes to light brown to tan, unconsolidated.		0.0								1145.4
5	U		-slightly clayey, with a dark brown band with a slight hydrocarbon odor.		1.5								
	U		-trace of clay at 8'.		0.0								
	U		-thin clayey sand seams (<0.25").		0.0								
10	S		- becomes wet @ 10.5', fine clay clasts from 10.5' to 12'.		0.0	1/6"							
	S				0.0	1/6"							
	S				0.0	3/6"							
	A				0.0	4/6"							
	S				0.0	3/6"							
	S				0.0	5/6"							
	A				0.0	4/6"							1133.9
	S				0.0	6/6"							
15	S				0.0	15/6"							
	A				0.0	4/6"							1131.9
	S				0.0	6/6"							
	S				0.0	15/6"							
	A				0.0	4/6"							1130.9
	S				0.0	3/6"							
	S				0.0	4/6"							
	S			0.0	7/6"								
	A		- sandy clay seam, brown, 2" thick at 20'.	0.0	8/6"								
	S			0.0	8/6"								
20	S		- clay seam, soft, plastic, 6" thick.	0.5	9/6"								
	S			0.5	1/6"								
	S			0.5	1/6"								
	S			0.5	6/6"								
	A		- grain size increases, coarse sand to fine gravel, poorly sorted, angular to subrounded grain.	0.0	7/6"								
	S		- clay seam, soft, plastic, 1" thick.	0.0	6/6"								
	S			0.0	5/6"								
25	A		- becomes slightly clayey, grain size changes, medium sand to fine gravel.	0.0	2/6"								
	S			0.0	5/6"								
	S			0.0	6/6"								
	A			0.0	1/6"							1120.9	
	S			0.0	3/6"								
	S			0.0	6/6"							1120.4	
	A			0.0	8/6"								
	S			0.0	10/6"								
	S			0.0	14/6"								

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

LOG OF BORING: MW-201R (PWB-3-2005)

Geologist: AS/BF
Driller: Total Support - Spaust

Project Title: East Oak Landfill Expansion

Project No: 0086-356-11-40-02

Field Tests Geotechnical Laboratory Results

Boring Start Date: 11/29/2005 Northing: 185217.39
Boring End Date: 11/30/2005 Easting: 2176210.85
Ground Elevation: 1147.4 ft-msl T.O.C.: 1150.05 ft-msl

Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.

▽ = Water Level at Time of Drilling: 1136.9 ft-msl

▾ = Static Water Level: 1137.31 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
32.5	A					10/6"								
33.0	S					12/6"								
33.5	S					22/6"								
34.0	S				1115.4									
34.5	A						34/6"							
35.0	S			SANDSTONE (SP), moist, weathered, very fine grain, reddish brown, with some fine gravel.			50/3.5"							
35.5	S			- very fine grain, no gravel.										
36.0	A													
37.0	C			SAND (continued). Sandstone, reddish-brown, weathered, 1" thick at 32'.		4.5								
40.0	S			- weathered with some fine gravel.	1107.2		50/3"							

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-4-2005		Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2					
			Project Title: East Oak Landfill Expansion											
			Project No: 0086-356-11-40-02		Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 11/30/2005 Northing: 184706.00		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200°/No. 40°	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 12/1/2005 Easting: 2175381.36											
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.											
			▽ = Water Level at Time of Drilling: 1138.1 ft-msl											
			▼ = Static Water Level: 1138.33 ft-msl											
			Description	FT MSL										
	C			1109.1	4.5									
	C		SANDSTONE (SP), slightly clayey in upper 1" of sample, moist, very stiff to hard, fine grained, slightly weathered, reddish brown and tan banded.		4.0									
				1107.1	4.5									
35														
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

LOG OF BORING: MW-14R2 (PWB-5-2005)

Geologist: AS/BF
Driller: Total Support - Spaust

Project Title: East Oak Landfill Expansion
Project No: 0086-356-11-40-02

Field Tests Geotechnical Laboratory Results

Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 11/30/2005	Northing: 184631.02										
			Ground Elevation: 1148.0 ft-msl T.O.C.: 1151.06 ft-msl											
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.											
			▽ = Water Level at Time of Drilling: 1135.5 ft-msl ▼ = Static Water Level: 1137.58 ft-msl											
			Description	FT MSL										
1.5	U		SAND (SP), slightly moist, fine to medium grained, brown to tan, with some clay.		1.5									
2.0	U		- trace of clay at 2'.		1.0								1146.0	
5.0	U		- light brown to tan, slightly moist, unconsolidated.		0.0									
10.0	U				0.0									
12.5	A		- becomes wet @ 12.5', color changes to light to medium brown.		1.0									
15.0	U		- sandy clay seam, brown, wet, plastic, 3" thick.										1134.5	
20.0	A		- grain size increase, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	3/6" 1/6" 2/6"							1132.5	
25.0	A		- grain size increase, coarse sand to fine gravel, poorly sorted, angular to subrounded grain, color changes to medium brown.		0.0	1/6" 1/6" 2/6"							1131.5	
30.0	S													
35.0	S													
40.0	S													
45.0	A													
50.0	S					15/6" 25/6" 12/6"							1121.5	
55.0	S												1121.0	

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/23/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: MW-14R2 (PWB-5-2005)		Geologist: AS/BF Driller: Total Support - Spaust		Page 2 of 2								
			Project Title: East Oak Landfill Expansion												
			Project No: 0086-356-11-40-02				Field Tests		Geotechnical Laboratory Results						
Depth (ft)	Samples	Graphic Log	Boring Start Date: 11/30/2005 Northing: 184631.02		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 11/30/2005 Easting: 2176204.12												Ground Elevation: 1148.0 ft-msl T.O.C.: 1151.06 ft-msl
			Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.												
			▽ = Water Level at Time of Drilling: 1135.5 ft-msl												
			▼ = Static Water Level: 1137.58 ft-msl												
			Description	FT MSL											
35	C		- grain size increase, very coarse sand to medium gravel, poorly sorted, angular to subrounded grain.	1111.8	6/6" 32/6" 50/1"										
	S														
	S														
	S														
40	C		SANDSTONE (SW), silty, moist, firm to hard, slightly weathered, reddish brown and tan banded, with some clay seams, <0.25" thick, and some medium gravel at top of section.	1108.0	4.5	15.0	118.7								
			- white sand seam.		4.0 1.0										
45															
50															
55															

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/23/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-6-2005		Geologist: AS/BF Driller: Total Support - Spaust		Page 1 of 2						
			Project Title: East Oak Landfill Expansion										
			Project No: 0086-356-11-40-02										
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/5/2005 Northing: 184724.09 Boring End Date: 12/5/2005 Easting: 2174489.75 Ground Elevation: 1145.2 ft-msl		Field Tests		Geotechnical Laboratory Results						
			Remarks: Borehole left open over night, caved to 5.5' bgs.		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)
			▽ = Water Level at Time of Drilling: 1139.0 ft-msl ▼ = Static Water Level: Not Measured										
			Description	FT MSL									
			CLAY (CL), slightly plastic, firm, brown.	1144.2	4.0								
	U		SAND (SW), moist, unconsolidated, fine to medium grain, poorly sorted, light brown to tan.		0.0								
	U				0.0								
5	U		- wet @ 6.25', trace of clay @ 7.5'.		0.0								▽
	U				0.0								
	U		No recovery due to flowing sand (8' - 10').		0.0								
	A				0.0								
	S		- grain size increases, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	5/6"							
	S					8/6"							
	S					12/6"							
15	A				0.0								
	S		- sandy clay seam, brown soft, plastic, 2" thick.		0.0	3/6"							
	S					2/6"							
	S					2/6"							
20	A				0.0								
	S		- clay seam, slightly sandy, soft, non-plastic, brown, 2" thick.		0.0	4/6"							
	S		- sandy clay seam, soft, plastic, brown, 2" thick.			4/6"							
	S					5/6"							
25	A		- grain size increases, medium sand to fine gravel, poorly sorted, angular to subrounded grain.		0.0								
	S		- grain size changes, coarse sand to fine gravel, poorly sorted, angular to subrounded grain.		0.0	2/6"							
	S					4/6"							
	S					6/6"							

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-6-2005		Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2					
			Project Title: East Oak Landfill Expansion											
			Project No: 0086-356-11-40-02		Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/5/2005 Northing: 184724.09		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 12/5/2005 Easting: 2174489.75											
			Remarks: Borehole left open over night, caved to 5.5' bgs.											
			▽ = Water Level at Time of Drilling: 1139.0 ft-msl ▽ = Static Water Level: Not Measured											
			Description	FT MSL										
	C			1113.2										
			SHALE (CL), clayey, slightly moist, slightly plastic, hard, weathered, reddish brown, with some sand.	1111.2	4.5									
35														
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-7-2005			Geologist: AS/BF		Page 1 of 2							
		Project Title: East Oak Landfill Expansion			Driller: Total Support - Spaust									
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 12/5/2005	Northing: 184713.39										
			Ground Elevation: 1139.9 ft-msl											
			Remarks: Borehole left open over night, caved to 5' bgs.											
			▽ = Water Level at Time of Drilling: 1134.9 ft-msl ▽ = Static Water Level: Not Measured											
			Description	FT MSL										
	U		SAND (SP), moist, unconsolidated, fine to medium grain, light brown to tan, with trace clay.		0.0									
	U		- trace of clay with some small gravel.		0.0									
5	U		- wet @ 5', unconsolidated, with a sandy clay seam, plastic, firm, brown, 4" thick.		1.0									▽
	U				0.0									
	S			- grain size increases, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	1/6" 2/6" 6/6"							
10	A			- grain size decreases, fine to medium grain, poorly sorted, angular to subrounded grain.										
	S			- grain size increases, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	16/6" 20/6" 22/6"							
15	A													
	S			- grain size increases, coarse to very coarse grain, poorly sorted, angular to subrounded grain.	1121.4	4.5	5/6" 50/4"							
20	C			SANDSTONE (SP), silty, slightly clayey, moist, hard, very fine grain, well sorted, rounded grain, reddish brown and tan banded.		4.5		17.0	119.3					
	C		- becomes very soft on top of shale seam. - SHALE seam, slightly plastic, hard, weathered, reddish brown, 3.5" thick. - becomes slightly clayey to clayey.		0.0									
25	C				4.5									
	C		- becomes slightly silty, no longer clayey.				21 ^a	15.0	110.6	27	22	5	20.4 (tsf) 2.4x10 ⁻⁶	

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-7-2005			Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2						
			Project Title: East Oak Landfill Expansion													
			Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/5/2005 Northing: 184713.39		Boring End Date: 12/5/2005 Easting: 2174983.64		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Ground Elevation: 1139.9 ft-msl		Remarks: Borehole left open over night, caved to 5' bgs.											
			▽ = Water Level at Time of Drilling: 1134.9 ft-msl		▽ = Static Water Level: Not Measured											
			Description	FT MSL												
	C			1106.9	4.5											
35																
40																
45																
50																
55																

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-8-2005		Geologist: AS/BF		Driller: Total Support - Spaust		Page 1 of 2					
			Project Title: East Oak Landfill Expansion											
			Project No: 0086-356-11-40-02											
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/5/2005 Northing: 184720.06		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 12/5/2005 Easting: 2175728.74											
			Remarks: Borehole left open over night, caved to 3' bgs.											
			▽ = Water Level at Time of Drilling: 1137.9 ft-msl											
			▼ = Static Water Level: Not Measured											
			Description	FT MSL										
	U	[Yellow dotted pattern]	SAND (SP), slightly moist, unconsolidated, fine to medium grain, light brown to tan.		0.0									
	U				0.0									
5	U		- wet @ 4.5'			0.0								▽
	U					0.0								
	S			- becomes silty, with some fine gravel from 8' to 10'.		0.0	1/9"							
	S					0.0	1/9"							
	A					0.0								
	S			- grain size increase, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	2/6"							
	S					0.0	4/6"							
	S					0.0	4/6"							
15	A		- no longer silty.											
	S				0.0	6/6"								
	S				0.0	12/6"								
	S		- scattered clay clasts, 18' to 19.5'.		0.0	12/6"								
20	A			1120.4										
	S	[Red solid pattern]	SANDSTONE (SM-SC), silty, clayey, moist, hard, very fine, rounded grain, weathered, reddish brown and tan banded.		4.5	50/4.5"								
25	C							3.0	113.3					
	C			- SHALE seam, non-plastic, hard, weathered, reddish brown, 7" thick.		4.5								
	C			- becomes slightly silty, unweathered, no longer clayey.										

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-8-2005				Geologist: AS/BF		Page 2 of 2						
		Project Title: East Oak Landfill Expansion				Driller: Total Support - Spaust								
		Project No: 0086-356-11-40-02				Field Tests		Geotechnical Laboratory Results						
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/5/2005 Northing: 184720.06		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 12/5/2005 Easting: 2175728.74											
			Remarks: Borehole left open over night, caved to 3' bgs.											
			▽ = Water Level at Time of Drilling: 1137.9 ft-msl											
			▼ = Static Water Level: Not Measured											
			Description	FT MSL										
	C				1108.4	4.5	11 ^a	17.0	111.1	29	22	7	37.9 (tsf)	
35													5.4x10 ⁻⁴ (cm/s)	
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-9-2005				Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2				
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02				Field Tests		Geotechnical Laboratory Results						
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/6/2005 Northing: 184427.68		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 12/6/2005 Easting: 2175059.28											
			Remarks: Borehole left open over night, caved to 3' bgs.											
			▽ = Water Level at Time of Drilling: 1137.9 ft-msl											
			▼ = Static Water Level: Not Measured											
			Description	FT MSL										
35	C		SHALE (CL), sandy, moist, plastic, hard, reddish brown and tan banded, tan bands are sandy shale.	1106.4	4.5		58 ^a	5.0	140.7	26	15	11		
			- sandstone lens, moist, fine grain, reddish brown, 9" thick.			4.5								
			- sandstone lens, moist, fine grain, reddish brown, 10" thick.											
40	C		SANDSTONE, moist, very fine grain, well-sorted, unweathered, reddish brown and tan banded.	1098.4	4.5									
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-10-2005			Geologist: AS/BF Driller: Total Support - Spaust			Page 1 of 2						
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests			Geotechnical Laboratory Results						
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 12/6/2005	Northing: 184208.22										
			Ground Elevation: 1146.0 ft-msl											
			Remarks: Borehole left open over night, caved to 8' bgs.											
			▽ = Water Level at Time of Drilling: 1137.5 ft-msl ▽ = Static Water Level: Not Measured											
			Description	FT MSL										
5	U		CLAY (CH), hard, plastic when moistened, dark to medium brown, with some sand.		4.5		98 ^a	15.0	106.9	57	21	36		
	U					4.5								
	U			- becomes moist @ 4.5', plastic.	1141.0	4.5								
	U			SAND (SW), slightly silty, moist, unconsolidated, fine to medium grain, poorly sorted, light brown to tan.		0.0								
10	U			- wet @ 8.5', with a sandy clay seam, slightly plastic, very stiff, brown.		4.0								
	A			- sand is no longer silty.										
	S			- some fine gravel.		0.0	6/6"							
	S						11/6"							
	S						16/6"							
15	A													
	S		- grain size increases, medium to coarse grain, poorly sorted, angular to subrounded grain.		0.0	17/6"								
	S					22/6"								
	S					32/6"								
20	A		- grain size increases, medium sand to fine gravel, poorly sorted, angular to subrounded grain.											
	S		- grain size increases, coarse sand to medium gravel, poorly sorted, angular to subrounded grain, with some clay clasts.		0.0	5/6"								
	S					9/6"								
	S					35/6"								
25	A													
	S													
	C		SANDSTONE (SP), slightly silty, slightly clayey, moist, very fine grain, well-sorted, rounded grain, weathered, reddish brown and tan banded.	1118.0	4.0	50/4"		12.0	117.4				2.0x10 ⁻⁴ (cm/s)	

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-10-2005			Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2					
			Project Title: East Oak Landfill Expansion												
			Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/6/2005 Northing: 184208.22		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 12/6/2005 Easting: 2175831.14												Ground Elevation: 1146.0 ft-msl
			Remarks: Borehole left open over night, caved to 8' bgs.												
			▽ = Water Level at Time of Drilling: 1137.5 ft-msl ▾ = Static Water Level: Not Measured												
			Description	FT MSL											
	C				4.5										
35			SHALE (CL), clayey, sandy, moist, plastic, hard, weathered, reddish brown and tan banded.	1111.5	4.5		74 ^a	10.0	124.5	38	16	22	1.3x10 ⁻⁸ (cm/s)		
	C					4.5									
40			SANDSTONE, slightly silty, moist, very fine grain, well-sorted, rounded grain, reddish brown and tan banded.	1107.5		4.5									
					1103.0										
45															
50															
55															

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-MW-226GW			Geologist: AS/BF		Driller: Mohawk Drilling		Page 1 of 4						
		Project Title: East Oak Landfill Expansion													
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/28/2005 Northing: 185212.74		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 12/28/2005 Easting: 2174990.06												Ground Elevation: 1148.6 ft-msl T.O.C.: 1151.24 ft-msl
			Remarks: Pilot borehole next to MW-226GW - used for geophysical logging. Logged from cuttings.												
			▽ = Water Level at Time of Drilling: 1138.6 ft-msl												
			▼ = Static Water Level: 1129.95 ft-msl												
			Description	FT MSL											
5			SAND (SP), silty, tan to light brown, fine to medium grain.												
10			- becomes less silty.												▽
15	W		- becomes coarse sand, angular to subrounded grain, with occasional clay clasts.												▼
25			- becomes coarse sand to small gravel, angular to subrounded grain.												

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-MW-226GW			Geologist: AS/BF		Driller: Mohawk Drilling		Page 2 of 4						
			Project Title: East Oak Landfill Expansion													
			Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/28/2005 Northing: 185212.74		Boring End Date: 12/28/2005 Easting: 2174990.06		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Ground Elevation: 1148.6 ft-msl T.O.C.: 1151.24 ft-msl		Remarks: Pilot borehole next to MW-226GW - used for geophysical logging. Logged from cuttings.											
			▽ = Water Level at Time of Drilling: 1138.6 ft-msl		▽ = Static Water Level: 1129.95 ft-msl											
			Description	FT MSL												
35				1113.6												
			SANDSTONE (SM), silty, slightly clayey, reddish brown, fine grain, rounded grain.													
40				1105.6												
			SHALE, silty, reddish brown.													
45	W			1102.6												
			SANDSTONE, silty, slightly clayey, reddish brown, fine grain, rounded grain.													
50				1098.6												
			SHALE, silty, reddish brown.													
55				1093.6												
			SANDSTONE, silty, reddish brown, fine grain, rounded grain.													

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-MW-226GW			Geologist: AS/BF		Driller: Mohawk Drilling		Page 3 of 4						
		Project Title: East Oak Landfill Expansion													
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/28/2005 Northing: 185212.74		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^o /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 12/28/2005 Easting: 2174990.06												Ground Elevation: 1148.6 ft-msl T.O.C.: 1151.24 ft-msl
		Remarks: Pilot borehole next to MW-226GW - used for geophysical logging. Logged from cuttings.													
		▽ = Water Level at Time of Drilling: 1138.6 ft-msl ▽ = Static Water Level: 1129.95 ft-msl													
		Description			FT MSL										
65			- becomes very silty silty to non-silty, very fine grain sand.												
70			- becomes clayey. SANDSTONE (continued).												
75	W		- no longer clayey. - becomes clayey.												
80			SHALE, very slightly silty, reddish brown and tan banded.		1068.6										
85			- becomes dark red to red brown.		1058.6										

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-MW-226GW			Geologist: AS/BF		Page 4 of 4								
		Project Title: East Oak Landfill Expansion			Driller: Mohawk Drilling										
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 12/28/2005 Northing: 185212.74		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 12/28/2005 Easting: 2174990.06												Ground Elevation: 1148.6 ft-msl T.O.C.: 1151.24 ft-msl
		Remarks: Pilot borehole next to MW-226GW - used for geophysical logging. Logged from cuttings.													
		▽ = Water Level at Time of Drilling: 1138.6 ft-msl ▾ = Static Water Level: 1129.95 ft-msl													
		Description			FT										
					MSL										
			SANDSTONE, reddish brown, very fine grain.												
95				1053.6											
			SHALE, silty, dark reddish brown to maroon.												
	W			1051.1											
			SANDSTONE, slightly silty, dark reddish brown.												
100				1048.6											
			SHALE, dark reddish brown to maroon.												
			- becomes sandy.												
				1045.6											
			SANDSTONE, clayey, reddish brown and tan banded, very fine grain.												
105				1043.6											
110															
115															

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/22/14

GEOPHYSICAL LOGS

RCA (1993)

WBC (2005)

WBC (2014)



(918) 652-4925

COMPENSATED DENSITY

North Side of
Sme

M W 220 #1156'

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 220
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21 TOWNSHIP : 12N RANGE : 2W

OTHER SERVICES

PERMANENT DATUM : GL
 ELEV. PERM. DATUM :
 LOG MEASURED FROM : GL
 DRLG. MEASURED FROM : GL

ELEVATIONS
 KB : GL
 DF :
 GL :

DATE : 2/16/94
 DEPTH-DRILLER :
 DEPTH-LOGGER : 147
 LOG BOTTOM : 147
 LOG TOP : 40
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT/VIS :
 SAMPLE SOURCE :
 RM : G F
 RMF : G F
 RMC : G F
 RM @ BHT : G F
 CIRC STOPPED :

CASING-DRILLER :
 CASING-LOGGER :
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

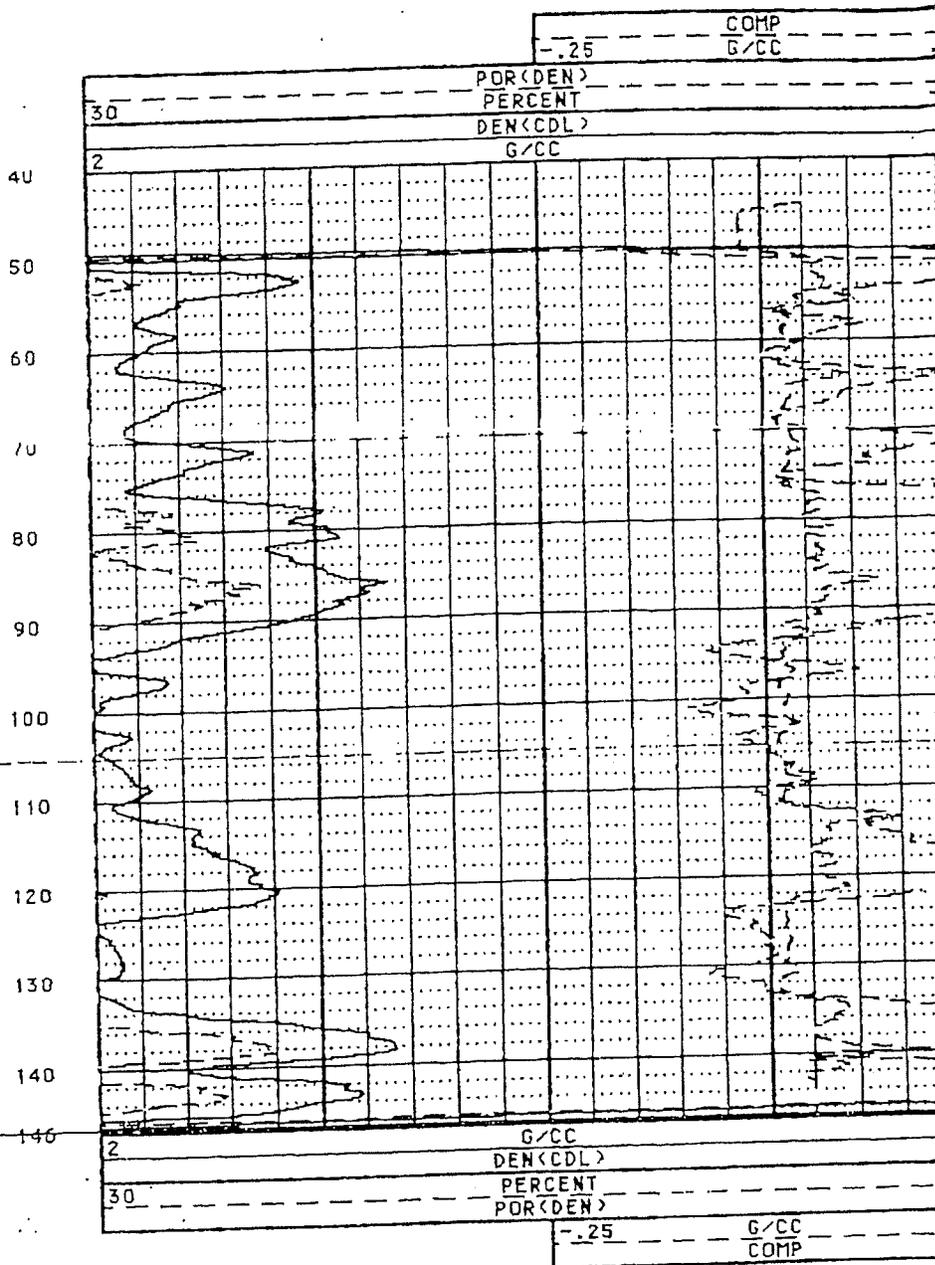
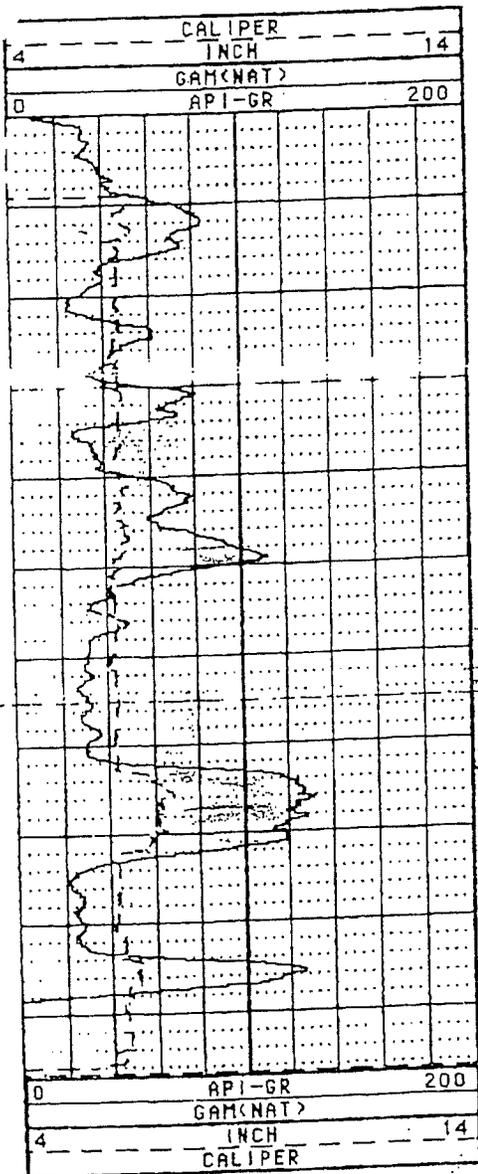
BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

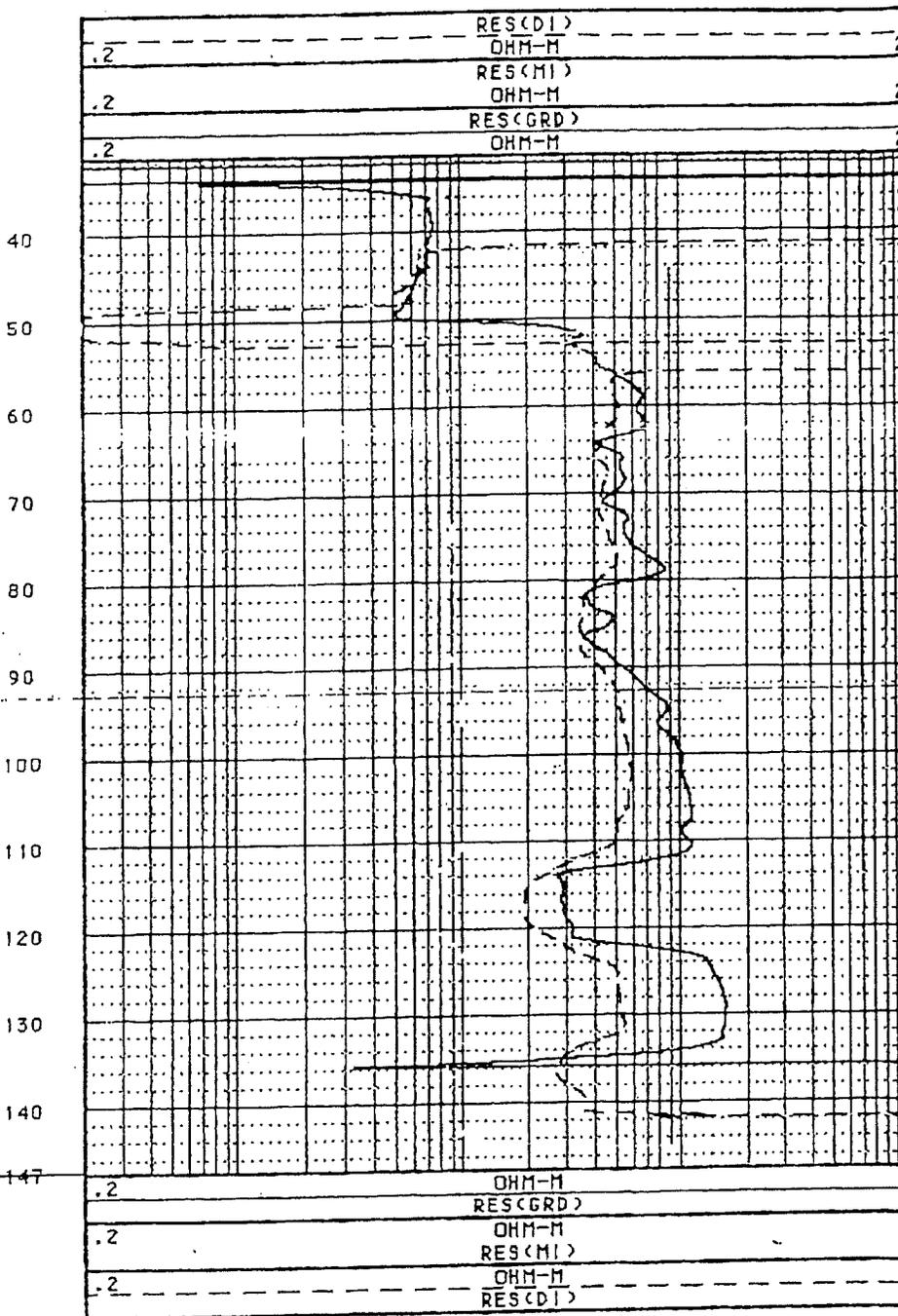
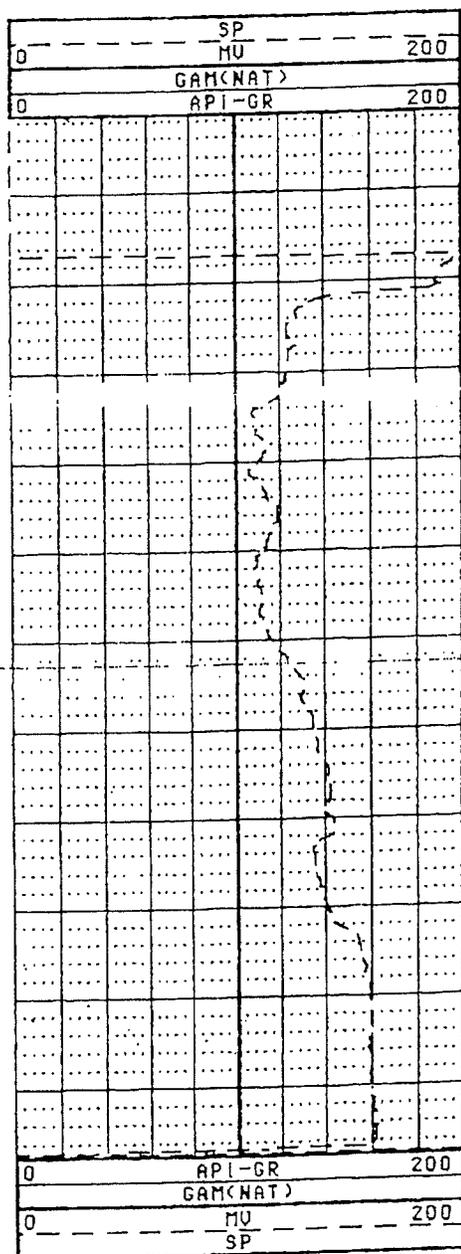
CALIPER INCH 4 14

COMP G/CC .25
 POR(DEN) PERCENT 30 -10



TOOL CALIBRATION TOOL = 9036A2 SERIAL NUMBER = 815

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS



Z15 0 0.10 02 MATRIX DENSITY: 2.71 NEUTRON: LS HOLESIZE= 6.25
 : 11.000 : -20.000



(918) 652-4925

COMPENSATED DENSITY

M W 221

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 221
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21 TOWNSHIP : 12N RANGE : 2W

OTHER SERVICES

PERMANENT DATUM : GL ELEVATIONS
 ELEV. PERM. DATUM : KB :
 LOG MEASURED FROM : GL DF :
 DRLG. MEASURED FROM : GL GL :

DATE : 2/22/94
 DEPTH-DRILLER :
 DEPTH-LOGGER : 163
 LOG BOTTOM : 163
 LOG TOP : 30
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT UIS :
 SAMPLE SOURCE :
 RM : @ F
 RMF : @ F
 RMC : @ F
 RM @ BHT : @ F
 CIRC STOPPED :

CASING-DRILLER : 40
 CASING-LOGGER : 40
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

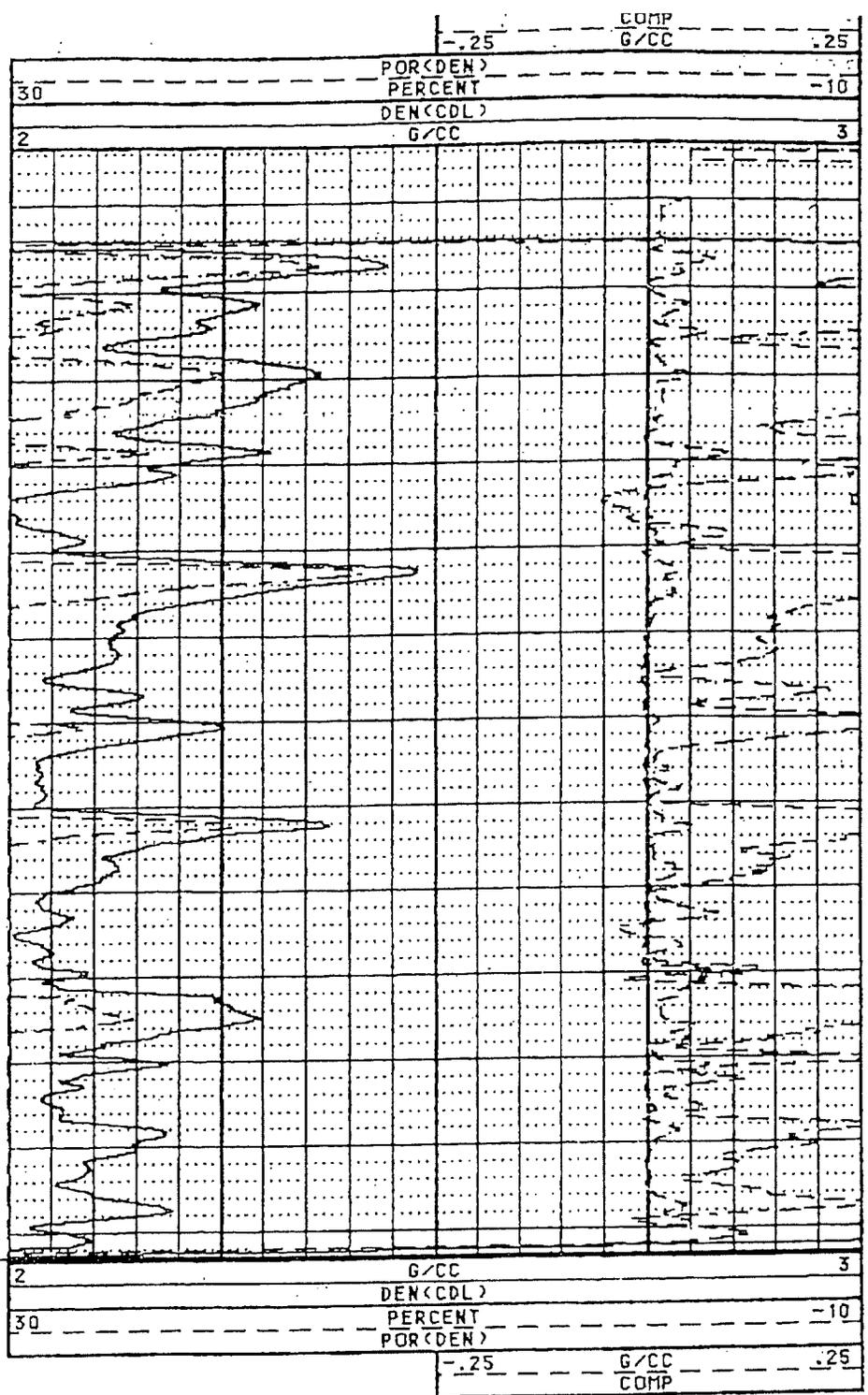
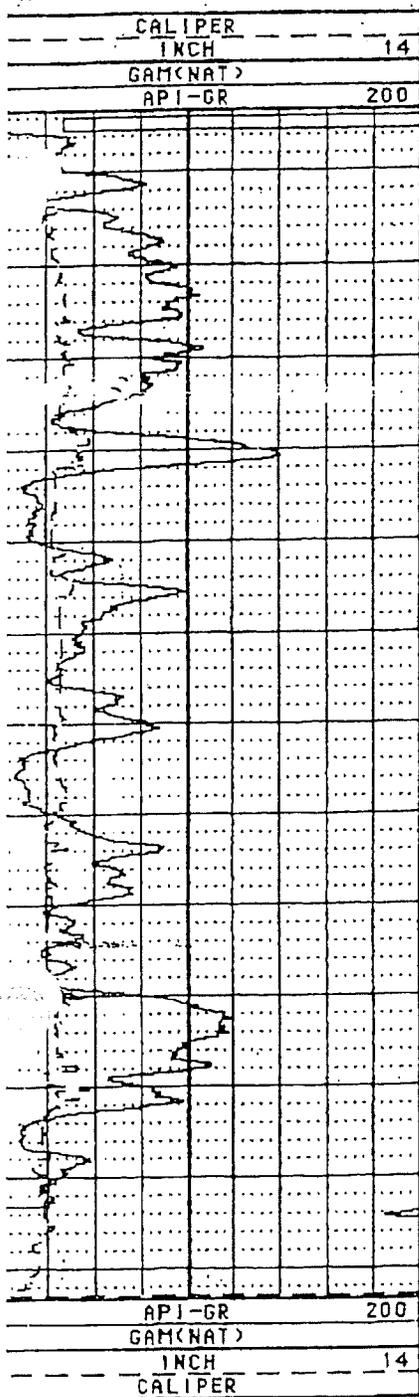
BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

CALIPER --- 14
 INCH
 GAM(NAT)

	COMP		.25
- .25	G/CC		
30	POR(DEN) PERCENT		-10
	DEN(CDL)		



TOOL CALIBRATION				TOOL = 9036A1	SERIAL NUMBER = 815	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD	
0	02/11/90	03:35:16	0	GAM(NAT)	10.000 CPS	6.000 API-GR
1	11/30/32	14:02:09	0	GAM(NAT)	385.000 CPS	280.000 API-GR
2	04/12/93	19:48:57	0	RES(SG)	7700.000 CPS	14.000 OHM-M
3	04/12/93	19:49:18	0	RES(SG)	151510.000 CPS	2000.000 OHM-M
	11/30/32	14:02:31	0	CALIPER	103.000 CPS	2.700 INCH
	11/30/32	14:02:42	0	CALIPER	2141.000 CPS	11.600 INCH
5	02/25/59	13:18:58	0	DEN(LS)	27922.000 CPS	1.106 G/CC
7	02/25/59	13:09:15	0	DEN(LS)	2075.000 CPS	2.612 G/CC



(918) 652-4925

DUAL INDUCTION LOG

M W 221

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 221
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21 TOWNSHIP : 12N RANGE : 2W

OTHER SERVICES

PERMANENT DATUM : GL ELEVATIONS
 ELEV. PERM. DATUM : KB :
 LOG MEASURED FROM : GL DF :
 DRLG. MEASURED FROM : GL GL :

DATE : 2/22/94
 DEPTH-DRILLER :
 DEPTH-LOGGER : 163
 LOG BOTTOM : 163
 LOG TOP : 30
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT/VIS :
 SAMPLE SOURCE :
 RM : @ F
 RMF : @ F
 RMC : @ F
 RM @ BHT : @ F
 CIRC STOPPED :

CASING-DRILLER : 40
 CASING-LOGGER : 40
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

SP	250
HU	
GAM(NAT)	
API-GR	200

42

RES(DI)	2000
.2 OHM-M	
RES(MI)	2000
.2 OHM-M	
RES(GRD)	2000
.2 OHM-M	



(918) 652-4925

COMPENSATED DENSITY

M W 221

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 221
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21

OTHER SERVICES

TOWNSHIP : 12N

RANGE : 2W

PERMANENT DATUM : GL
 ELEV. PERM. DATUM :
 LOG MEASURED FROM : GL
 DRLG. MEASURED FROM : GL

ELEVATIONS
 KB :
 DF :
 GL :

DATE : 2/22/94
 DEPTH-DRILLER :
 DEPTH-LOGGER : 163
 LOG BOTTOM : 163
 LOG TOP : 30
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT/VIS :
 SAMPLE SOURCE :
 RM : @ F
 RMF : @ F
 RMC : @ F
 RM @ BHT : @ F
 CIRC STOPPED :

CASING-DRILLER : 40
 CASING-LOGGER : 40
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

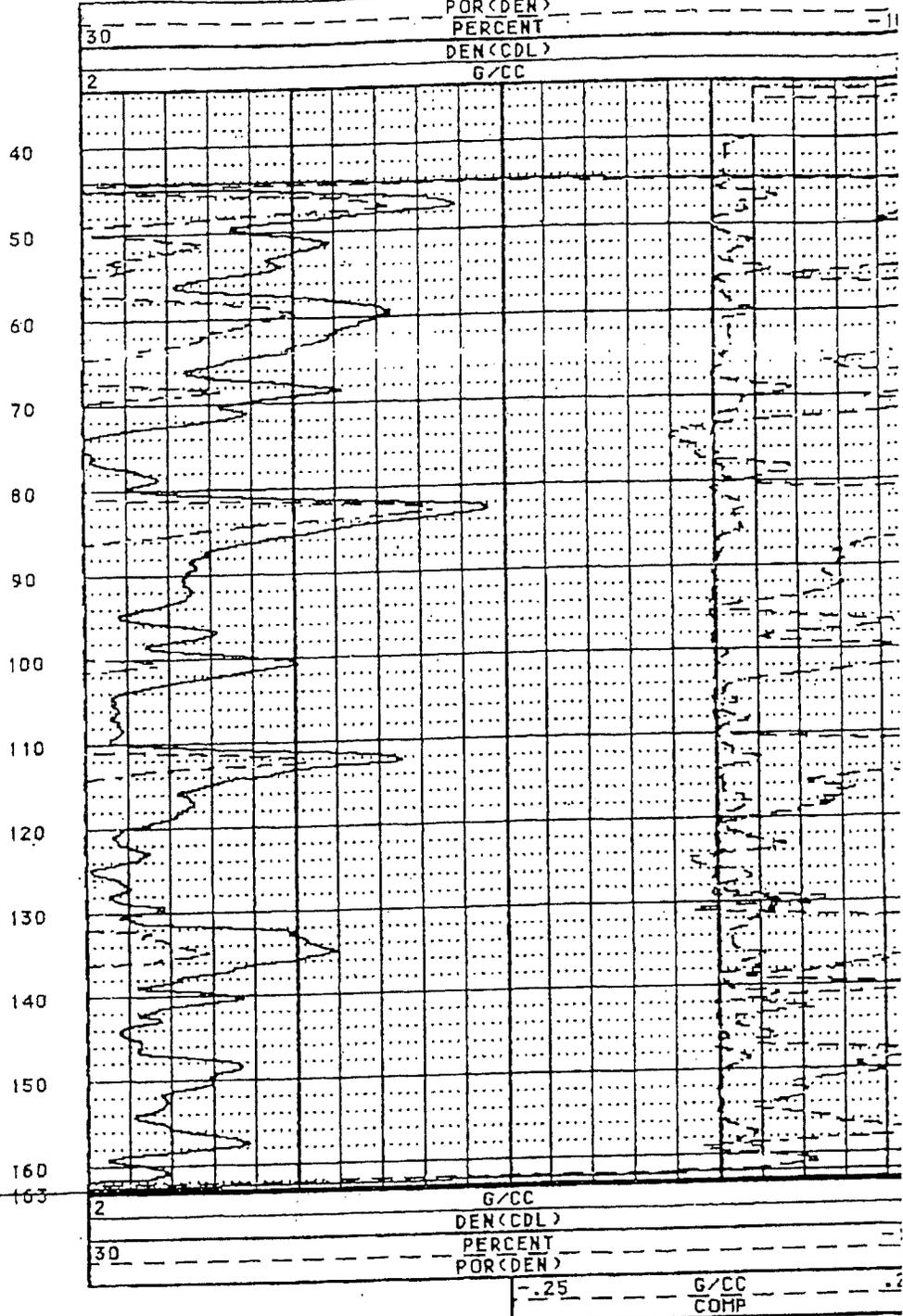
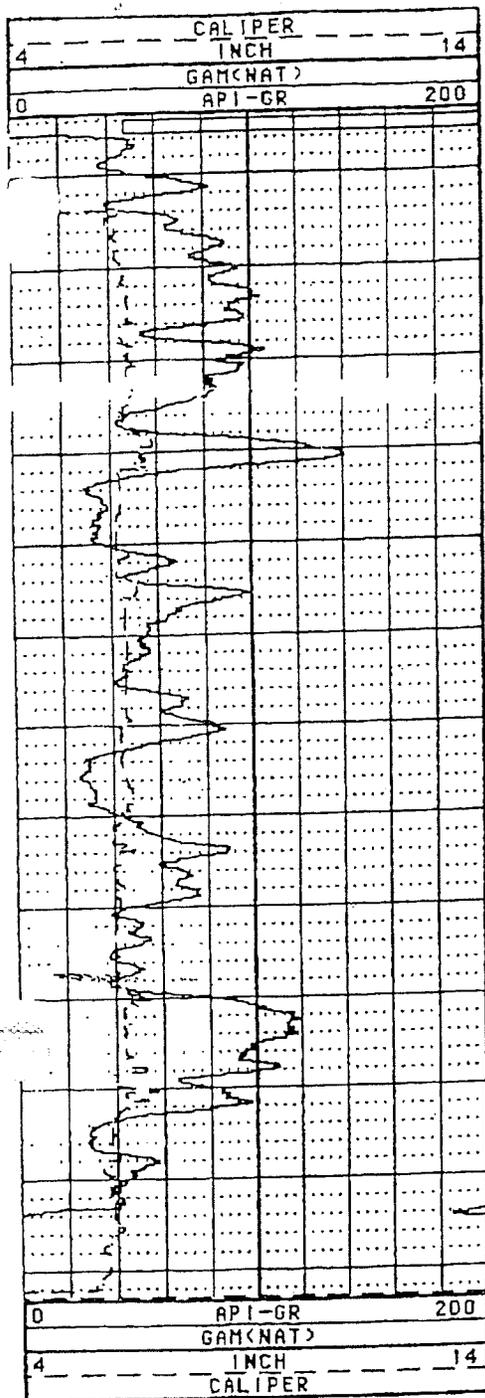
BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

CALIPER INCH 14

30 POR(DEN) PERCENT 10
 .25 COMP G/CC .25



TOOL CALIBRATION			TOOL = 9036A1	SERIAL NUMBER = 815		
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD	
0	02/11/90	03:35:16	0	GAM(NAT)	10.000 CPS	6.000 API-GR
1	11/30/32	14:02:09	0	GAM(NAT)	385.000 CPS	280.000 API-GR
2	04/12/93	19:48:57	0	RES(SG)	7700.000 CPS	14.000 OHM-M
3	04/12/93	19:49:18	0	RES(SG)	151510.000 CPS	2000.000 OHM-M
4	11/30/32	14:02:31	0	CALIPER	103.000 CPS	2.700 INCH
5	11/30/32	14:02:42	0	CALIPER	2141.000 CPS	11.600 INCH
6	02/25/59	13:18:58	0	DEN(LS)	27922.000 CPS	1.106 G/CC
7	02/25/59	13:09:15	0	DEN(LS)	2075.000 CPS	2.612 G/CC
8	02/25/59	13:18:38	0	DEN(SS)	27922.000 CPS	1.106 G/CC
9	02/25/59	13:09:25	0	DEN(SS)	12172.000 CPS	2.612 G/CC



(918) 652-4925

COMPENSATED DENSITY

M W 222

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 222
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21 TOWNSHIP : 12N RANGE : 2W

OTHER SERVICES

PERMANENT DATUM : GL
 ELEV. PERM. DATUM :
 LOG MEASURED FROM : GL
 DRG. MEASURED FROM : GL

ELEVATIONS
 KB :
 DF :
 GL :

DATE : 2/22/94
 DEPTH-DRILLER :
 DEPTH-LOGGER : 161
 LOG BOTTOM : 161
 LOG TOP : 50
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT/VIS :
 SAMPLE SOURCE :
 RM :
 RMF :
 RMC :
 RM @ BHT :
 CIRC STOPPED :

CASING-DRILLER : 48
 CASING-LOGGER : 48
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

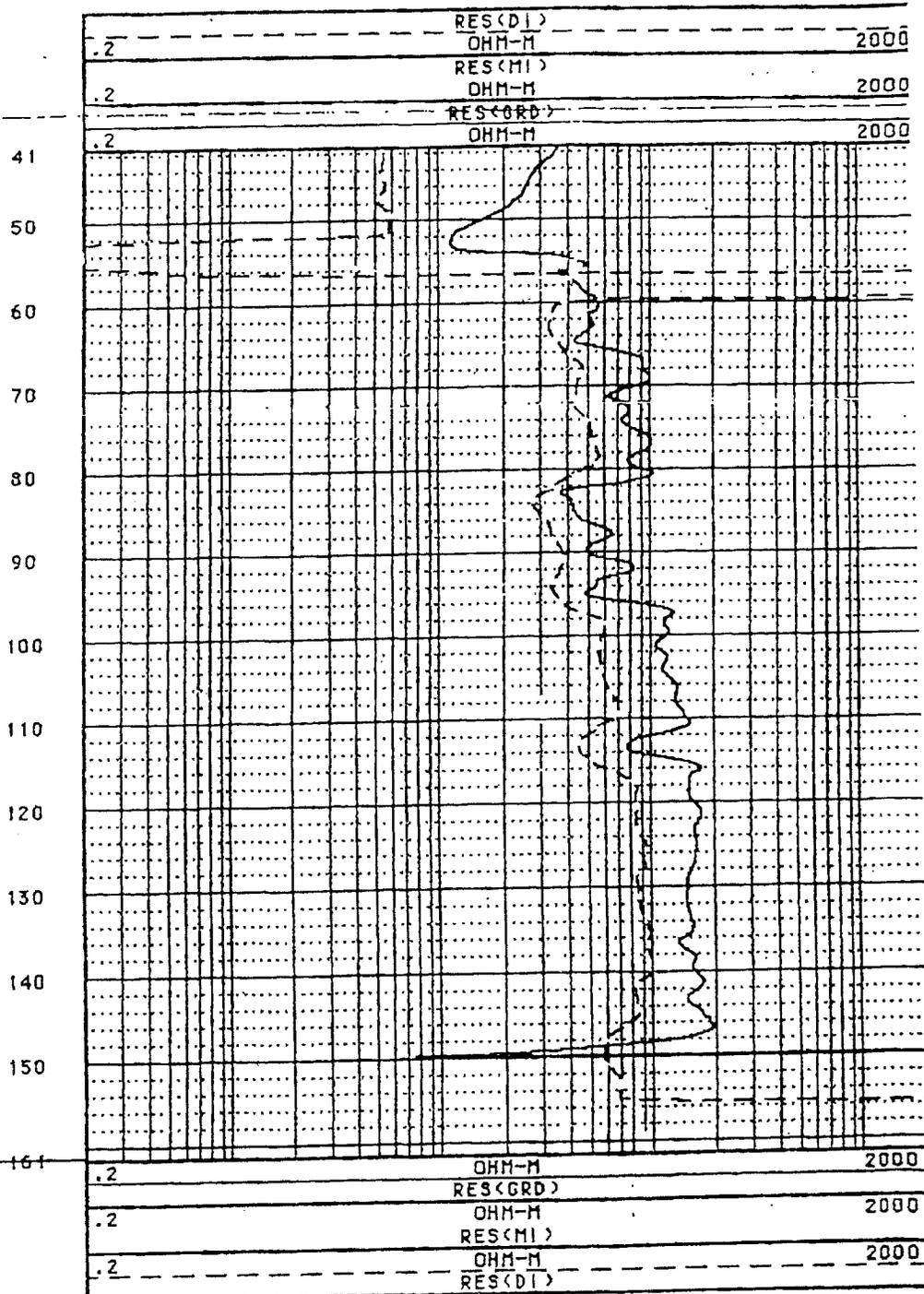
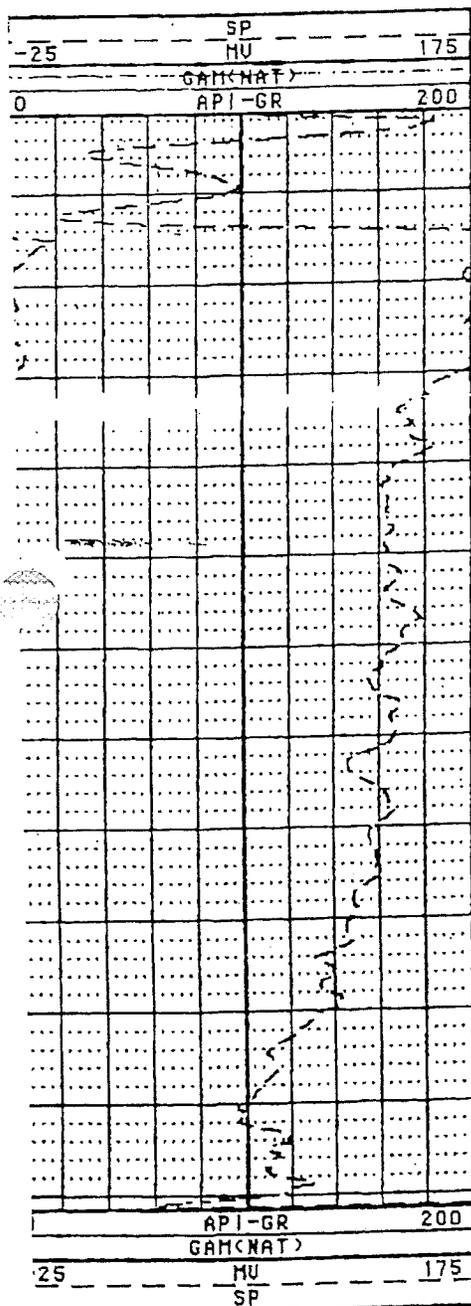
CALIPER INCH 14
 4
 (M/NAT)

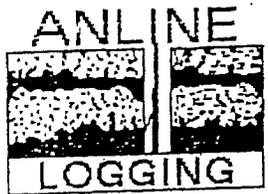
30
 .25 COMP G/CC .25
 POR(DEN) PERCENT
 DEN(CDL)

BIT SIZE :
DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS





(918) 652-4925

COMPENSATED DENSITY

NW/4

M W 223 #1159'

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 223
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21 TOWNSHIP : 12N RANGE : 2W

OTHER SERVICES

PERMANENT DATUM : GL ELEVATIONS
 FLEV. PERM. DATUM : KB : GL
 LOG MEASURED FROM : GL DF :
 DRLG. MEASURED FROM : GL GL :

DATE : 2/16/94
 DEPTH-DRILLER : 134
 DEPTH-LOGGER : 149
 LOG BOTTOM : 149
 LOG TOP : 40
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT UIS :
 SAMPLE SURFACE :
 RM : @ F
 RMF : @ F
 RMC : @ F
 RM @ BHT : @ F
 CIRC. STOPPED :

CASING-DRILLER :
 CASING-LOGGER :
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

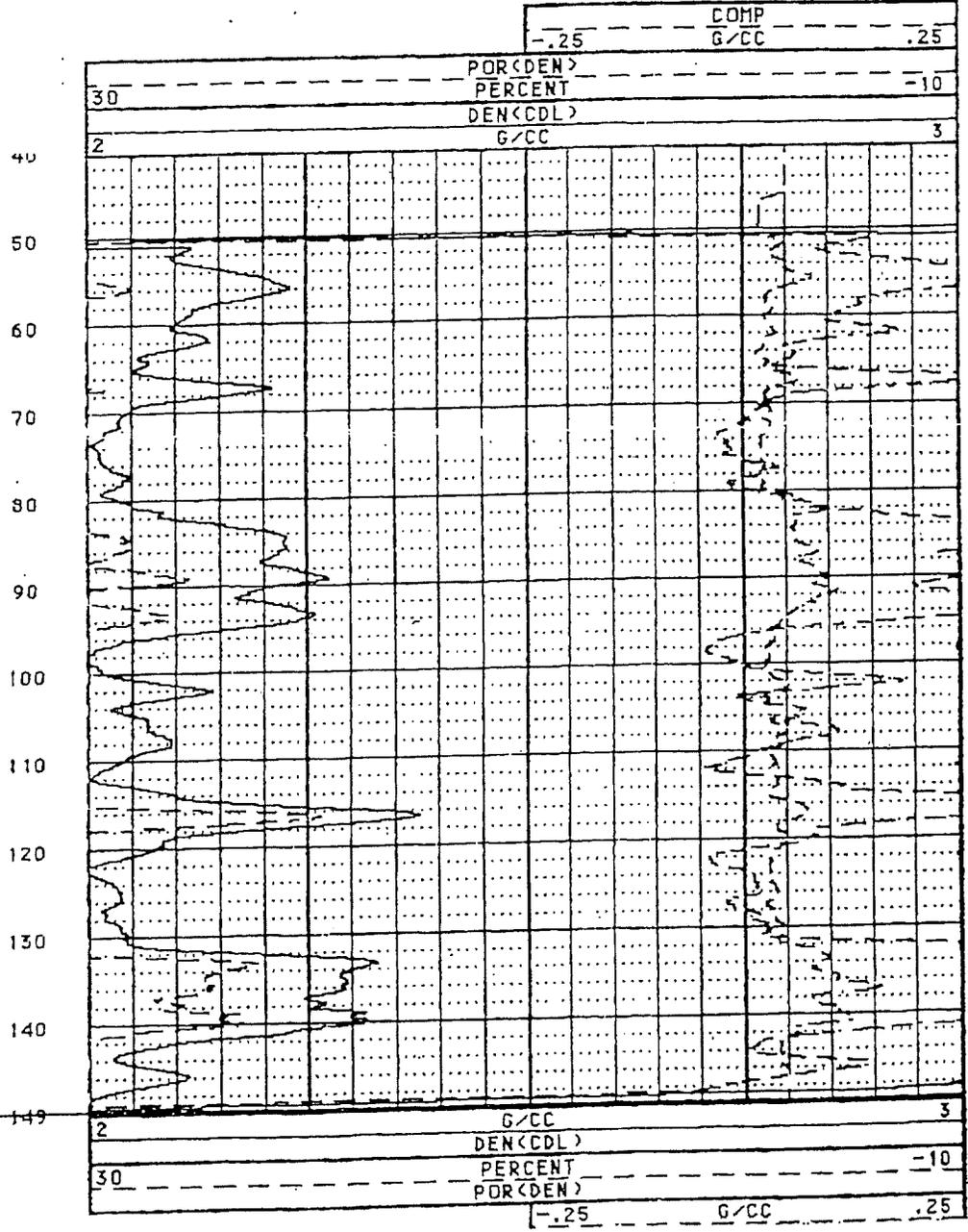
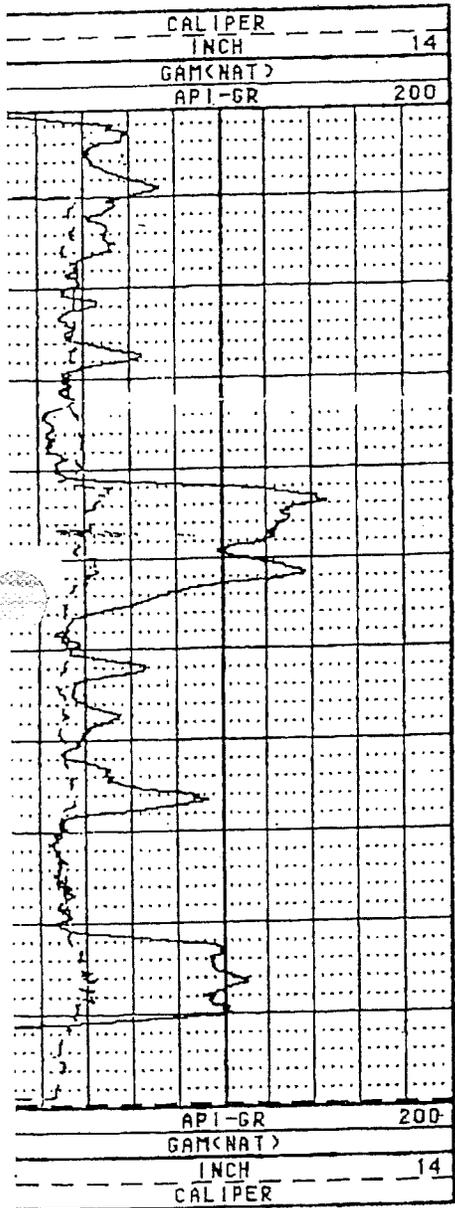
CALIPER INCH 14
 GAM<HAT>

	COMP	.25
	G/CC	.25
POR<DEN>		
PERCENT		-10
DEN<CDL>		

BIT SIZE :
DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS





(918) 652-4925

DUAL INDUCTION LOG

M W 223

COMPANY : WASTE MANAGEMENT OF OKLAHOMA
 WELL : M.W. 223
 FIELD :
 COUNTY : OKLAHOMA
 STATE : OK.
 NATION : USA
 LOCATION :
 SECTION : 21 TOWNSHIP : 12N RANGE : 2W

OTHER SERVICES

PERMANENT DATUM : GL
 ELEU. PERM. DATUM :
 LOG MEASURED FROM : GL
 DRLG. MEASURED FROM : GL

ELEVATIONS
 KB : GL
 DF :
 GL :

DATE : 2/16/94
 DEPTH-DRILLER : 134
 DEPTH-LOGGER : 149
 LOG BOTTOM : 149
 LOG TOP : 40
 TOOL TYPE :

BOREHOLE FLUID : H2O
 FLUID WT/VIS :
 SAMPLE SOURCE :
 KM :
 RMF :
 RMC :
 RM @ BHT :
 CIRC STOPPED :

F
F
F
F

CASING-DRILLER :
 CASING-LOGGER :
 CASING TYPE : STEEL
 CASING WEIGHT :

LOGGING UNIT : 7670
 FIELD OFFICE : HEN
 RECORDED BY : D. ANDREWS
 WITNESSED BY :

BIT SIZE :
 DEPTH :

REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS

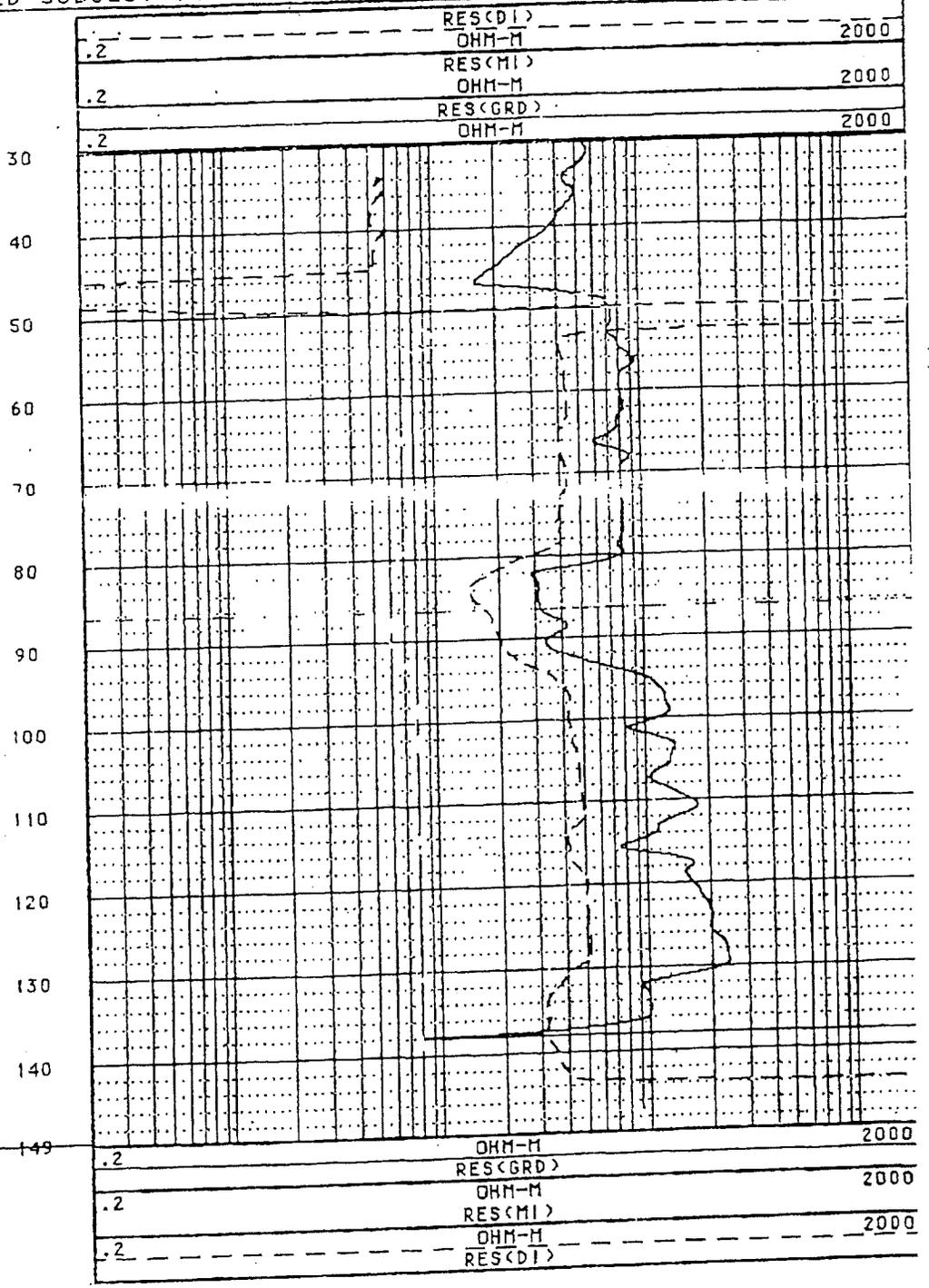
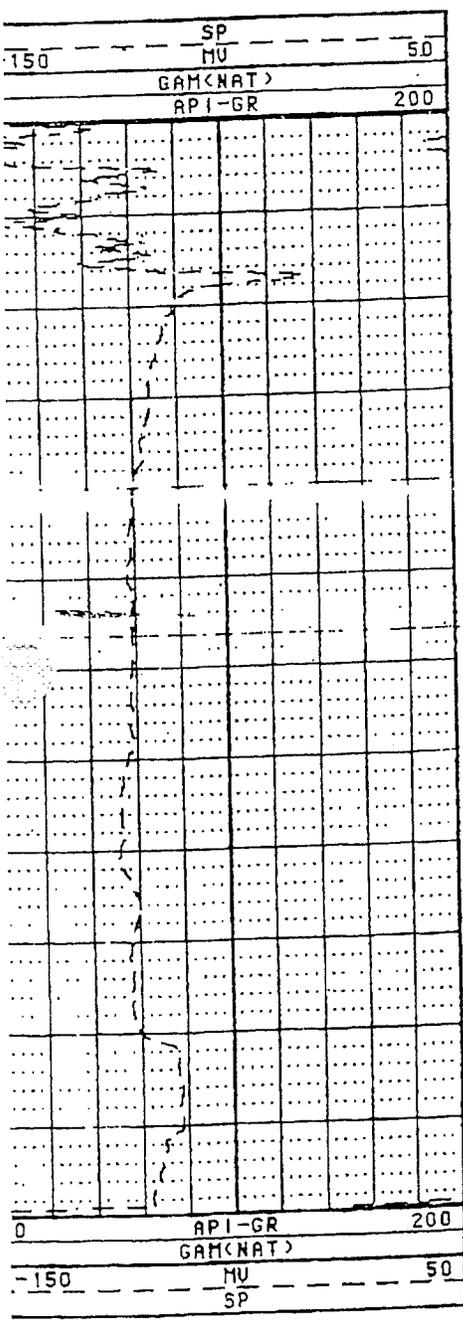
150	SP	50
	MV	
	GAM(NAT)	
	API-GR	200

30

.2	RES(DI)	200
	OHM-M	
.2	RES(MI)	200
	OHM-M	
.2	RES(GRD)	200
	OHM-M	

BIT SIZE :
 DEPTH :
 REMARKS : PHONE (918) 652-4925

ALL SERVICES PROVIDED SUBJECT TO CGC STANDARD TERMS AND CONDITIONS



Z11 0 0.10 02 MATRIX DENSITY: 2.71 NEUTRON: LS HOLESIZE = 6.25
 : 11.000 : -20.000



GEOPHYSICAL CORP.

century-geo.com

GAMMA-NEUTRON PWB-1

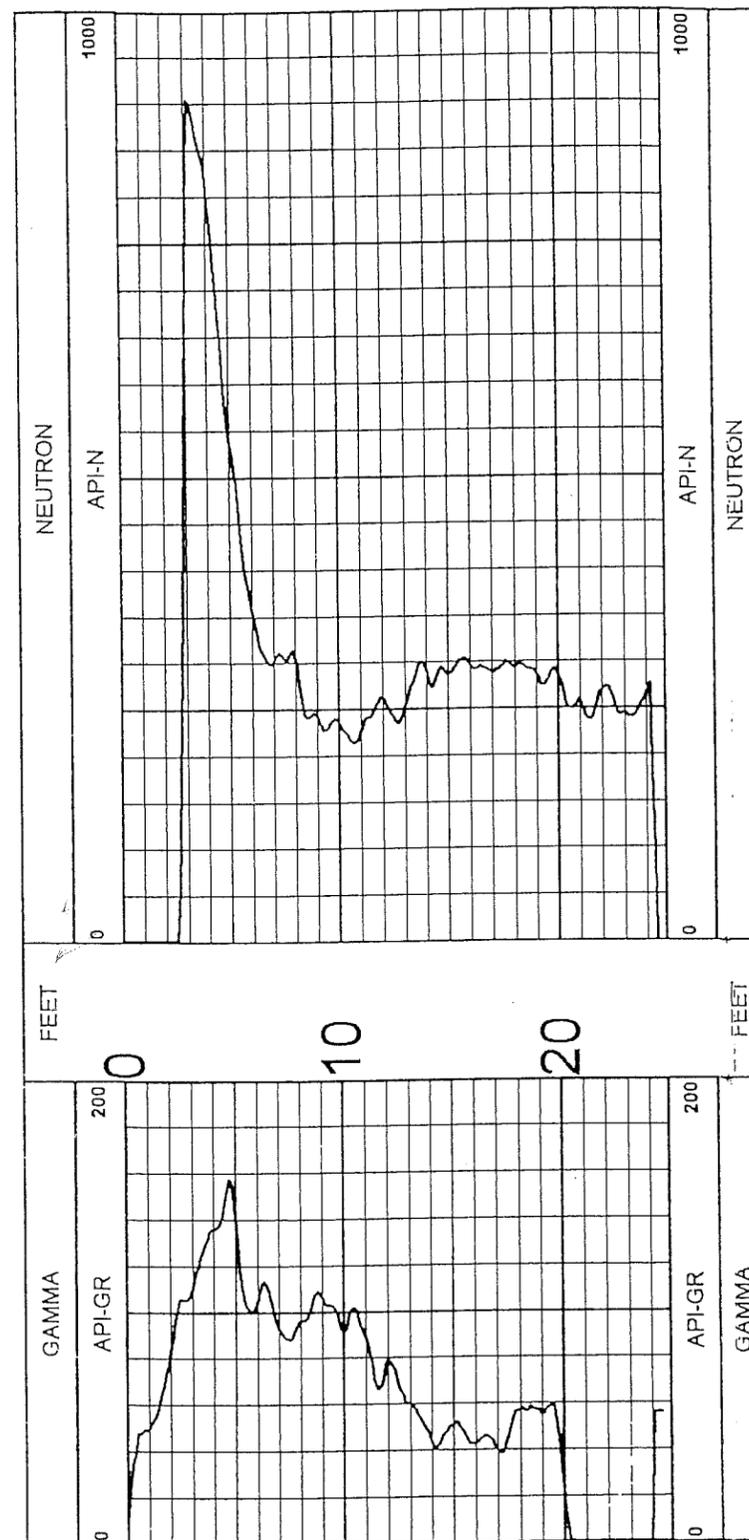
COMPANY	: WEAVER BOOS	OTHER SERVICES:
WELL	: PWB-1	
FIELD	: EAST OAK LANDFILL	
COUNTY	: OKLAHOMA	
STATE	: OK	

LOCATION	:
SECTION	:
TOWNSHIP	:
RANGE	:
API NO.	:
UNIQUE WELL ID.	:

PERMANENT DATUM	: GL	ELEVATION KB:
LOG MEASURED FROM:	GL	ELEVATION DF:
DRL MEASURED FROM:	GL	ELEVATION GL:

DATE	: 12/15/05
DEPTH DRILLER	: 25 GL
BIT SIZE	: 8
LOG TOP	: -3.30
LOG BOTTOM	: 24.70
CASING OD	: 2
CASING BOTTOM	:
CASING TYPE	: PVC
BOREHOLE FLUID	: WATER
RM TEMPERATURE	:
MUD RES	:
MUD WEIGHT	: 0
WITNESSED BY	: ANDREW SWINDLE
RECORDED BY	: M. SUTTON
REMARKS 1	:
REMARKS 2	:

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





GEOPHYSICAL CORP.

century-geo.com

GAMMA-NEUTRON PWB-2

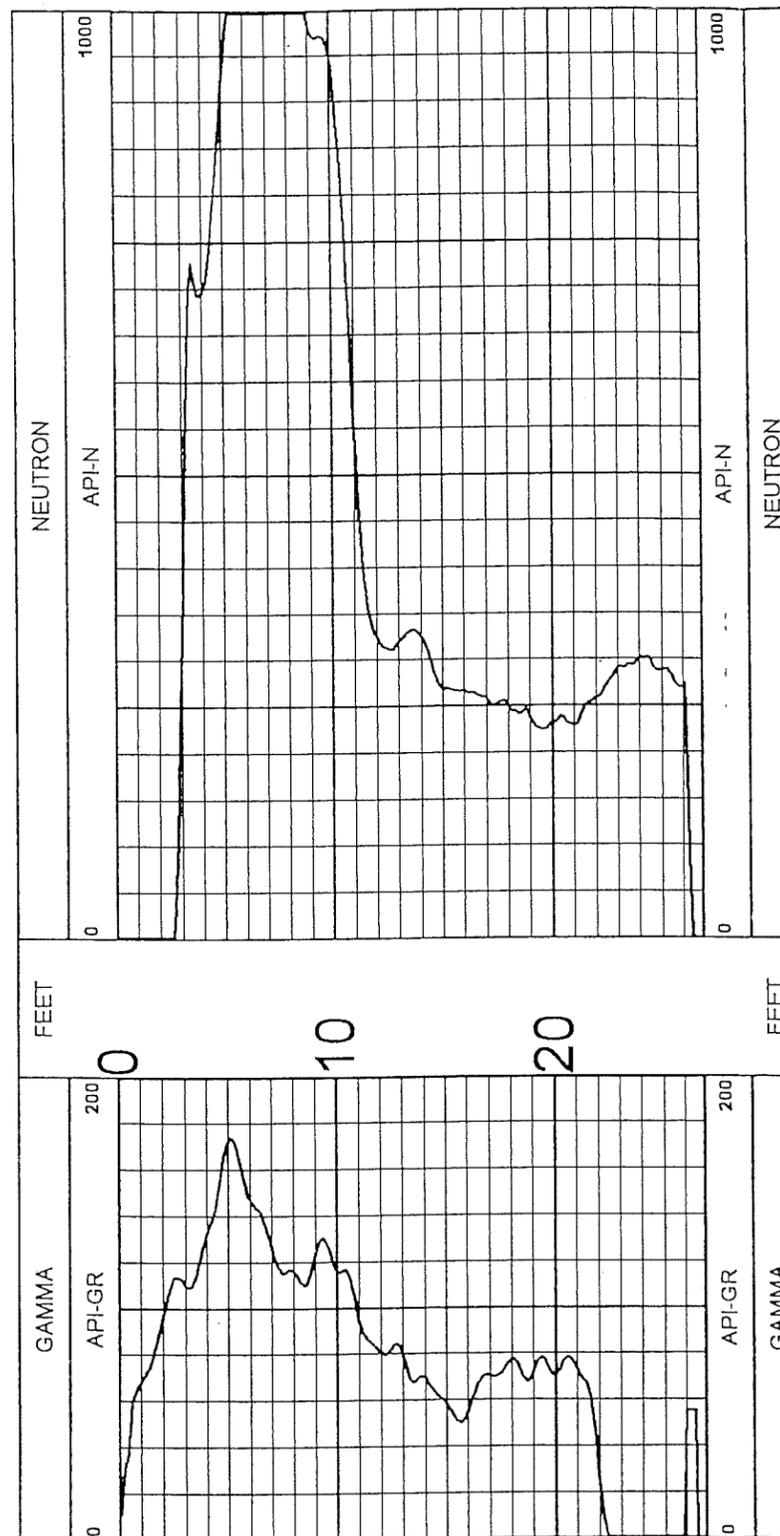
COMPANY : WEAVER BOOS	OTHER SERVICES:
WELL : PWB-2	
FIELD : EAST OAK LANDFILL	
COUNTY : OKLAHOMA	
STATE : OK	

LOCATION :
SECTION :
TOWNSHIP :
RANGE :
API NO. :
UNIQUE WELL ID. :

PERMANENT DATUM : GL	ELEVATION KB:
LOG MEASURED FROM: GL	ELEVATION DF:
DRL MEASURED FROM: GL	ELEVATION GL:

DATE : 12/15/05
DEPTH DRILLER : 27 GL
BIT SIZE : 8.0
LOG TOP : -3.10
LOG BOTTOM : 26.70
CASING OD :
CASING BOTTOM :
CASING TYPE :
BOREHOLE FLUID : WATER
RM TEMPERATURE :
MUD RES :
MUD WEIGHT :
WITNESSED BY : ANDREW SWIN
RECORDED BY : M. SUTTON
REMARKS 1 :
REMARKS 2 :

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





GEOPHYSICAL CORP.

