Karen Blue (adpce.ad)

From: Melissa Vaught <mmv@ftn-assoc.com>
Sent: Tuesday, September 26, 2023 3:51 PM
To: gwreports
Cc: Conrad, David; Reynolds, Jodi; Caldwell, Mike; Dana Derrington
Subject: Revised Sampling and Analysis Plan, Eco-Vista Class 1 and Class 4 Landfills, Solid Waste Permit Nos. 0290-S1-R4 and 0290-S4-R2

Good afternoon. On behalf of Eco-Vista, LLC, please access the link below to download the revised Sampling and Analysis Plan, as required by the recently issued class 1 permit.

https://owncloud.ftn-assoc.com/owncloud/index.php/s/EzmubckAB194IZk

Please contact me or WM if you have any questions.

Thank you,

Melissa Vaught, P.E.*
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ftn Associates Ltd.
water resources / environmental consultants

SAMPLING & ANALYSIS PLAN
ECO-VISTA, LLC, CLASS 1 AND CLASS 4 LANDFILLS
SPRINGDALE, ARKANSAS

PERMIT NOS. 0290-S1-R4 AND 0290-S4-R2
AFIN: 72-00144

SEPTEMBER 26, 2023

SAMPLING & ANALYSIS PLAN
ECO-VISTA, LLC, CLASS 1 AND CLASS 4 LANDFILLS
SPRINGDALE, ARKANSAS

PERMIT NOS. 0290-S1-R4 AND 0290-S4-R2
AFIN: 72-00144

Prepared for

Eco-Vista, LLC
2210 Waste Management Drive
Springdale, AR 72762

Prepared by

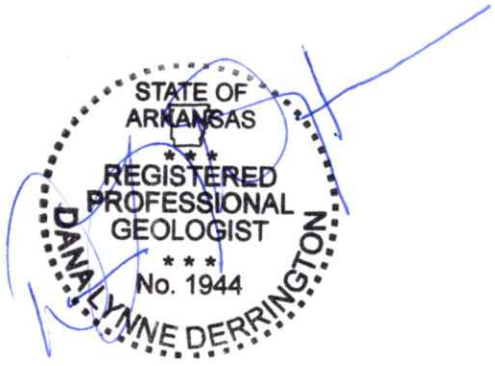
FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

FTN No. R06820-0100-008

September 26, 2023

PROFESSIONAL GEOLOGIST'S CERTIFICATION

With this certification, I certify that I, as a registered professional geologist in the state of Arkansas, am a qualified groundwater scientist as defined in chapter 12 of Arkansas Pollution Control & Ecology Commission Rule No. 22, that this document was prepared under my direction and supervision, and that this document, to the best of my knowledge, meets the applicable requirements of Rule No. 22, §22.1203(j).



Dana L. Derrington, Arkansas PG #1944

09/26/2023
Date

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1.0 INTRODUCTION

Eco-Vista, LLC (herein referred to as Eco-Vista), owns and operates a class 1 landfill and a class 4 landfill located in Washington County, Arkansas, as shown on Figure 1.1. The class 1 landfill is permitted by the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ), under permit no. 0290-S1-R4, issued July 31, 2023, and the class 4 landfill is permitted by DEQ under permit no. 0290-S4-R2 issued March 17, 2023.

FTN Associates, Ltd. (FTN) was contracted by Eco-Vista to update the existing sampling and analysis plan (SAP) in accordance with the requirements of §22.1203(j) following issuance of the class 1 and class 4 permit modifications. The purpose of this SAP is to provide guidelines for sample collection, preservation, shipment, analytical procedures, chain-of-custody (COC) control, and quality control to ensure that monitoring results are an accurate representation of groundwater quality. This SAP also includes procedures for the statistical treatment of groundwater quality data and the associated reporting, recordkeeping, and notification requirements.

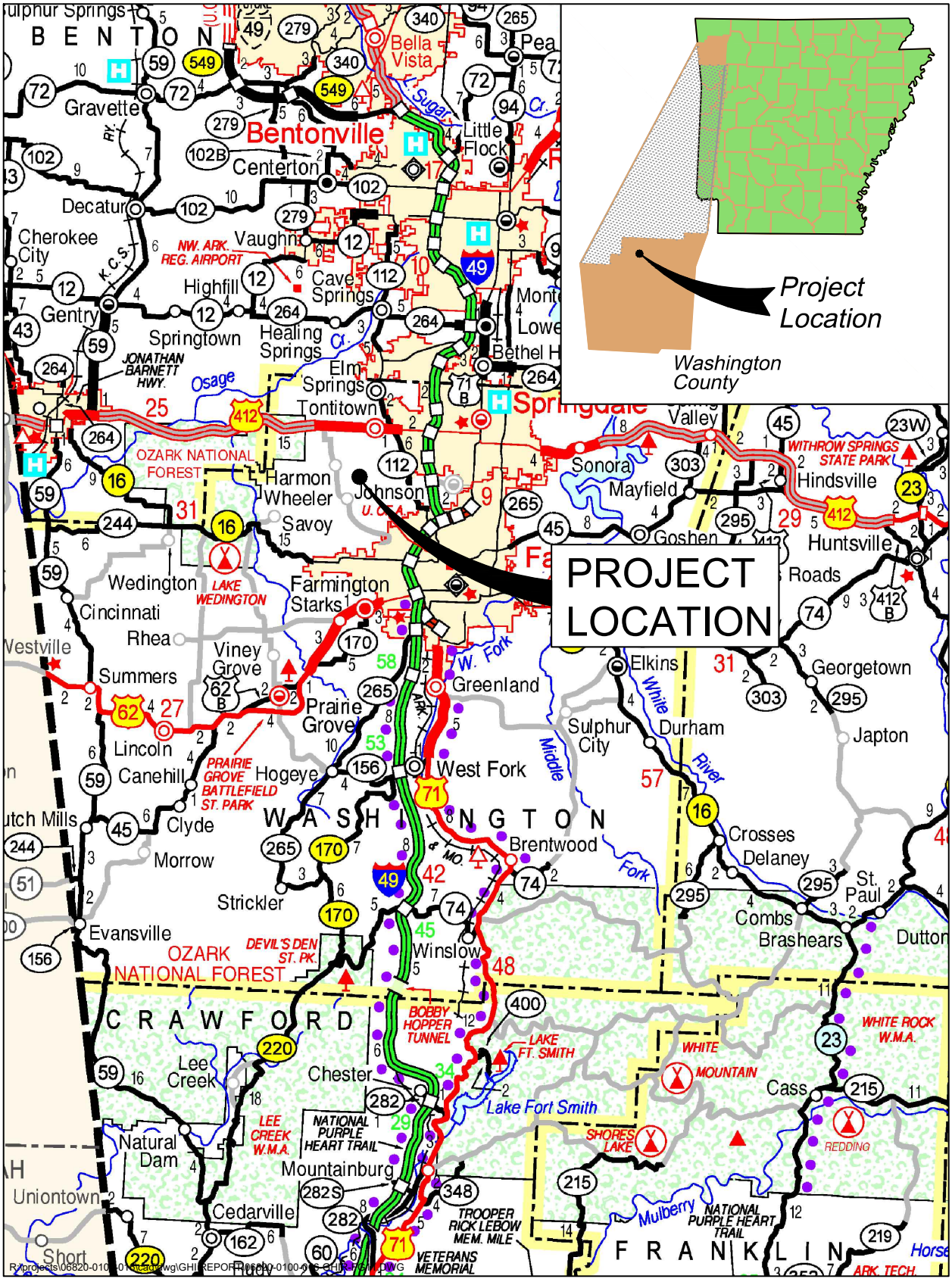


Figure 1.1. Site location map.

2.0 BACKGROUND

This section includes a brief description of the sampling area and summary of the site-specific hydrogeological setting at Eco-Vista. A more in-depth description of the hydrogeological setting can be found in previously submitted site investigations reports for the class 1 landfill (Geraghty & Miller 1986, Genesis Environmental Consulting [GEC] 1997, Chimney Rock Consulting [CRC] 2013a, CRC 2013b, and FTN 2020).

2.1 Sampling Area

As shown on the vicinity map included as Figure 2.1, Eco-Vista is located within the city limits of Tontitown, Arkansas. The more populous cities of Springdale and Fayetteville are located approximately 3 miles to the northeast and southeast of Eco-Vista, respectively. Interstate Highway 49 is located approximately 3.5 miles to the east and US Highway 412 is located approximately 2.3 miles to the north. Topography is gently to steeply sloping at Eco-Vista and in the surrounding area. Eco-Vista is in a rural to exurban area and is bordered by agricultural fields and numerous large residential plots.

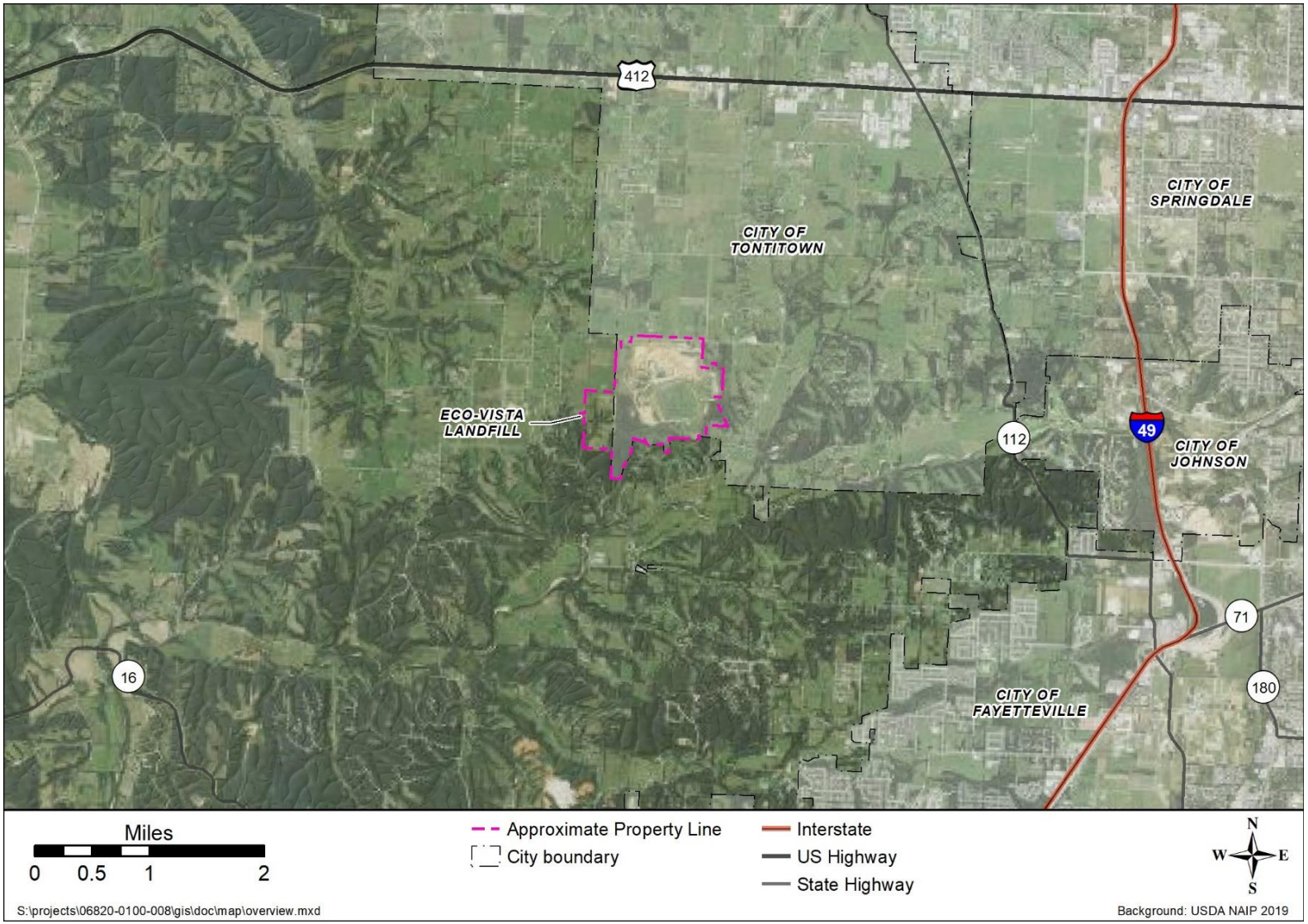


Figure 2.1. Eco-Vista vicinity map.

2.2 Regional Hydrogeology

The uppermost aquifer beneath Eco-Vista is the Springfield Plateau aquifer (hereafter referred to as the aquifer), which is primarily comprised of the limestone and cherty limestones of the Boone formation. In Washington County, the aquifer is 200 to 400 ft thick, is bounded below by the Ozark confining unit, and outcrops in the far northern part of the county (Imes and Emmett 1994). The regional direction of flow in the aquifer is variable and controlled by topography (Gillip, Czarnecki, & Mugel 2008). Generalized potentiometric surface maps based on limited water level data show the regional direction of flow toward the west (Adamski et al. 1995). Natural recharge to the aquifer occurs primarily from infiltration of rainfall where the Boone formation is exposed to the surface. Discharge from the aquifer occurs primarily through springs, wells, and flow to the underlying Ozark aquifer, particularly in areas where the Ozark confining unit is leaky or absent (Kresse et al. 2014, Imes and Emmett 1994).

Groundwater from the aquifer is used for domestic, public, and commercial purposes (Kresse et al. 2014). Published documents indicate that the aquifer yields 20 to 400 gallons per minute (gpm) (Gillip, Czarnecki, & Mugel 2008). The total use of groundwater from this aquifer is not known (Kresse et al. 2014).

2.3 Site Hydrogeology

Groundwater is present in three stratigraphic units beneath Eco-Vista which include (in descending order) regolith, epikarst, and limestone and chert bedrock. Groundwater conditions are variable and discontinuous in the regolith and epikarst units. With few exceptions, groundwater is present within the upper 20 ft of the limestone and chert bedrock based on evidence presented in past site investigation reports (Geraghty & Miller 1986, GEC 1997, CRC 2013a, CRC 2013b, and FTN 2020).

3.0 MONITORING SYSTEM

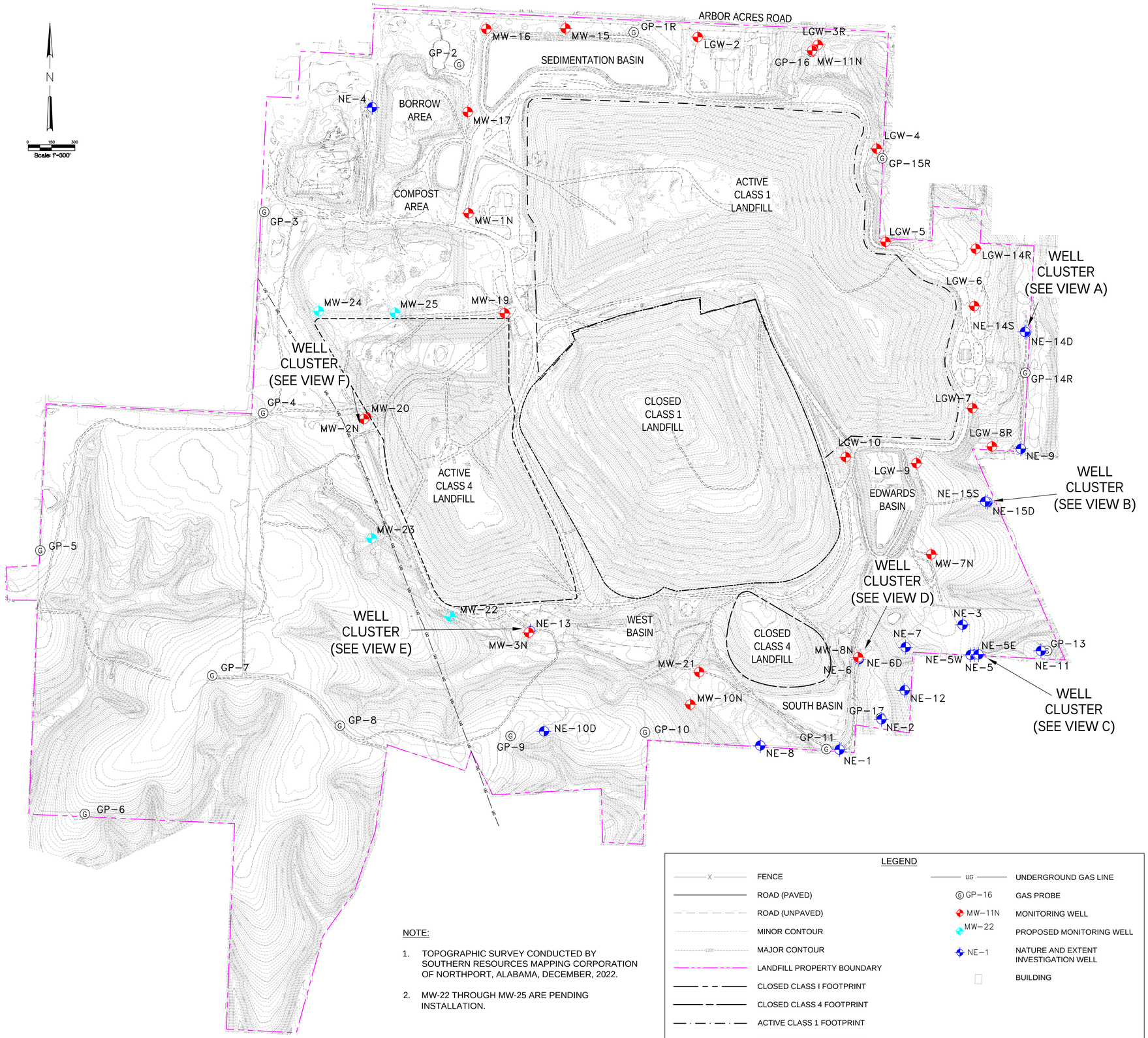
This section describes the required sampling locations for Eco-Vista's monitoring program.

3.1 Monitoring Well Network

The groundwater monitoring system is shown on Figure 3.1 and consists of 27 monitoring wells, four of which are pending installation (DINs 83983 and 84043). Also shown on Figure 3.1 are the 20 nature and extent (NE) wells. Each well varies with respect to the stratigraphic unit monitored, with screen/filter pack materials located in the regolith, epikarst, and/or bedrock units. Each existing well is constructed of 2-inch-diameter, Schedule 40 polyvinyl chloride (PVC) pipe, with screen lengths ranging from 9.2 ft to 25 ft. Tables 3.1 and 3.2 summarize the surveyed measuring point (MP) elevation located on the top of well casing, the total depth, and screened interval for each well. These data are based on well installation records and available survey reports. Available boring logs, well construction details, and survey reports are provided in Appendix A.

3.2 Surface Water

In accordance with permit condition 40 of the class 1 permit, sampling will be conducted at the Wildcat Creek location just north of the intersection of County Road 31 (Harmon Road) and County Road 863 (Clear Water Road). The surface water monitoring location is shown on Figure 3.2.

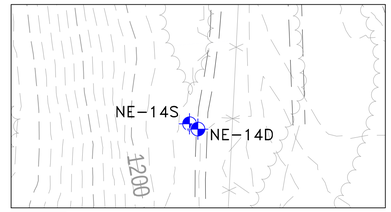


NOTE:

1. TOPOGRAPHIC SURVEY CONDUCTED BY SOUTHERN RESOURCES MAPPING CORPORATION OF NORTHPORT, ALABAMA, DECEMBER, 2022.
2. MW-22 THROUGH MW-25 ARE PENDING INSTALLATION.

LEGEND

- FENCE
- ROAD (PAVED)
- ROAD (UNPAVED)
- MINOR CONTOUR
- MAJOR CONTOUR
- LANDFILL PROPERTY BOUNDARY
- CLOSED CLASS I FOOTPRINT
- CLOSED CLASS 4 FOOTPRINT
- ACTIVE CLASS 1 FOOTPRINT
- ACTIVE CLASS 4 FOOTPRINT
- UNDERGROUND GAS LINE
- GP-16 GAS PROBE
- MW-11N MONITORING WELL
- MW-22 PROPOSED MONITORING WELL
- NE-1 NATURE AND EXTENT INVESTIGATION WELL
- BUILDING



VIEW A
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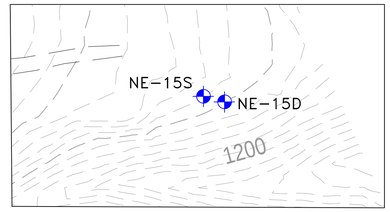

VIEW B
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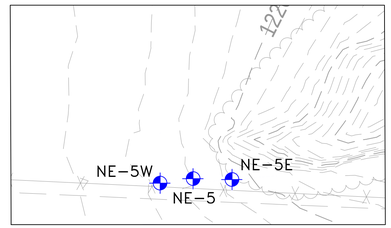

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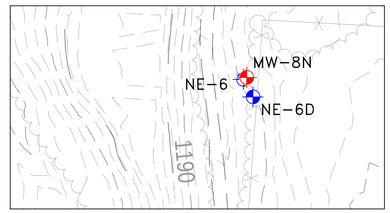

VIEW D
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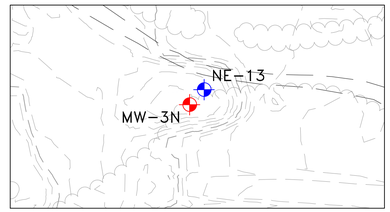

VIEW E
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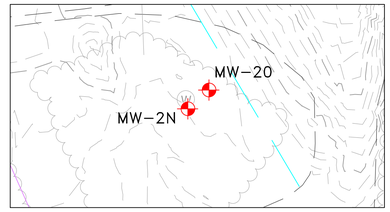

VIEW F
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ENVIRONMENTAL RESOURCES ASSOCIATES, LTD.
water resources / environmental consultants

SAMPLING AND ANALYSIS PLAN
ECO-VISTA, LLC.
CLASS 1 LANDFILL
SPRINGDALE, ARKANSAS

Figure 3.1.
Groundwater Monitoring System

DRAWN BY: jm	FILE NAME: FG31 Rev.DWG
APPROVED: bld	PROJECT NO. 06820-0100-008
SCALE: 1" = 300'	DATE: 09/01/2023
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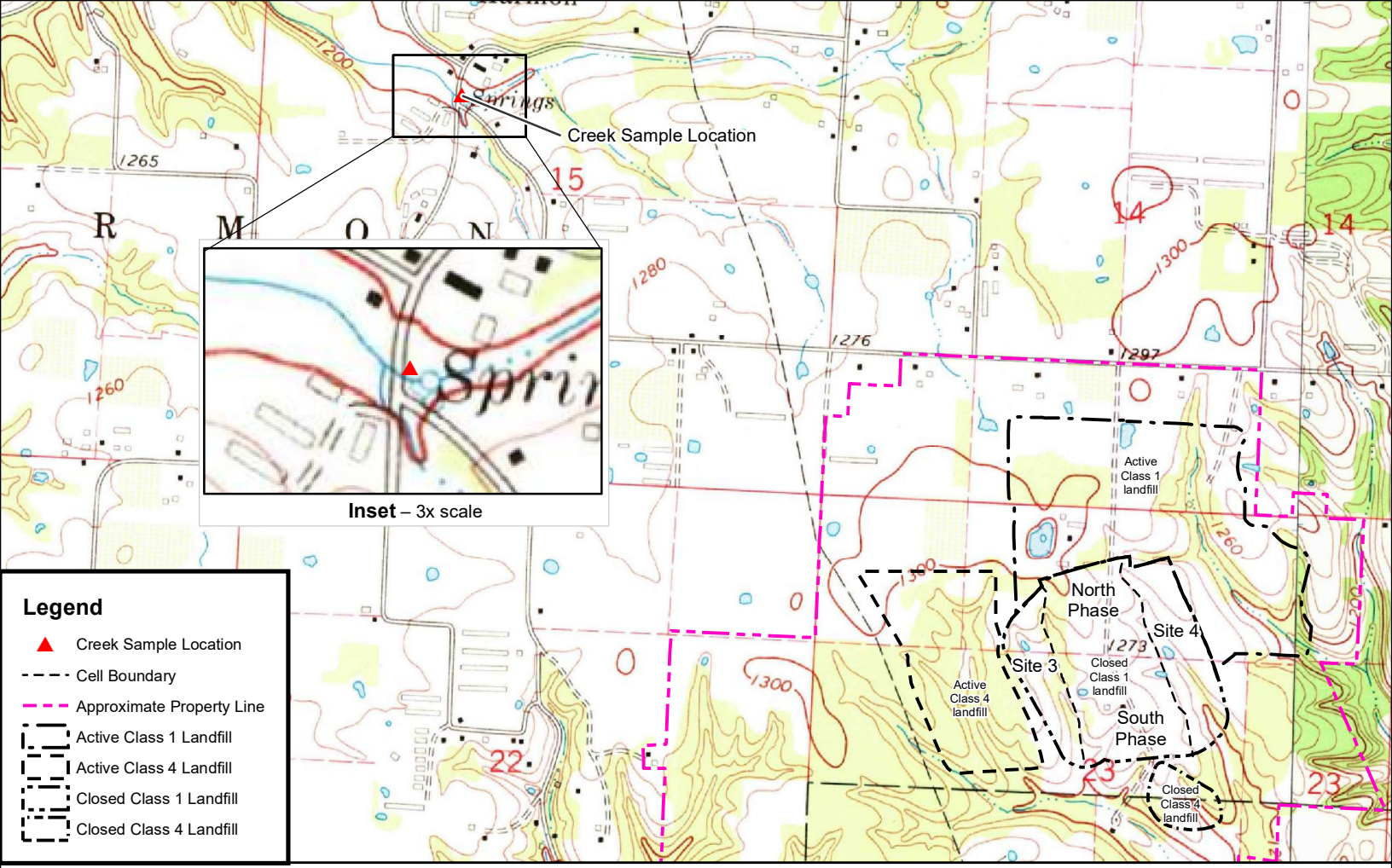

Figure 3.2-Surface Water Monitoring

S:\projects\06820-0100-008\gis\doc\map\Figure 3.2.mxd

Background: USGS Quadrangle, 1970

Table 3.1. Well construction data, groundwater monitoring wells.

Well ID[1]	Date Installed	Ground Surface Elevation (ft SRE[2])	MP Elevation (ft SRE)	Total Depth (ft below MP)	Solid Casing Length (ft)	Screen Length (ft)	Screened Elevation (ft SRE)
MW-1N	9/5/1997	1296.3	1298.57	117.5	97.5	20.0	1201.1-1181.1
MW-2N	9/10/1997	1286.8	1289.59	119.5	99.5	20.0	1190.0-1170.0
MW-3N	9/11/1997	1219.3	1222.09	71.5	61.5	10.0	1160.5-1150.5
MW-7N	9/17/1997	1244.5	1247.31	108.0	98.0	10.0	1152.8-1142.8
MW-8N	9/18/1997	1189.2	1191.74	73.0	53.0	20.0	1138.8-1118.8
MW-10N	9/18/1997	1191.1	1193.74	109.0	89.0	20.0	1104.6-1084.6
MW-11N	9/16/1997	1281.7	1284.50	129.5	109.5	20.0	1175.0-1155.0
MW-15	5/6/2015	1288.6	1291.51	94.1	53.1	20.0	1238.4-1218.4
MW-16	5/7/2015	1286.3	1289.75	118.8	93.8	25.0	1195.9-1170.9
MW-17	5/7/2015	1285.6	1288.99	79.6	59.6	15.0	1229.3-1214.3
MW-19	5/7/2015	1291.2	1293.89	82.9	62.9	20.0	1231.0-1211.0
MW-20	5/7/2015	1286.3	1289.55	83.4	68.4	15.0	1221.1-1206.1
MW-21	4/20/2015	1186.1	1188.90	43.0	33.0	10.0	1155.8-1145.8
LGW-2	9/26/2005	1299.1	1302.23	88.3	73.3	15.0	1228.8-1213.8
LGW-3R	6/16/2015	1286.1	1289.24	74.3	59.3	15.0	1229.9-1214.9
LGW-4	9/26/2005	1265.8	1267.93	82.8	67.8	15.0	1200.0-1185.0
LGW-5	9/21/2005	1269.9	1271.91	86.8	71.8	15.0	1200.1-1185.1
LGW-6	9/27/2005	1242.1	1244.78	73.3	58.3	15.0	1186.5-1171.5
LGW-7	9/27/2005	1219.3	1220.69	63.6	48.6	15.0	1172.0-1157.0
LGW-8R	8/19/2008	1184.7	1186.33	33.2	17.8	15.0	1168.4-1153.4
LGW-9	9/22/2005	1235.4	1237.56	78.9	63.9	15.0	1173.6-1158.6
LGW-10	9/23/2005	1238.7	1240.66	73.7	58.7	15.0	1182.0-1167.0
LGW-14R	8/13/2008	1247.9	1250.83	79.4	64.0	15.0	1186.9-1171.9

Notes: 1. MW-22 through MW-25 are pending installation.
2. Site-referenced elevation.

Table 3.2. Well construction data, NE wells.

Well ID	Date Installed	Ground Surface Elevation (ft SRE)	MP Elevation (ft SRE)	Total Depth (ft below MP)	Solid Casing Length (ft)	Screen Length (ft)	Screened Elevation (ft SRE)
NE-1	4/20/2001	1199.1	1201.55	56.8[a]	47.3	9.5	1154.2-1144.7
NE-2	4/24/2001	1174.1	1176.89	33.5	24.0	9.5	1152.6-1143.1
NE-3[b]	4/26/2001	1228.5	---[b]	87.8[a]	78.2	9.6	1153.3-1143.7
NE-4	5/3/2001	1290.6	1293.26	71.1[a]	61.5	9.6	1231.6-1222.0
NE-5	8/7/2001	1224.2	1227.13	84.4[a]	75.2	9.2	1151.8-1142.6
NE-5E	7/29/2019	1221.3	1224.34	86.6	76.4	10.0	1147.9-1137.9
NE-5W	7/29/2019	1225.7	1228.63	93.7	83.5	10.0	1145.1-1135.1
NE-6	12/15/2016	1189.3	1192.33	58.7[a,c]	48.7[c]	10.0	1144.0-1134.0[c]
NE-6D	7/29/2019	1189.9	1192.94	76.3	66.1	10.0	1126.8-1116.8
NE-7	12/8/2016	1215.0	1217.89	71.4[a]	61.4	10.0	1156.5-1146.5
NE-8	12/20/2016	1171.7	1174.51	32.8[a]	22.8	10.0	1151.7-1141.7
NE-9	12/7/2016	1179.0	1182.02	37.7[a]	27.7	10.0	1154.3-1144.3
NE-10D	7/29/2019	1258.2	1261.07	121.4	111.2	10.0	1149.9-1139.9
NE-11	12/6/2016	1202.2	1203.96	57.0	47.0	10.0	1157.0-1147.0
NE-12	12/13/2016	1211.2	1213.83	77.8[a]	57.8	20.0	1156.1-1136.1
NE-13	12/29/2016	1217.4	1220.18	43.2[a]	33.2	10.0	1187.0-1177.0
NE-14S	7/29/2019	1196.2	1199.24	22.7	12.5	10.0	1186.8-1176.8
NE-14D	7/29/2019	1196.0	1198.81	42.0	31.8	10.0	1167.0-1157.0
NE-15S	7/29/2019	1212.7	1215.36	45.3	35.1	10.0	1180.2-1170.2
NE-15D	7/29/2019	1212.9	1215.67	60.6	50.4	10.0	1165.3-1155.3

Notes:

a. Total depth (in ft bgs) listed on title block of field borehole log does not match total depth indicated on the construction diagram of the field borehole log; total depth listed in table has been adjusted accordingly and also includes solid casing stickup length.

b. Top of casing at NE-3 is damaged and well NE-3 is not required to be sampled under any of the monitoring programs.

c. Solid riser length listed on well log was off by more than 2 ft; total depth was field-confirmed by FTN and solid casing length and screened elevations are consistent with the well construction diagram.

4.0 SAMPLING FREQUENCY AND ANALYSIS

Groundwater must be monitored at Eco-Vista throughout the active life and post-closure period, as required by §22.1201(d). The sampling frequency and analysis for indicator monitoring, detection monitoring, assessment monitoring, nature and extent monitoring/corrective action and Wildcat Creek are shown in Table 4.1. Sampling frequency and analysis for each monitoring program are discussed below. The sampling and analysis approach for new well installations is also discussed.

4.1 Indicator Monitoring

Eco-Vista must collect monthly groundwater samples from the list of wells shown in Table 4.1. Groundwater samples must be analyzed for the following list of indicator parameters: chloride, ammonia (as nitrogen), pH, and specific conductance.

4.2 Detection Monitoring

While in detection monitoring, Eco-Vista must collect groundwater samples at the frequency required by §22.1204(b) for the list of wells shown in Table 4.1. Groundwater samples collected during each detection monitoring period must be analyzed for the list of parameters included in appendix 1 of Rule No. 22 plus chloride, total dissolved solids (TDS), sulfate, total organic carbon (TOC), pH, specific conductance, iron, and manganese. This list is included in Appendix B. Consistent with the historical sampling schedule at Eco-Vista, semiannual samples must be collected during the first and third quarters with resampling performed in the second and fourth quarters, unless extenuating circumstances arise.

4.3 Assessment Monitoring

While in assessment monitoring, Eco-Vista must collect groundwater samples at the frequencies required by §22.1205(b) through (d) at the list of wells shown in Table 4.1. Analysis of groundwater samples must be performed as follows:

- Annually for the list of parameters included in appendix 2 of Rule No. 22 plus chloride, TDS, sulfate, TOC, pH, specific conductance, iron, and manganese at any well that had confirmed measured detections above the GWPS during the prior calendar year. This list is included in Appendix B.
- Triennially for the list of parameters included in appendix 2 of Rule No. 22 plus chloride, TDS, sulfate, TOC, pH, specific conductance, iron, and manganese (Appendix B) at all wells.
- Semiannually for the assessment monitoring constituent (AMC) list, which is comprised of any newly detected appendix 2 parameters (from the triennial analysis) plus the parameters from appendix 1 of Rule No. 22 and TOC, iron, and manganese.

4.4 Nature and Extent/Corrective Action Monitoring

While Eco-Vista is in assessment monitoring or corrective action, the list of NE-series wells shown in Table 4.1 must be monitored for, at a minimum, the same list of parameters and at the same frequency as required by assessment monitoring (Section 4.3).

4.5 Monitor and Report

Wildcat Creek must be sampled semiannually for iron, manganese, TOC, hardness and the AMC list, while Eco-Vista is in assessment monitoring. If Eco-Vista moves into detection monitoring, the sampling parameters will consist of, at a minimum, iron, manganese, TOC, hardness and Rule 22 appendix 1 parameters.

4.6 New Wells

For new wells, the sampling frequency should be performed in accordance with §22.1203(e) or most recent US Environmental Protection Agency (EPA) guidance for the purpose of background data collection. Groundwater samples should be analyzed for the same list of parameters as required by detection or assessment monitoring, as applicable. Sampling for background data sets must continue until a minimum of 8 to 10 independent values have been collected, in accordance with EPA guidance.

Table 4.1. Sampling frequency and analysis.

Program:	Indicator Monitoring	Detection Monitoring	Assessment Monitoring	Nature and Extent/Corrective Action	Monitor and Report
Frequency and Parameters:	Monthly analysis of chloride, ammonia, pH, and specific conductance	Semiannual[(1)] analysis of appendix 1 plus TOC, iron, and manganese	• Semiannual analysis of AMC list plus iron, manganese and TOC[(2)]; • Annual or triennial[(3)] analysis of appendix 2 plus chloride, TDS, sulfate, TOC, pH, specific conductance, iron, and manganese	Follow assessment monitoring schedule	Semiannual analysis of iron, manganese, TOC, hardness and AMC list (while site is in assessment monitoring) or Appendix 1 (while site is in detection monitoring)
Sample Locations:		MW-1N	MW-1N	NE-1	
		MW-2N	MW-2N	NE-2	
		MW-3N	MW-3N	NE-4	
	MW-7N	MW-7N	MW-7N	NE-5	
		MW-8N	MW-8N	NE-5E	
		MW-10N	MW-10N	NE-5W	
		MW-11N	MW-11N	NE-6	
	MW-15	MW-15	MW-15	NE-6D	
	MW-16	MW-16	MW-16	NE-7	
	MW-17	MW-17	MW-17	NE-8	
	MW-19	MW-19	MW-19	NE-9	
		MW-20	MW-20	NE-10D	
		MW-21	MW-21	NE-11	
		MW-22[(4)]		NE-12	
		MW-23[(4)]		NE-13	
		MW-24[(4)]		NE-14D	
		MW-25[(4)]		NE-14S	
	LGW-2	LGW-2	LGW-2	NE-15D	
	LGW-3R	LGW-3R	LGW-3R	NE-15S	
	LGW-4	LGW-4	LGW-4		
	LGW-5	LGW-5	LGW-5		
	LGW-6	LGW-6	LGW-6		
	LGW-7	LGW-7	LGW-7		
	LGW-8R	LGW-8R	LGW-8R		
	LGW-9	LGW-9	LGW-9		
	LGW-10	LGW-10	LGW-10		
	LGW-14R	LGW-14R	LGW-14R		
					Wildcat Creek[(5)]

(1) As needed, retesting for detection monitoring will be conducted in accordance with Section 9.3.1.

(2) In accordance with permit condition 38(b), semiannual events must be performed during the first and third quarters, with resample events performed during the second and fourth quarters as needed and unless extenuating circumstances arise.

(3) Annual analysis of appendix 2 parameters must be collected at wells that had an exceedance above the GWPS during the prior calendar year. Triennial analysis of appendix 2 parameters is required at all 27 wells.

(4) MW-22 through MW-25 are pending installation. In accordance with Section 4.6 and permit condition 38(b), the newly installed wells will be sampled quarterly until sufficient data has been collected to establish background, then sampled quarterly for the AMC list, plus iron, manganese, and total organic carbon, as outlined in permit condition 38(b) and triennially for the Appendix 2 parameters, plus chloride, TDS, sulfate, TOC, pH, specific conductance, iron, and manganese.

(5) Refer to permit condition 40 for the sample collection location.

5.0 LABORATORY ANALYTICAL METHODS

Samples must be analyzed using methods that are appropriate for groundwater in accordance with §22.1204(d). Analytical methods must adhere to procedures and guidance provided in the currently available edition of EPA's in *Test Methods for Evaluating Solid Waste—Physical/Chemical Methods* (SW-846) (EPA 1986b). Suggested methods and associated bottle types, volumes, preservatives, and holding times are provided in Table 5.1 and are based on EPA SW-846 or EPA Clean Water Act analytical method guidelines. These may be adjusted based on the analyte tested and laboratory requirements. The laboratory reports should include all verifiable, positive detections above the constituent practical quantitation limit (PQL) and estimated values (J-flagged) between the method detection limit (MDL) and the PQL. In accordance with §22.1203(h)(5), the PQL or MDL shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions using current laboratory standards. The PQLs and MDLs are determined by the analytical laboratory and are subject to change without notice.

Table 5.1. Suggested analytical methods, volumes, bottle types, preservatives, holding times and method detection limits.

Analyte	Method[1]	Volume & Container	Preservative	Holding Time (days)	MDL[2]
Appendix I Parameters					
Chloride	9056A	125 mL high-density polyethylene (HDPE)	cool to 4° C	28	0.0519 mg/l
Sulfate	9056A	125 mL HDPE	cool to 4° C	28	0.0774 mg/l
Ammonia	350.1	250 mL HDPE	cool to 4° C, $NaThioH_2SO_4$ to pH < 2	28	0.0317 mg/l
Antimony	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000754 mg/l
Arsenic	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000250 mg/l
Barium	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0017 mg/l
Beryllium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000120 mg/l
Cadmium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000160 mg/l
Chromium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000540 mg/l
Cobalt	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000260 mg/l
Copper	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000520 mg/l
Iron	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0141 mg/l
Lead	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0019 mg/l
Manganese	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0012 mg/l
Nickel	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000350 mg/l
Selenium	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0074 mg/l
Silver	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0028 mg/l
Thallium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000190 mg/l
Vanadium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000180 mg/l
Zinc	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.002560 mg/l
TDS	2540 C-2011	250 mL HDPE	cool to 4° C	7	2.82 mg/l
TOC	9060A	250 mL HDPE	cool to 4° C, HCl to pH < 2	28	0.1020 mg/l
VOCs					
Acetone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.001050 mg/l
Acrylonitrile	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000873 mg/l
Benzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00008960 mg/l
Bromochloromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000145 mg/l
Bromodichloromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000080 mg/l
Bromofrom	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000186 mg/l
Carbon disulfide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000101 mg/l
Carbon tetrachloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000159 mg/l
Chlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000140 mg/l
Chloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000141 mg/l
Chloroform	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000086 mg/l
Dibromochloromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000128 mg/l
1,2-dibromo-3-chloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000325 mg/l
1,2-Dibromoethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000193 mg/l
1,2 Dichlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000101 mg/l
1,4 Dichlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000121 mg/l
trans-1,4-Dichloro-2-butene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000257 mg/l
1,1-Dichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000114 mg/l
1,2-Dichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000108 mg/l
1,1-Dichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000188 mg/l
cis-1,2-Dichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00009330 mg/l
trans-1,2-Dichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000152 mg/l
1,2-Dichloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000190 mg/l
cis-1,3-Dichloropropene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00009760 mg/l
trans-1,3-Dichloropropene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000222 mg/l
Ethylbenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000158 mg/l
2-Hexanone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000757 mg/l
Methyl bromide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000157 mg/l
Methyl chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000153 mg/l
Methylene bromide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000117 mg/l
Methylene chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.001070 mg/l
Methyl ethyl ketone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.001280 mg/l
Methyl iodide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000377 mg/l
4-Methyl-2-pentanone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000823 mg/l
Styrene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000117 mg/l
1,1,1,2-Tetrachloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000120 mg/l
1,1,2,2-Tetrachloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000130 mg/l
Tetrachloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000199 mg/l
Toluene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000412 mg/l

Table 5.1. Suggested analytical methods, volumes, bottle types, preservatives, holding times and method detection limits. (Continued)

Analyte	Method[1]	Volume & Container	Preservative	Holding Time (days)	MDL[2]
1,1,1-Trichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000094 mg/l
1,1,2-Trichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000186 mg/l
Trichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000153 mg/l
Trichlorofluoromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000130 mg/l
1,2,3-Trichloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000247 mg/l
Vinyl acetate	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000645 mg/l
Vinyl chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000118 mg/l
Xylenes	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000316 mg/l

Analyte	Method[1]	Volume & Container	Preservative	Holding Time (days)	MDL[2]
Appendix 2 Parameters					
Chloride	9056A	125 mL HDPE	cool to 4° C	28	0.0519 mg/l
Sulfate	9056A	125 mL HDPE	cool to 4° C	28	0.0774 mg/l
Ammonia	350.1	250 mL HDPE	cool to 4° C, $NaThioH_2SO_4$ to pH < 2	28	0.0317 mg/l
TDS	2540 C-2011	250 mL HDPE	cool to 4° C	7	2.82 mg/l
TOC	9060A	250 mL HDPE	cool to 4° C, HCl to pH < 2	28	0.1020 mg/l
Iron	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0141 mg/l
Manganese	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0012 mg/l
Acenaphthene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000316 mg/l
Acenaphthylene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000309 mg/l
Acetone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.001050 mg/l
Acetonitrile	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0150 mg/l
Acetophenone	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002710 mg/l
2-Acetylaminofluorene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000253 mg/l
Acrolein	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.008870 mg/l
Acrylonitrile	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000873 mg/l
Aldrin	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00000813 mg/l
Allyl chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0017 mg/l
4-Aminobiphenyl	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000461 mg/l
Anthracene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000291 mg/l
Antimony	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000754 mg/l
Arsenic	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000250 mg/l
Barium	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0017 mg/l
Benzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00008960 mg/l
Benzo[a]anthracene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.00009750 mg/l
Benzo[b]fluoranthene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.00008960 mg/l
Benzo[k]fluoranthene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000355 mg/l
Benzo[ghi]perylene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000161 mg/l
Benzo[a]pyrene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000340 mg/l
Benzyl alcohol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000393 mg/l
Beryllium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000120 mg/l
alpha-BHC	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001660 mg/l
beta-BHC	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001840 mg/l
delta-BHC	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000015 mg/l
gamma-BHC	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001760 mg/l
Bis-(2-chloroethoxy)methane	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000329 mg/l
Bis(2-chloroethyl) ether	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001620 mg/l
Bis-(2-chloro-1 -methylethyl) ether	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000445 mg/l
Bis(2-ethylhexyl) phthalate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000709 mg/l
Bromochloromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000145 mg/l
Bromodichloromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000080 mg/l
Bromoform	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000186 mg/l
4-Bromophenyl phenyl ether	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000335 mg/l
Butyl benzyl phthalate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000275 mg/l
Cadmium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000160 mg/l
Carbon disulfide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000101 mg/l
Carbon tetrachloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000159 mg/l
Chlordane	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001980 mg/l
p-Chloroaniline	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000382 mg/l
Chlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000140 mg/l
Chlorobenzilate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001330 mg/l
p-Chloro-m- cresol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000263 mg/l
Chloroform	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000086 mg/l

Table 5.1. Suggested analytical methods, volumes, bottle types, preservatives, holding times and method detection limits. (Continued)

Analyte	Method[1]	Volume & Container	Preservative	Holding Time (days)	MDL[2]
2- Chloronaphthalene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000330 mg/l
2- Chlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000283 mg/l
4- Chlorophenyl phenyl ether	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000303 mg/l
Chloroprene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0017 mg/l
Chromium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000540 mg/l
Chrysene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000332 mg/l
Cobalt	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000260 mg/l
Copper	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000520 mg/l
m-Cresol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000266 mg/l
o-Cresol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000312 mg/l
p-Cresol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000266 mg/l
Cyanide	9012B	250 mL HDPE	cool to 4° C, NaOH to pH > 12	14	0.0018 mg/l
2,4-D	8151	1 L amber glass	cool to 4° C	7	0.000744 mg/l
4,4^1-DDD	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000017 mg/l
4,4^1-DDE	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001540 mg/l
4,4^1-DDT	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001770 mg/l
Diallate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000524 mg/l
Dibenz[a,h]anthracene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000279 mg/l
Dibenzofuran	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000338 mg/l
Dibromochloromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000128 mg/l
1,2-Dibromo-3- chloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000325 mg/l
1,2- Dibromoethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000193 mg/l
Di-n-butyl phthalate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000266 mg/l
o- Dichlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000101 mg/l
m- Dichlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000130 mg/l
p- Dichlorobenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000121 mg/l
3,3^1- Dichlorobenzidine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002020 mg/l
trans-1,4- Dichloro-2- butene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000257 mg/l
Dichlorodifluoro methane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000127 mg/l
1,1-Dichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000114 mg/l
1,2 - Dichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000108 mg/l
1,1- Dichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000188 mg/l
cis-1,2- Dichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00009330 mg/l
trans-1,2- Dichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000152 mg/l
2,4- Dichlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000284 mg/l
2,6- Dichlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002770 mg/l
1,2- Dichloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000190 mg/l
1,3- Dichloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000147 mg/l
2,2- Dichloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00009290 mg/l
1,1- Dichloropropene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000128 mg/l
cis-1,3- Dichloropropene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.00009760 mg/l
trans-1,3- Dichloropropene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000222 mg/l
Dieldrin	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00000751 mg/l
Diethyl phthalate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000282 mg/l
Thionazin	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000204 mg/l
Dimethoate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001440 mg/l
p- (Dimethylamino) azobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000208 mg/l
7,12- Dimethylbenz[a] anthracene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001710 mg/l
3,3^1- Dimethylbenzidine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.003390 mg/l
2,4- Dimethylphenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000624 mg/l
Dimethyl phthalate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000283 mg/l
m-Dinitrobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000359 mg/l
4,6-Dinitro-o- cresol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002620 mg/l
2,4- Dinitrophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.003250 mg/l
2,4- Dinitrotoluene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001650 mg/l
2,6- Dinitrotoluene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000279 mg/l
Dinoseb	8270C	100 mL amber glass (2)	cool to 4° C	7	0.0179 mg/l
Di-n-octyl phthalate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000278 mg/l
Diphenylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001190 mg/l
Disulfoton	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000267 mg/l
Endosulfan I	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000016 mg/l
Endosulfan II	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001640 mg/l
Endosulfan sulfate	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001960 mg/l
Endrin	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001610 mg/l

Table 5.1. Suggested analytical methods, volumes, bottle types, preservatives, holding times and method detection limits. (Continued)

Analyte	Method[1]	Volume & Container	Preservative	Holding Time (days)	MDL[2]
Endrin aldehyde	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001420 mg/l
Ethylbenzene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000158 mg/l
Ethyl methacrylate	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0014 mg/l
Ethyl methanesulfonate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000326 mg/l
Famphur	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001060 mg/l
Fluoranthene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000310 mg/l
Fluorene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000323 mg/l
Heptachlor	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001080 mg/l
Heptachlor epoxide	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001750 mg/l
Hexachlorobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000341 mg/l
Hexachlorobutadiene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000329 mg/l
Hexachlorocyclopentadiene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002330 mg/l
Hexachloroethane	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000365 mg/l
Hexachloropropene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000149 mg/l
2-Hexanone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000757 mg/l
Indeno(1,2,3- cd)pyrene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000279 mg/l
Isobutanol	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0390 mg/l
Isodrin	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000293 mg/l
Isophorone	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000272 mg/l
Isosafrole	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000409 mg/l
Kepone	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001880 mg/l
Lead	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0019 mg/l
Mercury	7470A	250 mL HDPE	HNO_3 to pH < 2	180	0.000049 mg/l
Methacrylonitrile	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0130 mg/l
Methapyrilene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.004250 mg/l
Methoxychlor	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.00001930 mg/l
Methyl bromide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000157 mg/l
Methyl chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000153 mg/l
3- Methylcholanthrene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000164 mg/l
Methyl ethyl ketone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.001280 mg/l
Methyl iodide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000377 mg/l
Methyl methacrylate	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0012 mg/l
Methyl methanesulfonate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000647 mg/l
2- Methylnaphthalene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000311 mg/l
Methyl parathion	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000213 mg/l
4-Methyl-2- pentanone	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000823 mg/l
Methylene bromide	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000117 mg/l
Methylene chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.001070 mg/l
Naphthalene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000372 mg/l
1,4- Naphthoquinone	8270C	100 mL amber glass (2)	cool to 4° C	7	0.005560 mg/l
1-Naphthylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000289 mg/l
2-Naphthylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000195 mg/l
Nickel	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000350 mg/l
o-Nitroaniline	8270C	100 mL amber glass (2)	cool to 4° C	7	0.0019 mg/l
m-Nitroaniline	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000308 mg/l
p-Nitroaniline	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000349 mg/l
Nitrobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000367 mg/l
o-Nitrophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000320 mg/l
p-Nitrophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002010 mg/l
N-Nitrosodi-n- butylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000331 mg/l
N- Nitrosodiethylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000497 mg/l
N- Nitrosodimethylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001260 mg/l
N- Nitrosodiphenylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001190 mg/l
N- Nitrosodipropylamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000403 mg/l
N- Nitrosomethylethalamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001710 mg/l
N- Nitrosopiperidine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000268 mg/l
N- Nitrosopyrrolidine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002550 mg/l
5-Nitro-o- toluidine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001990 mg/l
Parathion	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000379 mg/l
Pentachlorobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000369 mg/l
Pentachloronitro benzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000327 mg/l
Pentachlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000313 mg/l
Phenacetin	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000262 mg/l
Phenanthrene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000366 mg/l

Table 5.1. Suggested analytical methods, volumes, bottle types, preservatives, holding times and method detection limits. (Continued)

Analyte	Method[1]	Volume & Container	Preservative	Holding Time (days)	MDL[2]
Phenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000334 mg/l
p- Phenylenediamine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.3870 mg/l
Phorate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000382 mg/l
PCB 1016	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.0001 mg/l
PCB 1221	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000073 mg/l
PCB 1232	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000042 mg/l
PCB 1242	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000047 mg/l
PCB 1248	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000086 mg/l
PCB 1254	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000047 mg/l
PCB 1260	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000120 mg/l
Pronamide	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000265 mg/l
Propionitrile	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.0130 mg/l
Pyrene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000330 mg/l
Safrole	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000259 mg/l
Selenium	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0074 mg/l
Silver	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0028 mg/l
Silvex	8151	1 L amber glass	cool to 4° C	7	0.000845 mg/l
Styrene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000117 mg/l
Sulfide	4500S2 D-2011	250 mL amber glass	cool to 4° C, NaOH + ZnAc to pH > 9	7	0.0065 mg/l
2,4,5-T	8151	1 L amber glass	cool to 4° C	7	0.000843 mg/l
1,2,4,5- Tetrachlorobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.002410 mg/l
1,1,1,2- Tetrachloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000120 mg/l
1,1,2,2- Tetrachloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000130 mg/l
Tetrachloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000199 mg/l
2,3,4,6- Tetrachlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.0020 mg/l
Thallium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000190 mg/l
Tin	6010B	250 mL HDPE	HNO_3 to pH < 2	180	0.0044 mg/l
Toluene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000412 mg/l
o-Toluidine	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000362 mg/l
Toxaphene	8081/8082	100 mL amber glass (2)	cool to 4° C, pH 5-9	7	0.000168 mg/l
1,2,4- Trichlorobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000355 mg/l
1,1,1- Trichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000094 mg/l
1,1,2- Trichloroethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000186 mg/l
Trichloroethylene	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000153 mg/l
Trichlorofluoromethane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000130 mg/l
2,4,5- Trichlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000236 mg/l
2,4,6- Trichlorophenol	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000297 mg/l
1,2,3- Trichloropropane	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000247 mg/l
0,0,0- Triethyl phosphorothioate	8270C	100 mL amber glass (2)	cool to 4° C	7	0.000537 mg/l
1,3,5- trinitrobenzene	8270C	100 mL amber glass (2)	cool to 4° C	7	0.001320 mg/l
Vanadium	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.000180 mg/l
Vinyl acetate	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000645 mg/l
Vinyl chloride	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000118 mg/l
Xylene (total)	8260B	40 mL amber (3)	cool to 4° C, HCl to pH < 2	14	0.000316 mg/l
Zinc	6020	250 mL HDPE	HNO_3 to pH < 2	180	0.002560 mg/l

Notes: 1. Analytical methods listed may be substituted, as necessary, provided that the alternate methods provide adequate analytical data to fulfill monitoring requirements and meet regulatory standards.

2. Listed MDLs are based on currently achievable levels by the third-party laboratory and are subject to change. As required by §22.1204(d), MDLs will be less than or equal to the values reported in EPA Report SW-846 unless written approval from the Division is granted.

6.0 FIELD METHODS AND PROCEDURES

This section describes procedures that should be used to collect representative groundwater samples in accordance with §22.1203(j). A field sampling logbook that includes this SAP and WM's environmental media sampling standard (WM Groundwater Protection Program [GPP] 2012) should be provided to the sampling team prior to each sampling event.

6.1 Field Equipment

6.1.1 Purging and Sampling Devices

WM requires the use of QED bladder pumps for groundwater sampling. The use of other equipment should be approved by the WM GPP Director. The GPP director may approve the following types of equipment:

- Dedicated bailers, or
- Disposable bailers.

Recommended options for purging include positive-displacement pumps (bladder pumps), or peristaltic pumps with adjustable flow control. Sampling devices and associated tubing are to be made of inert materials to reduce the possibility of these materials altering sample chemistry.

6.1.2 Water Level Measurement Device

An electric water level meter is to be used to gauge static water levels in the monitoring wells. The tape circuitry is to be checked prior to use by lowering the electrode probe into potable water to determine if the indicators are functioning properly.

6.1.3 Calibration

Field devices used to measure water quality parameters are to be calibrated prior to use each day using commercial standards. If at any time instrument readings seem inaccurate based on historical data or professional judgment, calibration is to be checked and the instrument recalibrated if necessary. All field calibration data are to be recorded on a calibration form similar to the one provided in Appendix C.

Periodic calibration of the electric tape is to be performed to account for tape stretch over time.

6.2 Well Inspection

A well condition summary form and well condition inspection form should be filled out prior to sampling activities. These records should be submitted to a WM representative to communicate well maintenance needs. These forms can be found in Appendix C. If samplers encounter unusual conditions at a sampling location during the inspection that could result in collection of a non-representative sample, the sampler should notify the WM representative before collecting the sample. With input from the sampling personnel, the WM representative should decide whether to delay sampling or collect a sample. Examples of unusual conditions that could affect sample integrity include the following:

- A damaged well or sample point,
- Evidence of tampering,
- Gas emanating from well,
- Strong or unusual odors,
- Significant soil staining or other evidence that a spill may have occurred near the well, or
- Excessive turbidity.

6.3 Groundwater Level Measurements

Static water levels in all monitoring wells are to be gauged using an electric tape prior to any purging, sampling, or other activities that may change the water level. All readings are to be taken using the same deflection point on the indicator to ensure that water levels should be consistent among measurements. Water level data for each sampling event should be collected within a one-day period or less.

The tape is to be lowered slowly into each well until the indicator shows that contact with the water surface has been made. The depth to water should be recorded at the MP to the nearest 0.01 ft. The MP elevations are identified in Table 3.1. The date and time measured should also be recorded for each measurement. Verification measurements are to be taken until repeat measurements are within 0.02 ft of the original, or until the reason for lack of agreement is determined. If more than two measurements are required, best judgment is to be used to select the measurement most representative of field conditions. Additionally, any outside influences on water levels such as barometric changes or nearby pumping are to be noted. An example water level measurement form is included in Appendix C. The electric tape probe should be decontaminated prior to its use in each well.

Measuring to the bottom of the well may cause re-suspension of settled solids and cause protracted purging times for turbidity stabilization. If necessary, well depths should be measured after sampling is completed.

6.4 Well Purging and Sample Extraction

This section describes allowable well purging and sample extraction methods for the groundwater monitoring program. These methods are based on EPA guidance documents (Puls and Barcelona 1996) and the WM environmental media sampling standard (WM GPP 2012).