century-geo.com

GAMMA-NEUTRON PWB-3

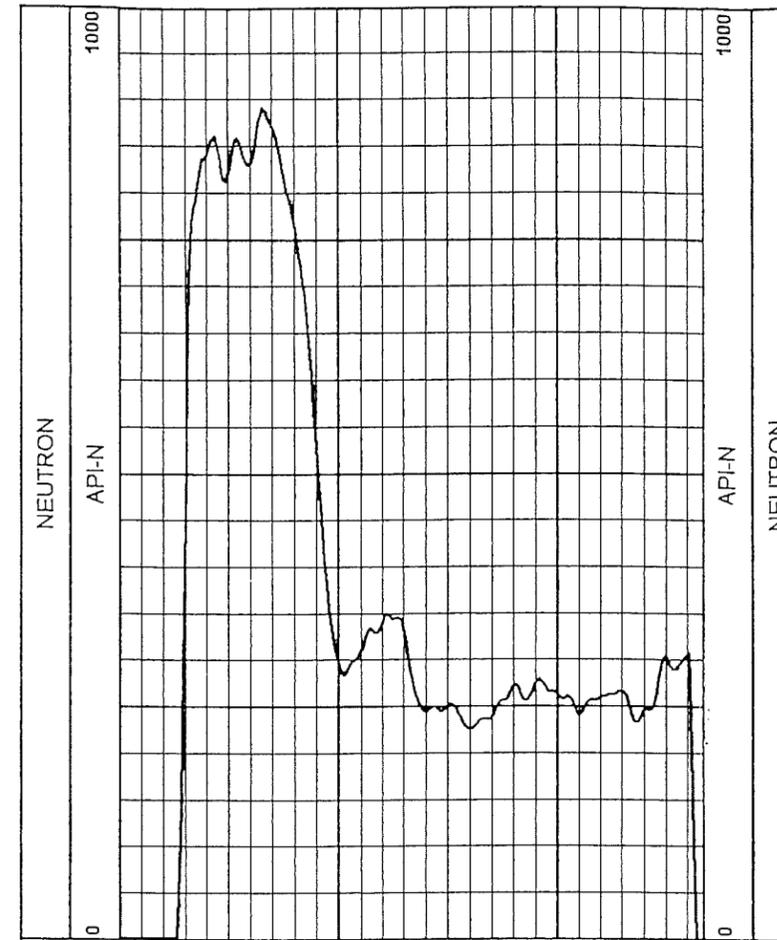
COMPANY	: WEAVER BOOS	OTHER SERVICES:
WELL	: PWB-3	
FIELD	: EAST OAK LANDFILL	
COUNTY	: OKLAHOMA	
STATE	: OK	

LOCATION	:
SECTION	:
TOWNSHIP	:
RANGE	:
API NO.	:
UNIQUE WELL ID.	:

PERMANENT DATUM	: GL	ELEVATION KB:
LOG MEASURED FROM:	GL	ELEVATION DF:
DRL MEASURED FROM:	GL	ELEVATION GL:

DATE	: 12/15/05
DEPTH DRILLER	: 27 GL
BIT SIZE	: 8.0
LOG TOP	: -3.20
LOG BOTTOM	: 26.60
CASING OD	:
CASING BOTTOM	:
CASING TYPE	:
BOREHOLE FLUID	: WATER
RM TEMPERATURE	:
MUD RES	:
MUD WEIGHT	:
WITNESSED BY	: ANDREW SWIN
RECORDED BY	: M. SUTTON
REMARKS 1	:
REMARKS 2	:

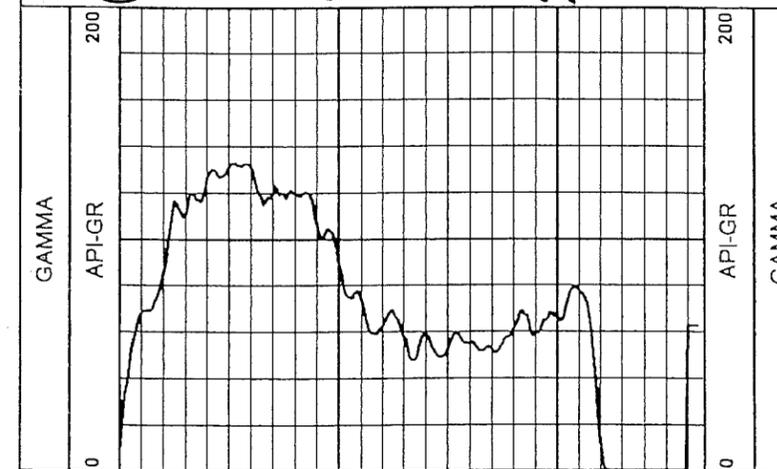
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



FEET

0 10 20

FEET





GEOPHYSICAL CORP.

century-geo.com

GAMMA-NEUTRON PWB-5

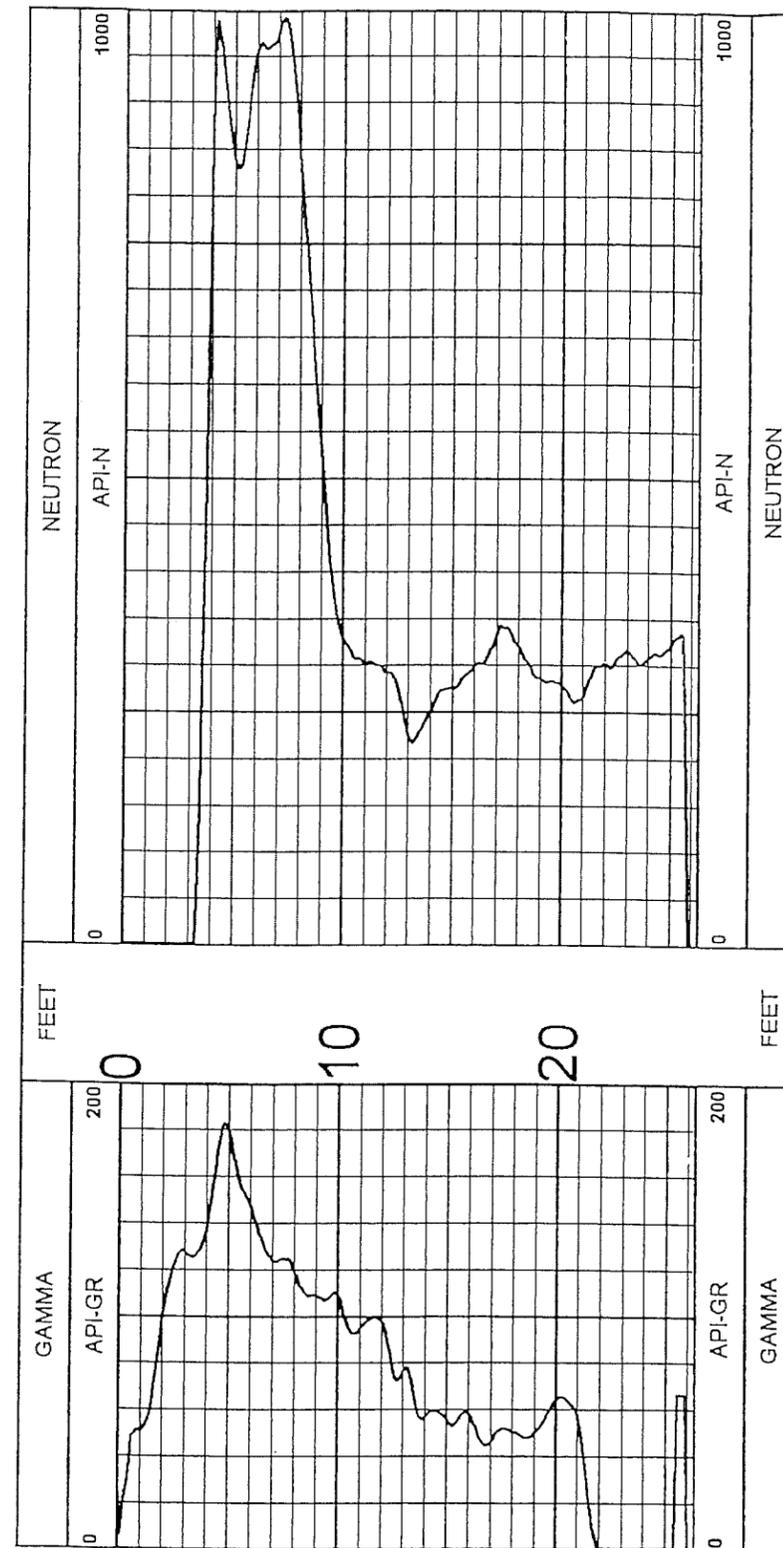
COMPANY	: WEAVER BOOS	OTHER SERVICES:
WELL	: PWB-5	
FIELD	: EAST OAK LANDFILL	
COUNTY	: OKLAHOMA	
STATE	: OK	

LOCATION	:
SECTION	:
TOWNSHIP	:
RANGE	:
API NO.	:
UNIQUE WELL ID.	:

PERMANENT DATUM	: GL	ELEVATION KB:
LOG MEASURED FROM:	GL	ELEVATION DF:
DRL MEASURED FROM:	GL	ELEVATION GL:

DATE	: 12/15/05
DEPTH DRILLER	: 27 GL
BIT SIZE	: 8.0
LOG TOP	: -2.40
LOG BOTTOM	: 26.20
CASING OD	:
CASING BOTTOM	:
CASING TYPE	:
BOREHOLE FLUID	: WATER
RM TEMPERATURE	:
MUD RES	:
MUD WEIGHT	:
WITNESSED BY	: ANDREW SWIN
RECORDED BY	: M. SUTTON
REMARKS 1	:
REMARKS 2	:

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





GEOPHYSICAL CORP.

century-geo.com

GAMMA-NEUTRON MW-226GWB

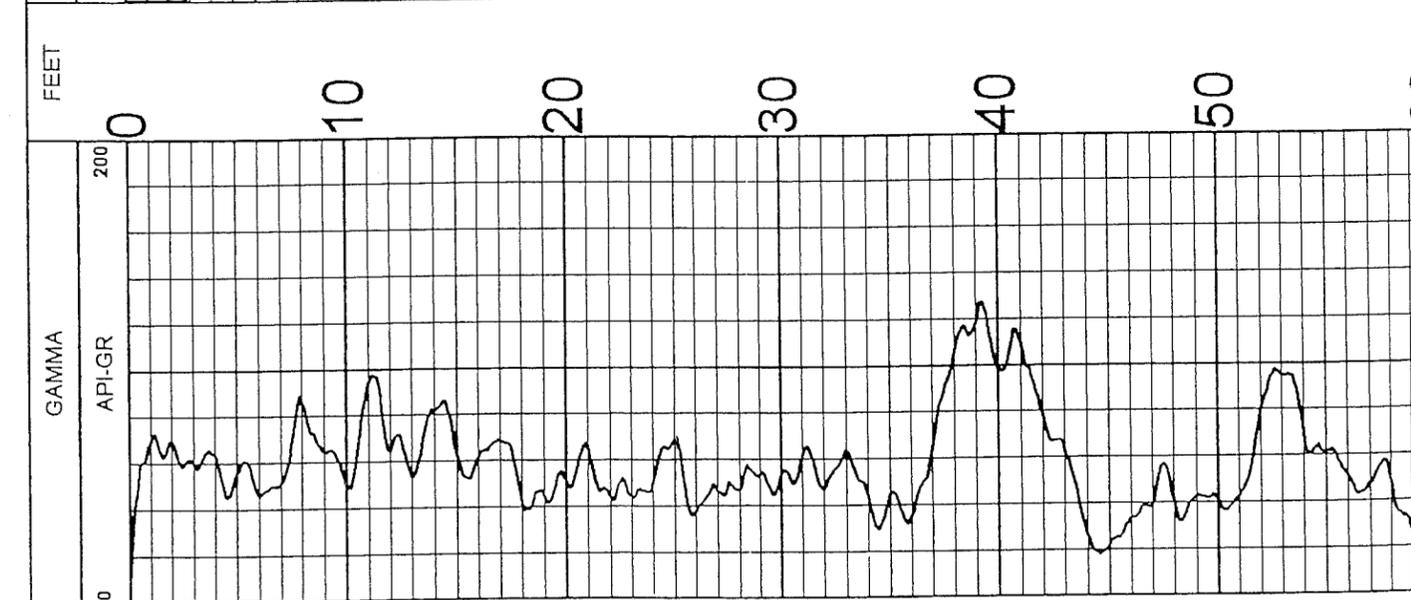
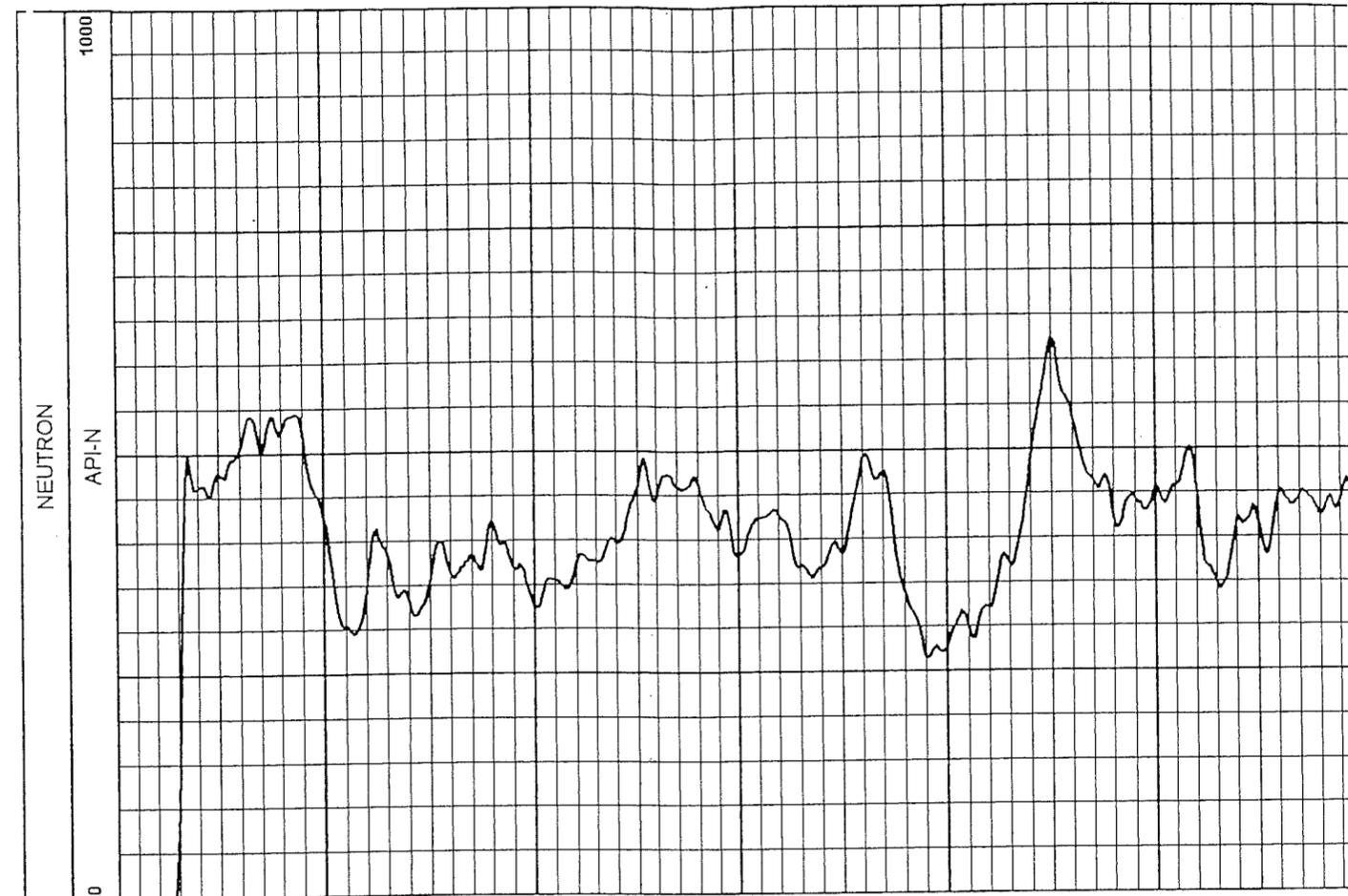
COMPANY	: WEAVER BOOS	OTHER SERVICES:
WELL	: MW-226GWB	
FIELD	: EAST OAK LANDFILL	
COUNTY	: OKLAHOMA	
STATE	: OK	

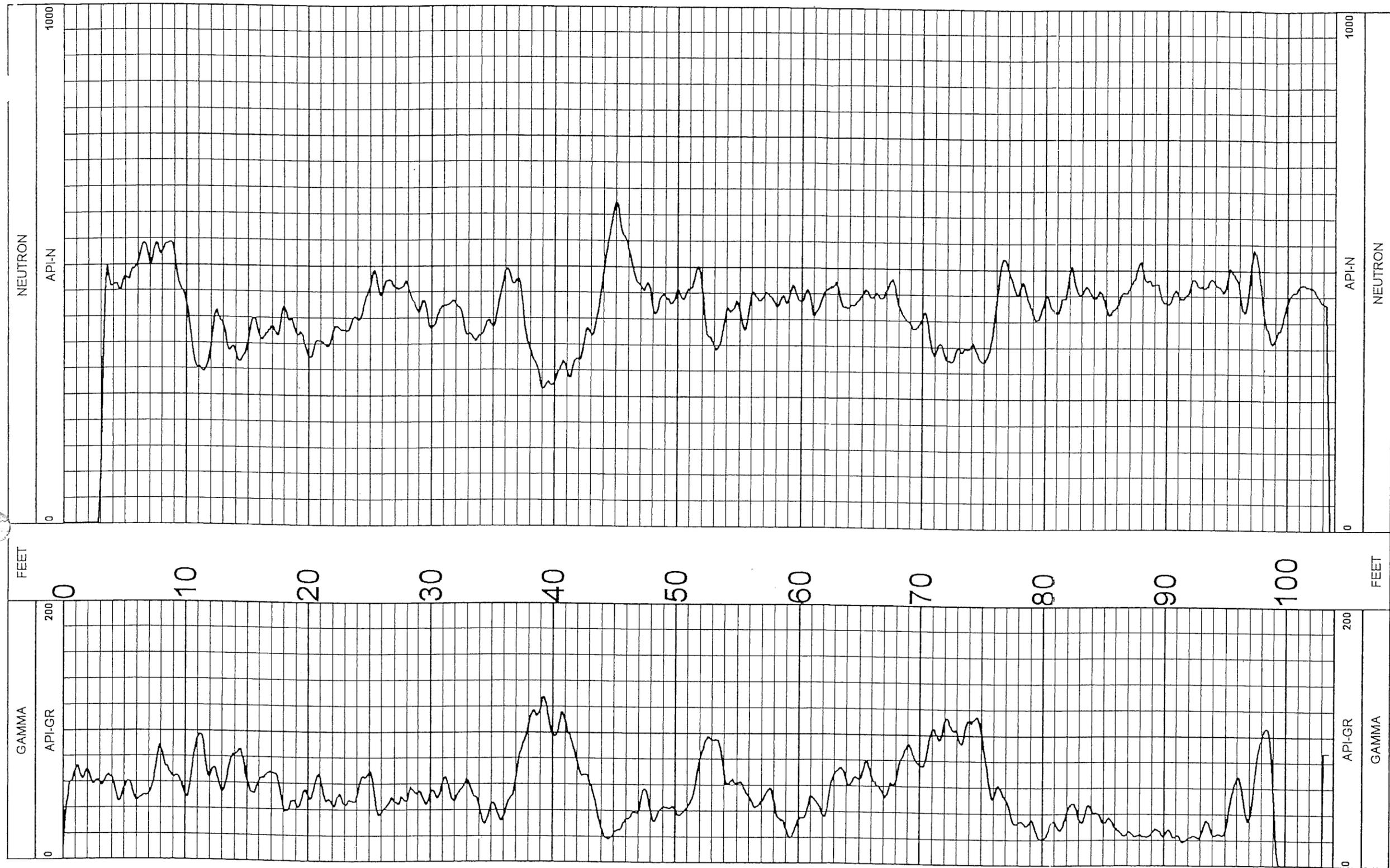
LOCATION	:
SECTION	:
TOWNSHIP	:
RANGE	:
API NO.	:
UNIQUE WELL ID.	:

PERMANENT DATUM	: GL	ELEVATION KB:
LOG MEASURED FROM:	GL	ELEVATION DF:
DRL MEASURED FROM:	GL	ELEVATION GL:

DATE	: 12/28/05
DEPTH DRILLER	: 105GL
BIT SIZE	: 4.75
LOG TOP	: -3.00
LOG BOTTOM	: 103.80
CASING OD	:
CASING BOTTOM	:
CASING TYPE	:
BOREHOLE FLUID	: WATER
RM TEMPERATURE	:
MUD RES	:
MUD WEIGHT	: 0
WITNESSED BY	: ANDREW SWINDLE
RECORDED BY	: M. SUTTON
REMARKS 1	:
REMARKS 2	:

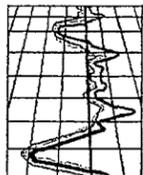
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





ENVIRO-LOG

Geophysical Well Logging
Casing Inspection
Downhole Video



GAMMA NEUTROM

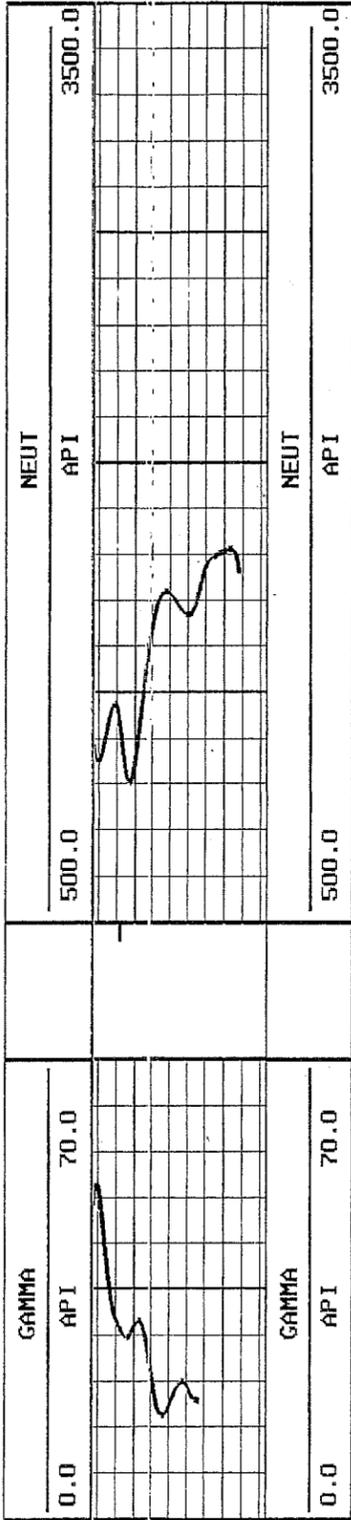
405 834 1417

CO. WEAVER BOOS LLC WELL PWB7 FIELD CNTY OKLAHOMA ST OKL	COMPANY <u>WEAVER BOOS LLC</u>				
	WELL <u>PWB7</u>				
	FIELD _____				
	COUNTY <u>OKLAHOMA</u>	STATE <u>OKLAHOMA</u>			
LOCATION: SEC. _____ TWP. _____ RGE. _____		OTHER SERVICES:			
PERMANENT DATUM <u>GL</u>	ELEV. _____	ELEV.: K.B. _____			
LOG MEASURED FROM <u>GL</u>	ABOVE PERMANENT DATUM	D.F. _____			
DRILLING MEASURED FROM <u>GL</u>		G.L. _____			
DATE	<u>6/13/14</u>				
RUN NO.	<u>1</u>				
DEPTH DRILLER	<u>22</u>				
DEPTH LOGGER	<u>21.8</u>				
BTM. LOG INTERVAL	<u>21.8</u>				
TOP LOG INTERVAL	<u>5</u>				
OPEN HOLE SIZE					
TYPE FLUID					
DENS. : VISC.					
MAX. REC. TEMP.					
EST. CEMENT TOP					
TIME WELL READY					
TIME LOGGER ON BTM.					
EQUIP. NO.	<u>105</u>				
LOCATION	<u>PIEDMONT</u>				
RECORDED BY	<u>M.MAYFIELD</u>				
WITNESSED BY	<u>AARON EVANS</u>				
BOREHOLE RECORD					
RUN NO.	BIT	FROM TO	SIZE	WGT.	FROM TO
CASING RECORD					
SIZE	MT/FT	GRADE	TYPE JOINT	TOP	BOTTOM
SURFACE STRING.					
PRD. STRING					
PROD. STRING					
LINER					

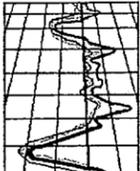
ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENT AND WE CANNOT AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES, OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS SET OUT IN OUR CURRENT PRICE SCHEDULE.

REMARKS:

STOP DEPTH: 105.5 FEET	FILE DATE: 06-13-2014
DIRECTION: UP	TIME: 09:28
FILE: PWB7.PTS	PLOT DATE: 06-13-2014
	TIME: 09:30 VI.58



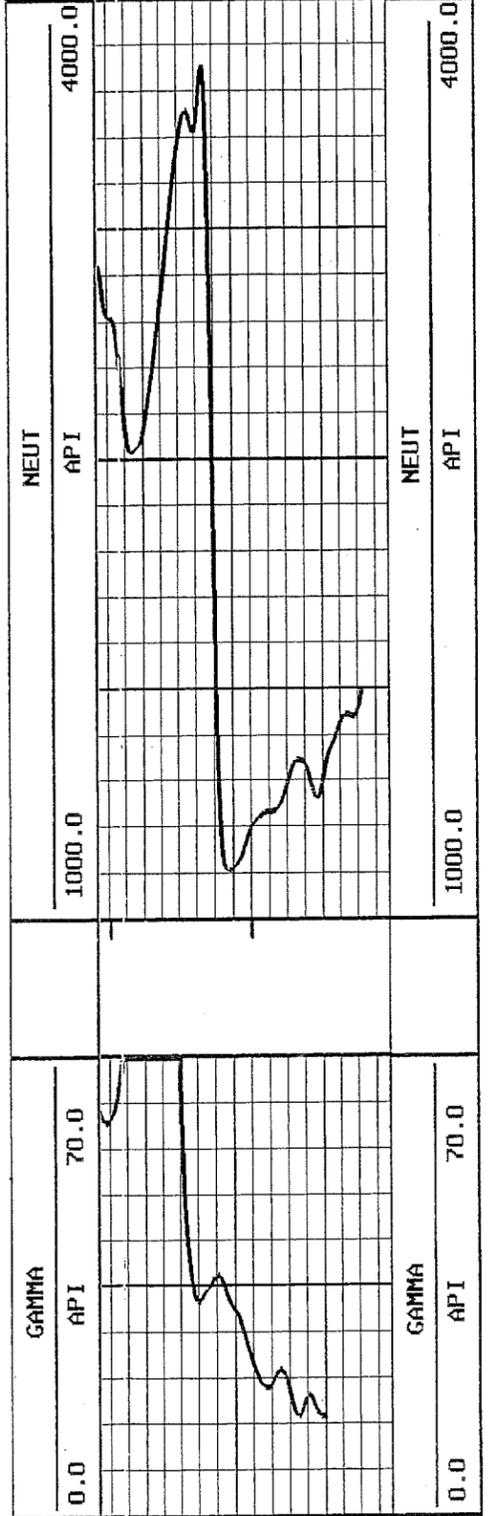
START DEPTH: 124.5 FEET	FILE DATE: 06-13-2014
DIRECTION: UP	TIME: 09:28
FILE: PWB7.PTS	PLOT DATE: 06-13-2014
	TIME: 09:30 VI.58

ENVIRO-LOG <i>Geophysical Well Logging Casing Inspection Downhole Video</i>				GAMMA NEUTROM			
405 834 1417							
CO. WEAVER BOOS LLC WELL PWB9 FIELD CNTY OKLAHOMA ST OKL	COMPANY <u>WEAVER BOOS LLC</u>						
	WELL <u>PWB9</u>						
	FIELD _____						
	COUNTY <u>OKLAHOMA</u> STATE <u>OKLAHOMA</u>						
LOCATION: SEC. _____ TWP. _____ RGE. _____			OTHER SERVICES:				
PERMANENT DATUM <u>GL</u> ELEV. _____		LOG MEASURED FROM <u>GL</u> ABOVE PERMANENT DATUM		ELEV.: K.B. _____ D.F. _____ G.L. _____			
DRILLING MEASURED FROM <u>GL</u>							
DATE	6/13/14						
RUN NO.	1						
DEPTH DRILLER	35						
DEPTH LOGGER	34.9						
BTM. LOG INTERVAL	34.9						
TOP LOG INTERVAL	5						
OPEN HOLE SIZE							
TYPE FLUID							
DENS. : VISC.							
MAX. REC. TEMP.							
EST. CEMENT TOP							
TIME WELL READY							
TIME LOGGER ON BTM.							
EQUIP. NO.	105						
LOCATION	PIEDMONT						
RECORDED BY	M. MAYFIELD						
WITNESSED BY	AARON EVANS						
BOREHOLE RECORD			TUBING RECORD				
RUN NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
CASING RECORD	SIZE	MT/FT	GRADE	TYPE JOINT	TOP	BOTTOM	
SURFACE STRING.							
PROD. STRING							
LINER							

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENT AND WE CANNOT AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES, OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS SET OUT IN OUR CURRENT PRICE SCHEDULE.

REMARKS:

STOP DEPTH: 104.9 FEET	FILE DATE: 06-13-2014
DIRECTION: UP 1:240	TIME: 08:19
FILE: PWB9.PTS	PLOT DATE: 06-13-2014
	TIME: 08:25 U1.58



START DEPTH: 137.3 FEET	FILE DATE: 06-13-2014
DIRECTION: UP 1:240	TIME: 08:19
FILE: PWB9.PTS	PLOT DATE: 06-13-2014
	TIME: 08:25 U1.58

**BIGGS & MATHEWS LITHOLOGIC LOGS
(2010)**

LOG OF MONITORING WELL NO. 204R

Project Description: Mosley Road Sanitary Landfill
3201 Mosley Road, Oklahoma City OK

Biggs & Mathews Environmental, Inc.
 1700 Robert Road, Suite 100
 Mansfield, TX 78063
 Phone: 817-563-1144
 Fax: 817-563-1224

Depth, feet	Samples	Symbol / USCS	Location: East Oak Recycling and Disposal Facility	Hand Penetrometer, tsf	Penetration Blows/foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			Surface El.: 1161.80 ft. msl Completion Depth: 40.0 ft. Date Boring Started: 4/1/10 Date Boring Completed: 4/1/10									
			MATERIAL DESCRIPTION									
			CLAY (CL-ML), silty, dark brown and red									
	CS1		SILT (ML), clayey, dark brown		1160.50							
5			SILT (ML), tan		1157.00							
	CS2											
10												
	CS3											
15			SAND (SP), tan very fine grained		1148.80							
	CS4											
20												
	CS5											
25												
	CS6											
30			sand with thin clay layers									
	CS											
35												
40					1121.80							
45												
50												

BME LOG MOSLEY ROAD.GPJ B&M DATA TEMPLATE.GDT 12/16/10

Drilling Contractor: **Associate Industries**
 Drilling Method: **Hollow Stem Auger**
 Sampling Method: **continuous sampling**
 Geologist/Engineer: **Randy Kress**
 Project No.: **101.28.601**

Groundwater Observations	
Date	Depth
4/1/2010	23

Remarks:



The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

FILTER PACK INFORMATION

Filter Pack Material: Sand 20-40 (medium)
 Filter Pack Interval: From 28 ft to 40

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 0 ft to 26 ft
 Type of Annular Seal n/a Annular Seal Interval: From n/a ft to n/a ft
 Filter Pack Seal Material Bentonite - Hole Plug Filter Pack Seal Interval: From 26 ft to 28 ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft Estimated yield of well gpm First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Clay	0	4	N
Sand	4	40	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? No
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a
 Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft to ft.
 Grouted with n/a Grouted from ft to ft.
 Grouted with Cement Grouted from ft to ft.

Firm Name Associated Environmental Industries, Corp. D/PC No. DPC-0269
 Operator Name CHARLES CLARK OP No. OP-1210
 Date 08/11/2010
 Comments: n/a

**LANDTEC GAS PROBE LITHOLOGIC LOGS
(2010)**

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
GP-12**

Project Number: 1556

Sheet 1 of 1

Depth, feet	Samples	Symbol / USCS	Location: See Figure 1 Surface El.: 1148.07 Northing: 1061184956.79 Easting: 2174500.14	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
MATERIAL DESCRIPTION														
			SANDY LEAN CLAY, brown, stiff	1147.07										
			CLAYEY SAND, brown to dark brown, firm	1146.07										
5	C1		SANDY LEAN CLAY, silty, dark grayish brown, firm											
				1141.57										
	C2		SAND, silty, light brown to tan											
10	C3			1136.07										
15														
20														
25														
30														
35														
40														
45														
50														

BORING LOG W/FIGURE (ELEVATIONS) 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.DDT 4/29/14

Completion Depth: 12 ft
Date: 10/18/10

Remarks: Top of PVC Cap Elevation: 1151.04

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
GP-13**

Project Number: 1556

Sheet 1 of 1

Depth, feet	Samples Symbol / USCS	Location: See Figure 1 Surface El.: 1147.54 Northing: 1057185225.76 Easting: 2174928.83	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
		MATERIAL DESCRIPTION											
		SILTY SAND, brown w/ thin brown clay seams											
	C1	SAND, silty & clayey, brown to dark brown	1145.54										
5		SAND, silty, tan	1143.54										
	C2												
10			1137.54										
15													
20													
25													
30													
35													
40													
45													
50													

BORING LOG W/FIGURE (ELEVATIONS) 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT 4/29/14

Completion Depth: 10 ft
Date: 10/18/10

Remarks: Top of PVC Cap Elevation: 1150.68

Project: East Oak Landfill
Oklahoma City, Oklahoma

Project Number: 1556

BORING LOG
GP-14

Sheet 1 of 1

Depth, feet

Samples

Symbol / USCS

Location: See Figure 1
Surface El.: 1149.58
Northing: 1053185224.23
Easting: 2175426.58

MATERIAL DESCRIPTION

Hand Penetrometer, tsf

Penetration Blows / Foot

Recovery %

RQD

Moisture Content, %

Unit Dry Weight, pcf

Liquid Limit

Plastic Limit

Plasticity Index

% Passing No. 200 Sieve

Unc. Compressive Strength, tsf

5	C1	SILTY SAND, light tan	1143.58															
10	C2	SAND, silty, tan	1139.58															
15																		
20																		
25																		
30																		
35																		
40																		
45																		
50																		

BORING LOG W/FIGURE (ELEVATIONS) 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT 4/29/14

Completion Depth: 10 ft
Date: 10/18/10

Remarks: Top of PVC Cap Elevation: 1152.40

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
GP-15**

Project Number: 1556

Sheet 1 of 1

Depth, feet	Samples	Symbol / USCS	Location: See Figure 1 Surface El.: 1148.96 Northing: 1049185221.06 Easting: 2175925.58	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
	C1		SILTY SAND, light brown to brown											
5				1145.96										
	C2		SAND, tan, silty											
10				1138.96										
15														
20														
25														
30														
35														
40														
45														
50														

BORING LOG W/FIGURE (ELEVATIONS) 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT -1/29/14

Completion Depth: 10 ft
Date: 10/18/10

Remarks: Top of PVC Cap Elevation: 1151.57

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A6

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
GP-16**

Project Number: 1556

Sheet 1 of 1

Depth, feet	Samples Symbol / USCS	Location: See Figure 1 Surface El.: 1147.93 Northing: 1041184791.26 Easting: 2176215.41	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
	C1	SILTY SAND, reddish tan											
5													
	C2	SILTY SAND, tan											
10													
15													
20													
25													
30													
35													
40													
45													
50													

BORING LOG W/FIGURE (ELEVATIONS), 1556 E. OAK LF GP & LOGS.GPJ, LANDTEC.GDT 4/29/14

Completion Depth: 10 ft
Date: 10/18/10

Remarks: Top of PVC Cap Elevation: 1150.76

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
GP-17**

Project Number: 1556

Sheet 1 of 1

Depth, feet	Samples Symbol / USCS	Location: See Figure 1 Surface El.: 1146.32 Northing: 1037184293.30 Easting: 2176206.45	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
		MATERIAL DESCRIPTION											
		SILTY SAND, reddish tan	1144.82										
5	C1	SILTY SAND, tan											
10	C2		1136.32										
15													
20													
25													
30													
35													
40													
45													
50													

BORING LOG W/Figure (ELEVATIONS) 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT 4/29/14

Completion Depth: 10 ft
Date: 10/18/10

Remarks: Top of PVC Cap Elevation: 1149.27

**LANDTEC MONITOR WELL LITHOLOGIC LOG
(2010)**

Project: East Oak Landfill
Oklahoma City, Oklahoma

Project Number: 1556

**BORING LOG
MW-220R**

Sheet 1 of 3

BORING LOG W/FIGURE 1556 E. OAK LF GP & LOGS.GPI LANDTEC.GDT 12/3/10

Depth, feet	Samples	Symbol / USCS	Location: See Figure A1 Surface El.: 1147.78 Northing: 1045185218.54 Easting: 2176162.56	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			MATERIAL DESCRIPTION											
	C1		SILTY SAND, light brown to brown	3.0										
5			SAND, silty, tan w/red, moist											
	C2													
10			SAND, tan w/gray, medium to coarse grain, wet	10.0										
	C3													
15														
	C4													
20														
	C5													
25														
	C6			28.0										
30			SAND, coarse grain, gray w/tan, wet w/fine to medium gravel											
	C7			33.0										
35			SANDSTONE, fine grained, reddish brown w/tan & gray, soft to moderately hard, moist to wet w/shale seams & layers											
	C8													
40														
	C9			47.0										
45			SANDSTONE, fine grained, reddish brown w/light gray, moderately hard w/shale seams & layers, moist											
50														

Completion Depth: 111.5 ft
Date: 10/26/10

Remarks: Seepage observed @ 11' during drilling.
Top of PVC Pipe Elevation: 1150.95
Water Level Elevation: 1131.75

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3a

Project: East Oak Landfill
 Oklahoma City, Oklahoma

Project Number: 1556

BORING LOG
MW-220R

Sheet 2 of 3

Depth, feet	Samples	Symbol / USCS	Location: See Figure A1 Surface El.: 1147.78 Northing: 1045185218.54 Easting: 2176162.56	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			MATERIAL DESCRIPTION											
55	C10		SANDSTONE, fine grained, reddish brown w/light gray, moderately hard w/shale seams & layers, moist (continued)											
60														
65	C11													
70														
75	C12													
77.0														
80			SANDSTONE, reddish brown & maroon w/gray, fine grained, hard, moist w/some shale seams											
85	C13													
90														
95	C14													
100														

BORING LOG W/FIGURE 1556 E. OAK LF GP & LOGS, GPI LANDTEC, GDT 12/3/10

Completion Depth: 111.5 ft
 Date: 10/26/10

Remarks: Seepage observed @ 11' during drilling.
 Top of PVC Pipe Elevation: 1150.95
 Water Level Elevation: 1131.75

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3b

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
MW-220R**

Project Number: 1556

Sheet 3 of 3

Depth, feet	Samples	Symbol / USCS	Location: See Figure A1 Surface El.: 1147.78 Northing: 1045185218.54 Easting: 2176162.56	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			MATERIAL DESCRIPTION											
	C15	SANDSTONE, reddish brown & maroon w/gray, fine grained, hard, moist w/some shale seams (continued)											
-105														
	C16												
-110		----		110.0										
		----	SHALE, red to reddish brown, hard w/light gray sandstone seams	111.5										
-115														
-120														
-125														
-130														
-135														
-140														
-145														
-150														

BORING LOG W/FIGURE 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT 12/9/10

Completion Depth: 111.5 ft
Date: 10/26/10

Remarks: Seepage observed @ 11' during drilling.
Top of PVC Pipe Elevation: 1150.95
Water Level Elevation: 1131.75

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3c



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

									X

«———— One Mile —————»
Each square is 10-acres

WELL ID NUMBER: 133143

Quarters NE-NE-NE Section 21 Township 12N Range 02W1

Latitude <u>35.5072222</u>	Longitude <u>-97.4080556</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>11/15/0010</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management Landfill
Address/City/State 3201 Moseley Rd. Oklahoma City OK
Finding Location _____
Well Name MW# 220R

Phone (405) 427-1112
Zip 73141-9703

Water Rights #: _____

TYPE OF WORK: Monitoring Well

USE OF WELL: Water Quality

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 10/26/2010
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 6.25 inches to a depth of 111.5 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft
1) Well Casing Material PVC Casing Diameter 2 inches Casing From 0 ft to 101 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 10 slot (0.010 inch) From 101 ft to 111 ft.

FILTER PACK INFORMATION

Filter Pack Material: Medium Sand
 Filter Pack Interval: From 98 ft to 111.5

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 0 ft to 2 ft
 Type of Annular Seal Bentonite/Cement Grout Annular Seal Interval: From 2 ft to 95 ft
 Filter Pack Seal Material Bentonite Granules/Chips Filter Pack Seal Interval: From 95 ft to 98 ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling 11 ft Estimated yield of well ___ gpm First water zone ___ ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Tan Sand	0	33	Y
Reddish Brown Sandstone	33	110	N
Red Shale	110	111.5	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a
 Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ___ ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ___ ft. to ___ ft.
 Grouted with n/a Grouted from ___ ft. to ___ ft.
 Grouted with Cement Grouted from ___ ft. to ___ ft.

Firm Name STRA CORE ENVIRONMENTAL DRILLING D/PC No. DPC-0727
 Operator Name JON STORM OP No. OP-1621
 Date 12/15/2010
 Comments: n/a

**TERRACON MONITOR WELL LITHOLOGIC LOG
(2011)**

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	SAMPLES				TESTS			
				USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	ATTERBERG LIMITS AND/OR #200 U.S. STANDARD SIEVE
1.8	SILT light brown	2" In in ft	0			DB					
2.4	CLAY dark brown		1			DB					
5	SILT brown		2			DB					
6	SAND brown		3			DB					
8	SILT brown		4			DB					
			5			DB					
			6			DB					
			7			DB					
			8			DB					
			9			DB					
			10			DB					
			11			DB					
			12			DB					
			13			DB					
			14			DB					
			15			DB					
			16			DB					
			17			DB					
			18			DB					
			19			DB					
			20			DB					
			21			DB					
			22			DB					
			23			DB					
			24			DB					
			25			DB					
			26			DB					
			27			DB					
			28			DB					
			29			DB					
			30			DB					
			31			DB					
			32			DB					
			33			DB					
			34			DB					
			35			DB					

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types; in-situ, the transition may be gradual. *Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft	
WL ∇ 14	W.D. ∇
WL ∇	∇
WL	



BORING STARTED	6-21-11
BORING COMPLETED	6-22-11
RIG Able Env	FOREMAN RD
APPROVED RD	JOB # 03117065

WELL 99 03117065.GPJ TERRACON.GDT 7/12/11

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
					NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
43	COARSE SAND gray, some gravel	43	40			DB				
45.3	+SANDSTONE maroon to gray very fine grained	45.3	45			DB				
55.4	+SHALE brownish-red	55.4	50			DB				
60	+SANDSTONE AND SHALE brownish-red, layered	60	55			DB				
	+SANDSTONE tan to brownish-red very fine grained		60			DB				
			65			DB				
			70							

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. *Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 14	W.D.	▽
WL	▽		▽
WL			



BORING STARTED	6-21-11
BORING COMPLETED	6-22-11
RIG	Able Env
FOREMAN	RD
APPROVED	RD
JOB #	03117065

WELL 99 03117065.GPJ TERRACON.GDT 7/4/11

LOG OF MONITORING WELL NO. 204R

Project Description: Mosley Road Sanitary Landfill
 3201 Mosley Road, Oklahoma City OK

Biggs & Mathews Environmental, Inc.
 1700 Robert Road, Suite 100
 Mansfield, TX 78063
 Phone: 817-563-1144
 Fax: 817-563-1224

Depth, feet	Samples	Symbol / USCS	Location: East Oak Recycling and Disposal Facility	Hand Penetrometer, lsf	Penetration Blows/foot	Moisture Content, %	Unit Dry Weight lb/cu ft	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, lsf
			Surface El.: 1161.80 ft. msl Completion Depth: 40.0 ft Date Boring Started: 4/1/10 Date Boring Completed: 4/1/10									
			MATERIAL DESCRIPTION									
			CLAY (CL-ML), silty, dark brown and red									
	CS1		SILT (ML), clayey, dark brown		1180.50							
5			SILT (ML), tan		1157.00							
	CS2											
10												
	CS3											
15			SAND (SP), tan very fine grained		1148.80							
	CS4											
20												
	CS5											
25												
	CS6											
30			sand with thin clay layers									
	CS											
35												
40					1121.80							
45												
50												

BME LOG MOSLEY ROAD.GPJ B&M DATA TEMPLATE.GDT 12/16/10

Drilling Contractor: Associate Industries
 Drilling Method: Hollow Stem Auger
 Sampling Method: continuous sampling
 Geologist/Engineer: Randy Krass
 Project No.: 101.28.601

Groundwater Observations	
Date	Depth
4/1/2010	23

Remarks:



The stratification lines represent approximate strata boundaries.
 In situ, the transition may be gradual.

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
					NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	ATTERBERG LIMITS AND/OR #200 U.S. STANDARD SIEVE
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> +SANDSTONE tan to brownish-red very fine grained </div>		75									
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> +SILTSTONE AND SHALE brownish-red interbedded </div>		80									
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> +SANDSTONE tan to brownish-red very fine grained </div>		95									
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> +SANDSTONE tan to brownish-red very fine grained </div>		100									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. *Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft WL ∇ 14 W.D. ∇ WL ∇ ∇ WL ∇		BORING STARTED 6-21-11 BORING COMPLETED 6-22-11 RIG Able Env FOREMAN RD APPROVED * RD JOB # 03117065
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WELL 99 03117065 G.P.L. TERRACON LGDT 7/12/11

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
					NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
107	+SANDSTONE tan to brownish-red very fine grained					DB				
	BOTTOM OF BORING +Classification estimated from disturbed samples. Core sample and petrographic analysis may reveal other rock types.									

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual. *Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 14	W.D.	▽
WL	▽		▽
WL			



BORING STARTED		6-21-11	
BORING COMPLETED		6-22-11	
RIG	Able Env	FOREMAN	RD
APPROVED	RD	JOB #	03117065

WELL 99 03117065.GPJ TERRACON.LGDT 7/12/11

**WBC LITHOLOGIC LOGS
2014**

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-1			Geologist: AE		Driller: Terracon		Page 1 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^o /No. 40 ^o	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Description	FT MSL										
			Boring Start Date: 5/29/2014 Northing: 185227.18 Boring End Date: 5/29/2014 Easting: 2173691.64 Ground Elevation: 1147.3 ft-msl T.O.C.: 1150.67 ft-msl Remarks: Borehole WB-1 continuously sampled with dry split spoons (0-14'), wet split spoons (14-40.5'), and wet rotary cored (40.5-49'). Piezometer boring PWB-1 advanced directly upgradient from WB-1 via wet rotary 6" reaming bit (0-32'). ▽ = Water Level at Time of Drilling: 1138.3 ft-msl ▼ = Static Water Level: 1137.39 ft-msl											
	S		CLAY (CL), silty, sandy, dark brown, moist, low plasticity, very fine grained, trace organics/roots.	1145.8	1/6"									
	S		SAND (SW), tan, moist, non-plastic, loose, very fine to medium grained.		2/6"								1145.3	
5	S		- Sand becomes predominately very fine grained below 4'.		1/6"									
	S		- Sand becomes very light yellow/brown below 7'.		2/6"									
10	S		- Sand becomes light brown and wet with trace silt at 9'.		2/6"									
	S		- Sand coarsening with depth below 10'.		2/6"									
	S		- Sand becomes very fine to coarse grained below 12'.		3/6"									
15	S		SAND (SW), gravelly, light gray, wet, non-plastic, loose, fine to coarse grained sand, very fine sub-rounded to sub-angular gravel.	1133.3	1/6"									
	S		SAND (SW), trace gravel, light gray, wet, non-plastic, loose, fine to coarse grained sand, very fine gravel.	1131.3	1/6"									
	S		SAND (SM), silty, trace clay, light gray, wet, non-plastic to low plasticity, loose to soft, very fine grained.	1129.3	4/6"									
20	S		SAND (SM), silty, trace clay, light gray, wet, non-plastic to low plasticity, loose to soft, very fine grained.	1127.3	2/6"								1128.3	
	S		SAND (SP), trace silt and clay, light gray, wet, non-plastic, loose, very fine grained.		5/6"								1126.3	
	S		- Sand becomes very fine to medium grained with no silt or clay below 22'.		8/6"									
25	S		- Sand becomes very fine to fine grained below 24'.		12/6"									
	S		- Sand contains trace large gravel below 27'.		5/6"									
	S		- Sand contains trace large gravel below 27'.		8/6"									
	S		- Sand contains trace large gravel below 27'.		1/6"									
	S		- Sand contains trace large gravel below 27'.		2/6"									
	S		- Sand contains trace large gravel below 27'.		5/6"									
	S		- Sand contains trace large gravel below 27'.		8/6"									
	S		- Sand contains trace large gravel below 27'.		9/6"									
	S		- 4" clay seam at 29', with trace silt, gray, moist, high plasticity.		4/6"									
	S		- 4" clay seam at 29', with trace silt, gray, moist, high plasticity.		5/6"									
	S		- 4" clay seam at 29', with trace silt, gray, moist, high plasticity.		7/6"									

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

LOG OF BORING: PWB-1

Project Title: East Oak Landfill Expansion
Project No: 0086-356-11-40-02

Geologist: AE
Driller: Terracon

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests		Geotechnical Laboratory Results						Well Detail
					Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	
			Boring Start Date: 5/29/2014 Northing: 185227.18 Boring End Date: 5/29/2014 Easting: 2173691.64 Ground Elevation: 1147.3 ft-msl T.O.C.: 1150.67 ft-msl Remarks: Borehole WB-1 continuously sampled with dry split spoons (0-14'), wet split spoons (14-40.5'), and wet rotary cored (40.5-49'). Piezometer boring PWB-1 advanced directly upgradient from WB-1 via wet rotary 6" reaming bit (0-32'). ▽ = Water Level at Time of Drilling: 1138.3 ft-msl ▼ = Static Water Level: 1137.39 ft-msl										
	S		- SAND, wet (continued).	1115.3		8/6" 1/6" 1/6" 3/6"							1116.3
	S		SAND (SP), gravelly, light gray, wet, non-plastic, loose, coarse grained sand, very fine to fine grained gravel.			6/6" 2/6" 2/6" 6/6" 6/6" 1/6" 3/6" 6/6" 7/6" 6/6" 6/6" 5/6"							1115.3
35	S												
	S												
	S		- Sand becomes reddish-brown and gray, and interbedded with trace thin low plasticity silt and clay seams below 36'.										
	S			1109.3									
	S		GRAVEL (GP), silty, trace sand and clay, gray and dark red-brown, wet, non-plastic, loose to soft, very fine grained sand, very fine to large gravel.			4/6" 13/6" 10/6" 16/6" 15/6" 50/5"							
40	S		- 1" clay seam at 39', dark brown, moist, medium plasticity, firm.	1107.3									
	A		SANDSTONE, trace silt, dark red-brown, wet, non-plastic, hard, laminated, very fine to fine grained.										
	C				4.5								
	C				4.5								
45	C			1102.3									
	C		SILTSTONE, sandy, dark red-brown, moist, non-plastic, hard, laminated and cross-bedded, very fine grained, with calcite filled partings.		4.5		11.9	118.5				49.7 (tsf)	
	C				4.5							1.1x10 ⁻⁵ (cm/s)	
	C				4.5								
	C			1098.3									
			Total Depth = 49'										
50													
55													

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-2		Geologist: AE Driller: Terracon		Page 1 of 2							
			Project Title: East Oak Landfill Expansion											
			Project No: 0086-356-11-40-02		Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 5/30/2014 Northing: 185216.94 Boring End Date: 5/30/2014 Easting: 2174396.33 Ground Elevation: 1146.5 ft-msl T.O.C.: 1149.75 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^b /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole WB-2 continuously sampled with dry split spoons (0-14'), wet split spoons (14-40'), and wet rotary cored (40-50'). Piezometer boring PWB-2 advanced directly upgradient from WB-2 via wet rotary 6" reaming bit (0-32'). ▽ = Water Level at Time of Drilling: 1139.5 ft-msl ▼ = Static Water Level: 1137.65 ft-msl											
			Description	FT MSL										
	S		SILT (ML), sandy, trace clay, dark brown, moist, non-plastic, loose, very fine grained, with trace roots.	1145.5	2/6"									
	S		SAND (SW), silty, very light brown, moist, non-plastic, loose, very fine grained.		2/6"									
	S		- Sand contains trace silt below 3'.		3/6"									
	S				1/6"									
	S				2/6"									
	S				1/6"									
5	S		SILT (ML), sandy, some clayey seams, light brown, moist, low plasticity, loose to soft, very fine grained, with trace roots and wood.		1/6"	56 ^a			33	17	16			
	S		- Silt becomes sandy and clayey below 6'.		1/6"									
	S		- Silt becomes WET at 7', with only trace very fine grained sand from 7' to 8'.		1/6"									
	S				1/6"									
10	S		SAND (SP), silty, light gray, wet, non-plastic, loose, very fine grained.	1136.5	1/6"									
	S				1/6"									
	S				2/6"									
	S				1/6"									
	S		SAND (SP), light gray, wet, non-plastic, loose, very fine to fine grained.	1134.5	1/6"									
	S				2/6"									
	S				2/6"									
	S				3/6"									
	S				2/6"									
	S				3/6"									
	S				4/6"									
	S				4/6"									
	S				2/6"									
	S		- Sand becomes medium to coarse grained below 17'.		4/6"									
	S				4/6"									
	S				4/6"									
	S				4/6"									
	S				6/6"									
	S				8/6"									
	S				4/6"									
	S				2/6"									
	S				3/6"									
	S				2/6"									
	S		- 6" clay seam at 22', silty, trace sand, gray, medium plasticity, very stiff.		1/6"									
	S				3/6"									
	S				3/6"									
	S		- 2" clay seam at 23.5', silty, trace sand, gray, medium plasticity, very stiff.	1122.5	4/6"									
	S				8/6"									
	S		SAND (SW), gravelly, light gray, wet, loose, non-plastic, fine to coarse grained sand, very fine to large gravel .		1/6"									
	S				3/6"									
	S				4/6"									
	S		SAND (SW), trace gravel, light gray, wet, non-plastic, loose, fine to coarse grained sand, fine gravel.	1120.5	4/6"									
	S				4/6"									
	S				8/6"									
	S				8/6"									
	S				4/6"									
	S				2/6"									
	S				1/6"									
	S				4/6"									
	S		- 6" clay seam at 29', silty, dark gray, medium plasticity, hard, very fine grained with trace wood.		1/6"									
	S				4/6"									

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-3			Geologist: AE		Driller: Terracon		Page 1 of 2						
			Project Title: East Oak Landfill Expansion													
			Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 5/31/2014 Northing: 184921.82		Boring End Date: 5/31/2014 Easting: 2173843.47		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Ground Elevation: 1142.6 ft-msl		Remarks: Borehole continuously sampled with dry split spoons (0-14') and wet split spoons (14-40').											
			∇ = Water Level at Time of Drilling: 1135.6 ft-msl ▼ = Static Water Level: Not Measured													
			Description		FT MSL											
	S		SAND (SM), silty, very light brown, moist, non-plastic, firm, very fine grained.		1139.6		20 ^a				18		17		1	
	S		SILT (ML), sandy, trace clay, medium brown, moist, low plasticity, firm, very fine grained, friable.				3/6"									
5	S						2/6"									
	S						5/6"									
	S						2/6"									
	S						3/6"									
	S						4/6"		66 ^a		26		24		2	
	S						4/6"									
	S						1/6"									
	S						1/6"									
10	S						3/6"									
	S						1/6"									
	S						3/6"									
	S						4/6"									
	S					1/6"										
15	S					4/6"										
	S					9/6"										
	S					2/6"										
	S					6/6"										
	S					7/6"										
	S					4/6"										
	S					2/6"										
	S					4/6"										
	S					7/6"										
20	S					4/6"										
	S					5/6"										
	S					11/6"										
	S					11/6"										
	S					12/6"										
	S					8/6"										
	S					11/6"										
	S					8/6"										
	S					8/6"										
	S					3/6"										
	S					6/6"										
	S					6/6"										
25	S					9/6"										
	S					5/6"										
	S					6/6"										
	S					7/6"										
	S					7/6"										
	S					4/6"										
	S					5/6"										
	S					7/6"										
	S					7/6"										
	S					6/6"										
	S					7/6"										
	S					9/6"										

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-3			Geologist: AE		Driller: Terracon		Page 2 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 5/31/2014 Northing: 184921.82 Boring End Date: 5/31/2014 Easting: 2173843.47 Ground Elevation: 1142.6 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^b /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole continuously sampled with dry split spoons (0-14') and wet split spoons (14-40'). ▽ = Water Level at Time of Drilling: 1135.6 ft-msl ▼ = Static Water Level: Not Measured											
		Description		FT MSL										
	S			1110.6		9/6" 4/6" 5/6" 5/6"								
	S		SAND (SW), gravelly, very light brown and light gray, wet, loose, non-plastic, very fine to coarse grained sand, very fine to medium gravel.	1109.1		6/6" 4/6" 5/6"								
35	S		SAND (SW), trace gravel, very light brown and light gray, wet, loose, non-plastic, very fine to coarse grained sand, very fine to medium gravel.			6/6" 7/6" 5/6" 7/6"								
	S		Sand, wet (Continued).			12/6" 5/6" 9/6" 9/6" 10/6" 5/6" 20/6"								
	S			1103.6		50/4"								
40	A		SILTSTONE (MP), trace sand, red-brown, wet, soft, non-plastic, very fine grained, friable.	1102.6										
			Total Depth = 40'											
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: WB-4			Geologist: AE/BF Driller: Terracon		Page 1 of 2						
			Project Title: East Oak Landfill Expansion Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results						
Depth (ft)	Samples	Graphic Log	Boring Start Date: 5/28/2014 Northing: 184755.97 Boring End Date: 5/28/2014 Easting: 2174142.99 Ground Elevation: 1143.4 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^b /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole continuously sampled with dry split spoons (0-14') and wet split spoons (14-39'). ▽ = Water Level at Time of Drilling: 1136.4 ft-msl ▼ = Static Water Level: Not Measured											
			Description	FT MSL										
	S		SILT (ML), sandy, with trace clay and silt, dark reddish brown, moist, non-plastic to low plasticity, loose, very fine to medium grained, laminated, friable, trace organics.			1/6" 2/6" 5/6"	58 ^a							
	S		- Sand becomes interbedded with sandy dark brown clay laminae below 3'.	1139.4		5/6" 2/6" 3/6"	67 ^a							
5	S		SAND (SM), silty, trace clay, light brown, moist, non-plastic, loose, very fine to fine grained.			5/6" 1/6" 1/6" 2/6" 2/6" 1/6"	45 ^a							
	S		SAND (SP), very light gray and brown, wet, non-plastic, loose, coarse grained.	1136.4		1/6" 2/6" 3/6" 1/6" 4/6" 6/6" 7/6" 3/6" 6/6" 7/6" 10/6" 2/6" 4/6" 9/6" 9/6" 2/6" 2/6" 2/6" 1/6" 1/6" 2/6" 3/6" 3/6" 3/6" 4/6" 2/6" 4/6" 4/6" 6/6" 4/6" 5/6" 7/6" 9/6" 7/6" 4/6" 6/6" 8/6"							▽	
	S		- Sand becomes light gray with trace silt in intervals below 12'.											
15	S		- Sand becomes very fine grained below 15'.											
	S		- Sand becomes coarse grained with no silt below 17'.											
	S		- Sand contains trace very fine gravel below 20'.											
20	S		- Sand becomes very coarse grained with trace very fine to medium gravel below 22'.											
	S		SAND (SW), gravelly, light gray, wet, non-plastic, loose, coarse grained sand, very fine to large gravel.	1117.4		7/6" 2/6" 4/6" 9/6"								
	S		SAND (SP), trace gravel, light gray, wet, non-plastic, loose, coarse grained sand, very fine gravel.	1115.4		9/6" 3/6" 6/6" 8/6"								

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-4			Geologist: AE/BF Driller: Terracon		Page 2 of 2								
		Project Title: East Oak Landfill Expansion													
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Start Date: 5/28/2014 Northing: 184755.97		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 [#] /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring End Date: 5/28/2014 Easting: 2174142.99												Ground Elevation: 1143.4 ft-msl
		Remarks: Borehole continuously sampled with dry split spoons (0-14') and wet split spoons (14-39').													
		▽ = Water Level at Time of Drilling: 1136.4 ft-msl ▼ = Static Water Level: Not Measured													
		Description			FT MSL										
	S		Sand, wet (Continued).			8/6"									
	S		SAND (SW) gravelly, light gray, wet, non-plastic, loose, coarse grained sand, very fine to large gravel.		1110.4	3/6"									
	S		GRAVEL (GW), sandy, gray, wet, non-plastic, loose, coarse grained sand, very fine to large gravel.		1109.4	6/6"									
35	S					5/6"									
	S					4/6"									
	S				1105.4	4/6"									
	S	SANDSTONE, silty, red-brown, wet, non-plastic, hard, friable, very fine to fine grained.		1104.4	4/6"										
40		Total Depth = 39'				7/6"									
						50/1"									
45															
50															
55															

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-5			Geologist: AE		Driller: Terracon		Page 1 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^ø /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 6/5/2014	Northing: 182576.93										
		Remarks: Borehole WB-5 continuously sampled with dry split spoons (0-10'), wet split spoons (10-22'), and wet rotary cored (22-34'). Piezometer boring PWB-5 advanced directly upgradient from WB-5 via wet rotary 6" reaming bit (0-34').												
		☒ = Water Level at Time of Drilling: 1142.0 ft-msl ▼ = Static Water Level: 1140.65 ft-msl												
Description			FT MSL											
	S		FILL (SW), sand, silty, gravelly, dry, non-plastic, loose, very fine grained.	1143.5		1/6" 2/6"								
	S		SAND (SP), very light brown, dry, non-plastic, loose, very fine to fine grained.			3/6" 5/6" 6/6" 6/6" 8/6" 12/6"								1143.0
5	S		- Sand becomes wet at 3'.			1/6" 2/6" 3/6" 3/6"								
	S		- Sand becomes very light gray below 7'.			1/6" 1/6" 2/6" 3/6" 3/6"								
10	S		CLAY (CH), silty, trace sand, dark brown, moist, medium to high plasticity, very stiff, very fine grained.	1136.0		1/6" 2/6" 4/6" 1/6"								
	S		- Clay becomes highly plastic with no sand below 10'.			1/6" 2/6" 3/6" 3/6"								
	S		SAND (SW), light gray, wet, non-plastic, loose, fine to coarse grained.	1132.0		10/6" 14/6" 7/6" 2/6"								1132.0
15	S		- Sand becomes medium to coarse grained below 14'.			2/6" 3/6" 3/6" 2/6"								1129.0
	S					4/6" 4/6" 6/6" 2/6"								
20	S					4/6" 6/6" 6/6" 3/6"								
	S					6/6" 6/6" 3/6" 6/6"								1124.0
	C		SANDSTONE (SP), silty, red-brown, moist, non-plastic, hard, very fine grained, friable, with trace very fine iron nodules and abundant iron stains, weathered.	1123.0		11/6"								1123.0
25	C				4.5	50/2"								
	C				4.5									
	C				4.5									
	C				4.5									
	C				4.5									
	C				4.5									
	C				4.5									
	C				1115.0									

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-5			Geologist: AE		Driller: Terracon		Page 2 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 6/5/2014	Northing: 182576.93										
			Ground Elevation: 1145.0 ft-msl T.O.C.: 1148.05 ft-msl											
			Remarks: Borehole WB-5 continuously sampled with dry split spoons (0-10'), wet split spoons (10-22'), and wet rotary cored (22-34'). Piezometer boring PWB-5 advanced directly upgradient from WB-5 via wet rotary 6" reaming bit (0-34').											
			▽ = Water Level at Time of Drilling: 1142.0 ft-msl ▼ = Static Water Level: 1140.65 ft-msl											
			Description	FT MSL										
	C		SANDSTONE, very light yellow brown and dark red-brown, wet, non-plastic, hard, laminated to thinly bedded, very fine to coarse grained. - Sandstone becomes yellow, tan and brown below 31'. - Sandstone becomes dark red-brown and yellow with trace silt below 32'.	1111.0	4.5		16.3	112.4						
			Total Depth = 34'											
35														
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-6			Geologist: AE Driller: Terracon		Page 2 of 2							
		Project Title: East Oak Landfill Expansion Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 6/10/2014 Northing: 182554.30 Boring End Date: 6/10/2014 Easting: 2174918.01 Ground Elevation: 1139.9 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole continuously sampled with dry split spoons (0-10'), wet split spoons (10-22.5'), and wet rotary cored (22.5-32'). ▽ = Water Level at Time of Drilling: 1135.9 ft-msl ▼ = Static Water Level: Not Measured											
			Description	FT MSL										
	C		- Sandstone becomes silty and fine to coarse grained below 31'. Total Depth = 32'	1107.9	4.5 4.5			16.1	114.8					
35														
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-7		Geologist: AE Driller: Terracon		Page 1 of 2							
Project Title: East Oak Landfill Expansion Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results									
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Description	FT MSL										
			Boring Start Date: 6/4/2014 Northing: 182604.93 Boring End Date: 6/4/2014 Easting: 2175493.29 Ground Elevation: 1144.0 ft-msl T.O.C.: 1146.96 ft-msl											
			Remarks: Borehole WB-7 continuously sampled with dry split spoons (0-10'), wet split spoons (10-22'), and wet rotary cored (22-32'). Piezometer boring PWB-7 advanced directly upgradient from WB-7 via wet rotary 6" reaming bit (0-32'). ▽ = Water Level at Time of Drilling: 1138.0 ft-msl ▼ = Static Water Level: 1139.69 ft-msl											
	S		SILT (ML), sandy, trace clay, medium brown, moist, non-plastic to low plasticity, soft, very fine grained, trace roots.			1/6" 1/6" 1/6" 0/6"								
	S		- Silt becomes interbedded with thin very fine to fine grained silty sand seams below 2'.	1141.0		3/6" 4/6" 1/6"								
5	S		SAND (SP), very light brown, moist, non-plastic, loose, very fine to fine grained.	1139.0		1/6" 1/6" 3/6"								
	S		SILT (ML), clayey, trace sand, dark brown to black, low to medium plasticity, soft, very fine grained, with roots and wood fragment.	1138.0		2/6" 4/6" 5/6" 4/6" 2/6" 3/6" 2/6"								
	S		SAND (SP), light brown, wet, non-plastic, loose, laminated to thinly bedded, very fine to fine grained.			1/6" 1/6" 1/6" 2/6" 2/6" 1/6" 1/6" 1/6" 1/6" 1/6" 2/6" 1/6" 1/6" 1/6" 1/6" 2/6" 3/6" 4/6" 0/6" 3/6" 3/6" 4/6"								
10	S		- Sand becomes very light gray below 9'.											
	S		- Sand becomes dark gray with light gray and light brown mottling below 10'.											
	S		- Sand becomes coarse grained below 13'.											
15	S		- Sand becomes light gray and very fine to coarse grained below 15'.											
	S													
	S													
20	S		- Sand becomes interbedded with thin clay laminae below 19.5'.											
	S			1122.0										
	C		SANDSTONE (SP), trace silt, dark red-brown, moist, non-plastic, stiff, laminated to thinly bedded, friable, very fine grained.		4.5	50/2"		6.7	149.8				49.6 (tsf)	
25	C		- Sandstone becomes light gray, dark red-brown and yellow mottled, and very fine to fine grained with common iron stains below 24'.	1118.0	4.5			8.3	139.5				12.0 (tsf)	
	C		SILTSTONE, trace sand, interbedded with silty sandstone, dark red-brown and light gray, moist, non-plastic, hard, laminated to thinly bedded, very fine grained, with common iron stains and calcite filled partings.		4.5								7.1x10 ⁻⁷ (cm/s)	
	C			1115.0	4.5									
	C		SANDSTONE, silty, dark red-brown and light gray, moist, non-plastic, hard, laminated and cross bedded, with light		4.5			12.5	124.7					

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-7			Geologist: AE Driller: Terracon			Page 2 of 2						
		Project Title: East Oak Landfill Expansion			Field Tests			Geotechnical Laboratory Results						
		Project No: 0086-356-11-40-02												
Depth (ft)	Samples	Graphic Log	Boring Start Date: 6/4/2014 Northing: 182604.93 Boring End Date: 6/4/2014 Easting: 2175493.29 Ground Elevation: 1144.0 ft-msl T.O.C.: 1146.96 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole WB-7 continuously sampled with dry split spoons (0-10'), wet split spoons (10-22'), and wet rotary cored (22-32'). Piezometer boring PWB-7 advanced directly upgradient from WB-7 via wet rotary 6" reaming bit (0-32'). ▽ = Water Level at Time of Drilling: 1138.0 ft-msl ▼ = Static Water Level: 1139.69 ft-msl											
			Description	FT MSL										
	C		gray mottled, very fine grained.	1112.0	4.5								4.7x10 ⁻⁷ (cm/s)	
			Total Depth = 32'											
35														
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-8			Geologist: AE		Driller: Terracon		Page 1 of 4						
		Project Title: East Oak Landfill Expansion													
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail	
			Boring Start Date: 6/10/2014	Northing: 181840.89											Boring End Date: 6/11/2014
			Ground Elevation: 1154.0 ft-msl												
			Remarks: Borehole continuously sampled with dry split spoons (0-32') and wet rotary cored (32-100').												
			▽ = Water Level at Time of Drilling: 1140.0 ft-msl ▽ = Static Water Level: Not Measured												
			Description	FT MSL											
	S		SILT (ML), clayey, sandy, trace gravel, red-brown to dark brown, dry, low to medium plasticity, very stiff, friable, very fine grained.	1153.0	7/6"										
	S		SAND (SP), trace silt, light brown, moist, non-platic, loose, very fine grained.		6/6"	6/6"									
	S					9/6"									
	S					3/6"									
5	S					2/6"									
	S					2/6"									
	S					1/6"									
	S					1/6"									
	S					1/6"									
	S			- Sand contains no silt, and becomes very light brown, laminated, and very fine to fine grained below 6'.		1/6"									
	S					7/6"									
	S					8/6"									
	S					10/6"									
	S					1/6"									
	S					5/6"									
10	S					7/6"									
	S					8/6"									
	S					10/6"									
	S					1/6"									
	S					4/6"									
	S				5/6"										
	S				5/6"										
	S				4/6"										
	S				8/6"										
	S				8/6"										
15	S		- Sand becomes light brown and WET below 14'.		10/6"										
	S				6/6"										
	S				6/6"										
	S				8/6"										
	S				10/6"										
	S				1/6"										
	S				1/6"										
	S				7/6"										
	S				8/6"										
	S				1/6"										
	S				1/6"										
	S		- Sand becomes very fine to coarse grained below 19'.		1/6"										
20	S				2/6"										
	S				2/6"										
	S				1/6"										
	S				3/6"										
	S				8/6"										
	S				3/6"										
	S				2/6"										
	S				3/6"										
	S				9/6"										
	S				9/6"										
25	S				6/6"										
	S				15/6"										
	S				20/6"										
	S				18/6"										
	S				6/6"										
	S				8/6"										
	S				10/6"										
	S				12/6"										
	S				4/6"										
	S				7/6"										
	S				11/6"										

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-8			Geologist: AE Driller: Terracon		Page 2 of 4							
		Project Title: East Oak Landfill Expansion Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole continuously sampled with dry split spoons (0-32') and wet rotary cored (32-100').											
			Boring Start Date: 6/10/2014 Northing: 181840.89 Boring End Date: 6/11/2014 Easting: 2175050.92 Ground Elevation: 1154.0 ft-msl											
			▽ = Water Level at Time of Drilling: 1140.0 ft-msl ▼ = Static Water Level: Not Measured											
			Description		FT MSL									
	S		SILTSTONE, trace clay and sand, dark red-brown, moist with light gray mottling, non-plastic, very stiff, laminated, friable, very fine grained.		1123.0	11/6" 5/6"								
	C		SANDSTONE, trace silt, dark red-brown with light gray and yellow mottling, wet, non-plastic, hard, laminated and cross bedding, friable in zones, very fine to fine grained, with common manganese stains.		1122.0	4.5								
35	C		Sandstone, trace silt, wet (Continued). - Sandstone contains abundant iron stains below 35'.			4.5		13.5	122.3				1.2x10 ⁻⁵ (cm/s)	
	C					4.5								
40	C		- Sandstone becomes very fine to coarse grain and friable below 39.5'. - 2" thin sandy Siltstone seams at 40', 40.5', 41' and 42'.			4.5								
	C					4.5								
45	C					4.5								
	C		SILTSTONE, sandy, dark red-brown and light gray, moist, non-plastic, hard, laminated, very fine grained.		1107.0	4.5								
50	C		SANDSTONE, silty, dark red-brown and light gray, moist, non-plastic, hard, laminated, very fine grained.		1104.0	4.5								
	C		- 8" sandy Siltstone seam at 53'.			4.5								
55	C		- 3" sandy Siltstone seam at 54.5'.			4.5								
	C		SANDSTONE, dark red-brown and light gray, moist, non-plastic, hard, laminated, very fine to medium grained, with common manganese stains.		1098.0	4.5								

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: WB-8			Geologist: AE Driller: Terracon		Page 3 of 4							
		Project Title: East Oak Landfill Expansion Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Start Date: 6/10/2014 Northing: 181840.89 Boring End Date: 6/11/2014 Easting: 2175050.92 Ground Elevation: 1154.0 ft-msl		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Remarks: Borehole continuously sampled with dry split spoons (0-32') and wet rotary cored (32-100'). ▽ = Water Level at Time of Drilling: 1140.0 ft-msl ▼ = Static Water Level: Not Measured											
			Description	FT MSL										
65	C		- Sand becomes poorly consolidated and friable below 67'.	1084.0	4.5		16.4	111.7						
	C		SANDSTONE, dark red-brown to dark brown, wet, non-plastic, poorly consolidated, laminated, friable, very fine to medium grained.		4.5									
75	C		- Sand becomes very light brown and dark red-brown below 75'.		4.5									
	C		- Sand becomes dark red-brown with very light brown mottling, hard, and well cemented below 77'.		4.5									
80	C		- Sand becomes very light brown and tan with dark red-brown mottling below 80'.		4.5			14.7	119.6					
85	C		- Sand becomes light gray below 85'.		4.5									
	C	SANDSTONE, silty, dark red-brown, moist, non-plastic, hard, laminated, very fine grained.		1066.0	4.5									

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-9		Geologist: AE Driller: Terracon		Page 2 of 2							
			Project Title: East Oak Landfill Expansion											
			Project No: 0086-356-11-40-02		Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 6/2/2014	Northing: 181316.78										
			Ground Elevation: 1160.7 ft-msl T.O.C.: 1164.09 ft-msl											
			Remarks: Borehole WB-9 continuously sampled with dry split spoons (0-20'), wet split spoons (20-36'), and wet rotary cored (36-50'). Piezometer boring PWB-9 advanced directly upgradient from WB-9 via wet rotary 6" reaming bit (0-35').											
			▽ = Water Level at Time of Drilling: 1144.7 ft-msl ▽ = Static Water Level: 1141.61 ft-msl											
			Description	FT MSL										
35	S		- Sand becomes predominately coarse grained with trace very fine gravel below 33'.		5/6"									
	S					3/6"								
	S					4/6"								
	S					3/6"								
	S		SAND, wet (Continued). - 2" Silt seam, clayey, wet, medium plasticity, very stiff at 35.5'.	1124.7	6/6"								1126.7	
	W		SILTSTONE, sandy, red-brown, moist, non-plastic, hard, friable, very fine grained. - No Recovery 36'-40', cuttings logged indicate material above.		7/6"									
40	W		- Siltstone contains only trace sand, and becomes red-brown with yellow mottling, hard, and friable below 40'.	1118.7	4/6"									
	C		SANDSTONE, silty, dark red with light gray mottling, moist, hard, laminated and cross bedded, very fine grained.	1116.7	5/6"									
45	C		SILTSTONE, trace sand, red-brown, moist, non-plastic, hard, laminated and cross bedded, very fine grained, interbedded with common light gray very fine grained sandstone laminae.		3/6"									
	C				45/6"									
50	C			1110.7			12.5	122.3					5.9x10 ⁻⁸ (cm/s)	
			Total Depth = 50'											
55														

EAST_OAK_LOGS_EAST_OAK_DATABASE_2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: PWB-10			Geologist: AE		Driller: Terracon		Page 1 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02			Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 ^a /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 6/3/2014	Northing: 181316.29										
			Ground Elevation: 1144.7 ft-msl T.O.C.: 1147.90 ft-msl											
			Remarks: Borehole WB-10 continuously sampled with dry split spoons (0-10'), wet split spoons (10-22'), and wet rotary cored (22-35'). Piezometer boring PWB-10 advanced directly upgradient from WB-10 via wet rotary 6" reaming bit (0-22').											
			▽ = Water Level at Time of Drilling: 1140.7 ft-msl											
			▼ = Static Water Level: 1141.22 ft-msl											
			Description	FT MSL										
	S		FILL (SW), silty, sandy, trace gravel, medium brown, moist, low plasticity, very stiff, with trace roots.	1142.7	1/6"	1/6"								
	S		SAND (SM), silty, medium brown, moist, non-plastic, soft, very fine grained.		3/6"	30 ^a								
5	S		- Sand becomes light brown, wet, with trace silt below 4'.		2/6"									
	S			1138.7	3/6"									
	S		SAND (SW), light brown, wet, non-plastic, loose, very fine to coarse grained, flowing, coarsening with depth.		2/6"									
	S				1/6"									
10	S		- Sand becomes fine to coarse grained below 9'.		1/6"									
	S				1/6"									
	S		- Sand becomes light gray below 11'.		1/6"									
	S				2/6"									
15	S		- Sand becomes predominantly coarse grained below 13'.		3/6"									
	S				1/6"									
	S		- Sand contains trace very fine to medium gravel below 17'.		1/6"									
	S				2/6"									
20	S		- Sand contains very fine gravel below 19'.		3/6"									
	S				4/6"									
	S		- 6" Sandstone seam at 21.5', red-brown, moist, soft, friable, very fine to fine grained, with trace silt.	1122.7	5/6"									
	C		SANDSTONE, silty, dark red-brown, moist, non-plastic, hard, laminated, very fine to fine grained.		8/6"									
25	C				16/6"									
	C		- Sandstone becomes yellow, dark red-brown and light gray mottled, with abundant iron nodules, iron stains, and trace silt in intervals below 25'.		16/6"			14.5	119.0			49.3 (tsf)		
	C				10/6"							5.2x10 ⁻⁷ (cm/s)		
	C		- Sandstone becomes predominantly dark red-brown and interbedded with friable silty Sandstone laminae below 28'.		14/6"									
	C				16/6"									
	C				7/6"									
	C				6/6"									
	C				9/6"									
	C				10/6"									
	C				4/6"									
	C				11/6"									
	C				12/6"									
	C				16/6"									
	C				50/4"									

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

WEAVER BOOS CONSULTANTS LLC			LOG OF BORING: PWB-10		Geologist: AE Driller: Terracon		Page 2 of 2							
			Project Title: East Oak Landfill Expansion											
			Project No: 0086-356-11-40-02		Field Tests		Geotechnical Laboratory Results							
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 /No. 40 ^b	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring Start Date: 6/3/2014	Northing: 181316.29										
			Ground Elevation: 1144.7 ft-msl T.O.C.: 1147.90 ft-msl											
			Remarks: Borehole WB-10 continuously sampled with dry split spoons (0-10'), wet split spoons (10-22'), and wet rotary cored (22-35'). Piezometer boring PWB-10 advanced directly upgradient from WB-10 via wet rotary 6" reaming bit (0-22').											
			▽ = Water Level at Time of Drilling: 1140.7 ft-msl											
			▼ = Static Water Level: 1141.22 ft-msl											
			Description	FT MSL										
			- Sandstone becomes dark red-brown with light gray mottling, and very fine to fine grained, with trace silt below 30'.		4.5									
					4.5									
					4.5									
					4.5									
35	C		Total Depth = 35'	1109.7	4.5									
40														
45														
50														
55														

EAST OAK LOGS EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 11/25/14

KEY TO LITHOLOGIC LOGS

East Oak Landfill Expansion

SAMPLING METHODS:		RELATIVE DENSITY OF COARSE GRAINED SOILS:	
Symbol:	Sampling Method:	Penetration Resistance: (Blows/Foot)	Relative Density:
U	Thin Walled Shelby Tube	0 - 4	Very Loose
S	Split Spoon Barrel	4 - 10	Loose
C	Double Tube Core Barrel	10 - 30	Medium Dense
P	Pitcher Barrel	30 - 50	Dense
A	Auger Sample	Over 50	Very Dense
W	Rotary Wash Sample		

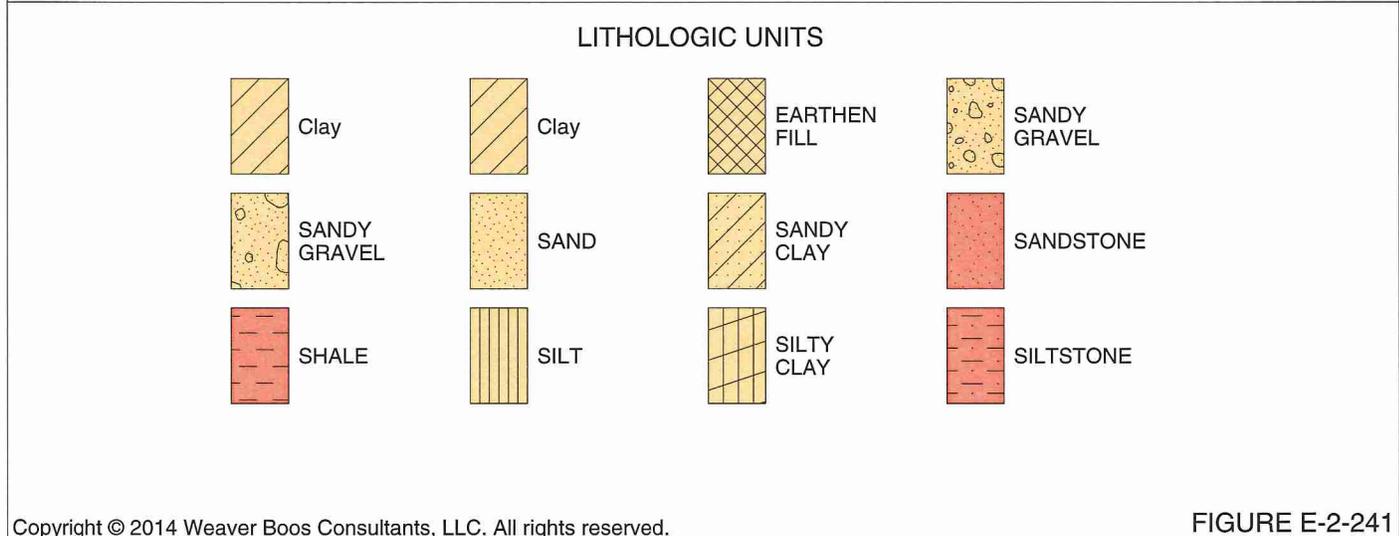
CONSISTENCY OF FINE-GRAINED SOILS:		
Unconfined Compressive Strength: (Tons per Square Foot)	Consistency:	Field Criteria:
Less than 0.25	Very Soft	Squeezes between fingers when fist is closed.
0.25 to 0.50	Soft	Easily molded by fingers.
0.50 to 1.00	Firm	Molded by strong pressure of fingers.
1.00 to 2.00	Stiff	Imprinted very slightly by finger pressure.
2.00 to 4.00	Very Stiff	Cannot imprint with finger pressure / can penetrate w/ pencil.
4.00 and Up	Hard	Imprinted only slightly by pencil point.