6.4.1 Low-Flow (Minimal Drawdown) Purging

Purging should be conducted at low-flow rates (<0.1 to 0.5 L/min) and continue until three successive readings are within ±0.2 su for pH, ±5% for conductivity, and ±10% or 0.2 mg/L

for dissolved oxygen, and until turbidity readings are 10 Nephelometric turbidity units (NTUs) or less, if reasonably possible. While stabilizing turbidity values below 10 NTUs and maintaining a minimal drawdown of (<0.33 ft) during purging is desirable, these protocols are not mandatory for sample collection. In accordance with the WM environmental media sampling standard (WM GPP 2012), should sample turbidity fall between 50 NTUs and 500 NTUs, the sampler should attempt to lower the turbidity by performing additional purging for a reasonable period of time or by lowering the flow rate. If NTU values exceed 500 and no attempt has been successful in lowering the turbidity below 500 NTUs, then the sampler should contact a WM representative and only collect a sample when authorized.

Water quality parameters are to be measured and recorded every 3 to 5 minutes during low-flow purging, as applicable. If parameters do not stabilize, at least three well water column volumes should be removed. The water level is to be checked periodically (every 3 to 5 minutes, or as appropriate) to monitor drawdown in the well as a guide to flow rate adjustment. Field personnel should avoid allowing recharge water to cascade in the well and should make proper adjustments to stabilize the flow rate as soon as possible. Purge rates and total volume of water purged are to be documented on the field information form in Appendix C. Formulas and methods to calculate the total volume of water in a well and volume of water removed during purging are provided in Appendix C.

Sampling should be performed as soon as possible after the well is purged and field measurements are performed. The same device used for purging the well is to be used to sample to reduce disturbance to the water column. The sampling flow rate should generally remain at the established purge rate (<0.1 to 0.5 L/min) unless minimal adjustments need to be made to minimize turbulence during the filling of sample bottles. Equipment and procedures that minimize sample agitation and reduce/eliminate contact with the atmosphere during sample transfer are to be utilized.

Non-dedicated sampling equipment should be decontaminated between wells as described in Section 6.6.

Groundwater samples should not be field-filtered prior to laboratory analysis in accordance with §22.1203(b). The exception to this is if sample turbidity of 10 NTUs or less cannot be achieved. Under this circumstance, a field-filtered split sample may be taken for comparative analysis using an in-line 0.45-micron filter. However, non-filtered samples should be collected for all required analyses.

6.4.2 Purging with Bailers

Bailers may only be used when approved by the GPP director, and using only disposable bailers and cordage is preferred. When bailers are approved for use, samplers should take the following steps:

- Attach new unused nylon line to the bailer each time it is used, regardless of whether the bailer is dedicated or disposable;
- Thoroughly rinse the bailer and line with distilled or deionized water prior to use;
- Lower the bailer to the midpoint of the well screen when performing traditional purging or to the bottom of the well screen if sampling with the complete evacuation method;
- Minimize splashing and bubbling as the bailer fills by slowly lowering the bailer below the water level; and
- Prevent the bailer or bailer line from touching the ground.

If a dedicated bailer is used, the bailer should be hung within the well above the water level between sampling events and the bailer line should be discarded.

6.4.3 Traditional Purging

When low-flow purging is not utilized, monitoring wells should be pumped prior to sample collection according to site-specific requirements, typically until three to five well volumes are removed. Other criteria for this method are listed as follows:

- Parameters should be stabilized with as little drawdown as possible;
- The pump inlet screen should never be exposed; and
- The same parameter stabilization criteria mentioned above in Section 6.4.1 should be met.

6.4.4 Wells That Purge Dry

When a well purges dry, recharge is very slow, drawdown is excessive, and the well is almost completely evacuated when pumping at low flow rates (0.5 L/min) and field parameters do not stabilize; therefore, field parameters are only recorded when samples are collected. When the above criteria are met, WM generally uses either the complete evacuation method or the minimal purge method to sample wells.

6.4.4.1 Complete Evacuation Method

When using the complete evacuation method, wells are purged dry and then allowed to recover before collecting the samples. When using this method, the following protocols should be followed:

- Document the date and time for both well evacuation and sample collection.
- Evacuate the well until it yields little or no water.
- Record the total volume of water removed.
- Allow the well to recover as specified in the site's controlling documents. If recovery criteria are not specified, collect samples as follows:
    - After the water level has recovered to 50% of the original water level,
    - When there is sufficient water to fill all sample bottles, or
    - At least 24 hours after evacuation.
- Record field parameters after collecting the samples for laboratory analysis.

6.4.4.2 Minimal Purge Method

This method is not approved for use in all states; therefore, it should only be used when specified in the controlling documents or authorized by the WM GPP director. When using this method, dedicated sampling pumps are required; bailers or non-dedicated pumps may not be used. To perform this method, the following protocols should be followed:

1. Calculate the volume of the water within the dedicated sample pump and tubing;
2. Purge one to three times that volume;
3. Record the total volume of water removed; and
4. Record field parameters after samples for laboratory analysis are collected.

The pumping rate used for minimal purge sampling is generally 100 mL per minute or less.

6.5 Wildcat Creek Sampling

This section describes the methods for collecting a surface water sample from Wildcat Creek. A surface water sample can be collected either utilizing a peristaltic pump or by taking a grab sample with a transfer device such as a polyethylene or stainless-steel dipper. Water quality parameters should be recorded prior to sample collection. To perform surface water sampling with a peristaltic pump, the following protocols should be followed:

1. Use new polyethylene and silicone peristaltic pump tubing.
2. Place the intake end of the tubing into the creek to a depth of 6 to 12 inches below the water surface, where possible, and turn the pump on.
3. Pump several tubing volumes through the system to flush the tubing prior to sample collection.
4. Fill the sample bottles, being careful not to remove the inlet tubing from the water.

To perform surface water sampling using the grab method, the following protocols should be followed:

1. Rinse the dipper with ample amounts of stream water prior to collecting the first sample. Discard the rinsate downstream from the sampling location.
2. After rinsing, fill the dipper with sample water from within the top 12 inches of the water column and avoid skimming the surface of the water during collection. Minimize agitation of the sample.
3. Fill sample containers directly from the dipper. Minimize agitation during bottle filling. Do not touch the sample bottle with the dipper.

6.6 Sampling Records

Field observations and information pertinent to sampling should be recorded in the field logbook. All entries are to be legible and made in indelible ink. Entry errors are to be crossed out with a single line, dated, and initialed by the person making the correction. Documentation is to be sufficient to reconstruct each sampling event without relying on field personnel memory. A form similar to the field information form included in Appendix C is to be used to record sampling data and information, including the following:

1. Sample location, including facility name and sample number or well number;
2. Date and time of sampling;
3. Identification of field personnel;
4. Weather conditions;
5. Sampling method;
6. Well evacuation method, rates, and volume of groundwater purged;
7. Depth to groundwater surface;
8. Field observations of sample appearance, color, turbidity, etc.;

9. Field measurements (pH, specific conductance, temperature, dissolved oxygen, oxidation reduction potential, and turbidity); and
10. Other pertinent information.

Samplers should identify inconsistent measurements by comparing current data to results from the prior sampling event. Inconsistent data are results between two sampling events that vary more than the following:

- pH: ±1 standard unit,
- Specific conductance: ±25%, or
- Turbidity: significant change in clarity.

In the event where inconsistent data are observed, samplers should verify the calibration of the meters and make an attempt to resolve the issue by performing additional purging. Where meter calibration and additional purging do not resolve the issue, samplers should report the information to the WM representative before collecting a sample.

6.7 Equipment Decontamination Procedures

Non-dedicated sampling equipment and test equipment that enter the well or contact the sample should be thoroughly decontaminated before use at each well location. Disposable items such as rope or low-grade tubing shall not be re-used between wells and shall be properly disposed of in an appropriate trash receptacle. The procedures for equipment cleaning are as follows, unless otherwise specified by the manufacturer:

1. Clean with potable water and phosphate-free laboratory detergent;
2. Rinse thoroughly with potable water;
3. Rinse thoroughly with distilled/deionized water, and
4. Air dry.

Non-sample-contacting equipment that should be decontaminated includes field instrument probes. Probes are triple-rinsed with type I distilled water before use and between wells, as applicable. If needed, probes should be washed using a detergent solution. These procedures follow ASTM D5088-15a, *Standard Practice for Decontamination of Field Equipment Used at Waste Sites* (ASTM International 2015), and are consistent with EPA protocol. Decontamination procedures are to be documented in the field sampling logbook, as needed.

6.8 Sample Labeling, Preservation, and Shipment

Sample containers are to be labeled with the following information:

1. Site name;
2. Sample location name;
3. Analytes to be measured;
4. Date and time sampled;
5. Sample collector's initials; and
6. Remarks (preservatives, storage temperature, or special considerations in collection).

Sample containers should be filled and stored as follows:

1. Sample containers should be filled completely full to minimize headspace;
2. Sample containers should be tightly sealed and placed in re-sealable bags;
3. All sample containers should be placed in a cooler that is double-bagged to prevent liquid from leaking from the cooler during shipment or direct transport to the laboratory;
4. Pack leachate or other highly impacted samples in separate coolers;
5. If required, coolers are to be ice-filled to maintain the required sample temperature (see Table 5.1);

6. Prior to transport or shipment, the sampling team should inspect the condition of the samples and the COC documentation to verify that containers were correctly labeled; and
7. Affix a custody seal over the lid and secure the cooler by taping over the seal when shipping samples.

If shipped by commercial carrier, the following protocols should be followed:

1. Each ice chest should be labeled with the names, addresses, and telephone numbers of field personnel and laboratory personnel;
2. The original COC and field information forms should be double-sealed in plastic bags and taped to the inside of the cooler lid. The sampler should also retain a copy of these forms; and
3. Following federal and state regulations, samples should be marked as environmental samples and shipped (overnight).

6.9 Chain-of-Custody Documentation

COC procedures should be followed to establish a written record concerning sample transport from the sampling site to the laboratory. The sampling team leader should be responsible for the completion of the COC form and for the care and custody of the samples collected until they are transferred or dispatched properly. COC documentation should include the following information:

1. Site/project name and number;
2. Sample identification;
3. Date and time of sample collection;
4. Sample type;
5. Sample location;
6. Preservatives added (if appropriate);
7. Analysis requested;
8. Signatures, dates, and times involved in the chain of possession; and

9. Remarks relaying other information to the laboratory.

COC forms should be completed in duplicate. One copy of the COC should be retained by the sampling team and the other copy should be shipped/transported to the laboratory with the samples. Upon arrival at the laboratory, the laboratory sample custodian should sign for custody and return a copy of the COC form with the analytical data. Custody of the samples should then proceed according to the policies of the laboratory.

6.10 Disposal of Residual Material

In the process of collecting environmental samples, the sampling team should generate different types of wastes, including used personal protective equipment (PPE), disposable sampling equipment, and purged groundwater. Decontamination fluids should also be generated during each sampling event and should consist of deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid should be sufficiently low to allow disposal at the site or sampling area. Listed below are the procedures that are to be followed for handling the materials from each sampling event:

- Used PPE and disposable equipment should be double-bagged and placed in a municipal refuse dumpster, and
- Purge water should be discharged to the ground at least 20 ft from the wellhead and draining away from the well unless controlling documents specify handling purge water differently.

7.0 QUALITY CONTROL

This section describes field and laboratory quality assurance/quality control (QA/QC) and procedures.

7.1 Field Quality Control Samples

All field QC samples should be prepared in the same manner as groundwater samples with regard to analytical method and sample volume, container, and preservation. COC procedures for the QC samples should be the same as those used for groundwater samples.

7.1.1 Duplicates

Field duplicates are two samples taken concurrently from the same well and as close to each other in time as practical. Data from the duplicate pair are compared to evaluate the level of precision associated with the sampling and analytical methods. The duplicate sample should be collected by alternating filling between the regular sample and duplicate sample bottles while following the designated sampling order for the sampling bottle sets. The duplicate should then be sealed and shipped in the same manner as the groundwater sample. Unless specified otherwise in the controlling documents or by the WM representative, a minimum of one duplicate sample per sampling event should be collected, or one per 20 groundwater samples, whichever is greater.

7.1.2 Trip Blanks

Trip blanks are used to determine error introduced to organic samples by shipping or analytical procedures. Trip blanks are prepared by the laboratory and shipped with the other sample bottles. Trip blanks should remain sealed and should be identified on the COC form. Unless specified otherwise in the controlling documents or by the WM representative, a minimum of one trip blank should be provided per cooler containing volatile organic samples.

7.1.3 Equipment Blanks

Equipment blanks are required for all sampling events where non-dedicated sampling equipment is used. Equipment blank results are used to verify that proper protocols for collection of samples and decontamination of equipment were followed in the field. Equipment blanks are prepared by pouring laboratory-supplied deionized water into or over the sampling device after it has been properly decontaminated, and then pouring the water into the equipment blank sample bottles with the appropriate preservative. Equipment blanks are identified on the COC form using the designation EB-(#) and are sealed and shipped in the same manner as the groundwater samples. A minimum of one equipment blank should be taken each day that non-dedicated equipment is used.

7.1.4 Field Blanks

Field blank results are used to assess contamination from field conditions during sampling and should be prepared at a sampling location that is likely to be affected by field environmental conditions (e.g., near a gas well). Field blanks are prepared in the field at the sampling site by pouring laboratory-supplied deionized water into clean, empty sample containers provided by the laboratory. The blank should be unfiltered and observations that may explain anomalous results should be noted on the field information form. Field blanks are identified on the COC form using the designation FB-(#) and are sealed and shipped in the same manner as the groundwater samples. If not specified in the controlling documents or by the WM representative, a minimum of one field blank should be collected per sampling event, or one per 20 groundwater samples, whichever is greater.

7.2 Laboratory Quality Control Samples

Laboratory QC samples should include method blanks, matrix spikes, and surrogate recoveries equivalent to those described in EPA's SW-846 or its equivalent. Results from the QC samples should be used to verify laboratory accuracy and precision. The analytical laboratory should use standard procedures to monitor and document performance and to implement an effective program.

8.0 DATA REVIEW

Laboratory and field documentation records are to be reviewed as soon as practicable following each sampling event. The following sections describe the review of field documentation, laboratory data, and field QC data.

8.1 Review of Field Documentation

At a minimum, field records should be reviewed to evaluate consistency and QC information and to summarize the samples collected. The reviewer should utilize the groundwater data review and evaluation form supplied by WM to summarize any deviations from sampling protocols and the potential impact on data quality.

8.2 Review of Laboratory Data

Upon receipt of the analytical data from the laboratory, laboratory report(s) should be reviewed to determine compliance with method, procedural, and required QC protocols using the groundwater data review and evaluation form supplied by WM. Reported sample results should be collectively reviewed, including laboratory qualifiers, and summarized on the review form with respect to any QC deficiencies that have the potential to impact overall data quality.

8.3 Review of Field Quality Control Samples

Analytical results from field duplicates, equipment blanks, field blanks, and trip blanks should be reviewed and summarized using the groundwater data review and evaluation form supplied by WM. Results from duplicate pairs should be compared to determine whether sampling methods produce an acceptable level of reproducibility. Equipment blanks should be reviewed for detections above the laboratory reporting limit (RL) to determine if field decontamination procedures are adequate such that cross-contamination between sampling points is minimized and sample results are representative of groundwater quality. Field blanks

and trip blanks should be reviewed for detections above the laboratory RL to determine if ambient field conditions or laboratory/shipping conditions, respectively, are affecting groundwater sampling results.

9.0 STATISTICAL APPROACH

This section describes the statistical approach for the indicator monitoring program, the detection monitoring program, and the assessment monitoring/corrective action programs. In accordance with permit condition 40 of permit no. 0290-S1-R4 and permit condition 15 of permit no. 0290-S4-R2, the sampling results for the Wildcat Creek sampling are not subject to the groundwater monitoring regulations within Chapter 12 of Rule 22 and will not be statistically evaluated.

9.1 Initial Data Screening

Groundwater data should be screened prior to statistical analysis to identify statistical outliers or excursions from normal. Suggested methods to identify outliers are described in EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance* (EPA 2009). If suspect data are evident in the current monitoring period's data set, results should be verified with the analytical laboratory, and calculation and/or transcription errors should be checked. If any errors are found, they should be corrected in the database.

Data that are identified as outliers with independent evidence of an error should not be used in statistical computations and should be documented in the groundwater monitoring reports. Some low- or high-magnitude outliers may be flagged and excluded from statistical analysis even though evidence of error cannot be identified, in order to improve environmental protection. However, the decision to include or exclude potential outliers in background should be based on technical information and the professional judgment of the certifying professional.

9.2 Indicator Monitoring Program

Indicator monitoring data should be evaluated as follows:

- Chloride results should be compared to a well-specific limit calculated from baseline concentrations, as described below;

- Ammonia data should be compared to a fixed limit of 1 mg/L; and
- Trend tests should be applied to period-of-record data sets for each parameter on the indicator parameter list in Table 4.1.

Intrawell chloride limits are calculated using the average of historical chloride concentrations compiled prior to waste placement (i.e., "baseline" concentrations). Table 9.1 summarizes the data set date ranges for the indicator monitoring wells.

Table 9.1. Date ranges for historical baseline chloride data sets.

Wells	Date Range
LGW-8R, LGW-14R	August 2008 through February 2016
LGW-3R, MW-15 through MW-17, MW-19	June 2015 through February 2016
LGW-2, LGW-4 through LGW-7, LGW-9, LGW-10, MW-7N	July 2006 through May 2008

A "significant finding" must be declared if a well-parameter pair contains a statistically significant increasing trend at a 99% confidence level and a reported concentration of chloride greater than 10 times baseline or a reported concentration of ammonia greater than 1 mg/L.

9.3 Detection Monitoring Program

This section describes the statistical program design as required by §22.1203(f) through (i) of Rule No. 22. The statistical program design is based on Rule No. 22 requirements and EPA's Unified Guidance (EPA 2009). The sections below describe the formal retesting program and selected statistical methods for evaluating groundwater data for statistically significant increases (SSIs) (or statistically significant decreases [SSDs] in the case of pH). The selected statistical methods include the combined Shewhart-CUSUM control chart, prediction limits, or Double Quantification Rule. These tests, or their equivalent, should be used to statistically evaluate all constituents reported at verifiable, positive detections above the laboratory PQL in accordance with §22.1203(h)(5).

9.3.1 Retesting Program

The formal retesting program should follow a "1 of 2" retesting scheme. That is, when an initial value exceeds a background limit by a statistical test, the "1 of 2" strategy requires collection of up to two resamples prior to the next regularly scheduled monitoring event (Gibbons 1994). If retesting disconfirms the initial exceedance, then a declaration of an SSI/SSD is not required, as recommended by the Unified Guidance. Unless the initial (disconfirmed) exceedance can be documented as an outlier, error, or other anomaly, it should be retained in the database as a valid measurement in addition to the resample result. If retesting confirms the initial exceedance, the facility is required to declare a confirmed SSI/SSD.

9.3.2 Shewhart-CUSUM Control Charts with Retesting

Intrawell Shewhart-CUSUM control charts should be used to evaluate detected inorganic constituents with normally distributed background data sets (i.e., parametric). If an SSI/SSD is indicated by an initial statistical result, either by the observation or CUSUM, retesting should be performed in accordance with the facility's "1 of 2" retesting strategy. If the resample observation and CUSUM is within the limit, the SSI/SSD is disconfirmed. If the resample observation and/or CUSUM remain outside the control limit, then the SSI/SSD is considered confirmed and the notification procedures discussed in Section 10.4 must be followed.

9.3.3 Prediction Limits with Retesting

Intrawell prediction limits should be used to evaluate detected inorganic constituents with background data sets that are not normally distributed, or cannot be mathematically normalized (i.e., non-parametric). If an SSI/SSD is indicated by the initial statistical results, retesting should be performed in accordance with the facility's "1 of 2" resampling strategy. If the resample is within the limit, the SSI/SSD is disconfirmed. If the result remains outside the prediction limit, the SSI/SSD is considered confirmed and the notification procedures discussed in Section 10.4 must be followed.

9.3.4 Double Quantification Rule

VOC data will be evaluated using the Double Quantification Rule (DQR), where a confirmed SSI is declared if any VOC is detected at or above the laboratory RL in two consecutive sample and resample events.

9.3.5 Establishing and Updating Background Data Sets

Section 22.1203(e) of Rule No. 22 requires that background water quality be established for each constituent consisting of a minimum of four independent samples from each monitoring well. However, the Unified Guidance recommends 8 to 10 independent values for most statistical tests. Unless otherwise approved by DEQ, samples should be collected quarterly to account for seasonal and temporal variations and to ensure statistically independent values.

The Unified Guidance recommends updating initial background data sets to add more recent observations, when appropriate, since long-term fluctuation in background concentrations is possible even when a given well has not been impacted by a landfill. As a general rule, background should be evaluated for updating when there are at least 4 to 8 new compliance data. Methods used to update background should follow those described in Chapter 5 of the Unified Guidance.

9.4 Assessment Monitoring/Corrective Action Program

The selected statistical method for assessment monitoring and corrective action monitoring is the confidence interval, constructed with lower and upper confidence limits (i.e., LCLs and UCLs) around the mean, median, or upper percentile of a data set. The Unified Guidance and ASTM D7048 recommend using a minimum of eight values per compliance well to construct the confidence interval. The LCL and UCL are compared to an approved groundwater protection standard (GWPS) for assessment or corrective active, respectively. The currently approved GWPSs for Eco-Vista were established in 2014 and 2019 (DINs 65838, 65893, and 77318).

For assessment monitoring, a statistically significant level (SSL) must be declared if the LCL exceeds the GWPS and the notification procedures discussed in Section 10.5 must be followed. For corrective action, a SSL must be declared if the UCL exceeds the GWPS.

9.5 Handling of Non-Detect Data

In accordance with §22.1203(h)(5), each statistical test should account for non-detect data. For detection monitoring tests, non-detect data should be replaced with the median PQL. For assessment/corrective action tests, non-detect data should be replaced with ½ the median PQL value. Other methods may be used if appropriate.

10.0 REPORTING AND NOTIFICATION PROCEDURES

This section presents a schedule for submitting groundwater analytical data and groundwater monitoring reports and describes the DEQ notification procedures in the event that statistically significant results are identified.

10.1 Groundwater Analytical Data Submittal

Analytical data from each sampling event must be submitted directly to DEQ by the independent third-party laboratory as required by §22.1203(j)(4).

10.2 Indicator Monitoring Report Submittal

The indicator monitoring report must be submitted to DEQ on a monthly basis due at the end of each month following the month to which the report pertains.

Each report must include groundwater elevations, groundwater analytical data, a summary of statistically significant trends and associated graphical results, chloride and ammonia baseline comparisons, a discussion of the results, and the historical groundwater database.

In addition to the above deliverables, analytical and flow rate data collected from the leachate collection system (LCS) and leak detection system (LDS) as part of the Action Leakage Rate Contingency Plan (FTN 2021) must be included as an attachment to the report. The indicator monitoring reports must also include a list and figure of active and passive landfill gas well locations at the site and the operational status in accordance with DEQ correspondence dated May 5, 2016 (DIN 69516).

For monitoring periods where sampling is performed concurrently with the detection/assessment monitoring programs, then the list of deliverables in this section may be included in the same report presenting the results of detection/assessment monitoring.

10.3 Detection/Assessment Monitoring Report Submittal

Detection/assessment monitoring reports must be submitted to DEQ within 90 days from the date of the last recorded sampling event. The report must be certified by a qualified groundwater scientist and include the reporting requirements of §22.1203(k). Each report must also include a summary discussion of results collected since the last groundwater monitoring report submittal for corrective action monitoring. Additionally, reports will include laboratory results and graphs of detected parameters for the Wildcat Creek samples obtained during the sampling period.

10.4 Notification and Contingency Plan for Statistically Significant Increases (or Decreases)

In accordance with §22.1204(c)(1), if an SSI (or SSD, in the case of pH) is identified, Eco-Vista must, within 14 days, place a notice in the facility operating record identifying the SSIs/SSDs and notify the director of DEQ that the notice has been placed.

If in detection monitoring, then Eco-Vista must also:

1. Establish an assessment monitoring program meeting the requirements of §22.1205 within ninety (90) days, or
2. In accordance with §22.1204(c)(3), demonstrate that a source other than a landfill caused the contamination or that the statistically significant result was due to an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The alternate source demonstration must be certified by a qualified groundwater scientist, placed in the facility operating record, and submitted to DEQ within 90 days of the finding.

10.5 Notification and Contingency Plan for Statistically Significant Levels Above a GWPS

In accordance with §22.1205(g), if one or more assessment monitoring constituents is detected at an SSL above a GWPS, Eco-Vista must, within 14 days, place a notice in the facility operating record identifying the constituents that have exceeded the GWPS at an SSL and notify the director of DEQ and all appropriate local government officials that the notice has been placed in the operating record.

1. Eco-Vista must also:
    i. Characterize the nature and extent of the release by installing additional monitoring wells as necessary;
    ii. Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with §22.1205(d)(2);
    iii. Notify all persons who own the land or reside on the land that directly overlies any part of the contaminant migration if contaminants have migrated off-site if indicated by sampling of wells in accordance with §22.1205(g)(1); and
    iv. Initiate an assessment of corrective measures as required by §22.1206 within ninety (90) days, and will be based on the findings of a completed nature and extent investigation; or
2. In accordance with §22.1205(g)(2), following the identification of a confirmed SSL above a GWPS, the facility may demonstrate that a source other than a landfill caused the contamination or that the statistically significant result was due to an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The alternate source demonstration must be certified by a qualified groundwater scientist, placed in the facility operating record, and submitted to DEQ within 90 days of the finding.

10.6 Return to Detection Monitoring

If groundwater results for the AMC list are determined to be at or below background values for two consecutive monitoring events, Eco-Vista must notify DEQ of this finding and may return to detection monitoring in accordance with §22.1205(e).

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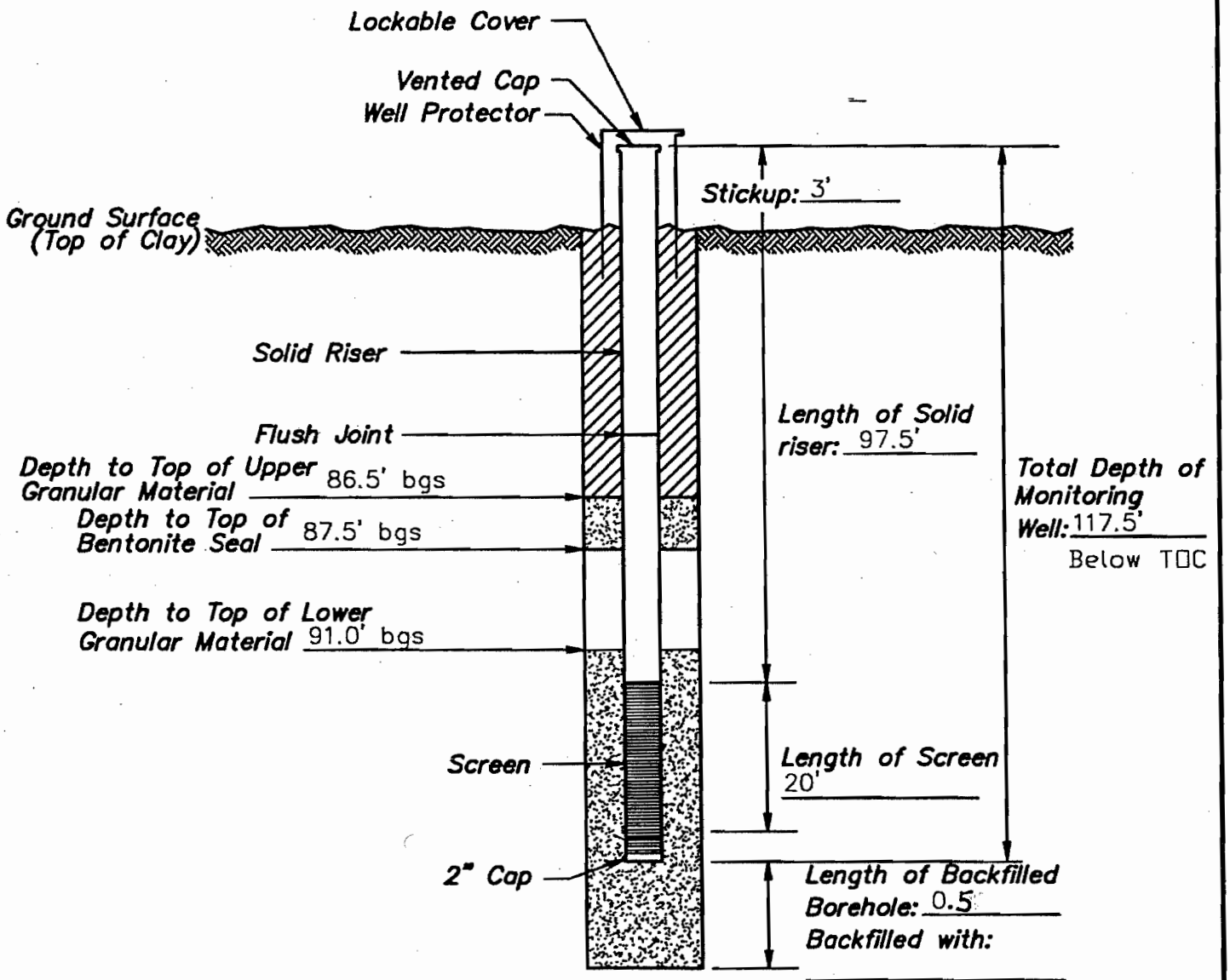
APPENDIX A

Well Logs, Construction Diagrams, and Surveys

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/USA Waste Tontitown — Well Number MW-IN
Job Number 9750 — Installation Date 9/5/97 — Location N-1249.5592 E1271.3512
Datum Elevation 1298.59 — Surface Elevation 1295.59
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.010
Riser Diameter & Material 2" PVC — Borehole Diameter 6"
Granular Backfill Material 10/20 Sand — GEC Representative DWM
Drilling Method Air Rotary — Drilling Contractor Anderson



(Not to Scale)

Stabilized water level _____ feet below datum.

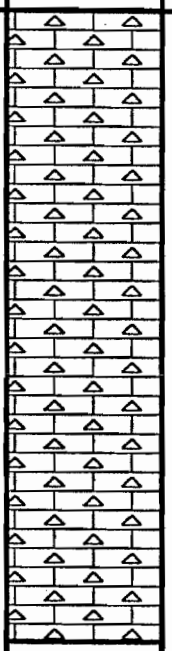
Measured on _____

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC. *11400 West Baseline Road* *Little Rock, AR 72209*	MONITORING WELL INSTALLATION RECORD PROJECT NUMBER: 9750 WELL NUMBER: MW-1N DRAWING NUMBER: CHECKED BY: AES

Boring #: MW-1N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.	Location: N -1249.5592 E 1271.3512	
Date: 9/2/97	11400 West Baseline Road Little Rock, AR 72209	Drilling Method: AIR ROTARY	
Elevation: 1295.59		Driller: ANDERSON	
Job No.: 9750		Logged By: DM	(pg.1)

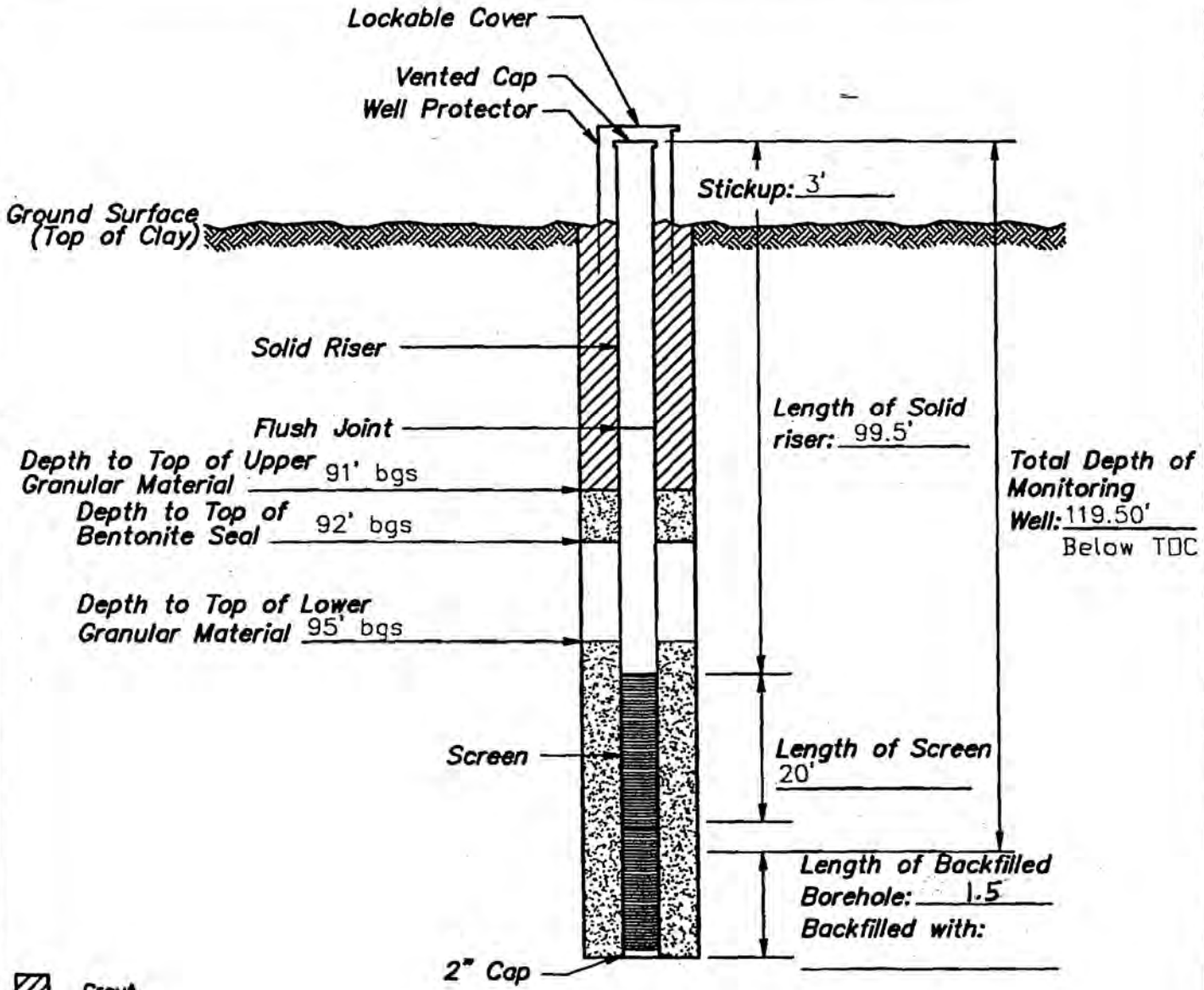
Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
		RED SILTY CLAY W/CHERT			BEGINING W/AIR DUE TO NO AUGERS
	10				
	20	CHERT LENS			
		RED SILTY CLAY W/CHERT			
		WEATHERED CHERT			
	30				
		WEATHERED CHERT WITH RED CLAY, EASY DRILLING			
	40				
		HARDER DRILLING CHERT			
	50	LOOSE, CAN NOT KEEP OPEN			WENT TO 6" ROLLER CONE BIT
	60				
		LIMESTONE W/CHERT DRY 63'			PROBLEMS KEEPING HOLE OPEN
	70				
	80				

Boring #: MW-1N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.	Location: N -1249.5592 E 1271.3512	
Date: 9/2/97	11400 West Baseline Road Little Rock, AR 72209	Drilling Method: AIR ROTARY	
Elevation: 1295.59		Driller: ANDERSON	
Job No.: 9750		Logged By: DM	(pg.2)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
		LIMESTONE W/CHERT HARD DRY			
	90				
	100	LIMESTONE W/CHERT HARD SOME MOISTURE			
	110	LIMESTONE W/CHERT HARD WATER INCREASING GOOD WATER 107-115'			
		TD 115'			WATER @ 80' 9/5/97 ON RODS
	120				

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/Tontitown — Well Number MW-2N
Job Number 9750 — Installation Date 9/10/97 — Location N-277.5690 E2391.4363
Datum Elevation 1289.53 — Surface Elevation 1286.53
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.010" 10 Slot
Riser Diameter & Material 2" PVC — Borehole Diameter 6.5 Nomnal
Granular Backfill Material GRANULAR — GEC Representative DM/AS
Drilling Method Air Rotary — Drilling Contractor Anderson



(Not to Scale)

Stabilized water level _____ feet below datum.

Measured on _____

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 9750
WELL NUMBER: MW-2N
DRAWING NUMBER: CHECKED BY: AES

Boring #: MW-2N
Date: 9/15/97
Elevation: 1286.53
Job No.: 9750

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

Location: N -277.5690 E 2391.4363
Drilling Method: AIR ROTARY
Driller: ANDERSON DEAN/GRAY
Logged By: DM (pg.1)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
		RED SILTY CLAY W/CHERT			AIR ROTARY TRI CONE BIT
	10				
	20				
	30				
	40				
	50	LESS CHERT			
	60				
	70	69.5' BEDROCK			AIR HAMMER
	80	SOFT CHALKY LIMESTONE LITTLE CHERT DRY			

Boring #: MW-2N
Date: 9/15/97
Elevation: 1286.53
Job No.: 9750

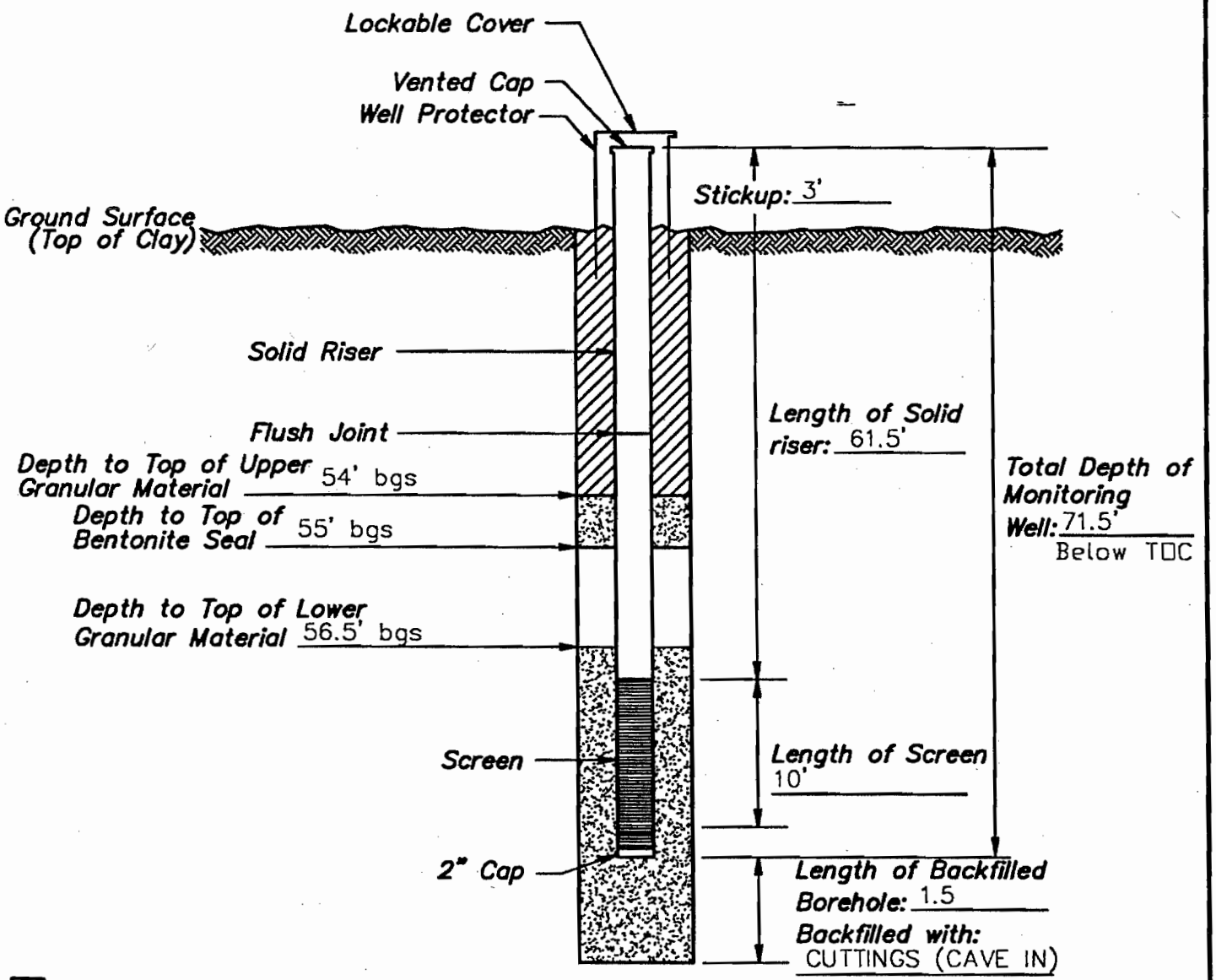
GEC GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

Location: N -277.5690 E 2391.4363
Drilling Method: AIR ROTARY
Driller: ANDERSON DEAN/GRAY
Logged By: DM (pg.2)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
	90	HARD LIMESTONE CHERT INCREASE DRY			
	100	102'-108' SMALL FRACTURE SOME WATER			
	110				NEW BIT REAM HOLE TO 6 1/2"
	120	TD 118'			

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/Tontitown — Well Number MW-3N
Job Number 9750 — Installation Date 9/11/97 — Location N1391.7507 E1927.1853
Datum Elevation 1222.04 — Surface Elevation 1219.04
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.010 10 Slot
Riser Diameter & Material 2" PVC — Borehole Diameter 6.5"
Granular Backfill Material 10/20 Sand — GEC Representative AS
Drilling Method Air Rotary — Drilling Contractor Anderson



(Not to Scale)

Stabilized water level _____ feet below datum.

Measured on _____

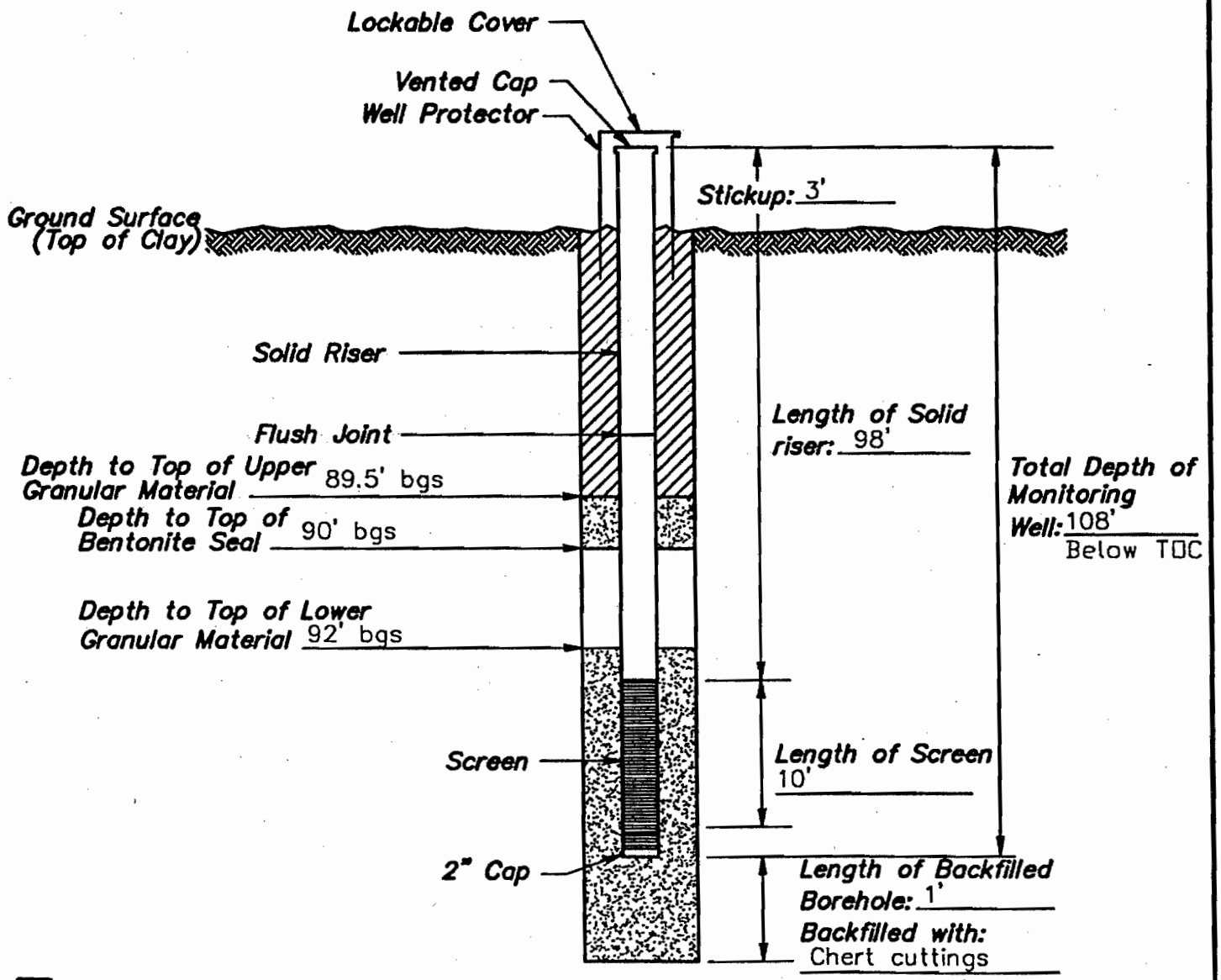
GEC // GENESIS ENVIRONMENTAL CONSULTING, INC. *11400 West Baseline Road* *Little Rock, AR 72209*	MONITORING WELL INSTALLATION RECORD PROJECT NUMBER: 9750 WELL NUMBER: MW-3N DRAWING NUMBER: CHECKED BY: AES

Boring #: MW-3N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.	Location: N 1391.7507 E 1927.1853
Date: 9/10/97	11400 West Baseline Road Little Rock, AR 72209	Drilling Method: AIR ROTARY
Elevation: 1219.04		Driller: ANDERSON
Job No.: 9750		Logged By: AS (pg.1)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
	10	RED SILTY CLAY W/CHERT MED PLASTIC			
		MORE LIMESTONE (15'–18') WEATHERED, SOME CHERT DRY			
	20				
		26' CLAY BALLS, SOME CHERT, CLAY SILTY MED PLASTIC, MOIST			
	30				
		37' RED SILTY CLAY W/CHERT AND LS VERY MOIST			
	40				
	50				
		55' 1 FT LS/CHERTY			
		58' BACK ONTO ROCK			
	60	61' HIT H20, SOME PRODUCTION SMALL FRACTURES			
		65' INCREASED CHERT, SLOWER DRILLING GOOD H20			
		68' CHERT STILL CAUSING SLOW DRILLING			
		68.5' VERY HARD CHERT			
	70	TD 70'			

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/Tontitown **Well Number** MW-7N
Job Number 9750 **Installation Date** 9/17/97 **Location** N1905.79 E -656.48
Datum Elevation 1250.84 **Surface Elevation** 1247.84
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC **Slot Size** 0.010
Riser Diameter & Material 2" PVC **Borehole Diameter** 8"
Granular Backfill Material 10/20 Sand **GEC Representative** AS
Drilling Method Air Rotary **Drilling Contractor** Flippin



(Not to Scale)

Stabilized water level _____ feet below datum.

Measured on _____

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC. *11400 West Baseline Road* *Little Rock, AR 72209*	MONITORING WELL INSTALLATION RECORD PROJECT NUMBER: 9750 WELL NUMBER: MW-7N DRAWING NUMBER: CHECKED BY: AES

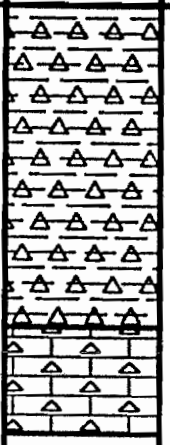
Boring #: MW-7N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.	Location: N 1905.79 E -655.48	
Date: 9/17/97	11400 West Baseline Road Little Rock, AR 72209	Drilling Method: AIR ROTARY	
Elevation: 1247.84		Driller: Flippin	
Job No.: 9750		Logged By: AS	(pg.1)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
					STARTED WITH 8" BIT
	10	RED SILTY CLAY SOME CHERT DRY			
	20	23'–27' YELLOW RED, WEATHERED LIMESTONE, ZONE			
	30	RED SILTY CLAY SOME CHERT DRY			
	40				
	50	RED CLAY MOD PLASTIC SOME CHERT			
	60				
		66' SOFT ROCK, LIMESTONE, WEATHERED SOME CHERT			
	70				ADDING H20 TO CLEAR HOLE
	80	CLAY, RED, INTERBEDDED SOME CHERT			

Boring #: MW-7N
Date: 9/17/97
Elevation: 1247.84
Job No.: 9750

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

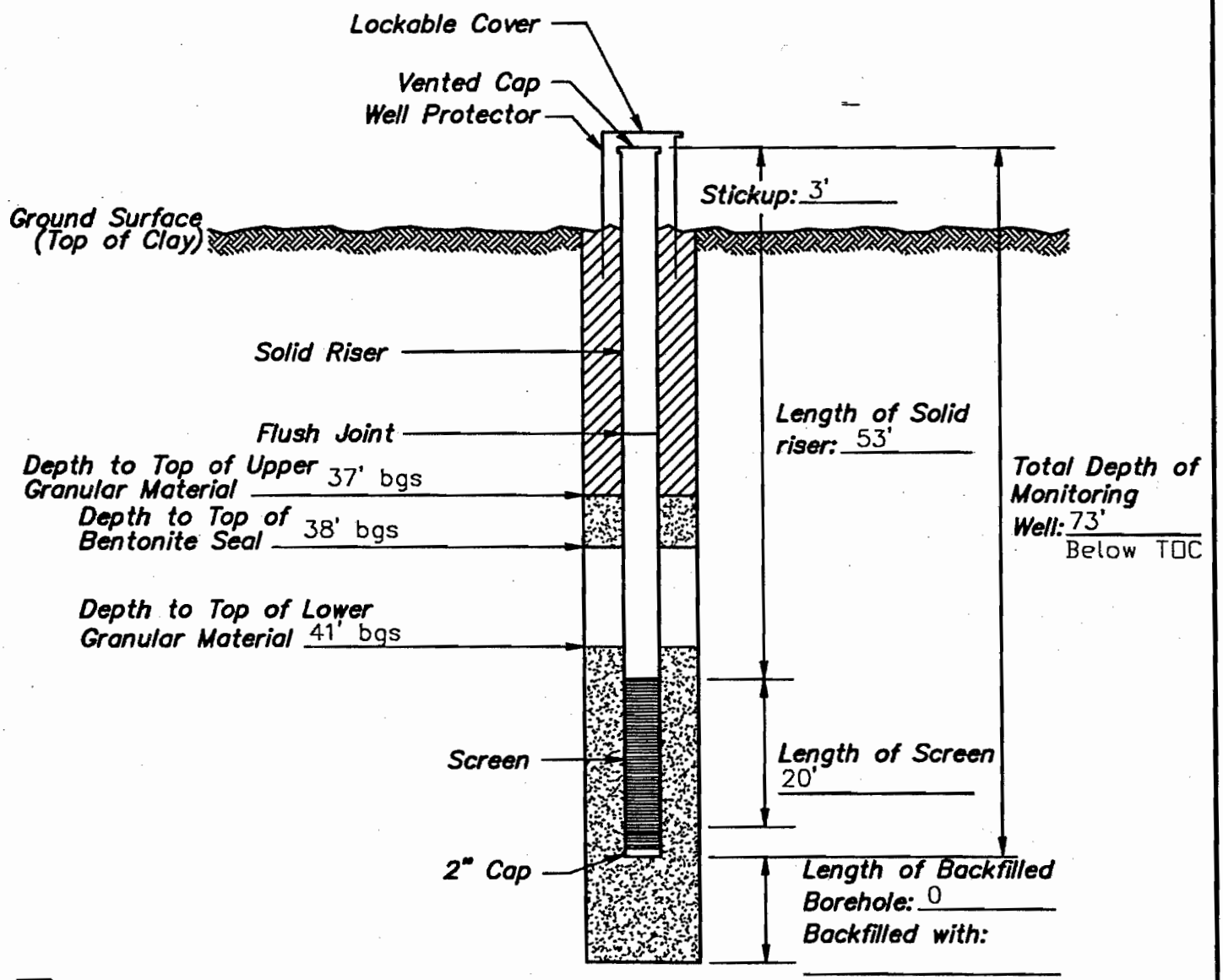
Location: N 1905.79 E -655.48
Drilling Method: AIR ROTARY
Driller: Flippin
Logged By: AS (pg.2)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
	90	CLAY, RED INTERBEDDED CHERT		Bedrock Groundwater	GETTING ~ 2GPM WILL OVER DRILL ~ 5 FT HAD ~ 1FT CAVING
	100	BEDROCK, CHERTY LIMESTONE H20 98'–100'			
		105' TD			
	110				
	120				
	130				

Note: Depths to bedrock and groundwater were added

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/Tontitown — Well Number MW-8N
Job Number 9750 — Installation Date 9/18/97 — Location N2334.7197 E26.5031
Datum Elevation 1191.76 — Surface Elevation 1188.76
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.010
Riser Diameter & Material 2" PVC — Borehole Diameter 8"
Granular Backfill Material 10/20 Sand — GEC Representative DM
Drilling Method Air Rotary — Drilling Contractor Flippin



(Not to Scale)

Stabilized water level _____ feet below datum.

Measured on _____

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

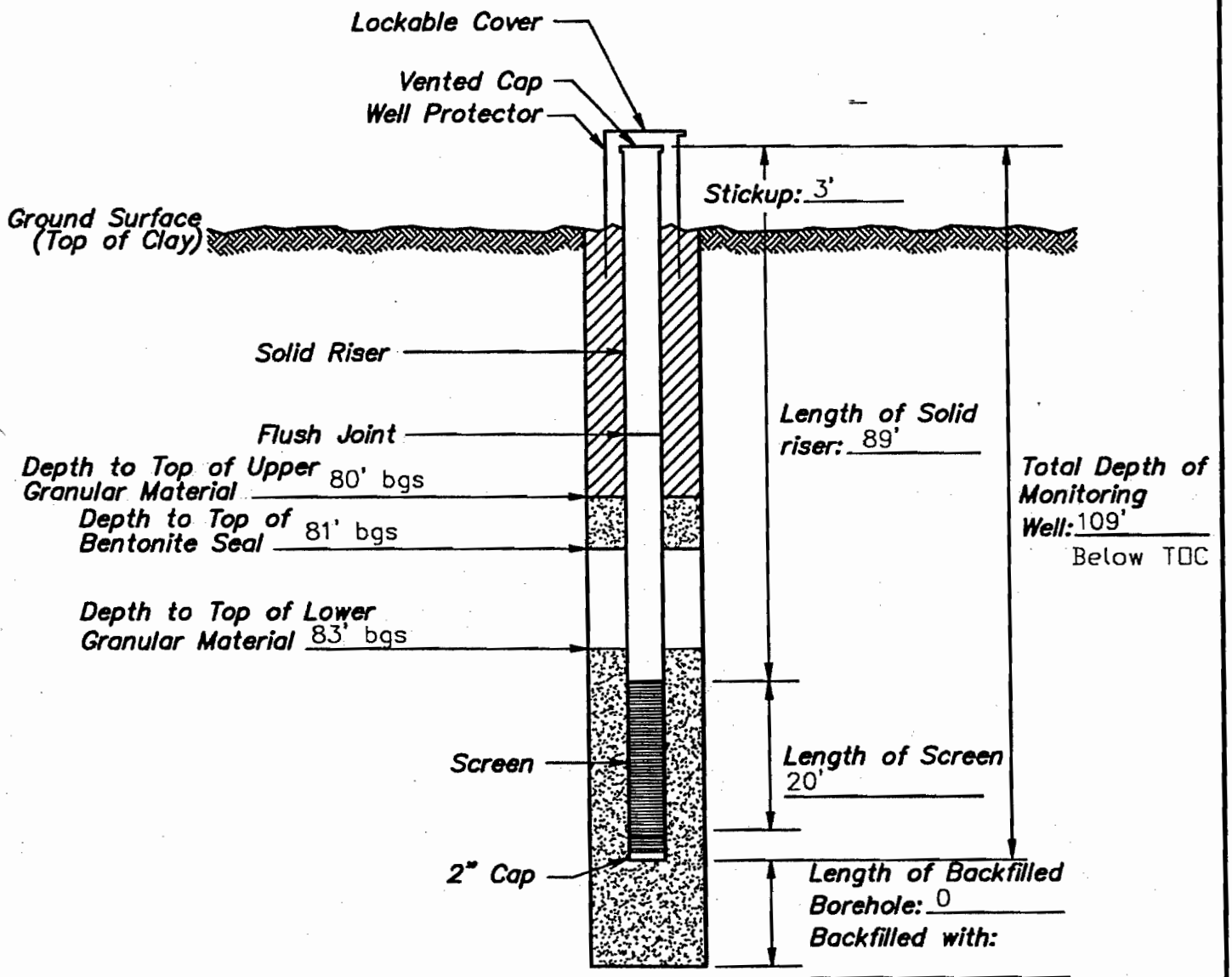
MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 9750
WELL NUMBER: MW-8N
DRAWING NUMBER:
CHECKED BY: AES

Boring #: MW-8N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.		Location: N 2334.7197 E 26.5031
Date: 9/18/97	11400 West Baseline Road Little Rock, AR 72209		Drilling Method: AIR ROTARY
Elevation: 1188.76			Driller: FLIPPIN
Job No.: 9750			Logged By: DM (pg.1)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
	10	RED, SILTY CLAY W/WEATHERED CHERT AND LIMESTONE			
	20				
	30				
	40	41' BEDROCK LIMESTONE, CHERTY AND FOSSILIFEROUS			
	50	50–55' H20 FILLED FRACTURE			
	60				
	70	TD			
	80				

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/Tontitown — Well Number MW-10N
Job Number 9750 — Installation Date 9/18/97 — Location N2210.5939 E1139.0099
Datum Elevation 1193.60 — Surface Elevation 1190.60
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.010
Riser Diameter & Material 2" PVC — Borehole Diameter 6.5-6" Nomnol
Granular Backfill Material 10/20 Sand — GEC Representative AS
Drilling Method Air Rotary — Drilling Contractor Anderson



(Not to Scale)

Stabilized water level _____ feet below datum.