MOISTURE:		PLASTICITY	
Description:	Criteria:	Description:	Criteria:
Dry	Absence of moisture.	Non-plastic	1/8" Thread Can't Be Rolled.
Moist	Damp, but no visible water.	Low	1/8" Thread Difficult to Roll / No Lump.
Wet	Very damp to visible water.	Medium	1/8" Thread Easy to Roll / No reroll / No Lump.
Water Bearing	Water drains freely.	High	Long time to 1/8" Thread at Plastic Limit.

STRATIFICATION:		SEDIMENTARY TEXTURES:	
Description:	Thickness:	Description:	Definition:
Massive Bedding	> 10 ft.	Slickensides	Polished fracture surface seen in stiff clay.
Very Thickly Bedded	3 ft. to 10 ft.	Fractures	Failure plane, commonly w/ mineralization.
Thickly Bedded	1 ft. to 3 ft.	Blocky	Angular lumps that resist further breakdown.
Moderately Bedded	3 in. to 1 ft.	Brecciated	Angular fragments commonly due to faulting.
Thinly Bedded	1.2 in. to 3 in.	Fissures	Cracks from shrinkage and frost w/ definite fracture plane.
Very Thinly Bedded	3/8 in. to 1.2 in.	Weathered	Irregular discoloration and diminished soil structure.
Laminated	< 3/8 in.	Calcareous	Contains calcium carbonate, commonly as cement.

SUBSURFACE CONDITIONS:

The lithologic log soil and rock descriptions are based on visual field observations and, where indicated on the logs, geotechnical testing. The geotechnical classifications are based only on the samples analyzed. Where no geotechnical classification or analysis is indicated, the stratum classifications are based on visual field classifications only. USCS classifications based on field observations are shown in parenthesis on WBC logs. The lithologic unit contacts shown on the logs indicate approximate boundaries between materials. The actual contacts may be gradational and vary between borehole locations. The visual/manual procedures used for the field classification of soils were performed in general accordance with ASTM Standard D-2488. Soil classifications based on geotechnical laboratory results were performed in general accordance with ASTM Standard D-2487. Water level observations were made at the time of drilling and at subsequent times, as indicated. Future water levels may vary significantly from those indicated due to climatic factors, construction activity, or other factors.



**BIGGS AND MATHEWS
LITHOLOGIC LOGS
2015**

LOG OF MONITORING WELL NO. MW-28R

Biggs and Mathews Environmental, Inc.
1700 Robert Rd. Ste 100
Mansfield, TX 76063
Phone: 817-563-1144

Project Description: **East Oak RDF**

Oklahoma County, OK

Depth, feet	Samples	Symbol / USCS	Location: East Oak Recycling E 2172925.055 N 184802.020	Monitoring Well Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			Top of Casing El.: 1152.70 ft. msl Surface El.: 1149.60 ft. msl Completion Depth: 34.0 ft. Date Boring Started: 5/1/15 Date Boring Completed: 5/1/15 MATERIAL DESCRIPTION										
			CLAY, sandy, dark brown, with roots, stiff.										
5			SAND, silty, tan to brown, fine grained, dense.										
10	S1												
15	S2		-tan to light brown below 12.0'										
20	S3		SAND, silty, light brown to grey and light grey, with clayey seams, dense.										
25	S4		SAND, brown to grey to dark grey, medium to coarse grained, subrounded to rounded, unconsolidated.										
30	S5												
35													
40													
45													
50													

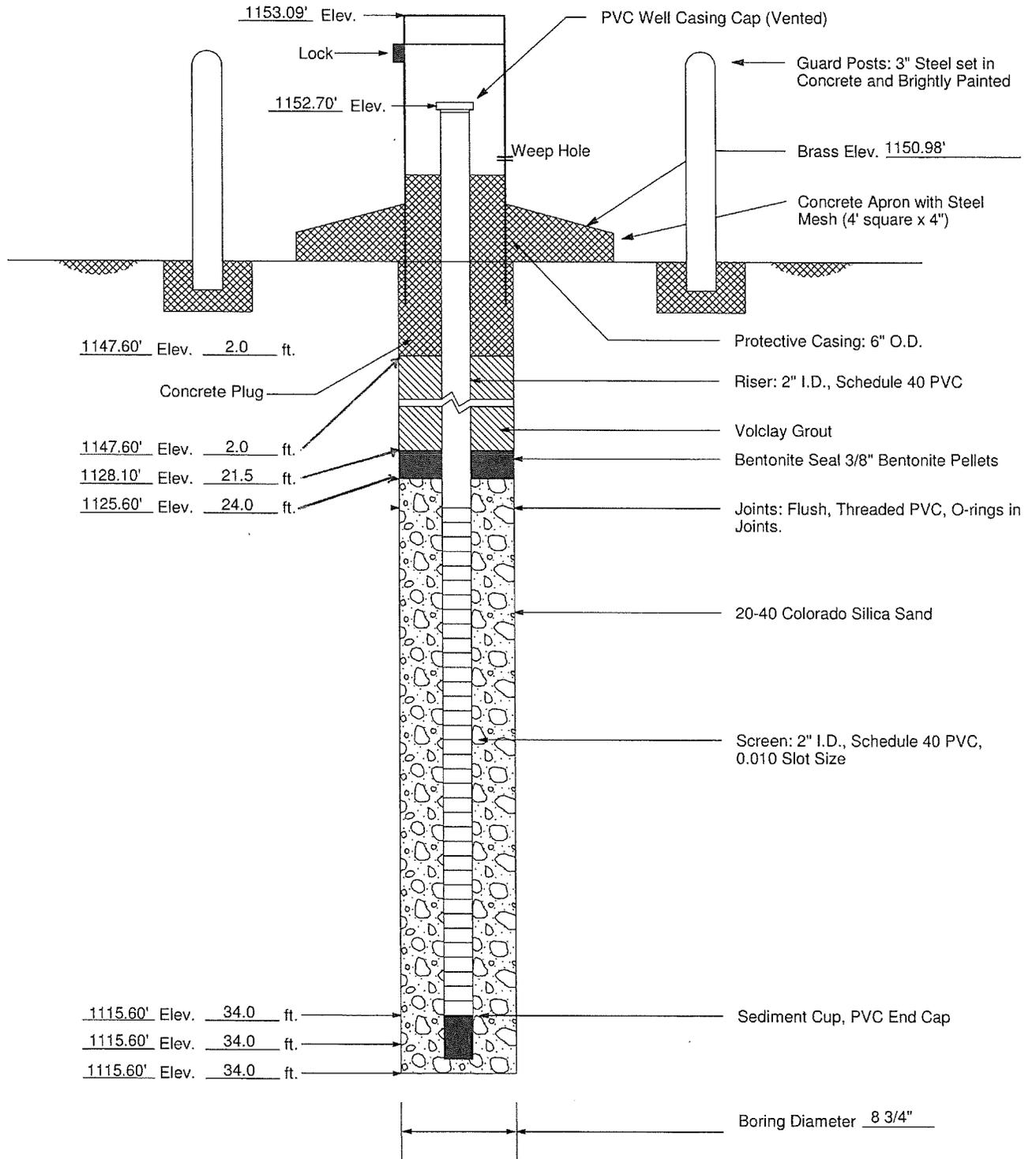
BME LOG MOSLEY ROAD.GPJ B&M DATA TEMPLATE.GDT: 5/27/15

Drilling Contractor: **H/ET**
 Drilling Method: **Hollow Stem Auger**
 Sampling Method: **Continuous sampling**
 Geologist/Engineer: **S. Stamoulis**
 Project No.: **101.28.601**

Groundwater Observations	
Date	Depth

Remarks: Continuous sample from 9.0' to 34.0'.
 Installed monitoring well upon completion





MONITORING WELL NO. MW-28R

APPENDIX E-3
WATER WELL REPORTS

Includes Figures E-3-1 through E-3-115

FILTER PACK INFORMATIONFilter Pack Material: Coarse GravelFilter Pack Interval: From 15 ft to 120**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 4 ft to 15 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 22 gpmFirst water zone 55 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sandy clay	0	11	N
shale	11	40	N
sandrock	40	53	N
watersand	53	58	Y
shale	58	90	N
watersand	90	96	Y
shale	96	105	N
watersand	105	111	Y
shale	111	120	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name Don Strawn Drilling, Inc.D/PC No. DPC-0189Operator Name JAMES LEMASTEROP No. OP-1408Date 07/15/2006Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
N/A	0	1	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material: Other

Filter Pack Interval: From 12 ft to 140

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 2 ft to 12 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 560 gpm

First water zone 35 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
SURFACE SOIL SANDY BROWN CLAY	0	1	N
SANDY RED CLAY	1	5	N
RED CLAY	5	12	N
SAND ROCK	12	24	N
RED SHALE	24	32	N
SAND ROCK	32	35	N
WATER SAND	35	50	Y
RED SHALE	50	55	N
WATER SAND	55	65	Y
ROCK W/SAND ROCK STREAKS	65	70	N
WATER SAND	70	85	Y
RED SHALE	85	90	N
WATER SAND	90	100	Y
RED SHALE	100	105	N
WATER SAND	105	117	Y
RED SHALE	117	125	N
WATER SAND	125	140	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name DON STRAWN DRILLING INC

D/PC No. DPC-0189

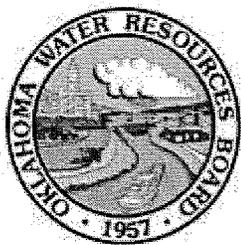
Operator Name STROUD ASH

OP No. OP-0289

Date n/a

Comments: n/a

MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT



(d)

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 101399

		X			

«———— One Mile —————»
Each square is 10-acres

Quarters SE-SE-NW Section 20 Township 12N Range 02W1

Latitude <u>35.50037</u>	Longitude <u>-97.43307</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/09/2006</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Martin Smith

Phone _____

Address/City/State Touchstone Homes OK

Zip _____

Finding Location Bartel and NE 23rd go N on Batel to 3rd new house on west side of Bartel

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/09/2006

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 5 inches Surface Pipe From 0 ft to 10 ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From 4 ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 180 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material: Coarse Gravel

Filter Pack Interval: From 140 ft to 200

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 0 ft to 10 ft

Type of Annular Seal Cement Grout

Annular Seal Interval: From 130 ft to 140 ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling 120 ft

Estimated yield of well 15 gpm

First water zone 130 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
None	0	200	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? No

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y

Distance of Well is 51 - 75 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Nelson Pump Company

D/PC No. DPC-0146

Operator Name KELLI BENNE

OP No. OP-1419

Date 05/16/2006

Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: Gravel - 1/4 inch (fine)Filter Pack Interval: From 12 ft to 160**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 2 ft to 12 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Pitless Adapter**HYDROLOGIC INFORMATION**Depth to water at time of drilling 160 ftEstimated yield of well 30 gpmFirst water zone 60 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	18	N
shale	18	40	N
sand rock	40	80	Y
shale	80	100	N
sand rock	100	149	Y
shale	149	160	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name Vannoy & Son DrillingD/PC No. DPC-0213Operator Name AARON VANNOYOP No. OP-0894Date 10/24/2006

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material: Fine Gravel

Filter Pack Interval: From 60 ft to 180

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 2 ft to 12 ft

Type of Annular Seal Bentonite Pellets

Annular Seal Interval: From 59 ft to 60 ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling 110 ft

Estimated yield of well 25 gpm

First water zone 110 ft

Drawdown Pumping Test

Date	Time	Start Depth	Rate(gpm)	Duration	Drawdown depth to water(ft)
06/28/2005	12:00 PM		25	.5	175

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand & rock	0	60	N
shale	60	110	N
water sand	110	180	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? Yes

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y

Distance of Well is 51 - 75 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Shady Nook Pump and Supply, Inc.

D/PC No. DPC-0261

Operator Name JOHNNY DAVIS

OP No. OP-1196

Date 07/06/2005

Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 2 ft to 12 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Pitless Adapter**HYDROLOGIC INFORMATION**Depth to water at time of drilling 95 ftEstimated yield of well 35 gpmFirst water zone 95 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Surface Soil	0	1	N
Sandy Red Clay	1	2	N
Red Clay	2	10	N
Red Shale	10	17	N
Sandrock	17	38	N
Red Shale	38	50	N
Sandrock	50	65	N
Red Shale	65	75	N
Sandrock	75	95	N
Watersand	95	100	Y
Sandrock	100	110	N
Watersand	110	115	Y
Red Shale	115	125	N
Watersand	125	140	Y
Red Shale & Rock Streaks	140	150	N
Watersand	150	160	Y
Red Shale	160	180	N
Watersand	180	216	Y
Red Shale	216	220	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.

Firm Name Don Strawn Drilling, Inc.

D/PC No. DPC-0189

Operator Name

OP No.

Date 02/13/2004

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 92423

		x				

Quarters NW-NE-NW Section 20 Township 12N Range 02W1

Latitude <u>35.5075167</u>	Longitude <u>-97.4356167</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>02/09/2005</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

«----- One Mile -----»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Hale

Phone (405) 424-2570

Address/City/State 3636 Marilyn Forest Park OK

Zip 73121

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 02/09/2005

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 140 ft.

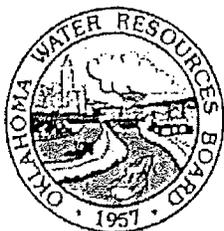
CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 6 inches Surface Pipe From 1 ft to 10 ft

1) Well Casing Material PVC Casing Diameter 4.5 inches Casing From -3 ft to 140 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 30 slot (0.030 inch) From 105 ft to 135 ft.

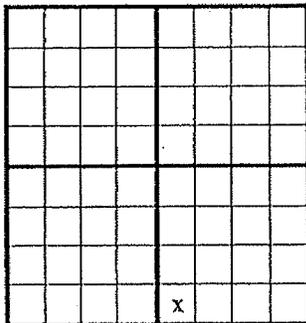


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 83231



«----- One Mile -----»
Each square is 10-acres

Quarters SW-SW-SE Section 17 Township 12N Range 02W1

Latitude 35.508744 Longitude -97.43175
Date collected (latitude and longitude), if different from date the well was drilled: 02/19/2004
Method latitude and longitude was collected: Mathematical conversion program

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner (Lloyd Triplett, Contractor)
Address/City/State 5920 Morgan Rd, Guthrie OK
Finding Location
Well Name

Phone
Zip 73044
Water Rights #:

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 04/30/2003
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 12.5 inches to a depth of 15 ft.
Hole Diameter 7 inches to a depth of 220 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC / Plastic Surface Pipe Diameter 6 inches Surface Pipe From 0 ft to 15 ft
1) Well Casing Material PVC Casing Diameter 4 inches Casing From 3 ft to 220 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted From 180 ft to 220 ft.

FILTER PACK INFORMATION

Filter Pack Material: Gravel 1/8 inch (pea gravel)
 Filter Pack Interval: From 15 ft to 220

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 0 ft to 15 ft
 Type of Annular Seal n/a Annular Seal Interval: From n/a ft to n/a ft
 Filter Pack Seal Material n/a Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling 130 ft Estimated yield of well 25 gpm First water zone 180 ft
 Drawdown Pumping Test

Date	Time	Start Depth	Rate(gpm)	Duration	Drawdown depth to water(ft)
08/30/2003	12:00 PM	130	130	25	180

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
top soil	0	3	N
sandy shale	3	150	N
sandrock	150	180	N
sand rock (water)	180	220	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? Yes
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y
 Distance of Well is 76 - 100 feet from possible source. Type of possible source: Other

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with n/a Grouted from ft. to ft.
 Grouted with Cement Grouted from ft. to ft.

Firm Name Ted Jenks Water Well Service, L.L.C. D/PC No. DPC-0109
 Operator Name OP No.
 Date 12/31/2003
 Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location North

Grid showing legal location with an 'X' in the 3rd row, 2nd column.

One Mile
Each square is 10-acres

WELL ID NUMBER: 92946

Quarters SW-NE-SW Section 17 Township 12N Range 02W1

Latitude 35.512359 Longitude -97.43619
Date collected (latitude and longitude), if different from date the well was drilled: 04/01/2005
Method latitude and longitude was collected: Mathematical conversion program

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Emmitt Wisby & Sons

Phone

Address/City/State 3823 Cimarron Estates Dr. OK

Zip

Finding Location NE 36th St & Bartel Rd. W to Cimarron Est. Dr. N to 3823 Cimarron Est. Dr.

Well Name

Water Rights #:

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 10/01/2003

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 20 ft.

Hole Diameter 7.875 inches to a depth of 240 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 6 inches Surface Pipe From 0 ft to 12 ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From 2 ft to 240 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Perforations From 154 ft to 167 ft.

Type of Screen: PVC Type of Slots or Openings: Perforations From 180 ft to 190 ft.

Type of Screen: PVC Type of Slots or Openings: Perforations From 210 ft to 220 ft.

Type of Screen: PVC Type of Slots or Openings: Perforations From 225 ft to 240 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 2 ft to 12 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling 95 ft

Estimated yield of well 45 gpm

First water zone 95 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
surface soil	0	2	N
red clay	2	5	N
red shale	5	15	N
sandrock	15	22	N
red shale & rock strks.	22	50	N
sandrock	50	65	N
red shale	65	70	N
sandrock	70	95	N
watersand	95	100	Y
red shale	100	110	N
watersand	110	130	Y
sandrock	130	140	N
rock-red shale	140	152	N
watersand	152	167	Y
sandrock	167	175	N
watersand	175	190	Y
sandrock	190	200	N
watersand & sandrock Strks.	200	210	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? Yes

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y

Distance of Well is 51 - 75 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Don Strawn Drilling, Inc.

D/PC No. DPC-0189

Operator Name STROUD ASH

OP No. OP-0289

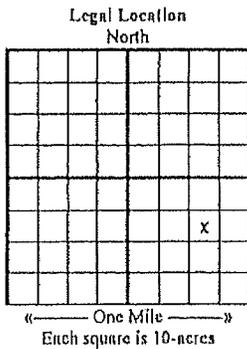
Date 12/29/2004

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800



WELL ID NUMBER: 103997

Quarters SW-NE-SE Section 17 Township 12N Range 02W1

Latitude <u>35.512359</u>	Longitude <u>-97.427309</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>08/30/2006</u>	
Method latitude and longitude was collected: <u>Mathematical conversion program</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Neal McGee Homes

Phone (000) 820-1515

Address/City/State 4320 NE 42nd, OK

Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 10/08/2004

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 20 ft.

Hole Diameter 7 inches to a depth of 220 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From 2 ft to 220 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hard Slotted From 175 ft to 180 ft.

Type of Screen: PVC Type of Slots or Openings: Hard Slotted From 195 ft to 220 ft.

①



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location North

Grid showing legal location with an 'X' in the 4th row, 4th column.

One Mile
Each square is 10-acres

WELL ID NUMBER: 101546

Quarters NW-S2-NE Section 17 Township 12N Range 02W1

Latitude 35.51778 Longitude -97.42731
Date collected (latitude and longitude), if different from date the well was drilled: 05/19/2006
Method latitude and longitude was collected: Mathematical conversion program

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Emmett Wecker

Phone

Address/City/State 5401 NE 56th Gregory add OK

Zip

Finding Location Corner & 50th north to 54th west 1 block north 2 block to 56th west to end

Well Name

Water Rights #:

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 07/02/2005

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 20 ft.

Hole Diameter 8 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC / Pipe Size Surface Pipe Diameter 4 inches Surface Pipe From 200 ft to 3 ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From 3 ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 165 ft to 175 ft.

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 185 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material: Coarse Gravel
 Filter Pack Interval: From 15 ft to 200

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 4 ft to 15 ft
 Type of Annular Seal n/a Annular Seal Interval: From n/a ft to n/a ft
 Filter Pack Seal Material n/a Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft Estimated yield of well 45 gpm First water zone 54 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sandy Clay	0	4	N
Shale	4	15	N
Sand Rock	15	30	N
Shale	30	38	N
Sand Rock	38	54	N
Water Sand	54	57	Y
Sand Rock	57	70	N
Shale	70	84	N
Water Sand	84	87	Y
Sand Rock	87	90	N
Shale	90	97	N
Water Sand	97	105	Y
Shale	105	122	N
Water Sand	122	128	Y
Sand Rock	128	138	N
Water Sand	138	144	Y
Shale	144	150	N
Water Sand	150	158	Y
Shale	158	170	N
Water Sand	170	175	Y
Sand Rock	175	181	N
Water Sand	181	187	Y
Shale	187	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? Yes
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y
 Distance of Well is 76 - 100 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with n/a Grouted from ft. to ft.
 Grouted with Cement Grouted from ft. to ft.

Firm Name Don Strawn Drilling, Inc. D/P/C No. DPC-0189
 Operator Name JAMES LEMASTER OP No. OP-1408
 Date 08/03/2005
 Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material: Fine Gravel

Filter Pack Interval: From 120 ft to 180

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 2 ft to 12 ft

Type of Annular Seal Cement Grout

Annular Seal Interval: From 110 ft to 120 ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling 61 ft

Estimated yield of well 25 gpm

First water zone 70 ft

Drawdown Pumping Test

Date	Time	Start Depth	Rate(gpm)	Duration	Drawdown depth to water(ft)
04/26/2006	12:00 PM		25	.5	160

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
topsoil	0	4	N
sandrock	4	10	N
shale	10	17	N
sandrock	17	54	N
shale	54	70	N
sandrock	70	73	Y
shale	73	85	N
sandrock	85	100	Y
shale	100	125	N
sandrock	125	180	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y

Distance of Well is 51 - 75 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Allen Water Well Drilling

D/P/C No. DPC-0003

Operator Name GARY ALLEN

OP No. OP-0003

Date 06/15/2006

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 25961

Grid table with 10 columns and 10 rows. An 'X' is marked in the top-right corner of the grid.

«----- One Mile -----»
Each square is 10-acres

Quarters NW-NE-NE Section 22 Township 12N Range 02W1

Latitude 35.506638 Longitude -97.391887
Date collected (latitude and longitude), if different from date the well was drilled: 01/08/1998
Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Mary Kathryn Grisso

Phone

Address/City/State Box 11286 Oklahoma OK

Zip

Finding Location

Well Name

Water Rights #:

TYPE OF WORK: Groundwater Well

USE OF WELL: Irrigation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/06/1971

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 10.75 inches to a depth of 830 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

1) Well Casing Material PVC Casing Diameter 10.75 inches Casing From ft to 830 ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 1.5 gpm

First water zone 140 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
no lithological description obtained			

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name MURPHY

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 6807

						X

Quarters NE-NE-NE Section 21 Township 12N Range 02W1

Latitude 35.506653 Longitude -97.407461
 Date collected (latitude and longitude), if different from date the well was drilled: 01/08/1998
 Method latitude and longitude was collected: Interpolation from PLSS

«— One Mile —»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Shady Nook Pump

Phone _____

Address/City/State 9705 NE 23rd, Oklahoma OK

Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 07/25/1986

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Well Diameter 8 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Steel Surface Pipe Diameter 6 inches Surface Pipe From ft to 10 ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 180 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
red brown dirt	0	28	N
red bed	28	42	N
rock	42	49	N
snnd	49	54	N
red bed	54	70	N
snnd	70	75	N
red bed	75	110	N
snnd	110	113	N
rock	113	120	N
red bed	120	140	N
snnd	140	145	N
red shale	145	159	N
snnd	159	163	N
red shale	163	183	N
snnd	183	187	N
shale	187	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Back filled with n/a

Back filled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name LLOYD KING

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement GroutSurface Seal Interval: From n/a ft to 62 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ftEstimated yield of well gpmFirst water zone 115 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	65	N
shale	65	90	N
water sand	90	120	N
shale	120	130	N
water sand	130	160	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name VANNOYD/PC No. Operator Name OP No. Date n/aComments: n/a

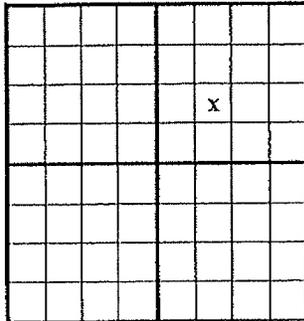
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MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North



WELL ID NUMBER: 55865

Quarters NE-SW-NE Section 21 Township 12N Range 02W1

Latitude <u>35.503038</u>	Longitude <u>-97.4119</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>11/30/2000</u>	
Method latitude and longitude was collected: <u>Interpolation from PLSS</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Martin
Address/City/State 4609 Rhode Island

Phone _____
Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 03/31/2000

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 190 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 20 gpm

First water zone 115 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
no lithological description obtained			

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Yanney & Son

D/PC No. DPC-0231

Operator Name

OP No.

Date n/a

Comments: n/a

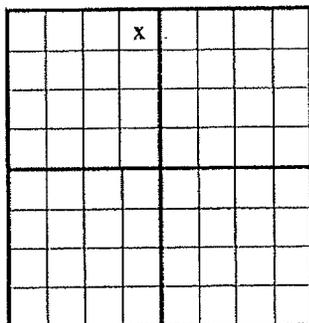


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 6808



«———— One Mile —————»
Each square is 10-meres

Quarters NE-NE-NW Section 21 Township 12N Range 02W1

Latitude 35.506653 Longitude -97.41634
Date collected(latitude and longitude), if different from date the well was drilled:
01/08/1998
Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Shady Nook Pump
Address/City/State 9705 NE 23rd
Finding Location
Well Name

Phone
Zip

Water Rights #:

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 01/16/1986
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 8 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Steel Surface Pipe Diameter 6 inches Surface Pipe From ft to 10 ft
1) Well Casing Material PVC Casing Diameter 4 inches Casing From ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 180 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 10 gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
brown dirt	0	17	N
red dirt	17	29	N
sandstone	29	33	N
red dirt	33	47	N
med rock	47	50	N
red dirt	50	63	N
clay	63	79	N
shale	79	88	N
clay	88	97	N
shale	97	105	N
sand	105	110	N
shale	110	131	N
sand	131	137	N
shale	137	152	N
sand	152	157	N
shale	157	173	N
sand	173	179	N
shale	179	193	N
sand	193	197	N
shale	197	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name LLOYD KING

D/PC No.

Well ID: 6808

Page 3 of 3

Operator Name ____

OP No. ____

Date n/a

Comments: n/a

E-3-40

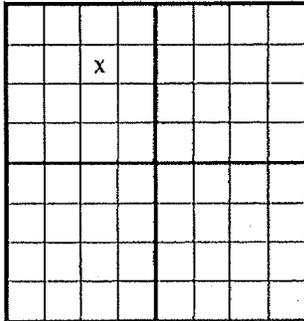


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 6809



Quarters SW-NE-NW Section 21 Township 12N Range 02W1

Latitude 35.504846 Longitude -97.418559
Date collected (Include and longitude), if different from date the well was drilled:
01/08/1998
Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Ron Collins

Phone _____

Address/City/State _____

Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 02/17/1983

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6.75 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From _____ ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 180 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 15 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 30 gpm

First water zone 100 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	12	N
sand rock	12	60	N
shale	60	85	N
sandrock	85	100	N
shale	100	135	N
water sand	135	160	N
shale	160	180	N
water sand	180	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name W. BUSBY

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 44793

Grid map showing a 10x10 square grid with an 'X' in the top-left square.

«-----» One Mile -----»
Each square is 10-acres

Quarters NW-NE-NW Section 16 Township 12N Range 02W1

Latitude 35.521318 Longitude -97.41853

Date collected (latitude and longitude), if different from date the well was drilled:
08/30/1999

Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Solitare Hones Inc.

Phone _____

Address/City/State 5500 NE 50th Street Oklahoma OK

Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 06/03/1998

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 15 ft.

Hole Diameter 7 inches to a depth of 150 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 6 inches Surface Pipe From 1 ft to 15 ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From -2 ft to 150 ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 0 ft to 15 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 15 gpm

First water zone 90 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
top soil	0	8	N
red clay	8	25	N
sand rock	25	60	N
sand rock	60	90	N
sand rock	90	105	N
sand rock	105	150	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name

D/PC No. DPC-0109

Operator Name

OP No.

Date 06/29/1999

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 6788

Grid map showing well location with an 'X' in the 3rd row, 1st column.

«----- One Mile -----»
Each square is 10-acres

Quarters NW-NW-SW Section 16 Township 12N Range 02W1

Latitude 35.51409 Longitude -97.42297
Date collected (latitude and longitude), if different from date the well was drilled: 01/08/1998
Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Tennessee Oil Exploration

Phone

Address/City/State 3000 United Founders Blvd Oklahoma OK

Zip

Finding Location

Well Name

Water Rights #: 19850089

TYPE OF WORK: Groundwater Well

USE OF WELL: Commercial

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/04/1985

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 180 ft.

CASING INFORMATION *Note: if surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

1) Well Casing Material PVC Casing Diameter 4.5 inches Casing From ft to 1803 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 133 ft to 152 ft.

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 155 ft to 168 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 30 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 90 gpm

First water zone 80 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
soil sandy soil	0	24	N
sand rock	24	68	N
shale	68	102	N
sand rock	102	118	N
shale	118	133	N
sandrock	133	152	N
shale	152	155	N
sandrock	155	168	N
shale	168	180	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name BILL MEYER

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

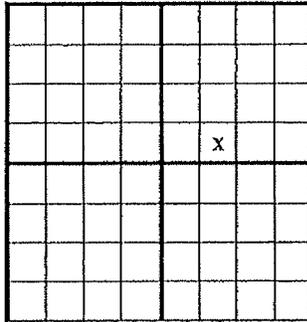


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 79145



Quarters SE-SW-NE Section 17 Township 12N Range 02W1

Latitude 35.515973 Longitude -97.42953
Date collected (latitude and longitude), if different from date the well was drilled:
08/04/2003
Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Les Spinner

Phone _____

Address/City/State 1226 NW 53 Oklahoma OK

Zip 73118

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 12/31/2002

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 11.5 inches to a depth of 15 ft.

Hole Diameter 7.5 inches to a depth of 240 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 45 gpm

First water zone 120 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
no lithological description obtained			

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Ted Jenks Water Well Svc.

D/PC No. DPC-0109

Operator Name

OP No.

Date n/a

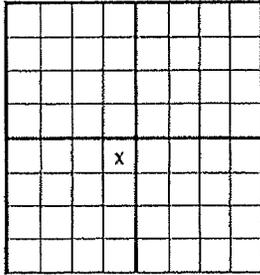
Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North



WELL ID NUMBER: 6792

Quarters NE-NE-SW Section 17 Township 12N Range 02W1

Latitude 35.514166 Longitude -97.43397
Date collected(latitude and longitude), if different from date the well was drilled: 01/08/1998
Method latitude and longitude was collected: interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) na

WELL OWNER - NAME AND ADDRESS

Well Owner Ronald Barnett
Address/City/State _____
Finding Location _____
Well Name _____

Phone _____
Zip _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 11/20/1986
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 6.75 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Steel Surface Pipe Diameter 6 inches Surface Pipe From ft to 10 ft
1) Well Casing Material PVC Casing Diameter 4 inches Casing From ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 180 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 40 gpm

First water zone 120 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
surface soil	0	1	N
red clay	1	15	N
sandrock	15	20	N
red shale	20	40	N
sandrock	40	50	N
red shale	50	75	N
sandrock	75	85	N
red shale	85	100	N
sandrock	100	110	N
red shale	110	120	N
watersand	120	130	N
red shale	130	150	N
watersand	150	165	N
red shale	165	175	N
watersand	175	195	N
red shale	195	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name STROUD ASH

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

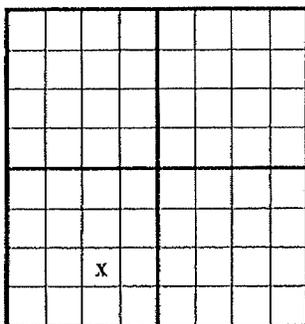


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 78024



Quarters NW-SE-SW Section 17 Township 12N Range 02W1

Latitude <u>35.510552</u>	Longitude <u>-97.43619</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>07/15/2003</u>	
Method latitude and longitude was collected: <u>Interpolation from PLSS</u>	

«----- One Mile -----»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Wisby & Sons

Phone _____

Address/City/State 4519 NE 38th Street Forrest Park OK

Zip _____

Pending Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 01/30/2003

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 20 ft.

Hole Diameter 2.875 inches to a depth of 220 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

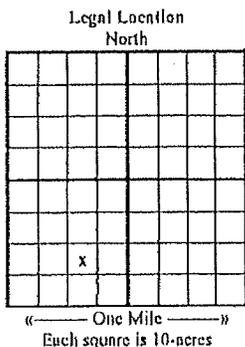
Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft

SCREEN OR PERFORATION INFORMATION



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800



WELL ID NUMBER: 105792

Quarters NW-SE-SW Section 17 Township 12N Range 02W1

Latitude 35.5107333 Longitude -97.4354667
Date collected (include and longitude), if different from date the well was drilled: 04/14/2006
Method latitude and longitude was collected: GPS - corrected data (WAAS)

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Elite Custom Homes

Phone

Address/City/State 4525 NE 38th St Forrest Park OK

Zip

Finding Location NE 36th St & Bartel Rd; W to Cimarron Estates Dr; N to NE 38th St; E to 4525

Well Name

Water Rights #:

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 04/14/2006

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 20 ft.

Hole Diameter 7.875 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 6 inches Surface Pipe From 0 ft to 12 ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From 3 ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 150 ft to 160 ft.

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 165 ft to 170 ft.

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 185 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material: Coarse Gravel
 Filter Pack Interval: From 12 ft to 200

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 2 ft to 12 ft
 Type of Annular Seal Cement Grout Annular Seal Interval: From 35 ft to 40 ft
 Filter Pack Seal Material n/a Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling 90 ft Estimated yield of well 30 gpm First water zone 90 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
surface soil - brown clay	0	3	N
tan clay	3	5	N
sandy red clay	5	10	N
sandrock	10	16	N
red shale	16	32	N
rock - sandrock	32	35	N
red shale	35	39	N
sandrock	39	75	N
red shale	75	80	N
sandrock	80	90	N
watersand	90	97	Y
red shale	97	105	N
sandrock	105	117	N
watersand	117	130	Y
red shale	130	138	N
sandrock	138	150	N
watersand	150	170	Y
red shale	170	175	N
watersand	175	190	Y
red shale	190	193	N
watersand	193	200	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? Yes
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y
 Distance of Well is 51 - 75 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with n/a Grouted from ft. to ft.
 Grouted with Cement Grouted from ft. to ft.

 Firm Name Don Strawn Drilling, Inc. D/P/C No. DPC-0189
 Operator Name STROUD ASH O/P No. OP-0289
 Date 11/19/2006
 Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 40 gpm

First water zone 80 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
no lithological description obtained			

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Don Strawn Drilling Inc.

D/PC No. DPC-0189

Operator Name

OP No.

Date n/a

Comments: n/a

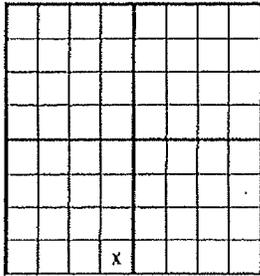
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MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North



«—— One Mile ——»
Each square is 10-acres

WELL ID NUMBER: 33396

Quarters SE-SE-SW Section 17 Township 12N Range 02W1

Latitude 35.508744 Longitude -97.43397

Date collected(latitude and longitude), if different from date the well was drilled: 01/08/1998

Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Scott Smith Well No. 21

Phone _____

Address/City/State 3811 Cimarron Park Drive

Zip _____

Finding Location NE 36th & Bartel W to Cimarron Park Estates N on Cimarron Park Drive to 3811

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 12/17/1995

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 9 inches to a depth of 20 ft.

Hole Diameter 7.875 inches to a depth of 220 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 6 inches Surface Pipe From 0 ft to 12 ft

1) Well Casing Material PVC Casing Diameter .04 inches Casing From 2 ft to 200 ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material: Fine Gravel
 Filter Pack Interval: From 220 ft to 12

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 2 ft to 12 ft
 Type of Annular Seal n/a Annular Seal Interval: From n/a ft to n/a ft
 Filter Pack Seal Material n/a Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft Estimated yield of well 35 gpm First water zone 155 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
surface soil	0	1	N
red clay	1	5	N
sandrock	5	8	N
red shale	8	25	N
sandrock	25	35	N
red shale	35	50	N
sandrock	50	65	N
red shale	65	85	N
sandrock	85	107	N
red shale	107	146	N
sandrock	146	155	Y
watersand	155	165	N
red shale	165	170	N
watersand	170	195	Y
red shale	195	200	N
watersand	200	218	Y
red shale	218	220	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a
 Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with n/a Grouted from ft. to ft.
 Grouted with Cement Grouted from ft. to ft.

Firm Name Stroud T. Ash D/PC No. DPC-189
 Operator Name OP No. OP-289
 Date 11/27/1996
 Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 22720

		X			

Quarters SE-NE-NW Section 20 Township 12N Range 02W1

Latitude <u>35.504883</u>	Longitude <u>-97.433968</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>01/08/1998</u>	
Method latitude and longitude was collected: <u>interpolation from PLSS</u>	

«———— One Mile ————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/n

WELL OWNER - NAME AND ADDRESS

Well Owner _____
Address/City/State _____
Finding Location _____
Well Name _____

Phone _____
Zip _____
Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 09/12/1990
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 7 inches to a depth of 155 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Steel Surface Pipe Diameter 6 inches Surface Pipe From _____ ft to 10 ft
1) Well Casing Material PVC Casing Diameter 4 inches Casing From _____ ft to 155 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 115 ft to 125 ft.
Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 135 ft to 150 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 25 gpm

First water zone 70 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
topsoil	0	4	N
sandroek	4	20	N
shale	20	45	N
sandroek	45	63	N
shale	63	80	N
sandroek	80	125	N
shale	125	135	N
sandroek	135	150	N
shale	150	155	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name ALLEN DRLG

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 30 gpm

First water zone 80 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	15	N
shale	15	25	N
sandrock	25	30	N
shale	30	50	N
sandrock	50	80	N
watersand	80	84	N
shale	84	97	N
watersand	97	100	N
sandrock	100	115	N
shale	115	120	N
sandrock	120	125	N
watersand	125	138	N
shale	138	140	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name CHICOTAW

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling 54 ft

Estimated yield of well 30 gpm

First water zone 60 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
no lithological description obtained			

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Gary Allen

D/PC No. DPC-0003

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 15 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 35 gpm

First water zone 90 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
quick sand	0	10	N
shale	10	35	N
sandstone	35	68	N
clay, shale	68	120	N
water sand	120	130	N
sandstone	130	145	N
water sand	145	160	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name JAMES NELSON

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 20 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 20 gpm

First water zone 70 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
top soil	0	4	N
soft sand rock	4	20	N
red shale	20	30	N
sand rock	30	70	N
sand rock	70	112	N
red shale	112	117	N
sand rock	117	140	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name TED JENKS

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 20 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone 95 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
red bed	20	120	N
sandstone	120	140	N
red bed	140	180	N
sandstone	180	200	N
sand & clay	0	201	N
red bed	200	225	N
sandstone	225	250	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name JAMES BOWEIN

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

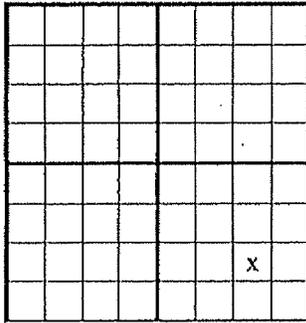


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 22718



«----- One Mile -----»
Each square is 10-acres

Quarters NW-SE-SE Section 17 Township 12N Range 02W1

Latitude <u>35.510552</u>	Longitude <u>-97.427309</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>01/08/1998</u>	
Method latitude and longitude was collected: <u>Interpolation from PLSS</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner _____
Address/City/State _____
Finding Location _____
Well Name _____

Phone _____
Zip _____
Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 06/02/1989
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 8 inches to a depth of 125 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Steel Surface Pipe Diameter 6 inches Surface Pipe From ft to 10 ft
1) Well Casing Material PVC Casing Diameter 4 inches Casing From ft to 125 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 105 ft to 125 ft.

E-3-72

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	45	N
sand rock	45	60	N
clay	60	105	N
sand rock	105	125	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name KING DRILL

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

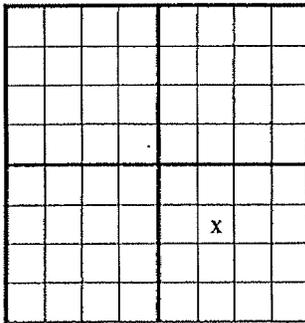


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 26762



Quarters SE-NW-SE Section 17 Township 12N Range 02W1

Latitude 35.512359 Longitude -97.42953

Date collected (latitude and longitude), if different from date the well was drilled:
01/08/1998

Method latitude and longitude was collected: Interpolation from PLSS

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner _____
Address/City/State _____
Finding Location _____
Well Name _____

Phone _____
Zip _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 10/18/1990
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 8 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft
1) Well Casing Material PVC Casing Diameter 4 inches Casing From _____ ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 180 ft to 200 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	80	N
sandrock	80	100	N
clay	100	160	N
sand rock	160	180	N
clay	180	185	N
sand rock	185	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name KING DRGL

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft.

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 30 gpm

First water zone 90 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	2	N
sand rock	2	6	N
shale	6	15	N
sand rock	15	25	N
shale	25	37	N
sand rock	37	90	N
water sand	90	115	N
sand rock	115	125	N
shale	125	165	N
water sand	165	175	N
sand rock	175	180	N
water sand	180	200	N
sand rock	200	205	N
water sand	205	217	N
sand rock	217	220	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name VANNOY

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

OK

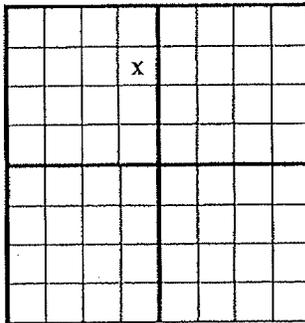


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 75648



Quarters SE-NE-NW Section 29 Township 12N Range 02W1

Latitude <u>35.490363</u>	Longitude <u>-97.434049</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>03/13/2003</u>	
Method latitude and longitude was collected: <u>Interpolation from PLSS</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Nicoma park First Baptist Chur.
Address/City/State 1931 Nichols Drive

Phone (000) 769-5323
Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 12/14/2001

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 140 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 35 gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
no lithological description obtained			

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name Yannoy Drilling

D/PC No. DPC-0213

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 40 gpm

First water zone 50 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	1	N
sand	1	7	N
sand rock	7	30	N
water sand	30	50	N
shale	50	67	N
water sand	67	140	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name VANNOY

D/PC No.

Operator Name

OP No.

Date n/a

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 76 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 76 gpm

First water zone 80 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	71	N
shale	71	76	N
water sand	76	107	N
shale	107	113	N
water sand	113	160	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name VANNOY

D/PC No.

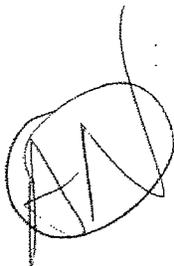
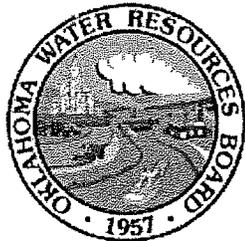
Operator Name

OP No.

Date n/a

Comments: n/a

ROPOSE WELL COMPLETION & PLUGGING REPORT



Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 6820

			X						

Quarters SW-NW-NE Section 27 Township 12N Range 02W1

Latitude <u>35.490326</u>	Longitude <u>-97.396382</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>01/08/1998</u>	
Method latitude and longitude was collected: <u>Interpolation from PLSS</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Gary Kropp

Phone _____

Address/City/State 10531 E. Apple Valley Rd. Oklahoma OK

Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 12/11/1983

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 7 inches to a depth of 140 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: ___ Surface Pipe Diameter ___ inches Surface Pipe From ___ ft to ___ ft

1) Well Casing Material PVC Casing Diameter 4 inches Casing From ___ ft to 140 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Hand Slotted From 120 ft to 140 ft.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From n/a ft to 10 ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well 30 gpm

First water zone 60 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	5	N
clay	5	11	N
sandrock	11	17	N
shale	17	22	N
rock	22	28	N
water-sand	28	30	N
rock	30	42	N
shale	42	55	N
rock	55	63	N
water-sand	63	66	N
rock	66	75	N
water-sand	75	78	N
rock	78	85	N
red-bed	85	95	N
rock	95	104	N
water-sand	104	107	N
shale	107	124	N
water-sand	124	132	N
shale	132	137	N
rock	137	140	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

E-3-85

Firm Name RON STREET

D/PC No. ____

Operator Name ____

OP No. ____

Date n/a

Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: Coarse GravelFilter Pack Interval: From 15 ft to 200**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 4 ft to 15 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 36 gpmFirst water zone 110 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	5	N
shale	5	30	N
sand rock brown	30	68	N
shale	68	84	N
sand rock red	84	93	N
shale	93	99	N
sand rock yellow	99	110	N
shale	110	118	N
water sand	118	124	N
sand rock	124	128	N
shale	128	133	Y
water sand	133	138	N
shale	138	145	N
water sand	145	153	N
shale	153	158	N
water sand	158	166	N
shale	166	170	N
water sand	170	176	N
shale	176	184	N
water sand	184	190	N
sand rock	190	195	N
shale	195	200	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/a

E-3-88

4/22/2015

Well ID: 128954

Backfilled with n/a
Grouted with n/a
Grouted with Cement

Backfilled from ___ ft. to ___ ft.
Grouted from ___ ft. to ___ ft.
Grouted from ___ ft. to ___ ft.

Firm Name DON STRAWN DRILLING, INC.

D/PC No. DPC-0189

Operator Name JAMES LEMASTER

OP No. OP-1408

Date 04/13/2010

Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: Fine GravelFilter Pack Interval: From 105 ft to 130**WELL SEAL INFORMATION**Type of Surface Seal Cement Grout/BentoniteSurface Seal Interval: From 2 ft to 20 ftType of Annular Seal Cement GroutAnnular Seal Interval: From 95 ft to 105 ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Pitless Adapter**HYDROLOGIC INFORMATION**Depth to water at time of drilling 94 ftEstimated yield of well 20 gpmFirst water zone 95 ft

Drawdown Pumping Test

Date	Time	Start Depth	Rate(gpm)	Duration	Drawdown depth to water(ft)
01/20/2010	12:00 PM		20	.5	160

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
topsoil/overburden	0	8	N
shale	8	14	N
sandrock	14	22	N
shale	22	45	N
sandrock	45	65	N
shale	65	85	N
sandrock	85	100	Y
shale	100	110	N
sandrock	110	130	Y
shale	130	138	N
sandrock	138	180	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name Allen Water Well DrillingD/PC No. DPC-0003

E-3-91

4/22/2015

Well ID: 127884

Operator Name ____

OP No. ____

Date 01/25/2010

Comments: n/a

E-3-92

FILTER PACK INFORMATIONFilter Pack Material: Coarse GravelFilter Pack Interval: From 22 ft to 240**WELL SEAL INFORMATION**Type of Surface Seal Cement Grout/BentoniteSurface Seal Interval: From 4 ft to 21 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 38 gpmFirst water zone 126 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	4	N
shale	4	31	N
sandrock	31	44	N
shale	44	50	N
sandrock	50	90	N
shale	90	110	N
sandrock	110	126	N
watersand	126	132	N
shale	132	150	N
sandrock	150	170	N
shale	170	181	N
watersand	181	186	N
shale	186	195	N
watersand	195	204	N
shale	204	217	N
watersand	217	225	N
shale	225	240	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.

E-3-94

4/22/2015

Well ID: 130626

Firm Name DON STRAWN DRILLING, INC.

D/PC No. DPC-0189

Operator Name JAMES LEMASTER

OP No. OP-1408

Date 06/09/2010

Comments: n/a

E-3-95

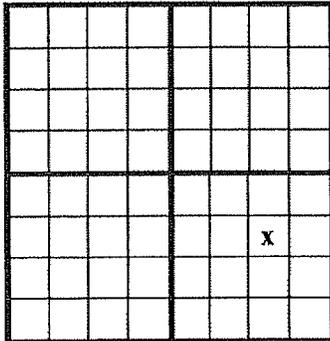
PROPOSE WELL COMPLETION & PLUGGING REPORT



Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 163297



«———— One Mile —————»

Each square is 10-acres

Quarters SW-NE-SE Section 21 Township 12N Range 02WI

Latitude <u>35.4980694</u>	Longitude <u>-97.4090528</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>10/18/2014</u>	
Method latitude and longitude was collected: <u>Mathematical conversion program</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner EAST OAK LANDFILL

Phone (817) 735-9770

Address/City/State N. E. 36TH AND SOONER ROAD OKLAHOMA CITY OK

Zip _____

Finding Location SEC OF INTERSECTION

Well Name P-3

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: De-Watering

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 10/18/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 20 inches to a depth of 40 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

1) Well Casing Material PVC Casing Diameter 16 inches Casing From 0 ft to 17 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 50 slot (0.050 inch) From 17 ft to 37 ft.

FILTER PACK INFORMATION

Filter Pack Material: Coarse Sand

Filter Pack Interval: From 15 ft to 40

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 0 ft to 2 ft

Type of Annular Seal Bentonite - Hole Plug

Annular Seal Interval: From 2 ft to 15 ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
CLAY	0	17	N
SAND	17	37	Y
SHALE	37	40	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? No

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name DAVIS ENVIRONMENTAL DRILLING, LLC

D/PC No. DPC-0197

Operator Name ROLAND DAVIS

OP No. OP-0302

Date 10/28/2014

Comments: INV. 5638. WEAVER BOOS BOB F.

FILTER PACK INFORMATION

Filter Pack Material: Gravel - 3/8 inch (medium)

Filter Pack Interval: From 120 ft to 215

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 0 ft to 10 ft

Type of Annular Seal Cement Grout

Annular Seal Interval: From 90 ft to 100 ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Pitless Adapter

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
none0	0	215	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? Yes

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y

Distance of Well is 51 - 75 feet from possible source. Type of possible source: House

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name NELSON PUMP COMPANY

D/PC No. DPC-0146

Operator Name KELLI BENNE

OP No. OP-1419

Date 04/18/2014

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material: Coarse Sand

Filter Pack Interval: From 12 ft to 34

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout

Surface Seal Interval: From 0 ft to 2 ft

Type of Annular Seal Bentonite - Hole Plug

Annular Seal Interval: From 2 ft to 12 ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
CLAY	0	14	N
SAND	14	34	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? No

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ft.

Was the well contaminated or was it plugged as though it was contaminated? n/a

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a

Was the grout tremied? n/a

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with n/a

Grouted from ft. to ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name DAVIS ENVIRONMENTAL DRILLING, LLC

D/PC No. DPC-0197

Operator Name ROLAND DAVIS

OP No. OP-0302

Date 10/28/2014

Comments: INV. 5638. WEAVER BOOS BOB F.

FILTER PACK INFORMATIONFilter Pack Material: Coarse SandFilter Pack Interval: From 15 ft to 40**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal Bentonite - Hole PlugAnnular Seal Interval: From 2 ft to 15 ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
CLAY	0	17	N
SAND	17	37	Y
SHALE	37	40	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? NoAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name DAVIS ENVIRONMENTAL DRILLING, LLCD/PC No. DPC-0197Operator Name ROLAND DAVISOP No. OP-0302Date 10/28/2014

Comments: INV. 5638. WEAVER BOOS BOB F.

FILTER PACK INFORMATIONFilter Pack Material: Coarse SandFilter Pack Interval: From 15 ft to 40**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal Bentonite - Hole PlugAnnular Seal Interval: From 2 ft to 15 ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
CLAY	0	17	N
SAND	17	37	Y
SHALE	37	40	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? NoAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name DAVIS ENVIRONMENTAL DRILLING, LLCD/PC No. DPC-0197Operator Name ROLAND DAVISOP No. OP-0302Date 10/28/2014

Comments: INV. 5638. WEAVER BOOS BOB F.

PROPOSE WELL COMPLETION & PLUGGING REPORT

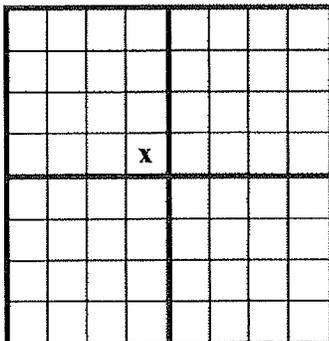


AW

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 130067



Quarters SE-SE-NW Section 17 Township 12N Range 02W1

Latitude <u>35.51512</u>	Longitude <u>-97.43506</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>03/09/2010</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Ken Jackson

Phone _____

Address/City/State 4425 NE 42nd OKC OK

Zip _____

Finding Location _____

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 03/09/2010

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: PVC/Plastic Surface Pipe Diameter 6 inches Surface Pipe From 1 ft to 10 ft

1) Well Casing Material PVC Casing Diameter 4.5 inches Casing From -3 ft to 200 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 30 slot (0.030 inch) From 140 ft to 160 ft

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 30 slot (0.030 inch) From 180 ft to 200 ft.

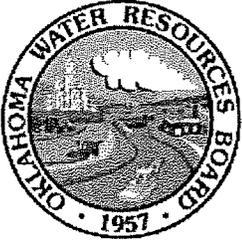
FILTER PACK INFORMATIONFilter Pack Material: Gravel 1/8 inch (pea gravel)Filter Pack Interval: From 20 ft to 200**WELL SEAL INFORMATION**Type of Surface Seal Cement Grout/BentoniteSurface Seal Interval: From 2 ft to 20 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Pitless Adapter**HYDROLOGIC INFORMATION**Depth to water at time of drilling 200 ftEstimated yield of well 25 gpmFirst water zone 140 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	15	N
sand rock	15	20	N
shale	20	60	N
sand rock	60	80	N
shale	80	140	N
sand rock	140	160	Y
shale	160	180	N
sand rock	180	200	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? YesAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 51 - 75 feet from possible source. Type of possible source: House**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name VANNOY & SON DRILLINGD/PC No. DPC-0213Operator Name AARON VANNOYOP No. OP-0894Date 06/14/2010

Comments: n/a

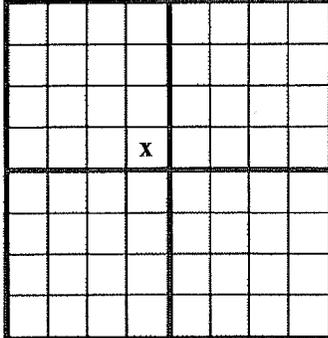
PROPOSE WELL COMPLETION & PLUGGING REPORT



Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 36516



Quarters SE-SE-NW Section 17 Township 12N Range 02WI

Latitude 35.515973 Longitude -97.43397

Date collected (latitude and longitude), if different from date the well was drilled:
04/28/1998

Method latitude and longitude was collected: Interpolation from PLSS

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner CHUA VIEN GIAC BUDDHIST TEMPLE

Phone _____

Address/City/State NE 36TH ST & BARTEL OKC OK

Zip _____

Finding Location NE 36TH ST & BARTEL

Well Name _____

Water Rights #: _____

TYPE OF WORK: Groundwater Well

USE OF WELL: Domestic

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/24/1994

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 7.5 inches to a depth of 200 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter 6 inches Surface Pipe From 0 ft to 10 ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATIONFilter Pack Material: Fine GravelFilter Pack Interval: From 15 ft to 200**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 3 ft to 15 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: Pitless Adapter**HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 38 gpmFirst water zone 52 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
TOP SOIL	0	2	N
CLAY	2	22	N
ROCK	22	28	N
CLAY	28	44	N
SAND STONE	44	60	Y
CLAY	60	78	N
SAND STONE	78	89	Y
CLAY	89	105	N
SAND STONE	105	116	N
CLAY	116	132	N
SAND STONE	132	200	Y

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name JIM CARROLL W/WELL DLGD/PC No. DPC-0036Operator Name JIM CARROLLOP No. OP-0045Date n/aComments: n/a

E-3-109

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From n/a ft to 10 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 30 gpmFirst water zone 30 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	4.5	N
sand rock	4.5	9	N
shale	9	16	N
sand rock	16	50	N
water sand	50	100	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name VANNOYD/PC No. Operator Name OP No. Date n/aComments: n/a

E-3-111

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From n/a ft to 10 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 40 gpmFirst water zone 20 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
sand	0	2	N
shale	2	9	N
sand rock	9	35	N
water sand	35	140	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name VANNOYD/PC No. Operator Name OP No. Date n/aComments: n/a

E-3-113

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From n/a ft to 20 ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well 0 gpmFirst water zone 12 ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
clay	0	12	N
quick sand	12	40	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/aTotal Depth of well being plugged ft.Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/aBackfilled from ft. to ft.Grouted with n/aGrouted from ft. to ft.Grouted with CementGrouted from ft. to ft.Firm Name CHOCTAWD/PC No. Operator Name OP No. Date n/aComments: n/a

E-3-115

APPENDIX E-4

AQTESOLV[®] HYDRAULIC CONDUCTIVITY COMPUTATIONS

Includes Figures E-4-1 through E-4-22

RISING HEAD SLUG TEST

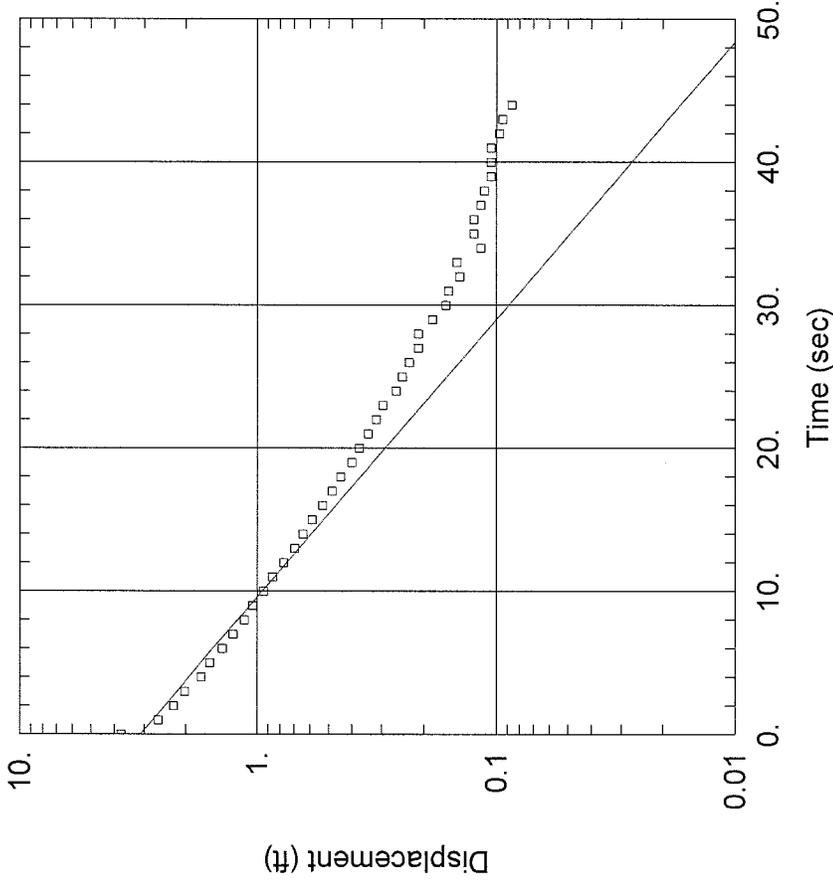
Data Set: P:\... \Aqtw1B.aqt
 Date: 10/15/14 Time: 10:44:17

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Well: PWB-1
 Test Date: June 2014

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 0.002904$ cm/sec
 $y0 = 3.113$ ft



AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

Saturated Thickness: 26. ft

WELL DATA (PWB-1)

Static Water Column Height: 18. ft
 Screen Length: 13. ft
 Well Radius: 0.25 ft

Initial Displacement: 3.749 ft
 Total Well Penetration Depth: 22.1 ft
 Casing Radius: 0.0833 ft

Figure E-4-1

Data Set: P:\Groundwater\WM\East Oak\2014 Site Exploration\Slug Test Data\Solutions\Aqtw1B.aqt
 Title: RISING HEAD SLUG TEST
 Date: 10/15/14
 Time: 10:44:41

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Date: June 2014
 Test Well: PWB-1

AQUIFER DATA

Saturated Thickness: 26. ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PWB-1

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 3.749 ft
 Static Water Column Height: 18. ft
 Casing Radius: 0.0833 ft
 Well Radius: 0.25 ft
 Well Skin Radius: 0.251 ft
 Screen Length: 13. ft
 Total Well Penetration Depth: 22.1 ft

No. of Observations: 45

Observation Data	
Time (sec)	Displacement (ft)
0.001	3.749
1.001	2.624
2.001	2.254
3.001	2.019
4.001	1.711
5.001	1.569
6.001	1.392
7.001	1.257
8.001	1.13
9.001	1.045
10.	0.937
11.	0.86
12.	0.772
15.	0.587
16.	0.53
17.	0.484
18.	0.445
19.	0.399
20.	0.372
21.	0.341
22.	0.315
23.	0.296
24.	0.261
25.	0.246
26.	0.23
27.	0.211
30.	0.162
31.	0.158
32.	0.142
33.	0.146
34.	0.116
35.	0.124
36.	0.124
37.	0.116
38.	0.112
39.	0.105
40.	0.105
41.	0.105
42.	0.097

Figure E-4-2

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
13.	0.695	28.	0.211	43.	0.094
14.	0.641	29.	0.184	44.	0.086

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.009

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	cm/sec
K	0.002904	
y0	3.113	ft

T = K*b = 2.302 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	cm/sec
K	0.002904	0.0001177	+/- 0.0002374	24.68	
y0	3.113	0.08348	+/- 0.1684	37.3	ft

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

T = K*b = 2.302 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.67
y0	0.67	1.00

Residual Statistics

for weighted residuals

Sum of Squares	0.7888 ft ²
Variance	0.01834 ft ²
Std. Deviation	0.1354 ft
Mean	0.04151 ft
No. of Residuals	45
No. of Estimates	2

WELL TEST ANALYSIS

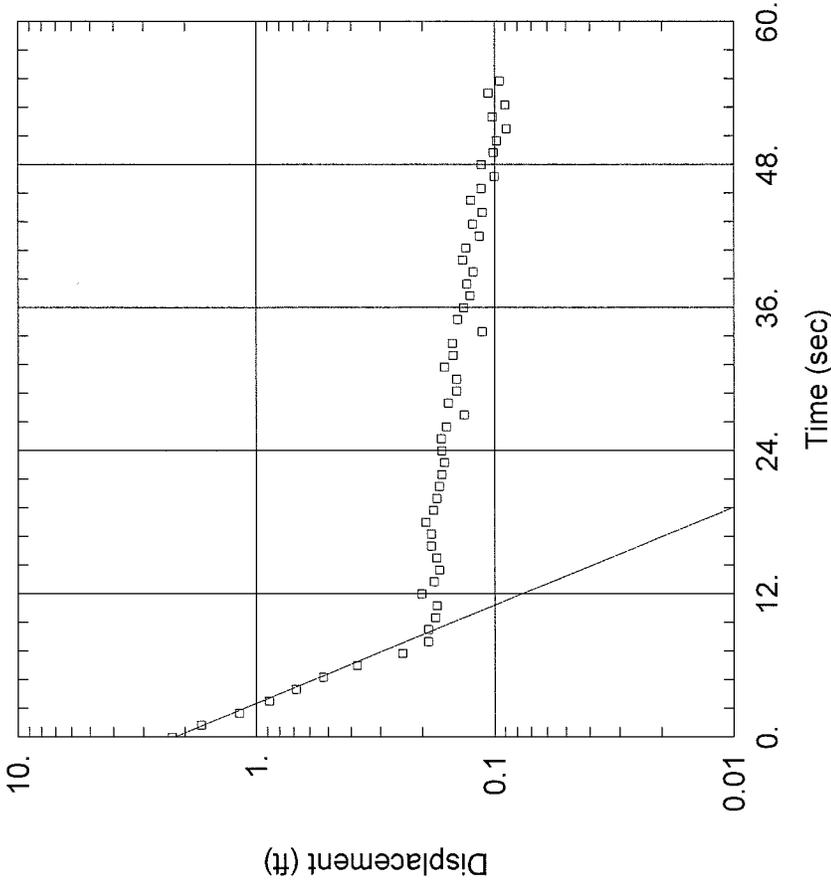
Data Set: P:\...\Aqtw2.aqt Time: 10:42:10
Date: 10/15/14

PROJECT INFORMATION

Company: Weaver Boos Consultants
Client: Waste Management, Inc.
Project: 86-356-11-40
Location: East Oak Landfill
Test Well: PWB-2
Test Date: June 2014

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.005745 cm/sec
y0 = 2.204 ft



AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

Saturated Thickness: 30.2 ft

WELL DATA (PWB-2)

Static Water Column Height: 28.2 ft
Screen Length: 17. ft
Well Radius: 0.25 ft

Initial Displacement: 2.263 ft
Total Well Penetration Depth: 28.2 ft
Casing Radius: 0.0833 ft

Figure E-4-4

AQTESOLV for Windows

Data Set: P:\Groundwater\WM\East Oak\2014 Site Exploration\Slug Test Data\Solutions\Aqtw2.aqt
Date: 10/15/14
Time: 10:42:38

PROJECT INFORMATION

Company: Weaver Boos Consultants
Client: Waste Management, Inc.
Project: 86-356-11-40
Location: East Oak Landfill
Test Date: June 2014
Test Well: PWB-2

AQUIFER DATA

Saturated Thickness: 30.2 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PWB-2

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.263 ft
Static Water Column Height: 28.2 ft
Casing Radius: 0.0833 ft
Well Radius: 0.25 ft
Well Skin Radius: 0.251 ft
Screen Length: 17. ft
Total Well Penetration Depth: 28.2 ft

No. of Observations: 56

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.001	2.263	19.	0.179	38.	0.13
1.	1.702	20.	0.173	39.	0.122
2.	1.179	21.	0.169	40.	0.135
3.	0.883	22.	0.165	41.	0.131
4.	0.681	23.	0.161	42.	0.115
5.	0.524	24.	0.165	43.	0.123
6.	0.376	25.	0.166	44.	0.112
7.	0.241	26.	0.158	45.	0.125
8.	0.188	27.	0.133	46.	0.113
9.	0.188	28.	0.155	47.	0.1
10.	0.176	29.	0.143	48.	0.113
11.	0.173	30.	0.143	49.	0.101
12.	0.201	31.	0.161	50.	0.098
13.	0.178	32.	0.148	51.	0.089

Figure E-4-5

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
14.	0.169	33.	0.149	52.	0.102
15.	0.174	34.	0.112	53.	0.09
16.	0.183	35.	0.142	54.	0.106
17.	0.183	36.	0.134	55.	0.095
18.	0.193	37.	0.126		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.296

VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.005745	cm/sec
y0	2.204	ft

T = K*b = 5.288 cm²/sec

RISING HEAD SLUG TEST

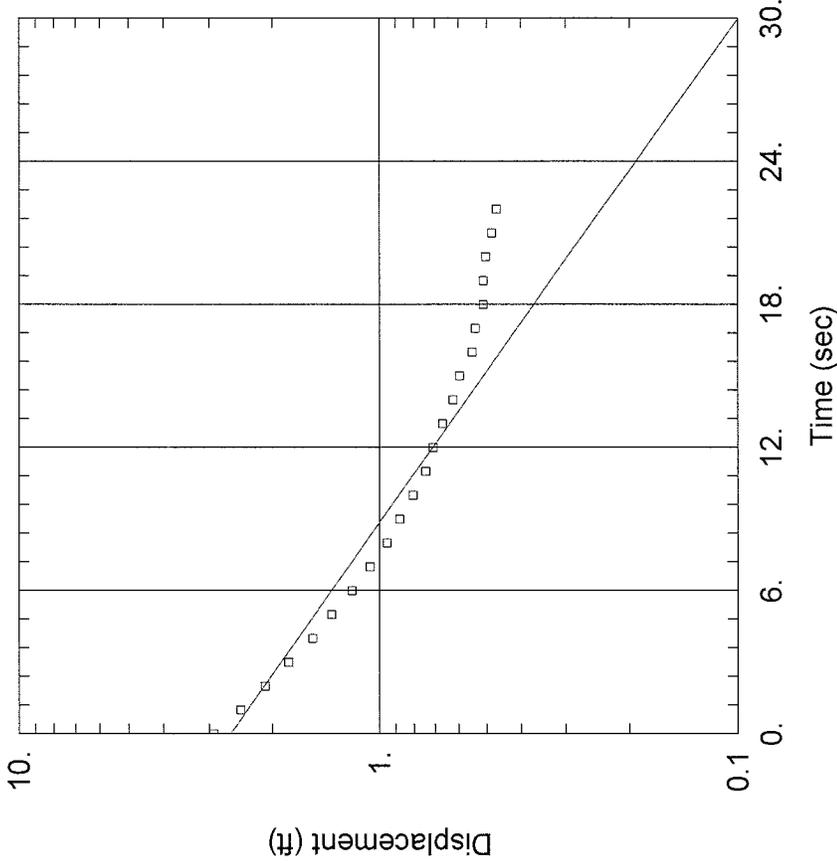
Data Set: P:\...\PWB-5.aqt Time: 10:40:01
 Date: 10/15/14

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Well: PWB-5
 Test Date: June 2014

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 0.004024$ cm/sec
 $y_0 = 2.62$ ft



AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 17.7 ft

WELL DATA (MW-5)

Static Water Column Height: 17.7 ft
 Screen Length: 9. ft
 Well Radius: 0.25 ft

Initial Displacement: 2.911 ft
 Total Well Penetration Depth: 17.7 ft
 Casing Radius: 0.0833 ft

Figure E-4-7

Data Set: P:\Groundwater\WM\East Oak\2014 Site Exploration\Slug Test Data\Solutions\PWB-5.aqt
 Title: RISING HEAD SLUG TEST
 Date: 10/15/14
 Time: 10:40:54

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Date: June 2014
 Test Well: PWB-5

AQUIFER DATA

Saturated Thickness: 17.7 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-5

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.911 ft
 Static Water Column Height: 17.7 ft
 Casing Radius: 0.0833 ft
 Well Radius: 0.25 ft
 Well Skin Radius: 0.251 ft
 Screen Length: 9. ft
 Total Well Penetration Depth: 17.7 ft

No. of Observations: 23

		Observation Data	
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.001	2.911	8.001	0.95
1.001	2.456	9.001	0.876
2.001	2.094	10.	0.803
3.001	1.801	11.	0.742
4.001	1.539	12.	0.707
5.001	1.362	13.	0.665
6.001	1.196	14.	0.622
7.001	1.061	15.	0.596
		16.	0.549
		17.	0.538
		18.	0.511
		19.	0.511
		20.	0.503
		21.	0.484
		22.	0.469

SOLUTION

Slug Test
 Aquifer Model: Unconfined

Solution Method: Bouwer-Rice
 ln(Re/rw): 3.142

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	cm/sec	ft
K	0.004024		
y0	2.62		

T = K*b = 2.171 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	cm/sec	ft
K	0.004024	0.0002284	+/- 0.000475	17.62		
y0	2.62	0.09256	+/- 0.1925	28.3		

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

T = K*b = 2.171 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.69
y0	0.69	1.00

Residual Statistics

for weighted residuals

Sum of Squares	0.4792 ft ²
Variance	0.02282 ft ²
Std. Deviation	0.1511 ft
Mean	0.0281 ft
No. of Residuals	23
No. of Estimates	2

RISING HEAD SLUG TEST

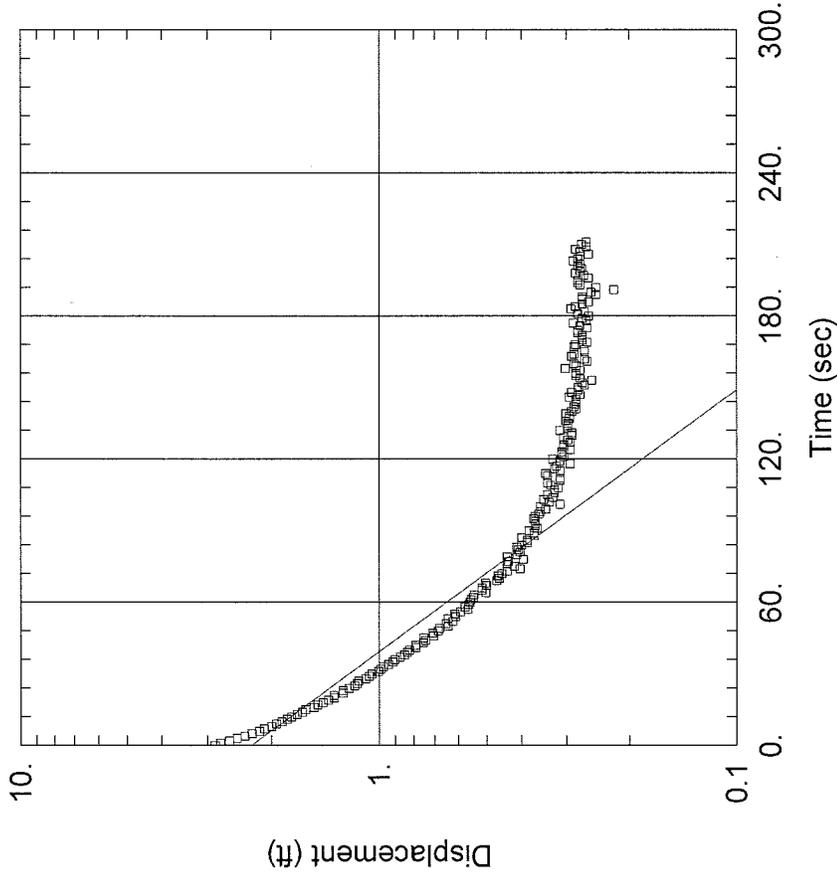
Data Set: P:\...\PWB-7.aqt
 Date: 10/15/14 Time: 10:36:54

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Well: PWB-7
 Test Date: June 2014

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 0.0008617$ cm/sec
 $y0 = 2.276$ ft



AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

Saturated Thickness: 17.7 ft

WELL DATA (MW-7)

Static Water Column Height: 17.7 ft
 Screen Length: 8. ft
 Well Radius: 0.25 ft

Initial Displacement: 2.869 ft
 Total Well Penetration Depth: 17.7 ft
 Casing Radius: 0.0833 ft

Figure E-4-10

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
13.	1.695	84.	0.4	155.	0.282
14.	1.641	85.	0.385	156.	0.282
15.	1.603	86.	0.385	157.	0.275
16.	1.522	87.	0.4	158.	0.302
17.	1.484	88.	0.369	159.	0.282
18.	1.434	89.	0.369	160.	0.286
19.	1.384	90.	0.381	161.	0.263
20.	1.337	91.	0.362	162.	0.267
21.	1.334	92.	0.366	163.	0.29
22.	1.257	93.	0.366	164.	0.286
23.	1.257	94.	0.366	165.	0.267
24.	1.21	95.	0.37	166.	0.267
25.	1.168	96.	0.366	167.	0.286
26.	1.149	97.	0.358	168.	0.283
27.	1.137	98.	0.354	169.	0.263
28.	1.087	99.	0.343	170.	0.271
29.	1.064	100.	0.354	171.	0.271
30.	1.045	101.	0.312	172.	0.271
31.	1.003	102.	0.335	173.	0.279
32.	0.987	103.	0.347	174.	0.279
33.	0.972	104.	0.327	175.	0.263
34.	0.941	105.	0.339	176.	0.275
35.	0.914	106.	0.324	177.	0.287
36.	0.903	107.	0.324	178.	0.264
37.	0.872	108.	0.316	179.	0.271
38.	0.849	109.	0.332	180.	0.26
39.	0.834	110.	0.339	181.	0.279
40.	0.822	111.	0.312	182.	0.267
41.	0.787	112.	0.312	183.	0.291
42.	0.791	113.	0.339	184.	0.283
43.	0.753	114.	0.343	185.	0.271
44.	0.742	115.	0.312	186.	0.26
45.	0.749	116.	0.324	187.	0.271
46.	0.703	117.	0.32	188.	0.271
47.	0.707	118.	0.293	189.	0.248
48.	0.684	119.	0.313	190.	0.256
49.	0.676	120.	0.328	191.	0.221
50.	0.642	121.	0.305	192.	0.248
51.	0.649	122.	0.309	193.	0.275
52.	0.622	123.	0.309	194.	0.279
53.	0.642	124.	0.293	195.	0.279
54.	0.611	125.	0.305	196.	0.26
55.	0.615	126.	0.305	197.	0.268
56.	0.592	127.	0.305	198.	0.283
57.	0.565	128.	0.297	199.	0.275
58.	0.576	129.	0.305	200.	0.272
59.	0.561	130.	0.29	201.	0.279
60.	0.557	131.	0.29	202.	0.275
61.	0.553	132.	0.313	203.	0.287
62.	0.546	133.	0.297	204.	0.279