Measured on _____

GEC GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 9750
WELL NUMBER: MW-10N
DRAWING NUMBER: CHECKED BY: AES

Boring #: MW-10N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.	Location: N 2210.5939 E 1139.0099	
Date: 9/15/97	11400 West Baseline Road Little Rock, AR 72209	Drilling Method: AIR ROTARY	
Elevation: 1190.60		Driller: ANDERSON	
Job No.: 9750		Logged By: AS	(pg.1)

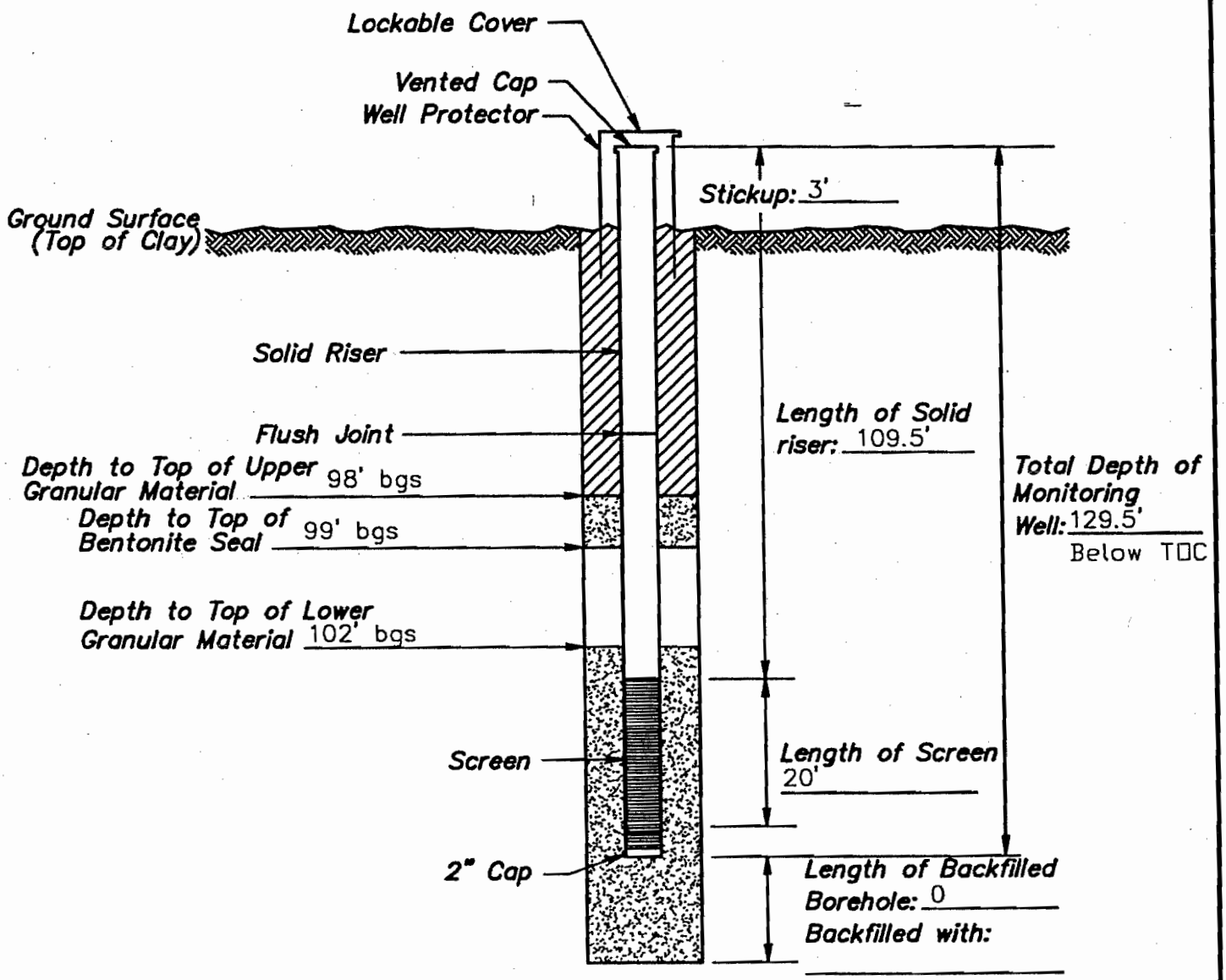
Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
		RED, BROWN, SILTY CLAY, SOME CHERT AND LIMESTONE DRY			
	10	DRY AS ABOVE, WEATHERED LIMESTONE AND CHERT			
		15' SOME WEATHERED LIMESTONE CHERTY		–	
		18' SOME WEATHERED LIMESTONE CHERTY			
	20				≃ 1 FT THICK
		23' INCREASED CLAY DRY			
	30	RED CLAY MOD PLASTIC, SOME CHERT MOIST			
		35' CHERTY, CLAY, MOIST AS ABOVE			38' DRY
	40	40' RED CLAY, MOIST SOME CHERT VERY PLASTIC			
		48' SAME AS 40			
	50	50'–51' DRILLING HARDER BEDROCK			
		53' SWITCH TO HAMMER 6"			52' ADDED H20/BIO MUD TO CLEAN OUT HOLE DOES NOT APPEAR TO BE VERY FRACTURED
	60	62' DRY, CHERTY LIMESTONE			
	70	71' LITTLE, SMALL FRACTURE CHERTY LIMESTONE			MAKING SLIGHT WATER
	80	82' NO ADDITIONAL H20			
	85				

Boring #: MW-10N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.	Location: N 2210.5939 E 1139.0099	
Date: 9/15/97	11400 West Baseline Road Little Rock, AR 72209	Drilling Method: AIR ROTARY	
Elevation: 1190.60		Driller: ANDERSON	
Job No.: 9750		Logged By: AS	(pg.2)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
	90				H20 COMING TO HOLE FROM 71' ZONE AT RATE OF ≃ .1 GAL/MIN
	100				
		TD 106' END OF DRILLING			
	110	FROM 91' TO 106' OVER DRILLED PRIOR TO WELL INSTALLATION			

MONITORING WELL INSTALLATION RECORD

Job Name Sunray/Tontitown — Well Number MW-11N
Job Number 9750 — Installation Date 9/16/97 — Location N-1385.9411 E-1166.3449
Datum Elevation 1284.52 — Surface Elevation 1281.52
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.010
Riser Diameter & Material 2" PVC — Borehole Diameter 8" to 6"
Granular Backfill Material 10/20 Sand — GEC Representative AS
Drilling Method Air Rotary — Drilling Contractor Flippin



(Not to Scale)

Stabilized water level _____ feet below datum.

Measured on _____

GEC GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 9750
WELL NUMBER: MW-11N
DRAWING NUMBER: CHECKED BY: AES

Boring #: MW-11N
Date: 9/16/97
Elevation: 1281.52
Job No.: 9750

GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 West Baseline Road
Little Rock, AR 72209

Location: N -1385.9411 E -1166.3449
Drilling Method: AIR ROTARY
Driller: FLIPPIN-BROS
Logged By: AS (pg.1)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
		RED, CLAY, SOME CHERT DRY SOME SILT			8 INCH BIT
	10				
	20				STARTED USING H20 TO CLEAN OUT HOLE
	30				
	40	RED CLAY, CHERTY			
	50	RED CLAY, CHERTY			
	60				
		66'-BEDROCK, CHERTY LIMESTONE			66' SWITCHING TO 6" HAMMER
	70				
	80				

Boring #: MW-11N	GEC // GENESIS ENVIRONMENTAL CONSULTING, INC.		Location: N -1385.9411 E -1166.3449
Date: 9/16/97	11400 West Baseline Road Little Rock, AR 72209		Drilling Method: AIR ROTARY
Elevation: 1281.52			Driller: FLIPPIN-BROS
Job No.: 9750			Logged By: AS (pg.2)

Elev.	Depth	Classification	Lithology	Sample or Box No.	Remarks
		83-CHERTY LIMESTONE			
	90				
	100				
		103-CHERTY, LIMESTONE			
	110	H20 ≃ 110-116 VERY LITTLE H20			
	120	123 YIELDING ≃ 1/4 GAL/MIN 126.5 TD			HOLDING TO TRY TO GET CHANGE IN TRANSDUCER IN OLD MONITOR WALL

Field Boring Log

Boring No. : MW-15	
Date Drilled: 5/6/2015	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Mark Witherspoon	
Total Depth: 91 ft below ground surface (bgs)	
Drilling Method: 6" Air Rotary	Drilling Co. : Anderson Engineering
Sampling Method: cuttings	Driller: Jacob Summers
Location: Tontitown, AR	Rig Type: Truck Mounted CME 55
Northing: 666696.25 Easting: 645547.24 Elevation: 1288.36 (ground surface)	Page: 1

CHIMNEY ROCK CONSULTING
7529 Counts Massie Road " North Little Rock, Arkansas 72113
Phone (501) 812-4551 " www.chimrockconsulting.com

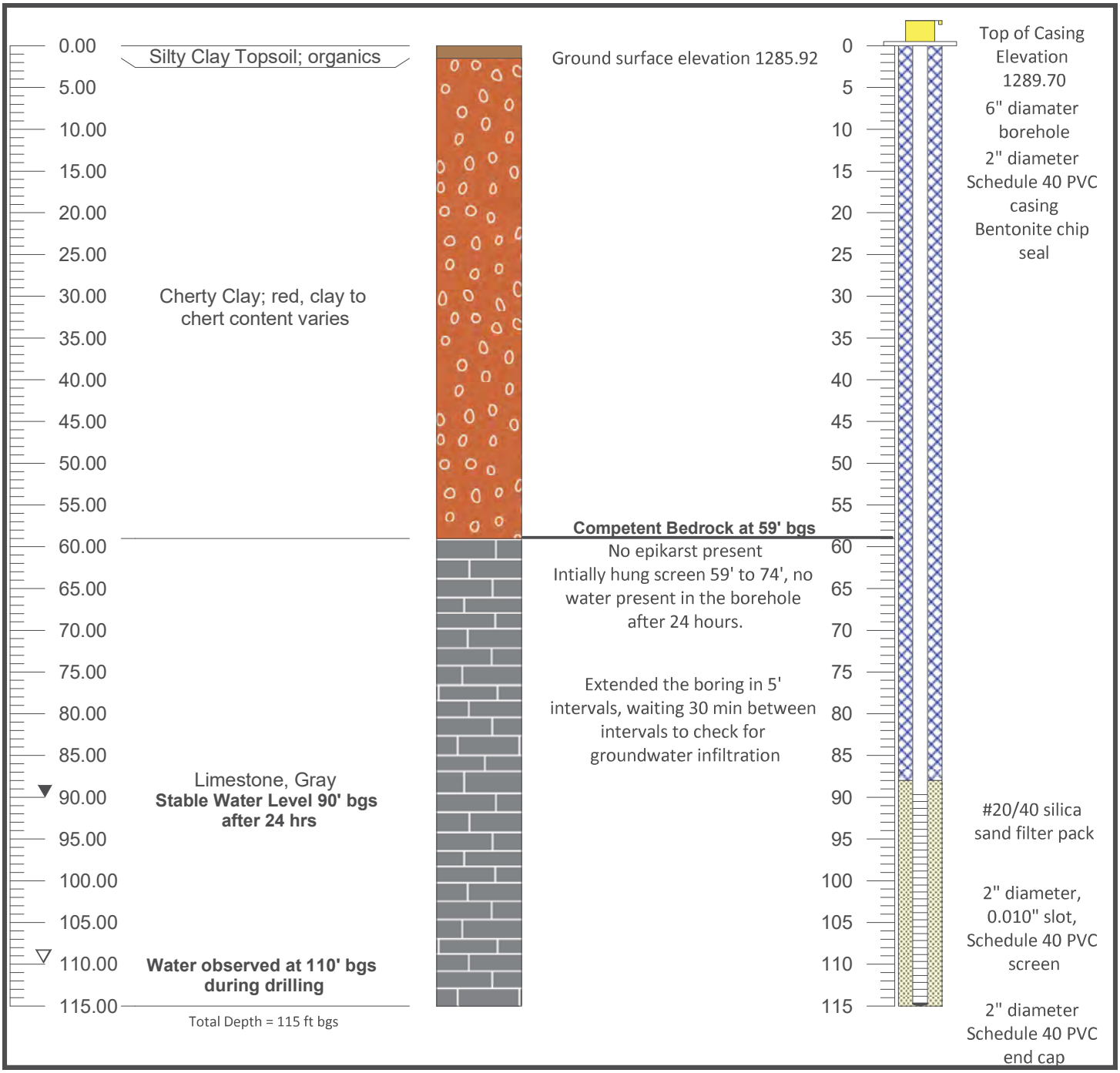
Depth bgs	Lithologic Description	Litho. Symbol	COMMENTS	WELL CONSTRUCTION DETAILS
0.00	Silty Clay Topsoil; organics		Ground surface elevation 1288.36	Top of Casing Elevation 1291.46
5.00				6" diamater borehole
10.00				2" diameter Schedule 40 PVC casing
15.00				
20.00				Bentonite chip seal
25.00	Cherty Clay; red, clay to chert content varies			
30.00				
35.00				
40.00				
45.00				
50.00				#20/40 silica sand filter pack
55.00	Gravelly Clay; gray with some tan clay, chert and limestone gravels		**Stable water level 24 hrs after drilling, 56' bgs** **Competent Bedrock at 57' bgs**	2" diameter, 0.010" slot, Schedule 40 PVC screen
60.00				
65.00				
70.00			67' bgs, stopped to allow Groundwater infiltration it was noted that the cuttings were moist, Dry after 20 min	2" diameter Schedule 40 PVC end cap
75.00	Limestone, Gray			
80.00			81' bgs, stopped for 20 min to allow Groundwater infiltration, Dry	
85.00				
90.00	Total Depth = 91 ft bgs		91' bgs, stopped for 20 min to allow Groundwater infiltration, show of water	
95				

Field Boring Log

Boring No. : MW-16	
Date Drilled: 5/7/15	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Mark Witherspoon	
Total Depth: 115 ft below ground surface (bgs)	
Drilling Method: 6" Air Rotary	Drilling Co. : Anderson Engineering
Sampling Method: cuttings	Driller: Jacob Summers
Location: Tontitown, AR	Rig Type: Ingersol Rand T3W

CHIMNEY ROCK CONSULTING
7529 Counts Massie Road " North Little Rock, Arkansas 72113
Phone (501) 812-4551 " www.chimrockconsulting.com

Northing: 666692.67 Easting: 645038.59 Elevation: 1285.92 (ground surface) Page: 1

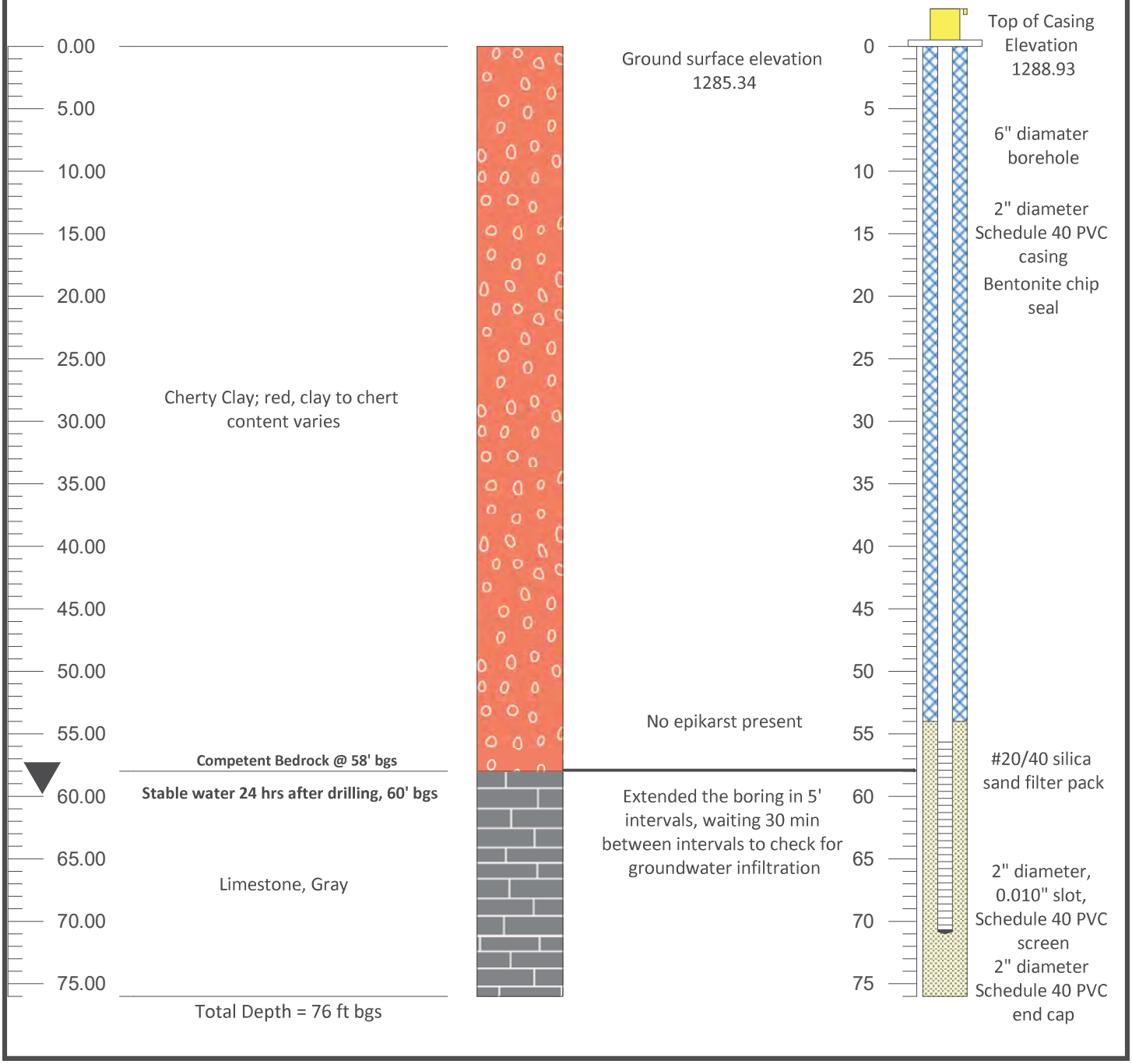


Field Boring Log

Boring No. : MW-17	
Date Drilled: 5/7/2015	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Mark Witherspoon	
Total Depth: 76 ft below ground surface (bgs)	
Drilling Method: 6" Air Rotary	Drilling Co. : Anderson Engineering
Sampling Method: cuttings	Driller: Jacob Summers
Location: Tontitown, AR	Rig Type: Ingersol Rand T3W
Northing: 666159.64 Easting: 644919.12 Elevation: 1285.34 (ground surface)	Page: 1

CHIMNEY ROCK CONSULTING
7529 Counts Massie Road " North Little Rock, Arkansas 72113
Phone (501) 812-4551 " www.chimrockconsulting.com

Depth bgs	Lithologic Description	Litho. Symbol	COMMENTS	WELL CONSTRUCTION DETAILS



Field Boring Log

Boring No. : MW-19	
Date Drilled: 5/7/2015	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Mark Witherspoon	
Total Depth: 80 ft below ground surface (bgs)	
Drilling Method: 6" Air Rotary	Drilling Co. : Anderson Engineering
Sampling Method: cuttings	Driller: Jacob Summers
Location: Tontitown, AR	Rig Type: Ingersol Rand T3W
Northing: 664866.93 Easting: 645156.17 Elevation: 1291.01 (ground surface)	Page: 1

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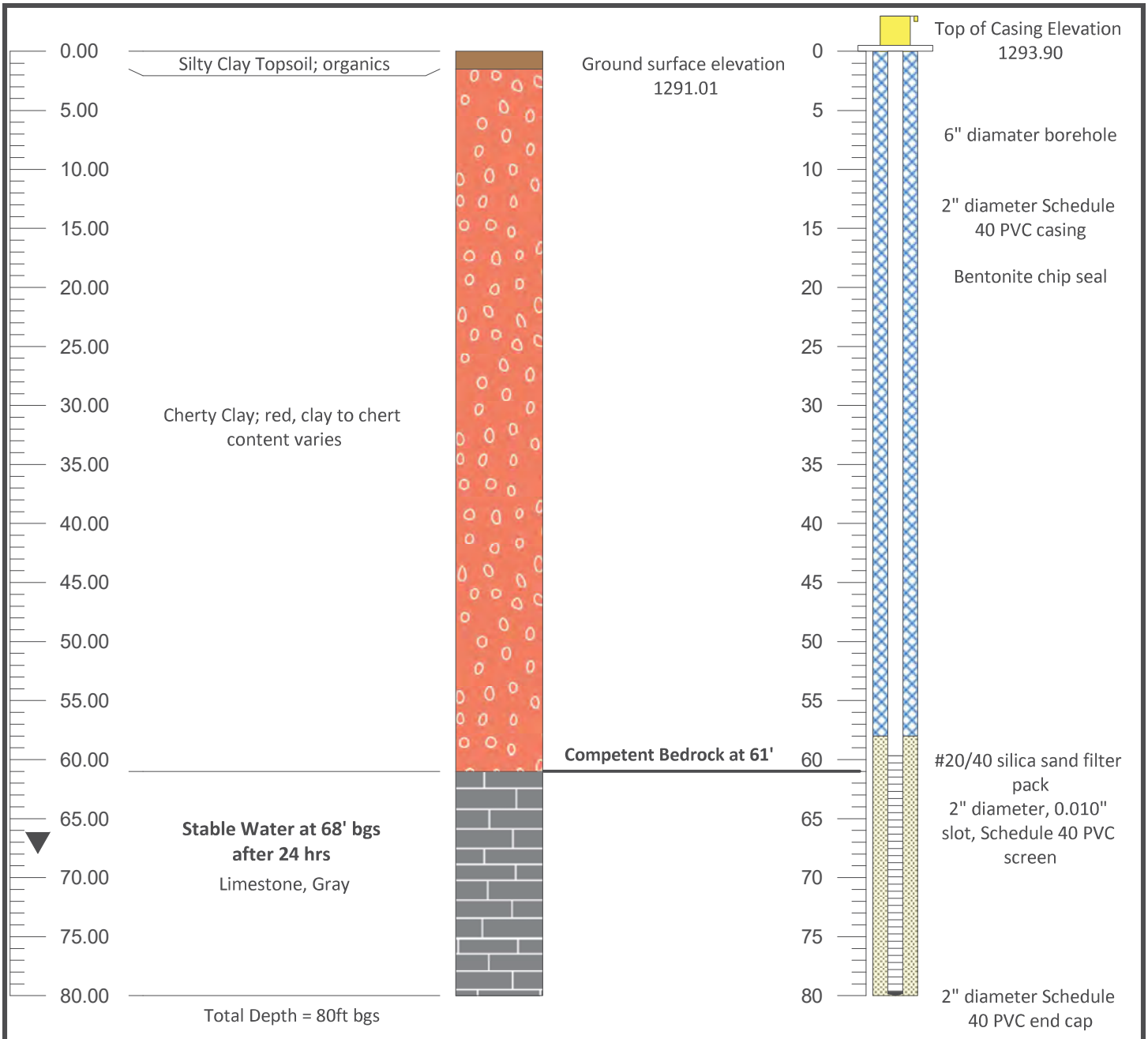
Phone (501) 812-4551 " www.chimrockconsulting.com

Depth bgs	Lithologic Description	Litho. Symbol	COMMENTS	WELL CONSTRUCTION DETAILS

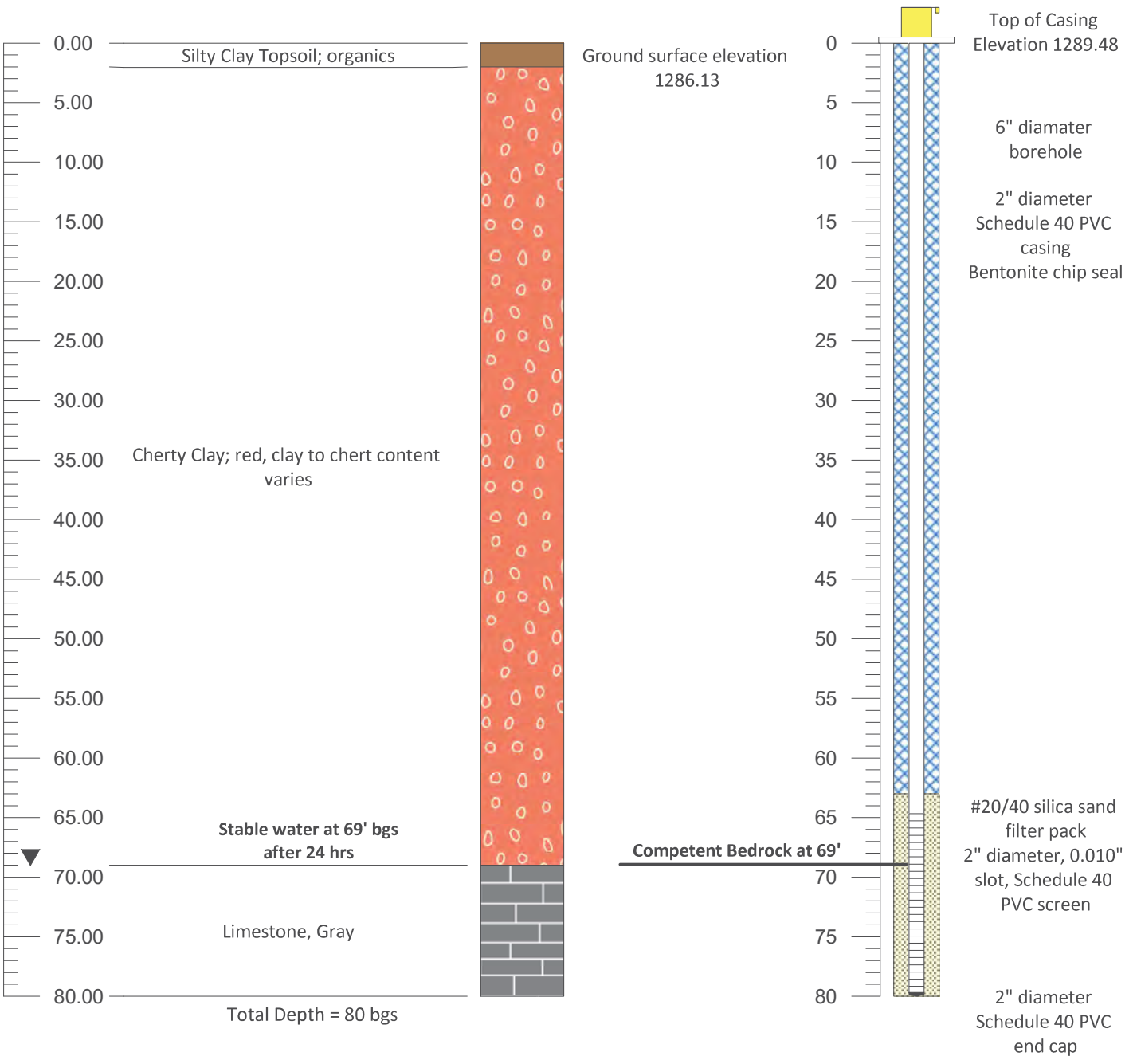


Field Boring Log

Boring No. : MW-20	
Date Drilled: 5/7/2015	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Mark Witherspoon	
Total Depth: 80 ft below ground surface (bgs)	
Drilling Method: 6" Air Rotary	Drilling Co. : Anderson Engineering
Sampling Method: cuttings	Driller: Jacob Summers
Location: Tontitown, AR	Rig Type: Ingersol Rand T3W

CHIMNEY ROCK CONSULTING
7529 Counts Massie Road " North Little Rock, Arkansas 72113
Phone (501) 812-4551 " www.chimrockconsulting.com

Northing: 664200.97 Easting: 644267.35 Elevation: 1286.13 (ground surface) Page: 1



Field Boring Log

Boring No. : MW-21	
Date Drilled: 4/20/2015	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Robert Fowler	
Total Depth: 40 ft below ground surface (bgs)	
Drilling Method: 8.25" Hollow Stem Augers	Drilling Co. : Anderson Engineering
Sampling Method: Cuttings	Driller: Gary Moyers
Location: Tontitown, AR	Rig Type: Truck Mounted CME 55
Northing: 662562.59 Easting: 646406.01 Elevation: 1185.83 (ground surface)	Page: 1