Figure E-4-12

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
63.	0.542	134.	0.297	205.	0.275
64.	0.503	135.	0.297	206.	0.26
65.	0.515	136.	0.301	207.	0.275
66.	0.515	137.	0.294	208.	0.283
67.	0.5	138.	0.294	209.	0.264
68.	0.504	139.	0.301	210.	0.272
69.	0.469	140.	0.29	211.	0.264
70.	0.461	141.	0.282		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.108

VISUAL ESTIMATION RESULTSEstimated Parameters

Parameter	Estimate	
K	0.0008617	cm/sec
y0	2.276	ft

$$T = K*b = 0.4649 \text{ cm}^2/\text{sec}$$

AUTOMATIC ESTIMATION RESULTSEstimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio
K	0.0008617	2.669E-5	+/- 5.261E-5	32.28
y0	2.276	0.04881	+/- 0.09621	46.64

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

$$T = K*b = 0.4649 \text{ cm}^2/\text{sec}$$

Parameter Correlations

	K	y0
K	1.00	0.70
y0	0.70	1.00

Residual Statistics

for weighted residuals

Sum of Squares 6.163 ft²
Variance 0.02935 ft²
Std. Deviation 0.1713 ft
Mean 0.07353 ft
No. of Residuals 212
No. of Estimates 2

RISING HEAD SLUG TEST

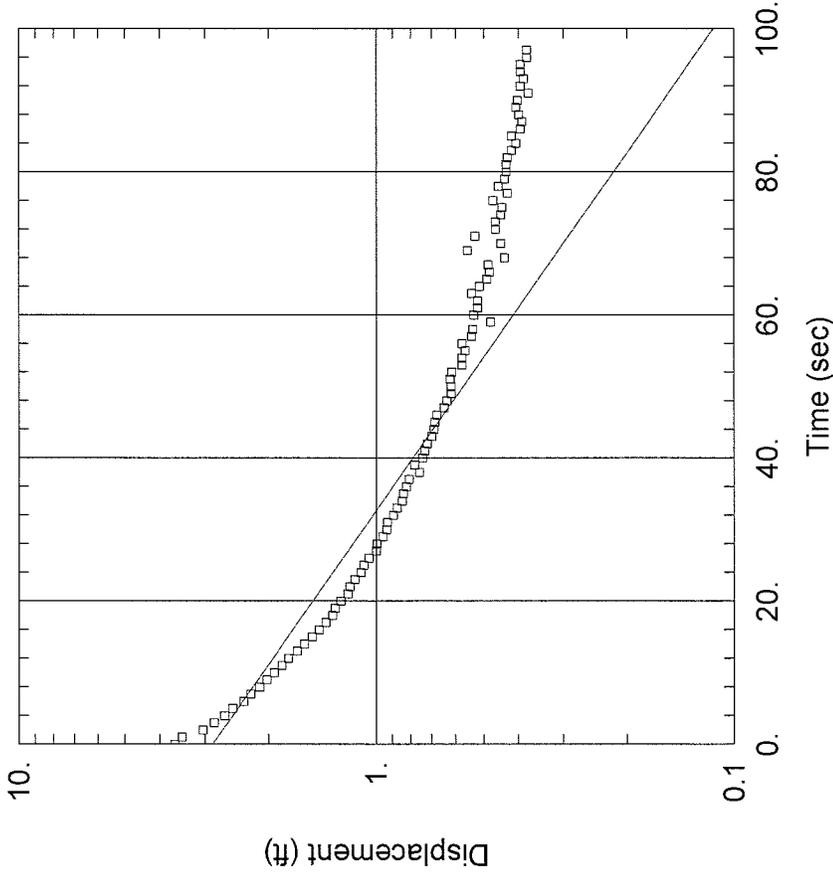
Data Set: P:\...\PWB-9.aqt
 Date: 10/15/14 Time: 15:20:06

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Well: PWB-9
 Test Date: June 2014

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 0.001067$ cm/sec
 $y_0 = 2.855$ ft



AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 16.9 ft

WELL DATA (MW-7)

Static Water Column Height: 15.9 ft
 Screen Length: 9. ft
 Well Radius: 0.25 ft

Initial Displacement: 3.629 ft
 Total Well Penetration Depth: 15.9 ft
 Casing Radius: 0.0833 ft

Figure E-4-15

Data Set: P:\Groundwater\WM\East Oak\2014 Site Exploration\Slug Test Data\Solutions\PWB-9.aqt
 Title: RISING HEAD SLUG TEST
 Date: 10/15/14
 Time: 15:20:26

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Date: June 2014
 Test Well: PWB-9

AQUIFER DATA

Saturated Thickness: 16.9 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-7

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 3.629 ft
 Static Water Column Height: 15.9 ft
 Casing Radius: 0.0833 ft
 Well Radius: 0.25 ft
 Well Skin Radius: 0.251 ft
 Screen Length: 9. ft
 Total Well Penetration Depth: 15.9 ft

No. of Observations: 98

Time (sec)	Displacement (ft)	Observation Data	
		Time (sec)	Displacement (ft)
0.01	3.629	33.	0.871
1.	3.467	34.	0.844
2.	3.032	35.	0.837
3.	2.82	36.	0.821
4.	2.646	37.	0.806
5.	2.512	38.	0.756
6.	2.338	39.	0.779
7.	2.234	40.	0.74
8.	2.111	41.	0.729
9.	2.019	42.	0.718
10.	1.926	43.	0.698
11.	1.83	44.	0.687
12.	1.753	45.	0.683
		66.	0.483
		67.	0.487
		68.	0.437
		69.	0.556
		70.	0.448
		71.	0.529
		72.	0.464
		73.	0.464
		74.	0.448
		75.	0.445
		76.	0.472
		77.	0.429
		78.	0.456

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
13.	1.653	46.	0.675	79.	0.437
14.	1.583	47.	0.644	80.	0.433
15.	1.506	48.	0.633	81.	0.433
16.	1.441	49.	0.617	82.	0.429
17.	1.379	50.	0.617	83.	0.418
18.	1.322	51.	0.621	84.	0.406
19.	1.299	52.	0.614	85.	0.418
20.	1.252	53.	0.575	86.	0.395
21.	1.198	54.	0.575	87.	0.391
22.	1.183	55.	0.564	88.	0.399
23.	1.145	56.	0.575	89.	0.406
24.	1.102	57.	0.541	90.	0.402
25.	1.083	58.	0.537	91.	0.375
26.	1.045	59.	0.479	92.	0.395
27.	0.998	60.	0.533	93.	0.387
28.	0.994	61.	0.521	94.	0.395
29.	0.956	62.	0.521	95.	0.395
30.	0.933	63.	0.541	96.	0.379
31.	0.929	64.	0.514	97.	0.379
32.	0.894	65.	0.491		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 2.821

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.001067	cm/sec
y0	2.855	ft

$$T = K \cdot b = 0.5497 \text{ cm}^2/\text{sec}$$

AUTOMATIC ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>Std. Error</u>	<u>Approx. C.I.</u>	<u>t-Ratio</u>
K	0.001067	4.047E-5	+/- 8.034E-5	26.37
y0	2.855	0.07297	+/- 0.1449	39.12

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

$T = K \cdot b = 0.5497 \text{ cm}^2/\text{sec}$

Parameter Correlations

	K	y0
K	1.00	0.71
y0	0.71	1.00

Residual Statistics

for weighted residuals

Sum of Squares	4.1 ft ²
Variance	0.04271 ft ²
Std. Deviation	0.2067 ft
Mean	0.05207 ft
No. of Residuals	98
No. of Estimates	2

RISING HEAD SLUG TEST

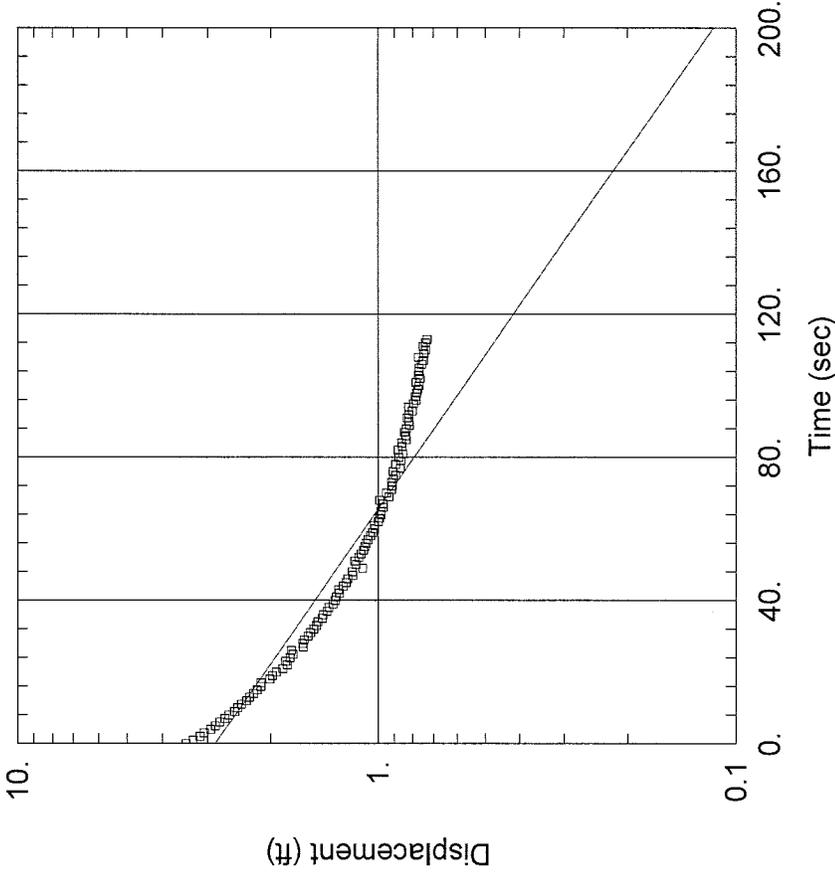
Data Set: P:\...\PWB-10.agt
 Date: 10/15/14
 Time: 15:29:58

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Well: PWB-10
 Test Date: June 2014

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 0.0006647$ cm/sec
 $y_0 = 2.856$ ft



AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 18.5 ft

WELL DATA (MW-10)

Static Water Column Height: 18.5 ft
 Screen Length: 8. ft
 Well Radius: 0.25 ft

Initial Displacement: 3.446 ft
 Total Well Penetration Depth: 18.5 ft
 Casing Radius: 0.0833 ft

Figure E-4-19

Data Set: P:\Groundwater\WM\East Oak\2014 Site Exploration\Slug Test Data\Solutions\PWB-10.aqt
 Title: RISING HEAD SLUG TEST
 Date: 10/15/14
 Time: 15:30:32

PROJECT INFORMATION

Company: Weaver Boos Consultants
 Client: Waste Management, Inc.
 Project: 86-356-11-40
 Location: East Oak Landfill
 Test Date: June 2014
 Test Well: PWB-10

AQUIFER DATA

Saturated Thickness: 18.5 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 3.446 ft
 Static Water Column Height: 18.5 ft
 Casing Radius: 0.0833 ft
 Well Radius: 0.25 ft
 Well Skin Radius: 0.251 ft
 Screen Length: 8. ft
 Total Well Penetration Depth: 18.5 ft

No. of Observations: 114

Observation Data	
<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.001	3.446
1.001	3.284
2.001	3.146
3.001	3.065
4.001	2.942
5.001	2.853
6.001	2.772
7.001	2.684
8.001	2.614
9.001	2.522
10.	2.476
11.	2.414
12.	2.337
<u>Time (sec)</u>	<u>Displacement (ft)</u>
38.	1.372
39.	1.337
40.	1.318
41.	1.307
42.	1.28
43.	1.288
44.	1.249
45.	1.226
46.	1.214
47.	1.176
48.	1.18
49.	1.103
50.	1.149
<u>Time (sec)</u>	<u>Displacement (ft)</u>
76.	0.907
77.	0.865
78.	0.892
79.	0.861
80.	0.873
81.	0.85
82.	0.877
83.	0.854
84.	0.858
85.	0.831
86.	0.835
87.	0.842
88.	0.831

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
13.	2.291	51.	1.161	89.	0.815
14.	2.233	52.	1.13	90.	0.819
15.	2.18	53.	1.115	91.	0.827
16.	2.13	54.	1.096	92.	0.819
17.	2.13	55.	1.088	93.	0.8
18.	2.01	56.	1.076	94.	0.82
19.	1.976	57.	1.065	95.	0.793
20.	1.93	58.	1.049	96.	0.781
21.	1.853	59.	1.034	97.	0.785
22.	1.799	60.	1.019	98.	0.777
23.	1.818	61.	1.023	99.	0.773
24.	1.768	62.	0.996	100.	0.766
25.	1.737	63.	0.988	101.	0.781
26.	1.753	64.	0.98	102.	0.762
27.	1.622	65.	0.98	103.	0.77
28.	1.626	66.	0.965	104.	0.766
29.	1.61	67.	0.965	105.	0.766
30.	1.572	68.	0.988	106.	0.754
31.	1.545	69.	0.93	107.	0.747
32.	1.514	70.	0.946	108.	0.77
33.	1.491	71.	0.915	109.	0.743
34.	1.476	72.	0.911	110.	0.735
35.	1.434	73.	0.915	111.	0.747
36.	1.426	74.	0.904	112.	0.735
37.	1.391	75.	0.892	113.	0.728

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.134

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0006647	cm/sec
y0	2.856	ft

T = K*b = 0.3748 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio
K	0.0006647	1.834E-5	+/- 3.633E-5	36.25
y0	2.856	0.04676	+/- 0.09262	61.08
				cm/sec
				ft

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

$T = K*b = 0.3748 \text{ cm}^2/\text{sec}$

Parameter Correlations

	K	y0
K	1.00	0.74
y0	0.74	1.00

Residual Statistics

for weighted residuals

Sum of Squares	3.366 ft ²
Variance	0.03005 ft ²
Std. Deviation	0.1734 ft
Mean	0.01887 ft
No. of Residuals	114
No. of Estimates	2

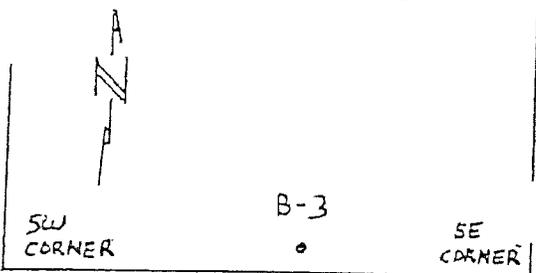
APPENDIX E-5

**EXISTING EAST OAK RDF AND MOSLEY ROAD LANDFILL
GROUNDWATER MONITORING SYSTEMS**

Includes pages E-5-1 through E-5-56

EXISTING EAST OAK RDF MONITORING SYSTEM LOGS

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak Landfill		DRILLING METHOD: Rotary with			BORING NO. B-3 (MW-22R)			
		6-1/4" ID Augers - Hollow Stem			SHEET 1 OF 1			
		SAMPLING METHOD: 2" Split Spoon			DRILLING			
					START TIME	FINISH TIME		
DATUM		ELEVATION 1149.6		DATE 8/14/91		DATE 8/15/91		
DRILL RIG CME-55		SURFACE CONDITIONS Dry, Sandy Clay Soil in Drainage Channel						
ANGLE Vertical BEARING								
SAMPLE HAMMER TORQUE		FT.-LBS						

DEPTH IN FEET (ELEVATION)	BLOWS/BLIN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS							
							WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS			
0		SP	1. SAND, Fine Medium Grain, Quartz, Round, Poorly Graded, Mod-Well Sorted, Brownish Yellow (10YR 6/6) Loose.	6 1/4 HS										
5	3,5,10 100%	SP	2. SAND, Coarse to Fine Grained, Quartz, Poor Sorted, Mod. to Well Graded, Brownish Yellow Becoming Grayish Brown (10YR 5/2) Rounded-Subrounded, Saturated, Loose.	2" SS										
10	11,4 100%	SP CH	3. SAND, As Above with Silty Clay Stringer @ 14.3' Low Plasticity, Dark gray (10YR 4/1) Wet, Soft, Homogeneous. @ 15.2' SAND, Fine to Medium Grained, Quartz, Round, Poorly Graded, Moderate to Well Sorted, Gray (10YR 6/1) Saturated, Loose.	2" SS										
15	2,2,9 100%	SP	4. SAND, Medium to Very Coarse Grained, with Pebbles, Quartz, Round, Moderate Sorting, Poorly Graded, Gray (10YR 5/1) Saturated Loose.	6 1/4 HS										
20	1,1,1 100%			2" SS										
25				6 1/4 HS										
30														
35		SS	33.5' Shale											
			35.0' Garber-Wellington											
			Total Depth 37'											

DRILLING CONTR Terracon

SL 11239

LOGGED BY Robert P. Bayer, II
DATE 8/14/91 CHK'D BY GPL/SJC

Well No. MW-22R

Boring No. X-Ref: B-3

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: _____ Elevation Ground Level 1149.57

Top of Casing 1152.31 (C2)

Drilling Summary:

Total Depth 37.0
 Borehole Diameter 7-7/8"
 Casing Stick-up Height: 3.0
 Driller Dan Dubray
 Helper - Don Plumb

Rig CME-55
 Bit(s) 6 1/4" ID Auger

Drilling Fluid 0' - 33' None
33' - 37' Clean H₂O
 Protective Casing 7'x 4" ID Aluminum

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	8/14/91	15:30	8/15/91	10:15
Well Const.	8/15/91	10:15	8/15/91	14:40
Well Cover	8/16/91	14:30	8/16/91	15:00
Geophys. Logging:	8/14/91	15:40	8/15/91	10:15
Casing:	8/15/91	10:15	8/15/91	10:30
Filter Placement:	8/15/91	10:30	8/15/91	12:00
Cementing:	8/15/91	13:30	8/15/91	14:40
Development:	10/17/91	15:30	10/18/91	8:50

Well Design & Specifications

Basis: Geologic Log X Geophysical Log _____
 Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
+ 3.5' - -3.5'	C1	1152.87 - 1145.87
+3.0' - 27.0'	C2	1152.31 - 1122.31
-27.0' - 37.0'	S1	1122.31 - 1112.31
-	-	-
-	-	-

Casing: C1 4" Dia. Aluminum
Well Protector
 C2 2" Schedule 40 PVC
Flush-Threaded
 Screen: S1 2" Sch 40 PVC 0.010
Slot flush Threaded
 S2 _____

Filter Pack: 37.0 - 22.0' 20-40 Colorado
Silica Sand; 22.0' - 20.0' Fine Sand

Grout Seal: 15.0 - 0.0' Lonestar
Type 1 Portland & Bentonite
Grout

Bentonite Seal: 20.0' - 15.0' Pel-Plug
Bentonite Pellets

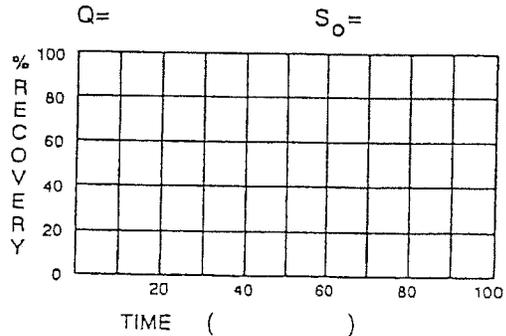
Well Development:

Air discharge until stabilization

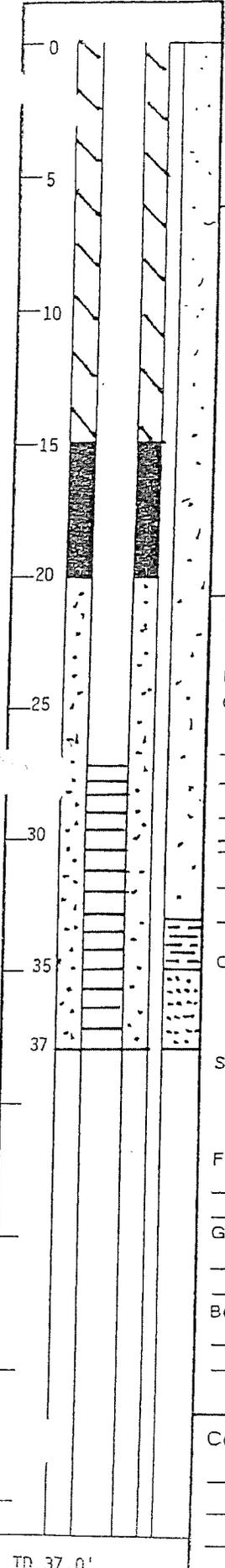
Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
15:30	7.96	0.91E3	18.5
16:00	7.84	0.84E3	17.9
16:30	7.77	0.83E3	17.7
17:00	7.76	0.81E3	17.6
18:00	7.72	0.78E3	17.4

Recovery Data:



Comments: _____



SITE NAME East Oak Landfill
 LOCATION Oklahoma City, OK

WC 03383

SUPERVISED BY Robert P. Bayer, II

DATE 8/14/91

4" ANODIZED ALUMINIUM PROTECTIVE CASING w/ CAP & LOCK

TOP OF CASING (Cap Open)
EL. 1152.87 FT.
LENGTH ABOVE G.L. 3.30 FT.

CAP

PEA GRAVEL

TOP OF RISER EL. 1152.31 FT.
LENGTH ABOVE G.L. 2.74 FT.

CONCRETE PAD
EL. NA

GROUND SURFACE

DEPTH (FL.) ELEV. (FL.)
0 1149.57

3.7 1145.87

3.7 FT.

GROUT: CEMENT & BENTONITE

11.3 FT.

2-INCH SCH.40 PVC RISER

15.0 1134.57

7-7/8-INCH NOMINAL DIAMETER BOREHOLE

5.0 FT.

BENTONITE PELLET SEAL

20.0 1129.57

SECONDARY FILTER PACK:
FINE SILICA SAND

2.0 FT.

22.0 1127.57

PRIMARY FILTER PACK:
20/40 WASHED SILICA SAND

5.26 FT.

27.26 1122.31

WELL SCREEN

MATERIAL: Sch.40 PVC
SLOT WIDTH: 0.010 inches
LENGTH: 10 feet
I.D.: 2.0 inches

10 FT.

37.26 TO 1112.31

THREADED BOTTOM CAP

TD = TOTAL DEPTH

DATE DRILLED: 8-15-91

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 65147.100

CADD File: 65147SW/6147W22R.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
Oklahoma City, Oklahoma

E-5 MONITORING WELL MW-22R

SOIL BOREHOLE LOG

SITE NAME AND LOCATION East Oak Landfill

DRILLING METHOD: Rotary with 6 1/4" Hollow Stem Augers

BORING NO. MW-25R
B-4

NORTH WEST CORNER
B-4



SAMPLING METHOD: 2" Split Spoon

SHEET 1 OF 2

DRILLING

WATER LEVEL 14.5'

START TIME

TIME 16:15

15:50 08:20

DATE 8/13/91

DATE

CASING DEPTH

8/15/91 8/17/91

DATUM ELEVATION 1155.8

DRILL RIG CME-55

SURFACE CONDITIONS Dry - Sandy Silty Soil.

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS								
							WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS				
0		SP	1. SAND, V.F. Grained, Some Silt, Poor Graded, Well Sorted Round, Quartz, Yellowish Brown (10YR 6/5) Loose, North Canadian Alluvium.	6 1/4" HS											
5	4,4,8 100%	SP	2. SAND, Silty, V.F. Grained XXX Well Sorted Quartz, Reddish Brown, (2.5 YR 4/4) Round Loose.	2" SS 6 1/4" HS											
10	5,5,4 100%	SP	3. SAND, V.F. to Fine Grain, Round, Poorly Graded Well Sorted, Quartz, Little to Trace Silt, Reddish Brown (2.5YR 5/4) Moist, Loose N. Canadian Alluvium.	2" SS 6 1/4" HS											
15	5,1,1 100%	SP	4. SAND, Fine Grained, Well Sorted, Poorly Graded Round, Quartz, Yellowish Red (5YR 5/6) Saturated, Loose.	2" SS 6 1/4" HS											
20	1,1,6 100%	SP	5. SAND, Fine to Medium Grained, Occasionally Coarse Grained, Quartz, Moderate Graded Moderate to Poorly Sorted, Round, Gray (10YR 6/1) Saturated Loose.	2" SS 6 1/4" HS											
25	1,1,2 100%			2" SS 6 1/4" HS											
30															
35															

DRILLING CONTR Tetracon

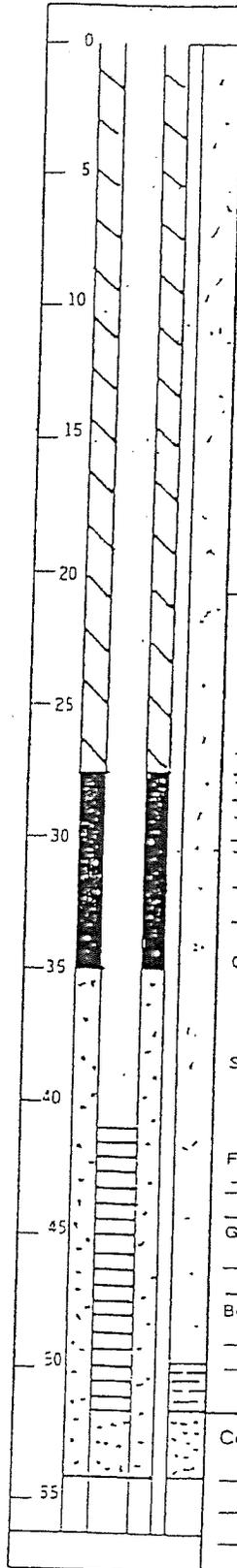
SL 11242

LOGGED BY Robert P. Bayer, II
DATE 8/15/91 CHK'D BY GPL/ SJC

Well No. MW-25 R
 Boring No. X-Ref: B-4

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: _____ Elevation Ground Level 1155.82
 Top of Casing 1158.80 (C2)



Drilling Summary:
 Total Depth 53.5'
 Borehole Diameter 7-7/8"
 Casing Stick-up Height: 3.0'
 Driller Dan Dubray
 Helper - Dan Plumb
 Geologist - Rob Bayer
 Rig CME-55
 Bit(s) 6 1/2" ID Auger
 Drilling Fluid 0' - 43.5' None
43.5' - 53.5' Clean H₂O
 Protective Casing 4" ID Aluminum x 7'

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	8/15/91	15:00	8/17/91	8:20
Well Cover	8/23/91	8:00	8/23/91	8:15
Geophys. Logging:	8/15/91	15:50	8/17/91	8:20
Casing:	8/17/91	8:20	8/17/91	8:30
Filter Placement:	8/17/91	8:30	8/17/91	10:45
Cementing:	8/17/91	11:30	8/17/91	12:40
Development:	10/16/91	16:10	10/17/91	9:00

Well Design & Specifications

Basis: Geologic Log y Geophysical Log _____
 Casing String (s): C = Casing S = Screen.

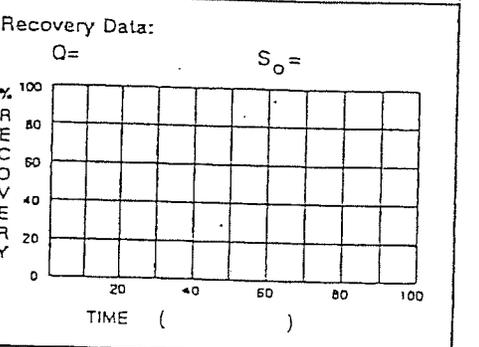
Depth	String(s)	Elevation
+3.5 - -3.5'	C1	1159.35 - 1142.35
+3.0 - 41.5	C2	1158.80 - 1114.30
-41.5 - 51.5	S1	1114.30 - 1104.30
-	-	-
-	-	-

Well Development:
 Air discharge until stabilization.

Casing: C1 4" ID Aluminum
Protective Cover
 C2 2" Sch. 40 PVC Riser
 Screen: S1 2" Sch. 40 PVC
0.010 Slot
 S2: _____
 Filter Pack: Colorado Silica 20-40
-52' to -37'; fine sand -37' to -35'
 Grout Seal: Lonestar Type 1 Portland
-25' to 0'
 Bentonite Seal: Pel Plug - Bentonite
Pellets -35' to -25'

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
16:10	7.11	0.79E3	20.4
16:45	7.42	0.77E3	20.1
17:30	7.50	0.74E3	17.8
8:30	7.57	0.70E3	15.7
9:00	7.59	0.70E3	16.0

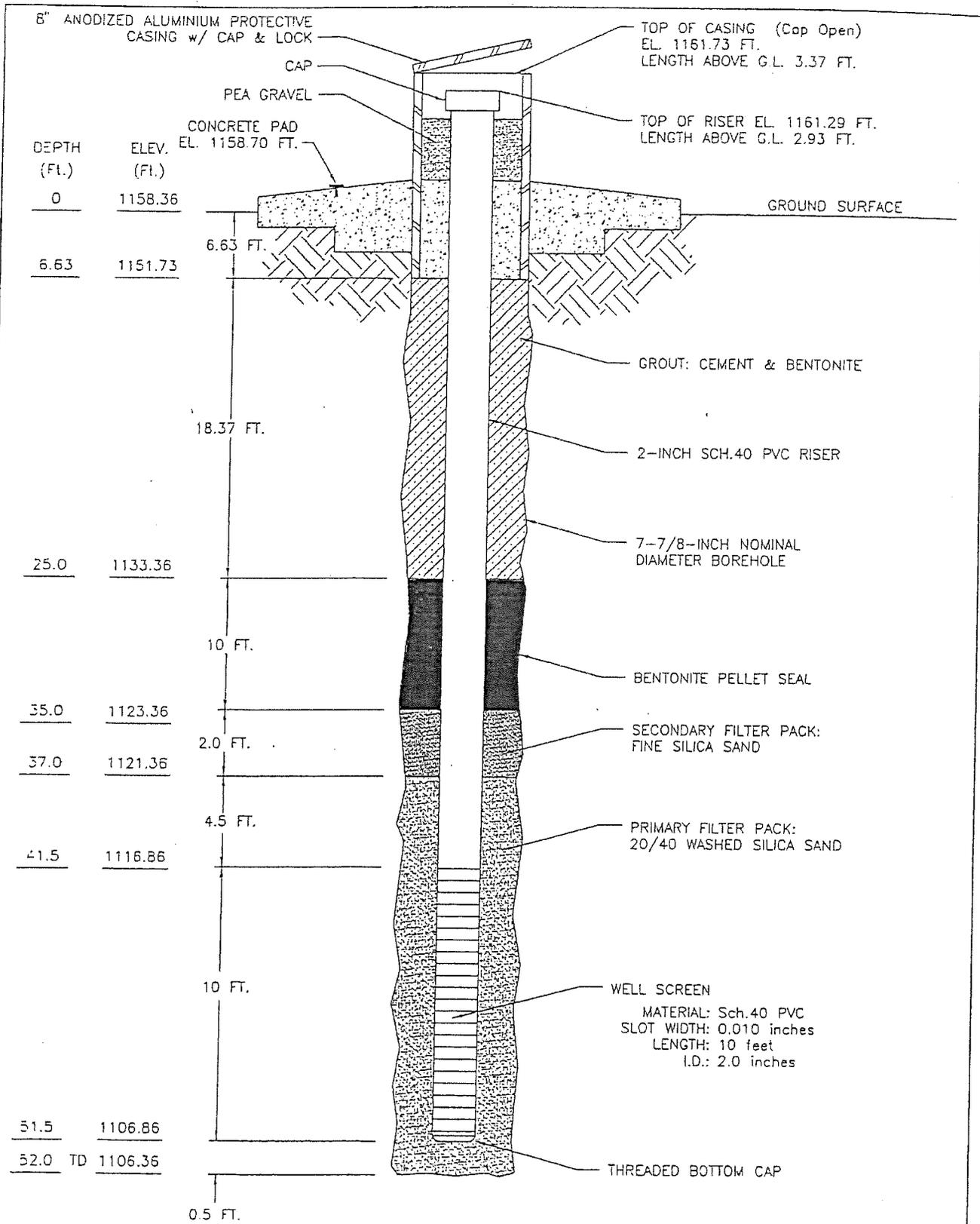


Comments: Screened interval, on MWCS is 41.5' - 51.5'
Hole came to S1 5'

SITE NAME East Oak Landfill
 LOCATION Oklahoma City, OK

WC 03384

SUPERVISED BY Robert P. Bayer, II
 DATE 8/15/91



TD = TOTAL DEPTH

DATE DRILLED: 8-17-91

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995
 Project: 65147.100
 CADD File: /68147SW/8147W25R.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
 INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
 Oklahoma City, Oklahoma

MONITORING WELL MW-25R

SOIL BOREHOLE LOG

MW-27

SITE NAME AND LOCATION:

East Oak RDF
Oklahoma City, Oklahoma
Monitoring Well Installation
68174.100

DRILLING METHOD: Hollow Stem Auger (HSA)

BORING NUMBER:

B-27

SAMPLING METHOD: Split Spoon (SS)

Sheet 1 of 2

Sampler (2-foot)

DRILLING

		INI		STATIC		START	FINISH
WATER LEVEL						TIME	TIME
		12.5		16.77		1358	1502
TIME				0932		DATE	DATE
		1431				8/21/95	8/21/95
DATE				8/24/95			
		8/21/95					
CASING DEPTH							

DATUM: ft. MSL

ELEVATION: 1156.60

DRILL RIG: CME-75

SURFACE CONDITIONS: Dry.

ANGLE: Vertical

BEARING: ---

SAMPLE HAMMER TORQUE: ft.-lbs.

Terracon Consultants
Drilling Contractor
Oklahoma City, OK

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS						
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS		
1	100		•••••	FILL: Silty SAND, fine-grained, pale yellowish brown (10YR 6/2), dry, rooted	000									
2														
3	100		•••••	: medium-grained, same colors w/some moderate yellowish brown (10YR 5/4), dry	001									
4														
5	100		•••••	: all moderate yellowish brown (10YR 5/4), dry to moist	002									
6				: slightly clayey										
7	100		•••••	: firm, some dark yellowish brown (10YR 4/2), moist	003									
8														
9	100		/ / / / /	CLAY, Sandy (CL): firm to hard, 2.5 (PP), greenish black (5GY 2/1)	004									
10														
11	100		•••••	SAND, Silty (SM): fine to medium-grained, grayish orange (10YR 7/4)	005									
12														
13	100		•••••	: wet, rapid dilatancy : silt seam @ 12.75-13 feet	006									
14				: medium-grained										
15	50		•••••	: no recovery from 14-15 feet	007									

LOGGED BY Jeff Austin
DATE 8/21/95
CHECKED BY Karen Gallup

WELL No. MW-27

Boring No X-Ref. B-27

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords E 2,172,448.21, N 183,564.61

Elevation Ground Level 1156.60

Pin Elevation 1156.68 Top of Casing 1159.04

Drilling Summary

Total Depth (ft): 24
 Borehole Diameter (in): 8-inch
 Casing Stickup Height (ft): 2.44
 Driller: Terracon Consultants
 Driller-Don Plumb
 Rig: CME-75
 Bit (s): HSA
 Drilling Fluid: NONE w/HSA

Protective Casing: 5-foot Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing String (s): C = Casing S = Screen

Depth (ft)	String (s)	Elevation (MSL)
+2.83 - 2.17	C ₁	1159.43 - 1154.43
+2.44 - 8.00	C ₂	1159.04 - 1148.60
8.00 - 23.00	S ₁	1148.60 - 1133.60
-	-	-
-	-	-

Casing: C1 6" Anodized Aluminum (square)
 (+3.14-1.86 feet)

Casing: C2 2" PVC, Sch.40, Flush Joint
 (+2.44-8 feet)

Screen: S1 2" PVC, Sch.40, .010-inch slotted
 (8-23 feet)

Screen: S2

Grout Seal: Bentonite Grout
 (0-3 feet)

Bentonite Seal: Bentonite Pel-Plug, fine-grained
 (3-6 feet)

Filter Pack: 20/40 Silica Sand
 (6-24 feet)

Comments

Drilled and sampled with HSA; very fast recovering well, therefore couldn't get many data points for recovery test.

Construction Time Log

8/21/95-8/26/95

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	8/21/95	1358	8/21/95	1502
Casing:				
C ₁ Prot.:	8/26/95	1021	8/26/95	1025
S ₁ /C ₂ 2" PVC:	8/21/95	1520	8/21/95	1524
Bentonite Seal:	8/21/95	1558	8/21/95	1601
Grout Seal:	8/21/95	1601	8/21/95	1606
Filter Placement:	8/21/95	1505	8/21/95	1557
Cementing:	8/26/95	1001	8/26/95	1137
Development:	8/24/95	1509	8/25/95	0836

Well Development

8/25/95

Removed 270 gallons on 8/24/95 with grundfos pump.
 Removed 45 gallons on 8/25/95 with grundfos pump.
 Total gallons removed = 315 gallons.

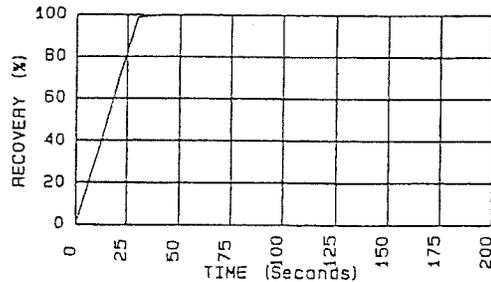
Stabilization Test Data

8/25/95

Time	pH	Spec. Cond.	Temp (C)
1631	7.7	660	25.5
1635	7.7	440	23.9
1638	7.7	431	21.4
1640	7.6	433	21.4

Recovery Data

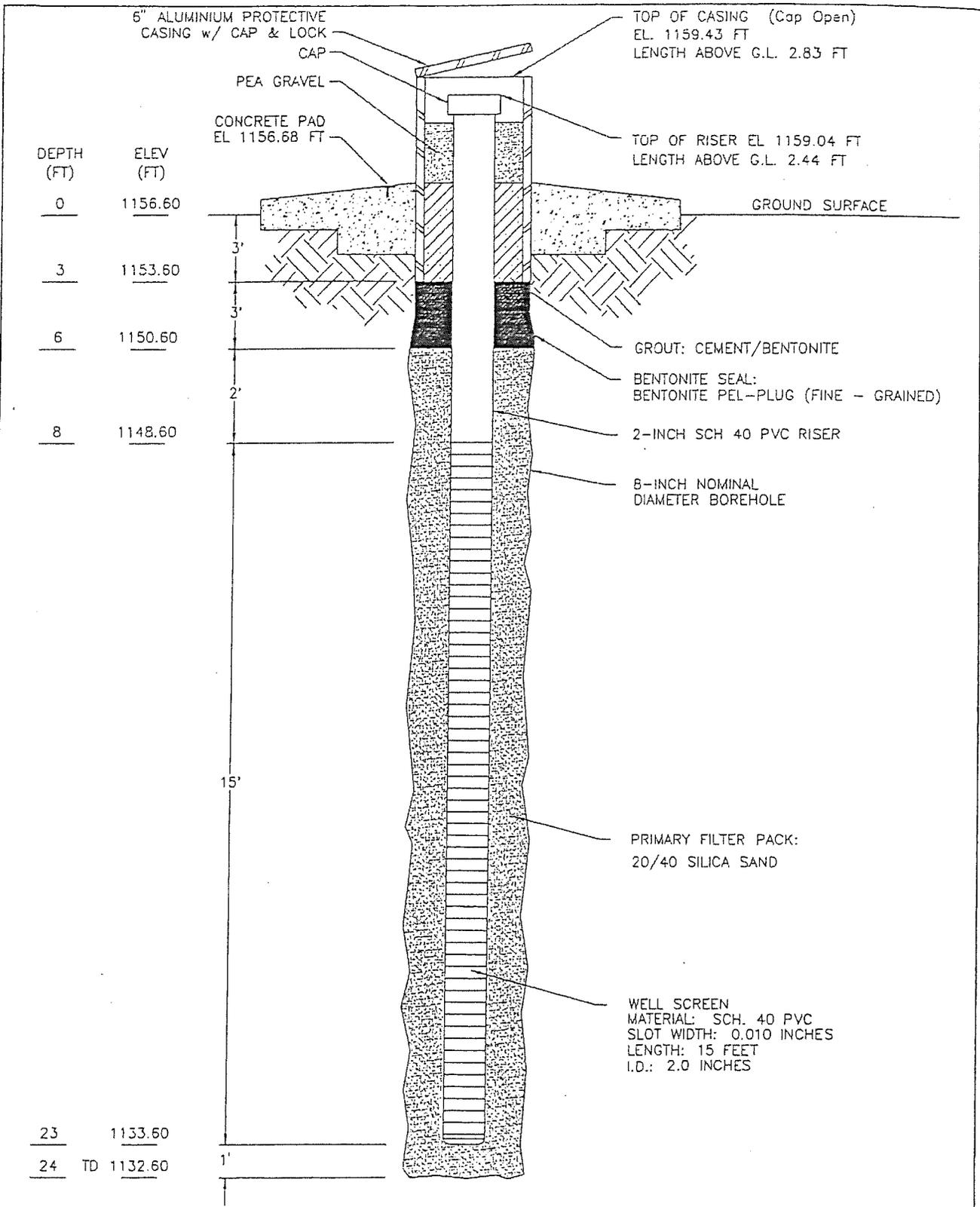
Q = 315 gallons S₀ = 16.77 feet



SITE NAME East Oak RDF
 LOCATION Oklahoma City, Oklahoma

SUPERVISED BY Jeff Austin
 DATE 8/21/95-8/26/95 CHECKED BY Karen Gallup

T.D. = 24 ft.



TD = TOTAL DEPTH

DATE DRILLED: 8-21-95

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 68147.100

CADD File: 68147SW/8147MW27.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
 INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
 Oklahoma City, Oklahoma

MONITORING WELL MW-27

LOG OF MONITORING WELL NO. MW-28R

Project Description: **East Oak RDF**
Oklahoma County, OK

Biggs and Mathews Environmental, Inc.
 1700 Robert Rd. Ste 100
 Mansfield, TX 76063
 Phone: 817-563-1144

Depth, feet	Samples	Symbol / USCS	Location: East Oak Recycling E 2172925.055 N 184802.020	Monitoring Well Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			Top of Casing El.: 1152.70 ft. msl Surface El.: 1149.60 ft. msl Completion Depth: 34.0 ft. Date Boring Started: 5/1/15 Date Boring Completed: 5/1/15 MATERIAL DESCRIPTION										
			CLAY, sandy, dark brown, with roots, stiff.										
5			SAND, silty, tan to brown, fine grained, dense.										
10	S1												
15			-tan to light brown below 12.0'										
15	S2		SAND, silty, light brown to grey and light grey, with clayey seams, dense.										
20	S3												
25			SAND, brown to grey to dark grey, medium to coarse grained, subrounded to rounded, unconsolidated.										
25	S4												
30	S5												
35													
40													
45													
50													

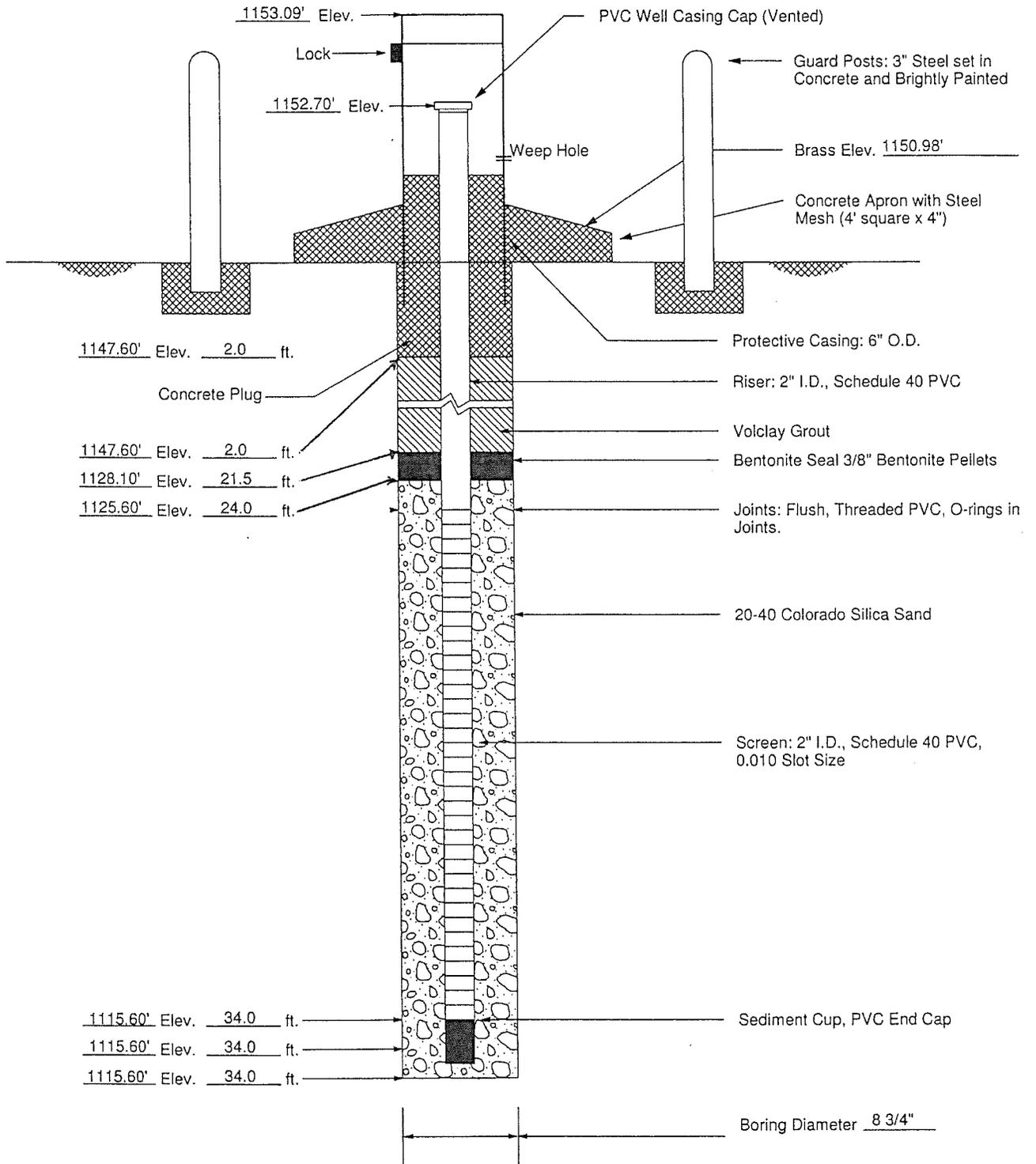
BME LOG MOSLEY ROAD.GPJ B&M DATA TEMPLATE.GDT 5/27/15

Drilling Contractor: **H/ET**
 Drilling Method: **Hollow Stem Auger**
 Sampling Method: **Continuous sampling**
 Geologist/Engineer: **S. Stamoulis**
 Project No.: **101.28.601**

Groundwater Observations	
Date	Depth

Remarks: Continuous sample from 9.0' to 34.0'.
 Installed monitoring well upon completion





MONITORING WELL NO. MW-28R



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 167546

x					

Quarters NE-NW-NW Section 21 Township 12N Range 02W1

Latitude <u>35.50625</u>	Longitude <u>-97.4200333</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/12/2015</u>	
Method latitude and longitude was collected: <u>Mathematical conversion program</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner WM-East Oak RDF
Address/City/State 3201 Mosley Road Oklahoma City OK
Finding Location _____
Well Name MW-28R

Phone _____
Zip 73141

Water Rights #: _____

TYPE OF WORK: Monitoring Well

USE OF WELL: Site Assessment

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/01/2015
Number of wells or borings represented by this log 1
* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)
Hole Diameter 8.75 inches to a depth of 34 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: _____ Surface Pipe Diameter _____ inches Surface Pipe From _____ ft to _____ ft
1) Well Casing Material PVC Casing Diameter 2 inches Casing From 0 ft to 24 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 10 slot (0.010 inch) From 24 ft to 34 ft.

FILTER PACK INFORMATION

Filter Pack Material: Sand 20-40 (medium)
 Filter Pack Interval: From 21.5 ft to 34

WELL SEAL INFORMATION

Type of Surface Seal Cement Grout Surface Seal Interval: From 0 ft to 2 ft
 Type of Annular Seal n/a Annular Seal Interval: From n/a ft to n/a ft
 Filter Pack Seal Material Bentonite Granules/Chips Filter Pack Seal Interval: From 2 ft to 21.5 ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft Estimated yield of well gpm First water zone 13 ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sandy Clay	0	4	N
Silty Sand	4	24	N
Sand	24	34	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? No
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a
 Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with n/a Grouted from ft. to ft.
 Grouted with Cement Grouted from ft. to ft.

Firm Name ASSOCIATED ENVIRONMENTAL INDUSTRIES, CORP. D/PC No. DPC-0269
 Operator Name WILLIAM NEWMAN, III OP No. OP-1962
 Date 05/12/2015
 Comments: n/a

SOIL BOREHOLE LOG

MW-29

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)			BORING NUMBER: B-29	
	SAMPLING METHOD: Split Spoon (SS)			Sheet 1 of 3	
	Sampler (2-foot)			DRILLING	
	INI	STATIC	START	FINISH	
WATER LEVEL	20.0	22.75	TIME	TIME	
TIME	0958	1032	0838	1250	
DATE	8/23/95	8/24/95	DATE	DATE	
CASING DEPTH			8/23/95	8/23/95	

DATUM: ft. MSL	ELEVATION: 1182.30	SURFACE CONDITIONS: Grassy and dry.
DRILL RIG: CME-75	ANGLE: Vertical	BEARING: ---
SAMPLE HAMMER TORQUE: ft.-lbs.		

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS

1	0			No recovery from 0-3 feet	000	X											
2																	
3	50		/	CLAY, Silty (CL): firm to hard, 3.0 (PP), dark yellowish brown (10YR 4/2)	001	X											
4			/	: silt seam from 3.5-4 feet, soft, <1.5 (PP), dark yellowish brown (10YR 4/2), dry to moist													
5	100		/	: firm to hard, 2.5 (PP), dark yellowish brown (10YR 4/2), dry to moist, pliable	002	X											
6			/	: no recovery from 6-7 feet													
7	50		/	: hard, 4.0 (PP), olive black (5Y 2/1) w/ some moderate brown (5YR 4/4)	003	X											
8			/														
9	100		/	CLAY (CH): hard, 3.5 (PP), moderate brown (5YR 4/4) w/ some black (N1) staining	004	X											
10			/														
11	100		/	CLAY, Sandy (CL): hard, 3.5 (PP), dark yellowish brown (10YR 4/2), w/ dark yellowish orange (10YR 6/6) staining, moist	005	X											
12			/	CLAY, Silty (CL): hard, 3.5 (PP), dark yellowish brown (10YR 4/2)													
13	100		/	: increase in sand content													
14			/	SILT, Sandy (ML): soft, grayish orange (10YR 7/4), moist to wet	006	X											
15	50		/	CLAY, Silty (CL): firm, 2.5 (PP), grayish orange (10YR 7/4), moist to wet	007	X											

Terracon Consultants
 DRILLING CONTRACTOR
 Oklahoma City, OK

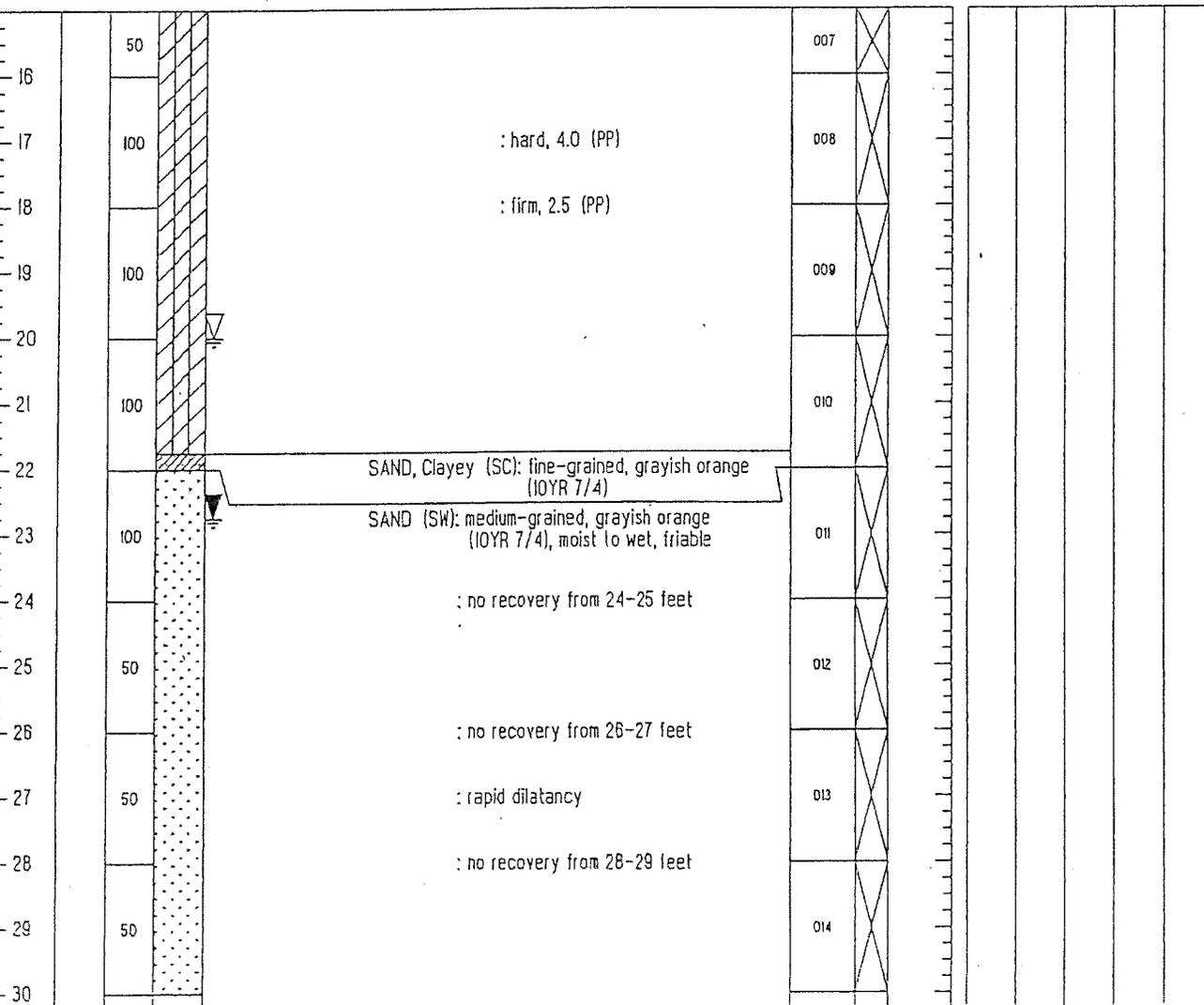
LOGGED BY Jeff Austin
 DATE 8/21/95
 CHECKED BY Karen Gallup

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: East Oak RDF Oklahoma City, Oklahoma Monitoring Well Installation 68174.100	DRILLING METHOD: Hollow Stem Auger (HSA)			BORING NUMBER: 8-29		
	SAMPLING METHOD: Split Spoon (SS)			Sheet 2 of 3		
	Sampler (2-foot)			DRILLING		
	INI			STATIC	START	FINISH
	WATER LEVEL	20.0		22.75	TIME	TIME
TIME	0958		1032	0838	1250	
DATE	8/23/95		8/24/95	DATE	DATE	
CASING DEPTH				8/23/95	8/23/95	
DATUM: ft. MSL		ELEVATION: 1162.30				
DRILL RIG: CME-75			SURFACE CONDITIONS: Grassy and dry.			
ANGLE: Vertical		BEARING: ---				
SAMPLE HAMMER TORQUE: ft.-lbs.						

 Terracon Consultants
 DRILLING CONTRACTOR
 Oklahoma City, OK

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER	RECOVERY %	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	SAMPLE TYPE	BLOWS/FT ON CASING	TEST RESULTS				
								WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS


 LOGGED BY Jeff Austin
 DATE 8/21/95
 CHECKED BY Karen Gallup

WELL No. MW-29

Boring No X-Ref. B-29

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords E 2,173,839.75, N 184,554.05

Elevation Ground Level 1162.30

Pin Elevation 1162.22 Top of Casing 1165.18

Drilling Summary

Total Depth (ft): 31.3
 Borehole Diameter (in): 8-inch
 Casing Stickup Height (ft): 2.88
 Driller: Terracon Consultants
 Driller-Don Plumb

Rlg: CME-75

Bit (s): HSA

Drilling Fluid: NONE w/HSA

Protective Casing: 5-foot Anodized Aluminum

Construction Time Log

8/23/95-8/26/95

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA:	8/23/95	0838	8/23/95	1250
Casing:				
C ₁ Prot.:	8/26/95	1150	8/26/95	1155
S ₁ /C ₂ 2" PVC:	8/23/95	1251	8/23/95	1253
Bentonite Seal:	8/23/95	1352	8/23/95	1356
Grout Seal:	8/23/95	1358	8/23/95	1410
Filter Placement:	8/23/95	1253	8/23/95	1352
Cementing:	8/26/95	1150	8/26/95	1223
Development:	8/26/95	1442	8/26/95	1610

Well Design & Specifications

Basis: Geologic Log Geophysical Log

Casing String (s): C = Casing S = Screen

Depth (ft)	String (s)	Elevation (MSL)
+3.30 - 1.70	C ₁	1165.60 1160.60
+2.88 - 15.3	C ₂	1165.18 1147.00
15.3 - 30.3	S ₁	1147.00 1132.00
-	-	-
-	-	-

Casing: C1 6" Anodized Aluminum (square)
 (+3.30-1.70 feet)

Casing: C2 2" PVC, Sch.40, Flush Joint
 (+2.88-15.3 feet)

Screen: S1 2" PVC, Sch.40, .010-Inch slotted
 (15.3-30.3 feet)

Screen: S2

Grout Seal: Bentonite Grout
 (0-7 feet)

Bentonite Seal: Bentonite Pel-Plug, fine-grained
 (7-12.5 feet)

Filter Pack: 20/40 Silica Sand
 (12.5-31.3 feet)

Well Development

8/26/95

Removed 410 gallons on 8/26/95 with grundfos pump.
 Total gallons removed = 410 gallons.

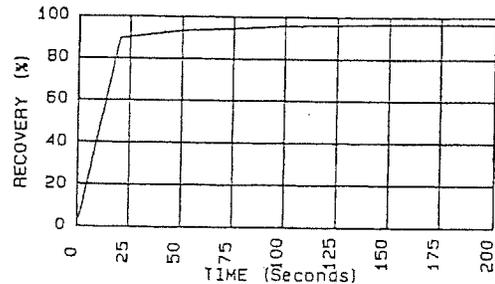
Stabilization Test Data

8/26/95

Time	pH	Spec. Cond.	Temp (C)
1535	7.5	1412	22.2
1540	7.1	1291	21.8
1544	7.1	1267	20.2
1551	7.0	1229	19.1

Recovery Data

Q = 410 gallons S₀ = 22.77 feet



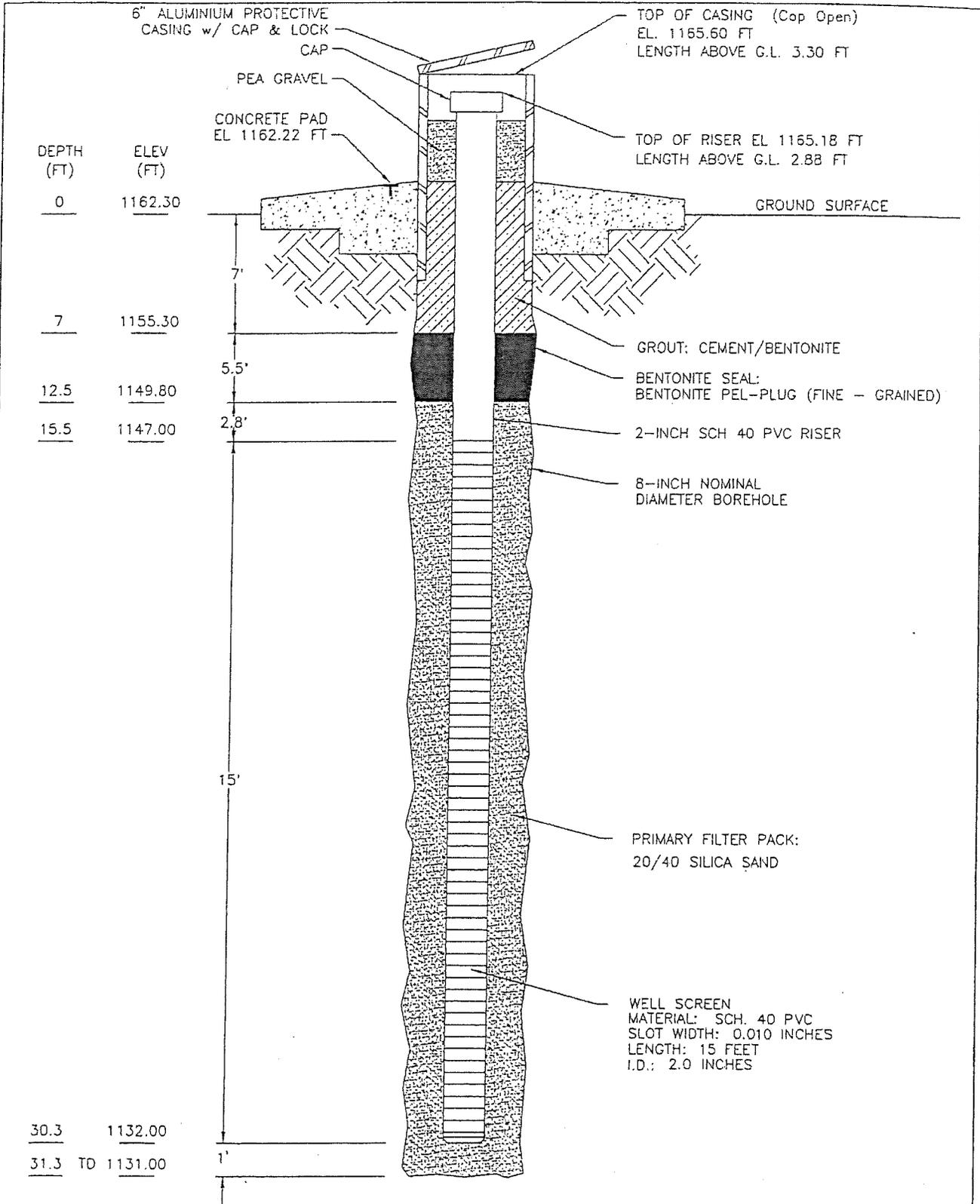
Comments

Drilled and sampled with HSA; very fast recovering well.

SITE NAME East Oak Rdf
 LOCATION Oklahoma City, Oklahoma

SUPERVISED BY Jeffr Austin
 DATE 8/23/95-8/26/95 CHECKED BY Karen Gallup

T.D. = 31.3 ft.



TD = TOTAL DEPTH

DATE DRILLED: 8-23-95

NOT TO SCALE

RUST ENVIRONMENT & INFRASTRUCTURE

OCTOBER 1995

Project: 66147.100

CADD File: 66147SW/8147MW29.DWG

EAST OAK RECYCLING AND DISPOSAL FACILITY
 INSTALLATION & DECOMMISSIONING OF MONITORING WELLS
 Oklahoma City, Oklahoma

MONITORING WELL MW-29

EXISTING DUAL SITE MONITORING SYSTEM LOGS

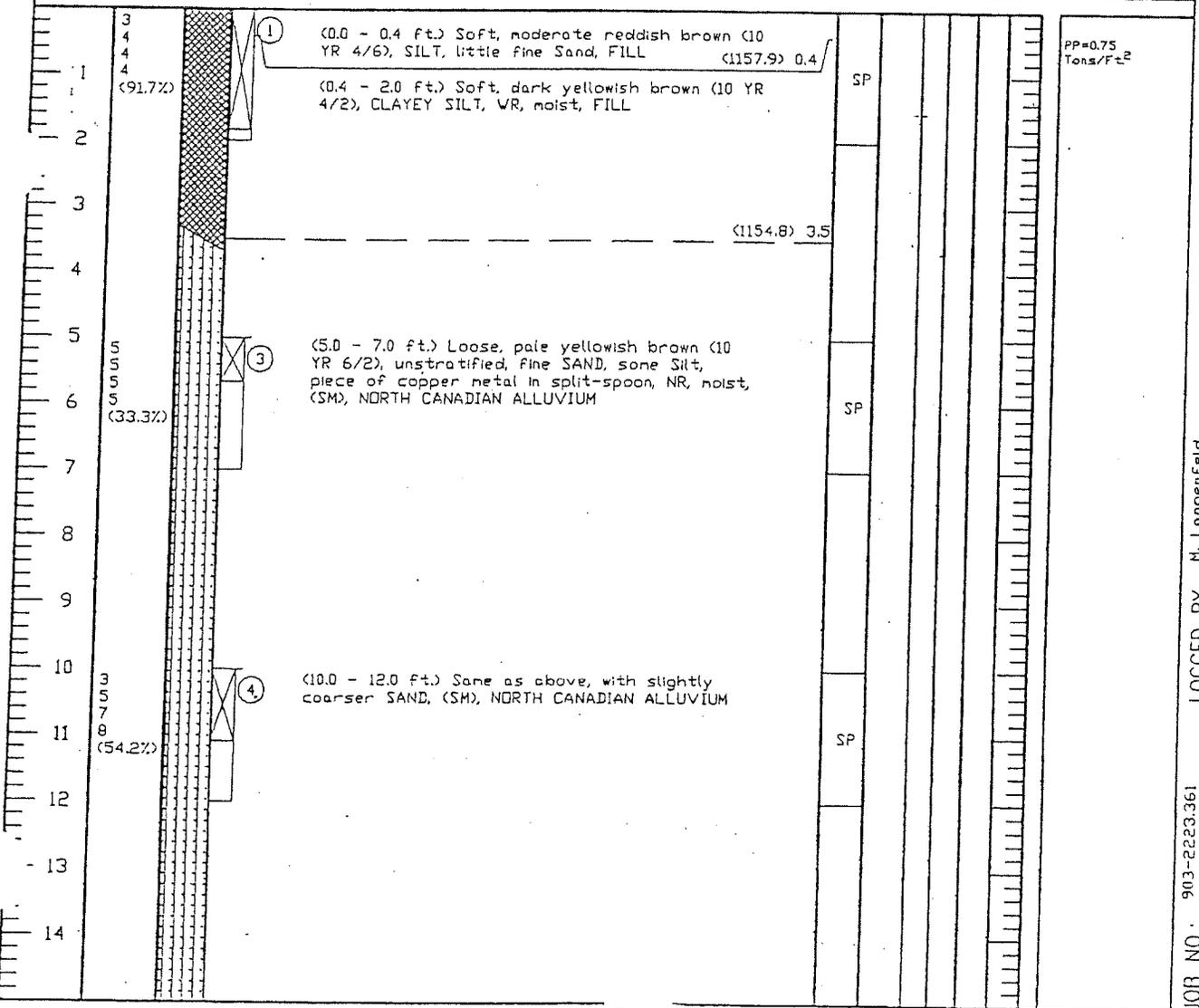
SOIL BOREHOLE LOG

SITE NAME AND LOCATION MOSLEY ROAD SANITARY LANDFILL OKLAHOMA CITY, OK		DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD		BORING NO. BH-12R	
		Hollow Stem Auger			
NORTHING: 182,692.67 Ft. EASTING: 2,174,653.58 Ft.		SAMPLING METHOD: 2-Inch Split Spoon (SP)		SHEET 1 OF 3	
				DRILLING	
DATUM NGVD ELEVATION 1158.30'		WATER LEVEL		START	FINISH
		TIME		1215	1615
DRILL RIG CHE 75 ANGLE Vertical BEARING		DATE		DATE	DATE
		CASING DEPTH		3/29/90	3/29/90
SAMPLE HAMMER 140 lbs., 30 inch drop		SURFACE CONDITIONS Gently sloping, wet, muddy.			

DRILLING CONTR Terracon Environmental, Inc.

R. Smally / L. Carson

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	



JOB NO.: 903-2223.361 LOGGED BY M. Langenfeld

FILENAME: BH-12R.DWG CHK'D BY SHH DATE 6/20/90

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

MOSLEY ROAD SANITARY LANDFILL
OKLAHOMA CITY, OK

NORTHING: 182,692.67 Ft.
EASTING: 2,174,653.58 Ft.

DATUM NGVD ELEVATION 1158.30'

DRILL RIG CME 75

ANGLE Vertical BEARING

SAMPLE HAMMER 140 lbs., 30 inch drop

DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD

Hollow Stem Auger

BORING NO.

BH-12R

SHEET

2 OF 3

SAMPLING METHOD: 2-Inch Split Spoon (SP)

DRILLING

WATER LEVEL

TIME

DATE

CASING DEPTH

START FINISH

TIME TIME

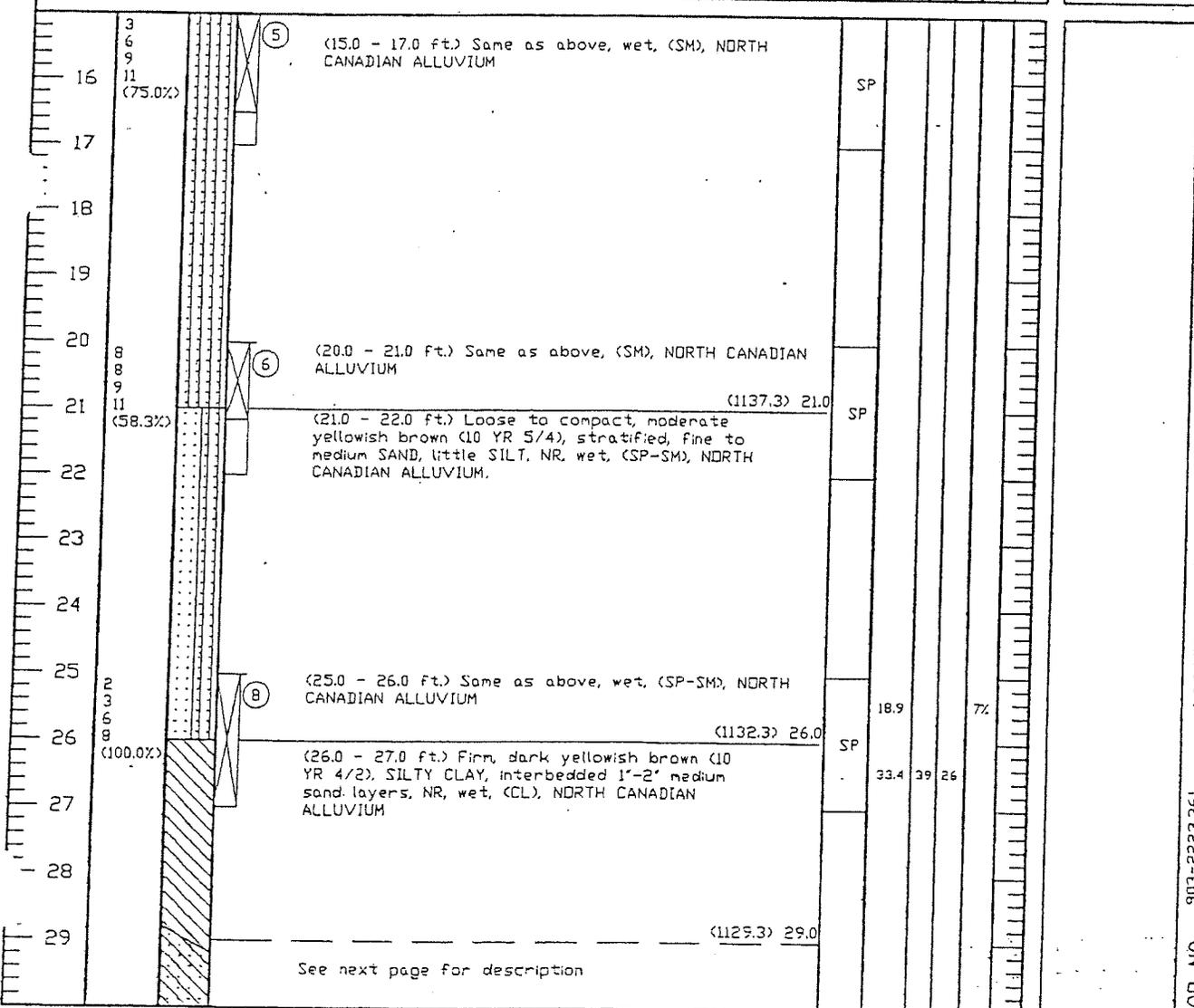
1215 1615

DATE DATE

3/29/90 3/29/90

SURFACE CONDITIONS Gently sloping, wet, muddy.

DEPTH IN FEET (ELEVATION)	BLOW, 6 IN. OR SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	



DRILLING CONTR Terracon Environmental Inc.

R. Snolly/ L. Carson

LOGGED BY H. Langenfeld

DATE 6/20/90

JOB NO.: 903-2223.361

CHK'D BY SHM

FILENAME: BH-12R.DWG

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

MOSLEY ROAD SANITARY LANDFILL
OKLAHOMA CITY, OK

NORTHING: 182,692.67 Ft.
EASTING: 2,174,653.58 Ft.

DATUM NGVD ELEVATION 1158.30'

DRILLING METHOD: 6.25-Inch ID, 10.25-Inch OD

Hollow Stem Auger

BORING NO.

BH-12R

SAMPLING METHOD: 2-Inch Split Spoon (SP)

SHEET

3 OF 3

DRILLING

WATER LEVEL

TIME

DATE

CASING DEPTH

START TIME

1215

FINISH TIME

1615

DATE

3/29/90

SURFACE CONDITIONS Gently sloping, wet, muddy.

DRILL RIG CME 75

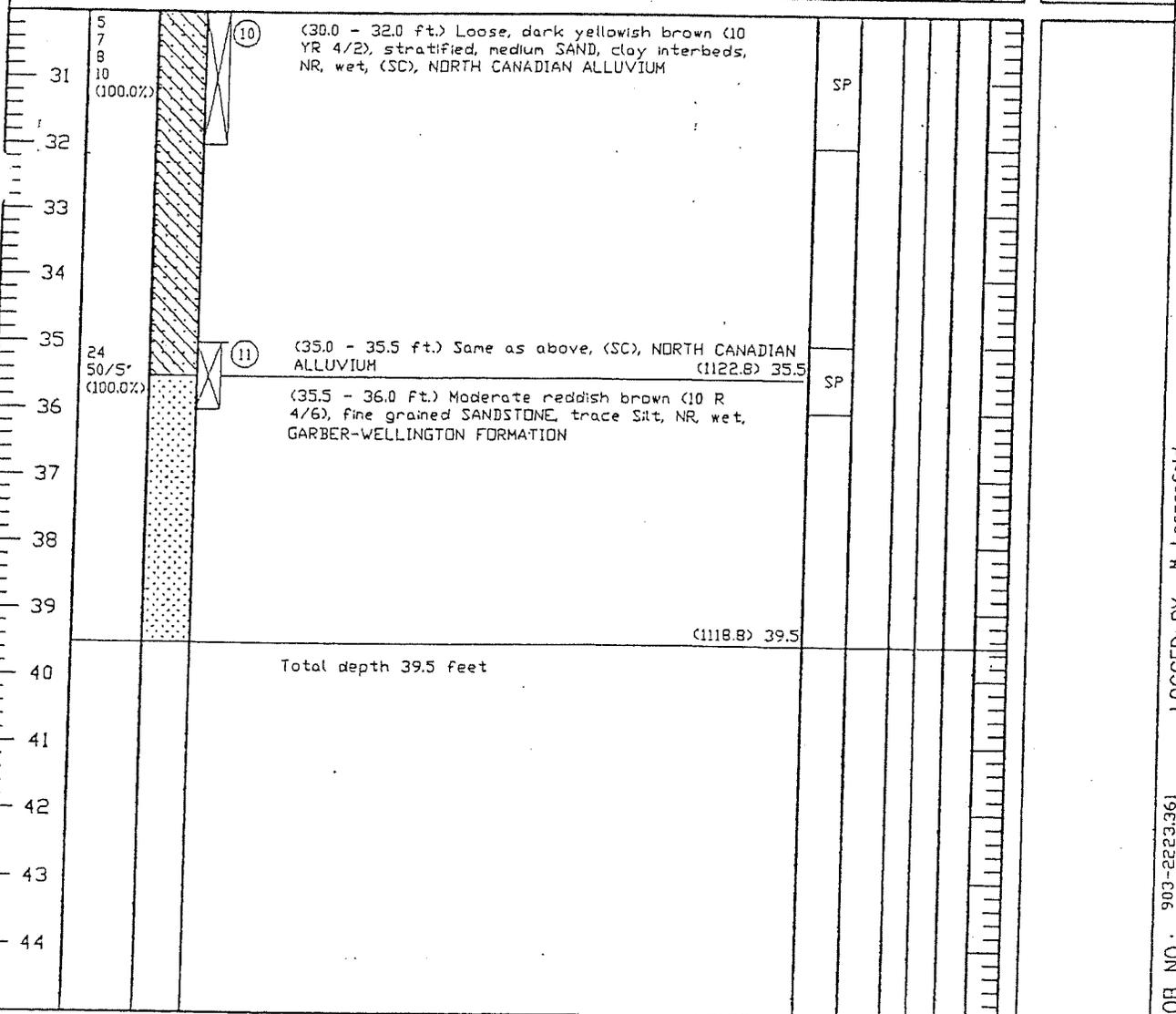
ANGLE Vertical BEARING

SAMPLE HAMMER 140 lbs., 30 inch drop

DRILLING CONTR Terracon Environmental, Inc.

R. Snally / L. Carson

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	TEST RESULTS				OTHER TESTS
					WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	LESS THAN No. 200	



LOGGED BY H. Langenfeld

CHK'D BY SIM DATE 6/20/90

JOB NO.: 903-2223361

FILENAME: BH-12R.DWG

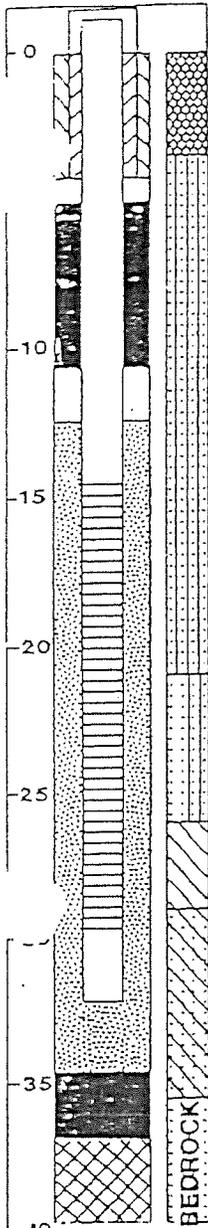
Well No. MW-12R

Boring No. X-Ref: BH-12R

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 182,692.67 ft.
Easting: 2,174,653.58 ft.

Elevation Ground Level 1158.30 ft. NGVD
 Top of PVC Casing 1160.85 ft. NGVD



Drilling Summary:

Total Depth 39.5 ft.
 Borehole Diameter 10.25 in.
 Casing Slickup Height 2.55 ft.
 Driller Terracon Environmental, Inc.
Oklahoma City, OK

Rig CME 75
 Bit(s) 6.25 in. I.D. Hollow Stem Auger

Drilling Fluid None

Protective Casing 6 in. I.D. Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
2.55 - 14.5	C1	1160.85 - 1143.80
14.5 - 29.5	S1	1143.80 - 1128.80
29.5 - 32.5	C1	1128.80 - 1125.80
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 PVC
flush threaded/ teflon tape

Screen: S1 2" diameter SCH 40 PVC
Machine slotted (0.010-in.)

Filter Pack: Primary Sand: 34.5-12.5 ft.
 Secondary Sand: 12.5-10.5 ft., 5.0-4.0 ft.

Grout Seal: Screte: 4.0-+0.5 ft.