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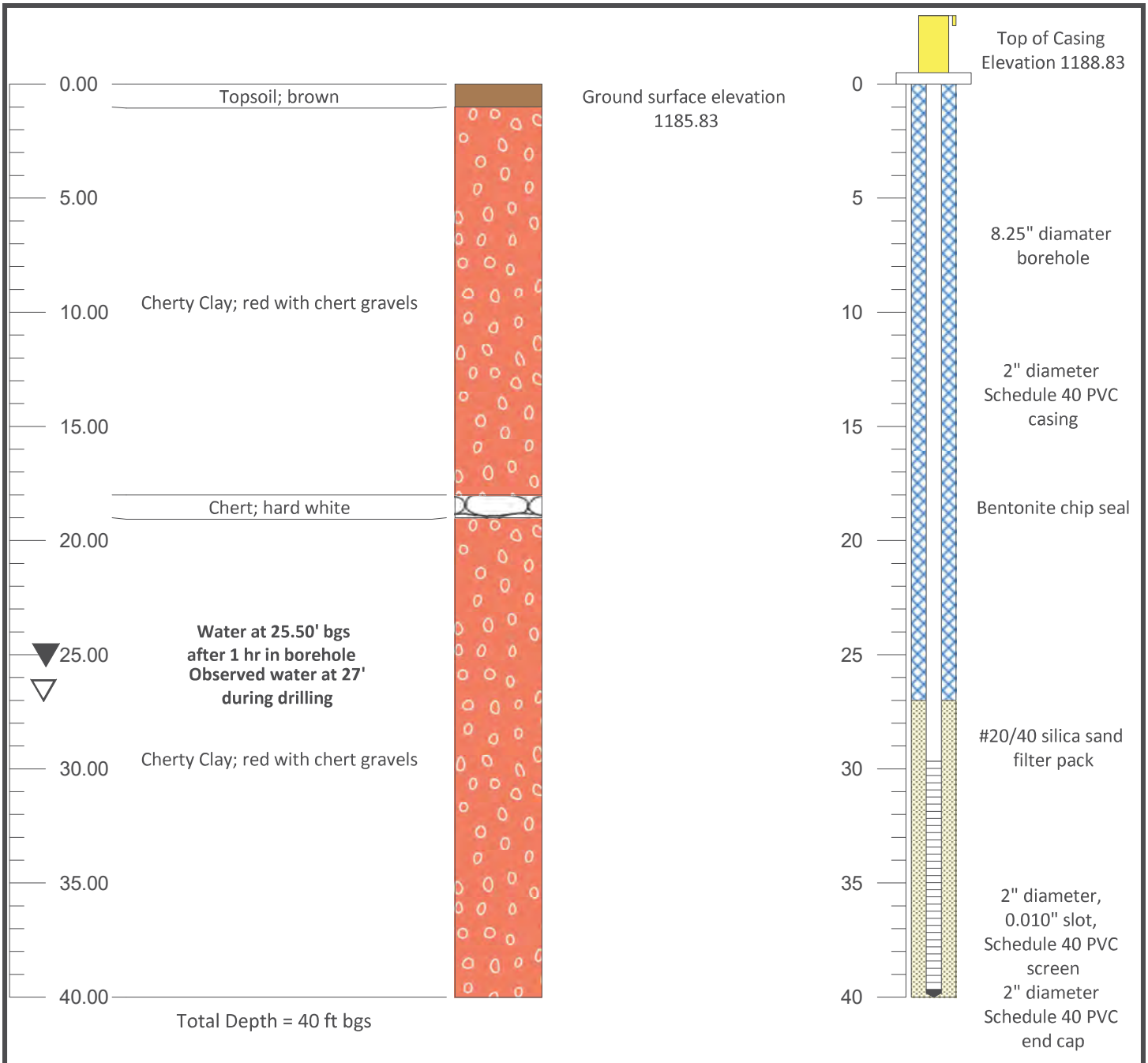
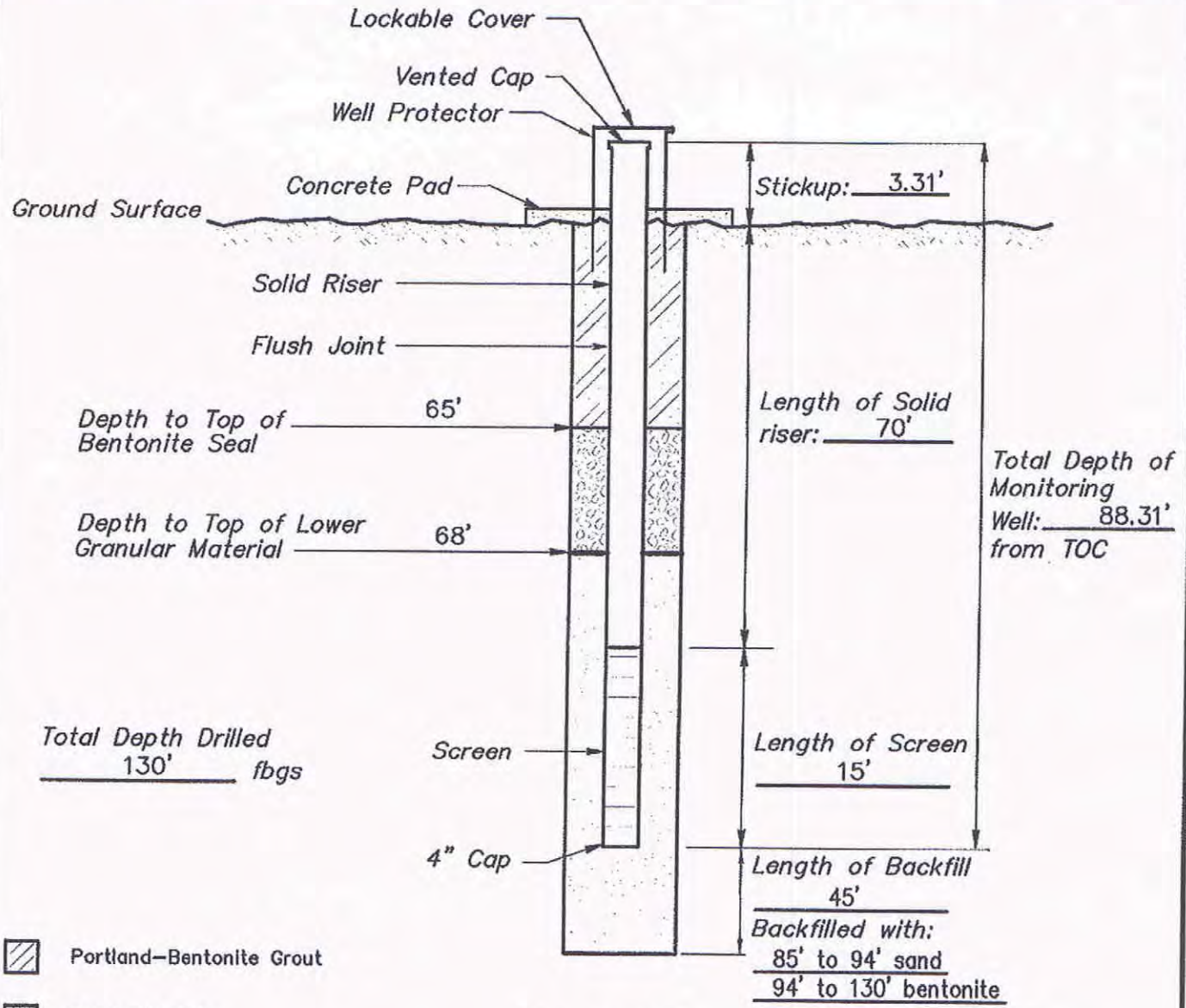
Phone (501) 812-4551 " www.chimrockconsulting.com



MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL Well Number LGW-2
Job Number 062-014-35017042 Installation Date 9-26-05 Location TONTITOWN, ARKANSAS
Datum Elevation 1302.14
Datum for Water Level Measurement T.O.C.
Screen Diameter & Material 2" PVC Slot Size 0.01
Riser Diameter & Material 2" PVC Borehole Diameter 10.25" and 6"
Granular Backfill Material 10-20 SAND GEC Representative MR
Drilling Method AUGER AND AIR HAMMER Drilling Contractor MOHAWK DRILLING



GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 WEST BASELINE ROAD
LITTLE ROCK, ARKANSAS 72209
PH. (501) 455-2199
FAX. (501) 455-4547
A Terracon Company

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-2
DRAWING NUMBER: 023 CHECKED BY: MR

GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 WEST BASELINE ROAD
LITTLE ROCK, ARKANSAS 72209
PH. (501) 455-2199
FAX. (501) 455-4547
A Terracon Company

FIELD BORING LOG

BORING NO.: LGW-2 PAGE: 1 of 2

TOTAL DEPTH: 130 FEET BELOW GROUND SURFACE (BGS)

CLIENT: WASTE MANAGEMENT

PROJECT: TONTITOWN LANDFILL

JOB NO.: 062-014-35017042-009

DRILLING CO.: MOHAWK DRILLING

LOGGED BY: MERRICK ROTENBERRY

DRILLER: KEVIN

DATE DRILLED: 9-26-05

RIG TYPE: FAILING SS-25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-41.5'); AIR HAMMER 6" OD (41.5-130')

SAMPLING METHOD: N/A

N: 666640.83 E: 646396.76 GROUND SURFACE ELEV: 1298.84

Depth BGS	Sample Interval	DESCRIPTION	Litho. Symbol	Comments	Well Construction
					3.3' Stickup
0		0' - 41.5' Clay and chert mixture.		Logged by cuttings.	
10					
20					
30					
40					
		41.5' - 130' Limestone rock.			
50					

Field Boring Log

Boring No. : LGW-3R	
Date Drilled: 6/16/2015	
Client: Waste Management-EcoVista	Proj. No.: 14-045
Logged By: Robert Fowler	
Total Depth: 71 ft below ground surface (bgs)	
Drilling Method: 8.25" Hollow Stem Augers8.25" Hollow Stem Augers	Drilling Co. : Anderson Engineering
Sampling Method: cuttings	Driller: Gary Moyers
Location: Tontitown, AR	Rig Type: Truck Mounted CME 55
Northing: 666590.86 Easting: 647168.00 Elevation: 1285.88 (ground surface)	Page: 1

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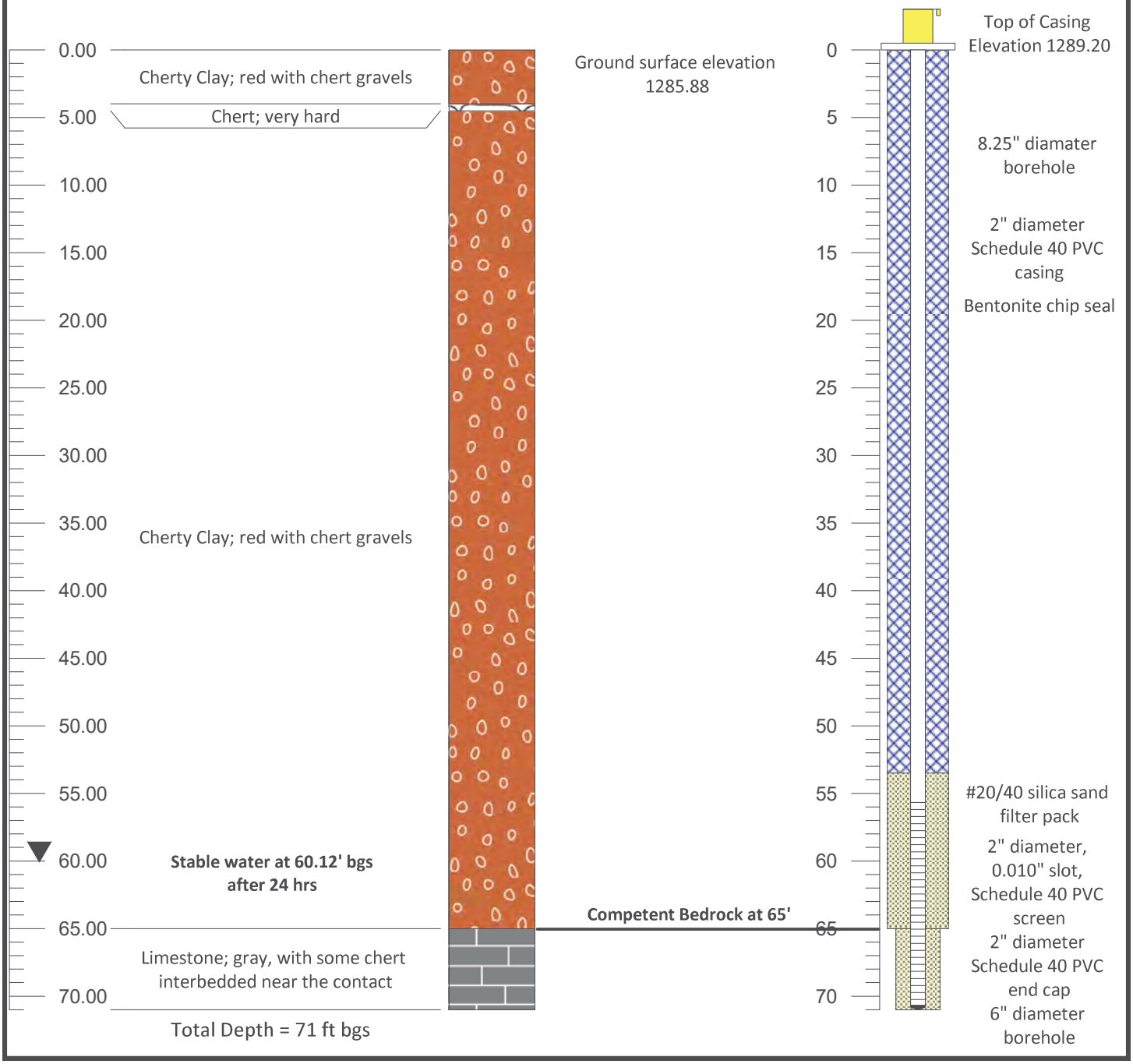
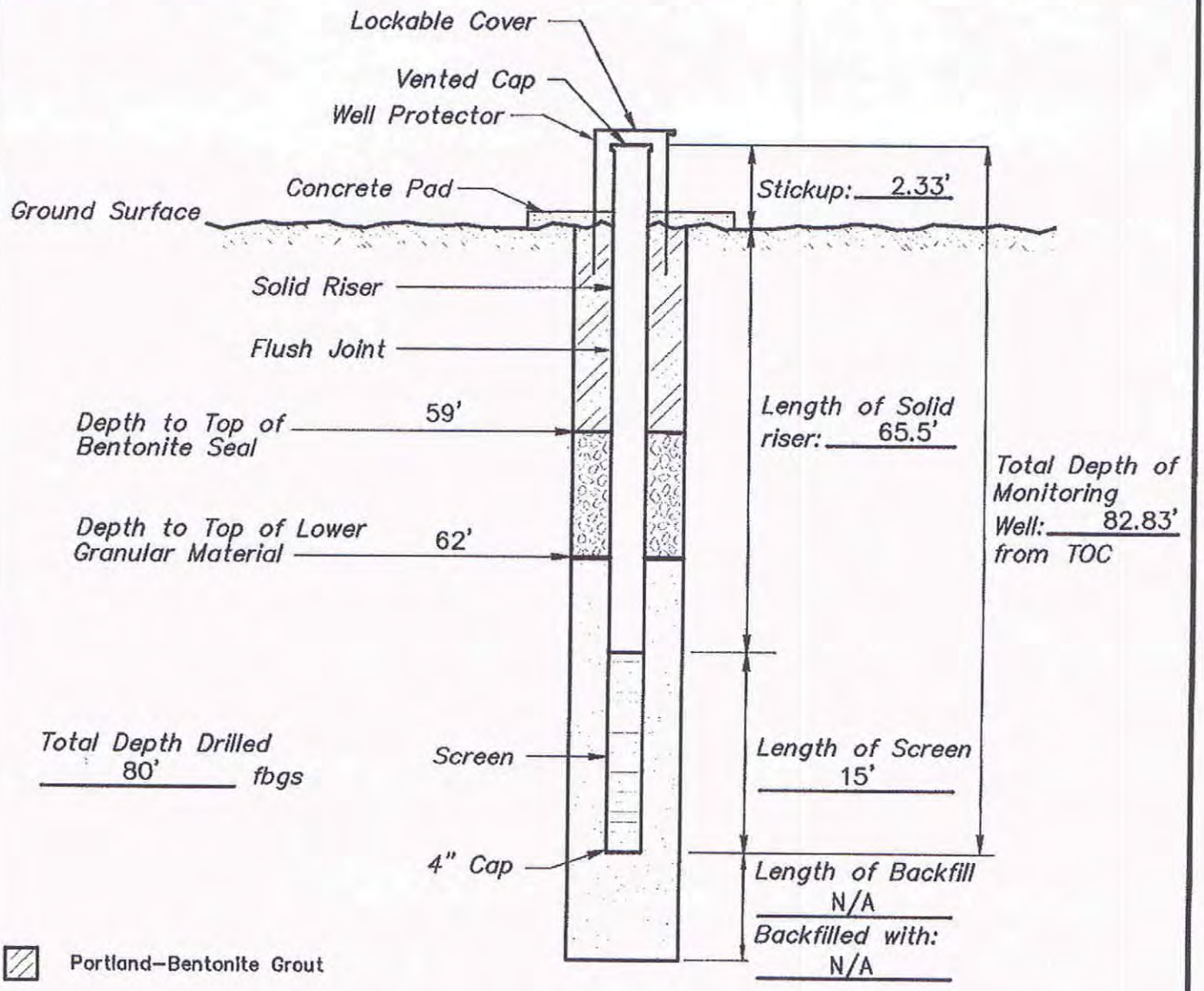
7529 Counts Massie Road " North Little Rock, Arkansas 72113
Phone (501) 812-4551 " www.chimrockconsulting.com



MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL — Well Number LGW-4
Job Number 062-014-35017042 — Installation Date 9-26-05 — Location TONTITOWN, ARKANSAS
Datum Elevation 1267.79
Datum for Water Level Measurement T.O.C.
Screen Diameter & Material 2" PVC — Slot Size 0.01
Riser Diameter & Material 2" PVC — Borehole Diameter 10.25" and 6"
Granular Backfill Material 10-20 SAND — GEC Representative MR
Drilling Method AUGER AND AIR HAMMER — Drilling Contractor MOHAWK DRILLING



GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 WEST BASELINE ROAD
LITTLE ROCK, ARKANSAS 72209
PH. (501) 455-2199
FAX. (501) 455-4547
A Terracon Company

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-4
DRAWING NUMBER: 025 CHECKED BY: MR

GENESIS ENVIRONMENTAL CONSULTING, INC.
11400 WEST BASELINE ROAD
LITTLE ROCK, ARKANSAS 72209
PH. (501) 455-2199
FAX. (501) 455-4547
A Terracon Company

FIELD BORING LOG

BORING NO.: LGW-4 PAGE: 1 of 2

TOTAL DEPTH: 80 FEET BELOW GROUND SURFACE (BGS)

CLIENT: WASTE MANAGEMENT	PROJECT: TONTITOWN LANDFILL
JOB NO.: 062-014-35017042-011	DRILLING CO.: MOHAWK DRILLING
LOGGED BY: MERRICK ROTENBERRY	DRILLER: KEVIN
DATE DRILLED: 9-26-05	RIG TYPE: FAILING SS 25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-65'); AIR HAMMER 6" OD (65-80')

SAMPLING METHOD: N/A

N: 665924.59 E: 647545.50 GROUND SURFACE ELEV: 1264.89

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
0	0' - 65' Clay and chert mixture.		Logged by cuttings.	2.9' Stickup
5				
10				
15				
20				
25				
30				

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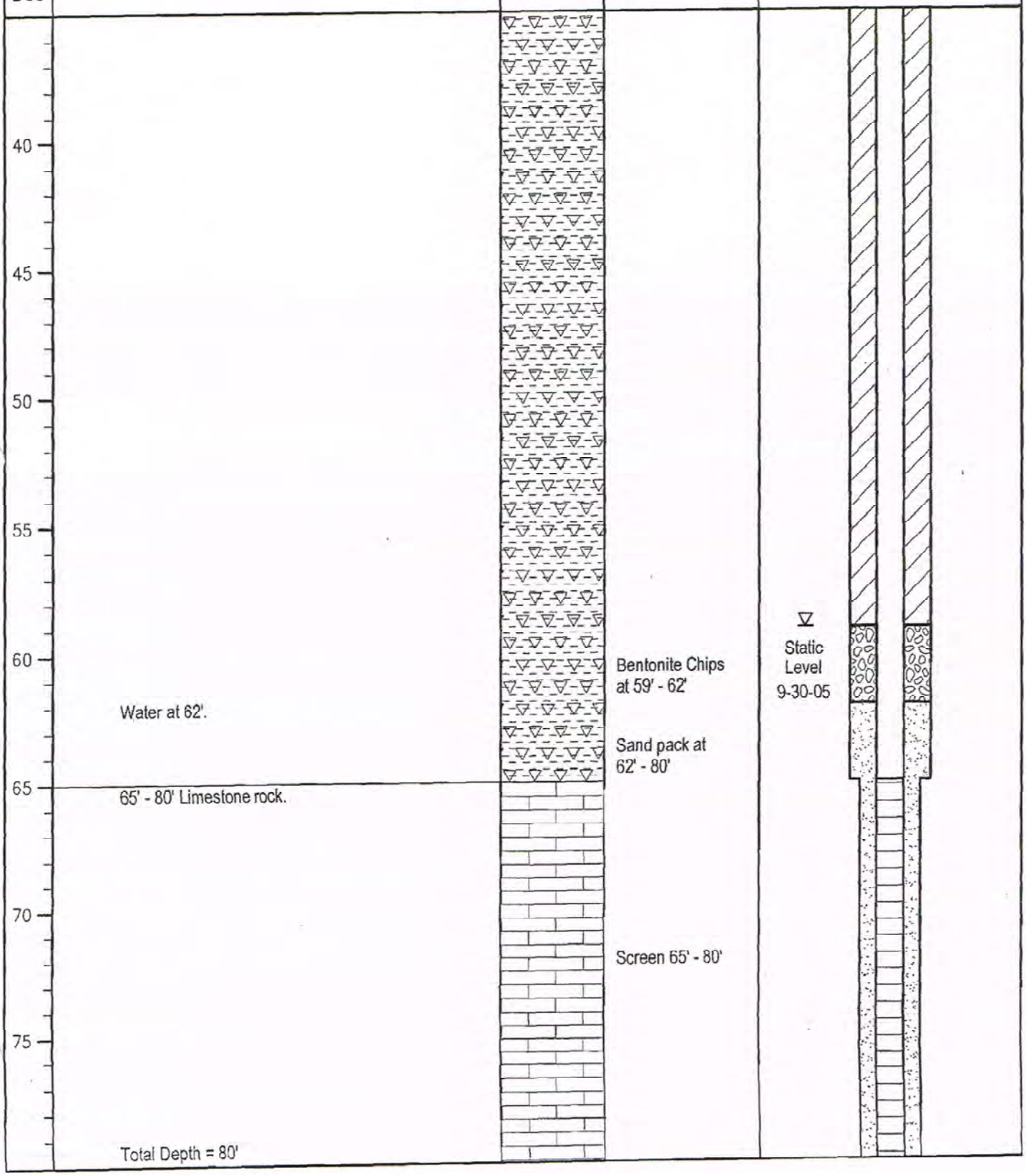
FIELD BORING LOG

BORING NO.: LGW-4 PAGE: 2 of 2

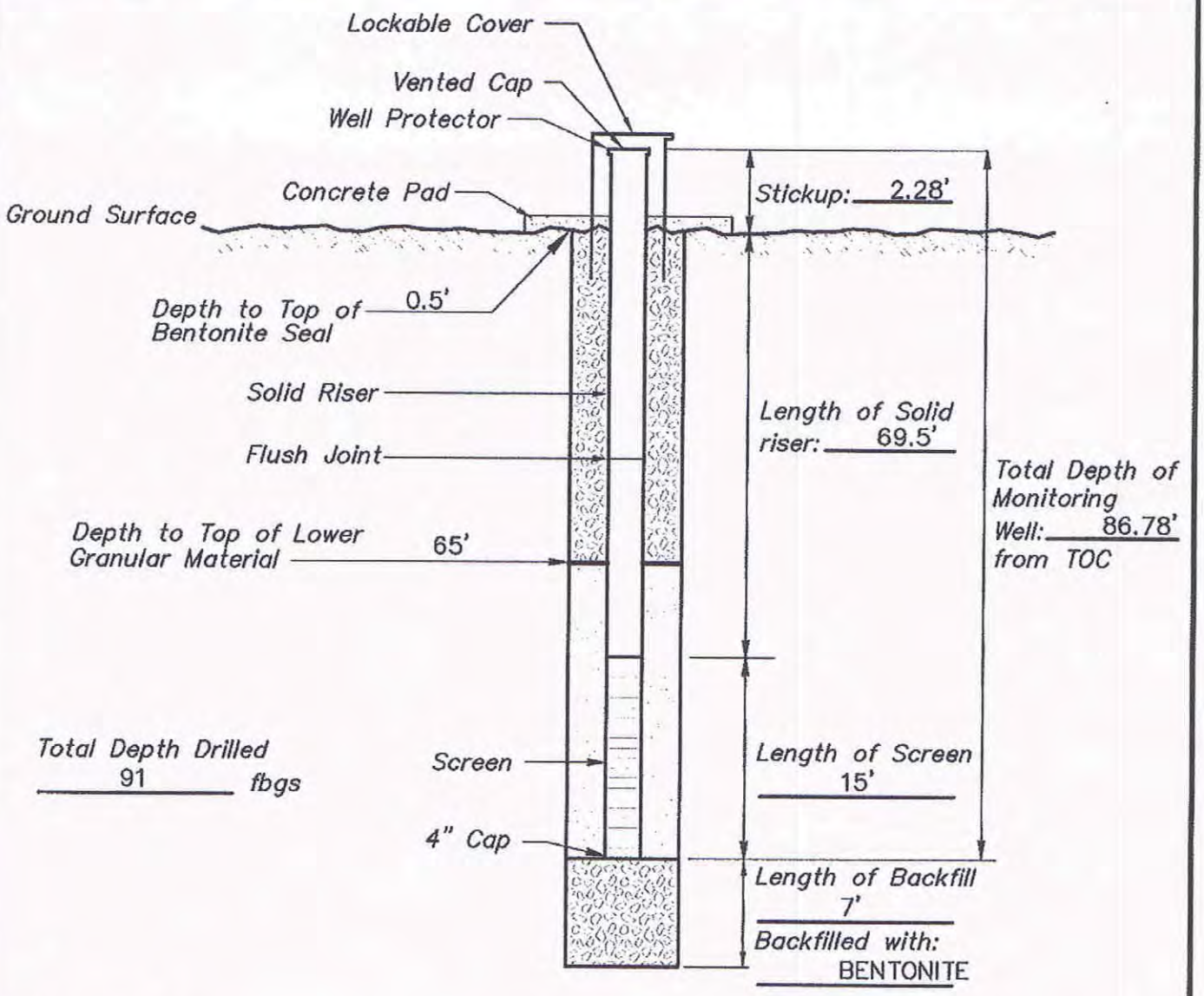
TOTAL DEPTH: 80 FEET BELOW GROUND SURFACE (BGS)

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
40				
45				
50				
55				
60	Water at 62'.		Bentonite Chips at 59' - 62'	Static Level 9-30-05
			Sand pack at 62' - 80'	
65	65' - 80' Limestone rock.			
70			Screen 65' - 80'	
75				
	Total Depth = 80'			



MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL — Well Number LGW-5
Job Number 062-014-35017042 — Installation Date 9-21-05 — Location TONTITOWN, ARKANSAS
Datum Elevation 1271.91
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.01
Riser Diameter & Material 2" PVC — Borehole Diameter 10.25" AND 6"
Granular Backfill Material 10-20 SAND — GEC Representative M. ROTENBERRY
Drilling Method AUGER AND HAMMER — Drilling Contractor MOHAWK DRILLING



Bentonite Plug

Granular Backfill Material

(Not to Scale)

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MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-5
DRAWING NUMBER: 026 CHECKED BY: MR

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FIELD BORING LOG

BORING NO.: LGW-5 PAGE: 1 of 2

TOTAL DEPTH: 91 FEET BELOW GROUND SURFACE (BGS)

CLIENT: WASTE MANAGEMENT	PROJECT: TONTITOWN LANDFILL
JOB NO.: 062-014-35017042-012	DRILLING CO.: MOHAWK DRILLING
LOGGED BY: MERRICK ROTENBERRY	DRILLER: KEVIN
DATE DRILLED: 9-21-05	RIG TYPE: FAILING SS-25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-70'); AIR HAMMER 6" OD (70-91')

SAMPLING METHOD: N/A

N: 665325.53 E: 647602.83 GROUND SURFACE ELEV: 1268.71

Depth BGS	Sample Interval	DESCRIPTION	Litho. Symbol	Comments	Well Construction
					3.2' Stickup
0		0' - 70' Clay and chert mixture.		Logged by cuttings.	
40		40' - 42' Hard drilling.			
50		Cuttings moist at 52'.			