Bentonite Seal: Chipped Bentonite: 37.0-34.5 ft.
10.5-5.0 ft.

Comments:

(39.5-37.0 ft.) overdrilled into Garber Wellington; sand and silt sloughed into rathole
Top of Garber Wellington Formation at 35.5 ft.

Construction Time log:

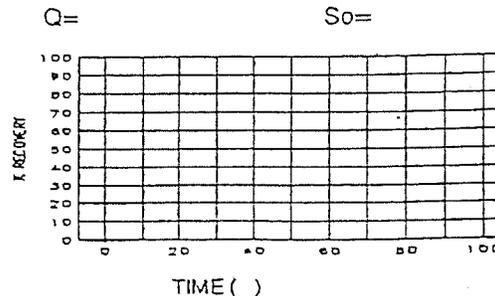
Task	Start		Finish	
	Date	Time	Date	Time
Drilling	3-29-90	1215	3-29-90	1650
Geophys. Logging	N/A			
Casing:				
PVC	3-30-90	0812	3-30-90	0950
6" aluminum	3-30-90	1020	3-30-90	1030
Filter Placement:	3-30-90	0812	3-30-90	0950
Cementing:				
Development	5-13-90	0750	5-13-90	1220

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:



Supervised by Matt Langenfeld Site Mosley Road Sanitary Landfill

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: MW-14R2 (PWB-5-2005)		Geologist: AS/BF		Page 1 of 2								
		Project Title: East Oak Landfill Expansion		Driller: Total Support - Spaust										
		Project No: 0086-356-11-40-02		Field Tests		Geotechnical Laboratory Results								
Depth (ft)	Samples	Graphic Log	Boring Data		Hand Penetrometer Test (tsf)	Penetration Blows/In	% Passing No. 200 [#] /No. 40 [#]	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Description	FT MSL										
			Boring Start Date: 11/30/2005 Northing: 184631.02 Boring End Date: 11/30/2005 Easting: 2176204.12 Ground Elevation: 1148.0 ft-msl T.O.C.: 1151.06 ft-msl Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap. ▽ = Water Level at Time of Drilling: 1135.5 ft-msl ▼ = Static Water Level: 1137.58 ft-msl											
5	U	[Graphic Log Column]	SAND (SP), slightly moist, fine to medium grained, brown to tan, with some clay.			1.5								
	U		- trace of clay at 2'.			1.0								1146.0
	U		- light brown to tan, slightly moist, unconsolidated.			0.0								
	U					0.0								
	U					0.0								
	A													
	U				- becomes wet @ 12.5', color changes to light to medium brown.		1.0							
	U				- sandy clay seam, brown, wet, plastic, 3" thick.									1134.5
	A													1132.5
	S													1131.5
20	S					0.0	3/6"							
	S						1/6"							
	S						2/6"							
	A			- grain size increase, medium to coarse grain, poorly sorted, angular to subrounded grain.										
	S						1/6"							
	S			- grain size increase, coarse sand to fine gravel, poorly sorted, angular to subrounded grain, color changes to medium brown.			1/6"							
	S						2/6"							
25	A					0.0								
	S						15/6"							
	S						25/6"							
	S						12/6"							
	A												1121.5	
													1121.0	

E02. EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/23/14

WEAVER BOOS CONSULTANTS LLC		LOG OF BORING: MW-14R2 (PWB-5-2005)			Geologist: AS/BF		Driller: Total Support - Spaust		Page 2 of 2					
		Project Title: East Oak Landfill Expansion												
		Project No: 0086-356-11-40-02												
Depth (ft)	Samples	Graphic Log	Boring Start Date: 11/30/2005 Northing: 184631.02		Hand Penetrometer Test (tsf)	Penetration Blows/in	% Passing No. 200* /No. 40*	Percent Moisture Content	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Permeability (cm/s) and Unconfined Compressive Strength (tsf)	Well Detail
			Boring End Date: 11/30/2005 Easting: 2176204.12											
		Remarks: Piezometer constructed of 2-inch i.d. schedule 40 PVC casing, 0.01-inch factory slotted PVC well screen, and 6-inch push-on bottom cap.												
		▽ = Water Level at Time of Drilling: 1135.5 ft-msl ▼ = Static Water Level: 1137.58 ft-msl												
			Description	FT MSL										
35	C													
	S		- grain size increase, very coarse sand to medium gravel, poorly sorted, angular to subrounded grain.	1111.8		6/6" 32/6" 50/1"								
	S				4.5			15.0	118.7					
	S		SANDSTONE (SW), silty, moist, firm to hard, slightly weathered, reddish brown and tan banded, with some clay seams, <0.25" thick, and some medium gravel at top of section.											
40	C		- white sand seam.	1108.0	4.0 1.0									
45														
50														
55														

E02 EAST OAK DATABASE 2014 - AE.GPJ EO-TEMPLATE.GDT 10/23/14

LOG OF MONITORING WELL NO. 207R2

Project Description: Mosley Road Sanitary Landfill

3201 Mosley Road, Oklahoma City OK

Biggs & Mathews Environmental, Inc.
1700 Robert Road, Suite 100
Wansfield, TX 78063
Phone: 817-663-1144
Fax: 817-663-1224

Depth, feet	Samples	Symbol / USCS	Location: East Oak Recycling and Disposal Facility	Hand Penetrometer, lsf	Penetration Blows/foot	Moisture Content, %	Unit Dry Weight, lb/cu ft	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, lsf
			Surface El.: 1149.10 ft. msl Completion Depth: 32.0 ft. Date Boring Started: 4/1/10 Date Boring Completed: 4/1/10									
			MATERIAL DESCRIPTION									
			SILT (ML), clayey, dark brown									
	CS1		CLAY (CL-ML), silty, dark brown	1147.10								
6			SILT (ML), tan	1143.60								
	CS2		SAND (SM), silty, tan	1142.10								
10												
	CS3											
15												
	CS4											
20												
	CS5											
25												
	CS6											
30												
				1117.10								
35												
40												
45												
50												

BME LOG MOSLEY ROAD CS-1 BSM DATA TEMPLATE QBT 12/6/10

Drilling Contractor: Associate Industries
 Drilling Method: Hollow Stem Auger
 Sampling Method: continuous sampling
 Geologist/Engineer: Randy Kraas
 Project No.: 101-28-601

Groundwater Observations	
Date	Depth
4/1/2010	14

Remarks:

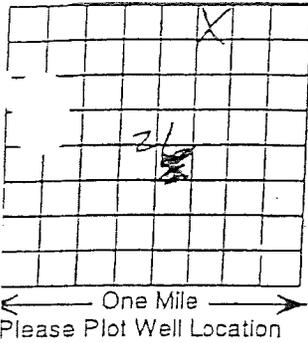


The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

Ten Acres

MULTI-PURPOSE COMPLETION REPORT MONITORING WELLS

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800



Do Not Write In This Space

Well Log ID Number _____

LEGAL DESCRIPTION

Do Not Write In This Space

_____ 1/4 _____ 1/4 _____ 1/4

of Sec. 21 Township T12 N S Range 2W WIM EIM ECM

Optional Information

Latitude _____ Longitude _____

Number of wells in 10 acre tract 2 Well No. (if applicable) ~~8R~~ MN 225A

County Oklahoma Variance Request No. (if applicable) _____

Well Owner WMI, Inc Phone (918) 439-7829

Address/City/State 4041 N. 14th E. Ave. Tulsa OK Zip 74116

Location Waste Management East OK Landfill Oklahoma City, OK

PURPOSE OF WORK

Geotechnical Boring

Monitoring Well

Plugging

USE OF WELL

Site Assessment Observation

Unsaturated Zone Monitoring

Air Sparge

Vapor Extraction

Water Quality

Recovery

Other _____

WELL BOREING OR WELL CONSTRUCTION DATA

Application for a variance must be requested and obtained before any changes are made to the minimum construction standards for any well.

Started 5/29/03 Date Completed 6/5/03

Diameter 8.5 inches From 0 feet to 34 feet

Diameter _____ inches From _____ feet to _____ feet

LOGGING RECORD:

Case Pipe (Casing) Diameter _____ inches From _____ feet to _____ feet

Casing Diameter 2 inches From 2+3 feet to 24 feet

Casing Diameter _____ inches From _____ feet to _____ feet

SCREEN OR PERFORATION RECORD:

Screen and Slot Size .020 From 24 feet to 34 feet

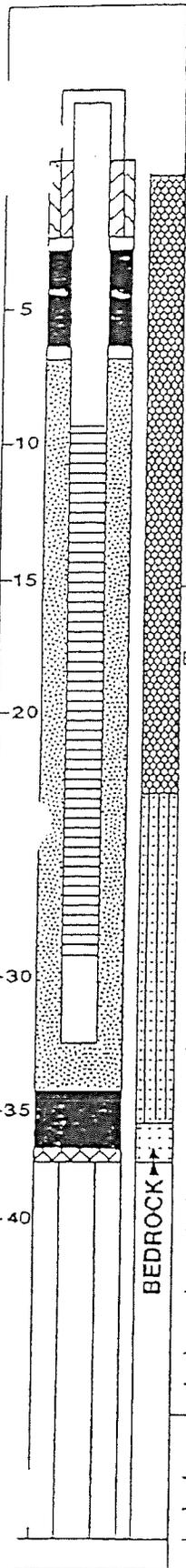
Screen and Slot Size _____ From _____ feet to _____ feet

SCREEN BACK:

Screen Size .020 silica From 22 feet to 34 feet

Screen Size _____ From _____ feet to _____ feet

**EXISTING MOSLEY ROAD LANDFILL
MONITORING SYSTEM LOGS**



Well No. MW-11R
 Boring No. X-Ref: BH-11R

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 182,692.62 ft. Elevation Ground Level 1157.30 ft. NGVD
Easting: 2,175,660.06 ft. Top of PVC Casing 1159.82 ft. NGVD

Drilling Summary:

Total Depth 37.0 ft.
 Borehole Diameter 10.25 in.
 Casing Slickup Height 2.52 ft.
 Driller Terracon Environmental, Inc.
Oklahoma City, OK
 Rig CME 76
 Bit(s) 6.25 in. I.D. Hollow Stem Auger
 Drilling Fluid None
 Protective Casing 6 in. I.D. Anodized Aluminum

Construction Time log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	4-3-90	0740	4-3-90	1030
Geophys. Logging	N/A			
Casing:				
PVC	4-3-90	1205	4-3-90	1400
6" aluminum	4-3-90	1400	4-3-90	1430
Filter Placement:	4-3-90	1100	4-3-90	1330
Cementing:	4-3-90	1400	4-3-90	1430
Development	5-13-90	1240	5-13-90	1025

Well Design & Specifications

Basis: Geologic Log Geophysical Log
 Casing string(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2.52 - 9.0	C1	1159.82 - 1148.30
9.0 - 29.0	S1	1148.30 - 1128.30
29.0 - 32.0	C1	1128.30 - 1125.30
-	-	-
-	-	-
-	-	-

Casing: C1 2" diameter SCH 40 PVC
flush threaded/ teflon tape
 Screen: S1 2" diameter SCH 40 PVC
Machine slotted (0.010-in.)

Filter Pack: Primary Sand: 34.0-7.0 ft.
Secondary Sand: 7.0-6.5 ft., 3.0-2.5 ft.

Grout Seal: Sacrete: 2.5-+0.5 ft.

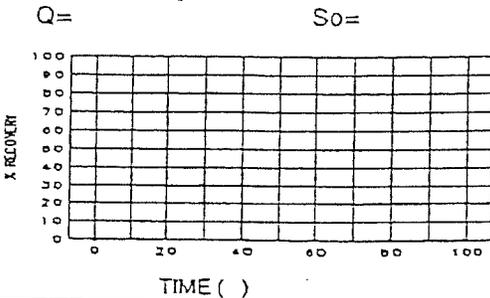
Bentonite Seal: Chipped Bentonite: 36.5-34.0 ft.
6.5-3.0 ft.

Well Development

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)

Recovery Data:



Comments:

Hole sloughed from 37.0 to 35.5 feet.

Supervised by Matt Langenfeld Site Mosley Road Sanitary Landfill
 MW-11R

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-208R

SITE NAME AND LOCATION
 East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2V

SAMPLING METHOD: N/A

SHEET
 1 OF 4
 DRILLING

WEATHER: SUNNY / RAIN TEMP: 83 F.

WATER LEVEL

START TIME
 15:40

FINISH TIME
 15:00

G.L. ELEV. 1,158.00 FT.

DATE

DATE
 6/2/03

DATE
 6/1/03

DATUM: NAVD83

TDC ELEV. 1,160.62 FT.

CASING DEPTH

DRILL RIG: CME

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

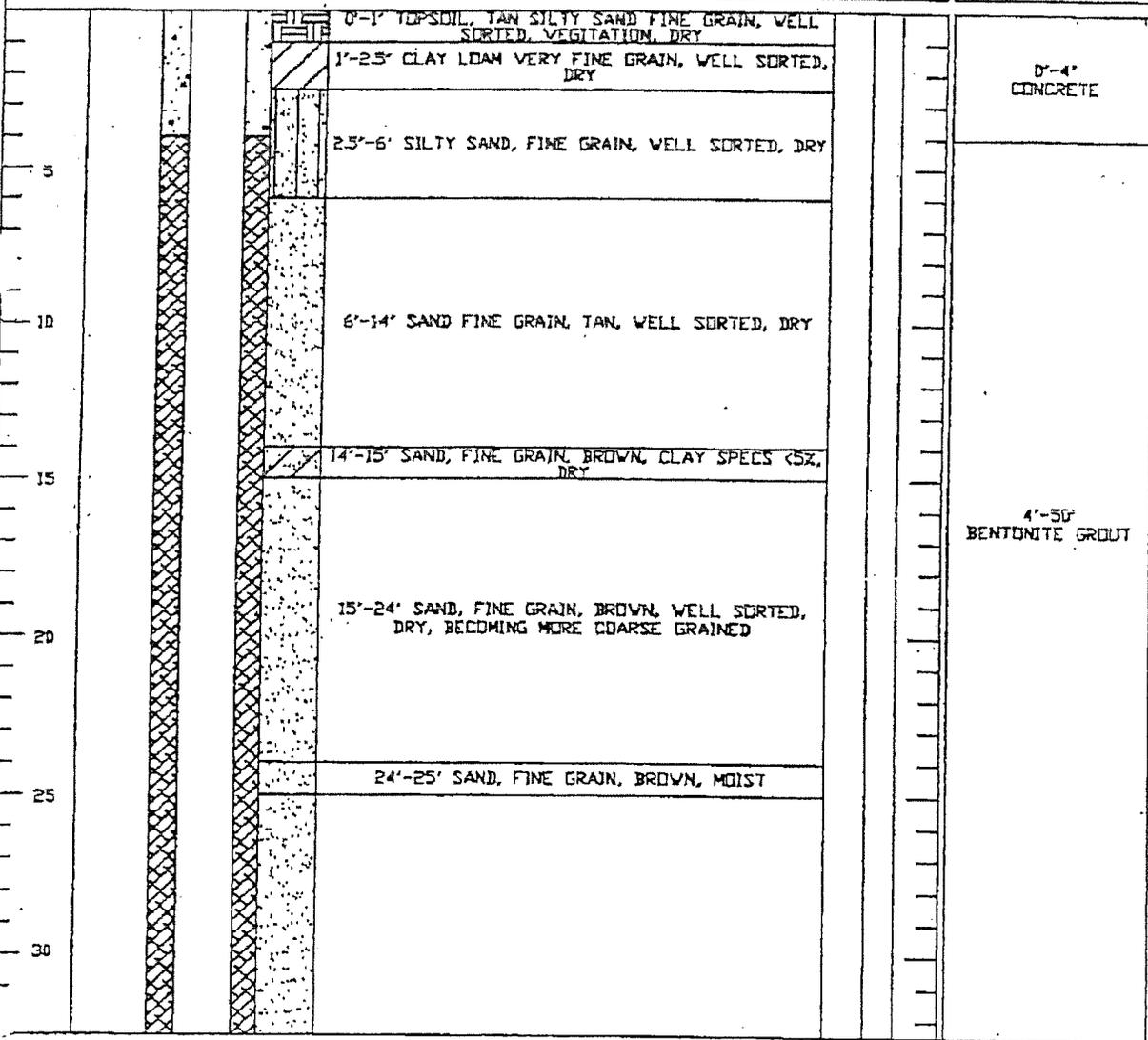
TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLINDS / 5 IN DIA SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLINDS / 5 IN DIA CASING	WELL CONSTRUCTION NOTES
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DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE

DATE 6/2/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A 2 M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG HOLLOW STEM AUGER		BORING NUMBER MW-208R	
	SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W		SHEET 2 OF 4	
WEATHER: SUNNY / RAIN TEMP: 83 F		WATER LEVEL		DRILLING START TIME: 15:40 FINISH TIME: 15:00
GL. ELEV. 1,158.00 FT.		DATE		DATE: 6/2/03
DATUM: NAVD88 TDC ELEV. 1,160.62 FT.		CASING DEPTH		DATE: 6/4/03
DRILL RIG: CMC		SURFACE CONDITIONS: DRY		CASING DIA: 2" SCREEN DIA: 2"
ANGLE: VERTICAL BEARING:		TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: #10
SAMPLE HAMMER TORQUE FT.-LBS		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		

DEPTH IN FEET (ELEVATION)	BLOW/6 IN IN SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOW/FOOT IN CASING	WELL CONSTRUCTION NOTES
---------------------------	---------------------------------	--------------	--------	-------------------------	-----------------	-------------	---------------------	-------------------------

35								
40				25'-49' SAND, COARSE GRAIN, BROWN/TAN, POORLY SORTED, WATER				0'-50' BENTONITE GROUT
45								
50				49'-50' SAND, COARSE GRAIN, BROWN, SOME COBBLES, WET				
				50'-51' SANDSTONE, WET				
				51'-52' SANDSTONE, SOME RED SHALE, WET				
55				52'-57' RED SHALE / SANDSTONE SOFT, WET				50'-90' BENTONITE CHIPS
				57'-60' SANDSTONE, POORLY SORTED, RED, WET				
60				6/2/03 - 17:35				
				6/3/03 - 06:50				
				60'-62' SOME HARD SHALE, SANDSTONE				

DRILLING CONTR: Mohawk Drilling
 DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULIZE
 DATE: 6/2/2003 CHK'D BY: PLS

Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-208R

SITE NAME AND LOCATION
 East Dak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET
 3 OF 4
 DRILLING

WATER LEVEL				START	FINISH
				TIME	TIME
				15:40	15:00

WEATHER: SUNNY / RAIN	TEMP: 83 F	TIME	DATE	DATE
	GL ELEV. 1,158.00 FT.			6/2/03
DATUM: NAVD83	TDC ELEV. 1,160.62 FT.	CASING DEPTH		6/4/03

DRILL RIG: CME	SURFACE CONDITIONS: DRY	CASING DIA: 2"	SCREEN DIA: 2"
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ANGLE: VERTICAL	BEARING:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM	SLOT SIZE: .010
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SAMPLE HAMMER TORQUE	FT.-LBS	TYPE BENTONITE: PUREGOLD MEDIUM CHIPS
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DEPTH IN FEET (ELEVATION)	BLVD'S / 6 IN OIL SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLVD'S/FOOT OR CASING	WELL CONSTRUCTION NOTES
---------------------------	--------------------------------------	--------------	--------	-------------------------	-----------------	-------------	-----------------------	-------------------------

65				62'-66' RED SHALE AND SANDSTONE WET, SAND FLOODED THE HOLE				
70				66'-75' RED/BROWN SHALE, SANDSTONE, WET WATER @ 74 FT.				
75				75'-80' RED/BROWN SHALE, SILTSTONE, WATER.				50'-90' BENTONITE CHIPS
80				80'-83 COARSE GRAINED SAND AND GRAVEL LAYER, BROWN SORTED SILICA, LOTS OF WATER				
85				6/3/03 - 18:00 6/4/03 - 07:30				
90				85'-94' HARD SANDSTONE, FINE GRAIN, WHITE TO RED BROWN, BREAKS IN CONICAL SHAPE, WATER				
95								90'-125' GRAVEL PACK

DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULTZE

DATE: 6/2/2003 CHK'D BY: PLS

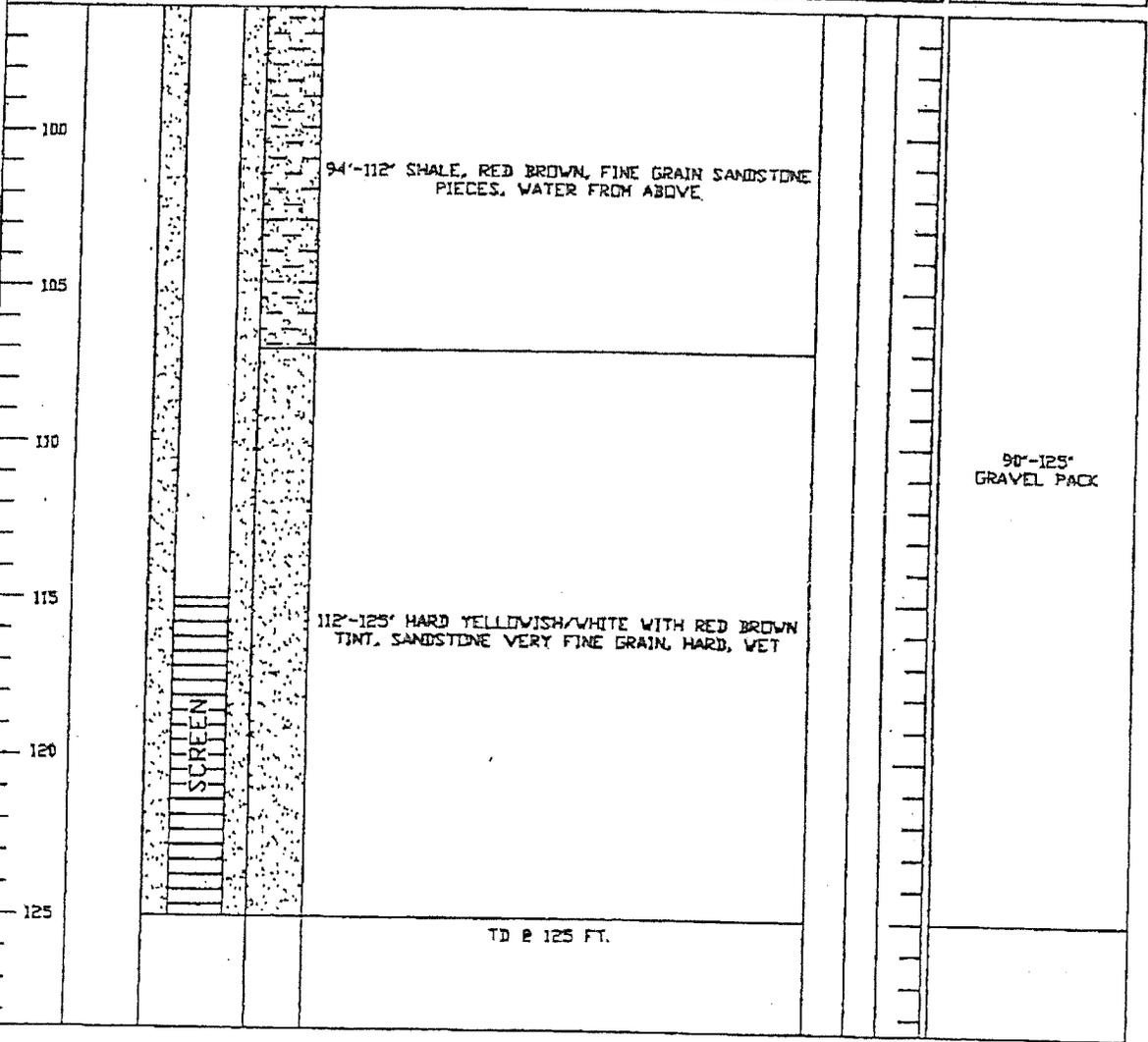
Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG		BORING NUMBER	
	HOLLOW STEM AUGER		MW-208R	
SITE NAME AND LOCATION East Dak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W	SAMPLING METHOD: N/A		SHEET	
			4 OF 4	
			DRILLING	
WEATHER: SUNNY / RAIN	TEMP: 83 F	WATER LEVEL	START TIME	FINISH TIME
			15:40	15:00
DATUM: NAVD88	GL. ELEV. 1,158.00 FT.	DATE	DATE	DATE
			6/2/03	6/4/03
DRILL RIG: CME	SURFACE CONDITIONS: DRY	CASING DIA: 2"	SCREEN DIA: 2"	
ANGLE: VERTICAL	BEARING:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLDT SIZE: #10
SAMPLE HAMMER TORQUE	FT.-LBS	TYPE BENTONITE: PUREGOLD MEDIUM CHIPS		

DRILLING CONTR: Mohawk Drilling
 DRILLER: ALAN BRANTLEY

DEPTH IN FEET (ELEVATION)	BLOWZ 6 IN ENL SAMPLER (FREQUENCY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	FLOW/FOOT OR CASING	WELL CONSTRUCTION NOTES
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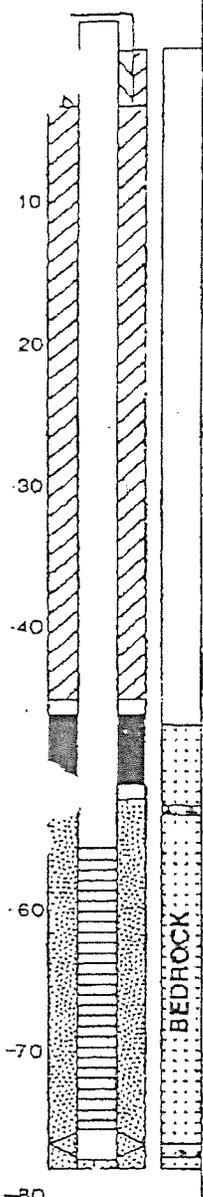
LOGGED BY: PETER SCHULIZE
 DATE: 6/2/2003
 CHK'D BY: PLS

Boring No. X-Ref: BH-209

MONITORING WELL CONSTRUCTION SUMMARY

Survey Coords: Northing: 181,623.04 ft.
Easting: 2,175,696.36 ft.

Elevation Ground Level 1162.30 ft. NGVD
Top of PVC Casing 1165.45 ft. NGVD



Drilling Summary:
 Total Depth 78.5 ft.
 Borehole Diameter 10.25 in.
 Casing Stickup Height 3.15 ft.
 Driller Terracon Environmental, Inc.
 Oklahoma City, OK
 R. Kelly
 Rig CME 75
 Bit(s) 6.25 in. I.D. Hollow Stem Auger
 Drilling Fluid Potable Water
 Protective Casing 8 in. I.D. Anodized aluminum

Construction Time log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling				
Coring	4-8-90	0900	4-8-90	1229
Geophys. Logging	N/A			
Casing:				
PVC	4-8-90	1710	4-8-90	1725
4" Protective	4-10-90	0900	4-10-90	0920
Filter Placement:	4-9-90	1730	4-9-90	1845
Cementing:	4-10-90	0750	4-10-90	0840
Development	5-16-90	0910	5-16-90	1130

Well Design & Specifications
 Basis: Geologic Log Geophysical Log
 Casing string(s): C = Casing S = Screen

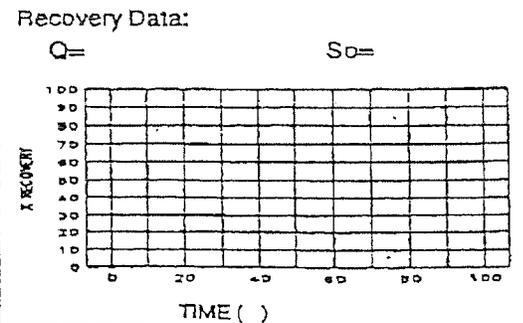
Depth	String(s)	Elevation
+ 1.30 - 47.0	C1	1163.60 - 1115.30
+ 3.15 - 55.5	C2	1165.45 - 1106.80
55.5 - 75.5	S1	1106.80 - 1086.80
75.5 - 78.5	C2	1086.80 - 1083.80

Well Development

Casing: C1 6" steel surface casing.
 C2 2" diameter, SCH 40 Brainard-Kilman
 PVC flush threaded/ teflon tape
 Screen: S1 2" diameter, SCH 40 Brainard-Kilman
 Machine slotted (0.010-in.) PVC
 Filter Pack: Primary Sand: 78.5-52.0 ft.
 Secondary Sand: 52.0-51.3 ft., 45.0-45.0 ft.
 Grout Seal: 45.0-1.3 ft.
 Bentonite Seal: Holeplug: 51.3-45.0 ft.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (°C)



Comments:
 4-arm stainless steel centralizer placed at bottom of screen.

Supervised by Paul Griscadick Site Mosley Road Sanitary Landfill
 Job number 903-0223-361 File name MWL-209

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
MW-220R**

Project Number: 1556

Sheet 1 of 3

Depth, feet	Samples Symbol / USCS	Location: See Figure A1 Surface El.: 1147.78 Northing: 1045185218.54 Easting: 2176162.56	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Uno. Compressive Strength, tsf
		MATERIAL DESCRIPTION											
	C1	SILTY SAND, light brown to brown											
5			3.0										
	C2	SAND, silty, tan w/red, moist											
10			10.0										
	C3	SAND, tan w/gray, medium to coarse grain, wet											
15													
	C4												
20													
	C5												
25													
	C6		28.0										
30		SAND, coarse grain, gray w/tan, wet w/fine to medium gravel											
	C7		33.0										
35		SANDSTONE, fine grained, reddish brown w/tan & gray, soft to moderately hard, moist to wet w/shale seams & layers											
40													
	C8												
45													
	C9		47.0										
50		SANDSTONE, fine grained, reddish brown w/light gray, moderately hard w/shale seams & layers, moist											

BORING LOG W/FIGURE 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT 12/3/10

Completion Depth: 111.5 ft
Date: 10/26/10

Remarks: Seepage observed @ 11' during drilling.
Top of PVC Pipe Elevation: 1150.95
Water Level Elevation: 1131.75

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3a

Project: East Oak Landfill
Oklahoma City, Oklahoma

BORING LOG
MW-220R

Project Number: 1556

Sheet 2 of 3

Depth, feet	Samples	Symbol / USCS	Location: See Figure A1 Surface El.: 1147.78 Northing: 1045185218.54 Easting: 2176162.56	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
MATERIAL DESCRIPTION														
55	C10		SANDSTONE, fine grained, reddish brown w/light gray, moderately hard w/shale seams & layers, moist (continued)											
60														
65	C11													
70														
75	C12		SANDSTONE, reddish brown & maroon w/gray, fine grained, hard, moist w/some shale seams	77.0										
80														
85	C13													
90														
95	C14													
100														

BORING LOG W/FIGURE 1556 E. OAK LF GP & LOGS.GPI LANDTEC.GDT 12/3/10

Completion Depth: 111.5 ft
Date: 10/26/10

Remarks: Seepage observed @ 11' during drilling.
Top of PVC Pipe Elevation: 1150.95
Water Level Elevation: 1131.75

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3b

Project: East Oak Landfill
Oklahoma City, Oklahoma

**BORING LOG
MW-220R**

Project Number: 1556

Sheet 3 of 3

Depth, feet	Samples	Symbol / USCS	Location: See Figure A1 Surface El.: 1147.78 Northing: 1045185218.54 Easting: 2176162.56	Hand Penetrometer, tsf	Penetration Blows / Foot	Recovery %	RQD	Moisture Content, %	Unit Dry Weight, pcf	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
			MATERIAL DESCRIPTION											
	C15	SANDSTONE, reddish brown & maroon w/gray, fine grained, hard, moist w/some shale seams (continued)											
-105														
	C16												
-110		----	SHALE, red to reddish brown, hard w/light gray sandstone seams	110.0										
				111.5										
-115														
-120														
-125														
-130														
-135														
-140														
-145														
-150														

BORING LOG W/FIGURE 1556 E. OAK LF GP & LOGS.GPJ LANDTEC.GDT 12/3/10

Completion Depth: 111.5 ft
Date: 10/26/10

Remarks: Seepage observed @ 11' during drilling.
Top of PVC Pipe Elevation: 1150.95
Water Level Elevation: 1131.75

LANDTEC

Soil and rock descriptions on this boring log are a compilation of data collected in both the field and the laboratory. The stratification lines represent the approximate boundary between soil types and the transition can be gradual.

FIGURE A3c

FILTER PACK INFORMATIONFilter Pack Material: Medium SandFilter Pack Interval: From 98 ft to 111.5**WELL SEAL INFORMATION**Type of Surface Seal Cement GroutSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal Bentonite/Cement GroutAnnular Seal Interval: From 2 ft to 95 ftFilter Pack Seal Material Bentonite Granules/ChipsFilter Pack Seal Interval: From 95 ft to 98 ftTYPE OF COMPLETION: Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling 11 ft

Estimated yield of well ___ gpm

First water zone ___ ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Tan Sand	0	33	Y
Reddish Brown Sandstone	33	110	N
Red Shale	110	111.5	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged n/a

Total Depth of well being plugged ___ ft.

Was the well contaminated or was it plugged as though it was contaminated? n/aIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/aWas the grout tremied? n/aBackfilled with n/a

Backfilled from ___ ft. to ___ ft.

Grouted with n/a

Grouted from ___ ft. to ___ ft.

Grouted with Cement

Grouted from ___ ft. to ___ ft.

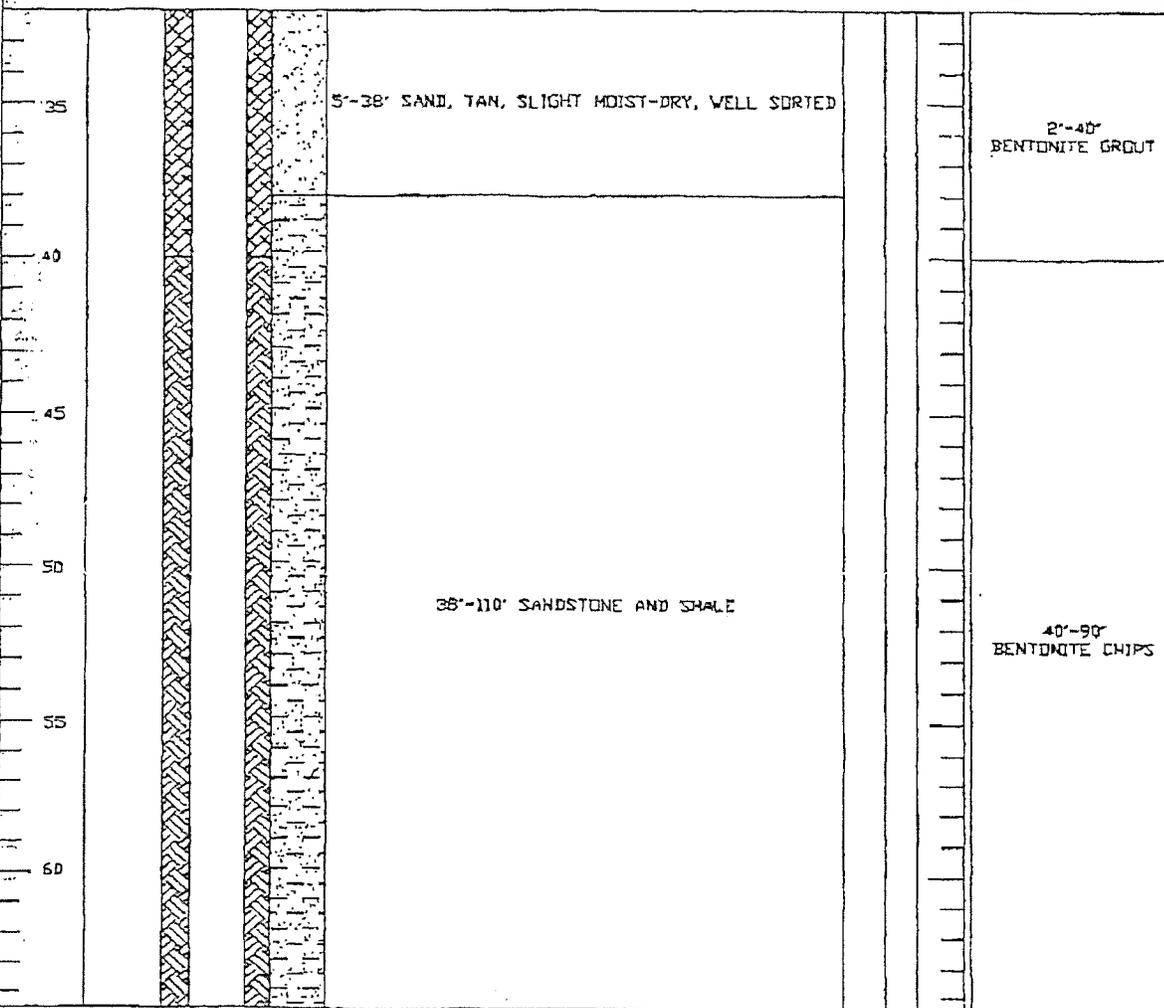
Firm Name STRA CORE ENVIRONMENTAL DRILLINGD/PC No. DPC-0727Operator Name JON STORMOP No. OP-1621Date 12/15/2010Comments: n/a

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG	BORING NUMBER: MW-221R
	HOLLOW STEM AUGER	
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W	SAMPLING METHOD: N/A	SHEET: 2 OF 4
	DRILLING	
WEATHER: SUNNY	TEMP: 85 F	START TIME: 15:43
GL. ELEV. 1158.70 FT.	DATE:	FINISH TIME:
DATUM: NAVD89	TQC ELEV. 1161.52 FT.	DATE: 6/4/03
DRILL RIG: CHE	SURFACE CONDITIONS: DRY	CASING DIA: 2"
ANGLE: VERTICAL	BEARING:	SCREEN DIA: 2"
SAMPLE HAMMER TORQUE:	FT.-LBS:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM
		SLOT SIZE: .010
		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS 6 IN OR SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT (OR CASING)	WELL CONSTRUCTION NOTES
---------------------------	----------------------------------	--------------	--------	-------------------------	-----------------	-------------	------------------------	-------------------------



DRILLING CONTR: McBrowk Drilling
 DRILLER: ALAN BRANTLEY

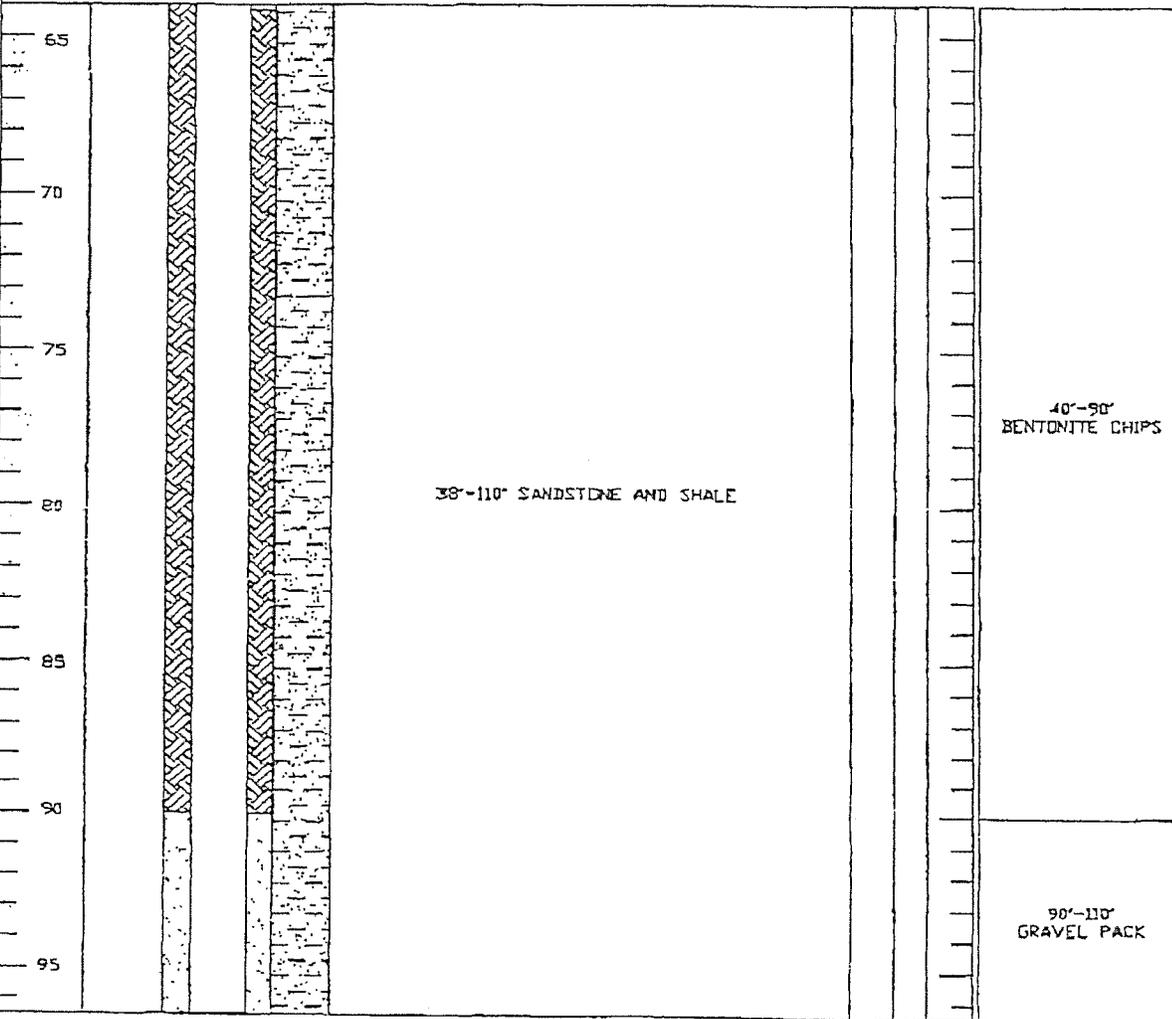
LOGGED BY: PETER SCHULIZE
 DATE: 6/4/2003 CHK'D BY: PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG	BORING NUMBER
	HOLLOW STEM AUGER	MW-221R
SITE NAME AND LOCATION East Oak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W	SAMPLING METHOD: N/A	SHEET
		3 OF 4
		DRILLING
WEATHER: SUNNY	TEMP: 85 F	START TIME
		15:43
	GL ELEV. 1,158.70 FT.	DATE
		6/4/03
DATUM: NAVD88	TDC ELEV. 1,161.52 FT.	CASING DEPTH
		6/4/03
DRILL RIG: CME	SURFACE CONDITIONS: DRY	CASING DIA: 2"
		SCREEN DIA: 2"
ANGLE: VERTICAL	BEARING:	TYPE GRAVEL: SILICA SAND 0.45-0.48MM
		SLOT SIZE: .010
SAMPLE HAMMER TORQUE	FT.-LBS	TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS & IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/TOT ON CASING	WELL CONSTRUCTION NOTES
---------------------------	----------------------------------	--------------	--------	-------------------------	-----------------	-------------	---------------------	-------------------------



DRILLING CONTR: Mohawk Drilling
 DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULTZE
 DATE: 6/4/2003
 CHK'D BY: PLS

Waste Management of Oklahoma, Inc. East Dak Landfill 4041 N. 141st E. Ave. Tulsa, Oklahoma				<h1 style="margin: 0;">SOIL BORING LOG</h1>				
 A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.		DRILLING METHOD: ROTARY RIG HOLLOW STEM AUGER		BORING NUMBER MW-221R				
SITE NAME AND LOCATION East Dak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2W		SAMPLING METHOD: N/A		SHEET 4 OF 4				
WEATHER: SUNNY TEMP: 85 F		WATER LEVEL		DRILLING START FINISH TIME TIME 15:43				
DATUM: NAVD88 TDC ELEV. 1,161.52 FT.		SURFACE CONDITIONS: DRY		DATE DATE 6/4/03 6/4/03				
DRILL RIG: CME		CASING DIA: 2"		SCREEN DIA: 2"				
ANGLE: VERTICAL BEARING:		TYPE GRAVEL: SILICA SAND 0.45-0.48MM		SLOT SIZE: #10				
SAMPLE HAMMER TORQUE FT.-LBS		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS						
DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN OH SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOW/COUNT ON CASING	WELL CONSTRUCTION NOTES
100				38'-110' SANDSTONE AND SHALE				90'-110' GRAVEL PACK
105								
110				TD @ 110 FT.				
115								
120								
125								

DRILLING CONTR: Mohawk Drilling
 DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULTZE
 DATE: 6/4/2003 CHK'D BY: PLS

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	SAMPLES				TESTS			
				USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	ATTERBERG LIMITS AND/OR #200 U.S. STANDARD SIEVE
1.8	SILT light brown	2" in in ft				DB					
2.4	CLAY dark brown					DB					
5	SILT brown		5			DB					
6	SAND brown					DB					
8	SILT brown					DB					
			10			DB					
			15			DB					
			20			DB					
			25			DB					
			30			DB					
			35			DB					

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual. *Calibrated Hand Penetrometer

WELL 99 03117065.GPJ TERRACON.GDT 7/12/11

WATER LEVEL OBSERVATIONS, ft	<h2 style="margin: 0;">Terracon</h2>	BORING STARTED 6-21-11	
WL ∇ 14 W.D. ∇		BORING COMPLETED 6-22-11	
WL ∇		RIG Able Env	FOREMAN RD
WL		APPROVED RD	JOB # 03117065

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft	USCS SYMBOL	SAMPLES				TESTS	
					NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft	WATER CONTENT, %	DRY UNIT WT pcf
43	<u>COARSE SAND</u> gray, some gravel		40			DB				
45.3	<u>+SANDSTONE</u> maroon to gray very fine grained		45			DB				
65.4	<u>+SHALE</u> brownish-red		50			DB				
60	<u>+SANDSTONE AND SHALE</u> brownish-red, layered		55			DB				
	<u>+SANDSTONE</u> tan to brownish-red very fine grained		60			DB				
			65			DB				
			70							

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types; in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WELL 99 03117065.GPJ TERRACON.GDT 7/12/11

WATER LEVEL OBSERVATIONS, ft		
WL	▽ 14	W.D. ▽
WL	▽	▽
WL		



BORING STARTED	6-21-11
BORING COMPLETED	6-22-11
RIG Able Env	FOREMAN RD
APPROVED RD	JOB # 03117065

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.	ENGINEER / ARCHITECT Biggs & Mathews Environmental
SITE 3201 Mosley Road Oklahoma City, Oklahoma	PROJECT Mosley Road Landfill

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft	USCS SYMBOL	SAMPLES				TESTS	
					NUMBER	TYPE	RECOVERY, In.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
+SANDSTONE tan to brownish-red very fine grained	79.5		75		DB					
+SILTSTONE AND SHALE brownish-red interbedded	82.5		80		DB					
+SANDSTONE tan to brownish-red very fine grained			85		DB					
			90		DB					
			95		DB					
			100		DB					
			105							

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WELL 99_03117065.GPJ TERRACON.GDT 7/12/11

WATER LEVEL OBSERVATIONS, ft	
WL ∇ 14	W.D. ∇
WL ∇	∇
WL	



BORING STARTED	6-21-11
BORING COMPLETED	6-22-11
RIG Able Env	FOREMAN RD
APPROVED RD	JOB # 03117065

LOG OF WELL NO. MW-223R1

CLIENT Waste Management of Oklahoma, Inc.		ENGINEER / ARCHITECT Biggs & Mathews Environmental								
SITE 3201 Mosley Road Oklahoma City, Oklahoma		PROJECT Mosley Road Landfill								
GRAPHIC LOG	DESCRIPTION	WELL DETAIL	SAMPLES				TESTS			
			DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
107	<p>*SANDSTONE tan to brownish-red very fine grained</p> <p>BOTTOM OF BORING</p> <p>+Classification estimated from disturbed samples. Core sample and petrographic analysis may reveal other rock types.</p>				DB					

WELL 99 03117065.GPJ TERRACON.GDI 7/12/11

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual. *Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft	
WL ▽ 14	W.D. ▽
WL ▽	▽
WL	

BORING STARTED		6-21-11	
BORING COMPLETED		6-22-11	
RIG	Able Env	FOREMAN	RD
APPROVED	RD	JOB #	03117065

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-226GW

SITE NAME AND LOCATION
 East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET
 1 OF 4

DRILLING

WATER LEVEL

START TIME
 14:18

FINISH TIME
 13:00

WEATHER: SUNNY TEMP: 85 F

TIME

DATE
 5/29/03

G.L. ELEV. 1,148.60 FT.

DATE

DATE
 6/2/03

DATUM: NAVD88

TDC ELEV. 1,151.24 FT.

CASING DEPTH

DRILL RIG: CMC

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

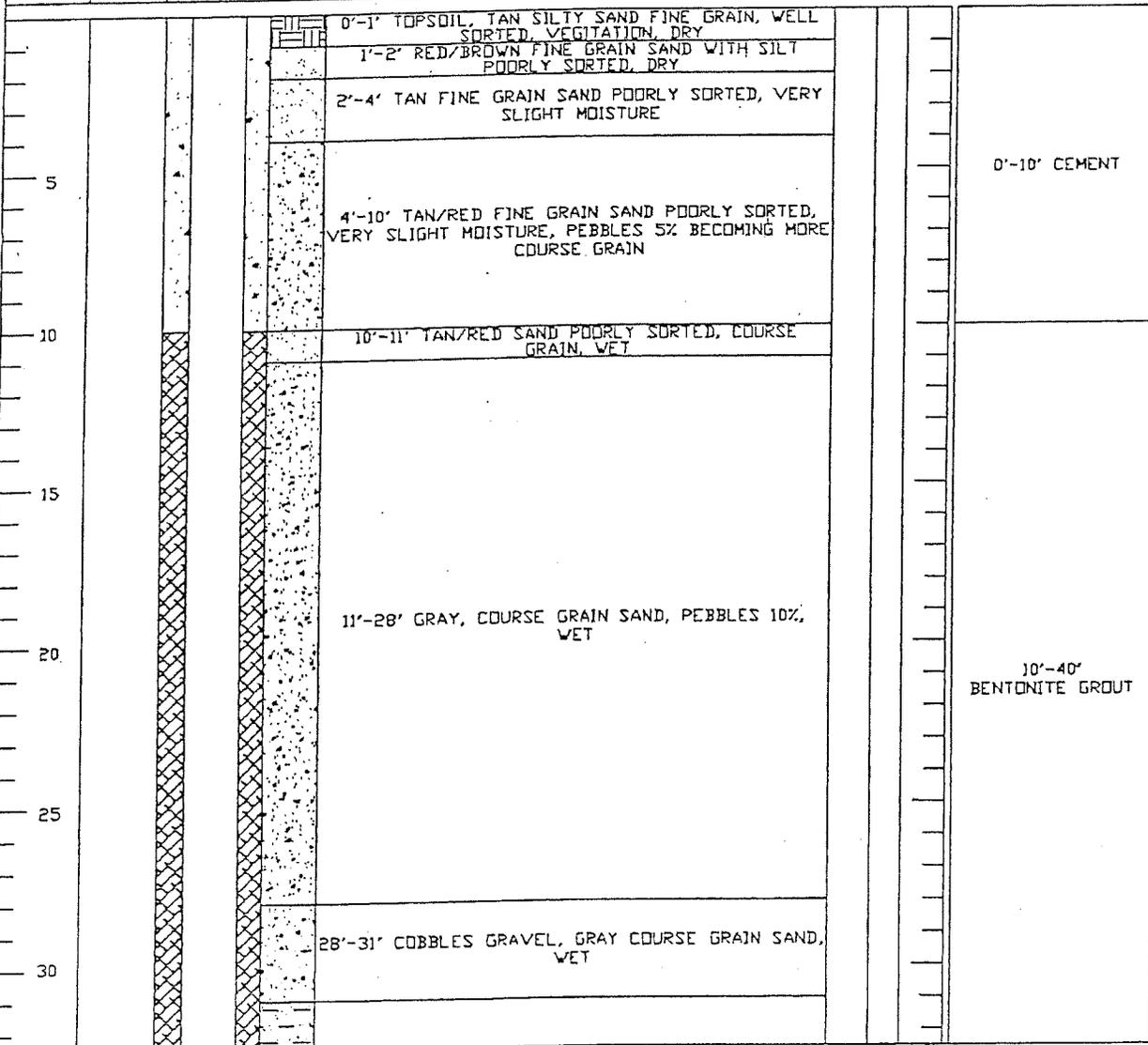
TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
---------------------------	----------------------------------	--------------	--------	-------------------------	-----------------	-------------	----------------------	-------------------------



DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY PETER SCHULTZE

DATE 5/29/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Oak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BORING NUMBER
 MW-226GW

SITE NAME AND LOCATION
 East Oak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R 2W

SAMPLING METHOD: N/A

SHEET
 2 OF 4

DRILLING

WATER LEVEL

START TIME
 14:18

FINISH TIME
 13:00

WEATHER: SUNNY TEMP: 85 F

TIME

DATE
 5/29/03

DATE
 6/2/03

G.L. ELEV. 1,148.60 FT.

DATE

DATUM: NAVD8S

TOC ELEV. 1,151.24 FT.

CASING DEPTH

DRILL RIG: CME

SURFACE CONDITIONS: DRY

CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE

FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DRILLING CONTR: Mohawk Drilling

DRILLER: ALAN BRANTLEY

LOGGED BY: PETER SCHULTZE

DATE: 5/29/2003 CHK'D BY: PLS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN DN SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
35								10'-40' BENTONITE GROUT
40								
45				32'-63' HARD RED/BROWN SANDSTONE & SHALE				
50								40'-85' BENTONITE CHIPS
55								
60								

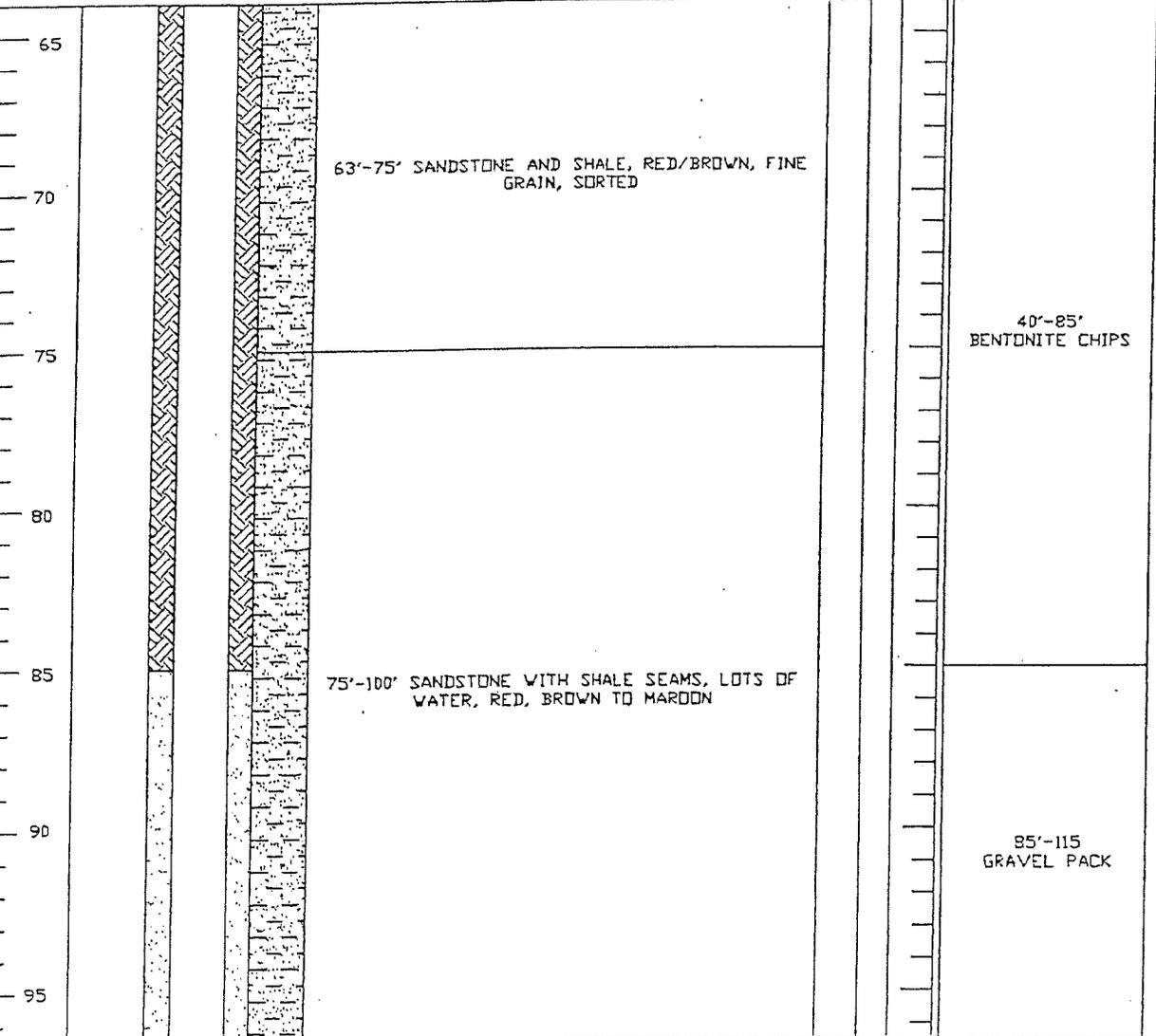
Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG

M A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	DRILLING METHOD: ROTARY RIG	BORING NUMBER
	HOLLOW STEM AUGER	MW-226GW
SITE NAME AND LOCATION East Dak Landfill Oklahoma City, Oklahoma SEC 21 T 12N R 2V	SAMPLING METHOD: N/A	SHEET
		3 OF 4
		DRILLING
	WATER LEVEL	START TIME
WEATHER: SUNNY	TEMP: 85 F	FINISH TIME
	DATE	DATE
DATUM: NAVD88	GL. ELEV. 1,148.60 FT.	5/29/03
	TOC ELEV. 1,151.24 FT.	6/2/03
DRILL RIG: CME	SURFACE CONDITIONS: DRY	CASING DIA: 2"
ANGLE: VERTICAL	BEARING:	SCREEN DIA: 2"
SAMPLE HAMMER TORQUE	FT.-LBS	TYPE GRAVEL: SILICA SAND 0.45-0.48MM
		SLOT SIZE: .010
		TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DRILLING CONTR Mohawk Drilling
 DRILLER: ALAN BRANTLEY

DEPTH IN FEET (ELEVATION)	BLOWS/5 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
---------------------------	----------------------------------	--------------	--------	-------------------------	-----------------	-------------	----------------------	-------------------------



LOGGED BY PETER SCHULTZE
 DATE 5/29/2003 CHK'D BY PLS

Waste Management of Oklahoma, Inc.
 East Dak Landfill
 4041 N. 141st E. Ave.
 Tulsa, Oklahoma

SOIL BORING LOG



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRILLING METHOD: ROTARY RIG
 HOLLOW STEM AUGER

BDRING NUMBER
 MW-226GW

SITE NAME AND LOCATION
 East Dak Landfill
 Oklahoma City, Oklahoma
 SEC 21 T 12N R2W

SAMPLING METHOD: N/A

SHEET
 4 OF 4

WATER LEVEL
 TIME 14:18
 FINISH TIME 13:00

WEATHER: SUNNY TEMP: 85 F

DATE 5/29/03
 DATE 6/2/03

DATUM: NAVD88 GL. ELEV. 1,148.60 FT.

CASING DEPTH
 DATE 5/29/03
 DATE 6/2/03

DRILL RIG: CME

SURFACE CONDITIONS: DRY CASING DIA: 2"

SCREEN DIA: 2"

ANGLE: VERTICAL BEARING:

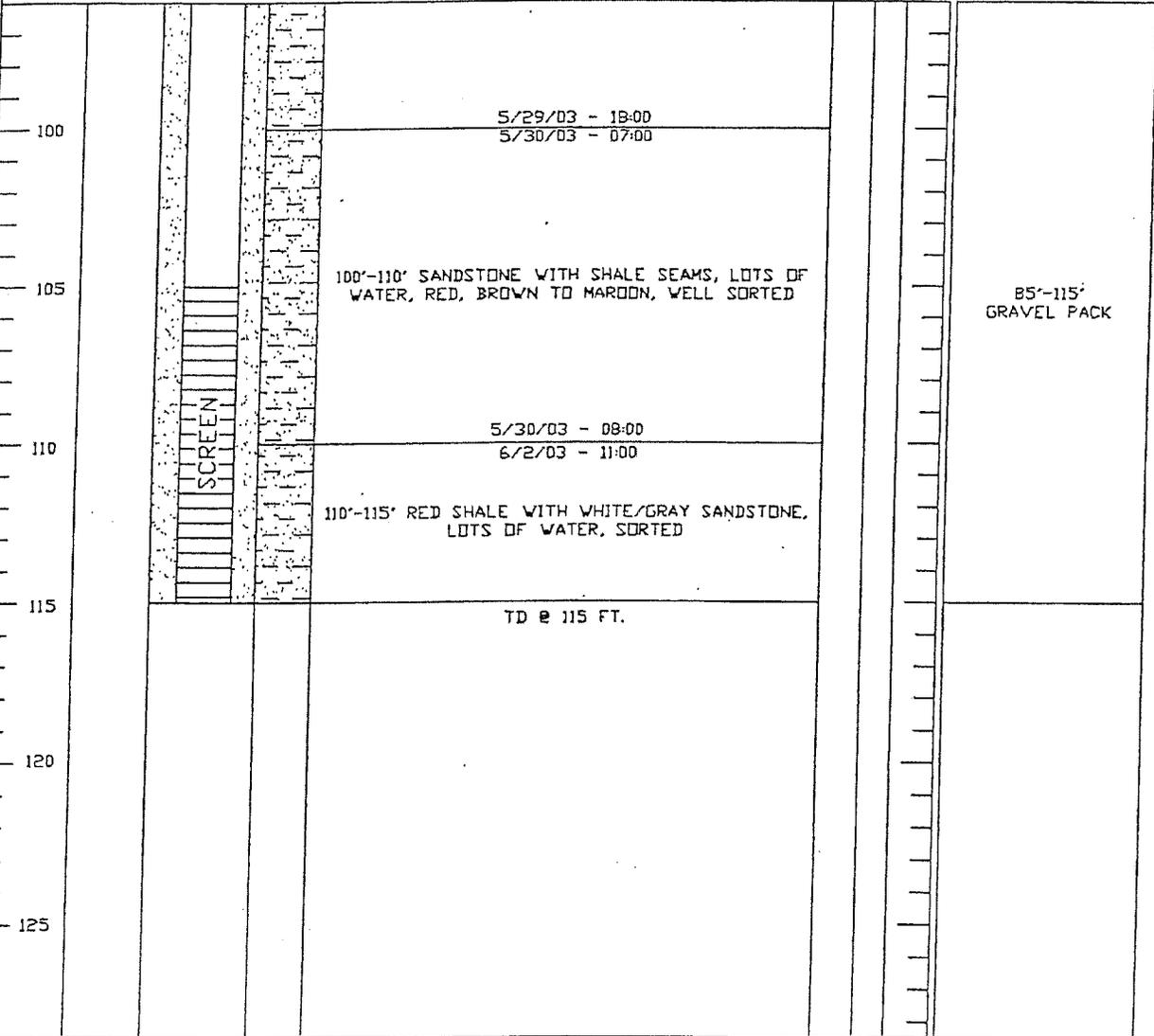
TYPE GRAVEL: SILICA SAND 0.45-0.48MM

SLOT SIZE: .010

SAMPLE HAMMER TORQUE FT.-LBS

TYPE BENTONITE: PUREGOLD MEDIUM CHIPS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	WELL TYPICAL	SYMBOL	DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION NOTES
---------------------------	----------------------------------	--------------	--------	-------------------------	-----------------	-------------	----------------------	-------------------------



DRILLING CONTR Mohawk Drilling
 DRILLER: ALAN BRANTLEY

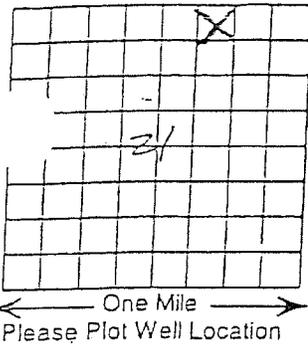
LOGGED BY PETER SCHULTZE
 DATE 5/29/2003 CHK'D BY PLS



Ten Acres

MULTI-PURPOSE COMPLETION REPORT MONITORING WELLS

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800



Do Not Write In This Space
Well Log ID Number _____

LEGAL DESCRIPTION

Do Not Write In This Space
____ 1/4 ____ 1/4 ____ 1/4

of Sec. 21 Township T-12- N S Range 2 W. WIM EIM ECM

Optional Information
Latitude _____ Longitude _____

Number of wells in 10 acre tract 2 Well No. (if applicable) ~~221 R~~ MW 226GW
County Oklahoma Variance Request No. (if applicable) _____
Well Owner WMI, Inc Phone (918) 439-7629
Address/City/State 4041 N 141st E, Ave Zip 74116
Location Waste Management East ~~of~~ Landfill Oklahoma City, OK

TYPE OF WORK	USE OF WELL	
<input type="checkbox"/> Geotechnical Boring	<input type="checkbox"/> Site Assessment Observation	<input type="checkbox"/> Vapor Extraction
<input type="checkbox"/> Monitoring Well	<input type="checkbox"/> Unsaturated Zone Monitoring	<input type="checkbox"/> Water Quality
<input type="checkbox"/> Plugging	<input type="checkbox"/> Air Sparge	<input type="checkbox"/> Recovery
		<input type="checkbox"/> Other _____

NEW BORING OR WELL CONSTRUCTION DATA

Application for a variance must be requested and obtained before any changes are made to the minimum construction standards for any well.

Date Started 5/29/03 Date Completed 6/5/03
Well Diameter ~~8.5~~ 11 inches From 0 feet to 45 feet
Well Diameter 6.25 inches From 45 feet to 115 feet

LOGGING RECORD:
Surface Pipe (Casing) Diameter _____ inches From _____ feet to _____ feet
1st Casing Diameter 2 inches From 73 feet to 105 feet
2nd Casing Diameter _____ inches From _____ feet to _____ feet

SCREEN OR PERFORATION RECORD:
Screen and Slot Size .020 PVC From 105 feet to 115 feet
Screen and Slot Size _____ From _____ feet to _____ feet

TRAILER PACK:
Gravel Size 10/20 silica From ~~75~~ 90 feet to 115 feet
Gravel Size _____ From _____ feet to _____ feet

APPENDIX E-6
EAST OAK RECYCLING AND DISPOSAL FACILITY
LEACHATE ANALYSES

Includes pages E-6-1 through E-6-64

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

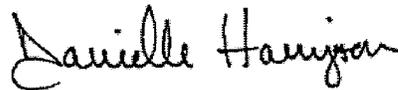
ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Tel: (303)736-0100

TestAmerica Job ID: 280-56768-1
Client Project/Site: 856|EAST OAK RDF
Sampling Event: Annual Leachate Monitoring - April

For:
Waste Management
1201 N. Central Avenue
PO BOX 400
Ferris, Texas 75125

Attn: Ms. Paula Carboni



Authorized for release by:
7/8/2014 10:22:18 AM

Danielle Harrington, Project Manager II
(303)736-0176
danielle.harrington@testamericainc.com

LINKS

Review your project
results through
Total Access

Have a Question?

 **Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
*	LCS or LCSD exceeds the control limits
F1	MS and/or MSD Recovery exceeds the control limits
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.

General Chemistry

Qualifier	Qualifier Description
F3	Duplicate RPD exceeds the control limit
b	Result Detected in the Unseeded Control blank (USB).
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
F1	MS and/or MSD Recovery exceeds the control limits
E	Result exceeded calibration range.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Job ID: 280-56768-1

Laboratory: TestAmerica Denver

Narrative

CASE NARRATIVE

Client: Waste Management

Project: 856|East Oak

Report Number: 280-56768-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

This report may include reporting limits (RLs) less than TestAmerica's standard reporting limit. The reported sample results and associated reporting limits are being used specifically to meet the needs of this project. Note that data are not normally reported to these levels without qualification because they are inherently less reliable and potentially less defensible than required by the latest industry standards.

This submission may contain field data obtained by the sampler. The methods referenced in this submission for the field data results may not be the methods used to obtain the field data by the sampler.

RECEIPT

The samples were received on 06/18/2014 with cooler temperatures of 2.9C, 1.8C, and 1.6C.

All sample bottles were received in acceptable condition.

HOLDING TIMES

All Holding Times were met.

METHOD BLANKS

All Method Blanks were within the acceptance limits.

LABORATORY CONTROL SAMPLES (LCS)

The LCS for method 200.7 exhibited a percent recovery above the QC limits for Silver. This is an indicator that data may be biased high. As no detectable concentrations are present in the associated samples, corrective action is deemed unnecessary. Usability of the sample data is not compromised.

All other Laboratory Control Samples were within the acceptance limits.

MATRIX SPIKE (MS) and MATRIX SPIKE DUPLICATES (MSD)

The method 8011 required MS/MSD could not be performed for batch 280-231912, due to insufficient sample volume submitted. Method precision and accuracy have been verified by the acceptable LCS/LCSD analysis data.

Percent recoveries and RPD data could not be calculated for the Iron, Calcium, Manganese, and Sodium MS/MSD performed on sample LCS-13, due to the sample concentration reading greater than four times the spike amount.

MS/MSD analysis was performed on sample LCS-13. The MS/MSD for method 200.7 exhibited spike recoveries outside the QC limits for Silver, Cadmium, and Antimony. The acceptable LCS analysis data indicated that the analytical system was operating within control; therefore, corrective action is deemed unnecessary.

Case Narrative

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Job ID: 280-56768-1 (Continued)

Laboratory: TestAmerica Denver (Continued)

MS/MSD analysis was performed on sample LCS-13. The MS/MSD for method 245.1 exhibited spike recoveries outside the QC limits for Mercury. The acceptable LCS analysis data indicated that the analytical system was operating within control; therefore, corrective action is deemed unnecessary.

Laboratory generated MS/MSD analysis data have been provided. The MS/MSD for method 300.0 exhibited spike recoveries outside the QC limits for Nitrate. Method precision and accuracy have been verified by the acceptable LCS/LCSD analysis data; therefore, corrective action is deemed unnecessary.

Percent recoveries and RPD data could not be calculated for the laboratory generated Chloride and Sulfate MS/MSD, due to the sample concentration reading greater than four times the spike amount.

MS/MSD analysis was performed on sample LCS-08. The MS/MSD for method 335.4 exhibited spike recoveries outside the QC limits for Total Cyanide. Method precision and accuracy have been verified by the acceptable LCS/LCSD analysis data; therefore, corrective action is deemed unnecessary.

Laboratory generated MS/MSD analysis data have been provided. The MS/MSD for method 410.4 exhibited spike recoveries outside the QC limits for Chemical Oxygen Demand. Method precision and accuracy have been verified by the acceptable LCS/LCSD analysis data; therefore, corrective action is deemed unnecessary.

MS/MSD analysis was performed on sample LCS-13. The MS/MSD for method 5310B exhibited spike recoveries outside the QC limits for Total Organic Carbon. Method precision and accuracy have been verified by the acceptable LCS/LCSD analysis data; therefore, corrective action is deemed unnecessary.

All other Matrix Spike and Matrix Spike Duplicates were within the acceptance limits.

SAMPLE DUPLICATE

The Total Suspended Solids sample duplicate analysis data associated with QC batch 280-231392 exhibited RPD data outside the QC limits. The acceptable LCS analysis data indicated that the analytical system was operating within control; therefore, corrective action is deemed unnecessary.

The pH sample duplicate analysis data associated with QC batch 280-230908 exhibited RPD data outside the QC limits. The acceptable LCS analysis data indicated that the analytical system was operating within control; therefore, corrective action is deemed unnecessary.

ORGANICS

Due to matrix interference, samples LCS-10, LCS-13 and LCS-07 were analyzed using a smaller aliquot for Method 8260B. The reporting limits have been adjusted relative to the dilution required.

The analyst notated that the samples were received at a neutral pH due to the nature of the samples.

METALS

Continuing Calibration Verification Low (CCVL) standards associated with the Method Blank in batch 280-232653 exhibited %D values out of range, biased high, for Sodium. This is an indicator that data may be biased high. As no detectable concentrations of Sodium are present in the associated Method Blank, corrective action is deemed unnecessary.

GENERAL CHEMISTRY

Due to analytes present above the linear calibration curve or matrix interference, several samples were analyzed at a dilution for various analyses. The reporting limits have been adjusted relative to the dilution required.

Please note, the unseeded control blank for Biochemical Oxygen Demand was outside the method criteria of 0.2 mg/L. The LCS and method blank were in control; therefore no further corrective action was taken.

Please note, samples LCS-08 and LCS-07 showed a possible sign of toxicity for Biochemical Oxygen Demand.

Case Narrative

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Job ID: 280-56768-1 (Continued)

Laboratory: TestAmerica Denver (Continued)

ADDITIONAL COMMENTS

Due to issues with our Oil and Grease analysis, the samples for 1664A Oil and Grease were subbed to our sister laboratory, TestAmerica Buffalo

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228
Ph: (716)-691-2600

Due to issues with the Total Cyanide analysis, the samples for 335.4 Total Cyanide were subbed to our sister laboratory, TestAmerica Buffalo

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228
Ph: (716)-691-2600

Detection Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS13

Lab Sample ID: 280-56768-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Vinyl chloride	11		8.0		ug/L	1		8260B	Total/NA
Barium	3900		200		ug/L	1		200.7 Rev 4.4	Total Recoverable
Calcium	400000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Iron	26000		100		ug/L	1		200.7 Rev 4.4	Total Recoverable
Potassium	36000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Magnesium	110000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Manganese	4700		15		ug/L	1		200.7 Rev 4.4	Total Recoverable
Sodium	420000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Nickel	81		40		ug/L	1		200.7 Rev 4.4	Total Recoverable
Arsenic	58		10		ug/L	1		200.8	Total Recoverable
Chloride	640		25		mg/L	50		300.0	Total/NA
Sulfate	12		10		mg/L	2		300.0	Total/NA
Ammonia as N	42		0.76		mg/L	20		350.1	Total/NA
Total Kjeldahl Nitrogen	27		5.0		mg/L	5		351.2	Total/NA
Chemical Oxygen Demand (COD)	230		100		mg/L	10		410.4	Total/NA
Total Alkalinity	1400		5.0		mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	2700		20		mg/L	1		SM 2540C	Total/NA
Total Suspended Solids	110		10		mg/L	1		SM 2540D	Total/NA
TOC Result 1	73		1.9		mg/L	1.92		SM 5310B	Total/NA
TOC Result 2	73		1.9		mg/L	1.92		SM 5310B	Total/NA
Biochemical Oxygen Demand	18	b	13		mg/L	5		SM5210B	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	3700		2.0		umhos/cm	1		SM 2510B	Total/NA
pH	7.03	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: LCS12

Lab Sample ID: 280-56768-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	6.6		5.0		ug/L	1		8260B	Total/NA
Vinyl chloride	21		2.0		ug/L	1		8260B	Total/NA
Barium	3700		200		ug/L	1		200.7 Rev 4.4	Total Recoverable
Calcium	410000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Iron	28000		100		ug/L	1		200.7 Rev 4.4	Total Recoverable
Potassium	31000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Magnesium	110000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Manganese	4900		15		ug/L	1		200.7 Rev 4.4	Total Recoverable
Sodium	350000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Detection Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS12 (Continued)

Lab Sample ID: 280-56768-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nickel	82		40		ug/L	1		200.7 Rev 4.4	Total Recoverable
Arsenic	70		10		ug/L	1		200.8	Total Recoverable
Chloride	490		25		mg/L	50		300.0	Total/NA
Cyanide, Total	0.014		0.010		mg/L	1		335.4	Total/NA
Ammonia as N	44		0.76		mg/L	20		350.1	Total/NA
Total Kjeldahl Nitrogen	30		5.0		mg/L	5		351.2	Total/NA
Chemical Oxygen Demand (COD)	400		50		mg/L	5		410.4	Total/NA
Total Alkalinity	1400		5.0		mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	2500		20		mg/L	1		SM 2540C	Total/NA
Total Suspended Solids	90		10		mg/L	1		SM 2540D	Total/NA
TOC Result 1	120		3.6		mg/L	3.57		SM 5310B	Total/NA
TOC Result 2	130		3.6		mg/L	3.57		SM 5310B	Total/NA
Biochemical Oxygen Demand	39	b	13		mg/L	5		SM5210B	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	3300		2.0		umhos/cm	1		SM 2510B	Total/NA
pH	7.02	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: LCS10

Lab Sample ID: 280-56768-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	720		170		ug/L	1		8260B	Total/NA
4-Methyl-2-pentanone (MIBK)	62		50		ug/L	1		8260B	Total/NA
2-Butanone (MEK)	710		250		ug/L	1		8260B	Total/NA
Barium	2600		200		ug/L	1		200.7 Rev 4.4	Total Recoverable
Calcium	260000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Chromium	19		10		ug/L	1		200.7 Rev 4.4	Total Recoverable
Iron	14000		100		ug/L	1		200.7 Rev 4.4	Total Recoverable
Potassium	150000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Magnesium	150000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Manganese	2900		15		ug/L	1		200.7 Rev 4.4	Total Recoverable
Sodium	770000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Nickel	100		40		ug/L	1		200.7 Rev 4.4	Total Recoverable
Antimony	37		6.0		ug/L	1		200.7 Rev 4.4	Total Recoverable
Zinc	110		20		ug/L	1		200.7 Rev 4.4	Total Recoverable
Arsenic	34		10		ug/L	1		200.8	Total Recoverable
Chloride	860		50		mg/L	100		300.0	Total/NA
Nitrate as N	0.20		0.10		mg/L	2		300.0	Total/NA
Cyanide, Total	0.010		0.010		mg/L	1		335.4	Total/NA
Ammonia as N	200		3.8		mg/L	100		350.1	Total/NA
Total Kjeldahl Nitrogen	210		25		mg/L	5		351.2	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Detection Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS10 (Continued)

Lab Sample ID: 280-56768-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chemical Oxygen Demand (COD)	600		50		mg/L	5		410.4	Total/NA
Total Alkalinity	2100		5.0		mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	3600		40		mg/L	1		SM 2540C	Total/NA
Total Suspended Solids	48		5.0		mg/L	1		SM 2540D	Total/NA
TOC Result 1	200		5.0		mg/L	5		SM 5310B	Total/NA
TOC Result 2	200		5.0		mg/L	5		SM 5310B	Total/NA
Biochemical Oxygen Demand	73	b	50		mg/L	5		SM5210B	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	5500		2.0		umhos/cm	1		SM 2510B	Total/NA
pH	7.23	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: LCS08

Lab Sample ID: 280-56768-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	8.1		5.0		ug/L	1		8260B	Total/NA
Chlorobenzene	21		5.0		ug/L	1		8260B	Total/NA
1,4-Dichlorobenzene	21		10		ug/L	1		8260B	Total/NA
Xylenes (total)	14		10		ug/L	1		8260B	Total/NA
Barium	9900		200		ug/L	1		200.7 Rev 4.4	Total Recoverable
Calcium	270000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Chromium	12		10		ug/L	1		200.7 Rev 4.4	Total Recoverable
Iron	15000		100		ug/L	1		200.7 Rev 4.4	Total Recoverable
Potassium	240000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Magnesium	180000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Manganese	1600		15		ug/L	1		200.7 Rev 4.4	Total Recoverable
Sodium	1800000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Nickel	110		40		ug/L	1		200.7 Rev 4.4	Total Recoverable
Arsenic	70		10		ug/L	1		200.8	Total Recoverable
Chloride	2500		50		mg/L	100		300.0	Total/NA
Cyanide, Total	0.027		0.010		mg/L	1		335.4	Total/NA
Ammonia as N	320		3.8		mg/L	100		350.1	Total/NA
Total Kjeldahl Nitrogen	380		50		mg/L	10		351.2	Total/NA
Chemical Oxygen Demand (COD)	980		100		mg/L	10		410.4	Total/NA
Total Alkalinity	2500		5.0		mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	6200		100		mg/L	1		SM 2540C	Total/NA
Total Suspended Solids	42		5.0		mg/L	1		SM 2540D	Total/NA
TOC Result 1	420		9.0		mg/L	9		SM 5310B	Total/NA
TOC Result 2	420		9.0		mg/L	9		SM 5310B	Total/NA
Biochemical Oxygen Demand	290	b	50		mg/L	10		SM5210B	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	9400		2.0		umhos/cm	1		SM 2510B	Total/NA
pH	7.38	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Detection Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS07

Lab Sample ID: 280-56768-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	23		20		ug/L	1		8260B	Total/NA
1,4-Dichlorobenzene	48		40		ug/L	1		8260B	Total/NA
Barium	9200		200		ug/L	1		200.7 Rev 4.4	Total Recoverable
Calcium	220000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Chromium	14		10		ug/L	1		200.7 Rev 4.4	Total Recoverable
Iron	3300		100		ug/L	1		200.7 Rev 4.4	Total Recoverable
Potassium	190000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Magnesium	220000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Manganese	360		15		ug/L	1		200.7 Rev 4.4	Total Recoverable
Sodium	1500000		5000		ug/L	1		200.7 Rev 4.4	Total Recoverable
Nickel	59		40		ug/L	1		200.7 Rev 4.4	Total Recoverable
Zinc	30		20		ug/L	1		200.7 Rev 4.4	Total Recoverable
Arsenic	79		10		ug/L	1		200.8	Total Recoverable
Chloride	2200		50		mg/L	100		300.0	Total/NA
Cyanide, Total	0.010		0.010		mg/L	1		335.4	Total/NA
Ammonia as N	230		3.8		mg/L	100		350.1	Total/NA
Total Kjeldahl Nitrogen	280		50		mg/L	10		351.2	Total/NA
Chemical Oxygen Demand (COD)	1400		200		mg/L	20		410.4	Total/NA
Total Alkalinity	2200		5.0		mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	6200		100		mg/L	1		SM 2540C	Total/NA
Total Suspended Solids	5.2		2.0		mg/L	1		SM 2540D	Total/NA
TOC Result 1	480		10		mg/L	10		SM 5310B	Total/NA
TOC Result 2	480		10		mg/L	10		SM 5310B	Total/NA
Biochemical Oxygen Demand	430	b	100		mg/L	10		SM5210B	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	8100		2.0		umhos/cm	1		SM 2510B	Total/NA
pH	7.21	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Method Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL DEN
8011	EDB, DBCP, and 1,2,3-TCP (GC)	SW846	TAL DEN
200.7 Rev 4.4	Metals (ICP)	EPA	TAL DEN
200.8	Metals (ICP/MS)	EPA	TAL DEN
245.1	Mercury (CVAA)	EPA	TAL DEN
1664A	HEM and SGT-HEM	1664A	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL DEN
335.4	Cyanide, Total	MCAWW	TAL BUF
350.1	Nitrogen, Ammonia	MCAWW	TAL DEN
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL DEN
410.4	COD	MCAWW	TAL DEN
SM 2320B	Alkalinity	SM	TAL DEN
SM 2510B	Conductivity, Specific Conductance	SM	TAL DEN
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL DEN
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL DEN
SM 4500 H+ B	pH	SM	TAL DEN
SM 5310B	Organic Carbon, Total (TOC)	SM	TAL DEN
SM5210B	BOD, 5 Day	SM	TAL DEN

Protocol References:

1664A = EPA-821-98-002

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-56768-1	LCS13	Water	06/17/14 11:45	06/18/14 09:40
280-56768-2	LCS12	Water	06/17/14 12:10	06/18/14 09:40
280-56768-3	LCS10	Water	06/17/14 12:35	06/18/14 09:40
280-56768-4	LCS08	Water	06/17/14 13:10	06/18/14 09:40
280-56768-5	LCS07	Water	06/17/14 13:39	06/18/14 09:40

Client Sample Results

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Client Sample ID: LCS13

Lab Sample ID: 280-56768-1

Date Collected: 06/17/14 11:45

Matrix: Water

Date Received: 06/18/14 09:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		140		ug/L			06/25/14 13:32	1
Acrylonitrile	ND		400		ug/L			06/25/14 13:32	1
Benzene	ND		20		ug/L			06/25/14 13:32	1
Bromochloromethane	ND		40		ug/L			06/25/14 13:32	1
Bromodichloromethane	ND		20		ug/L			06/25/14 13:32	1
Bromoform	ND		20		ug/L			06/25/14 13:32	1
Bromomethane	ND		40		ug/L			06/25/14 13:32	1
Carbon disulfide	ND		20		ug/L			06/25/14 13:32	1
Carbon tetrachloride	ND		20		ug/L			06/25/14 13:32	1
Chlorobenzene	ND		20		ug/L			06/25/14 13:32	1
Dibromochloromethane	ND		20		ug/L			06/25/14 13:32	1
Chloroethane	ND		40		ug/L			06/25/14 13:32	1
Chloroform	ND		20		ug/L			06/25/14 13:32	1
Dibromomethane	ND		20		ug/L			06/25/14 13:32	1
1,2-Dichlorobenzene	ND		40		ug/L			06/25/14 13:32	1
1,4-Dichlorobenzene	ND		40		ug/L			06/25/14 13:32	1
trans-1,4-Dichloro-2-butene	ND		40		ug/L			06/25/14 13:32	1
1,1-Dichloroethane	ND		20		ug/L			06/25/14 13:32	1
1,2-Dichloroethane	ND		20		ug/L			06/25/14 13:32	1
cis-1,2-Dichloroethene	ND		40		ug/L			06/25/14 13:32	1
trans-1,2-Dichloroethene	ND		40		ug/L			06/25/14 13:32	1
1,1-Dichloroethene	ND		20		ug/L			06/25/14 13:32	1
1,2-Dichloropropane	ND		20		ug/L			06/25/14 13:32	1
cis-1,3-Dichloropropene	ND		20		ug/L			06/25/14 13:32	1
trans-1,3-Dichloropropene	ND		20		ug/L			06/25/14 13:32	1
Ethylbenzene	ND		20		ug/L			06/25/14 13:32	1
2-Hexanone	ND		40		ug/L			06/25/14 13:32	1
Iodomethane	ND		40		ug/L			06/25/14 13:32	1
Methylene Chloride	ND		20		ug/L			06/25/14 13:32	1
4-Methyl-2-pentanone (MIBK)	ND		40		ug/L			06/25/14 13:32	1
Styrene	ND		20		ug/L			06/25/14 13:32	1
1,1,1,2-Tetrachloroethane	ND		20		ug/L			06/25/14 13:32	1
1,1,2,2-Tetrachloroethane	ND		20		ug/L			06/25/14 13:32	1
Tetrachloroethene	ND		20		ug/L			06/25/14 13:32	1
1,1,1-Trichloroethane	ND		20		ug/L			06/25/14 13:32	1
1,1,2-Trichloroethane	ND		20		ug/L			06/25/14 13:32	1
Trichloroethene	ND		20		ug/L			06/25/14 13:32	1
Trichlorofluoromethane	ND		40		ug/L			06/25/14 13:32	1
1,2,3-Trichloropropane	ND		40		ug/L			06/25/14 13:32	1
Vinyl acetate	ND		40		ug/L			06/25/14 13:32	1
Vinyl chloride	11		8.0		ug/L			06/25/14 13:32	1
Xylenes (total)	ND		40		ug/L			06/25/14 13:32	1
Chloromethane	ND		40		ug/L			06/25/14 13:32	1
2-Butanone (MEK)	ND		200		ug/L			06/25/14 13:32	1
1,3-Dichlorobenzene	ND		4.0		ug/L			06/25/14 13:32	1
Toluene	ND		20		ug/L			06/25/14 13:32	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	88		70 - 127		06/25/14 13:32	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: LCS13
Date Collected: 06/17/14 11:45
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
Matrix: Water

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	99		80 - 125		06/25/14 13:32	1
4-Bromofluorobenzene (Surr)	86		78 - 120		06/25/14 13:32	1
Dibromofluoromethane (Surr)	95		77 - 120		06/25/14 13:32	1

Client Sample ID: LCS12
Date Collected: 06/17/14 12:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		34		ug/L			06/25/14 13:53	1
Acrylonitrile	ND		100		ug/L			06/25/14 13:53	1
Benzene	6.6		5.0		ug/L			06/25/14 13:53	1
Bromochloromethane	ND		10		ug/L			06/25/14 13:53	1
Bromodichloromethane	ND		5.0		ug/L			06/25/14 13:53	1
Bromoform	ND		5.0		ug/L			06/25/14 13:53	1
Bromomethane	ND		10		ug/L			06/25/14 13:53	1
Carbon disulfide	ND		5.0		ug/L			06/25/14 13:53	1
Carbon tetrachloride	ND		5.0		ug/L			06/25/14 13:53	1
Chlorobenzene	ND		5.0		ug/L			06/25/14 13:53	1
Dibromochloromethane	ND		5.0		ug/L			06/25/14 13:53	1
Chloroethane	ND		10		ug/L			06/25/14 13:53	1
Chloroform	ND		5.0		ug/L			06/25/14 13:53	1
Dibromomethane	ND		5.0		ug/L			06/25/14 13:53	1
1,2-Dichlorobenzene	ND		10		ug/L			06/25/14 13:53	1
1,4-Dichlorobenzene	ND		10		ug/L			06/25/14 13:53	1
trans-1,4-Dichloro-2-butene	ND		10		ug/L			06/25/14 13:53	1
1,1-Dichloroethane	ND		5.0		ug/L			06/25/14 13:53	1
1,2-Dichloroethane	ND		5.0		ug/L			06/25/14 13:53	1
cis-1,2-Dichloroethene	ND		10		ug/L			06/25/14 13:53	1
trans-1,2-Dichloroethene	ND		10		ug/L			06/25/14 13:53	1
1,1-Dichloroethene	ND		5.0		ug/L			06/25/14 13:53	1
1,2-Dichloropropane	ND		5.0		ug/L			06/25/14 13:53	1
cis-1,3-Dichloropropene	ND		5.0		ug/L			06/25/14 13:53	1
trans-1,3-Dichloropropene	ND		5.0		ug/L			06/25/14 13:53	1
Ethylbenzene	ND		5.0		ug/L			06/25/14 13:53	1
2-Hexanone	ND		10		ug/L			06/25/14 13:53	1
Iodomethane	ND		10		ug/L			06/25/14 13:53	1
Methylene Chloride	ND		5.0		ug/L			06/25/14 13:53	1
4-Methyl-2-pentanone (MIBK)	ND		10		ug/L			06/25/14 13:53	1
Styrene	ND		5.0		ug/L			06/25/14 13:53	1
1,1,1,2-Tetrachloroethane	ND		5.0		ug/L			06/25/14 13:53	1
1,1,2,2-Tetrachloroethane	ND		5.0		ug/L			06/25/14 13:53	1
Tetrachloroethene	ND		5.0		ug/L			06/25/14 13:53	1
1,1,1-Trichloroethane	ND		5.0		ug/L			06/25/14 13:53	1
1,1,2-Trichloroethane	ND		5.0		ug/L			06/25/14 13:53	1
Trichloroethene	ND		5.0		ug/L			06/25/14 13:53	1
Trichlorofluoromethane	ND		10		ug/L			06/25/14 13:53	1
1,2,3-Trichloropropane	ND		10		ug/L			06/25/14 13:53	1
Vinyl acetate	ND		10		ug/L			06/25/14 13:53	1
Vinyl chloride	21		2.0		ug/L			06/25/14 13:53	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: LCS12
Date Collected: 06/17/14 12:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes (total)	ND		10		ug/L			06/25/14 13:53	1
Chloromethane	ND		10		ug/L			06/25/14 13:53	1
2-Butanone (MEK)	ND		50		ug/L			06/25/14 13:53	1
1,3-Dichlorobenzene	ND		1.0		ug/L			06/25/14 13:53	1
Toluene	ND		5.0		ug/L			06/25/14 13:53	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	91		70 - 127		06/25/14 13:53	1
Toluene-d8 (Surr)	103		80 - 125		06/25/14 13:53	1
4-Bromofluorobenzene (Surr)	89		78 - 120		06/25/14 13:53	1
Dibromofluoromethane (Surr)	96		77 - 120		06/25/14 13:53	1

Client Sample ID: LCS10
Date Collected: 06/17/14 12:35
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	720		170		ug/L			06/27/14 16:53	1
Acrylonitrile	ND		500		ug/L			06/27/14 16:53	1
Benzene	ND		25		ug/L			06/27/14 16:53	1
Bromochloromethane	ND		50		ug/L			06/27/14 16:53	1
Bromodichloromethane	ND		25		ug/L			06/27/14 16:53	1
Bromoform	ND		25		ug/L			06/27/14 16:53	1
Bromomethane	ND		50		ug/L			06/27/14 16:53	1
Carbon disulfide	ND		25		ug/L			06/27/14 16:53	1
Carbon tetrachloride	ND		25		ug/L			06/27/14 16:53	1
Chlorobenzene	ND		25		ug/L			06/27/14 16:53	1
Dibromochloromethane	ND		25		ug/L			06/27/14 16:53	1
Chloroethane	ND		50		ug/L			06/27/14 16:53	1
Chloroform	ND		25		ug/L			06/27/14 16:53	1
Dibromomethane	ND		25		ug/L			06/27/14 16:53	1
1,2-Dichlorobenzene	ND		50		ug/L			06/27/14 16:53	1
1,4-Dichlorobenzene	ND		50		ug/L			06/27/14 16:53	1
trans-1,4-Dichloro-2-butene	ND		50		ug/L			06/27/14 16:53	1
1,1-Dichloroethane	ND		25		ug/L			06/27/14 16:53	1
1,2-Dichloroethane	ND		25		ug/L			06/27/14 16:53	1
cis-1,2-Dichloroethene	ND		50		ug/L			06/27/14 16:53	1
trans-1,2-Dichloroethene	ND		50		ug/L			06/27/14 16:53	1
1,1-Dichloroethene	ND		25		ug/L			06/27/14 16:53	1
1,2-Dichloropropane	ND		25		ug/L			06/27/14 16:53	1
cis-1,3-Dichloropropene	ND		25		ug/L			06/27/14 16:53	1
trans-1,3-Dichloropropene	ND		25		ug/L			06/27/14 16:53	1
Ethylbenzene	ND		25		ug/L			06/27/14 16:53	1
2-Hexanone	ND		50		ug/L			06/27/14 16:53	1
Iodomethane	ND		50		ug/L			06/27/14 16:53	1
Methylene Chloride	ND		25		ug/L			06/27/14 16:53	1
4-Methyl-2-pentanone (MIBK)	62		50		ug/L			06/27/14 16:53	1
Styrene	ND		25		ug/L			06/27/14 16:53	1
1,1,1,2-Tetrachloroethane	ND		25		ug/L			06/27/14 16:53	1
1,1,2,2-Tetrachloroethane	ND		25		ug/L			06/27/14 16:53	1
Tetrachloroethene	ND		25		ug/L			06/27/14 16:53	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: LCS10							Lab Sample ID: 280-56768-3		
Date Collected: 06/17/14 12:35							Matrix: Water		
Date Received: 06/18/14 09:40									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		25		ug/L			06/27/14 16:53	1
1,1,2-Trichloroethane	ND		25		ug/L			06/27/14 16:53	1
Trichloroethene	ND		25		ug/L			06/27/14 16:53	1
Trichlorofluoromethane	ND		50		ug/L			06/27/14 16:53	1
1,2,3-Trichloropropane	ND		50		ug/L			06/27/14 16:53	1
Vinyl acetate	ND		50		ug/L			06/27/14 16:53	1
Vinyl chloride	ND		10		ug/L			06/27/14 16:53	1
Xylenes (total)	ND		50		ug/L			06/27/14 16:53	1
Chloromethane	ND		50		ug/L			06/27/14 16:53	1
2-Butanone (MEK)	710		250		ug/L			06/27/14 16:53	1
1,3-Dichlorobenzene	ND		5.0		ug/L			06/27/14 16:53	1
Toluene	ND		25		ug/L			06/27/14 16:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	90		70 - 127					06/27/14 16:53	1
Toluene-d8 (Surr)	98		80 - 125					06/27/14 16:53	1
4-Bromofluorobenzene (Surr)	85		78 - 120					06/27/14 16:53	1
Dibromofluoromethane (Surr)	96		77 - 120					06/27/14 16:53	1

Client Sample ID: LCS08							Lab Sample ID: 280-56768-4		
Date Collected: 06/17/14 13:10							Matrix: Water		
Date Received: 06/18/14 09:40									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		34		ug/L			06/25/14 14:36	1
Acrylonitrile	ND		100		ug/L			06/25/14 14:36	1
Benzene	8.1		5.0		ug/L			06/25/14 14:36	1
Bromochloromethane	ND		10		ug/L			06/25/14 14:36	1
Bromodichloromethane	ND		5.0		ug/L			06/25/14 14:36	1
Bromoform	ND		5.0		ug/L			06/25/14 14:36	1
Bromomethane	ND		10		ug/L			06/25/14 14:36	1
Carbon disulfide	ND		5.0		ug/L			06/25/14 14:36	1
Carbon tetrachloride	ND		5.0		ug/L			06/25/14 14:36	1
Chlorobenzene	21		5.0		ug/L			06/25/14 14:36	1
Dibromochloromethane	ND		5.0		ug/L			06/25/14 14:36	1
Chloroethane	ND		10		ug/L			06/25/14 14:36	1
Chloroform	ND		5.0		ug/L			06/25/14 14:36	1
Dibromomethane	ND		5.0		ug/L			06/25/14 14:36	1
1,2-Dichlorobenzene	ND		10		ug/L			06/25/14 14:36	1
1,4-Dichlorobenzene	21		10		ug/L			06/25/14 14:36	1
trans-1,4-Dichloro-2-butene	ND		10		ug/L			06/25/14 14:36	1
1,1-Dichloroethane	ND		5.0		ug/L			06/25/14 14:36	1
1,2-Dichloroethane	ND		5.0		ug/L			06/25/14 14:36	1
cis-1,2-Dichloroethene	ND		10		ug/L			06/25/14 14:36	1
trans-1,2-Dichloroethene	ND		10		ug/L			06/25/14 14:36	1
1,1-Dichloroethene	ND		5.0		ug/L			06/25/14 14:36	1
1,2-Dichloropropane	ND		5.0		ug/L			06/25/14 14:36	1
cis-1,3-Dichloropropene	ND		5.0		ug/L			06/25/14 14:36	1
trans-1,3-Dichloropropene	ND		5.0		ug/L			06/25/14 14:36	1
Ethylbenzene	ND		5.0		ug/L			06/25/14 14:36	1
2-Hexanone	ND		10		ug/L			06/25/14 14:36	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: LCS08

Lab Sample ID: 280-56768-4

Date Collected: 06/17/14 13:10

Matrix: Water

Date Received: 06/18/14 09:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iodomethane	ND		10		ug/L			06/25/14 14:36	1
Methylene Chloride	ND		5.0		ug/L			06/25/14 14:36	1
4-Methyl-2-pentanone (MIBK)	ND		10		ug/L			06/25/14 14:36	1
Styrene	ND		5.0		ug/L			06/25/14 14:36	1
1,1,1,2-Tetrachloroethane	ND		5.0		ug/L			06/25/14 14:36	1
1,1,2,2-Tetrachloroethane	ND		5.0		ug/L			06/25/14 14:36	1
Tetrachloroethene	ND		5.0		ug/L			06/25/14 14:36	1
1,1,1-Trichloroethane	ND		5.0		ug/L			06/25/14 14:36	1
1,1,2-Trichloroethane	ND		5.0		ug/L			06/25/14 14:36	1
Trichloroethene	ND		5.0		ug/L			06/25/14 14:36	1
Trichlorofluoromethane	ND		10		ug/L			06/25/14 14:36	1
1,2,3-Trichloropropane	ND		10		ug/L			06/25/14 14:36	1
Vinyl acetate	ND		10		ug/L			06/25/14 14:36	1
Vinyl chloride	ND		2.0		ug/L			06/25/14 14:36	1
Xylenes (total)	14		10		ug/L			06/25/14 14:36	1
Chloromethane	ND		10		ug/L			06/25/14 14:36	1
2-Butanone (MEK)	ND		50		ug/L			06/25/14 14:36	1
1,3-Dichlorobenzene	ND		1.0		ug/L			06/25/14 14:36	1
Toluene	ND		5.0		ug/L			06/25/14 14:36	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	88		70 - 127		06/25/14 14:36	1
Toluene-d8 (Surr)	101		80 - 125		06/25/14 14:36	1
4-Bromofluorobenzene (Surr)	86		78 - 120		06/25/14 14:36	1
Dibromofluoromethane (Surr)	94		77 - 120		06/25/14 14:36	1

Client Sample ID: LCS07

Lab Sample ID: 280-56768-5

Date Collected: 06/17/14 13:39

Matrix: Water

Date Received: 06/18/14 09:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		140		ug/L			06/25/14 14:57	1
Acrylonitrile	ND		400		ug/L			06/25/14 14:57	1
Benzene	ND		20		ug/L			06/25/14 14:57	1
Bromochloromethane	ND		40		ug/L			06/25/14 14:57	1
Bromodichloromethane	ND		20		ug/L			06/25/14 14:57	1
Bromoform	ND		20		ug/L			06/25/14 14:57	1
Bromomethane	ND		40		ug/L			06/25/14 14:57	1
Carbon disulfide	ND		20		ug/L			06/25/14 14:57	1
Carbon tetrachloride	ND		20		ug/L			06/25/14 14:57	1
Chlorobenzene	23		20		ug/L			06/25/14 14:57	1
Dibromochloromethane	ND		20		ug/L			06/25/14 14:57	1
Chloroethane	ND		40		ug/L			06/25/14 14:57	1
Chloroform	ND		20		ug/L			06/25/14 14:57	1
Dibromomethane	ND		20		ug/L			06/25/14 14:57	1
1,2-Dichlorobenzene	ND		40		ug/L			06/25/14 14:57	1
1,4-Dichlorobenzene	48		40		ug/L			06/25/14 14:57	1
trans-1,4-Dichloro-2-butene	ND		40		ug/L			06/25/14 14:57	1
1,1-Dichloroethane	ND		20		ug/L			06/25/14 14:57	1
1,2-Dichloroethane	ND		20		ug/L			06/25/14 14:57	1
cis-1,2-Dichloroethene	ND		40		ug/L			06/25/14 14:57	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: LCS07
Date Collected: 06/17/14 13:39
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,2-Dichloroethene	ND		40		ug/L			06/25/14 14:57	1
1,1-Dichloroethene	ND		20		ug/L			06/25/14 14:57	1
1,2-Dichloropropane	ND		20		ug/L			06/25/14 14:57	1
cis-1,3-Dichloropropene	ND		20		ug/L			06/25/14 14:57	1
trans-1,3-Dichloropropene	ND		20		ug/L			06/25/14 14:57	1
Ethylbenzene	ND		20		ug/L			06/25/14 14:57	1
2-Hexanone	ND		40		ug/L			06/25/14 14:57	1
Iodomethane	ND		40		ug/L			06/25/14 14:57	1
Methylene Chloride	ND		20		ug/L			06/25/14 14:57	1
4-Methyl-2-pentanone (MIBK)	ND		40		ug/L			06/25/14 14:57	1
Styrene	ND		20		ug/L			06/25/14 14:57	1
1,1,1,2-Tetrachloroethane	ND		20		ug/L			06/25/14 14:57	1
1,1,2,2-Tetrachloroethane	ND		20		ug/L			06/25/14 14:57	1
Tetrachloroethene	ND		20		ug/L			06/25/14 14:57	1
1,1,1-Trichloroethane	ND		20		ug/L			06/25/14 14:57	1
1,1,2-Trichloroethane	ND		20		ug/L			06/25/14 14:57	1
Trichloroethene	ND		20		ug/L			06/25/14 14:57	1
Trichlorofluoromethane	ND		40		ug/L			06/25/14 14:57	1
1,2,3-Trichloropropane	ND		40		ug/L			06/25/14 14:57	1
Vinyl acetate	ND		40		ug/L			06/25/14 14:57	1
Vinyl chloride	ND		8.0		ug/L			06/25/14 14:57	1
Xylenes (total)	ND		40		ug/L			06/25/14 14:57	1
Chloromethane	ND		40		ug/L			06/25/14 14:57	1
2-Butanone (MEK)	ND		200		ug/L			06/25/14 14:57	1
1,3-Dichlorobenzene	ND		4.0		ug/L			06/25/14 14:57	1
Toluene	ND		20		ug/L			06/25/14 14:57	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	87		70 - 127					06/25/14 14:57	1
Toluene-d8 (Surr)	106		80 - 125					06/25/14 14:57	1
4-Bromofluorobenzene (Surr)	86		78 - 120					06/25/14 14:57	1
Dibromofluoromethane (Surr)	96		77 - 120					06/25/14 14:57	1

Method: 8011 - EDB, DBCP, and 1,2,3-TCP (GC)

Client Sample ID: LCS13
Date Collected: 06/17/14 11:45
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 02:36	1
1,2-Dibromo-3-Chloropropane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 02:36	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dibromopropane	103		70 - 130				06/25/14 17:00	06/26/14 02:36	1

Client Sample ID: LCS12
Date Collected: 06/17/14 12:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 02:55	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8011 - EDB, DBCP, and 1,2,3-TCP (GC) (Continued)

Client Sample ID: LCS12
Date Collected: 06/17/14 12:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromo-3-Chloropropane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 02:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dibromopropane	104		70 - 130				06/25/14 17:00	06/26/14 02:55	1

Client Sample ID: LCS10
Date Collected: 06/17/14 12:35
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 03:14	1
1,2-Dibromo-3-Chloropropane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 03:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dibromopropane	91		70 - 130				06/25/14 17:00	06/26/14 03:14	1

Client Sample ID: LCS08
Date Collected: 06/17/14 13:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 03:32	1
1,2-Dibromo-3-Chloropropane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 03:32	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dibromopropane	102		70 - 130				06/25/14 17:00	06/26/14 03:32	1

Client Sample ID: LCS07
Date Collected: 06/17/14 13:39
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 03:51	1
1,2-Dibromo-3-Chloropropane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 03:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dibromopropane	103		70 - 130				06/25/14 17:00	06/26/14 03:51	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Client Sample ID: LCS13
Date Collected: 06/17/14 11:45
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	3900		200		ug/L		06/20/14 07:30	06/30/14 20:40	1
Beryllium	ND		4.0		ug/L		06/20/14 07:30	06/30/14 20:40	1
Calcium	400000		5000		ug/L		06/20/14 07:30	06/30/14 20:40	1
Cadmium	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:40	1
Cobalt	ND		50		ug/L		06/20/14 07:30	06/30/14 20:40	1
Chromium	ND		10		ug/L		06/20/14 07:30	06/30/14 20:40	1
Copper	ND		25		ug/L		06/20/14 07:30	06/30/14 20:40	1
Iron	26000		100		ug/L		06/20/14 07:30	06/30/14 20:40	1
Potassium	36000		5000		ug/L		06/20/14 07:30	06/30/14 20:40	1
Magnesium	110000		5000		ug/L		06/20/14 07:30	06/30/14 20:40	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable (Continued)

Client Sample ID: LCS13
Date Collected: 06/17/14 11:45
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	4700		15		ug/L		06/20/14 07:30	06/30/14 20:40	1
Sodium	420000		5000		ug/L		06/20/14 07:30	06/30/14 20:40	1
Nickel	81		40		ug/L		06/20/14 07:30	06/30/14 20:40	1
Lead	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:40	1
Antimony	ND		6.0		ug/L		06/20/14 07:30	06/30/14 20:40	1
Zinc	ND		20		ug/L		06/20/14 07:30	06/30/14 20:40	1
Silver	ND	*	25		ug/L		06/20/14 07:30	06/30/14 20:40	1

Client Sample ID: LCS12
Date Collected: 06/17/14 12:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	3700		200		ug/L		06/20/14 07:30	06/30/14 20:51	1
Beryllium	ND		4.0		ug/L		06/20/14 07:30	06/30/14 20:51	1
Calcium	410000		5000		ug/L		06/20/14 07:30	06/30/14 20:51	1
Cadmium	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:51	1
Cobalt	ND		50		ug/L		06/20/14 07:30	06/30/14 20:51	1
Chromium	ND		10		ug/L		06/20/14 07:30	06/30/14 20:51	1
Copper	ND		25		ug/L		06/20/14 07:30	06/30/14 20:51	1
Iron	28000		100		ug/L		06/20/14 07:30	06/30/14 20:51	1
Potassium	31000		5000		ug/L		06/20/14 07:30	06/30/14 20:51	1
Magnesium	110000		5000		ug/L		06/20/14 07:30	06/30/14 20:51	1
Manganese	4900		15		ug/L		06/20/14 07:30	06/30/14 20:51	1
Sodium	350000		5000		ug/L		06/20/14 07:30	06/30/14 20:51	1
Nickel	82		40		ug/L		06/20/14 07:30	06/30/14 20:51	1
Lead	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:51	1
Antimony	ND		6.0		ug/L		06/20/14 07:30	06/30/14 20:51	1
Zinc	ND		20		ug/L		06/20/14 07:30	06/30/14 20:51	1
Silver	ND	*	25		ug/L		06/20/14 07:30	06/30/14 20:51	1

Client Sample ID: LCS10
Date Collected: 06/17/14 12:35
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	2600		200		ug/L		06/20/14 07:30	06/30/14 20:54	1
Beryllium	ND		4.0		ug/L		06/20/14 07:30	06/30/14 20:54	1
Calcium	260000		5000		ug/L		06/20/14 07:30	06/30/14 20:54	1
Cadmium	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:54	1
Cobalt	ND		50		ug/L		06/20/14 07:30	06/30/14 20:54	1
Chromium	19		10		ug/L		06/20/14 07:30	06/30/14 20:54	1
Copper	ND		25		ug/L		06/20/14 07:30	06/30/14 20:54	1
Iron	14000		100		ug/L		06/20/14 07:30	06/30/14 20:54	1
Potassium	150000		5000		ug/L		06/20/14 07:30	06/30/14 20:54	1
Magnesium	150000		5000		ug/L		06/20/14 07:30	06/30/14 20:54	1
Manganese	2900		15		ug/L		06/20/14 07:30	06/30/14 20:54	1
Sodium	770000		5000		ug/L		06/20/14 07:30	06/30/14 20:54	1
Nickel	100		40		ug/L		06/20/14 07:30	06/30/14 20:54	1
Lead	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:54	1
Antimony	37		6.0		ug/L		06/20/14 07:30	06/30/14 20:54	1
Zinc	110		20		ug/L		06/20/14 07:30	06/30/14 20:54	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable (Continued)

Client Sample ID: LCS10 Lab Sample ID: 280-56768-3
Date Collected: 06/17/14 12:35 Matrix: Water
Date Received: 06/18/14 09:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND	*	25		ug/L		06/20/14 07:30	06/30/14 20:54	1

Client Sample ID: LCS08 Lab Sample ID: 280-56768-4
Date Collected: 06/17/14 13:10 Matrix: Water
Date Received: 06/18/14 09:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	9900		200		ug/L		06/20/14 07:30	06/30/14 20:57	1
Beryllium	ND		4.0		ug/L		06/20/14 07:30	06/30/14 20:57	1
Calcium	270000		5000		ug/L		06/20/14 07:30	06/30/14 20:57	1
Cadmium	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:57	1
Cobalt	ND		50		ug/L		06/20/14 07:30	06/30/14 20:57	1
Chromium	12		10		ug/L		06/20/14 07:30	06/30/14 20:57	1
Copper	ND		25		ug/L		06/20/14 07:30	06/30/14 20:57	1
Iron	15000		100		ug/L		06/20/14 07:30	06/30/14 20:57	1
Potassium	240000		5000		ug/L		06/20/14 07:30	06/30/14 20:57	1
Magnesium	180000		5000		ug/L		06/20/14 07:30	06/30/14 20:57	1
Manganese	1600		15		ug/L		06/20/14 07:30	06/30/14 20:57	1
Sodium	1800000		5000		ug/L		06/20/14 07:30	06/30/14 20:57	1
Nickel	110		40		ug/L		06/20/14 07:30	06/30/14 20:57	1
Lead	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:57	1
Antimony	ND		6.0		ug/L		06/20/14 07:30	06/30/14 20:57	1
Zinc	ND		20		ug/L		06/20/14 07:30	06/30/14 20:57	1
Silver	ND	*	25		ug/L		06/20/14 07:30	06/30/14 20:57	1

Client Sample ID: LCS07 Lab Sample ID: 280-56768-5
Date Collected: 06/17/14 13:39 Matrix: Water
Date Received: 06/18/14 09:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	9200		200		ug/L		06/20/14 07:30	06/30/14 21:00	1
Beryllium	ND		4.0		ug/L		06/20/14 07:30	06/30/14 21:00	1
Calcium	220000		5000		ug/L		06/20/14 07:30	06/30/14 21:00	1
Cadmium	ND		5.0		ug/L		06/20/14 07:30	06/30/14 21:00	1
Cobalt	ND		50		ug/L		06/20/14 07:30	06/30/14 21:00	1
Chromium	14		10		ug/L		06/20/14 07:30	06/30/14 21:00	1
Copper	ND		25		ug/L		06/20/14 07:30	06/30/14 21:00	1
Iron	3300		100		ug/L		06/20/14 07:30	06/30/14 21:00	1
Potassium	190000		5000		ug/L		06/20/14 07:30	06/30/14 21:00	1
Magnesium	220000		5000		ug/L		06/20/14 07:30	06/30/14 21:00	1
Manganese	360		15		ug/L		06/20/14 07:30	06/30/14 21:00	1
Sodium	1500000		5000		ug/L		06/20/14 07:30	06/30/14 21:00	1
Nickel	59		40		ug/L		06/20/14 07:30	06/30/14 21:00	1
Lead	ND		5.0		ug/L		06/20/14 07:30	06/30/14 21:00	1
Antimony	ND		6.0		ug/L		06/20/14 07:30	06/30/14 21:00	1
Zinc	30		20		ug/L		06/20/14 07:30	06/30/14 21:00	1
Silver	ND	*	25		ug/L		06/20/14 07:30	06/30/14 21:00	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 200.8 - Metals (ICP/MS) - Total Recoverable

Client Sample ID: LCS13
 Date Collected: 06/17/14 11:45
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	58		10		ug/L		06/19/14 13:00	06/26/14 01:33	1
Selenium	ND		5.0		ug/L		06/19/14 13:00	06/26/14 01:33	1
Thallium	ND		2.0		ug/L		06/19/14 13:00	06/26/14 01:33	1
Vanadium	ND		50		ug/L		06/19/14 13:00	06/26/14 01:33	1

Client Sample ID: LCS12
 Date Collected: 06/17/14 12:10
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	70		10		ug/L		06/19/14 13:00	06/26/14 01:42	1
Selenium	ND		5.0		ug/L		06/19/14 13:00	06/26/14 01:42	1
Thallium	ND		2.0		ug/L		06/19/14 13:00	06/26/14 01:42	1
Vanadium	ND		50		ug/L		06/19/14 13:00	06/26/14 01:42	1

Client Sample ID: LCS10
 Date Collected: 06/17/14 12:35
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-3
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	34		10		ug/L		06/19/14 13:00	06/26/14 01:45	1
Selenium	ND		5.0		ug/L		06/19/14 13:00	06/26/14 01:45	1
Thallium	ND		2.0		ug/L		06/19/14 13:00	06/26/14 01:45	1
Vanadium	ND		50		ug/L		06/19/14 13:00	06/26/14 01:45	1

Client Sample ID: LCS08
 Date Collected: 06/17/14 13:10
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-4
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	70		10		ug/L		06/19/14 13:00	06/26/14 01:54	1
Selenium	ND		5.0		ug/L		06/19/14 13:00	06/26/14 01:54	1
Thallium	ND		2.0		ug/L		06/19/14 13:00	06/26/14 01:54	1
Vanadium	ND		50		ug/L		06/19/14 13:00	06/26/14 01:54	1

Client Sample ID: LCS07
 Date Collected: 06/17/14 13:39
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-5
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	79		10		ug/L		06/19/14 13:00	06/26/14 01:58	1
Selenium	ND		5.0		ug/L		06/19/14 13:00	06/26/14 01:58	1
Thallium	ND		2.0		ug/L		06/19/14 13:00	06/26/14 01:58	1
Vanadium	ND		50		ug/L		06/19/14 13:00	06/26/14 01:58	1

Method: 245.1 - Mercury (CVAA)

Client Sample ID: LCS13
 Date Collected: 06/17/14 11:45
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.20		ug/L		06/19/14 12:00	06/19/14 16:28	1

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 245.1 - Mercury (CVAA)

Client Sample ID: LCS12							Lab Sample ID: 280-56768-2			
Date Collected: 06/17/14 12:10							Matrix: Water			
Date Received: 06/18/14 09:40										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Mercury	ND		0.20		ug/L		06/19/14 12:00	06/19/14 16:40	1	

Client Sample ID: LCS10							Lab Sample ID: 280-56768-3			
Date Collected: 06/17/14 12:35							Matrix: Water			
Date Received: 06/18/14 09:40										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Mercury	ND		0.20		ug/L		06/19/14 12:00	06/19/14 16:42	1	

Client Sample ID: LCS08							Lab Sample ID: 280-56768-4			
Date Collected: 06/17/14 13:10							Matrix: Water			
Date Received: 06/18/14 09:40										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Mercury	ND		0.20		ug/L		06/19/14 12:00	06/19/14 16:44	1	

Client Sample ID: LCS07							Lab Sample ID: 280-56768-5			
Date Collected: 06/17/14 13:39							Matrix: Water			
Date Received: 06/18/14 09:40										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Mercury	ND		0.20		ug/L		06/19/14 12:00	06/19/14 16:46	1	

General Chemistry

Client Sample ID: LCS13							Lab Sample ID: 280-56768-1			
Date Collected: 06/17/14 11:45							Matrix: Water			
Date Received: 06/18/14 09:40										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Oil & Grease	ND		5.0		mg/L		07/03/14 01:11	07/03/14 01:27	1	
Chloride	640		25		mg/L			06/19/14 12:43	50	
Nitrate as N	ND		0.10		mg/L			06/18/14 18:01	2	
Sulfate	12		10		mg/L			06/18/14 18:01	2	
Cyanide, Total	ND		0.010		mg/L		06/23/14 14:20	06/24/14 11:03	1	
Ammonia as N	42		0.76		mg/L			06/27/14 15:13	20	
Total Kjeldahl Nitrogen	27		5.0		mg/L		06/24/14 22:15	06/25/14 21:58	5	
Chemical Oxygen Demand (COD)	230		100		mg/L			06/24/14 10:15	10	
Total Alkalinity	1400		5.0		mg/L			06/24/14 17:41	1	
Carbonate Alkalinity	ND		5.0		mg/L			06/24/14 17:41	1	
Total Dissolved Solids	2700		20		mg/L			06/19/14 15:54	1	
Total Suspended Solids	110		10		mg/L			06/21/14 10:40	1	
TOC Result 1	73		1.9		mg/L			06/20/14 18:50	1.92	
TOC Result 2	73		1.9		mg/L			06/20/14 18:50	1.92	
Biochemical Oxygen Demand	18	b	13		mg/L			06/18/14 13:26	5	
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Specific Conductance	3700		2.0		umhos/cm			06/18/14 17:42	1	
pH	7.03	HF	0.100		SU			06/18/14 18:55	1	

Client Sample ID: LCS12							Lab Sample ID: 280-56768-2			
Date Collected: 06/17/14 12:10							Matrix: Water			
Date Received: 06/18/14 09:40										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Oil & Grease	ND		5.0		mg/L		07/03/14 01:11	07/03/14 01:27	1	

TestAmerica Denver

Client Sample Results

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Client Sample ID: LCS12
 Date Collected: 06/17/14 12:10
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	490		25		mg/L			06/19/14 13:02	50
Nitrate as N	ND		0.10		mg/L			06/18/14 22:46	2
Sulfate	ND		10		mg/L			06/18/14 22:46	2
Cyanide, Total	0.014		0.010		mg/L		06/23/14 14:20	06/24/14 11:06	1
Ammonia as N	44		0.76		mg/L			06/27/14 15:15	20
Total Kjeldahl Nitrogen	30		5.0		mg/L		06/24/14 22:15	06/25/14 22:00	5
Chemical Oxygen Demand (COD)	400		50		mg/L			06/20/14 08:46	5
Total Alkalinity	1400		5.0		mg/L			06/24/14 17:47	1
Carbonate Alkalinity	ND		5.0		mg/L			06/24/14 17:47	1
Total Dissolved Solids	2500		20		mg/L			06/19/14 15:54	1
Total Suspended Solids	90		10		mg/L			06/21/14 10:40	1
TOC Result 1	120		3.6		mg/L			06/20/14 20:06	3.57
TOC Result 2	130		3.6		mg/L			06/20/14 20:06	3.57
Biochemical Oxygen Demand	39	b	13		mg/L			06/18/14 16:21	5
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	3300		2.0		umhos/cm			06/18/14 17:42	1
pH	7.02	HF	0.100		SU			06/18/14 18:55	1

Client Sample ID: LCS10
 Date Collected: 06/17/14 12:35
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-3
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Oil & Grease	ND		5.0		mg/L		07/03/14 01:11	07/03/14 01:27	1
Chloride	860		50		mg/L			06/19/14 13:22	100
Nitrate as N	0.20		0.10		mg/L			06/18/14 23:06	2
Sulfate	ND		10		mg/L			06/18/14 23:06	2
Cyanide, Total	0.010		0.010		mg/L		06/23/14 14:20	06/24/14 11:08	1
Ammonia as N	200		3.8		mg/L			06/27/14 15:17	100
Total Kjeldahl Nitrogen	210		25		mg/L		06/24/14 22:15	06/25/14 22:05	5
Chemical Oxygen Demand (COD)	600		50		mg/L			06/20/14 08:46	5
Total Alkalinity	2100		5.0		mg/L			06/24/14 17:55	1
Carbonate Alkalinity	ND		5.0		mg/L			06/24/14 17:55	1
Total Dissolved Solids	3600		40		mg/L			06/19/14 15:54	1
Total Suspended Solids	48		5.0		mg/L			06/21/14 10:40	1
TOC Result 1	200		5.0		mg/L			06/20/14 20:37	5
TOC Result 2	200		5.0		mg/L			06/20/14 20:37	5
Biochemical Oxygen Demand	73	b	50		mg/L			06/18/14 16:21	5
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	5500		2.0		umhos/cm			06/18/14 17:42	1
pH	7.23	HF	0.100		SU			06/18/14 18:55	1

Client Sample ID: LCS08
 Date Collected: 06/17/14 13:10
 Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-4
 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Oil & Grease	ND		5.0		mg/L		07/03/14 01:11	07/03/14 01:27	1
Chloride	2500		50		mg/L			06/19/14 13:42	100
Nitrate as N	ND		0.25		mg/L			06/18/14 23:26	5
Sulfate	ND		25		mg/L			06/18/14 23:26	5

TestAmerica Denver

Client Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Client Sample ID: LCS08
Date Collected: 06/17/14 13:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.027		0.010		mg/L		06/23/14 14:20	06/24/14 11:09	1
Ammonia as N	320		3.8		mg/L			06/27/14 15:19	100
Total Kjeldahl Nitrogen	380		50		mg/L		06/24/14 22:15	06/25/14 22:06	10
Chemical Oxygen Demand (COD)	980		100		mg/L			06/20/14 08:46	10
Total Alkalinity	2500		5.0		mg/L			06/24/14 18:03	1
Carbonate Alkalinity	ND		5.0		mg/L			06/24/14 18:03	1
Total Dissolved Solids	6200		100		mg/L			06/19/14 15:54	1
Total Suspended Solids	42		5.0		mg/L			06/21/14 10:40	1
TOC Result 1	420		9.0		mg/L			06/24/14 22:07	9
TOC Result 2	420		9.0		mg/L			06/24/14 22:07	9
Biochemical Oxygen Demand	290	b	50		mg/L			06/18/14 16:21	10
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	9400		2.0		umhos/cm			06/18/14 17:42	1
pH	7.38	HF	0.100		SU			06/18/14 18:55	1

Client Sample ID: LCS07
Date Collected: 06/17/14 13:39
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Oil & Grease	ND		5.0		mg/L		07/03/14 01:11	07/03/14 01:27	1
Chloride	2200		50		mg/L			06/19/14 14:02	100
Nitrate as N	ND		0.25		mg/L			06/18/14 23:46	5
Sulfate	ND		25		mg/L			06/18/14 23:46	5
Cyanide, Total	0.010		0.010		mg/L		06/25/14 07:20	06/25/14 13:06	1
Ammonia as N	230		3.8		mg/L			06/27/14 15:21	100
Total Kjeldahl Nitrogen	280		50		mg/L		06/24/14 22:15	06/25/14 22:10	10
Chemical Oxygen Demand (COD)	1400		200		mg/L			06/20/14 08:46	20
Total Alkalinity	2200		5.0		mg/L			06/24/14 18:11	1
Carbonate Alkalinity	ND		5.0		mg/L			06/24/14 18:11	1
Total Dissolved Solids	6200		100		mg/L			06/19/14 15:54	1
Total Suspended Solids	5.2		2.0		mg/L			06/21/14 10:40	1
TOC Result 1	480		10		mg/L			06/24/14 23:14	10
TOC Result 2	480		10		mg/L			06/24/14 23:14	10
Biochemical Oxygen Demand	430	b	100		mg/L			06/18/14 16:21	10
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	8100		2.0		umhos/cm			06/18/14 17:42	1
pH	7.21	HF	0.100		SU			06/18/14 18:55	1

TestAmerica Denver

Surrogate Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)			
		12DCE (70-127)	TOL (80-125)	BFB (78-120)	DBFM (77-120)
280-56768-1	LCS13	88	99	86	95
280-56768-2	LCS12	91	103	89	96
280-56768-3	LCS10	90	98	85	96
280-56768-4	LCS08	88	101	86	94
280-56768-5	LCS07	87	106	86	96
280-56779-E-2 MS	Matrix Spike	90	110	84	96
280-56779-E-2 MSD	Matrix Spike Duplicate	87	107	84	94
280-56887-D-3 MSD	Matrix Spike Duplicate	91	109	84	95
280-56887-G-3 MS	Matrix Spike	90	108	82	95
LCS 280-231811/4	Lab Control Sample	92	112	86	96
LCS 280-232202/4	Lab Control Sample	94	108	83	95
MB 280-231811/7	Method Blank	85	103	89	95
MB 280-232202/5	Method Blank	83	101	88	94

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
 TOL = Toluene-d8 (Surr)
 BFB = 4-Bromofluorobenzene (Surr)
 DBFM = Dibromofluoromethane (Surr)

Method: 8011 - EDB, DBCP, and 1,2,3-TCP (GC)

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)
		12DBP1 (70-130)
280-56768-1	LCS13	103
280-56768-2	LCS12	104
280-56768-4	LCS08	102
280-56768-5	LCS07	103

Surrogate Legend

12DBP = 1,2-Dibromopropane

Method: 8011 - EDB, DBCP, and 1,2,3-TCP (GC)

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)
		12DBP2 (70-130)
280-56768-3	LCS10	91
LCS 280-231909/2-A	Lab Control Sample	102
LCSD 280-231909/3-A	Lab Control Sample Dup	100
MB 280-231909/4-A	Method Blank	106

Surrogate Legend

12DBP = 1,2-Dibromopropane

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 280-231811/7

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 231811

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	ND		34		ug/L			06/25/14 08:58	1
Acrylonitrile	ND		100		ug/L			06/25/14 08:58	1
Benzene	ND		5.0		ug/L			06/25/14 08:58	1
Bromochloromethane	ND		10		ug/L			06/25/14 08:58	1
Bromodichloromethane	ND		5.0		ug/L			06/25/14 08:58	1
Bromoform	ND		5.0		ug/L			06/25/14 08:58	1
Bromomethane	ND		10		ug/L			06/25/14 08:58	1
Carbon disulfide	ND		5.0		ug/L			06/25/14 08:58	1
Carbon tetrachloride	ND		5.0		ug/L			06/25/14 08:58	1
Chlorobenzene	ND		5.0		ug/L			06/25/14 08:58	1
Dibromochloromethane	ND		5.0		ug/L			06/25/14 08:58	1
Chloroethane	ND		10		ug/L			06/25/14 08:58	1
Chloroform	ND		5.0		ug/L			06/25/14 08:58	1
Dibromomethane	ND		5.0		ug/L			06/25/14 08:58	1
1,2-Dichlorobenzene	ND		10		ug/L			06/25/14 08:58	1
1,4-Dichlorobenzene	ND		10		ug/L			06/25/14 08:58	1
trans-1,4-Dichloro-2-butene	ND		10		ug/L			06/25/14 08:58	1
1,1-Dichloroethane	ND		5.0		ug/L			06/25/14 08:58	1
1,2-Dichloroethane	ND		5.0		ug/L			06/25/14 08:58	1
cis-1,2-Dichloroethene	ND		10		ug/L			06/25/14 08:58	1
trans-1,2-Dichloroethene	ND		10		ug/L			06/25/14 08:58	1
1,1-Dichloroethene	ND		5.0		ug/L			06/25/14 08:58	1
1,2-Dichloropropane	ND		5.0		ug/L			06/25/14 08:58	1
cis-1,3-Dichloropropene	ND		5.0		ug/L			06/25/14 08:58	1
trans-1,3-Dichloropropene	ND		5.0		ug/L			06/25/14 08:58	1
Ethylbenzene	ND		5.0		ug/L			06/25/14 08:58	1
2-Hexanone	ND		10		ug/L			06/25/14 08:58	1
Iodomethane	ND		10		ug/L			06/25/14 08:58	1
Methylene Chloride	ND		5.0		ug/L			06/25/14 08:58	1
4-Methyl-2-pentanone (MIBK)	ND		10		ug/L			06/25/14 08:58	1
Styrene	ND		5.0		ug/L			06/25/14 08:58	1
1,1,1,2-Tetrachloroethane	ND		5.0		ug/L			06/25/14 08:58	1
1,1,2,2-Tetrachloroethane	ND		5.0		ug/L			06/25/14 08:58	1
Tetrachloroethene	ND		5.0		ug/L			06/25/14 08:58	1
1,1,1-Trichloroethane	ND		5.0		ug/L			06/25/14 08:58	1
1,1,2-Trichloroethane	ND		5.0		ug/L			06/25/14 08:58	1
Trichloroethene	ND		5.0		ug/L			06/25/14 08:58	1
Trichlorofluoromethane	ND		10		ug/L			06/25/14 08:58	1
1,2,3-Trichloropropane	ND		10		ug/L			06/25/14 08:58	1
Vinyl acetate	ND		10		ug/L			06/25/14 08:58	1
Vinyl chloride	ND		2.0		ug/L			06/25/14 08:58	1
Xylenes (total)	ND		10		ug/L			06/25/14 08:58	1
Chloromethane	ND		10		ug/L			06/25/14 08:58	1
2-Butanone (MEK)	ND		50		ug/L			06/25/14 08:58	1
1,3-Dichlorobenzene	ND		1.0		ug/L			06/25/14 08:58	1
Toluene	ND		5.0		ug/L			06/25/14 08:58	1

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 280-231811/7

Matrix: Water

Analysis Batch: 231811

Client Sample ID: Method Blank

Prep Type: Total/NA

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
1,2-Dichloroethane-d4 (Surr)	85		70 - 127		06/25/14 08:58	1
Toluene-d8 (Surr)	103		80 - 125		06/25/14 08:58	1
4-Bromofluorobenzene (Surr)	89		78 - 120		06/25/14 08:58	1
Dibromofluoromethane (Surr)	95		77 - 120		06/25/14 08:58	1

Lab Sample ID: LCS 280-231811/4

Matrix: Water

Analysis Batch: 231811

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Benzene	5.00	4.40	J	ug/L		88	74 - 135
Bromodichloromethane	5.00	4.71	J	ug/L		94	73 - 135
Carbon tetrachloride	5.00	4.66	J	ug/L		93	67 - 135
Chlorobenzene	5.00	4.42	J	ug/L		88	76 - 135
Chloroform	5.00	4.78	J	ug/L		96	76 - 120
1,1-Dichloroethane	5.00	4.57	J	ug/L		91	75 - 135
trans-1,2-Dichloroethene	5.00	4.48	J	ug/L		90	75 - 135
1,1-Dichloroethene	5.00	4.25	J	ug/L		85	71 - 136
1,2-Dichloropropane	5.00	4.61	J	ug/L		92	71 - 120
Ethylbenzene	5.00	4.32	J	ug/L		86	72 - 120
Methylene Chloride	5.00	4.48	J	ug/L		90	54 - 141
Tetrachloroethene	5.00	4.52	J	ug/L		90	70 - 135
1,1,1-Trichloroethane	5.00	4.54	J	ug/L		91	70 - 135
Trichloroethene	5.00	4.58	J	ug/L		92	73 - 135
1,3-Dichlorobenzene	5.00	4.26		ug/L		85	74 - 135
Toluene	5.00	4.40	J	ug/L		88	73 - 120

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
1,2-Dichloroethane-d4 (Surr)	92		70 - 127
Toluene-d8 (Surr)	112		80 - 125
4-Bromofluorobenzene (Surr)	86		78 - 120
Dibromofluoromethane (Surr)	96		77 - 120

Lab Sample ID: 280-56779-E-2 MS

Matrix: Water

Analysis Batch: 231811

Client Sample ID: Matrix Spike

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS MS		Unit	D	%Rec	%Rec. Limits
				Result	Qualifier				
Benzene	ND		5.00	ND		ug/L		83	74 - 135
Bromodichloromethane	ND		5.00	ND		ug/L		88	73 - 135
Carbon tetrachloride	ND		5.00	ND		ug/L		89	67 - 135
Chlorobenzene	ND		5.00	ND		ug/L		84	76 - 135
Chloroform	ND		5.00	ND		ug/L		91	76 - 120
1,1-Dichloroethane	ND		5.00	ND		ug/L		89	75 - 135
trans-1,2-Dichloroethene	ND		5.00	ND		ug/L		86	75 - 135
1,1-Dichloroethene	ND		5.00	ND		ug/L		86	71 - 136
1,2-Dichloropropane	ND		5.00	ND		ug/L		87	71 - 120
Ethylbenzene	ND		5.00	ND		ug/L		83	72 - 120

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 280-56779-E-2 MS

Client Sample ID: Matrix Spike

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 231811

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	%Rec. Limits
	Result	Qualifier		Result	Qualifier				
Methylene Chloride	ND		5.00	ND		ug/L		84	54 - 141
Tetrachloroethene	ND		5.00	ND		ug/L		87	70 - 135
1,1,1-Trichloroethane	ND		5.00	ND		ug/L		90	70 - 135
Trichloroethene	ND		5.00	ND		ug/L		87	73 - 135
1,3-Dichlorobenzene	ND		5.00	3.66	F1	ug/L		73	74 - 135
Toluene	ND		5.00	ND		ug/L		83	73 - 120
MS MS									
Surrogate	%Recovery	Qualifier	Limits						
1,2-Dichloroethane-d4 (Surr)	90		70 - 127						
Toluene-d8 (Surr)	110		80 - 125						
4-Bromofluorobenzene (Surr)	84		78 - 120						
Dibromofluoromethane (Surr)	96		77 - 120						

Lab Sample ID: 280-56779-E-2 MSD

Client Sample ID: Matrix Spike Duplicate

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 231811

Analyte	Sample	Sample	Spike Added	MSD	MSD	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
	Result	Qualifier		Result	Qualifier						
Benzene	ND		5.00	ND		ug/L		82	74 - 135	1	20
Bromodichloromethane	ND		5.00	ND		ug/L		85	73 - 135	3	20
Carbon tetrachloride	ND		5.00	ND		ug/L		89	67 - 135	0	21
Chlorobenzene	ND		5.00	ND		ug/L		80	76 - 135	6	20
Chloroform	ND		5.00	ND		ug/L		88	76 - 120	2	20
1,1-Dichloroethane	ND		5.00	ND		ug/L		86	75 - 135	3	21
trans-1,2-Dichloroethene	ND		5.00	ND		ug/L		85	75 - 135	1	24
1,1-Dichloroethene	ND		5.00	ND		ug/L		85	71 - 136	2	20
1,2-Dichloropropane	ND		5.00	ND		ug/L		84	71 - 120	4	20
Ethylbenzene	ND		5.00	ND		ug/L		79	72 - 120	4	26
Methylene Chloride	ND		5.00	ND		ug/L		85	54 - 141	0	20
Tetrachloroethene	ND		5.00	ND		ug/L		85	70 - 135	2	20
1,1,1-Trichloroethane	ND		5.00	ND		ug/L		88	70 - 135	2	20
Trichloroethene	ND		5.00	ND		ug/L		87	73 - 135	1	20
1,3-Dichlorobenzene	ND		5.00	4.10		ug/L		82	74 - 135	11	20
Toluene	ND		5.00	ND		ug/L		83	73 - 120	0	20
MSD MSD											
Surrogate	%Recovery	Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	87		70 - 127								
Toluene-d8 (Surr)	107		80 - 125								
4-Bromofluorobenzene (Surr)	84		78 - 120								
Dibromofluoromethane (Surr)	94		77 - 120								

Lab Sample ID: MB 280-232202/5

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 232202

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	ND		34		ug/L			06/27/14 09:01	1
Acrylonitrile	ND		100		ug/L			06/27/14 09:01	1

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 280-232202/5

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 232202

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Benzene	ND		5.0		ug/L			06/27/14 09:01	1
Bromochloromethane	ND		10		ug/L			06/27/14 09:01	1
Bromodichloromethane	ND		5.0		ug/L			06/27/14 09:01	1
Bromoform	ND		5.0		ug/L			06/27/14 09:01	1
Bromomethane	ND		10		ug/L			06/27/14 09:01	1
Carbon disulfide	ND		5.0		ug/L			06/27/14 09:01	1
Carbon tetrachloride	ND		5.0		ug/L			06/27/14 09:01	1
Chlorobenzene	ND		5.0		ug/L			06/27/14 09:01	1
Dibromochloromethane	ND		5.0		ug/L			06/27/14 09:01	1
Chloroethane	ND		10		ug/L			06/27/14 09:01	1
Chloroform	ND		5.0		ug/L			06/27/14 09:01	1
Dibromomethane	ND		5.0		ug/L			06/27/14 09:01	1
1,2-Dichlorobenzene	ND		10		ug/L			06/27/14 09:01	1
1,4-Dichlorobenzene	ND		10		ug/L			06/27/14 09:01	1
trans-1,4-Dichloro-2-butene	ND		10		ug/L			06/27/14 09:01	1
1,1-Dichloroethane	ND		5.0		ug/L			06/27/14 09:01	1
1,2-Dichloroethane	ND		5.0		ug/L			06/27/14 09:01	1
cis-1,2-Dichloroethene	ND		10		ug/L			06/27/14 09:01	1
trans-1,2-Dichloroethene	ND		10		ug/L			06/27/14 09:01	1
1,1-Dichloroethene	ND		5.0		ug/L			06/27/14 09:01	1
1,2-Dichloropropane	ND		5.0		ug/L			06/27/14 09:01	1
cis-1,3-Dichloropropene	ND		5.0		ug/L			06/27/14 09:01	1
trans-1,3-Dichloropropene	ND		5.0		ug/L			06/27/14 09:01	1
Ethylbenzene	ND		5.0		ug/L			06/27/14 09:01	1
2-Hexanone	ND		10		ug/L			06/27/14 09:01	1
Iodomethane	ND		10		ug/L			06/27/14 09:01	1
Methylene Chloride	ND		5.0		ug/L			06/27/14 09:01	1
4-Methyl-2-pentanone (MIBK)	ND		10		ug/L			06/27/14 09:01	1
Styrene	ND		5.0		ug/L			06/27/14 09:01	1
1,1,1,2-Tetrachloroethane	ND		5.0		ug/L			06/27/14 09:01	1
1,1,2,2-Tetrachloroethane	ND		5.0		ug/L			06/27/14 09:01	1
Tetrachloroethene	ND		5.0		ug/L			06/27/14 09:01	1
1,1,1-Trichloroethane	ND		5.0		ug/L			06/27/14 09:01	1
1,1,2-Trichloroethane	ND		5.0		ug/L			06/27/14 09:01	1
Trichloroethene	ND		5.0		ug/L			06/27/14 09:01	1
Trichlorofluoromethane	ND		10		ug/L			06/27/14 09:01	1
1,2,3-Trichloropropane	ND		10		ug/L			06/27/14 09:01	1
Vinyl acetate	ND		10		ug/L			06/27/14 09:01	1
Vinyl chloride	ND		2.0		ug/L			06/27/14 09:01	1
Xylenes (total)	ND		10		ug/L			06/27/14 09:01	1
Chloromethane	ND		10		ug/L			06/27/14 09:01	1
2-Butanone (MEK)	ND		50		ug/L			06/27/14 09:01	1
1,3-Dichlorobenzene	ND		1.0		ug/L			06/27/14 09:01	1
Toluene	ND		5.0		ug/L			06/27/14 09:01	1

Surrogate	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
1,2-Dichloroethane-d4 (Surr)	83		70 - 127		06/27/14 09:01	1
Toluene-d8 (Surr)	101		80 - 125		06/27/14 09:01	1

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 280-232202/5

Matrix: Water

Analysis Batch: 232202

Client Sample ID: Method Blank

Prep Type: Total/NA

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
4-Bromofluorobenzene (Surr)	88		78 - 120		06/27/14 09:01	1
Dibromofluoromethane (Surr)	94		77 - 120		06/27/14 09:01	1

Lab Sample ID: LCS 280-232202/4

Matrix: Water

Analysis Batch: 232202

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.	
							Limits	
Benzene	5.00	5.11		ug/L		102	74 - 135	
Bromodichloromethane	5.00	5.44		ug/L		109	73 - 135	
Carbon tetrachloride	5.00	5.06		ug/L		101	67 - 135	
Chlorobenzene	5.00	5.04		ug/L		101	76 - 135	
Chloroform	5.00	5.55		ug/L		111	76 - 120	
1,1-Dichloroethane	5.00	5.38		ug/L		108	75 - 135	
trans-1,2-Dichloroethene	5.00	5.14	J	ug/L		103	75 - 135	
1,1-Dichloroethene	5.00	4.82	J	ug/L		96	71 - 136	
1,2-Dichloropropane	5.00	5.44		ug/L		109	71 - 120	
Ethylbenzene	5.00	4.83	J	ug/L		97	72 - 120	
Methylene Chloride	5.00	5.22		ug/L		104	54 - 141	
Tetrachloroethene	5.00	4.85	J	ug/L		97	70 - 135	
1,1,1-Trichloroethane	5.00	5.07		ug/L		101	70 - 135	
Trichloroethene	5.00	5.32		ug/L		106	73 - 135	
1,3-Dichlorobenzene	5.00	4.77		ug/L		95	74 - 135	
Toluene	5.00	5.14		ug/L		103	73 - 120	

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
1,2-Dichloroethane-d4 (Surr)	94		70 - 127
Toluene-d8 (Surr)	108		80 - 125
4-Bromofluorobenzene (Surr)	83		78 - 120
Dibromofluoromethane (Surr)	95		77 - 120

Lab Sample ID: 280-56887-D-3 MSD

Matrix: Water

Analysis Batch: 232202

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec.		RPD	
									Limits		RPD	Limit
Benzene	ND		5.00	ND		ug/L		97	74 - 135	5	20	
Bromodichloromethane	ND		5.00	5.20		ug/L		104	73 - 135	3	20	
Carbon tetrachloride	ND		5.00	5.10		ug/L		102	67 - 135	4	21	
Chlorobenzene	ND		5.00	ND		ug/L		97	76 - 135	3	20	
Chloroform	ND		5.00	5.22		ug/L		104	76 - 120	4	20	
1,1-Dichloroethane	ND		5.00	5.14		ug/L		103	75 - 135	4	21	
trans-1,2-Dichloroethene	ND		5.00	ND		ug/L		102	75 - 135	2	24	
1,1-Dichloroethene	ND		5.00	ND		ug/L		98	71 - 136	7	20	
1,2-Dichloropropane	ND		5.00	5.10		ug/L		102	71 - 120	2	20	
Ethylbenzene	ND		5.00	ND		ug/L		94	72 - 120	4	26	
Methylene Chloride	ND		5.00	ND		ug/L		92	54 - 141	4	20	
Tetrachloroethene	ND		5.00	ND		ug/L		98	70 - 135	5	20	

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 280-56887-D-3 MSD

Client Sample ID: Matrix Spike Duplicate

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 232202

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	RPD
	Result	Qualifier	Added	Result	Qualifier				Limits		
1,1,1-Trichloroethane	ND		5.00	5.03		ug/L		101	70 - 135	5	20
Trichloroethene	ND		5.00	5.19		ug/L		104	73 - 135	4	20
1,3-Dichlorobenzene	ND		5.00	4.69		ug/L		94	74 - 135	1	20
Toluene	ND		5.00	5.04		ug/L		101	73 - 120	3	20
MSD MSD											
Surrogate	%Recovery	Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	91		70 - 127								
Toluene-d8 (Surr)	109		80 - 125								
4-Bromofluorobenzene (Surr)	84		78 - 120								
Dibromofluoromethane (Surr)	95		77 - 120								

Lab Sample ID: 280-56887-G-3 MS

Client Sample ID: Matrix Spike

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 232202

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.	RPD	RPD
	Result	Qualifier	Added	Result	Qualifier				Limits		
Benzene	ND		5.00	5.13		ug/L		103	74 - 135		
Bromodichloromethane	ND		5.00	5.38		ug/L		108	73 - 135		
Carbon tetrachloride	ND		5.00	5.32		ug/L		106	67 - 135		
Chlorobenzene	ND		5.00	5.03		ug/L		101	76 - 135		
Chloroform	ND		5.00	5.44		ug/L		109	76 - 120		
1,1-Dichloroethane	ND		5.00	5.38		ug/L		108	75 - 135		
trans-1,2-Dichloroethene	ND		5.00	ND		ug/L		104	75 - 135		
1,1-Dichloroethene	ND		5.00	5.26		ug/L		105	71 - 136		
1,2-Dichloropropane	ND		5.00	5.19		ug/L		104	71 - 120		
Ethylbenzene	ND		5.00	ND		ug/L		98	72 - 120		
Methylene Chloride	ND		5.00	ND		ug/L		96	54 - 141		
Tetrachloroethene	ND		5.00	5.15		ug/L		103	70 - 135		
1,1,1-Trichloroethane	ND		5.00	5.30		ug/L		106	70 - 135		
Trichloroethene	ND		5.00	5.41		ug/L		108	73 - 135		
1,3-Dichlorobenzene	ND		5.00	4.73		ug/L		95	74 - 135		
Toluene	ND		5.00	5.20		ug/L		104	73 - 120		
MS MS											
Surrogate	%Recovery	Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	90		70 - 127								
Toluene-d8 (Surr)	108		80 - 125								
4-Bromofluorobenzene (Surr)	82		78 - 120								
Dibromofluoromethane (Surr)	95		77 - 120								

Method: 8011 - EDB, DBCP, and 1,2,3-TCP (GC)

Lab Sample ID: MB 280-231909/4-A

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 231912

Prep Batch: 231909

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
1,2-Dibromoethane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 02:17	1

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 8011 - EDB, DBCP, and 1,2,3-TCP (GC) (Continued)

Lab Sample ID: MB 280-231909/4-A

Matrix: Water

Analysis Batch: 231912

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 231909

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromo-3-Chloropropane	ND		0.020		ug/L		06/25/14 17:00	06/26/14 02:17	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dibromopropane	106		70 - 130	06/25/14 17:00	06/26/14 02:17	1

Lab Sample ID: LCS 280-231909/2-A

Matrix: Water

Analysis Batch: 231912

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 231909

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2-Dibromoethane	0.250	0.228		ug/L		91	70 - 130
1,2-Dibromo-3-Chloropropane	0.250	0.247		ug/L		99	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dibromopropane	102		70 - 130

Lab Sample ID: LCSD 280-231909/3-A

Matrix: Water

Analysis Batch: 231912

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 231909

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dibromoethane	0.250	0.227		ug/L		91	70 - 130	0	10
1,2-Dibromo-3-Chloropropane	0.250	0.246		ug/L		99	70 - 130	0	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
1,2-Dibromopropane	100		70 - 130

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 280-231132/1-A

Matrix: Water

Analysis Batch: 232653

Client Sample ID: Method Blank

Prep Type: Total Recoverable

Prep Batch: 231132

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		200		ug/L		06/20/14 07:30	06/30/14 20:35	1
Beryllium	ND		4.0		ug/L		06/20/14 07:30	06/30/14 20:35	1
Calcium	ND		5000		ug/L		06/20/14 07:30	06/30/14 20:35	1
Cadmium	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:35	1
Cobalt	ND		50		ug/L		06/20/14 07:30	06/30/14 20:35	1
Chromium	ND		10		ug/L		06/20/14 07:30	06/30/14 20:35	1
Copper	ND		25		ug/L		06/20/14 07:30	06/30/14 20:35	1
Iron	ND		100		ug/L		06/20/14 07:30	06/30/14 20:35	1
Potassium	ND		5000		ug/L		06/20/14 07:30	06/30/14 20:35	1
Magnesium	ND		5000		ug/L		06/20/14 07:30	06/30/14 20:35	1
Manganese	ND		15		ug/L		06/20/14 07:30	06/30/14 20:35	1
Sodium	ND	^	5000		ug/L		06/20/14 07:30	06/30/14 20:35	1
Nickel	ND		40		ug/L		06/20/14 07:30	06/30/14 20:35	1

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: MB 280-231132/1-A

Matrix: Water

Analysis Batch: 232653

Client Sample ID: Method Blank

Prep Type: Total Recoverable

Prep Batch: 231132

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Lead	ND		5.0		ug/L		06/20/14 07:30	06/30/14 20:35	1
Antimony	ND		6.0		ug/L		06/20/14 07:30	06/30/14 20:35	1
Zinc	ND		20		ug/L		06/20/14 07:30	06/30/14 20:35	1
Silver	ND		25		ug/L		06/20/14 07:30	06/30/14 20:35	1

Lab Sample ID: LCS 280-231132/2-A

Matrix: Water

Analysis Batch: 232653

Client Sample ID: Lab Control Sample

Prep Type: Total Recoverable

Prep Batch: 231132

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec.	Limits
		Result	Qualifier					
Barium	2000	2030		ug/L		102	90 - 112	
Beryllium	50.0	50.2		ug/L		100	89 - 113	
Calcium	50000	49400		ug/L		99	90 - 111	
Cadmium	100	108		ug/L		108	88 - 111	
Cobalt	500	505		ug/L		101	89 - 111	
Chromium	200	205		ug/L		102	90 - 113	
Copper	250	268		ug/L		107	86 - 112	
Iron	1000	1010		ug/L		101	89 - 115	
Potassium	50000	51900		ug/L		104	89 - 114	
Magnesium	50000	51500		ug/L		103	90 - 113	
Manganese	500	501		ug/L		100	90 - 110	
Sodium	50000	55500		ug/L		111	90 - 115	
Nickel	500	503		ug/L		101	89 - 111	
Lead	500	507		ug/L		101	89 - 110	
Antimony	500	540		ug/L		108	88 - 110	
Zinc	500	496		ug/L		99	85 - 111	
Silver	50.0	58.8	*	ug/L		118	85 - 115	

Lab Sample ID: 280-56768-1 MS

Matrix: Water

Analysis Batch: 232653

Client Sample ID: LCS13

Prep Type: Total Recoverable

Prep Batch: 231132

Analyte	Sample Result	Sample Qualifier	Spike Added	MS	MS	Unit	D	%Rec	%Rec.	Limits
				Result	Qualifier					
Barium	3900		2000	5790		ug/L		95	90 - 112	
Beryllium	ND		50.0	50.1		ug/L		100	89 - 113	
Calcium	400000		50000	437000	4	ug/L		71	90 - 111	
Cadmium	ND		100	111		ug/L		111	88 - 111	
Cobalt	ND		500	494		ug/L		98	89 - 111	
Chromium	ND		200	207		ug/L		102	90 - 113	
Copper	ND		250	275		ug/L		109	86 - 112	
Iron	26000		1000	25900	4	ug/L		7	89 - 115	
Potassium	36000		50000	87400		ug/L		102	89 - 114	
Magnesium	110000		50000	157000		ug/L		93	90 - 113	
Manganese	4700		500	5090	4	ug/L		73	90 - 110	
Sodium	420000		50000	461000	4	ug/L		77	90 - 115	
Nickel	81		500	562		ug/L		96	89 - 111	
Lead	ND		500	479		ug/L		96	89 - 110	
Antimony	ND		500	546		ug/L		109	88 - 110	
Zinc	ND		500	489		ug/L		96	85 - 111	

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: 280-56768-1 MS							Client Sample ID: LCS13			
Matrix: Water							Prep Type: Total Recoverable			
Analysis Batch: 232653							Prep Batch: 231132			
Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec.	%Rec.	
	Result	Qualifier	Added	Result	Qualifier			Limits	Limits	
Silver	ND	*	50.0	62.2	F1	ug/L		121	85 - 115	

Lab Sample ID: 280-56768-1 MSD							Client Sample ID: LCS13					
Matrix: Water							Prep Type: Total Recoverable					
Analysis Batch: 232653							Prep Batch: 231132					
Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec.	%Rec.		RPD	
	Result	Qualifier	Added	Result	Qualifier			Limits	Limits	RPD	Limit	
Barium	3900		2000	6140		ug/L		112	90 - 112		6	20
Beryllium	ND		50.0	54.1		ug/L		108	89 - 113		8	20
Calcium	400000		50000	458000	4	ug/L		112	90 - 111		5	20
Cadmium	ND		100	115	F1	ug/L		115	88 - 111		3	20
Cobalt	ND		500	511		ug/L		101	89 - 111		3	20
Chromium	ND		200	214		ug/L		105	90 - 113		3	20
Copper	ND		250	282		ug/L		112	86 - 112		3	20
Iron	26000		1000	27200	4	ug/L		141	89 - 115		5	20
Potassium	36000		50000	93500		ug/L		114	89 - 114		7	20
Magnesium	110000		50000	157000		ug/L		95	90 - 113		0	20
Manganese	4700		500	5060	4	ug/L		66	90 - 110		1	20
Sodium	420000		50000	486000	4	ug/L		126	90 - 115		5	20
Nickel	81		500	579		ug/L		100	89 - 111		3	20
Lead	ND		500	495		ug/L		99	89 - 110		3	20
Antimony	ND		500	557	F1	ug/L		111	88 - 110		2	20
Zinc	ND		500	502		ug/L		98	85 - 111		3	20
Silver	ND	*	50.0	63.2	F1	ug/L		123	85 - 115		2	20

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 280-230942/1-A							Client Sample ID: Method Blank				
Matrix: Water							Prep Type: Total Recoverable				
Analysis Batch: 232080							Prep Batch: 230942				
Analyte	MB	MB	RL	MDL	Unit	D	Prepared		Analyzed		Dil Fac
	Result	Qualifier									
Arsenic	ND		10		ug/L		06/19/14 13:00	06/26/14 01:27			1
Selenium	ND		5.0		ug/L		06/19/14 13:00	06/26/14 01:27			1
Thallium	ND		2.0		ug/L		06/19/14 13:00	06/26/14 01:27			1
Vanadium	ND		50		ug/L		06/19/14 13:00	06/26/14 01:27			1

Lab Sample ID: LCS 280-230942/2-A							Client Sample ID: Lab Control Sample			
Matrix: Water							Prep Type: Total Recoverable			
Analysis Batch: 232080							Prep Batch: 230942			
Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec.	%Rec.		Dil Fac	
						%Rec.	Limits	Limits		
Arsenic	40.0	40.3		ug/L		101	89 - 111			
Selenium	40.0	40.0		ug/L		100	85 - 114			
Thallium	40.0	40.9		ug/L		102	86 - 115			
Vanadium	40.0	39.4	J	ug/L		98	90 - 115			

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: 280-56768-1 MS

Matrix: Water

Analysis Batch: 232080

Client Sample ID: LCS13

Prep Type: Total Recoverable

Prep Batch: 230942

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	%Rec.	
	Result	Qualifier		Result	Qualifier				Limits	Limits
Arsenic	58		40.0	100		ug/L		106	79 - 120	
Selenium	ND		40.0	40.6		ug/L		101	85 - 114	
Thallium	ND		40.0	37.1		ug/L		93	86 - 115	
Vanadium	ND		40.0	50.2		ug/L		110	90 - 115	

Lab Sample ID: 280-56768-1 MSD

Matrix: Water

Analysis Batch: 232080

Client Sample ID: LCS13

Prep Type: Total Recoverable

Prep Batch: 230942

Analyte	Sample	Sample	Spike Added	MSD	MSD	Unit	D	%Rec	%Rec.		RPD
	Result	Qualifier		Result	Qualifier				Limits	RPD	Limit
Arsenic	58		40.0	99.8		ug/L		105	79 - 120		0 20
Selenium	ND		40.0	40.6		ug/L		102	85 - 114		0 20
Thallium	ND		40.0	36.7		ug/L		92	86 - 115		1 20
Vanadium	ND		40.0	ND		ug/L		107	90 - 115		3 20

Method: 245.1 - Mercury (CVAA)

Lab Sample ID: MB 280-231015/1-A

Matrix: Water

Analysis Batch: 231297

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 231015

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Mercury	ND		0.20		ug/L		06/19/14 12:00	06/19/14 16:21	1

Lab Sample ID: LCS 280-231015/2-A

Matrix: Water

Analysis Batch: 231297

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 231015

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec.	
		Result	Qualifier				Limits	Limits
Mercury	5.00	5.15		ug/L		103	90 - 110	

Lab Sample ID: 280-56768-1 MS

Matrix: Water

Analysis Batch: 231297

Client Sample ID: LCS13

Prep Type: Total/NA

Prep Batch: 231015

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	%Rec.	
	Result	Qualifier		Result	Qualifier				Limits	Limits
Mercury	ND		5.00	3.24	F1	ug/L		63	80 - 120	

Lab Sample ID: 280-56768-1 MSD

Matrix: Water

Analysis Batch: 231297

Client Sample ID: LCS13

Prep Type: Total/NA

Prep Batch: 231015

Analyte	Sample	Sample	Spike Added	MSD	MSD	Unit	D	%Rec	%Rec.		RPD
	Result	Qualifier		Result	Qualifier				Limits	RPD	Limit
Mercury	ND		5.00	3.29	F1	ug/L		64	80 - 120		1 10

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 480-191130/1-A						Client Sample ID: Method Blank			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 191131						Prep Batch: 191130			
Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Oil & Grease	ND		5.0		mg/L		07/03/14 01:11	07/03/14 01:27	1

Lab Sample ID: LCS 480-191130/2-A						Client Sample ID: Lab Control Sample			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 191131						Prep Batch: 191130			
Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oil & Grease			40.0	32.0		mg/L		80	78 - 114

Lab Sample ID: 480-62669-B-1-A MS						Client Sample ID: Matrix Spike			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 191131						Prep Batch: 191130			
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Oil & Grease	ND		19.9	16.8		mg/L		84	78 - 114

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 280-230840/33						Client Sample ID: Method Blank			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 230840									
Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.050		mg/L			06/19/14 03:25	1

Lab Sample ID: MB 280-230840/6						Client Sample ID: Method Blank			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 230840									
Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.050		mg/L			06/18/14 14:40	1

Lab Sample ID: LCS 280-230840/31						Client Sample ID: Lab Control Sample			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 230840									
Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N			5.00	4.80		mg/L		96	90 - 110

Lab Sample ID: LCS 280-230840/4						Client Sample ID: Lab Control Sample			
Matrix: Water						Prep Type: Total/NA			
Analysis Batch: 230840									
Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N			5.00	4.90		mg/L		98	90 - 110