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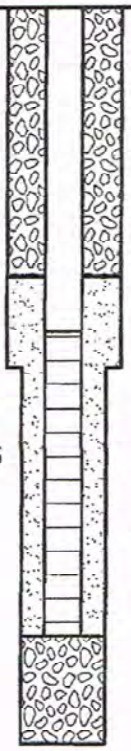
FIELD BORING LOG

BORING NO.: LGW-5 PAGE: 2 of 2

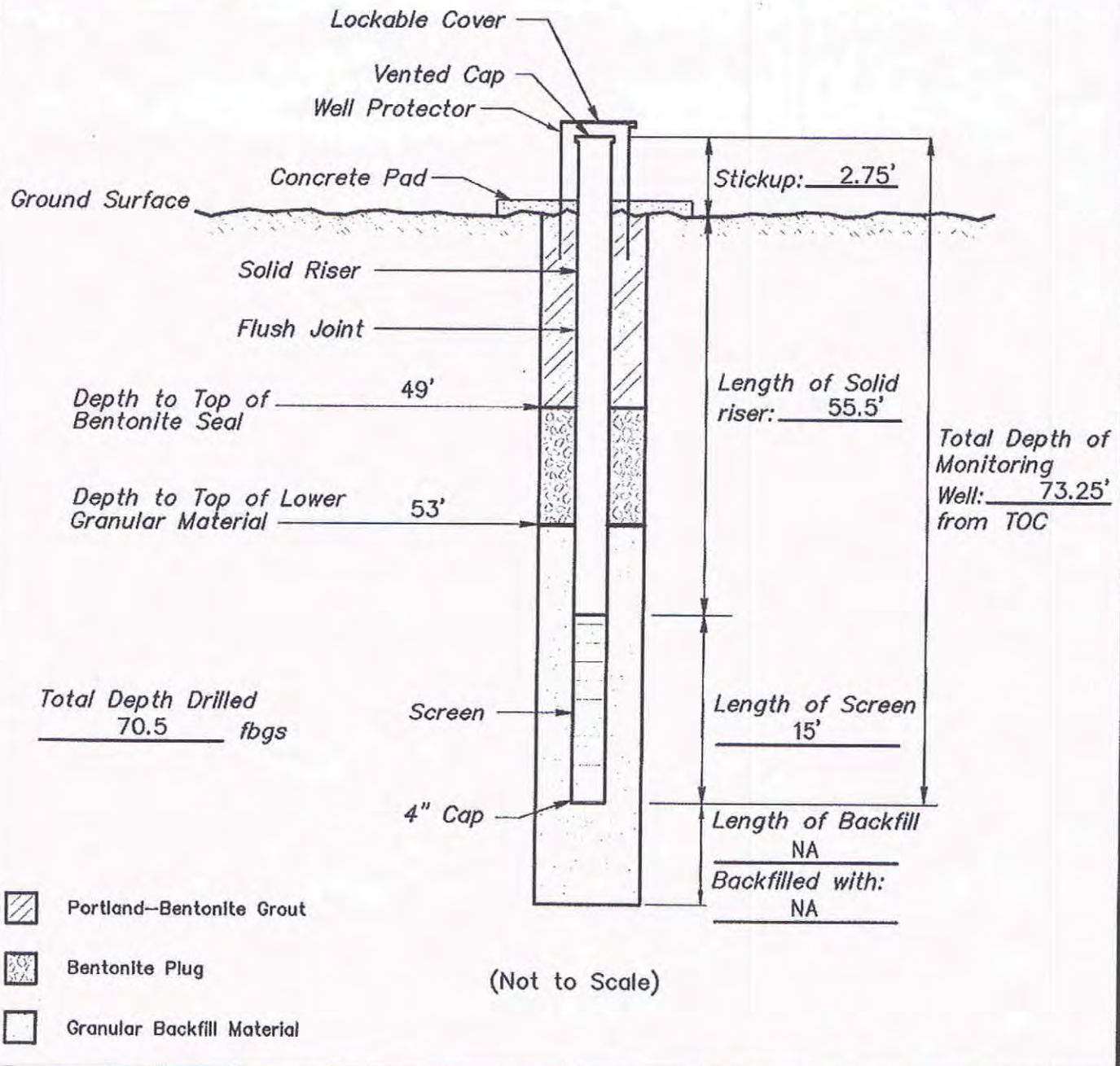
TOTAL DEPTH: 91 FEET BELOW GROUND SURFACE (BGS)

Depth BGS	Sample Interval	DESCRIPTION	Litho. Symbol	Comments	Well Construction
55				Bentonite to surface	
60		No show of water during drilling.		Sand pack at 65' - 84'	
70		70' - 91' Limestone rock.		Screen 69' - 84'	▽ Static Level 9-30-05
80				Bentonite at 84' - 91'	
90		Total Depth = 91'			
100					
110					
120					
130					



MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL — Well Number LGW-6
Job Number 062-014-35017042 — Installation Date 9-27-05 — Location TONTITOWN, ARKANSAS
Datum Elevation 1244.79
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.01
Riser Diameter & Material 2" PVC — Borehole Diameter 10.25" AND 6"
Granular Backfill Material 10-20 SAND — GEC Representative M. ROTENBERRY
Drilling Method AUGER AND AIR HAMMER — Drilling Contractor MOHAWK DRILLING



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MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-6
DRAWING NUMBER: 027 CHECKED BY: MR

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FIELD BORING LOG

BORING NO.: LGW-6 PAGE: 1 of 2

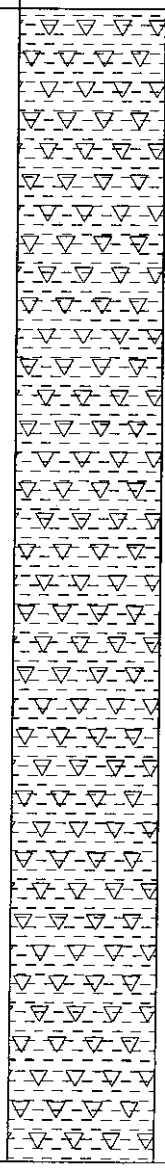
TOTAL DEPTH: 70.5 FEET BELOW GROUND SURFACE (BGS)

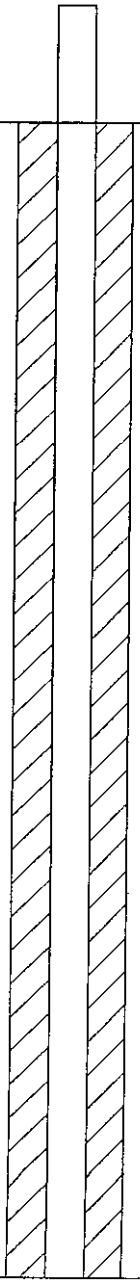
CLIENT: WASTE MANAGEMENT	PROJECT: TONTITOWN LANDFILL
JOB NO.: 062-014-35017042-013	DRILLING CO.: MOHAWK DRILLING
LOGGED BY: MERRICK ROTENBERRY	DRILLER: KEVIN
DATE DRILLED: 9-27-05	RIG TYPE: FAILING SS 25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-54'); AIR HAMMER 6" OD (54-70.5')

SAMPLING METHOD: N/A

Depth BGS	N: 664913.38 E: 648173.35 ELEV: 1242.04 DESCRIPTION	Litho. Symbol	Comments	Well Construction
0	0' - 54.0' Clay and chert mixture.		Logged by cuttings.	
5				
10				
15				
20				
25				
30				





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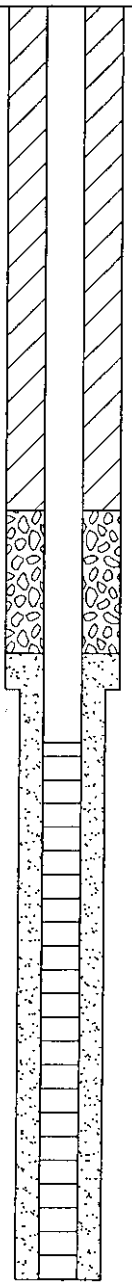
FIELD BORING LOG

BORING NO.: LGW-6 PAGE: 2 of 2

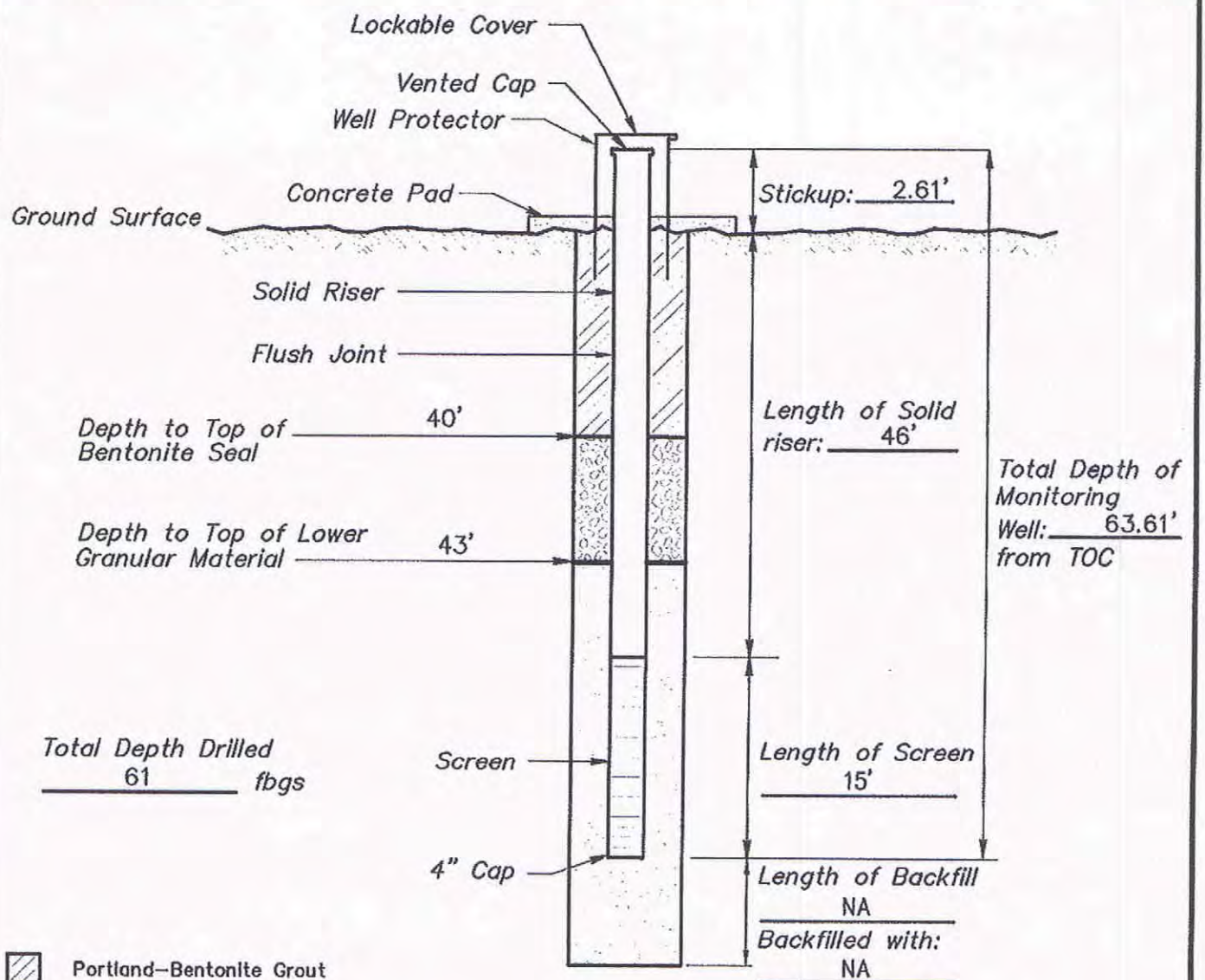
TOTAL DEPTH: 70.5 FEET BELOW GROUND SURFACE (BGS)

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
40				
45				
50			Bentonite Chips at 49' - 53'	▽ Static Level 9-30-05
			Sand pack at 53' - 70.5'	
55	54' - 70' Limestone rock. Wet at 55'.			
60				
			Screen 55.5' - 70.5'	
65				
70	Total Depth = 70.5'			
75				



MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL — Well Number LGW-7
Job Number 062-014-35017042 — Installation Date 9-27-05 — Location TONTITOWN, ARKANSAS
Datum Elevation 1220.60
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.01
Riser Diameter & Material 2" PVC — Borehole Diameter 10.25" AND 6"
Granular Backfill Material 10-20 SAND — GEC Representative M. ROTENBERRY
Drilling Method AUGER AND AIR HAMMER — Drilling Contractor MOHAWK DRILLING



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MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-7
DRAWING NUMBER: 028 CHECKED BY: MR

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FIELD BORING LOG

BORING NO.: LGW-7 PAGE: 1 of 2

TOTAL DEPTH: 61 FEET BELOW GROUND SURFACE (BGS)

CLIENT: WASTE MANAGEMENT	PROJECT: TONTITOWN LANDFILL
JOB NO.: 062-014-35017042-014	DRILLING CO.: MOHAWK DRILLING
LOGGED BY: MERRICK ROTENBERRY	DRILLER: KEVIN
DATE DRILLED: 9-27-05	RIG TYPE: FAILING SS 25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-44'); AIR HAMMER 6" OD (44-61')

SAMPLING METHOD: N/A

N: 664257.00 E: 648161.05 GROUND SURFACE ELEV: 1216.90

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
0	0' - 44.0' Clay and chert mixture.		Logged by cuttings.	3.7' Stickup
5				
10				
15				
20				
25				
30				

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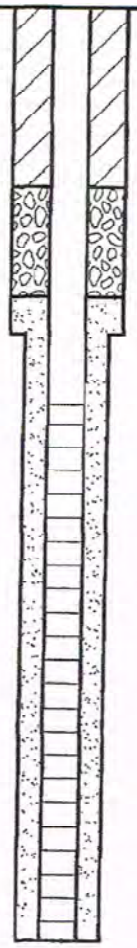
FIELD BORING LOG

BORING NO.: LGW-7 PAGE: 2 of 2

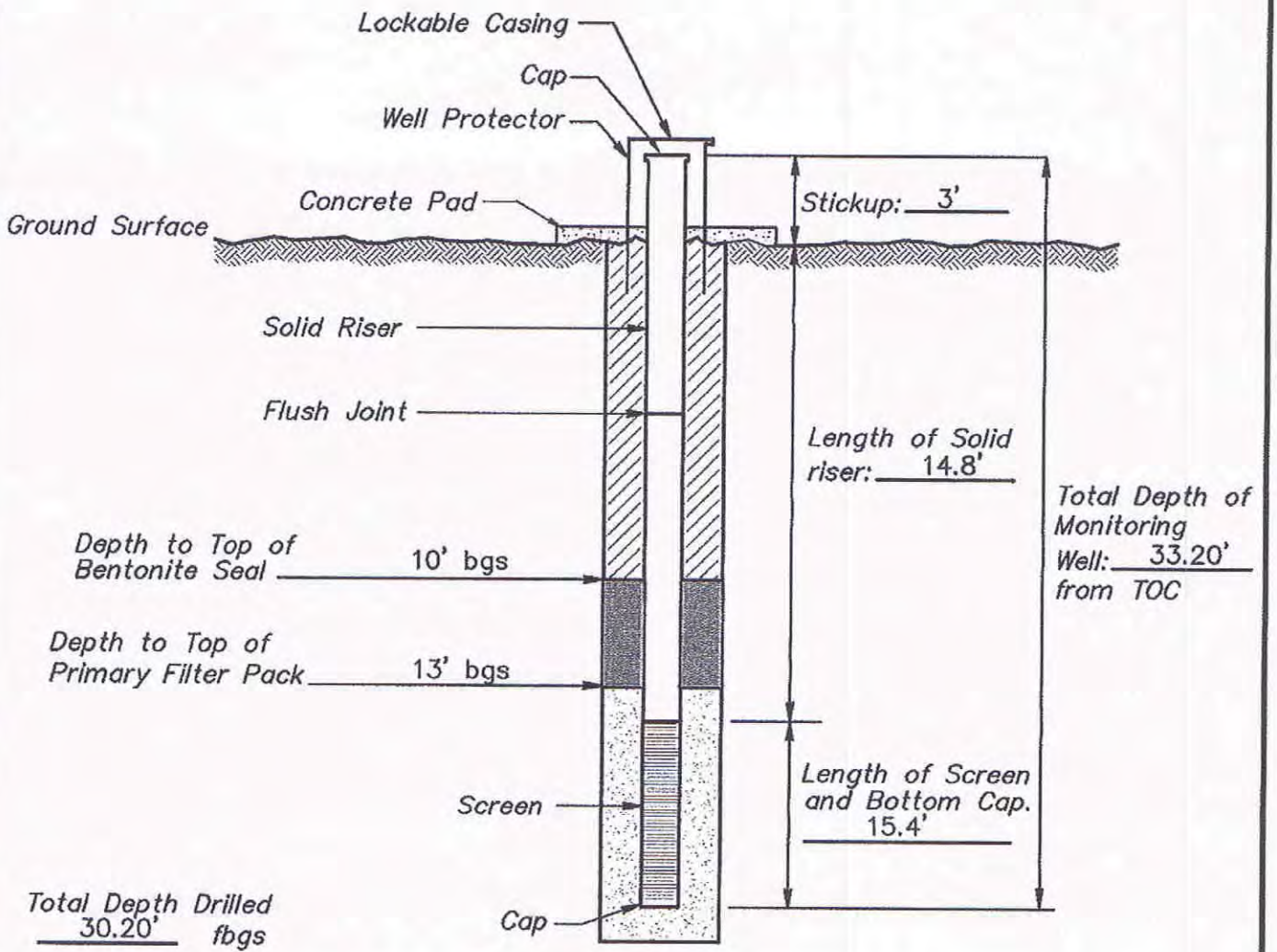
TOTAL DEPTH: 61 FEET BELOW GROUND SURFACE (BGS)

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
40	39' - 44' Chert, hard drilling.		Bentonite Chips at 40' - 43'	
	Cuttings, wet.			▽ Static Level 9-30-05
45	44' - 61' Limestone rock. Wet at 55'.		Sand pack at 43' - 61'	
50			Screen 46' - 61'	
55				
60	Total Depth = 61'			
65				
70				
75				



MONITORING WELL INSTALLATION RECORD

Job Name INSTALLATION OF REPLACEMENT WELL Well Number LGW-8R
Installation Date 8/19/08 Location ECO-VISTA CLASS 1 LANDFILL
Datum Elevation 1186.24 (T.O.C.) Surface Elevation 1183.35
Screen Diameter & Material 2" PVC Borehole Diameter 8 1/4" / 4"
Riser Diameter & Material 2" PVC Terracon Representative JODY ADAMS
Granular Backfill Material 10-20 SAND Northing 664011.30 Easting 648287.11
Drilling Method HOLLOW STEM AUGER/AIR ROTARY Drilling Contractor ANDERSON ENGINEERING



Terracon
Consulting Engineers and Scientists
25803 I-30 South BRYANT, AR 72022
PH. (501) 847-9232 FAX. (501) 847-9210

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35087055
WELL NUMBER: LGW-8R
DRAWING NUMBER: 004 CHECKED BY: JBA

Terracon
Consulting Engineers and Scientists
25809 I-30 South BRYANT, AR. 72022
PH. (501) 847-9292 FAX. (501) 847-9210

FIELD BORING LOG

BORING NO.: LGW-8R PAGE: 1 of 1

TOTAL DEPTH: 30 FEET BELOW GROUND SURFACE (BGS)

CLIENT: ECO-VISTA CLASS 1 LANDFILL

PROJECT: INSTALLATION OF REPLACEMENT WELLS

JOB NO.: 062-014-35087055-007

DRILLING CO.: ANDERSON ENGINEERING

LOGGED BY: JBA

DRILLER: GM

DATE DRILLED: 8/19/08

RIG TYPE: CME-55

DRILLING METHOD: 8 1/4" HOLLOW STEM AUGER / AIR ROTARY

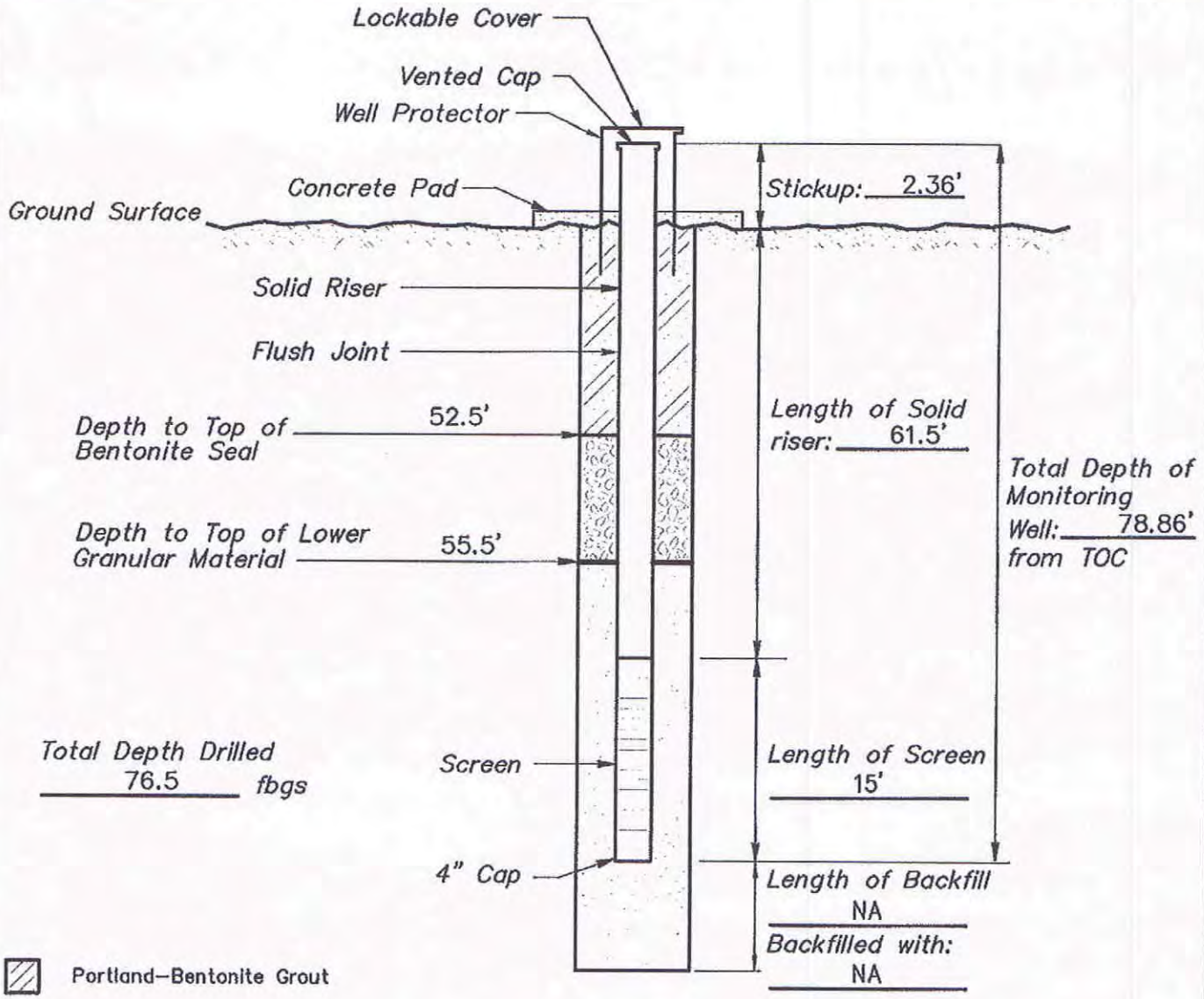
SAMPLING METHOD: CUTTINGS

N: 664011.30 E: 648287.11 G.S. ELEV.: 1183.35

Depth BGS	Sample Interval	DESCRIPTION	Litho. Symbol	PID (ppm)	Comments
0		0'-8' GRAVELLY CLAY dark brown, gravel is chert and weathered limestone			
5					
10		8'-19' GRAVELLY CLAY reddish brown, gravel is chert and weathered limestone			
15					
20		19'-30' LIMESTONE gray with intermittent chert beds			Changed to air rotary at 20' bgs
25					
30		Total Depth = 30' bgs.			

MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL — Well Number LGW-9
Job Number 062-014-35017042 — Installation Date 9-22-05 — Location TONTITOWN, ARKANSAS
Datum Elevation 1237.47
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.01
Riser Diameter & Material 2" PVC — Borehole Diameter 10.25" AND 6"
Granular Backfill Material 10-20 SAND — GEC Representative M. ROTENBERRY
Drilling Method AUGER AND AIR HAMMER — Drilling Contractor MOHAWK DRILLING



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MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-9
DRAWING NUMBER: 030 CHECKED BY: MR

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FIELD BORING LOG

BORING NO.: LGW-9 PAGE: 1 of 2

TOTAL DEPTH: 76.5 FEET BELOW GROUND SURFACE (BGS)

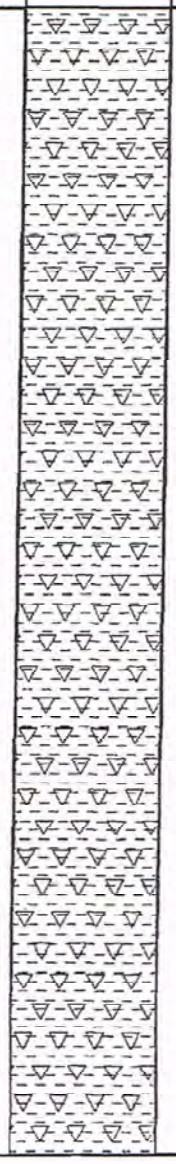
CLIENT: WASTE MANAGEMENT	PROJECT: TONTITOWN LANDFILL
JOB NO.: 062-014-35017042-016	DRILLING CO.: MOHAWK DRILLING
LOGGED BY: MERRICK ROTENBERRY	DRILLER: KEVIN
DATE DRILLED: 9-22-05	RIG TYPE: FAILING SS 25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-57.5'); AIR HAMMER 6" OD (57.5-76.5')

SAMPLING METHOD: N/A

N: 663904.19 E: 647801.14 GROUND SURFACE ELEV: 1234.07

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
0	0' - 57.5' Clay and chert mixture.		Logged by cuttings.	3.4' Stickup
5				
10				
15				
20				
25				
30				



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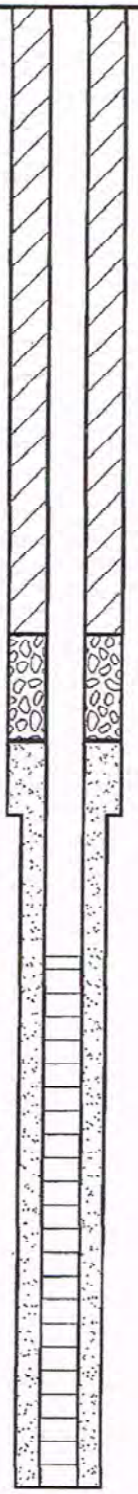
FIELD BORING LOG

BORING NO.: LGW-9 PAGE: 2 of 2

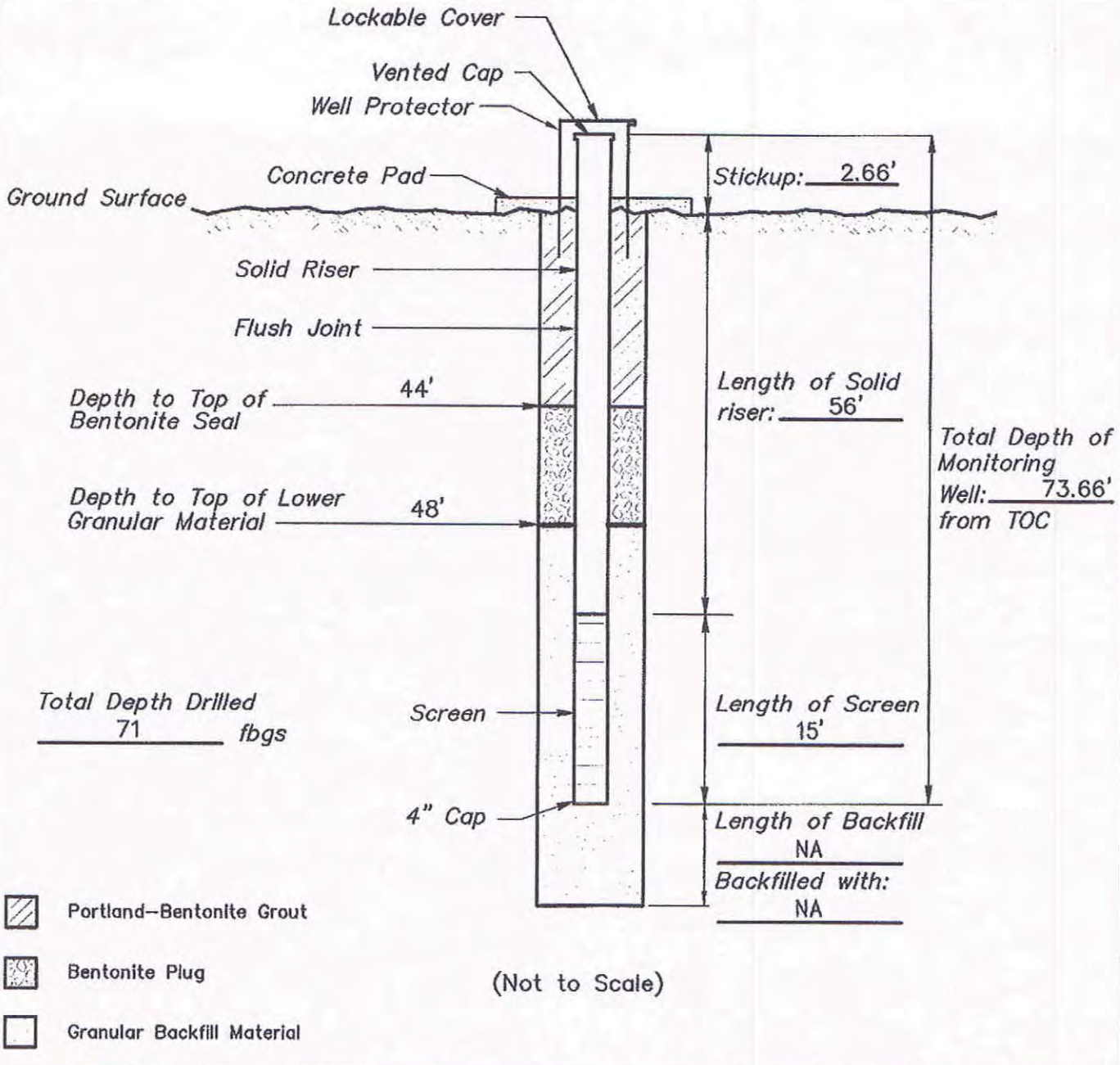
TOTAL DEPTH: 76.5 FEET BELOW GROUND SURFACE (BGS)