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 280-230840/32				Client Sample ID: Lab Control Sample Dup							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit		
Nitrate as N	5.00	4.84		mg/L		97	90 - 110	1	10		
Lab Sample ID: LCSD 280-230840/5				Client Sample ID: Lab Control Sample Dup							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit		
Nitrate as N	5.00	4.84		mg/L		97	90 - 110	1	10		
Lab Sample ID: MRL 280-230840/3				Client Sample ID: Lab Control Sample Dup							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits				
Nitrate as N	0.200	ND		mg/L		120	50 - 150				
Lab Sample ID: 280-56770-A-1 MS				Client Sample ID: Matrix Spike							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Nitrate as N	6.7		5.00	12.8	E F1	mg/L		121	80 - 120		
Lab Sample ID: 280-56770-A-1 MSD				Client Sample ID: Matrix Spike Duplicate							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	6.7		5.00	13.1	E F1	mg/L		126	80 - 120	2	20
Lab Sample ID: 280-56778-F-9 MS				Client Sample ID: Matrix Spike							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Nitrate as N	4.2		5.00	9.89		mg/L		114	80 - 120		
Lab Sample ID: 280-56778-F-9 MSD				Client Sample ID: Matrix Spike Duplicate							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	4.2		5.00	9.95		mg/L		115	80 - 120	1	20
Lab Sample ID: 280-56770-A-1 DU				Client Sample ID: Duplicate							
Matrix: Water				Prep Type: Total/NA							
Analysis Batch: 230840											
Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D		RPD	RPD Limit	
Nitrate as N	6.7			6.74		mg/L			0.008	15	

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Lab Sample ID: 280-56778-F-9 DU
Matrix: Water
Analysis Batch: 230840

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
Nitrate as N	4.2		4.20		mg/L			0.3	15

Lab Sample ID: MB 280-230841/33
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	ND		0.50		mg/L			06/19/14 03:25	1
Sulfate	ND		5.0		mg/L			06/19/14 03:25	1

Lab Sample ID: MB 280-230841/6
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	ND		0.50		mg/L			06/18/14 14:40	1
Sulfate	ND		5.0		mg/L			06/18/14 14:40	1

Lab Sample ID: LCS 280-230841/31
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	25.0	24.6		mg/L		98	90 - 110

Lab Sample ID: LCS 280-230841/4
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	25.0	24.7		mg/L		99	90 - 110

Lab Sample ID: LCSD 280-230841/32
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	25.0	24.7		mg/L		99	90 - 110	0	10

Lab Sample ID: LCSD 280-230841/5
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	25.0	24.7		mg/L		99	90 - 110	0	10

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: MRL 280-230841/3 Matrix: Water Analysis Batch: 230841			Client Sample ID: Lab Control Sample Prep Type: Total/NA						
Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride	1.00	ND		mg/L		126	50 - 150		
Sulfate	1.00	ND		mg/L		120	50 - 150		

Lab Sample ID: 280-56770-A-1 MS Matrix: Water Analysis Batch: 230841			Client Sample ID: Matrix Spike Prep Type: Total/NA						
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	130		25.0	157	E 4	mg/L		121	80 - 120
Sulfate	2000		25.0	2020	E 4	mg/L		66	80 - 120

Lab Sample ID: 280-56770-A-1 MSD Matrix: Water Analysis Batch: 230841			Client Sample ID: Matrix Spike Duplicate Prep Type: Total/NA								
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	130		25.0	158	E 4	mg/L		126	80 - 120	1	20
Sulfate	2000		25.0	2020	E 4	mg/L		73	80 - 120	0	20

Lab Sample ID: 280-56778-F-9 MS Matrix: Water Analysis Batch: 230841			Client Sample ID: Matrix Spike Prep Type: Total/NA						
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	9.9		25.0	38.1		mg/L		113	80 - 120
Sulfate	14		25.0	43.0		mg/L		114	80 - 120

Lab Sample ID: 280-56778-F-9 MSD Matrix: Water Analysis Batch: 230841			Client Sample ID: Matrix Spike Duplicate Prep Type: Total/NA								
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	9.9		25.0	38.3		mg/L		114	80 - 120	1	20
Sulfate	14		25.0	42.9		mg/L		114	80 - 120	0	20

Lab Sample ID: 280-56770-A-1 DU Matrix: Water Analysis Batch: 230841			Client Sample ID: Duplicate Prep Type: Total/NA						
Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit	
Chloride	130		127	E	mg/L		0.03	15	
Sulfate	2000		2000	E	mg/L		0.02	15	

Lab Sample ID: 280-56778-F-9 DU Matrix: Water Analysis Batch: 230841			Client Sample ID: Duplicate Prep Type: Total/NA						
Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit	
Chloride	9.9		9.90		mg/L		0.07	15	

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 280-56778-F-9 DU
Matrix: Water
Analysis Batch: 230841

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Sulfate	14		14.4		mg/L		0.2	15

Method: 335.4 - Cyanide, Total

Lab Sample ID: MB 480-189350/1-A
Matrix: Water
Analysis Batch: 189566

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 189350

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Cyanide, Total	ND		0.010		mg/L		06/23/14 14:20	06/24/14 10:39	1

Lab Sample ID: LCS 480-189350/2-A
Matrix: Water
Analysis Batch: 189566

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 189350

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Cyanide, Total	0.250	0.238		mg/L		95	90 - 110

Lab Sample ID: 280-56768-4 MS
Matrix: Water
Analysis Batch: 189566

Client Sample ID: LCS08
Prep Type: Total/NA
Prep Batch: 189350

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	%Rec. Limits
	Result	Qualifier		Result	Qualifier				
Cyanide, Total	0.027		0.100	0.111	F1	mg/L		85	90 - 110

Lab Sample ID: 280-56768-1 DU
Matrix: Water
Analysis Batch: 189566

Client Sample ID: LCS13
Prep Type: Total/NA
Prep Batch: 189350

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Cyanide, Total	ND		ND		mg/L		NC	15

Lab Sample ID: MB 480-189771/1-A
Matrix: Water
Analysis Batch: 189803

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 189771

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Cyanide, Total	ND		0.010		mg/L		06/25/14 07:20	06/25/14 12:40	1

Lab Sample ID: LCS 480-189771/2-A
Matrix: Water
Analysis Batch: 189803

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 189771

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Cyanide, Total	0.400	0.392		mg/L		98	90 - 110

TestAmerica Denver

QC Sample Results

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 335.4 - Cyanide, Total (Continued)

Lab Sample ID: 480-62095-E-4-C MSD							Client Sample ID: Matrix Spike Duplicate				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 189803							Prep Batch: 189771				
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cyanide, Total	ND		0.100	0.101		mg/L		101	90 - 110	0	15

Lab Sample ID: 480-62385-D-1-B MS							Client Sample ID: Matrix Spike				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 189803							Prep Batch: 189771				
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cyanide, Total	0.030		0.100	0.129		mg/L		100	90 - 110		

Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 280-231803/3-A							Client Sample ID: Method Blank				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 232004							Prep Batch: 231803				
Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac		
Total Kjeldahl Nitrogen	ND		1.0		mg/L		06/24/14 22:15	06/25/14 21:21	1		

Lab Sample ID: LCS 280-231803/1-A							Client Sample ID: Lab Control Sample				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 232004							Prep Batch: 231803				
Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits				
Total Kjeldahl Nitrogen	6.00	6.11		mg/L		102	90 - 110				

Lab Sample ID: LCSD 280-231803/2-A							Client Sample ID: Lab Control Sample Dup				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 232004							Prep Batch: 231803				
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit		
Total Kjeldahl Nitrogen	6.00	6.02		mg/L		100	90 - 110	2	25		

Lab Sample ID: 280-56196-F-1-B MS							Client Sample ID: Matrix Spike				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 232004							Prep Batch: 231803				
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Kjeldahl Nitrogen	ND		3.00	2.73		mg/L		91	90 - 110		

Lab Sample ID: 280-56196-F-1-C MSD							Client Sample ID: Matrix Spike Duplicate				
Matrix: Water							Prep Type: Total/NA				
Analysis Batch: 232004							Prep Batch: 231803				
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Kjeldahl Nitrogen	ND		3.00	2.84		mg/L		95	90 - 110	4	25

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: 410.4 - COD

Lab Sample ID: MB 280-231217/5

Matrix: Water

Analysis Batch: 231217

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chemical Oxygen Demand (COD)	ND		10		mg/L			06/20/14 08:46	1

Lab Sample ID: LCS 280-231217/3

Matrix: Water

Analysis Batch: 231217

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD

Lab Sample ID: LCSD 280-231217/4

Matrix: Water

Analysis Batch: 231217

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit

Lab Sample ID: 280-56785-E-1 MS

Matrix: Water

Analysis Batch: 231217

Client Sample ID: Matrix Spike

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD

Lab Sample ID: 280-56785-E-1 MSD

Matrix: Water

Analysis Batch: 231217

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit

Lab Sample ID: MB 280-231699/5

Matrix: Water

Analysis Batch: 231699

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chemical Oxygen Demand (COD)	ND		10		mg/L			06/24/14 10:15	1

Lab Sample ID: LCS 280-231699/3

Matrix: Water

Analysis Batch: 231699

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD

Lab Sample ID: LCSD 280-231699/4

Matrix: Water

Analysis Batch: 231699

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Lab Sample ID: 280-56196-F-1 MS Client Sample ID: Matrix Spike
Matrix: Water Prep Type: Total/NA
Analysis Batch: 231699

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand (COD)	13		50.0	66.7		mg/L		108	90 - 110

Lab Sample ID: 280-56196-F-1 MSD Client Sample ID: Matrix Spike Duplicate
Matrix: Water Prep Type: Total/NA
Analysis Batch: 231699

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Chemical Oxygen Demand (COD)	13		50.0	60.7		mg/L		96	90 - 110	9	11

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 280-231876/6 Client Sample ID: Method Blank
Matrix: Water Prep Type: Total/NA
Analysis Batch: 231876

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity	ND		5.0		mg/L			06/24/14 17:29	1
Carbonate Alkalinity	ND		5.0		mg/L			06/24/14 17:29	1

Lab Sample ID: LCS 280-231876/4 Client Sample ID: Lab Control Sample
Matrix: Water Prep Type: Total/NA
Analysis Batch: 231876

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Alkalinity	200	187		mg/L		94	90 - 110

Lab Sample ID: LCSD 280-231876/5 Client Sample ID: Lab Control Sample Dup
Matrix: Water Prep Type: Total/NA
Analysis Batch: 231876

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Total Alkalinity	200	191		mg/L		96	90 - 110	2	10

Lab Sample ID: 280-56906-A-1 DU Client Sample ID: Duplicate
Matrix: Water Prep Type: Total/NA
Analysis Batch: 231876

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Total Alkalinity	190		199		mg/L		4	10

Method: SM 2510B - Conductivity, Specific Conductance

Lab Sample ID: MB 280-230899/5 Client Sample ID: Method Blank
Matrix: Water Prep Type: Total/NA
Analysis Batch: 230899

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	ND		2.0		umhos/cm			06/18/14 17:40	1

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: SM 2510B - Conductivity, Specific Conductance (Continued)

Lab Sample ID: LCS 280-230899/3				Client Sample ID: Lab Control Sample						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 230899										
Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits			
Specific Conductance	1410	1350		umhos/cm		96	90 - 110			

Lab Sample ID: LCSD 280-230899/4				Client Sample ID: Lab Control Sample Dup						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 230899										
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits		RPD	RPD Limit
Specific Conductance	1410	1360		umhos/cm		96	90 - 110		0	10

Lab Sample ID: 280-56685-C-2 DU				Client Sample ID: Duplicate						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 230899										
Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD		RPD Limit	
Specific Conductance	1100		1020		umhos/cm		8		10	

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 280-231133/1				Client Sample ID: Method Blank						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 231133										
Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Total Dissolved Solids	ND		10		mg/L			06/19/14 15:54	1	

Lab Sample ID: LCS 280-231133/2				Client Sample ID: Lab Control Sample						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 231133										
Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits			
Total Dissolved Solids	500	495		mg/L		99	86 - 110			

Lab Sample ID: LCSD 280-231133/3				Client Sample ID: Lab Control Sample Dup						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 231133										
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits		RPD	RPD Limit
Total Dissolved Solids	500	500		mg/L		100	86 - 110		1	20

Lab Sample ID: 280-56787-G-4 DU				Client Sample ID: Duplicate						
Matrix: Water				Prep Type: Total/NA						
Analysis Batch: 231133										
Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD		RPD Limit	
Total Dissolved Solids	530		524		mg/L		0.9		10	

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 280-231392/3
Matrix: Water
Analysis Batch: 231392

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		2.0		mg/L			06/21/14 10:40	1

Lab Sample ID: LCS 280-231392/1
Matrix: Water
Analysis Batch: 231392

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Suspended Solids	100	92.0		mg/L		92	86 - 114

Lab Sample ID: LCSD 280-231392/2
Matrix: Water
Analysis Batch: 231392

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Suspended Solids	100	89.0		mg/L		89	86 - 114	3	20

Lab Sample ID: 280-56850-A-1 DU
Matrix: Water
Analysis Batch: 231392

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Suspended Solids	3.6		3.20		mg/L		12	10

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 280-230908/4
Matrix: Water
Analysis Batch: 230908

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.000		SU		100	99 - 101

Lab Sample ID: LCSD 280-230908/5
Matrix: Water
Analysis Batch: 230908

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
pH	7.00	6.990		SU		100	99 - 101	0	5

Lab Sample ID: 280-56728-F-1 DU
Matrix: Water
Analysis Batch: 230908

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	9.20		7.220	F3	SU		24	5

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: SM 5310B - Organic Carbon, Total (TOC)

Lab Sample ID: MB 280-231433/5

Matrix: Water

Analysis Batch: 231433

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Result 1	ND		1.0		mg/L			06/20/14 18:13	1
TOC Result 2	ND		1.0		mg/L			06/20/14 18:13	1

Lab Sample ID: LCS 280-231433/3

Matrix: Water

Analysis Batch: 231433

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TOC Result 1	25.0	23.1		mg/L		92	88 - 112
TOC Result 2	25.0	23.1		mg/L		92	88 - 112

Lab Sample ID: LCSD 280-231433/4

Matrix: Water

Analysis Batch: 231433

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD Limit
TOC Result 1	25.0	23.2		mg/L		93	88 - 112	0 15
TOC Result 2	25.0	23.0		mg/L		92	88 - 112	0 15

Lab Sample ID: 280-56768-1 MS

Matrix: Water

Analysis Batch: 231433

Client Sample ID: LCS13

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
TOC Result 1	73		25.0	94.5	F1	mg/L		86	88 - 112
TOC Result 2	73		25.0	93.6	F1	mg/L		83	88 - 112

Lab Sample ID: 280-56768-1 MSD

Matrix: Water

Analysis Batch: 231433

Client Sample ID: LCS13

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD Limit
TOC Result 1	73		25.0	95.1		mg/L		89	88 - 112	1 15
TOC Result 2	73		25.0	94.7		mg/L		88	88 - 112	1 15

Lab Sample ID: MB 280-231659/5

Matrix: Water

Analysis Batch: 231659

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Result 1	ND		1.0		mg/L			06/21/14 16:52	1
TOC Result 2	ND		1.0		mg/L			06/21/14 16:52	1

Lab Sample ID: LCS 280-231659/3

Matrix: Water

Analysis Batch: 231659

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TOC Result 1	25.0	24.5		mg/L		98	88 - 112

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: SM 5310B - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: LCS 280-231659/3

Matrix: Water

Analysis Batch: 231659

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TOC Result 2	25.0	24.6		mg/L		98	88 - 112

Lab Sample ID: LCSD 280-231659/4

Matrix: Water

Analysis Batch: 231659

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TOC Result 1	25.0	24.7		mg/L		99	88 - 112	1	15
TOC Result 2	25.0	24.9		mg/L		99	88 - 112	1	15

Lab Sample ID: 280-56523-B-1 MS

Matrix: Water

Analysis Batch: 231659

Client Sample ID: Matrix Spike

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
TOC Result 1	1.9		25.0	26.8		mg/L		100	88 - 112
TOC Result 2	1.9		25.0	26.8		mg/L		99	88 - 112

Lab Sample ID: 280-56523-B-1 MSD

Matrix: Water

Analysis Batch: 231659

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TOC Result 1	1.9		25.0	27.0		mg/L		100	88 - 112	0	15
TOC Result 2	1.9		25.0	27.0		mg/L		100	88 - 112	1	15

Lab Sample ID: MB 280-231839/15

Matrix: Water

Analysis Batch: 231839

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Result 1	ND		1.0		mg/L			06/24/14 20:06	1
TOC Result 2	ND		1.0		mg/L			06/24/14 20:06	1

Lab Sample ID: LCS 280-231839/13

Matrix: Water

Analysis Batch: 231839

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TOC Result 1	25.0	23.7		mg/L		95	88 - 112
TOC Result 2	25.0	23.6		mg/L		94	88 - 112

Lab Sample ID: LCSD 280-231839/14

Matrix: Water

Analysis Batch: 231839

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TOC Result 1	25.0	23.8		mg/L		95	88 - 112	0	15
TOC Result 2	25.0	23.4		mg/L		94	88 - 112	1	15

TestAmerica Denver

QC Sample Results

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Method: SM 5310B - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: 280-56589-C-1 MS

Matrix: Water

Analysis Batch: 231839

Client Sample ID: Matrix Spike

Prep Type: Total/NA

Analyte	Sample	Sample	Spike Added	MS		Unit	D	%Rec	%Rec.	
	Result	Qualifier		Result	Qualifier				Limits	Limits
TOC Result 1	ND		25.0	24.5		mg/L		96	88 - 112	
TOC Result 2	ND		25.0	24.0		mg/L		94	88 - 112	

Lab Sample ID: 280-56589-C-1 MSD

Matrix: Water

Analysis Batch: 231839

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

Analyte	Sample	Sample	Spike Added	MSD		Unit	D	%Rec	%Rec.		RPD	
	Result	Qualifier		Result	Qualifier				Limits	Limits	RPD	Limit
TOC Result 1	ND		25.0	24.4		mg/L		96	88 - 112		0	15
TOC Result 2	ND		25.0	24.2		mg/L		95	88 - 112		1	15

Method: SM5210B - BOD, 5 Day

Lab Sample ID: MB 280-230791/6

Matrix: Water

Analysis Batch: 230791

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Biochemical Oxygen Demand	ND		2.0		mg/L			06/18/14 09:37	1

Lab Sample ID: SCB 280-230791/1

Matrix: Water

Analysis Batch: 230791

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	SCB	SCB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Biochemical Oxygen Demand	ND		2.0		mg/L			06/18/14 09:37	1

Lab Sample ID: LCS 280-230791/3

Matrix: Water

Analysis Batch: 230791

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS		Unit	D	%Rec	%Rec.	
		Result	Qualifier				Limits	Limits
Biochemical Oxygen Demand	198	213		mg/L		108	85 - 115	

Lab Sample ID: LCSD 280-230791/5

Matrix: Water

Analysis Batch: 230791

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD		Unit	D	%Rec	%Rec.		RPD	
		Result	Qualifier				Limits	Limits	RPD	Limit
Biochemical Oxygen Demand	198	223		mg/L		113	85 - 115		5	20

Lab Sample ID: 280-56699-A-2 DU

Matrix: Water

Analysis Batch: 230791

Client Sample ID: Duplicate

Prep Type: Total/NA

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier		Result				
Biochemical Oxygen Demand	ND		ND		mg/L		NC	20

TestAmerica Denver

QC Association Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

GC/MS VOA

Analysis Batch: 231811

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	8260B	
280-56768-2	LCS12	Total/NA	Water	8260B	
280-56768-4	LCS08	Total/NA	Water	8260B	
280-56768-5	LCS07	Total/NA	Water	8260B	
280-56779-E-2 MS	Matrix Spike	Total/NA	Water	8260B	
280-56779-E-2 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
LCS 280-231811/4	Lab Control Sample	Total/NA	Water	8260B	
MB 280-231811/7	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 232202

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-3	LCS10	Total/NA	Water	8260B	
280-56887-D-3 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
280-56887-G-3 MS	Matrix Spike	Total/NA	Water	8260B	
LCS 280-232202/4	Lab Control Sample	Total/NA	Water	8260B	
MB 280-232202/5	Method Blank	Total/NA	Water	8260B	

GC Semi VOA

Prep Batch: 231909

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	8011	
280-56768-2	LCS12	Total/NA	Water	8011	
280-56768-3	LCS10	Total/NA	Water	8011	
280-56768-4	LCS08	Total/NA	Water	8011	
280-56768-5	LCS07	Total/NA	Water	8011	
LCS 280-231909/2-A	Lab Control Sample	Total/NA	Water	8011	
LCSD 280-231909/3-A	Lab Control Sample Dup	Total/NA	Water	8011	
MB 280-231909/4-A	Method Blank	Total/NA	Water	8011	

Analysis Batch: 231912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	8011	231909
280-56768-2	LCS12	Total/NA	Water	8011	231909
280-56768-3	LCS10	Total/NA	Water	8011	231909
280-56768-4	LCS08	Total/NA	Water	8011	231909
280-56768-5	LCS07	Total/NA	Water	8011	231909
LCS 280-231909/2-A	Lab Control Sample	Total/NA	Water	8011	231909
LCSD 280-231909/3-A	Lab Control Sample Dup	Total/NA	Water	8011	231909
MB 280-231909/4-A	Method Blank	Total/NA	Water	8011	231909

Metals

Prep Batch: 230942

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total Recoverable	Water	200.8	
280-56768-1 MS	LCS13	Total Recoverable	Water	200.8	
280-56768-1 MSD	LCS13	Total Recoverable	Water	200.8	
280-56768-2	LCS12	Total Recoverable	Water	200.8	
280-56768-3	LCS10	Total Recoverable	Water	200.8	

TestAmerica Denver

QC Association Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Metals (Continued)

Prep Batch: 230942 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-4	LCS08	Total Recoverable	Water	200.8	
280-56768-5	LCS07	Total Recoverable	Water	200.8	
LCS 280-230942/2-A	Lab Control Sample	Total Recoverable	Water	200.8	
MB 280-230942/1-A	Method Blank	Total Recoverable	Water	200.8	

Prep Batch: 231015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	245.1	
280-56768-1 MS	LCS13	Total/NA	Water	245.1	
280-56768-1 MSD	LCS13	Total/NA	Water	245.1	
280-56768-2	LCS12	Total/NA	Water	245.1	
280-56768-3	LCS10	Total/NA	Water	245.1	
280-56768-4	LCS08	Total/NA	Water	245.1	
280-56768-5	LCS07	Total/NA	Water	245.1	
LCS 280-231015/2-A	Lab Control Sample	Total/NA	Water	245.1	
MB 280-231015/1-A	Method Blank	Total/NA	Water	245.1	

Prep Batch: 231132

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total Recoverable	Water	200.7	
280-56768-1 MS	LCS13	Total Recoverable	Water	200.7	
280-56768-1 MSD	LCS13	Total Recoverable	Water	200.7	
280-56768-2	LCS12	Total Recoverable	Water	200.7	
280-56768-3	LCS10	Total Recoverable	Water	200.7	
280-56768-4	LCS08	Total Recoverable	Water	200.7	
280-56768-5	LCS07	Total Recoverable	Water	200.7	
LCS 280-231132/2-A	Lab Control Sample	Total Recoverable	Water	200.7	
MB 280-231132/1-A	Method Blank	Total Recoverable	Water	200.7	

Analysis Batch: 231297

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	245.1	231015
280-56768-1 MS	LCS13	Total/NA	Water	245.1	231015
280-56768-1 MSD	LCS13	Total/NA	Water	245.1	231015
280-56768-2	LCS12	Total/NA	Water	245.1	231015
280-56768-3	LCS10	Total/NA	Water	245.1	231015
280-56768-4	LCS08	Total/NA	Water	245.1	231015
280-56768-5	LCS07	Total/NA	Water	245.1	231015
LCS 280-231015/2-A	Lab Control Sample	Total/NA	Water	245.1	231015
MB 280-231015/1-A	Method Blank	Total/NA	Water	245.1	231015

Analysis Batch: 232080

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total Recoverable	Water	200.8	230942
280-56768-1 MS	LCS13	Total Recoverable	Water	200.8	230942
280-56768-1 MSD	LCS13	Total Recoverable	Water	200.8	230942
280-56768-2	LCS12	Total Recoverable	Water	200.8	230942
280-56768-3	LCS10	Total Recoverable	Water	200.8	230942
280-56768-4	LCS08	Total Recoverable	Water	200.8	230942
280-56768-5	LCS07	Total Recoverable	Water	200.8	230942
LCS 280-230942/2-A	Lab Control Sample	Total Recoverable	Water	200.8	230942

TestAmerica Denver

QC Association Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Metals (Continued)

Analysis Batch: 232080 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 280-230942/1-A	Method Blank	Total Recoverable	Water	200.8	230942

Analysis Batch: 232653

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total Recoverable	Water	200.7 Rev 4.4	231132
280-56768-1 MS	LCS13	Total Recoverable	Water	200.7 Rev 4.4	231132
280-56768-1 MSD	LCS13	Total Recoverable	Water	200.7 Rev 4.4	231132
280-56768-2	LCS12	Total Recoverable	Water	200.7 Rev 4.4	231132
280-56768-3	LCS10	Total Recoverable	Water	200.7 Rev 4.4	231132
280-56768-4	LCS08	Total Recoverable	Water	200.7 Rev 4.4	231132
280-56768-5	LCS07	Total Recoverable	Water	200.7 Rev 4.4	231132
LCS 280-231132/2-A	Lab Control Sample	Total Recoverable	Water	200.7 Rev 4.4	231132
MB 280-231132/1-A	Method Blank	Total Recoverable	Water	200.7 Rev 4.4	231132

General Chemistry

Prep Batch: 189350

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	Distill/CN	
280-56768-1 DU	LCS13	Total/NA	Water	Distill/CN	
280-56768-2	LCS12	Total/NA	Water	Distill/CN	
280-56768-3	LCS10	Total/NA	Water	Distill/CN	
280-56768-4	LCS08	Total/NA	Water	Distill/CN	
280-56768-4 MS	LCS08	Total/NA	Water	Distill/CN	
LCS 480-189350/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 480-189350/1-A	Method Blank	Total/NA	Water	Distill/CN	

Analysis Batch: 189566

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	335.4	189350
280-56768-1 DU	LCS13	Total/NA	Water	335.4	189350
280-56768-2	LCS12	Total/NA	Water	335.4	189350
280-56768-3	LCS10	Total/NA	Water	335.4	189350
280-56768-4	LCS08	Total/NA	Water	335.4	189350
280-56768-4 MS	LCS08	Total/NA	Water	335.4	189350
LCS 480-189350/2-A	Lab Control Sample	Total/NA	Water	335.4	189350
MB 480-189350/1-A	Method Blank	Total/NA	Water	335.4	189350

Prep Batch: 189771

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-5	LCS07	Total/NA	Water	Distill/CN	
480-62095-E-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	Distill/CN	
480-62385-D-1-B MS	Matrix Spike	Total/NA	Water	Distill/CN	
LCS 480-189771/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 480-189771/1-A	Method Blank	Total/NA	Water	Distill/CN	

Analysis Batch: 189803

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-5	LCS07	Total/NA	Water	335.4	189771
480-62095-E-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	335.4	189771

TestAmerica Denver

QC Association Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Analysis Batch: 189803 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-62385-D-1-B MS	Matrix Spike	Total/NA	Water	335.4	189771
LCS 480-189771/2-A	Lab Control Sample	Total/NA	Water	335.4	189771
MB 480-189771/1-A	Method Blank	Total/NA	Water	335.4	189771

Prep Batch: 191130

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	1664A	
280-56768-2	LCS12	Total/NA	Water	1664A	
280-56768-3	LCS10	Total/NA	Water	1664A	
280-56768-4	LCS08	Total/NA	Water	1664A	
280-56768-5	LCS07	Total/NA	Water	1664A	
480-62669-B-1-A MS	Matrix Spike	Total/NA	Water	1664A	
LCS 480-191130/2-A	Lab Control Sample	Total/NA	Water	1664A	
MB 480-191130/1-A	Method Blank	Total/NA	Water	1664A	

Analysis Batch: 191131

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	1664A	191130
280-56768-2	LCS12	Total/NA	Water	1664A	191130
280-56768-3	LCS10	Total/NA	Water	1664A	191130
280-56768-4	LCS08	Total/NA	Water	1664A	191130
280-56768-5	LCS07	Total/NA	Water	1664A	191130
480-62669-B-1-A MS	Matrix Spike	Total/NA	Water	1664A	191130
LCS 480-191130/2-A	Lab Control Sample	Total/NA	Water	1664A	191130
MB 480-191130/1-A	Method Blank	Total/NA	Water	1664A	191130

Analysis Batch: 230791

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56699-A-2 DU	Duplicate	Total/NA	Water	SM5210B	
280-56768-1	LCS13	Total/NA	Water	SM5210B	
280-56768-2	LCS12	Total/NA	Water	SM5210B	
280-56768-3	LCS10	Total/NA	Water	SM5210B	
280-56768-4	LCS08	Total/NA	Water	SM5210B	
280-56768-5	LCS07	Total/NA	Water	SM5210B	
LCS 280-230791/3	Lab Control Sample	Total/NA	Water	SM5210B	
LCSD 280-230791/5	Lab Control Sample Dup	Total/NA	Water	SM5210B	
MB 280-230791/6	Method Blank	Total/NA	Water	SM5210B	
SCB 280-230791/1	Method Blank	Total/NA	Water	SM5210B	

Analysis Batch: 230840

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	300.0	
280-56768-2	LCS12	Total/NA	Water	300.0	
280-56768-3	LCS10	Total/NA	Water	300.0	
280-56768-4	LCS08	Total/NA	Water	300.0	
280-56768-5	LCS07	Total/NA	Water	300.0	
280-56770-A-1 DU	Duplicate	Total/NA	Water	300.0	
280-56770-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
280-56770-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
280-56778-F-9 DU	Duplicate	Total/NA	Water	300.0	
280-56778-F-9 MS	Matrix Spike	Total/NA	Water	300.0	

TestAmerica Denver

QC Association Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Analysis Batch: 230840 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56778-F-9 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
LCS 280-230840/31	Lab Control Sample	Total/NA	Water	300.0	
LCS 280-230840/4	Lab Control Sample	Total/NA	Water	300.0	
LCSD 280-230840/32	Lab Control Sample Dup	Total/NA	Water	300.0	
LCSD 280-230840/5	Lab Control Sample Dup	Total/NA	Water	300.0	
MB 280-230840/33	Method Blank	Total/NA	Water	300.0	
MB 280-230840/6	Method Blank	Total/NA	Water	300.0	
MRL 280-230840/3	Lab Control Sample	Total/NA	Water	300.0	

Analysis Batch: 230841

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	300.0	
280-56768-1	LCS13	Total/NA	Water	300.0	
280-56768-2	LCS12	Total/NA	Water	300.0	
280-56768-2	LCS12	Total/NA	Water	300.0	
280-56768-3	LCS10	Total/NA	Water	300.0	
280-56768-3	LCS10	Total/NA	Water	300.0	
280-56768-4	LCS08	Total/NA	Water	300.0	
280-56768-4	LCS08	Total/NA	Water	300.0	
280-56768-5	LCS07	Total/NA	Water	300.0	
280-56768-5	LCS07	Total/NA	Water	300.0	
280-56770-A-1 DU	Duplicate	Total/NA	Water	300.0	
280-56770-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
280-56770-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
280-56778-F-9 DU	Duplicate	Total/NA	Water	300.0	
280-56778-F-9 MS	Matrix Spike	Total/NA	Water	300.0	
280-56778-F-9 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
LCS 280-230841/31	Lab Control Sample	Total/NA	Water	300.0	
LCS 280-230841/4	Lab Control Sample	Total/NA	Water	300.0	
LCSD 280-230841/32	Lab Control Sample Dup	Total/NA	Water	300.0	
LCSD 280-230841/5	Lab Control Sample Dup	Total/NA	Water	300.0	
MB 280-230841/33	Method Blank	Total/NA	Water	300.0	
MB 280-230841/6	Method Blank	Total/NA	Water	300.0	
MRL 280-230841/3	Lab Control Sample	Total/NA	Water	300.0	

Analysis Batch: 230899

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56685-C-2 DU	Duplicate	Total/NA	Water	SM 2510B	
280-56768-1	LCS13	Total/NA	Water	SM 2510B	
280-56768-2	LCS12	Total/NA	Water	SM 2510B	
280-56768-3	LCS10	Total/NA	Water	SM 2510B	
280-56768-4	LCS08	Total/NA	Water	SM 2510B	
280-56768-5	LCS07	Total/NA	Water	SM 2510B	
LCS 280-230899/3	Lab Control Sample	Total/NA	Water	SM 2510B	
LCSD 280-230899/4	Lab Control Sample Dup	Total/NA	Water	SM 2510B	
MB 280-230899/5	Method Blank	Total/NA	Water	SM 2510B	

Analysis Batch: 230908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56728-F-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	
280-56768-1	LCS13	Total/NA	Water	SM 4500 H+ B	

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QC Association Summary

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Analysis Batch: 230908 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-2	LCS12	Total/NA	Water	SM 4500 H+ B	
280-56768-3	LCS10	Total/NA	Water	SM 4500 H+ B	
280-56768-4	LCS08	Total/NA	Water	SM 4500 H+ B	
280-56768-5	LCS07	Total/NA	Water	SM 4500 H+ B	
LCS 280-230908/4	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSD 280-230908/5	Lab Control Sample Dup	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 231133

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	SM 2540C	
280-56768-2	LCS12	Total/NA	Water	SM 2540C	
280-56768-3	LCS10	Total/NA	Water	SM 2540C	
280-56768-4	LCS08	Total/NA	Water	SM 2540C	
280-56768-5	LCS07	Total/NA	Water	SM 2540C	
280-56787-G-4 DU	Duplicate	Total/NA	Water	SM 2540C	
LCS 280-231133/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 280-231133/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
MB 280-231133/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 231217

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-2	LCS12	Total/NA	Water	410.4	
280-56768-3	LCS10	Total/NA	Water	410.4	
280-56768-4	LCS08	Total/NA	Water	410.4	
280-56768-5	LCS07	Total/NA	Water	410.4	
280-56785-E-1 MS	Matrix Spike	Total/NA	Water	410.4	
280-56785-E-1 MSD	Matrix Spike Duplicate	Total/NA	Water	410.4	
LCS 280-231217/3	Lab Control Sample	Total/NA	Water	410.4	
LCSD 280-231217/4	Lab Control Sample Dup	Total/NA	Water	410.4	
MB 280-231217/5	Method Blank	Total/NA	Water	410.4	

Analysis Batch: 231392

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	SM 2540D	
280-56768-2	LCS12	Total/NA	Water	SM 2540D	
280-56768-3	LCS10	Total/NA	Water	SM 2540D	
280-56768-4	LCS08	Total/NA	Water	SM 2540D	
280-56768-5	LCS07	Total/NA	Water	SM 2540D	
280-56850-A-1 DU	Duplicate	Total/NA	Water	SM 2540D	
LCS 280-231392/1	Lab Control Sample	Total/NA	Water	SM 2540D	
LCSD 280-231392/2	Lab Control Sample Dup	Total/NA	Water	SM 2540D	
MB 280-231392/3	Method Blank	Total/NA	Water	SM 2540D	

Analysis Batch: 231433

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	SM 5310B	
280-56768-1 MS	LCS13	Total/NA	Water	SM 5310B	
280-56768-1 MSD	LCS13	Total/NA	Water	SM 5310B	
280-56768-2	LCS12	Total/NA	Water	SM 5310B	
280-56768-3	LCS10	Total/NA	Water	SM 5310B	
LCS 280-231433/3	Lab Control Sample	Total/NA	Water	SM 5310B	

TestAmerica Denver

QC Association Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Analysis Batch: 231433 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 280-231433/4	Lab Control Sample Dup	Total/NA	Water	SM 5310B	
MB 280-231433/5	Method Blank	Total/NA	Water	SM 5310B	

Analysis Batch: 231659

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56523-B-1 MS	Matrix Spike	Total/NA	Water	SM 5310B	
280-56523-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	SM 5310B	
LCS 280-231659/3	Lab Control Sample	Total/NA	Water	SM 5310B	
LCSD 280-231659/4	Lab Control Sample Dup	Total/NA	Water	SM 5310B	
MB 280-231659/5	Method Blank	Total/NA	Water	SM 5310B	

Analysis Batch: 231699

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56196-F-1 MS	Matrix Spike	Total/NA	Water	410.4	
280-56196-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	410.4	
280-56768-1	LCS13	Total/NA	Water	410.4	
LCS 280-231699/3	Lab Control Sample	Total/NA	Water	410.4	
LCSD 280-231699/4	Lab Control Sample Dup	Total/NA	Water	410.4	
MB 280-231699/5	Method Blank	Total/NA	Water	410.4	

Prep Batch: 231803

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56196-F-1-B MS	Matrix Spike	Total/NA	Water	351.2	
280-56196-F-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	
280-56768-1	LCS13	Total/NA	Water	351.2	
280-56768-2	LCS12	Total/NA	Water	351.2	
280-56768-3	LCS10	Total/NA	Water	351.2	
280-56768-4	LCS08	Total/NA	Water	351.2	
280-56768-5	LCS07	Total/NA	Water	351.2	
LCS 280-231803/1-A	Lab Control Sample	Total/NA	Water	351.2	
LCSD 280-231803/2-A	Lab Control Sample Dup	Total/NA	Water	351.2	
MB 280-231803/3-A	Method Blank	Total/NA	Water	351.2	

Analysis Batch: 231839

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56589-C-1 MS	Matrix Spike	Total/NA	Water	SM 5310B	
280-56589-C-1 MSD	Matrix Spike Duplicate	Total/NA	Water	SM 5310B	
280-56768-4	LCS08	Total/NA	Water	SM 5310B	
280-56768-5	LCS07	Total/NA	Water	SM 5310B	
LCS 280-231839/13	Lab Control Sample	Total/NA	Water	SM 5310B	
LCSD 280-231839/14	Lab Control Sample Dup	Total/NA	Water	SM 5310B	
MB 280-231839/15	Method Blank	Total/NA	Water	SM 5310B	

Analysis Batch: 231876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	SM 2320B	
280-56768-2	LCS12	Total/NA	Water	SM 2320B	
280-56768-3	LCS10	Total/NA	Water	SM 2320B	
280-56768-4	LCS08	Total/NA	Water	SM 2320B	
280-56768-5	LCS07	Total/NA	Water	SM 2320B	
280-56906-A-1 DU	Duplicate	Total/NA	Water	SM 2320B	

TestAmerica Denver

QC Association Summary

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

General Chemistry (Continued)

Analysis Batch: 231876 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 280-231876/4	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 280-231876/5	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
MB 280-231876/6	Method Blank	Total/NA	Water	SM 2320B	

Analysis Batch: 232004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56196-F-1-B MS	Matrix Spike	Total/NA	Water	351.2	231803
280-56196-F-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	231803
280-56768-1	LCS13	Total/NA	Water	351.2	231803
280-56768-2	LCS12	Total/NA	Water	351.2	231803
280-56768-3	LCS10	Total/NA	Water	351.2	231803
280-56768-4	LCS08	Total/NA	Water	351.2	231803
280-56768-5	LCS07	Total/NA	Water	351.2	231803
LCS 280-231803/1-A	Lab Control Sample	Total/NA	Water	351.2	231803
LCSD 280-231803/2-A	Lab Control Sample Dup	Total/NA	Water	351.2	231803
MB 280-231803/3-A	Method Blank	Total/NA	Water	351.2	231803

Analysis Batch: 232380

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-56768-1	LCS13	Total/NA	Water	350.1	
280-56768-2	LCS12	Total/NA	Water	350.1	
280-56768-3	LCS10	Total/NA	Water	350.1	
280-56768-4	LCS08	Total/NA	Water	350.1	
280-56768-5	LCS07	Total/NA	Water	350.1	

Lab Chronicle

Client: Waste Management
 Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS13
Date Collected: 06/17/14 11:45
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	20 mL	231811	06/25/14 13:32	TAW	TAL DEN
Total/NA	Prep	8011			35 mL	35 mL	231909	06/25/14 17:00	MPS	TAL DEN
Total/NA	Analysis	8011		1	35 mL	35 mL	231912	06/26/14 02:36	MPS	TAL DEN
Total Recoverable	Prep	200.7			50 mL	50 mL	231132	06/20/14 07:30	SEJ	TAL DEN
Total Recoverable	Analysis	200.7 Rev 4.4		1	50 mL	50 mL	232653	06/30/14 20:40	SJS	TAL DEN
Total Recoverable	Prep	200.8			50 mL	50 mL	230942	06/19/14 13:00	WAW	TAL DEN
Total Recoverable	Analysis	200.8		1	50 mL	50 mL	232080	06/26/14 01:33	TEL	TAL DEN
Total/NA	Prep	245.1			30 mL	30 mL	231015	06/19/14 12:00	JM	TAL DEN
Total/NA	Analysis	245.1		1	30 mL	30 mL	231297	06/19/14 16:28	JM	TAL DEN
Total/NA	Prep	1664A			1000 mL	1000 mL	191130	07/03/14 01:11	LAW	TAL BUF
Total/NA	Analysis	1664A		1	1000 mL	1000 mL	191131	07/03/14 01:27	LAW	TAL BUF
Total/NA	Analysis	300.0		2	5 mL	5 mL	230840	06/18/14 18:01	TLP	TAL DEN
Total/NA	Analysis	300.0		2	5 mL	5 mL	230841	06/18/14 18:01	TLP	TAL DEN
Total/NA	Analysis	300.0		50	5 mL	5 mL	230841	06/19/14 12:43	TLP	TAL DEN
Total/NA	Prep	Distill/CN			50 mL	50 mL	189350	06/23/14 14:20	MDL	TAL BUF
Total/NA	Analysis	335.4		1	50 mL	50 mL	189566	06/24/14 11:03	JTS	TAL BUF
Total/NA	Analysis	350.1		20	10 mL	10 mL	232380	06/27/14 15:13	AFH	TAL DEN
Total/NA	Prep	351.2			25 mL	25 mL	231803	06/24/14 22:15	MW1	TAL DEN
Total/NA	Analysis	351.2		5	25 mL	25 mL	232004	06/25/14 21:58	MW1	TAL DEN
Total/NA	Analysis	410.4		10	2 mL	2 mL	231699	06/24/14 10:15	CCJ	TAL DEN
Total/NA	Analysis	SM 2320B		1			231876	06/24/14 17:41	AFH	TAL DEN
Total/NA	Analysis	SM 2510B		1		25 mL	230899	06/18/14 17:42	MRB	TAL DEN
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	231133	06/19/14 15:54	CMS	TAL DEN
Total/NA	Analysis	SM 2540D		1	50 mL	250 mL	231392	06/21/14 10:40	MW1	TAL DEN
Total/NA	Analysis	SM 4500 H+ B		1		1 mL	230908	06/18/14 18:55	MRB	TAL DEN
Total/NA	Analysis	SM 5310B		1.92			231433	06/20/14 18:50	CCJ	TAL DEN
Total/NA	Analysis	SM5210B		5		300 mL	230791	06/18/14 13:26	AFH	TAL DEN

Client Sample ID: LCS12
Date Collected: 06/17/14 12:10
Date Received: 06/18/14 09:40

Lab Sample ID: 280-56768-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	20 mL	20 mL	231811	06/25/14 13:53	TAW	TAL DEN
Total/NA	Prep	8011			35.1 mL	35 mL	231909	06/25/14 17:00	MPS	TAL DEN
Total/NA	Analysis	8011		1	35.1 mL	35 mL	231912	06/26/14 02:55	MPS	TAL DEN
Total Recoverable	Prep	200.7			50 mL	50 mL	231132	06/20/14 07:30	SEJ	TAL DEN
Total Recoverable	Analysis	200.7 Rev 4.4		1	50 mL	50 mL	232653	06/30/14 20:51	SJS	TAL DEN
Total Recoverable	Prep	200.8			50 mL	50 mL	230942	06/19/14 13:00	WAW	TAL DEN
Total Recoverable	Analysis	200.8		1	50 mL	50 mL	232080	06/26/14 01:42	TEL	TAL DEN
Total/NA	Prep	245.1			30 mL	30 mL	231015	06/19/14 12:00	JM	TAL DEN
Total/NA	Analysis	245.1		1	30 mL	30 mL	231297	06/19/14 16:40	JM	TAL DEN

TestAmerica Denver

Lab Chronicle

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS12

Lab Sample ID: 280-56768-2

Date Collected: 06/17/14 12:10

Matrix: Water

Date Received: 06/18/14 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1664A			1000 mL	1000 mL	191130	07/03/14 01:11	LAW	TAL BUF
Total/NA	Analysis	1664A		1	1000 mL	1000 mL	191131	07/03/14 01:27	LAW	TAL BUF
Total/NA	Analysis	300.0		2	5 mL	5 mL	230840	06/18/14 22:46	TLP	TAL DEN
Total/NA	Analysis	300.0		2	5 mL	5 mL	230841	06/18/14 22:46	TLP	TAL DEN
Total/NA	Analysis	300.0		50	5 mL	5 mL	230841	06/19/14 13:02	TLP	TAL DEN
Total/NA	Prep	Distill/CN			50 mL	50 mL	189350	06/23/14 14:20	MDL	TAL BUF
Total/NA	Analysis	335.4		1	50 mL	50 mL	189566	06/24/14 11:06	JTS	TAL BUF
Total/NA	Analysis	350.1		20	10 mL	10 mL	232380	06/27/14 15:15	AFH	TAL DEN
Total/NA	Prep	351.2			25 mL	25 mL	231803	06/24/14 22:15	MW1	TAL DEN
Total/NA	Analysis	351.2		5	25 mL	25 mL	232004	06/25/14 22:00	MW1	TAL DEN
Total/NA	Analysis	410.4		5	2 mL	2 mL	231217	06/20/14 08:46	CCJ	TAL DEN
Total/NA	Analysis	SM 2320B		1			231876	06/24/14 17:47	AFH	TAL DEN
Total/NA	Analysis	SM 2510B		1		25 mL	230899	06/18/14 17:42	MRB	TAL DEN
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	231133	06/19/14 15:54	CMS	TAL DEN
Total/NA	Analysis	SM 2540D		1	50 mL	250 mL	231392	06/21/14 10:40	MW1	TAL DEN
Total/NA	Analysis	SM 4500 H+ B		1		1 mL	230908	06/18/14 18:55	MRB	TAL DEN
Total/NA	Analysis	SM 5310B		3.57			231433	06/20/14 20:06	CCJ	TAL DEN
Total/NA	Analysis	SM5210B		5		300 mL	230791	06/18/14 16:21	AFH	TAL DEN

Client Sample ID: LCS10

Lab Sample ID: 280-56768-3

Date Collected: 06/17/14 12:35

Matrix: Water

Date Received: 06/18/14 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	4 mL	20 mL	232202	06/27/14 16:53	TAW	TAL DEN
Total/NA	Prep	8011			35.4 mL	35 mL	231909	06/25/14 17:00	MPS	TAL DEN
Total/NA	Analysis	8011		1	35.4 mL	35 mL	231912	06/26/14 03:14	MPS	TAL DEN
Total Recoverable	Prep	200.7			50 mL	50 mL	231132	06/20/14 07:30	SEJ	TAL DEN
Total Recoverable	Analysis	200.7 Rev 4.4		1	50 mL	50 mL	232653	06/30/14 20:54	SJS	TAL DEN
Total Recoverable	Prep	200.8			50 mL	50 mL	230942	06/19/14 13:00	WAW	TAL DEN
Total Recoverable	Analysis	200.8		1	50 mL	50 mL	232080	06/26/14 01:45	TEL	TAL DEN
Total/NA	Prep	245.1			30 mL	30 mL	231015	06/19/14 12:00	JM	TAL DEN
Total/NA	Analysis	245.1		1	30 mL	30 mL	231297	06/19/14 16:42	JM	TAL DEN
Total/NA	Prep	1664A			1010 mL	1000 mL	191130	07/03/14 01:11	LAW	TAL BUF
Total/NA	Analysis	1664A		1	1010 mL	1000 mL	191131	07/03/14 01:27	LAW	TAL BUF
Total/NA	Analysis	300.0		2	5 mL	5 mL	230840	06/18/14 23:06	TLP	TAL DEN
Total/NA	Analysis	300.0		2	5 mL	5 mL	230841	06/18/14 23:06	TLP	TAL DEN
Total/NA	Analysis	300.0		100	5 mL	5 mL	230841	06/19/14 13:22	TLP	TAL DEN
Total/NA	Prep	Distill/CN			50 mL	50 mL	189350	06/23/14 14:20	MDL	TAL BUF
Total/NA	Analysis	335.4		1	50 mL	50 mL	189566	06/24/14 11:08	JTS	TAL BUF
Total/NA	Analysis	350.1		100	10 mL	10 mL	232380	06/27/14 15:17	AFH	TAL DEN
Total/NA	Prep	351.2			5 mL	25 mL	231803	06/24/14 22:15	MW1	TAL DEN

TestAmerica Denver

Lab Chronicle

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS10

Lab Sample ID: 280-56768-3

Date Collected: 06/17/14 12:35

Matrix: Water

Date Received: 06/18/14 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	351.2		5	5 mL	25 mL	232004	06/25/14 22:05	MW1	TAL DEN
Total/NA	Analysis	410.4		5	2 mL	2 mL	231217	06/20/14 08:46	CCJ	TAL DEN
Total/NA	Analysis	SM 2320B		1			231876	06/24/14 17:55	AFH	TAL DEN
Total/NA	Analysis	SM 2510B		1		25 mL	230899	06/18/14 17:42	MRB	TAL DEN
Total/NA	Analysis	SM 2540C		1	25 mL	100 mL	231133	06/19/14 15:54	CMS	TAL DEN
Total/NA	Analysis	SM 2540D		1	100 mL	250 mL	231392	06/21/14 10:40	MW1	TAL DEN
Total/NA	Analysis	SM 4500 H+ B		1		1 mL	230908	06/18/14 18:55	MRB	TAL DEN
Total/NA	Analysis	SM 5310B		5			231433	06/20/14 20:37	CCJ	TAL DEN
Total/NA	Analysis	SM5210B		5		300 mL	230791	06/18/14 16:21	AFH	TAL DEN

Client Sample ID: LCS08

Lab Sample ID: 280-56768-4

Date Collected: 06/17/14 13:10

Matrix: Water

Date Received: 06/18/14 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	20 mL	20 mL	231811	06/25/14 14:36	TAW	TAL DEN
Total/NA	Prep	8011			35.2 mL	35 mL	231909	06/25/14 17:00	MPS	TAL DEN
Total/NA	Analysis	8011		1	35.2 mL	35 mL	231912	06/26/14 03:32	MPS	TAL DEN
Total Recoverable	Prep	200.7			50 mL	50 mL	231132	06/20/14 07:30	SEJ	TAL DEN
Total Recoverable	Analysis	200.7 Rev 4.4		1	50 mL	50 mL	232653	06/30/14 20:57	SJS	TAL DEN
Total Recoverable	Prep	200.8			50 mL	50 mL	230942	06/19/14 13:00	WAW	TAL DEN
Total Recoverable	Analysis	200.8		1	50 mL	50 mL	232080	06/26/14 01:54	TEL	TAL DEN
Total/NA	Prep	245.1			30 mL	30 mL	231015	06/19/14 12:00	JM	TAL DEN
Total/NA	Analysis	245.1		1	30 mL	30 mL	231297	06/19/14 16:44	JM	TAL DEN
Total/NA	Prep	1664A			1010 mL	1000 mL	191130	07/03/14 01:11	LAW	TAL BUF
Total/NA	Analysis	1664A		1	1010 mL	1000 mL	191131	07/03/14 01:27	LAW	TAL BUF
Total/NA	Analysis	300.0		5	5 mL	5 mL	230840	06/18/14 23:26	TLP	TAL DEN
Total/NA	Analysis	300.0		5	5 mL	5 mL	230841	06/18/14 23:26	TLP	TAL DEN
Total/NA	Analysis	300.0		100	5 mL	5 mL	230841	06/19/14 13:42	TLP	TAL DEN
Total/NA	Prep	Distill/CN			50 mL	50 mL	189350	06/23/14 14:20	MDL	TAL BUF
Total/NA	Analysis	335.4		1	50 mL	50 mL	189566	06/24/14 11:09	JTS	TAL BUF
Total/NA	Analysis	350.1		100	10 mL	10 mL	232380	06/27/14 15:19	AFH	TAL DEN
Total/NA	Prep	351.2			5 mL	25 mL	231803	06/24/14 22:15	MW1	TAL DEN
Total/NA	Analysis	351.2		10	5 mL	25 mL	232004	06/25/14 22:06	MW1	TAL DEN
Total/NA	Analysis	410.4		10	2 mL	2 mL	231217	06/20/14 08:46	CCJ	TAL DEN
Total/NA	Analysis	SM 2320B		1			231876	06/24/14 18:03	AFH	TAL DEN
Total/NA	Analysis	SM 2510B		1		25 mL	230899	06/18/14 17:42	MRB	TAL DEN
Total/NA	Analysis	SM 2540C		1	10 mL	100 mL	231133	06/19/14 15:54	CMS	TAL DEN
Total/NA	Analysis	SM 2540D		1	100 mL	250 mL	231392	06/21/14 10:40	MW1	TAL DEN
Total/NA	Analysis	SM 4500 H+ B		1		1 mL	230908	06/18/14 18:55	MRB	TAL DEN
Total/NA	Analysis	SM 5310B		9			231839	06/24/14 22:07	CCJ	TAL DEN

TestAmerica Denver

Lab Chronicle

Client: Waste Management
Project/Site: 856|EAST OAK RDF

TestAmerica Job ID: 280-56768-1

Client Sample ID: LCS08

Lab Sample ID: 280-56768-4

Date Collected: 06/17/14 13:10

Matrix: Water

Date Received: 06/18/14 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM5210B		10		300 mL	230791	06/18/14 16:21	AFH	TAL DEN

Client Sample ID: LCS07

Lab Sample ID: 280-56768-5

Date Collected: 06/17/14 13:39

Matrix: Water

Date Received: 06/18/14 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	20 mL	231811	06/25/14 14:57	TAW	TAL DEN
Total/NA	Prep	8011			35.1 mL	35 mL	231909	06/25/14 17:00	MPS	TAL DEN
Total/NA	Analysis	8011		1	35.1 mL	35 mL	231912	06/26/14 03:51	MPS	TAL DEN
Total Recoverable	Prep	200.7			50 mL	50 mL	231132	06/20/14 07:30	SEJ	TAL DEN
Total Recoverable	Analysis	200.7 Rev 4.4		1	50 mL	50 mL	232653	06/30/14 21:00	SJS	TAL DEN
Total Recoverable	Prep	200.8			50 mL	50 mL	230942	06/19/14 13:00	WAW	TAL DEN
Total Recoverable	Analysis	200.8		1	50 mL	50 mL	232080	06/26/14 01:58	TEL	TAL DEN
Total/NA	Prep	245.1			30 mL	30 mL	231015	06/19/14 12:00	JM	TAL DEN
Total/NA	Analysis	245.1		1	30 mL	30 mL	231297	06/19/14 16:46	JM	TAL DEN
Total/NA	Prep	1664A			1010 mL	1000 mL	191130	07/03/14 01:11	LAW	TAL BUF
Total/NA	Analysis	1664A		1	1010 mL	1000 mL	191131	07/03/14 01:27	LAW	TAL BUF
Total/NA	Analysis	300.0		5	5 mL	5 mL	230840	06/18/14 23:46	TLP	TAL DEN
Total/NA	Analysis	300.0		5	5 mL	5 mL	230841	06/18/14 23:46	TLP	TAL DEN
Total/NA	Analysis	300.0		100	5 mL	5 mL	230841	06/19/14 14:02	TLP	TAL DEN
Total/NA	Prep	Distill/CN			50 mL	50 mL	189771	06/25/14 07:20	LAW	TAL BUF
Total/NA	Analysis	335.4		1	50 mL	50 mL	189803	06/25/14 13:06	JTS	TAL BUF
Total/NA	Analysis	350.1		100	10 mL	10 mL	232380	06/27/14 15:21	AFH	TAL DEN
Total/NA	Prep	351.2			5 mL	25 mL	231803	06/24/14 22:15	MW1	TAL DEN
Total/NA	Analysis	351.2		10	5 mL	25 mL	232004	06/25/14 22:10	MW1	TAL DEN
Total/NA	Analysis	410.4		20	2 mL	2 mL	231217	06/20/14 08:46	CCJ	TAL DEN
Total/NA	Analysis	SM 2320B		1			231876	06/24/14 18:11	AFH	TAL DEN
Total/NA	Analysis	SM 2510B		1		25 mL	230899	06/18/14 17:42	MRB	TAL DEN
Total/NA	Analysis	SM 2540C		1	10 mL	100 mL	231133	06/19/14 15:54	CMS	TAL DEN
Total/NA	Analysis	SM 2540D		1	250 mL	250 mL	231392	06/21/14 10:40	MW1	TAL DEN
Total/NA	Analysis	SM 4500 H+ B		1		1 mL	230908	06/18/14 18:55	MRB	TAL DEN
Total/NA	Analysis	SM 5310B		10			231839	06/24/14 23:14	CCJ	TAL DEN
Total/NA	Analysis	SM5210B		10		300 mL	230791	06/18/14 16:21	AFH	TAL DEN

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Login Sample Receipt Checklist

Client: Waste Management

Job Number: 280-56768-1

Login Number: 56768

List Source: TestAmerica Denver

List Number: 1

Creator: Broander, Laura L

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

Login Sample Receipt Checklist

Client: Waste Management

Job Number: 280-56768-1

Login Number: 56768

List Source: TestAmerica Buffalo

List Number: 2

List Creation: 06/20/14 03:32 PM

Creator: Stau, Brandon M

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	True	

APPENDIX E-7
PIEZOMETER AS-BUILT SURVEYOR'S REPORT

Includes page E-7-1

LEMKE LAND SURVEYING, LLC

3226 Bart Conner Drive - Norman, OK 73072

Ph (405) 366-8541 FAX (405) 366-8540 E-mail Robbyj@lemke-ls.com

C.A. No. 6975

SOIL BORING AND PIEZOMETER AS-BUILT SURVEY EAST OAK LANDFILL OKLAHOMA CITY, OKLAHOMA Project No. 00071

NORTHING	EASTING	ELEVATION	LATTITUDE	LONGITUDE	DESCRIPTION
185227.18	2173691.64	1150.67	35°30'26.70302"	97°24'59.23862"	PWB-1 Top of Casing
185230.00	2173691.85	1147.32	35°30'26.73087"	97°24'59.23591"	PWB-1 Ground
185216.94	2174396.33	1149.75	35°30'26.55974"	97°24'50.71654"	PWB-2 Top of Casing
185219.66	2174396.40	1146.54	35°30'26.58664"	97°24'50.71550"	PWB-2 Ground
182576.93	2174547.08	1148.05	35°30'00.44142"	97°24'49.08614"	PWB-5 Top of Casing
182579.98	2174547.12	1145.02	35°30'00.46997"	97°24'48.75892"	PWB-5 Ground
182604.93	2175493.29	1146.96	35°30'00.66167"	97°24'37.64122"	PWB-7 Top of Casing
182607.70	2175493.12	1143.96	35°30'00.68906"	97°24'37.64102"	PWB-7 Ground
181840.89	2175050.92	1153.96	35°29'53.13196"	97°24'43.04693"	WB-8
181316.78	2174488.09	1164.09	35°29'47.98225"	97°24'49.89154"	PWB-9 Top of Casing
181319.48	2174487.93	1160.66	35°29'48.00896"	97°24'49.89327"	PWB-9 Ground
181316.29	2174821.88	1147.90	35°29'47.95745"	97°24'45.85510"	PWB-10 Top of Casing
181318.93	2174822.76	1144.74	35°29'47.98351"	97°24'45.84427"	PWB-10 Ground

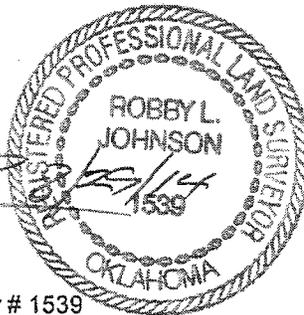
VERTICAL DATUM: NAVD88

HORIZONTAL DATUM: Oklahoma State Plane NAD 27

REFERENCE BENCHMARKS: Based on control monuments used for 4/6/1999 Aerial Photography

DATE OF SURVEY: July 2, 2014

CREW: Ricketts / Goad

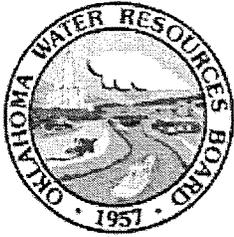


Robby L. Johnson

Oklahoma Registered Land Surveyor # 1539

APPENDIX E-8
DRILLER'S WELL INSTALLATION AND PLUGGING REPORTS

Includes pages E-8-1 through E-8-32



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 160403

	X				

Quarters NW-NE-NW Section 21 Township 12N Range 02W1

Latitude <u>35.50744</u>	Longitude <u>-97.41754</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/29/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Moslev Road Oklahoma City OK

Zip 73111

Finding Location 3201 Moslev Road. OKC

Well Name WB-1

Water Rights #:

TYPE OF WORK: Geotechnical Boring

USE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/29/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 41 ft.

Hole Diameter 3 inches to a depth of 49 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

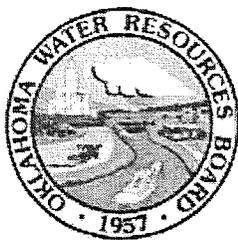
Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling 9 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	41	N
Sandstone	41	49	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 05/29/2014Total Depth of well being plugged 49 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 49 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 160404

	X				

Quarters NW-NE-NW Section 21 Township 12N Range 02W1

Latitude <u>35.50744</u>	Longitude <u>-97.41754</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/29/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road, OKC

Well Name PWB-1

Water Rights #:

TYPE OF WORK: Monitoring Well

USE OF WELL: Site Assessment

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/29/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 32 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

1) Well Casing Material PVC Casing Diameter 2 inches Casing From 0 ft to 21 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 10 slot (0.010 inch) From 21 ft to 31 ft.

FILTER PACK INFORMATION

Filter Pack Material: Sand 20-40 (medium)
 Filter Pack Interval: From 19 ft to 32

WELL SEAL INFORMATION

Type of Surface Seal Other Surface Seal Interval: From 0 ft to 2 ft
 Type of Annular Seal H. S. Bentonite Grout Annular Seal Interval: From 2 ft to 16 ft
 Filter Pack Seal Material Bentonite Pellets Filter Pack Seal Interval: From 16 ft to 19 ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling 9 ft Estimated yield of well gpm First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	32	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

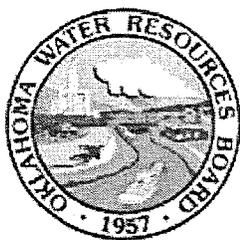
Has this well been disinfected after completion of work? No
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y
 Distance of Well is 301 - 1320 feet from possible source. Type of possible source: Landfill

PLUGGING INFORMATION

Date Well or Boring Was Plugged n/a Total Depth of well being plugged ft.
 Was the well contaminated or was it plugged as though it was contaminated? n/a
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? n/a
 Was the grout tremied? n/a
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with n/a Grouted from ft. to ft.
 Grouted with Cement Grouted from ft. to ft.

Firm Name TERRACON, INC.-OKC D/PC No. DPC-0205
 Operator Name RUSSELL SMALLEY OP No. OP-0318
 Date 06/18/2014

Comments: Surface seal = concrete.



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
 3800 North Classen Boulevard
 Oklahoma City, OK 73118
 Telephone (405) 530-8800

Legal Location
 North

WELL ID NUMBER: 160405

			X		

«———— One Mile —————»

Each square is 10-acres

Quarters NW-NW-NE Section 21 Township 12N Range 02W1

Latitude 35.50739

Longitude -97.41517

Date collected (latitude and longitude), if different from date the well was drilled:
05/30/2014

Method latitude and longitude was collected: GPS - uncorrected data

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road, OKC

Well Name WB-2

Water Rights #:

TYPE OF WORK: Geotechnical Boring

USE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/30/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 40 ft.

Hole Diameter 3 inches to a depth of 50 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

E-8-5

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/a Surface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/a Annular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/a Filter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling 7 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	40	N
Sandstone	40	50	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/a Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a Distance of Well is n/a from possible source. Type of possible source: n/a **PLUGGING INFORMATION**Date Well or Boring Was Plugged 05/30/2014 Total Depth of well being plugged 50 ft.Was the well contaminated or was it plugged as though it was contaminated? No If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? No Was the grout tremied? Yes Backfilled with n/a Backfilled from ft. to ft.Grouted with H. S. Bentonite Grout Grouted from 0 ft. to 50 ft.Grouted with Cement Grouted from ft. to ft.Firm Name TERRACON, INC.-OKC D/PC No. DPC-0205 Operator Name RUSSELL SMALLEY OP No. OP-0318 Date 06/18/2014 Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 160406

			X						

Quarters NW-NW-NE Section 21 Township 12N Range 02W1

Latitude <u>35.50739</u>	Longitude <u>-97.41517</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/30/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road OKC

Well Name PWB-2

Water Rights #:

TYPE OF WORK: Monitoring Well

USE OF WELL: Site Assessment

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/30/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 37 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

1) Well Casing Material PVC Casing Diameter 2 inches Casing From 0 ft to 26 ft

SCREEN OR PERFORATION INFORMATION

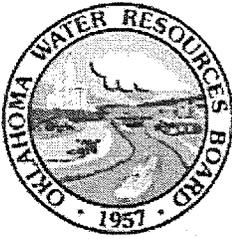
Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 10 slot (0.010 inch) From 26 ft to 36 ft.

FILTER PACK INFORMATIONFilter Pack Material: Sand 20-40 (medium)Filter Pack Interval: From 20 ft to 37**WELL SEAL INFORMATION**Type of Surface Seal OtherSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal H. S. Bentonite GroutAnnular Seal Interval: From 2 ft to 17 ftFilter Pack Seal Material Bentonite Granules/ChipsFilter Pack Seal Interval: From 17 ft to 20 ftTYPE OF COMPLETION: Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling 7 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	37	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? NoAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 301 - 1320 feet from possible source. Type of possible source: Landfill**PLUGGING INFORMATION**Date Well or Boring Was Plugged 05/30/2014Total Depth of well being plugged 50 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 50 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014

Comments: Surface seal = concrete.



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
 3800 North Classen Boulevard
 Oklahoma City, OK 73118
 Telephone (405) 530-8800

Legal Location
 North

		X			

«———— One Mile —————»
 Each square is 10-acres

WELL ID NUMBER: 160407

Quarters NE-NE-NW Section 21 Township 12N Range 02W1

Latitude <u>35.50661</u>	Longitude <u>-97.41706</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/31/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road. OKC

Well Name WB-3

Water Rights #:

TYPE OF WORK: Geotechnical Boring

USE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/31/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 40 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

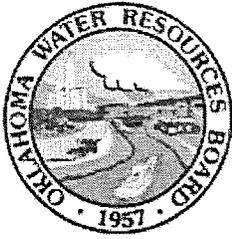
Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	40	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 05/31/2014Total Depth of well being plugged 40 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 40 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 160408

		X			

Quarters NE-NE-NW Section 21 Township 12N Range 02W1

Latitude <u>35.50615</u>	Longitude <u>-97.41598</u>
Date collected (latitude and longitude), if different from date the well was drilled: <u>05/28/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road, OKC

Well Name WB-4

Water Rights #: _____

TYPE OF WORK: Geotechnical Boring

USE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 05/28/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 39 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	39	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged 05/28/2014

Total Depth of well being plugged 39 ft.

Was the well contaminated or was it plugged as though it was contaminated? No

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? No

Was the grout tremied? Yes

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with H. S. Bentonite Grout

Grouted from 0 ft. to 39 ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name TERRACON, INC.-OKC

D/PC No. DPC-0205

Operator Name RUSSELL SMALLEY

OP No. OP-0318

Date 06/18/2014

Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 160541

			X				

Quarters NW-NW-SE Section 21 Township 12N Range 02WI

Latitude <u>35.50015</u>	Longitude <u>-97.4147</u>
Date collected(latitude and longitude), if different from date the well was drilled: <u>06/05/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road OKC

Well Name WB-5

Water Rights #: _____

TYPE OF WORK: Geotechnical Boring

USE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 06/05/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 22 ft.

Hole Diameter 3 inches to a depth of 32 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling 3 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22	N
Sandstone	22	32	N

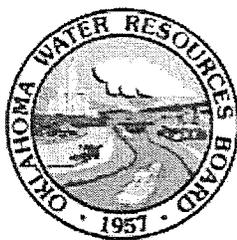
WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/05/2014Total Depth of well being plugged 32 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 32 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/23/2014Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: Sand 20-40 (medium)Filter Pack Interval: From 13 ft to 22**WELL SEAL INFORMATION**Type of Surface Seal OtherSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal H. S. Bentonite GroutAnnular Seal Interval: From 2 ft to 10 ftFilter Pack Seal Material Bentonite Granules/ChipsFilter Pack Seal Interval: From 10 ft to 13 ftTYPE OF COMPLETION: Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling 3 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? NoAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 101 - 300 feet from possible source. Type of possible source: Landfill**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/05/2014Total Depth of well being plugged 32 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 32 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/23/2014

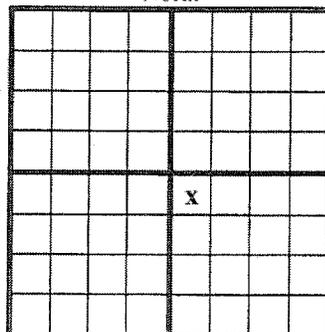
Comments: Surface seal = concrete.



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
 3800 North Classen Boulevard
 Oklahoma City, OK 73118
 Telephone (405) 530-8800

Legal Location
 North

WELL ID NUMBER: 160409

«———— One Mile —————»

Each square is 10-acres

Quarters NW-NW-SE Section 21 Township 12N Range 02W1Latitude 35.50014Longitude -97.41344Date collected (latitude and longitude), if different from date the well was drilled:
06/10/2014Method latitude and longitude was collected: GPS - uncorrected dataCounty OklahomaVariance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste ManagementPhone (405) 417-8124Address/City/State 3201 Moslev Road Oklahoma City OKZip 73111Finding Location 3201 Moslev Road, OKCWell Name WB-6Water Rights #: TYPE OF WORK: Geotechnical BoringUSE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 06/10/2014Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 22.5 ft.Hole Diameter 3 inches to a depth of 32 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

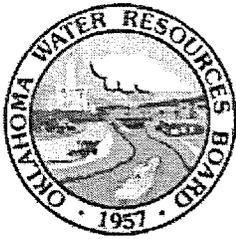
SCREEN OR PERFORATION INFORMATION

E-8-17

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22.5	N
Sandstone	22.5	32	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/10/2014Total Depth of well being plugged 32 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 32 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014Comments: n/a

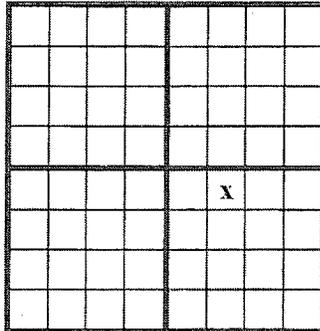


MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
 3800 North Classen Boulevard
 Oklahoma City, OK 73118
 Telephone (405) 530-8800

Legal Location
 North

WELL ID NUMBER: 160417



«———— One Mile —————»
 Each square is 10-acres

Quarters NE-NW-SE Section 21 Township 12N Range 02W1

Latitude <u>35.50018</u>	Longitude <u>-97.41156</u>
Date collected(latitude and longitude), if different from date the well was drilled: <u>06/04/2014</u>	
Method latitude and longitude was collected: <u>GPS - uncorrected data</u>	

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Moslev Road Oklahoma City OK

Zip 73111

Finding Location 3201 Moslev Road, OKC

Well Name WB-7

Water Rights #:

TYPE OF WORK: Geotechnical Boring

USE OF WELL: Soil Evaluation

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 06/04/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 6 inches to a depth of 22.5 ft.

Hole Diameter 3 inches to a depth of 32 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

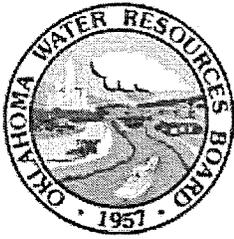
Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

SCREEN OR PERFORATION INFORMATION

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling 6 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22.5	N
Sandstone	22.5	32	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/04/2014Total Depth of well being plugged 32 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 32 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014Comments: n/a



MULTI-PURPOSE WELL COMPLETION & PLUGGING REPORT

Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Telephone (405) 530-8800

Legal Location
North

WELL ID NUMBER: 160418

			X		

Quarters NE-NW-SE Section 21 Township 12N Range 02WI

Latitude 35.50018 Longitude -97.41156

Date collected (latitude and longitude), if different from date the well was drilled:
06/04/2014

Method latitude and longitude was collected: GPS - uncorrected data

«———— One Mile —————»
Each square is 10-acres

County Oklahoma

Variance Request No. (if applicable) n/a

WELL OWNER - NAME AND ADDRESS

Well Owner Waste Management

Phone (405) 417-8124

Address/City/State 3201 Mosley Road Oklahoma City OK

Zip 73111

Finding Location 3201 Mosley Road, OKC

Well Name PWB-7

Water Rights #:

TYPE OF WORK: Monitoring Well

USE OF WELL: Site Assessment

NEW WELL CONSTRUCTION DATA

Date Well or Boring Was Completed 06/04/2014

Number of wells or borings represented by this log 1

* (Borings are within the same 10 acre-tract and with the same general depths and lithologies)

Hole Diameter 8 inches to a depth of 22 ft.

CASING INFORMATION *Note: If surface casing is used please indicate that on the appropriate well casing information line.

Surface Pipe Material: Surface Pipe Diameter inches Surface Pipe From ft to ft

1) Well Casing Material PVC Casing Diameter 2 inches Casing From 0 ft to 16 ft

SCREEN OR PERFORATION INFORMATION

Type of Screen: PVC Type of Slots or Openings: Factory Slotted - 10 slot (0.010 inch) From 16 ft to 21 ft.

FILTER PACK INFORMATIONFilter Pack Material: Sand 20-40 (medium)Filter Pack Interval: From 14 ft to 22**WELL SEAL INFORMATION**Type of Surface Seal OtherSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal H. S. Bentonite GroutAnnular Seal Interval: From 2 ft to 11 ftFilter Pack Seal Material Bentonite PelletsFilter Pack Seal Interval: From 11 ft to 14 ftTYPE OF COMPLETION: Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling 6 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? NoAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 301 - 1320 feet from possible source. Type of possible source: Landfill**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/04/2014Total Depth of well being plugged 32 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 32 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014

Comments: Surface seal = concrete.

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	32	N
Sandstone	32	100	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/11/2014Total Depth of well being plugged 100 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 100 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: **WELL SEAL INFORMATION**Type of Surface Seal n/aSurface Seal Interval: From n/a ft to n/a ftType of Annular Seal n/aAnnular Seal Interval: From n/a ft to n/a ftFilter Pack Seal Material n/aFilter Pack Seal Interval: From n/a ft to n/a ftTYPE OF COMPLETION: **HYDROLOGIC INFORMATION**Depth to water at time of drilling 16 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	36	N
Sandstone	36	50	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? n/aAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/aDistance of Well is n/a from possible source. Type of possible source: n/a**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/03/2014Total Depth of well being plugged 50 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 50 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014Comments: n/a

FILTER PACK INFORMATIONFilter Pack Material: Sand 20-40 (medium)Filter Pack Interval: From 26 ft to 35**WELL SEAL INFORMATION**Type of Surface Seal OtherSurface Seal Interval: From 0 ft to 2 ftType of Annular Seal H. S. Bentonite GroutAnnular Seal Interval: From 2 ft to 23 ftFilter Pack Seal Material Bentonite Granules/ChipsFilter Pack Seal Interval: From 23 ft to 26 ft**TYPE OF COMPLETION:** Above Ground**HYDROLOGIC INFORMATION**Depth to water at time of drilling 16 ftEstimated yield of well gpmFirst water zone ft**LITHOLOGY DESCRIPTION**

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	35	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTIONHas this well been disinfected after completion of work? NoAre there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? YDistance of Well is 301 - 1320 feet from possible source. Type of possible source: Landfill**PLUGGING INFORMATION**Date Well or Boring Was Plugged 06/03/2014Total Depth of well being plugged 50 ft.Was the well contaminated or was it plugged as though it was contaminated? NoIf the well or boring was plugged as if it was contaminated, was the casing removed or perforated? NoWas the grout tremied? YesBackfilled with n/aBackfilled from ft. to ft.Grouted with H. S. Bentonite GroutGrouted from 0 ft. to 50 ft.Grouted with CementGrouted from ft. to ft.Firm Name TERRACON, INC.-OKCD/PC No. DPC-0205Operator Name RUSSELL SMALLEYOP No. OP-0318Date 06/18/2014

Comments: Surface seal = concrete.

FILTER PACK INFORMATION

Filter Pack Material:

WELL SEAL INFORMATION

Type of Surface Seal n/a

Surface Seal Interval: From n/a ft to n/a ft

Type of Annular Seal n/a

Annular Seal Interval: From n/a ft to n/a ft

Filter Pack Seal Material n/a

Filter Pack Seal Interval: From n/a ft to n/a ft

TYPE OF COMPLETION:

HYDROLOGIC INFORMATION

Depth to water at time of drilling 4 ft

Estimated yield of well gpm

First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22	N
Sandstone	22	35	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? n/a

Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? n/a

Distance of Well is n/a from possible source. Type of possible source: n/a

PLUGGING INFORMATION

Date Well or Boring Was Plugged 06/04/2014

Total Depth of well being plugged 35 ft.

Was the well contaminated or was it plugged as though it was contaminated? No

If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? No

Was the grout tremied? Yes

Backfilled with n/a

Backfilled from ft. to ft.

Grouted with H. S. Bentonite Grout

Grouted from 0 ft. to 35 ft.

Grouted with Cement

Grouted from ft. to ft.

Firm Name TERRACON, INC.-OKC

D/PC No. DPC-0205

Operator Name RUSSELL SMALLEY

OP No. OP-0318

Date 06/18/2014

Comments: n/a

FILTER PACK INFORMATION

Filter Pack Material: Sand 20-40 (medium)
 Filter Pack Interval: From 14 ft to 22

WELL SEAL INFORMATION

Type of Surface Seal Other Surface Seal Interval: From 0 ft to 2 ft
 Type of Annular Seal H. S. Bentonite Grout Annular Seal Interval: From 2 ft to 11 ft
 Filter Pack Seal Material Bentonite Granules/Chips Filter Pack Seal Interval: From 11 ft to 14 ft

TYPE OF COMPLETION: Above Ground

HYDROLOGIC INFORMATION

Depth to water at time of drilling 4 ft Estimated yield of well gpm First water zone ft

LITHOLOGY DESCRIPTION

MATERIAL	ENCOUNTERED		SATURATED
	FROM (ft.)	TO (ft.)	
Sand	0	22	N

WELL LOCATION TO POTENTIAL SOURCES OF POLLUTION

Has this well been disinfected after completion of work? No
 Are there any potential sources of pollution or wastewater lagoons within 300 ft. of the well? Y
 Distance of Well is 301 - 1320 feet from possible source. Type of possible source: Landfill

PLUGGING INFORMATION

Date Well or Boring Was Plugged 06/04/2014 Total Depth of well being plugged 35 ft.
 Was the well contaminated or was it plugged as though it was contaminated? No
 If the well or boring was plugged as if it was contaminated, was the casing removed or perforated? No
 Was the grout tremied? Yes
 Backfilled with n/a Backfilled from ft. to ft.
 Grouted with H. S. Bentonite Grout Grouted from 0 ft. to 35 ft.
 Grouted with Cement Grouted from ft. to ft.

Firm Name TERRACON, INC.-OKC D/PC No. DPC-0205
 Operator Name RUSSELL SMALLEY OP No. OP-0318
 Date 06/18/2014

Comments: Surface seal = concrete.

APPENDIX E-9
DRILLING PLAN APPROVAL LETTER

Includes page E-9-1



SCOTT A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

MARY FALLIN
Governor

April 17, 2014

Mr. Guy Campbell
Waste Management of Oklahoma, Inc.
3201 Mosley Road
Oklahoma City, OK 73141

Re: Drilling Plan for a Proposed 47.5 Acre Lateral Expansion
East Oak R&D Facility (Permit No. 3555036)
Oklahoma County, Oklahoma

Dear Mr. Campbell:

The Oklahoma Department of Environmental Quality (DEQ) is in receipt of the Drilling Plan for a proposed 47.5 acre lateral expansion dated April 2, 2014, submitted by Weaver Boos Consultants on behalf of Waste Management of Oklahoma, Inc. The drilling plan will be incorporated into a Tier III Permit Modification to expand the landfill.

The Drilling Plan includes the completion of ten (10) new borings, six (6) of which will be advanced at least 10 feet below the top of the saturated zone and converted to piezometers. One (1) boring will extend 100 feet below ground surface. In addition, three (3) existing borings (GP-8R, TH-1-SD, and TH-2-SD) are incorporated into the drilling plan in accordance with OAC 252:515-7-4(b)(3)(D).

Dry methods of drilling, such as hollow stem auger or air rotary, shall be used. Wet methods may only be used when dry methods fail due to the formation encountered. As noted in the Plan, DEQ must be provided with written notice of intent to drill at least two weeks prior to initiating drilling.

The drilling plan complies with OAC 252:515-7-4. If you have questions, please contact Rachel Hanigan at (405) 702 - 5196.

Sincerely,

Hillary Young, P.E.
Engineering Manager
Solid Waste Permitting

HY/rh

cc: Jonathan V. Queen, P.E., Weaver Boos Consultants LLC Southwest



**EAST OAK RECYCLING AND DISPOSAL FACILITY
OKLAHOMA COUNTY, OKLAHOMA
ODEQ PERMIT NO. 3555036**

APPENDIX F

GROUNDWATER SAMPLING AND ANALYSIS PLAN

Prepared for

Waste Management of Oklahoma

June 2015

~~Revised January 2016~~

Revised May 2016



Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 ♦ Mansfield, Texas 76063 ♦ 817-563-1144

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ATTACHMENTS

- F-A Supplemental Groundwater Monitoring Program for Effectiveness of Remedy in the Garber-Wellington
- F-B Statistical Methodologies [Gibbons Report] (*Included by Reference*)

1 INTRODUCTION

The following sampling and analysis plan covers the procedures for collecting representative samples from East Oak Recycling and Disposal Facility (RDF) groundwater monitoring wells and the laboratory requirements for obtaining valid, defensible data. The plan is a general requirement for groundwater monitoring sampling and analysis based primarily on the federal requirements in 40 CFR Part 258, current U.S. Environmental Protection Agency (USEPA) guidance documents, and Oklahoma Administrative Code (OAC) 252:515 Municipal Solid Waste Landfill (MSWLF) Regulations, Subchapter 9 – Groundwater Monitoring/Corrective Action.

Attachment FA – Supplemental Groundwater Monitoring Program for the Effectiveness of Remedy in the Garber-Wellington is included as a supplement to the East Oak RDF monitoring program to provide for continued monitoring as described therein. The methodologies described within Appendix F are applicable unless specifically superseded by requirements of Attachment FA.

2 GROUNDWATER SAMPLING PROCEDURES

Proper sampling procedures are the most important and fundamental aspect in an effective monitoring program. All environmental quality sampling at the site will be accomplished by personnel trained in proper sampling protocol.

This section summarizes specific tasks involved in sampling of the groundwater monitoring system and presents the proposed groundwater monitoring parameters and sampling schedule for the East Oak RDF.

2.1 Well Inspection

Prior to performing any purging or sampling each monitoring well will be inspected to assess its integrity. The condition of each well will be evaluated for any physical damage that may have been caused by the operation of site equipment or other vehicular traffic. The security of each well will be assessed in order to confirm that no outside source constituents have been introduced to the well. All inspection information, as well as the date and time, general weather conditions, and sampling personnel identification, will be documented on the Field Information Form (Figure 1) or equivalent form and a copy will be maintained in the site operating record.

2.2 Equipment Decontamination

Any non-dedicated equipment used for purging and the collection of groundwater samples will be decontaminated prior to use at each well location. An appropriate decontamination procedure will be sufficient to avoid (and prevent) the introduction of any contaminant into a well and to not allow any contaminant to be transported between wells that will create false sample results or otherwise harm the environment.

2.3 Water Level Measurements

Prior to groundwater purging and sampling, water level measurements will be taken at each well location utilizing a portable water level indicator, fiberglass tape, or other suitable measuring device. Water level measurements will be collected over a period of time short enough to avoid temporal variations in water levels. Water levels will be measured from a permanent, clearly marked location at the top of the well riser or dedicated sampling device cap. Measurements will be recorded to the nearest hundredth of a foot.

If site wells are known to be contaminated, water level measurements will be proceed from wells least likely to be contaminated to those wells known to be contaminated. To further prevent cross-contamination between sampling points, the measuring instrument will be properly decontaminated between well locations.

The locations of the existing groundwater monitoring wells are presented in Figure 3. A summary of the monitoring well construction details are presented in Figure 4.

2.4 Purging/Bailing

Prior to sampling at each well location, water will be evacuated until a minimum of three well volumes has been purged, until the well has been pumped or bailed dry, or until an appropriate amount of water has been purged to achieve the collection of a representative sample. Groundwater will be considered representative once pH, specific conductance and temperature have stabilized. If low flow/minimal drawdown purging has been approved, the procedures described in EPA/540/S-95/504 will be followed. This will ensure that samples are drawn from the water bearing unit and not from stagnant water left in the well screen between sampling events. If the well contains less than three well volumes, the well will be pumped or bailed dry, allowed to recover and immediately sampled. If sufficient water is not available for sampling within 24 hours of purging for slowly recovering wells, the well will be considered dry and the well will not be sampled during that sampling event. As discussed previously a dedicated sampling device or a properly decontaminated (or disposable) bailer will be utilized for this task. Purge water will be disposed of properly.

2.5 Sample Collection

Each monitoring well in the groundwater monitoring system will have a dedicated sampling device (e.g., a Well Wizard™ bladder pump or equivalent or a Teflon® or stainless steel bailer). If a non-dedicated sampling device is used it will be properly decontaminated prior to its use. For bladder pumps, flow rates when sampling will not exceed the EPA recommended 0.1 liters per minute for collection of volatile organic compounds (VOCs). The sample collection rate is to be maintained between 0.1 and 0.5 liters per minute for all other organic and inorganic analytes. If dedicated sampling devices are used it will not be necessary to proceed from wells with higher water elevations to those with lower elevations as determined from the prior sampling event. However, if contamination is known to exist at certain locations, non-contaminated wells will be sampled prior to those wells which are known to be contaminated.

Sampling for analysis of VOCs involves extra care. Water should flow slowly from the sampling device into each sample vial until a positive meniscus is formed over the top of the container. After the cap has been placed on the vial and tightened, the vial should be checked for air bubbles by turning it upside down and tapping with your finger. If an air bubble is seen rising to the bottom of the vial, the sample should be discarded and the process outlined above should be repeated. If no air bubbles are seen in each vial, the sample is accepted.

2.6 Sample Preservation and Filtering

It is recommended that an in-line flow system be used. When using an in-line flow system a minimum of three pump cycles of water must be allowed to pass through the flow-through cell before obtaining a sample. All equipment must be properly decontaminated prior to use at each well. As required by 252:515-9-3(c), samples will not be filtered prior to laboratory analysis. The material and use of prefiltration bottles must be noted on the Field Information Form (Figure 1) and Chain of Custody Record (Figure 2).

The appropriate sample container and preservative requirement for each analyte is listed on Table 1. Pre-labeled containers may be supplied by the laboratory or sampling personnel for each sampling event. The appropriate preservatives will be added to each sample container based on the analytical method.

2.7 Sample Shipment

After collection and sample preservation, the sample bottles will be wiped clean, checked for proper labeling and placed into an insulated, plastic-shelled cooler or other suitable shipping container with frozen ice packs or ice. The samples will be maintained at about 4°C. The temperature of the samples will be recorded when the shipping container arrives at the analytical laboratory to assure that the appropriate sample temperature was maintained during shipment. All samples included in the cooler will be packed in such a manner to minimize the potential for container breakage. VOA vials and TOX bottles (if any) will never be placed directly on the ice packs. A Field Information Form (Figure 1) and Chain of Custody Record (Figure 2) will be sealed in a water resistant bag and placed with the appropriate sample bottle set. Actual forms used may vary in format, but the information indicated is considered typical. The coolers will then be properly sealed with a tamper proof custody seal and sent to the designated analytical laboratory. All shipments will be scheduled for next day delivery. Upon arrival of the shipping container at the laboratory, the cooler will be opened and the Chain of Custody forms will be signed and time/dated by the person taking custody of the samples. If the cooler is shipped, this person will affix the bill of lading or receipt to the Chain of Custody form.

2.7.1 Chain of Custody

Appropriate Chain of Custody procedures for samples will be implemented to ensure sample integrity, and to provide technically and legally defensible groundwater quality data. At the time each sample is collected, the Field Information Form (Figure 1) and Chain of Custody Record (Figure 2) will be completed and placed in the shipping container. The Field Information Form will include general sampling event information including location, time, weather conditions, sampler identification, well integrity, any numerical field data values and well purging procedures.

3 GROUNDWATER ANALYSIS PROCEDURES

3.1 Laboratory Analytical Methods/Procedures

Table 2 presents the methodologies used by Waste Management's (WM) designated laboratory for each parameter or group of parameters. All methods are USEPA approved.

3.2 Quality Assurance/Quality Control

In addition to strict chain of custody procedures, field blanks and trip blanks are used to assure the integrity of the sampling and shipping process. A record of laboratory sample receipt, storage and analysis procedures will be kept for each sample received. A summary of this record will be part of the laboratory analysis report. Any internal quality control problem associated with the submitted sample/analyte will be identified on the data qualifier report included with each sample's analytical client report.

Field Sampling QA/QC

Field Procedures. As quality assurance procedures are an integral part of each segment of field sampling methodology, the quality assurance procedures associated with each step of the field sampling routine (e.g., proper well purging, field sampling and preservation methodologies) have been directly incorporated into each respective field sampling subsection of this document.

Field and Trip Blanks. Trip and field blanks will be utilized during each round of sampling at the site.

The *trip blank*, containing laboratory-grade distilled water, will be prepared by the laboratory and shipped with the empty sample bottles from the laboratory, will remain unopened and be packaged during the sampling process, and will be returned to the laboratory in the same manner as the site field-collected environmental samples. The trip blank will be provided by the analytical laboratory supplying the sample bottles and shipping containers. One trip blank will be taken and analyzed for volatile organic compounds (VOCs) only in each groundwater sampling event.

The field blank will be prepared in the field by pouring the supplied laboratory-grade distilled water into one of the clean sample containers opened in the field. The field blank will then be sealed and shipped in the same manner as the environmental samples. One field blank will be taken and analyzed for VOCs only in each groundwater sampling event.

Laboratory QA/QC

Analytical Blanks and Spikes. The selected laboratory will use method quality control procedures that are equivalent to those described in SW-846. Duplicate samples,

method blanks, instrument/reagent blanks, matrix spikes, blank/water reagent spikes and surrogate spikes are typical quality control checks performed throughout the analysis process at the analytical laboratory. With the exception of instrument/reagent blanks and surrogate spikes, these checks are performed at a frequency of 5% or 10% (i.e., 1 in 20 samples, 1 in 10 samples). Instrument/reagent blanks and surrogate spikes are performed on a daily or per sample (where required by method) frequency. Each of the above applied quality control checks will be compared against the acceptance criterion for each quality control check to ensure that analytical quality is maintained.

Instrument Calibration. Applicable instruments are calibrated using calibration standards and method specified calibration criteria. A solution containing various compounds of known concentrations is diluted and analyzed to establish calibration curves and performed daily or per the method to monitor the accuracy and precision of the instrument. Instrument calibration is verified by analyzing a solution containing a known concentration of the pure compound(s) of interest and comparing it against the calibration curve. This standard compound is taken from the same stock as that used to develop the calibration curve. Calibration verification is done at a 5% frequency, or as the method requires, to check the stability of the calibration curve as well as the accuracy and precision of the system or analyst.

Instrument Maintenance. Routine maintenance is performed and documented for all major instruments. In addition, any service agreements for laboratory equipment are renewed annually. The EPA's "Good Automated Laboratory Practices" (GALPs) are followed in the laboratory.

4 ESTABLISHMENT OF BACKGROUND GROUNDWATER QUALITY

Background groundwater quality will be established for all upgradient and downgradient wells in the groundwater monitoring system on a quarterly basis for two full years (until eight quarterly samples have been collected) to establish background water quality, as required by OAC 252:515-9-31(c).

Constituents to be monitored for establishment of background are listed in Table 3. This background constituent list, as required by 252:515-9-31(d), consists of pH, chemical oxygen demand, specific conductivity, chloride, sulfate, calcium, magnesium, nitrates, sodium, carbonates, potassium, and those constituents listed in Appendix A of OAC 252:515.

5 DETECTION MONITORING

The Detection Monitoring Program procedure for the site is summarized and discussed in the following subsections.

5.1 Groundwater Detection Monitoring Parameters

Parameters that will be monitored during detection monitoring are listed in OAC 252:515-9-31(d), unless alternative constituents are approved in accordance with OAC 252:515-9-72. The site-specific detection monitoring parameters list has been included as Table 4.

In accordance with OAC 252:515-9-72(c), "The DEQ may approve the use of an alternative list of indicator constituents, in lieu of some or all of the heavy metal constituents of the approved groundwater monitoring program, if the alternative constituents provide a reliable indication of inorganic releases from the disposal facility to the groundwater," a Groundwater Detection Monitoring Optimization Evaluation was conducted by WM and approved by ODEQ in December 2008. The Parameter Optimization Evaluation modified the list of constituents for statistical analysis to only those that are inherent to waste streams and that will facilitate a statistical program that will be more protective of human health and the environment by lowering the false positive rate and raising the statistical power to more accurately identify real releases from the landfill to the environment.

Therefore, the indicator and general water quality parameters have been removed from Table 4, Detection Monitoring Parameter List and are listed separately in Table 5, *Water Quality Parameters List*. Per ODEQ request, the water quality parameters list will not be included in statistical analysis but instead be presented annually using Piper and Stiff plots. WM will also re-evaluate the leachate constituents on an annual basis to monitor any increases or additions to the constituent list.

5.2 Groundwater Detection Monitoring Frequency

After the establishment of background groundwater quality (Refer to Section 4), in accordance with 252:515-9-73, groundwater from each monitoring well shall be sampled and analyzed at least semi-annually during the active life of the facility and during the post-closure monitoring period. The ODEQ may, in the future, approve alternate sampling and analysis frequencies in the approved detection monitoring program. Alternative detection monitoring frequencies shall not be less than annual during the active life, but may be less than annual during the post-closure monitoring period.

5.3 Reporting Requirements

Within 60 days after sampling, a statistical analysis evaluation shall be performed on the groundwater monitoring results to determine whether there has been a statistically significant increase (SSI) over background values at each monitoring well and the

groundwater monitoring analytical report and the results of the statistical evaluation shall be submitted to the ODEQ in the format prescribed by ODEQ.

To determine if an SSI has occurred, first the groundwater quality of each chemical parameter or hazardous constituent at each monitoring well shall be compared to the background value of that constituent in the upgradient well (inter-well comparison), according to the specified statistical procedures and performance standards. If an SSI over background values in any parameter or constituent is evident, that is, if it has failed the inter-well comparison, then the groundwater quality of each parameter or constituent at each monitoring well shall be compared to the background value of that parameter or constituent in the same well (intra-well comparison), according to the specified statistical procedures and performance standards.

If there is an SSI over background for one or more of the constituents at any monitoring well, the owner/operator:

(1) must notify the ODEQ in writing within 14 days of the determination and place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels; and

(2) must establish an assessment monitoring program meeting the requirements of Part 9 of 252:515-9 within 90 days of the determination, and have the assessment monitoring program approved by the ODEQ; or

(3) may, during the 90-day development of an assessment monitoring program, demonstrate that a source other than the facility causes the contamination or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. A report documenting this demonstration shall be submitted to the ODEQ for approval.

If a successful demonstration is approved by the ODEQ, then the landfill may return to detection monitoring. If at the end of the 90-day period, a successful demonstration is not made, the assessment monitoring program must be initiated.

5.4 Statistical Method

Statistical analysis will be conducted in accordance with OAC 252:515-9. The most appropriate method will be selected for each individual parameter based on the analysis of the data. The statistical method has not been selected at this time and is dependent upon the evaluation of the analytical data selected to be representative of background groundwater quality. Additionally, the background groundwater quality may require the statistical method to include procedures to control or correct for seasonal and spatial variability, as well as temporal conditions in the data. An appropriate statistical methodology will be selected in accordance with ASTM D 6312-98, "Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs" (ASTM, 2005). The statistical evaluation methodology will be established such that the statistical method(s) chosen are technically sound and are the most appropriate method(s) to be protective of human health and the environment.

5.4.1 Volatile Organic Compounds

Practical quantitation limits (PQLs) assure that the quantitative value of the analyte is close to the measured value. Conversely, method detection limits (MDLs), indicate that the analyte is present in the sample with a specified degree of confidence. For analytes with estimated concentrations greater than the MDL but not the PQL, it can only be concluded that the true concentration is greater than zero; the actual concentration cannot be determined. Comparison of a detected concentration to any regulatory standard (such as a maximum contaminant level [MCL]), or any other concentration limit, is by definition not meaningful unless the concentration is greater than the PQL.

If a MSWLF facility actually produces a release to groundwater, multiple constituents contained in the leachate are typically associated with the source fluids and are subsequently detected by the groundwater monitoring program. A single constituent at very low concentration (i.e., below the PQL) typically is not the signature that is produced from an actual release.

VOCs represent very effective indicators of a release from a solid waste unit. Because these compounds are rarely detected in background groundwater samples, establishing monitor well-specific limits for VOCs is generally not an option. Therefore, detection decision rules based on laboratory-specific PQLs will be used.

5.4.2 Inorganic Parameters

The statistical analysis methodology for inorganic parameters with a detection frequency greater than 25% will be based on a combined Shewhart-cumulative sum (CUSUM) control chart that is capable of detecting both sudden and gradual changes in groundwater chemistry (Gibbons, 1994). Combined Shewhart-CUSUM control charts will be constructed for each well and parameter monitored to provide a statistical/visual tool for detecting trends and abrupt changes in inorganic groundwater chemistry. For inorganic parameters with a detection frequency less or equal to 25%, calculation of non-parametric limits will be conducted. Some facilities may require alternate methods (such as normal prediction limits) based on the number of statistical comparisons required for the site and the alternatives allowed to manage the site-wide false positive and false negative rates.

The combined Shewhart-CUSUM procedure requires a minimum of eight historical independent samples (i.e., background data) to provide a reliable estimate of the mean and standard deviation of each constituent in each well. The combined Shewhart-CUSUM control chart procedure assumes that the data are independent and normally distributed with a fixed mean and constant variance. Shewhart-CUSUM control charts are not recommended for data sets of less than 8 independent samples except as time-series plots and evaluation of trends. Once background data are obtained from each detection monitor well, subsequent sample results are statistically compared to the estimated control limit both in terms of their absolute magnitude and cumulative sum.

If all inorganic parameter data collected during the background period (minimum of 8 independent events) are not detected in concentrations greater than the respective PQLs, the PQL will be used as the non-parametric prediction limit. The collection of thirteen (13) samples in background for this detection frequency provides a 99% confidence non-parametric prediction limit with one re-sample. Note that 99%

confidence is equivalent to a 1% false positive rate and pertains to a single comparison (that is, well and constituent) and not the site-wide error rate (all wells and constituents), which is set to 5%. If the detection frequency is greater than zero but less than 25%, the non-parametric prediction limit is the largest of the 13 background samples (for 1 verification re-sample) or 8 background samples if a pass "1 of 2" verification re-sampling program is implemented.

5.5 Statistical Analysis

The statistical analysis program for inorganic parameters DUMPStat® will be based on combined Shewhart-CUSUM control charts or prediction limits at all compliance point wells. Future intra-well measurements that do not exceed the statistical limits and do not exhibit a significant trend will be combined with historical data to update these estimates every two years.

In selecting the statistical evaluation methodology using DUMPStat®, a screening procedure based on the data set and total number of statistical comparisons per event should be conducted for each monitoring event to allow for management of the site-wide false positive rate. Following selection of the monitoring points and parameters, a statistical power curve should be computed to allow the determination of a site-wide false positive rate. The EPA guidance document entitled "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance" (USEPA, 1992) recommends that the selected statistical method for multiple constituent comparisons provide a site-wide false positive rate of 5% or less while maintaining a statistical power (1 minus the false negative rate) from the EPA reference power curve (correlating to a statistical power of >50% for a 3-sigma release and >80% for a 4-sigma release). If this cannot be achieved through a parameter or monitoring point reduction, then options available within DUMPStat® can be used. Adjustments to the control chart factor (for intra-well control charts) and verification re-sampling options, or the use of normal prediction limits may be implemented to achieve the statistical standards recommended by USEPA (1992) and Robert Gibbons (1994). This concept is consistent with updated EPA guidance in the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009.

5.5.1 Detection Verification Procedure

Once groundwater analysis results have been collected, checked for QA/QC consistency and determined to be above the appropriate statistical level, the results must be verified in accordance with the objectives of 40 CFR Part 258.53. Verification re-sampling is an integral part of the statistical methodology described by EPA's Addendum to Interim Final Guidance Document. Without verification re-sampling, much larger statistical limits would be required to achieve site-wide false positive rates of 5% or less. Furthermore, the resulting false negative rate would be greatly increased. The following procedure will be performed for each compound determined to be initially above its statistical limit. Only compounds that initially exceed their statistical limit will be sampled for verification purposes. The use of "pass 1 of 1" or "pass 1 of 2" verification options will be evaluated on a per event basis based on the calculated site-wide false positive rate.

5.5.1.1 Volatile Organic Compounds

If one or more VOCs are detected above their statistical limit (i.e., PQL), up to two verification resamples will be scheduled no sooner than 30 days apart to provide sample independence. A statistically significant increase (SSI) will be recorded if any single VOC is verified in each of the scheduled re-sampling events in a concentration greater than the PQL.

5.5.1.2 Inorganic Constituents

If one or more of the inorganic parameters are detected above their statistical limit (i.e., Shewhart-CUSUM control chart computation value/prediction limit), up to two verification re-samples will be collected at the next sampling event with the re-sampling event scheduled no sooner than 30 days apart to provide sample independence. A SSI will be recorded if verification of one elevated parameter is confirmed in a concentration greater than the control/prediction limit for each of the discrete verification re-samples. If the re-sampling program confirms that the initial sample represented a laboratory or sampling-induced outlier, the verification sample will replace the original reported value to eliminate bias from the CUSUM calculation, which considers all data points collected at the site.

6 ASSESSMENT MONITORING

Assessment monitoring will be conducted if, during detection monitoring, an SSI over background is detected and verified for the constituents identified in Section 5.1, Groundwater Detection Monitoring Parameters, in accordance with ODEQ regulations. Upon commencement of assessment monitoring, a minimum of one groundwater sample will be collected from each downgradient well and a minimum of four independent samples from each well to establish background for any OAC 252:515 Appendix C constituents detected. In accordance with 252:515-9-94, the ODEQ may specify a subset of wells to be sampled and analyzed during assessment monitoring. This sampling (assessment monitoring) will occur within a period of 180 days from the date of notice to the ODEQ of the SSI identified during detection monitoring. Samples collected for assessment monitoring will be analyzed for the assessment constituents listed in Appendix C of OAC 252:515 and for the detection monitoring constituents identified in Table 4. For assessment monitoring, an abbreviated list of assessment constituents may be approved by the ODEQ in accordance with OAC 252:515-9-93.

If one or more assessment monitoring constituents are detected at statistically significant levels above the groundwater protection standard of OAC 252:515-9-96 in any sampling event, the owner/operator shall comply with all procedures listed in OAC 252:515-9-95(c) within 14 days of this finding.

Data evaluation during assessment monitoring will consist of the establishment of 95% Lower Confidence Limits (LCLs) for any Appendix II constituent detected in concentrations greater than the PQL, assuming that a minimum of four background samples exist for each parameter detected during the assessment monitoring program. If inadequate background data exists, sufficient background data will be collected to provide adequate sample size for statistical analysis. According to USEPA technical guidance, if the 95% Lower Confidence Limit (LCL) of one parameter exceeds action levels defined as MCLs, if applicable, or a health-based alternate groundwater protection standard (GWPS), the facility is to initiate an assessment of corrective measures.

The use of LCLs for assessment monitoring as stipulated by USEPA in the 1989 statistical guidance document and supported by Dr. Kirk Cameron (statistical consultant to USEPA), Jim Brown (USEPA), and Dr. Robert Gibbons remains consistent with USEPA, 2009 (Part IV). In accordance with the USEPA document entitled "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance" (USEPA, 1989), Section 6.2.1,

"When a regulated unit is in compliance monitoring with a fixed compliance limit (either an MCL or an ACL) confidence intervals are the recommended procedure.....If the entire confidence interval exceeds the compliance limit, this is statistically significant evidence that the mean concentration exceeds the compliance limit." Furthermore, it is stated in Section 6.2.1.1 "If any well confidence interval's lower limit exceeds the compliance limit, this is statistically significant evidence of contamination."

If the concentrations of all assessment constituents are at or below the established statistical limit for two consecutive assessment monitoring events, normal detection monitoring can be resumed in subsequent events, if approved by the ODEQ.

7 REFERENCES

- American Society of Testing Materials, 1986, *Standard Guide for Sampling Groundwater Monitoring Wells*, D 4448 – 850.
- American Society of Testing Materials, 2005, *Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs*, D6312-98.
- Biggs and Mathews Environmental, 2011, *Mosley Road Sanitary Landfill, Technical Impracticability Evaluation for Arsenic and Barium*, submitted to USEPA.
- Biggs and Mathews Environmental, 2012, *Mosley Road Sanitary Landfill, Final Close Out Report Request*, submitted to USEPA.
- Biggs and Mathews Environmental, 2013, *Groundwater Monitoring Report, Second Semi-annual Monitoring Event*, submitted to ODEQ.
- Gibbons, R.D., 1994, *Statistical Methods for Groundwater Monitoring*, John Wiley & Sons, Inc., New York.
- Gibbons, R.D. and Coleman, D.E., 2001, *Statistical Methods for Detection and Quantification of Environmental Contamination*, John Wiley and Sons, New York, 384 p.
- Gibbons, R.D., et al., 2009, *Statistical Methods for Groundwater Monitoring, Second Edition*, John Wiley & Sons, Inc., New York.
- Gilbert, R.O., 1987, *Statistical Methods for Environmental Pollution Monitoring*, Van Nostrand Reinhold, New York.
- Golder Associates, Inc., 1991, *Final Remedial Investigation Report, Mosley Road Sanitary Landfill/Feasibility Study, Volume II*, submitted to the USEPA.
- Martin, W.F., Lippitt, J.M., and Protherd, T.G., 1987, *Hazardous Waste Handbook for Health and Safety*, Butterworth Publishers, Stoneham, Massachusetts, pp. 28 – 30.
- State of Oklahoma, Oklahoma Administrative Code, Title 252, Department of Environmental Quality, Chapter 515, Municipal Solid Waste Landfill Regulations, Subchapter 9 Groundwater, Effective June 1, 2003.
- U.S. Environmental Protection Agency, 1986, *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, OSWER – 99550.1, Office of Waste Programs Enforcement, Office of Solid Waste and Emergency Response, Washington, D.C.

- U.S. Environmental Protection Agency, November 1986, *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods*, Third Edition (Revised), SW-846, Office of Solid Waste and Emergency Response, Washington, D.C.
- U.S. Environmental Protection Agency, 1989, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, Interim Final Guidance, Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Federal Register, 40 CFR 258, October 9, 1991.
- U.S. Environmental Protection Agency, 1991b, *Handbook – Groundwater, Volume II: Methodology*, EPA/625/6-90/0166.
- U.S. Environmental Protection Agency, 1992, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, Addendum to Interim Final Guidance, Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, 1992, *RCRA Groundwater Monitoring: Draft Technical Guidance*, EPA/530-R-93-001, NTIC #PB93-139-350, Office of Solid Waste and Emergency Response, Washington, D.C.
- U.S. Environmental Protection Agency, November 1993, *Solid Waste Disposal Facility Criteria Technical Manual*, EPA/530-R-93-017, NTIC #PB94-100-450, Office of Solid Waste and Emergency Response, Washington, D.C.
- U.S. Environmental Protection Agency, 2009, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, Unified Guidance, Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.
- Weaver-Boos Consultants, Inc., 2007, *East Oak Recycling and Disposal Facility, Tier III Permit Modification, Lateral Expansion, Subsurface Investigation and Groundwater Report*, submitted to ODEQ.

TABLES

- 1 Sample Collection, Preservation, and Holding Times
- 2 Methodologies for Testing and Analysis
- 3 Background Monitoring Parameter List
- 4 Detection Monitoring Parameter List
- 5 Water Quality Parameters List

Table 1
East Oak Recycling and Disposal Facility
Sample Collection, Preservation, and Holding Times

PARAMETER	SAMPLE COLLECTION¹ AND CONTAINER	SAMPLE^{2,3} PRESERVATION	RECOMMENDED⁴ HOLDING TIMES
Acid Extractables	1000 ml Glass only (amber) with Teflon liner	Cool, 4°C	Extract within 7 days; analyze within 40 days
Alkalinity	100 ml P, G	Cool, 4°C	14 days
Ammonia	125 ml P, G	Cool, 4°C H ₂ SO ₄ to pH < 2	28 days
Base/Neutral Extractables (priority pollutants)	1000 ml Glass only (amber) with Teflon liner	Cool, 4°C	Extract within 7 days; analyze within 40 days
Biochemical Oxygen Demand, 5 day (BOD 5)	1000 ml P, G	Cool, 4°C	48 hours
Calcium (dissolved)	500 ml P, G	Filter on site, HNO ₃ to pH < 2	6 months
Chemical Oxygen Demand (COD)	125 ml P, G	Cool, 4°C H ₂ SO ₄ to pH < 2	28 days
Chloride	250 ml P, G	None required	28 days
Coliform, fecal and total	100 ml P, G sterilized	Cool, 4°C	24 hours
Cyanide	1000 ml P, G	Cool, 4°C NaOH to pH > 12 0.6 g ascorbic acid	14 days
Fluoride	250 ml P	None required	28 days
Hardness	100 ml P, G	HNO ₃ to pH < 2	6 months
Metals			
Chromium (hexavalent)	200 ml P, G	Cool, 4°C	24 hours
Mercury (dissolved)	1000 ml P, G	Filter on site HNO ₃ to pH < 2	28 days
Mercury (total)	1000 ml P, G	HNO ₃ to pH < 2	28 days

Table 1 (Cont'd)
East Oak Recycling and Disposal Facility
Sample Collection, Preservation, and Holding Times

PARAMETER	SAMPLE COLLECTION¹ AND CONTAINER	SAMPLE^{2,3} PRESERVATION	RECOMMENDED⁴ HOLDING TIMES
Other Metals, (dissolved) (Arsenic, Antimony, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Sodium, Silver, Sodium, Thallium, Vanadium, Zinc)	1000 ml P, G	Filter on site HNO ₃ to pH < 2	6 months
Other Metals, (totals) (Arsenic, Antimony, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Sodium, Silver, Sodium, Thallium, Vanadium, Zinc)	1000 ml P, G	HNO ₃ to pH < 2	6 months
Nitrate	125 ml P, G	Cool, 4°C	48 hours
Nitrite	125 ml P, G	Cool, 4°C	48 hours
Oil and grease	1000 ml G only	Cool, 4°C H ₂ SO ₄ to pH < 2	28 days
PCB (Priority Pollutant)	1000 ml Glass only (amber) with Teflon liner	Cool, 4°C	Extract within 7 days; analyze within 40 days
Pesticides Endrin Lindane Toxaphene Methoxychlor	1000 ml Glass only (amber) with Teflon liner	Cool, 4°C	Extract within 7 days; analyze within 40 days
pH (field)	25 ml P, G	None required	Analyze immediately
Phenols	500 ml G only	Cool, 4°C H ₂ SO ₄ to pH < 2	28 days
Phosphorus (total)	125 ml P, G	Cool, 4°C H ₂ SO ₄ to pH < 2	28 days

Table 1 (Cont'd)
East Oak Recycling and Disposal Facility
Sample Collection, Preservation, and Holding Times

PARAMETER	SAMPLE COLLECTION¹ AND CONTAINER	SAMPLE^{2,3} PRESERVATION	RECOMMENDED⁴ HOLDING TIMES
Specific Conductance (field)	100 ml P, G	None required	Analyze immediately
Sulfate	50 ml P, G	Cool, 4°C	28 days
Temperature (field)	1000 ml P, G	None required	Analyze immediately
Total Dissolved Solids Residue on evaporation (TDS/ROE) 180°C	1000 ml P	Cool, 4°C	7 days
Total Organic Carbon (TOC)	2-40 ml P	Cool, 4°C H ₂ SO ₄ to pH < 2	28 days
Total Suspended Solids (TSS)	1000 ml P	Cool, 4°C	7 days
Volatile Organic Acids, Priority pollutants	4-40 ml glass vial with septum caps	Cool, 4°C	14 days

1. Plastic (P) or Glass (G). For metals, polyethylene with polypropylene cap (no liner) is preferred.
2. Simple preservation should be performed immediately upon sample collection. For composite samples, each aliquot should be preserved at the same time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
3. When any sample is to be shipped by common carrier or sent through the United States mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring each compliance. For the preservation requirements of Table 5-4, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCL) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO₃) in water solutions and concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H₂SO₄) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid; samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of sample under study are stable for the longer time, and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.

Table 2
East Oak Recycling and Disposal Facility
Methodologies for Testing and Analysis

PARAMETER	METHOD DESCRIPTION	METHOD
Acid Extractables	GC/MS	EPA 625/8270C(D)
Alkalinity	Colorimetric, Automated Methyl Orange/Titrimetric	(A)310.2/310.1
Ammonia	Colorimetric, Automated Phenate	(A)350.1
Base/Neutral Extractables	GC/MS	EPA 625/8270C(D)
Biological Oxygen Demand, 5 day (BOD5)	BOD (5 day, 20°C)	(A)405.1
Calcium	Atomic Emission Spectrometric	(A)200.7/6010B(D)
Chemical Oxygen Demand (COD)	Colorimetric, Automated; Manual	(A)410.4
Chloride	Colorimetric, Automated Ferricyanide/Ion Chromatography	(A)325.2/300.0A
Coliform (fecal)	Standard Membrane Filtration	(B)9221
Coliform (total)	Standard Membrane Filter Procedure	(B)9222
Cyanide (total)	Colorimetric, Automated UV	(A)335.3/9012(D)
Fluoride	Potentiometric, Ion Selective Electrode	(A)340.2
Hardness	Calculation	(C)2340B
<u>Metals, dissolved</u>		
Antimony	Atomic Absorption, furnace technique, ICP	(A)200.7/7041/6010B(D)
Arsenic	Atomic Absorption, furnace technique, ICP	(A)200.7/7060A/6010B(D)
Barium	ICP	(A)200.7/6010B(D)
Beryllium	ICP	(A)200.7/6010B(D)
Boron	ICP	(A)200.7/6010B(D)
Cadmium	ICP	(A)200.7/6010B(D)
Chromium	ICP	(A)200.7/6010B(D)
Chromium (hexavalent)	Colorimetric	7196A
Copper	Atomic Absorption, Furnace, ICP	(A)200.7/6010B(D)
Iron	ICP	(A)200.7/6010B(D)
Lead	Atomic Absorption, Furnace, ICP	(A)200.7/7421/6010B(D)
Magnesium	ICP	(A)200.7/6010B(D)
Manganese	ICP	(A)200.7/6010B(D)
Mercury	Atomic Absorption, cold vapor technique	7470A
Nickel	ICP	(A)200.7/6010B(D)
Potassium	ICP	(A)200.7/6010B(D)
Selenium	Atomic Absorption, furnace technique, ICP	(A)200.7/7740/6010B(D)

Table 2 (Cont'd)
East Oak Recycling and Disposal Facility
Methodologies for Testing and Analysis

PARAMETER	METHOD DESCRIPTION	METHOD
<u>Metals, dissolved</u>		
Silver	ICP	(A)200.7/6010B(D)
Sodium	ICP	(A)200.7/6010B(D)
Thallium	ICP	(A)200.7/7841/6020(D)
Zinc	ICP	(A)200.7/6010B(D)
<u>Metals, total</u>		
Antimony	Atomic Absorption, furnace technique, ICP	(A)200.7/7041/6010B(D)
Arsenic	Atomic Absorption, furnace technique, ICP	(A)200.7/7060A/6010B(D)
Barium	ICP	(A)200.7/6010B(D)
Beryllium	ICP	(A)200.7/6010B(D)
Boron	ICP	(A)200.7/6010B(D)
Cadmium	ICP	(A)200.7/6010B(D)
Chromium	ICP	(A)200.7/6010B(D)
Chromium (hexavalent)	Colorimetric	7196A
Copper	Atomic Absorption, Furnace, ICP	(A)200.7/6010B(D)
Iron	ICP	(A)200.7/6010B(D)
Lead	Atomic Absorption, Furnace, ICP	(A)200.7/7421/6010B(D)
Magnesium	ICP	(A)200.7/6010B(D)
Manganese	ICP	(A)200.7/6010B(D)
Mercury	Atomic Absorption, cold vapor technique	7470A
Nickel	ICP	(A)200.7/6010B(D)
Potassium	ICP	(A)200.7/6010B(D)
Selenium	Atomic Absorption, furnace technique, ICP	(A)200.7/7740/6010B(D)
Silver	ICP	(A)200.7/6010B(D)
Sodium	ICP	(A)200.7/6010B(D)
Thallium	ICP	(A)200.7/7841/6020(D)
Zinc	ICP	(A)200.7/6010B(D)
<u>Other</u>		
Nitrate	Colorimetric, Automated, Cadmium Reduction, Ion Chromatography	(A)353.2/300.0A
Nitrite	Colorimetric, Automated, Cadmium Reduction, IC	(A)353.2/300.0A
Oil and Grease	Gravimetric, Separatory Funnel Extraction	1664A
PCB (priority pollutants)	Gas Chromatography	EPA 608/8083
Pesticides	Gas Chromatography	EPA 608/8081A
pH (field)	Electrometric	(A)150.1
Phenols	Colorimetric, Automated 4-AAP with Distillation	(A)420.2/9066(D)
Phosphorous, Total	Colorimetric, Automated Ascorbic Acid	(A)365.3

Table 2 (Cont'd)
East Oak Recycling and Disposal Facility
Methodologies for Testing and Analysis

PARAMETER	METHOD DESCRIPTION	METHOD
Specific Conductance (field)	Wheatstone bridge	(A)120.1
Sulfate	Turbidimetric, Ion Chromatography	(A)375.4/300.0A
Temperature (field)	Revering Thermometer	(B)212.7
Total Dissolved Solids (TDS)	Gravimetric, Dried at 180°C	(A)160.1
Total Organic Carbon (TOC)	Combustion or Oxidation	(A)415.1
Total Suspended Solids (TSS)	Gravimetric, Dried at 103-105°C	(A)160.2
Volatile Organic Compounds	Purge and Trap/GC/MS	EPA 624/8260B(D)

**NOTE: Analytical methods listed above may be substituted for as deemed necessary provided that the alternate methods provide adequate analytical data to fulfill monitoring requirements and meet regulatory standards.*

References:

- A: Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-0920, EMSL, Cincinnati, Revision (March 1983).
- B: Standard Methods for the Examination of Water and Wastewaters, 15th Edition, APHA-AQWQA-WPCF, 1980.
- C*: Standard Methods for the Examination of Water and Wastewaters, 18th Edition, APHA-AWWA-WEF, 1992.
- D: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, July 1992 (as Revised).

* 2340B is the same in the 18th Edition as in the 17th Edition.

Table 3
East Oak Recycling and Disposal Facility
Background Monitoring Parameter List

COMMON NAME	<u>CAS RN</u>
<u>Inorganic Parameters:</u>	
Alkalinity	Total
Ammonia, Nitrogen	
Antimony	Total
Arsenic	Total
Barium	Total
Beryllium	Total
Cadmium	Total
Chloride	
Chromium	Total
Cobalt	Total
Copper	Total
Iron	Total
Lead	Total
Nickel	Total
Selenium	Total
Silver	Total
Thallium	Total
Zinc	Total
pH	
Chemical Oxygen Demand	
Specific Conductivity	
Sulfate	
Calcium	
Magnesium	
Nitrate, Nitrogen	
Sodium	
Carbonates	
Potassium	
<u>Organic Constituents:</u>	
Acetone	67-64-1
Acrylonitrile	107-13-1
Benzene	71-43-2
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform (tribromomethane)	75-25-2
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroethane (ethyl chloride)	75-00-3
Chloroform (trichloromethane)	67-66-3
Dibromochloromethane (chlorodibromomethane)	124-48-1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8
1,2-Dibromoethane (ethylene dibromide, EDB)	106-93-4
o-Dichlorobenzene (1,2-dichlorobenzene)	95-50-1
p-Dichlorobenzene (1,4-dichlorobenzene)	106-46-7

Table 3 (Cont'd)
East Oak Recycling and Disposal Facility
Background Monitoring Parameter List

COMMON NAME

Organic Constituents (continued):

CAS RN

trans-1,4-Dichloro-2-butene	110-57-6
1,1-Dichloroethane (ethylidene chloride)	75-34-4
1,2-Dichloroethane (ethylene dichloride)	107-06-2
1,1-Dichloroethylene (1,1-dichloroethene, vinylidene chloride)	75-35-3
cis-1,2-Dichloroethylene (cis-1,2-dichloroethene)	156-59-2
trans-1,2-Dichloroethylene (trans-1,2-dichloroethene)	156-60-5
1,2-Dichloropropane (Propylene dichloride)	78-87-5
cis-1,3-Dichloropropene	10061-01-5
trans-1,3-Dichloropropene	10061-02-6
Ethylbenzene	100-41-4
2-Hexanone (methyl butyl ketone)	591-78-6
Methyl bromide (bromomethane)	74-83-9
Methyl chloride (chloromethane)	74-87-3
Methylene bromide (dibromomethane)	74-95-3
Methylene chloride (dichloromethane)	75-09-2
Methyl ethyl ketone (MEK, 2-butanone)	78-93-3
Methyl iodide (iodomethane)	74-88-4
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1
Styrene	100-42-5
1,1,1,2-Tetrachloroethane	630-20-6
1,1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethylene (tetrachloroethane, perchloroethylene)	127-18-4
Toluene	108-88-3
1,1,1-Trichloroethane (methylchloroform)	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethylene (trichloroethene)	79-01-6
Trichlorofluoromethane (CFC-11)	75-69-4
1,2,3-Trichloropropane	96-18-4
Vinyl acetate	108-05-4
Vinyl chloride	75-01-4
Xylenes (total)	1330-20-7

Table 4
East Oak Recycling and Disposal Facility
Detection Monitoring Parameter List

COMMON NAME	CAS RN
<u>Inorganic Parameters¹:</u>	
Alkalinity, Total	
Ammonia, Nitrogen	
Arsenic	Total
Barium	Total
Chloride	
Iron	Total
Lead	Total
Nickel	Total
Zinc	Total
Chemical Oxygen Demand	
<u>Organic Constituents:</u>	
Acetone	67-64-1
Acrylonitrile	107-13-1
Benzene	71-43-2
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform (tribromomethane)	75-25-2
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroethane (ethyl chloride)	75-00-3
Chloroform (trichloromethane)	67-66-3
Dibromochloromethane (chlorodibromomethane)	124-48-1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8
1,2-Dibromoethane (ethylene dibromide, EDB)	106-93-4
o-Dichlorobenzene (1,2-dichlorobenzene)	95-50-1
p-Dichlorobenzene (1,4-dichlorobenzene)	106-46-7
trans-1,4-Dichloro-2-butene	110-57-6
1,1-Dichloroethane (ethylidene chloride)	75-34-4
1,2-Dichloroethane (ethylene dichloride)	107-06-2
1,1-Dichloroethylene (1,1-dichloroethene, vinylidene chloride)	75-35-3
cis-1,2-Dichloroethylene (cis-1,2-dichloroethene)	156-59-2
trans-1,2-Dichloroethylene (trans-1,2-dichloroethene)	156-60-5
1,2-Dichloropropane (Propylene dichloride)	78-87-5
cis-1,3-Dichloropropene	10061-01-5
trans-1,3-Dichloropropene	10061-02-6
Ethylbenzene	100-41-4
2-Hexanone (methyl butyl ketone)	591-78-6
Methyl bromide (bromomethane)	74-83-9
Methyl chloride (chloromethane)	74-87-3
Methylene bromide (dibromomethane)	74-95-3
Methylene chloride (dichloromethane)	75-09-2

Table 4 (Cont'd)
East Oak Recycling and Disposal Facility
Detection Monitoring Parameter List

COMMON NAME

Organic Constituents (continued):

	CAS RN
Methyl ethyl ketone (MEK, 2-butanone)	78-93-3
Methyl iodide (iodomethane)	74-88-4
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1
Styrene	100-42-5
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethylene (tetrachloroethane, perchloroethylene)	127-18-4
Toluene	108-88-3
1,1,1-Trichloroethane (methylchloroform)	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethylene (trichloroethene)	79-01-6
Trichlorofluoromethane (CFC-11)	75-69-4
1,2,3-Trichloropropane	96-18-4
Vinyl acetate	108-05-4
Vinyl chloride	75-01-4
Xylenes (total)	1330-20-7

Notes:

¹Inorganic parameters have been optimized in accordance with OAC 252:515-9-72(c).

Table 5
East Oak Recycling and Disposal Facility
Water Quality Parameters List

COMMON NAME

Indicator Parameters:

Sulfate
Calcium
Sodium
Magnesium
Potassium

CAS RN

Dissolved
Dissolved
Dissolved
Dissolved

FIGURE F1

FIELD INFORMATION FORM

(For informational purposes only. Actual may vary.)

FIGURE F2

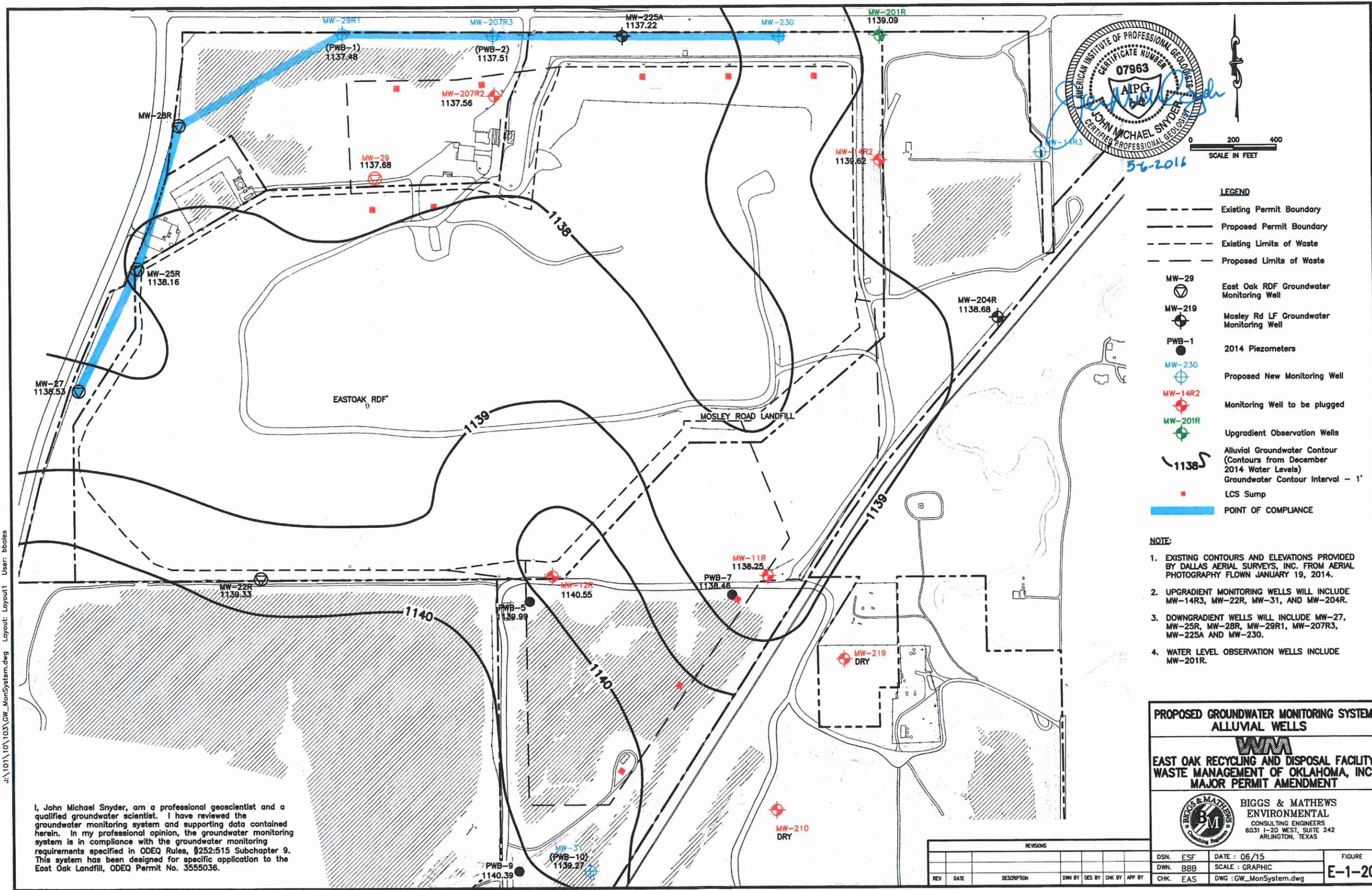
CHAIN-OF-CUSTODY RECORD

(For informational purposes only. Actual may vary.)

FIGURE F3 and FIGURE F4

**F3 – Copy of Appendix E, Figure E-1-20 – Proposed
Groundwater Monitoring System**

**F4 – Copy of Appendix E, Figure E-1-21 – Groundwater
Monitoring Well Details**



- LEGEND**
- Existing Permit Boundary
 - Proposed Permit Boundary
 - Existing Limits of Waste
 - Proposed Limits of Waste
 - MW-29 East Oak RDF Groundwater Monitoring Well
 - MW-219 Mosley Rd LF Groundwater Monitoring Well
 - PWB-1 2014 Piezometers
 - MW-230 Proposed New Monitoring Well
 - MW-14R2 Monitoring Well to be plugged
 - MW-201R Upgradient Observation Wells
 - 1138 Alluvial Groundwater Contour (Contours from December 2014 Water Levels) Groundwater Contour Interval - 1'
 - LCS Sump
 - POINT OF COMPLIANCE

- NOTE:**
1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.
 2. UPGRADIENT MONITORING WELLS WILL INCLUDE MW-14R3, MW-22R, MW-31, AND MW-204R.
 3. DOWNGRADIENT WELLS WILL INCLUDE MW-27, MW-25R, MW-28R, MW-29R1, MW-207R3, MW-225A AND MW-230.
 4. WATER LEVEL OBSERVATION WELLS INCLUDE MW-201R.

PROPOSED GROUNDWATER MONITORING SYSTEM ALLUVIAL WELLS

WM
EAST OAK RECYCLING AND DISPOSAL FACILITY
WASTE MANAGEMENT OF OKLAHOMA, INC.
MAJOR PERMIT AMENDMENT



BIGGS & MATHEWS ENVIRONMENTAL
 CONSULTING ENGINEERS
 6031 I-20 WEST, SUITE 242
 ARLINGTON, TEXAS

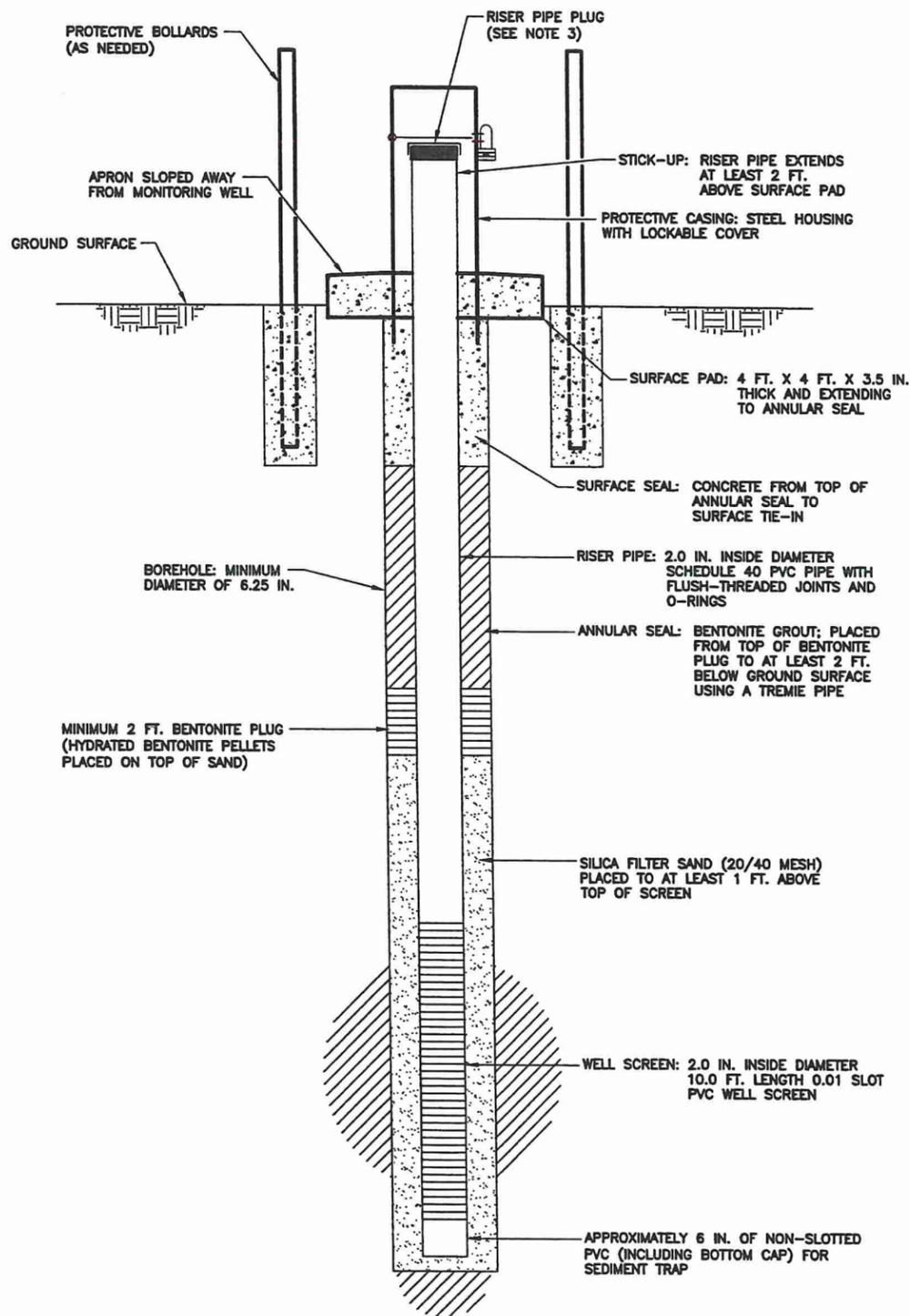
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. ESF DATE : 06/15
 DWN. BBB SCALE : GRAPHIC
 CHK. EAS DWG : GW_MonSystem.dwg

FIGURE
E-1-20

I, John Michael Snyder, am a professional geoscientist and a qualified groundwater scientist. I have reviewed the groundwater monitoring system and supporting data contained herein. In my professional opinion, the groundwater monitoring system is in compliance with the groundwater monitoring requirements specified in ODEQ Rules, §252-515 Subchapter 9. This system has been designed for specific application to the East Oak Landfill, ODEQ Permit No. 3555036.

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TYPICAL MONITORING WELL DETAIL
NOT TO SCALE

MONITORING WELL NO.	NORTHING	EASTING	LONGITUDE	LATITUDE	GROUND ELEVATION	TOTAL WELL DEPTH	FILTER PACK ELEVATIONS		WELL SCREEN ELEVATIONS		APPROXIMATE POTENTIOMETRIC SURFACE ELEVATION
							TOP	BOTTOM	TOP	BOTTOM	
EXISTING ALLUVIAL MONITORING WELLS											
MW-22R	182687	2173295	-97°18'43.22"	35°29'59.52"	1149.6	37.3	1129.6	1112.3	1122.3	1112.3	1139.3
MW-25R	184132	2172726	-97°18'50.14"	35°30'13.91"	1158.4	52.0	1123.4	1106.4	1116.9	1106.9	1138.2
MW-27	183562	2172449	-97°18'53.30"	35°30'08.26"	1156.6	24.0	1150.6	1132.6	1148.6	1133.6	1138.5
MW-28R	184802	2172925	-97°18'08.54"	35°30'22.54"	1149.6	34.0	1128.1	1115.6	1125.6	1115.6	1137.5
MW-225A	185213	2175034	-97°18'21.97"	35°30'24.38"	1148.6	31.0	1134.6	1117.6	1132.6	1117.6	1137.2
PROPOSED ALLUVIAL MONITORING WELLS											
MW-31 (PWB-10)	181316	2174822	-97°18'24.87"	35°29'45.85"	1144.7	22.0	1130.7	1122.7	1128.7	1123.7	1141.2
MW-207R3 (PWB-2)	185217	2174396	-97°18'29.69"	35°30'24.46"	1146.5	37.0	1126.5	1109.5	1120.5	1110.5	1137.5
MW-29R1 (PWB-1)	185227	2173692	-97°18'28.20"	35°30'24.61"	1147.3	32.0	1128.3	1115.3	1126.3	1116.3	1137.4
MW-14R3	184663	2176953	-97°17'58.82"	35°30'18.80"	1145.0	24.5	1133.5	1120.5	1131.5	1121.5	1143.0
MW-230	185210	2175734	-97°18'13.51"	35°30'24.30"	1146.0	30.5	1128.5	1115.5	1126.5	1116.5	1138.0
EXISTING GARBER WELLINGTON MONITORING WELLS TO REMAIN											
MW-208R	184155	2172762	-97°17'55.12"	35°30'13.76"	1158.0	125.0	1068.0	1033.0	1043.0	1033.0	1126.3
MW-220R	115218	2176163	-97°18'08.32"	35°30'24.35"	1147.8	111.5	1049.8	1136.3	1046.8	1036.8	1130.2
MW-226GW	185213	2175004	-97°18'22.34"	35°30'24.38"	1148.6	115.0	1063.6	1033.6	1043.6	1033.6	1128.9
PROPOSED GARBER WELLINGTON MONITORING WELLS											
MW-223R2	185208	2174447	-97°18'29.07"	35°30'24.37"	1152.0	100.0	1065.0	1052.0	1063.0	1053.0	1128.0
MW-221R2	182692	2174311	-97°18'30.93"	35°29'59.50"	1156.0	100.0	1069.0	1056.0	1067.0	1057.0	1135.0
MW-222R	184124	2176971	-97°17'58.64"	35°30'13.47"	1162.0	103.0	1072.0	1059.0	1070.0	1060.0	1133.0

NOTES:

- ELEVATIONS LISTED ABOVE IN FEET ABOVE MEAN SEA LEVEL, EXCEPT TOTAL DEPTH LISTED IN FEET BELOW GROUND SURFACE.
- POTENTIOMETRIC SURFACE ELEVATIONS MEASURED IN JUNE 2014.
- ALL PROPOSED WELLS ARE 2-INCH DIAMETER.
- MONITORING WELLS MW-201R AND MW-204R WILL BE CONVERTED INTO OBSERVATION WELLS AND WILL NO LONGER BE MONITORED.

COPY



**GROUNDWATER MONITORING WELL
DETAIL**

WM
EAST OAK RECYCLING AND DISPOSAL FACILITY
WASTE MANAGEMENT OF OKLAHOMA, INC.
MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS							DSN.	ESF	DATE : 06/15	FIGURE
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	DWN.	BBB	SCALE : GRAPHIC	E-1-21
							CHK.	EAS	DWG : MW_Detail.dwg	

**EAST OAK RECYCLING AND DISPOSAL FACILITY
OKLAHOMA COUNTY, OKLAHOMA
ODEQ PERMIT NO. 3555036**

APPENDIX F

**ATTACHMENT F-A
SUPPLEMENTAL GROUNDWATER PROGRAM FOR
EFFECTIVENESS OF REMEDY IN THE
GARBER-WELLINGTON AQUIFER**

Prepared for

Waste Management of Oklahoma

June 2015

~~Revised January 2016~~

Revised May 2016



Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 ♦ Mansfield, Texas 76063 ♦ 817-563-1144

CONTENTS

1	EFFECTIVENESS OF REMEDY MONITORING	F-A-1
1.1	Introduction to Effectiveness of Remedy Monitoring.....	F-A-1
1.2	Garber-Wellington Aquifer.....	F-A-1
1.2.1	Performance Goals	F-A-1
1.2.2	Monitoring Well Locations	F-A-1
1.2.3	Constituents.....	F-A-1
1.2.4	Statistical Method.....	F-A-2
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1.3	Contingency Action Plan	F-A-3
2	EVALUATION OF SAMPLING FREQUENCY	F-A-5

TABLES

1	Parameters for EOR Garber-Wellington Aquifer Monitoring Wells
2	EOR Baseline/Background Values – Garber Wellington Wells – Constituents of Concern
3	Contingency Monitoring Program for EOR in the Garber-Wellington Aquifer

FIGURE

F-A-1	Groundwater Monitoring System – Garber-Wellington
-------	---

1 EFFECTIVENESS OF REMEDY MONITORING

1.1 Introduction to Effectiveness of Remedy Monitoring

A corrective action remedy was initiated at Mosley Road Landfill under EPA guidance following a U.S. EPA Record of Decision (ROD) that identified the site as a Superfund facility in June 1992. The Mosley Road Landfill area is now included within the East Oak Recycling and Disposal Facility permit boundary but the Effectiveness of Remedy Monitoring in the Garber-Wellington Aquifer continues as described herein. To measure performance of the selected remed(ies) groundwater monitoring was required. This method requires monitoring of wells screened in the Garber-Wellington aquifer to prevent impacts above a baseline and off-site migration within the Garber-Wellington above groundwater protection standards. Those objectives are discussed in more detail in the following sections.

1.2 Garber-Wellington Aquifer

1.2.1 Performance Goals

The performance goals established in the 1992 ROD include the following for the Garber-Wellington Aquifer. Effectiveness of remedy monitoring to achieve these goals is performed using the groundwater monitoring and statistical analysis programs developed in cooperation with the EPA under the ROD. Contamination migration management is achieved via the following methods:

- Contain low-level groundwater contamination within site boundaries. The groundwater remediation goals were established for ROD-defined constituents of concern (COC) only.
- Prevent contamination of the Garber-Wellington aquifer above health-based risk levels by implementing a groundwater monitoring program of Alluvial and Garber-Wellington wells. The Alluvial program is integrated into the East Oak RDF

1.2.2 Monitoring Well Locations

Groundwater monitoring for effectiveness of remedy in the underlying Garber-Wellington Aquifer is proposed in ~~six~~ seven monitoring wells: MW-208R, MW-220R, MW-221R~~2~~, MW-222R, MW-223R~~2~~, ~~and~~ MW-226GW, and MW-32GW (see Figure F-A-1). Groundwater flow is primarily to the west and northwest.

1.2.3 Constituents

Effectiveness of Remedy monitoring for the Garber-Wellington Aquifer, as approved by USEPA, consists of an optimized list of parameters intended to detect migration of COCs from the closed Mosley Road Sanitary Landfill. The following parameters will be

monitored and evaluated on an annual basis for statistical exceedances and trends in the Garber-Wellington monitoring wells (see Section 2 *Evaluation of Monitoring Frequency*).

**Table 1
Parameters for EOR Garber-Wellington Aquifer Monitoring Wells**

Constituent
Metals
Arsenic – total
Barium – total
Manganese – total
Vanadium – total
Volatile Organic Compounds
1,1-Dichloroethane
Benzene
Chlorobenzene
Cis-1,2-dichloroethene
Trans-1,2-dichloroethene
Xylenes (total)

1.2.4 Statistical Method

An intrawell statistical method is used to compare monitoring data on an annual basis with baseline groundwater quality data for metals and groundwater protection standards (GWPS) for all other organic compounds. A baseline value for constituents of concern in each Garber-Wellington well has been established (see Table 2).

For this evaluation, a verified exceedance of either the constituent concentration or the cumulative sum (CUSUM) occurs when the control limit (baseline value) is exceeded for two consecutive sampling events. Repeated exceedances of the control limit in downgradient monitoring wells could indicate a situation that may require further investigation to determine if the exceedance indicates spatial or temporal variability or a release from the landfill unit.

For comparison to a GWPS, statistical methods will follow EPA-approved methods for comparison to a health-based standard. Data evaluation will consist of the establishment of 95% Lower Confidence Limits (LCLs) for any organic COC detected in concentrations greater than the PQL, assuming that a minimum of four background samples exist for each parameter detected during the assessment monitoring program. If inadequate background data exists, sufficient background data will be collected to provide adequate sample size for statistical analysis. According to USEPA technical guidance, if the 95% Lower Confidence Limit (LCL) of one parameter exceeds action levels defined as MCLs, if applicable, or a health-based alternate groundwater protection standard (GWPS), the facility has confidence that an exceedance of a GWPS has occurred and response action is required.

1.2.5 Baseline/Background Values

Baseline values established in accordance with the June 1992 EPA Record of Decision for constituents of concern for wells screened in the Garber-Wellington aquifer were established during sampling conducted in 1995 and 1996 for each well and constituent. The health-based baseline values are listed in Table 2. These USEPA-approved baseline values represent the risk-based equivalent to background in DUMPStat.

Table 2
EOR Baseline/Background Values – Garber-Wellington Wells – Constituents of Concern

Constituent	MCL or GWPS (µg/L)	Baseline (µg/L)	Monitoring Well
Inorganic Constituents			
Barium	2000	418.34	MW-220
		390.11	MW-222
		327.88	MW-223
		407.84	MW-226
Manganese	1100*	45.69	MW-208R
		999.07	MW-209
		78.31	MW-220
		68.66	MW-221R
		41.24	MW-222
		495.70	MW-223
		120.00	MW-226

* Groundwater Protection Standard

1.3 Contingency Action Plan

If a verified exceedance of the baseline limits in a Garber-Wellington well is recorded, the potential for migration off-site will be re-evaluated, in accordance with the “Contingency Measure Criteria and Presumptive Responses” section of the 1992 ROD, and alternate measures for active remediation activities proposed if needed. Any statistical increase will also be evaluated in terms of the impact on cumulative risk to human health and the environment. The primary remedies implemented at Mosley Road were the construction of a low permeability cap and the installation of an active landfill gas collection system. If it is determined that the selected remedy is not performing as required, additional remedial activities that may be proposed include, but are not limited to, the following:

- Upgrade the landfill gas collection system
- Conduct monitored natural attenuation
- Monitor groundwater quality at perimeter

An initial contingent response to a verified exceedance of the baseline limits in a Garber-Wellington well will be to sample for the modified OAC 252:515 Appendix C list of parameters shown in Table 3. In addition, if the standards are not being met, ODEQ may require implementation of other remedial activities.

**Table 3
Contingency Monitoring Program for EOR in the Garber-Wellington Aquifer**

Metals	Semi-Volatile Organic Compounds (Cont.)	Volatile Organic Compounds
Antimony – total	Acenaphthene	1,1,1-Trichloroethane
Arsenic – total	Acenaphthylene	1,1,2-Trichloroethane
Barium – total	Anthracene	1,1,2,2-Tetrachloroethane
Beryllium – total	Benzidine	1,1-Dichloroethane
Cadmium – total	Benzo[a]pyrene	1,2-Dichloroethane
Chromium – total	Benzo[b]fluoranthene	1,1-Dichloroethene
Copper – total	Benzo[g,h,i]perylene	1,2-Dichloroethene (total)
Lead – total	Benzo[k]fluoranthene	1,2-Dichloropropane
Manganese – total	Benz[a]anthracene	1,3-Dichloropropene (Total)
Mercury – total	Bis(2-chloroethoxy)methane	2-Chloroethylvinyl ether
Nickel – total	Bis(2-chloroethyl)ether	Acrolein
Selenium – total	Bis(2-chloroisopropyl)ether	Acrylonitrile
Silver – total	Bis(2-ethylhexyl)phthalate	Benzene
Thallium – total	Butylbenzylphthalate	Bromodichloromethane
Zinc – total	Chrysene	Bromoform
	Di-n-butylphthalate	Bromomethane
	Di-n-octylphthalate	Carbon tetrachloride
Semi-Volatile Organic Compounds	Dibenz[a,h]anthracene	Chlorobenzene
1,2,4-Trichlorobenzene	Diethylphthalate	Chloroethane
1,2-Dichlorobenzene	Dimethylphthalate	Chloroform
1,2-Diphenylhydrazine	Fluoranthene	Chloromethane
1,3-Dichlorobenzene	Fluorene	Dibromochloromethane
1,4-Dichlorobenzene	Hexachlorobenzene	Ethylbenzene
2,4,6-Trichlorophenol	Hexachlorobutadiene	Methylene chloride
2,4-Dichlorophenol	Hexachlorocyclopentadiene	Tetrachloroethene
2,4-Dimethylphenol	Hexachloroethane	Toluene
2,4-Dinitrophenol	Indeno[1,2,3-CD]pyrene	Trans-1,2-dichloroethene
2,4-Dinitrotoluene	Isophorone	Trichloroethene
2,6-Dinitrotoluene	N-nitrosodi-n-propylamine	Vinyl chloride
2-Chloronaphthalene	N-nitrosodimethylamine	
2-Chlorophenol	N-nitrosodiphenylamine	
2-Nitrophenol	Naphthalene	
3,3'-Dichlorobenzidine	Nitrobenzene	
4,6-Dinitro-2-methylphenol	Pentachlorophenol	
4-Bromophenyl-phenyl ether	Phenanthrene	
4-Chloro-3-methylphenol	Phenol	
4-Chlorophenyl phenyl ether	Pyrene	
4-Nitrophenol		

2 EVALUATION OF SAMPLING FREQUENCY

The closed Mosley Road Landfill site is underlain with North Canadian River alluvium overlying the bedrock unit known as the Garber-Wellington sandstone. The alluvium is composed of unconsolidated sediments deposited by the North Canadian River and contains a shallow groundwater layer that extends to a depth of about 50 feet below ground surface (bgs). This is the uppermost aquifer beneath the site.

The Garber-Wellington Formation underlies the alluvium and consists predominantly of massive, well-cemented sandstone. The maximum thickness of the Garber-Wellington Formation is approximately 900 feet. The unit is encountered below the landfill at about elevation 1,120 feet NGVD. The Remedial Investigation/Feasibility Study (RI/FS) report concluded that the Canadian River is the major discharge area for the bedrock aquifer. Based on an aquifer test conducted at well PW-217, the horizontal hydraulic conductivity of this unit is approximately 2×10^{-3} cm/sec (Golder, 1991). In the upper parts of the Garber Wellington (Consolidated Unit) at the site low permeability shale beds (3 to 10 feet thick) occur over large areas of the site (Golder, 1991 and Weaver-Boos, 2007).

Vertical hydraulic gradients between the alluvial and Garber-Wellington aquifers were calculated based on information collected by Golder in the RI/FS. Vertical gradients ranged between 0.002 ft/ft to 0.18. Measurements obtained as part of October 2013 monitoring event identified vertical gradients between the two permeable zones as 0.11 to 0.21. These calculations are based on head differential only and do not take into account seasonal variability based on river stage and local precipitation. However, the data collected during the RI/FS as well as recent data from paired wells represent hydraulic separation between the permeable zones across most if not all of the site.

Based upon the empirical data supporting hydraulic separation and site documents that show a shale horizon in the upper portion of the Garber-Wellington (Golder, 1991 and Weaver-Boos, 2007) an estimate of the time of travel between the two water-bearing units can be derived. Assuming an average thickness of five (5) feet of 1×10^{-8} cm/sec soils, an estimated vertical velocity can be calculated using Darcy's Law.

$$\begin{aligned} V &= Ki/n \\ &= (0.00000001)(0.12)/0.1 \\ &= 1.2 \times 10^{-8} \text{ cm/sec. or } 0.012 \text{ ft/yr.} \end{aligned}$$

Time Required to Travel Vertically Through 5 Feet of Shale = 416 years

The potential for lateral flow within the alluvial aquifer prior to migration to the deeper zone is highlighted by the point of discharge to the Canadian River for both the Garber Wellington and alluvial aquifers. Also, an estimated difference in vertical to lateral hydraulic conductivity between the zone of greater than 4 orders of magnitude (where the shale is present) supports preferential lateral flow to the river for any contaminant released from the East Oak or Mosley Road landfill units.

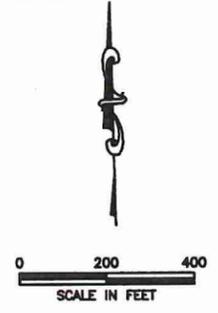
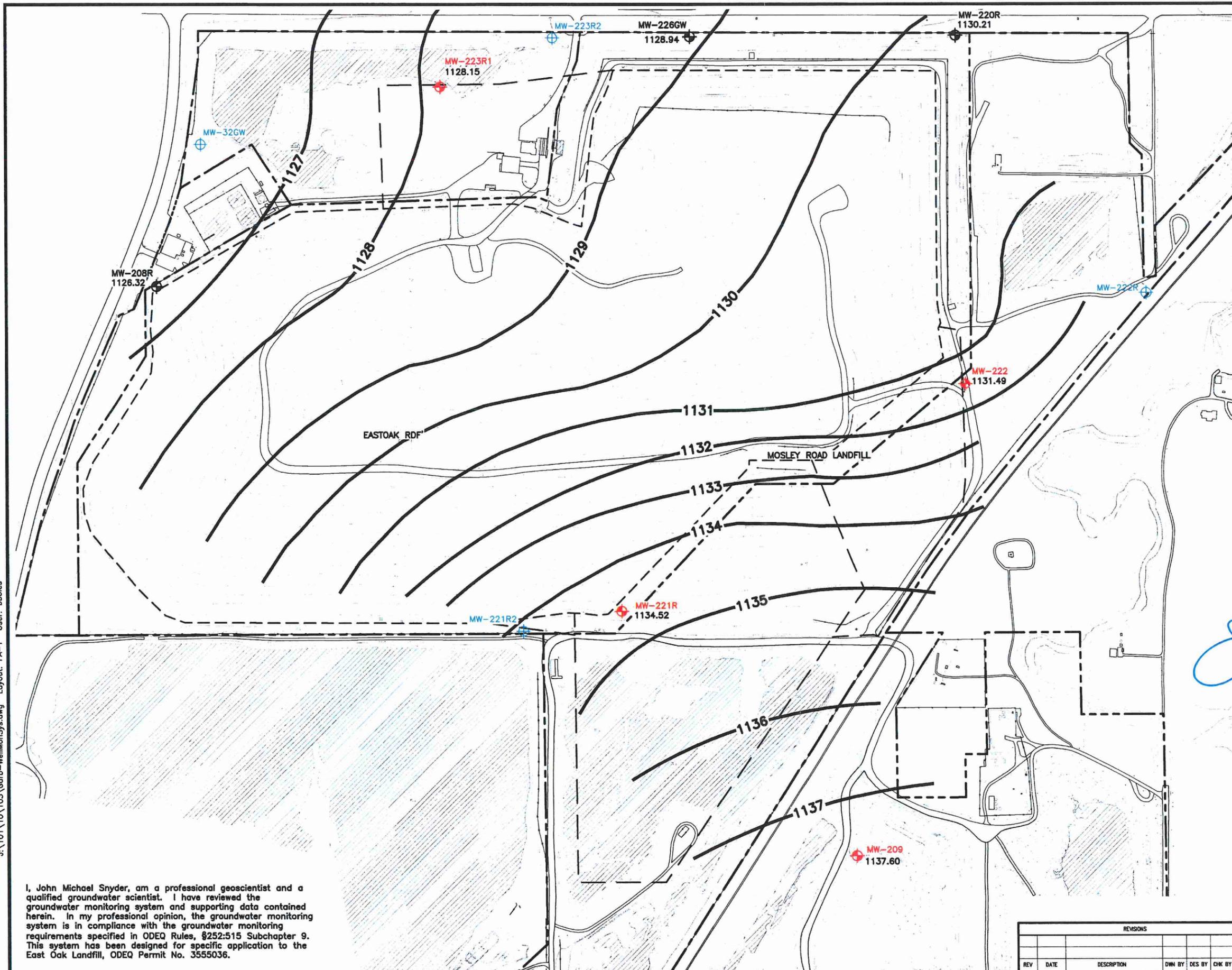
According to the 1992 ROD, vinyl chloride was determined to be the contaminant contributing most to the risk in the alluvial groundwater. Historically, vinyl chloride has not been detected in any Garber-Wellington well.

Benzene was identified in the ROD as the only constituent of concern for the Garber-Wellington aquifer. The risk for benzene was driven by a single unverified detection over the MCL in the Garber-Wellington during the RI/FS and was determined to be "within EPA's acceptable risk range for carcinogenic and non-carcinogenic effects" (ROD, p. 22). Since the installation of the groundwater monitoring system in 1995, benzene has not been detected in any of the groundwater monitoring wells in the Garber-Wellington. Additionally, benzene has not been detected in the alluvium since July 2003 (Biggs and Mathews, 2011).

After more than 20 years of monitoring since the ROD was issued, none of the primary COCs are currently detected above the ARARs in the Garber Wellington aquifer. Currently, the single secondary COC above the ARAR at the site is arsenic in the Alluvium aquifer. However, groundwater monitoring data from the site, indicates that there is neither a plume of contamination associated with arsenic nor any indication that the detections are a result of a release from the landfill. All other ARARs have been achieved in both aquifers at the point of compliance wells. Also, ARARs for all primary COCs have been achieved in facility Garber-Wellington monitoring wells (Biggs and Mathews, 2012).

Therefore, after more than 20 years of groundwater monitoring results, there is no indication that any constituents have migrated from the overlying alluvium downward into the Garber-Wellington. Based on the calculated vertical travel time (>416 years) through only five feet of shale and the calculated horizontal travel time within the aquifer at less than one foot per year (Biggs and Mathews, 2013), reducing the monitoring frequency to once every five years within site Garber-Wellington monitoring wells would be justified. However, at this time, it is recommended that the site is monitored on an annual basis only.

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- LEGEND**
- Existing Permit Boundary
 - - - Proposed Permit Boundary
 - - - Existing Limits of Waste
 - - - Proposed Limits of Waste
 - MW-222 Garber-Wellington Groundwater Monitoring Well
 - MW-221R2 Proposed New Monitoring Well
 - MW-14R2 Monitoring Well to be plugged
 - 1132 Garber-Wellington Potentiometric Contour (Contours from June 2014)
 - Groundwater Contour Interval - 1'

NOTE:
 1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN JANUARY 19, 2014.



I, John Michael Snyder, am a professional geoscientist and a qualified groundwater scientist. I have reviewed the groundwater monitoring system and supporting data contained herein. In my professional opinion, the groundwater monitoring system is in compliance with the groundwater monitoring requirements specified in ODEQ Rules, §252:515 Subchapter 9. This system has been designed for specific application to the East Oak Landfill, ODEQ Permit No. 3555036.

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

**PROPOSED GROUNDWATER MONITORING SYSTEM
 GARBER-WELLINGTON WELLS**

WWM
**EAST OAK RECYCLING AND DISPOSAL FACILITY
 WASTE MANAGEMENT OF OKLAHOMA, INC.
 MAJOR PERMIT AMENDMENT**

BIGGS & MATHEWS
ENVIRONMENTAL
 CONSULTING ENGINEERS
 6031 I-20 WEST, SUITE 242
 ARLINGTON, TEXAS

DSN. ESF	DATE : 06/15	FIGURE
DWN. BBB	SCALE : GRAPHIC	FA-1
CHK. EAS	DWG : Garb-WellMonSys.dwg	

ATTACHMENT F-B

Statistical Methodologies [Gibbons Report]

Included by reference only.