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
40	Clay and chert mixture.		Bentonite Chips at 52.5' - 55.5'	Static Level 9-30-05
45				
50				
55	Wet at 56'.			
	57.5' - 76.5' Limestone rock.		Sand pack at 55.5' - 76.5'	
60				
65			Screen 61.5' - 76.5'	
70				
75	Total Depth = 76.5'			



MONITORING WELL INSTALLATION RECORD

Job Name TONTITOWN LANDFILL — Well Number LGW-10
Job Number 062-014-35017042 — Installation Date 9-23-05 — Location TONTITOWN, ARKANSAS
Datum Elevation 1240.61
Datum for Water Level Measurement TOC
Screen Diameter & Material 2" PVC — Slot Size 0.01
Riser Diameter & Material 2" PVC — Borehole Diameter 10.25" AND 6"
Granular Backfill Material 10-20 SAND — GEC Representative M. ROTENBERRY
Drilling Method AUGER AND AIR HAMMER — Drilling Contractor MOHAWK DRILLING



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MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35017042
WELL NUMBER: LGW-10
DRAWING NUMBER: 031 CHECKED BY: MR

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FIELD BORING LOG

BORING NO.: LGW-10 PAGE: 1 of 2

TOTAL DEPTH: 71 FEET BELOW GROUND SURFACE (BGS)

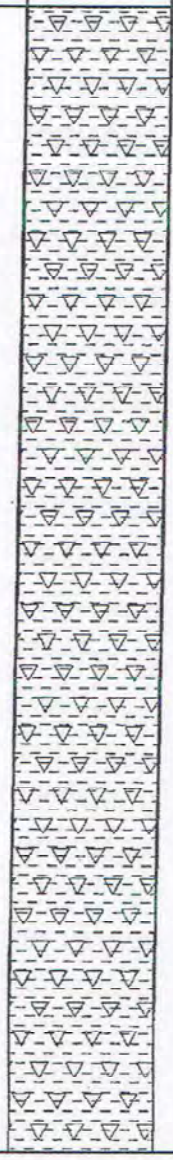
CLIENT: WASTE MANAGEMENT	PROJECT: TONTITOWN LANDFILL
JOB NO.: 062-014-35017042-017	DRILLING CO.: MOHAWK DRILLING
LOGGED BY: MERRICK ROTENBERRY	DRILLER: KEVIN
DATE DRILLED: 9-23-05	RIG TYPE: FAILING SS 25 AND INGERSOL T3W

DRILLING METHOD: AUGER 10.25" OD (0-50'); AIR HAMMER 6" OD (50-71')

SAMPLING METHOD: N/A

N: 663943.21 E: 647347.78 GROUND SURFACE ELEV: 1237.41

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
0	0' - 50' Clay and chert mixture.		Logged by cuttings.	3.2' Stickup
5				
10				
15				
20				
25				
30				



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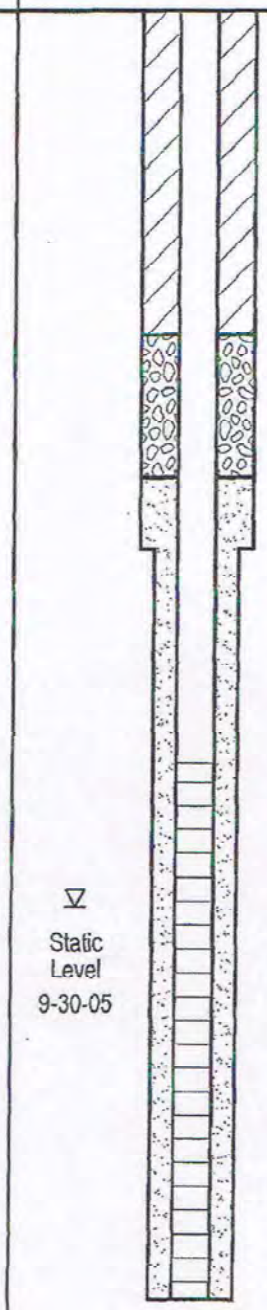
FIELD BORING LOG

BORING NO.: LGW-10 PAGE: 2 of 2

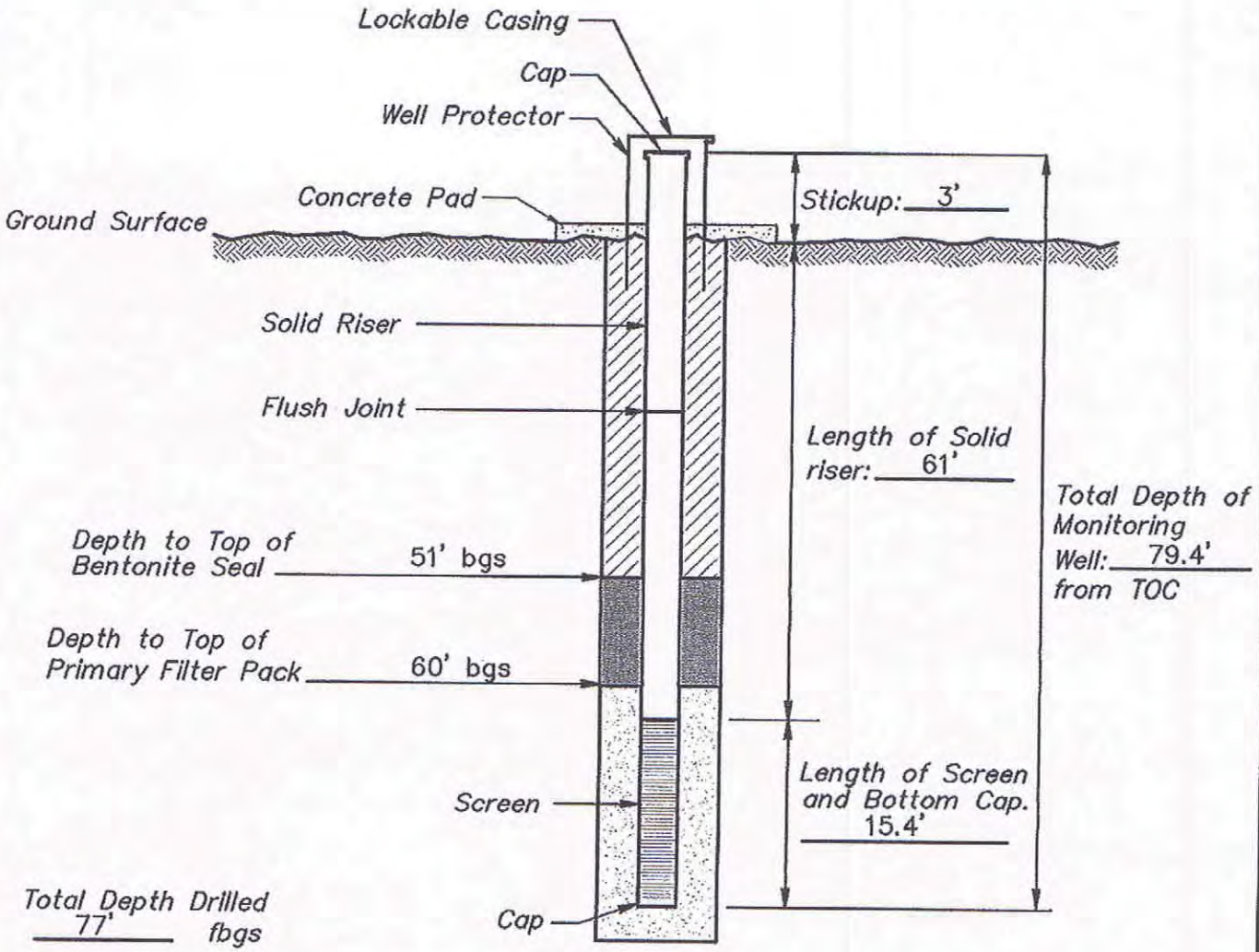
TOTAL DEPTH: 71 FEET BELOW GROUND SURFACE (BGS)

Depth BGS	DESCRIPTION	Litho. Symbol	Comments	Well Construction
40	Clay and chert mixture.		No show of water during drilling.	
45			Bentonite Chips at 44' - 48'	
50	50' - 71' Limestone rock.		Sand pack at 48' - 71'	
55				
60				Static Level 9-30-05
65			Screen 56' - 71'	
70	Total Depth = 71'			
75				



MONITORING WELL INSTALLATION RECORD

Job Name INSTALLATION OF REPLACEMENT WELL Well Number LGW-14R
Installation Date 8/13/08 Location ECO-VISTA CLASS 1 LANDFILL
Datum Elevation 1250.93 (T.O.C.) Surface Elevation 1247.96
Screen Diameter & Material 2" PVC Borehole Diameter 8 1/4" / 4"
Riser Diameter & Material 2" PVC Terracon Representative JODY ADAMS
Granular Backfill Material 10-20 SAND Northing 665280.74 Easting 648182.70
Drilling Method HOLLOW STEM AUGER/AIR ROTARY Drilling Contractor ANDERSON ENGINEERING



Terracon
Consulting Engineers and Scientists
2560 I-30 South BRYANT, AR 72022
PH. (501) 847-9292 FAX. (501) 847-9210

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 062-014-35087055
WELL NUMBER: LGW-14R
DRAWING NUMBER: 003 CHECKED BY: JBA

Terracon
Consulting Engineers and Scientists
25809 I-30 South BRYANT, AR. 72022
PH. (501) 847-9292 FAX. (501) 847-9210

FIELD BORING LOG

BORING NO.: LGW-14R PAGE: 1 of 1

TOTAL DEPTH: 77 FEET BELOW GROUND SURFACE (BGS)

CLIENT: ECO-VISTA CLASS 1 LANDFILL	PROJECT: INSTALLATION OF REPLACEMENT WELLS
JOB NO.: 062-014-35087055-008	DRILLING CO.: ANDERSON ENGINEERING
LOGGED BY: JBA	DRILLER: GM
DATE DRILLED: 8/13/08	RIG TYPE: CME-55

DRILLING METHOD: 8 1/4" HOLLOW STEM AUGER / 4" AIR ROTARY

SAMPLING METHOD: CUTTINGS

N: 665280.74 E: 648182.70 G.S. ELEV. 1247.96

Depth BGS	DESCRIPTION	Litho. Symbol	% Recovery	RQD	Remarks
0	0'-51' CLAY red with chert and weathered limestone gravel, moist at 46'				
50	51'-77' LIMESTONE gray with intermittent chert beds ▼				Changed to air rotary (4") at 52' bgs
80	Total Depth = 77' bgs.				

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FIELD BOREHOLE LOG

Well NO.: **NE-1** Total Depth: 54.3 ft bgs

COORDINATES: N662064 E647308
TOC ELEVATION: 1201.43

PROJECT INFORMATION

PROJECT: **TONTITOWN LANDFILL**
CLIENT: **WASTE MANAGEMENT**
JOB NO.: **01042**
LOGGED BY: **BILL SADLER**
DATE INSTALLED: **APRIL 20, 2001**

DRILLING INFORMATION

DRILLING CO.: **HORIZON DRILLING**
DRILLER: **ALLEN BRANTLEY/RYAN THOMSON**
RIG TYPE: **BOART LONGYEAR BK-66**
DRILLING METHOD: **6.5 in. HOLLOW STEM AUGER (0-44')**
6.25 in. AIR HAMMER (44-55.5')

GRAVEL PACK: 10-20 Sand		SEAL: BENTONITE	GROUT: PORTLAND/BENTONITE
CASING TYPE: PVC, SCH. 40, FLUSH THREADS	DIAMETER: 2 in.	LENGTH: 44.25 ft bgs	WATER LEVEL: 45.25 ft bgs ▽
SCREEN TYPE: 0.010 in. FACTORY SLOT	DIAMETER: 2 in.	LENGTH: 9.5 ft	DATE OF WATER LEVEL: 4/20/01

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE Type & No.	Blows/ 6 in.	WELL COMPLETION	WELL DESCRIPTION
0		CHERTY CLAY: Alternating Layers of Chert and Clay. Chert - white, hard, freshly broken by auger. Clay - orangish-red, slightly moist, CL.	CUTTINGS			PVC Stickup, 3.0 ft Grout, 0 to 2.2 ft bgs
-5						
-10						PVC Casing, 3 ft ags to 44.25 ft bgs
-15						Centralizer, 15 ft
-20						Bentonite, 2.2 to 34 ft bgs
-25		Same as above except gradually a higher percentage of chert with depth and cuttings gradually becoming lighter - light pink. Lighter color due to mixing of clay with highly weathered crushed chert.				
-30						
-35						Centralizer, 35 ft Grout, 34 to 39.6 ft bgs
-40						Bentonite, 39.6 to 43.9 ft bgs
-45		LIMESTONE: 42 ft bgs, Competent Limestone with Chert, Limestone - gray, fizzes with HCL, Chert - white.			▽	Groundwater Level Sand Pack, 43.9 to 54.5 ft bgs
-50						PVC Screen, 44.25 to 53.75 ft bgs
-55						

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FIELD BOREHOLE LOG

Well NO.: **NE-2** Total Depth: 31.15 ft bgs

COORDINATES: N662259 E647577
TOC ELEVATION: 1176.55

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: **TONTITOWN LANDFILL**	DRILLING CO.: **HORIZON DRILLING**
CLIENT: **WASTE MANAGEMENT**	DRILLER: **ALLEN BRANTLEY/RYAN THOMSON**
JOB NO.: **01042**	RIG TYPE: **BOART LONGYEAR BK-66**
LOGGED BY: **BILL SADLER**	DRILLING METHOD: **6.5 in. HOLLOW STEM AUGER (0-23')**
DATE INSTALLED: **APRIL 24, 2001**	**6.25 in. AIR HAMMER (23-35.5')**

GRAVEL PACK: 10-20 Sand		SEAL: BENTONITE	GROUT: PORTLAND/BENTONITE
CASING TYPE: PVC, SCH. 40, FLUSH THREADS	DIAMETER: 2 in.	LENGTH: 21.0 ft bgs	WATER LEVEL: 21.50 ft bgs ▽
SCREEN TYPE: 0.010 in. FACTORY SLOT	DIAMETER: 2 in.	LENGTH: 9.54 ft	DATE OF WATER LEVEL: 4/24/01

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE Type & No.	Blows/ 6 in.	WELL COMPLETION	WELL DESCRIPTION
0		CHERTY CLAY: Alternating Layers of Chert and Clay. Chert - white, hard, freshly broken by auger. Clay - reddish-brown, moist, CL.	CUTTINGS		PVC Stickup, 3.0 ft Grout, 0 to 2.5 ft bgs PVC Casing, 3 ft ags to 21.0 ft bgs Bentonite, 2.5 to 20.38 ft bgs	
-5						
-10						
-15						
-20					▽	Groundwater Level
-25		LIMESTONE: 22.5 ft bgs, Competent Limestone & Chert, ~50/50 mixture, Limestone - gray, fizzes with HCL, Chert - white.				Sand Pack, 20.38 to 32.5 ft bgs PVC Screen, 21.0 to 30.54 ft bgs Cuttings/Slough, 32.5 to 35.5 ft bgs
-30						
-35						

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FIELD BOREHOLE LOG

WELL NO.: **NE-3** Total Depth: 85.4 ft bgs

COORDINATES: N662866 E648098
TOC ELEVATION: 1231.53

PROJECT INFORMATION

PROJECT: **TONTITOWN LANDFILL**
CLIENT: **WASTE MANAGEMENT**
JOB NO.: **01042**
LOGGED BY: **DAN McCULLOUGH/BILL SADLER**
DATE DRILLED/CONSTRUCTED: **APRIL 26, 2001**

DRILLING INFORMATION

DRILLING CO.: **HORIZON DRILLING**
DRILLER: **RYAN THOMPSON**
RIG TYPE: **BOART LONGYEAR BK-66**
DRILLING METHOD: **10 in. HOLLOW STEM AUGER (0-5')**
6.25 in. AIR ROLLER CONE (5-88')

GRAVEL PACK: 10-20 Sand		SEAL: BENTONITE	GROUT: PORTLAND/BENTONITE
CASING TYPE: PVC, SCH. 40, FLUSH THREADS	DIAMETER: 2 in.	LENGTH: 75.2 ft bgs	WATER LEVEL: 75.7 ft bgs ▽
SCREEN TYPE: 0.010 in. FACTORY SLOT	DIAMETER: 2 in.	LENGTH: 9.55 ft	DATE OF WATER LEVEL: 4/26/01

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE Type & No.	Blows/ 6 in.	WELL COMPLETION	WELL DESCRIPTION
0		CHERTY CLAY: Alternating Layers of Chert and Clay. More Clay than Chert in cuttings. Chert - white, hard, freshly broken by auger. Clay - orangish-red, moist, CL.	CUTTINGS		PVC Stickup, 3.0 ft	
-5					Grout, 0 to 69.7 ft bgs	
-10						
-15						
-20		Same as above except clay pink in color, probably from mixing with ground up weathered chert. More competent chert than clay mixture in cuttings.			PVC Casing, 3 ft ags to 75.2 ft bgs	
-25						
-30						
-35						
-40						
-45						
-50						
-55						
-60						
-65						
-70		Cuttings same as above	Possible Void		Bentonite, 69.7 to 74.4 ft bgs	
-75		LIMESTONE: 73.5 ft bgs, Competent Limestone & Chert, ~50/50 mixture, Limestone - gray, sparry, fossiliferous, fizzes with HCL, Chert - white.			▽ Groundwater Level	
-80					PVC Screen, 75.2 to 84.75 ft bgs	
-85					Sand Pack, 74.4 to 88 ft bgs	

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FIELD BOREHOLE LOG

Well NO.: **NE-4** Total Depth: 68.6 ft bgs

COORDINATES: N666189 E644305
TOC ELEVATION: 1293.06

PROJECT INFORMATION

PROJECT: **TONTITOWN LANDFILL**
CLIENT: **WASTE MANAGEMENT**
JOB NO.: **01042**
LOGGED BY: **BILL SADLER**
DATE INSTALLED: **MAY 3, 2001**

DRILLING INFORMATION

DRILLING CO.: **HORIZON DRILLING**
DRILLER: **ALLAN BRANTLEY/RYAN THOMPSON**
RIG TYPE: **BOART LONGYEAR BK-66**
DRILLING METHOD: **7.5 in. AIR ROLLER CONE (0-62')**
6.25 in. AIR HAMMER (62-80.5')

GRAVEL PACK: 10-20 Sand		SEAL: BENTONITE	GROUT: PORTLAND/BENTONITE	
CASING TYPE: PVC, SCH. 40, FLUSH THREADS	DIAMETER: 2 in.	LENGTH: 58.49 ft bgs	WATER LEVEL: 59.0 ft bgs ▽	
SCREEN TYPE: 0.010 in. FACTORY SLOT	DIAMETER: 2 in.	LENGTH: 9.57 ft	DATE OF WATER LEVEL: 5/3/01	

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE Type & No.	Blows/ 6 in.	WELL COMPLETION	WELL DESCRIPTION
0		CHERT & CLAY: Alternating Layers of Chert and Clay. More Clay than Chert in cuttings. Chert - white, hard, freshly broken by auger. Clay - orangish-red, moist, CL.	CUTTINGS			PVC Stickup, 3.0 ft Grout, 0 to 3 ft bgs
-5						
-10						
-15						
-20						PVC Casing, 3 ft ags to 58.49 ft bgs
-25						
-30		CHERT & CLAY: Same as above except more chert than clay, cuttings tan in color, probably from mixing with large amount of ground up weathered chert.				Bentonite, 3 to 58.1 ft bgs
-35						
-40						
-45		CHERT & CLAY: Air flow to surface greatly reduced during remainder of				
-50		CHERT: Weathered chert with very little clay.				
-55						
-60					▽	Groundwater Level
-65		LIMESTONE: 62 ft bgs, Competent Limestone & Chert, ~70% limestone, 30% chert, Limestone - gray, fizzes with HCL, Chert - white.				PVC Screen, 58.49 to 68.06 ft bgs
-70						Sand Pack, 58.1 to 78.5 ft bgs
-75						
-80						

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FIELD BOREHOLE LOG

Well NO.: NE-5 Total Depth: 82 ft bgs

COORDINATES: N662676 E648173
TOC ELEVATION: 1227.03

PROJECT INFORMATION

PROJECT: **TONTITOWN LANDFILL**
CLIENT: **WASTE MANAGEMENT**
JOB NO.: **01042**
LOGGED BY: **BILL SADLER**
DATE INSTALLED: **AUG. 7, 2001**

DRILLING INFORMATION

DRILLING CO.: **MOHAWK DRILLING**
DRILLER: **MATT JOHNSON**
RIG TYPE: **BOART LONGYEAR BK-66**
DRILLING METHOD: **11 in. HOLLOW STEM AUGER (0-9')**
6.5 in. AIR ROLLER CONE (9-82')

GRAVEL PACK: 10-20 Sand			SEAL: BENTONITE	GROUT: NONE
CASING TYPE: PVC, SCH. 40, FLUSH THREADS	DIAMETER: 2 in.		LENGTH: 72.2 ft bgs	WATER LEVEL: 73.39 ft bgs
SCREEN TYPE: 0.020 in. FACTORY SLOT	DIAMETER: 2 in.		LENGTH: 9.24 ft	DATE OF WATER LEVEL: 9/21/01

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE Type & No.	Blows/ 6 in.	WELL COMPLETION	WELL DESCRIPTION
0		TOPSOIL: Brown, clayey, slightly moist	CUTTINGS			PVC Stickup, 3.0 ft
-5		CHERTY CLAY: Alternating Layers of Chert and Clay. More Clay than Chert in cuttings. Chert - white, hard, freshly broken. Clay - orangish-red, moist, CL.	Alternating hard & soft drilling.			Concrete, 0 to 21.0 ft bgs
-10						
-15						
-20						
-25						Bentonite, 21.9 to 71.5 ft bgs
-30						
-35						
-40						PVC Casing, 3 ft ags to 82 ft bgs
-45						
-50						
-55		CHERT: with small amouts of clay. Chert in various stages of weathering, some soft enough to powder with fingernail, some very competent. Clay - reddish orange as above, moist.	Possible voids ~60 - 60.5 ft, 63 - 63.5 ft, 66.5 - 67.5 ft, 68 - 68.5 ft bgs.			
-60						
-65						
-70						
-75		LIMESTONE: 71 ft bgs, Competent Limestone & Chert, ~50/50 mixture, Limestone - gray, sparry, fossiliferous, fizzes with HCL, Chert - white.	Very slow drilling		▽	Groundwater Level PVC Screen, 72.2 to 81.4 ft bgs Sand Pack, 71.5 to 82 ft bgs
-80						

	PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-5E**	WELL ID: **NE-5E**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662678.1**	EASTING, FT SRC: **648201.9**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1221.1**	TOC MP, FT SRE: **1224.32**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **86.6**	INSTALLATION DATES: **7/14-7/29/2019**
	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		

Depth (feet)	% REC	USCS	Description
0			
	100	GC	CLAYEY GRAVEL, reddish orange to reddish brown, some silt, gravel (<3" dia), medium dense to dense, moist.
		SM	SILTY SAND, tan to orange with a lenses of brown fat clay, medium dense, moist.
		SW	
		CH	WELL GRADED SAND with silt and gravel, gravel (<1" dia), loose, moist.
	100		FAT CLAY, dark reddish brown, stiff to very stiff, moist.
			CHERT, white, 6-7 ft bgs.
10		CH	FAT CLAY with gravel, dark reddish brown, stiff to very stiff, moist.
		GC	CLAYEY GRAVEL, reddish brown, gravel (<2" dia), loose, moist.
	100	GM	
		ML	SILTY GRAVEL, orange, loose, moist.
		GM	SILT with gravel, tan with lenses of reddish brown fat clay, stiff, moist.
			SILTY GRAVEL, orange, loose, moist.
		GC	CLAYEY GRAVEL, reddish brown, gravel (<1" dia), loose, moist.
		CH	CHERT, white, 19-19.5 ft bgs.
20			GRAVELLY FAT CLAY, reddish brown, with black and red staining along weathered gravel, soft, moist.
	80		CHERT, white, 20-20.5 ft bgs.
			GRAVELLY FAT CLAY, reddish brown, with black and red staining along weathered gravel, gravel (<4" dia), soft, moist.
		CH	
30			@ 30-31 ft bgs gravel (<8" dia).
	100		GRAVELLY LEAN CLAY, with lenses of white silt and red fat clay throughout, gravel (<2" dia), medium stiff to soft, moist.
		CL	
			GRAVELLY FAT CLAY, reddish brown, with black and red staining along weathered gravel, soft, moist.
40		CH	

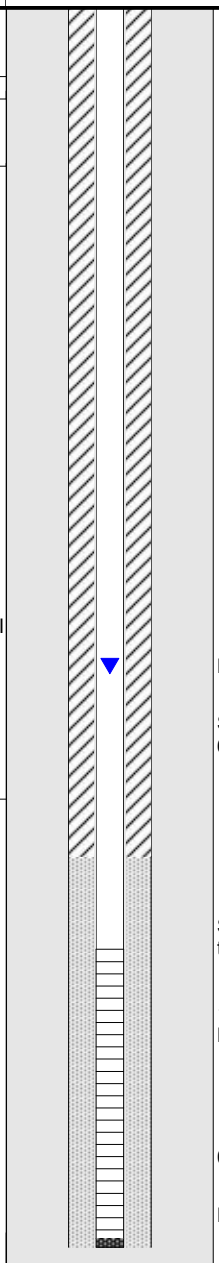
Well Construction

- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 76.4 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.2 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 21.0 ft bgs
- Bentonite chip seal from 21.0 ft bgs to 60.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-5E**	WELL ID: **NE-5E**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662678.1**	EASTING, FT SRC: **648201.9**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1221.1**	TOC MP, FT SRE: **1224.32**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **86.6**	INSTALLATION DATES: **7/14-7/29/2019**
	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		

Depth (feet)	% REC	USCS	Description
	100	GC	CLAYEY GRAVEL, tannish orange, loose, moist.
		CL	GRAVELLY LEAN CLAY, with lenses of white silt and red fat clay throughout, gravel (<2" dia), medium stiff to soft, moist.
50	100		WEATHERED CHERT/EPIKARST, chert is weathered into a silty gravel (<2" dia), tan to orange, with orange color along weathered surfaces. @ 48.5-49.5 ft bgs tannish white, loosely cemented tripoli, very loose, moist. @ 49.5-50 ft bgs white, loose, moist. @ 50-68 ft bgs tan to orange, chert is orange along weathered surfaces. @ 55-56 ft bgs white silt lens with little gravel, wet. @ 57-57.5 ft bgs chert layer. @ 57-68 ft bgs with sand. @ 60-62 ft bgs color changes to tan. @ 60-60.5 ft bgs chert layer. @ 62-64 ft bgs color changes to white, chert gravel (<3" dia).
60	60		
	100		
70	94		LIMESTONE AND CHERT, interbedded. Limestone is competent, white and gray. Chert is competent to less competent, white. Some dissolution and brown clay along fractures throughout. @68-74.8 ft bgs no loss of air, fractures 9-80° off horizontal. @ 68-70.5 ft bgs limestone weathered and parted along bedding planes. @ 70.5-73 ft bgs white chert breccia with gray microcrystalline limestone. @ 71.4-74 ft bgs some bedding planes contain brown clay and white to tan silt.
	100		
80	100		@ 74.8-79 ft bgs no loss of air, fractures 59-70° off horizontal. Chert is white and light gray. @ 79-83 ft bgs no loss of air, fractures 59-70° off horizontal. Weathered limestone and chert, parted along bedding planes. Chert is white and light gray.



Well Construction

Depth to water: 63.4 ft bgs (7/29/2019)

Slow-release bentonite pellet seal from 60.0 ft bgs to 70.0 ft bgs

Silica size 20/40 filter pack from 70.0 ft bgs to 83.5 ft bgs

10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

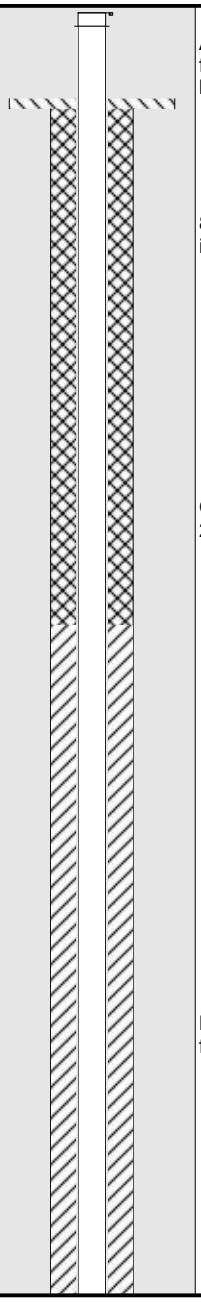
0.19 ft, 2 in dia., Sch. 40 PVC end cap

Drilling terminated at 83.5 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-5W**	WELL ID: **NE-5W**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662680.3**	EASTING, FT SRC: **648146.0**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1225.4**	TOC MP, FT SRE: **1228.62**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **93.7**	INSTALLATION DATES: **7/15-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**	

Depth (feet)	% REC	USCS	Description
0		ML	SILT, tan to brown, soft, moist to dry.
	100	GC	CLAYEY GRAVEL, reddish orange to reddish brown, with some tan silt, gravel (<3" dia), medium dense, moist.
		SM	SILTY SAND, orange to tan, medium dense, moist.
		CL	LEAN CLAY with sand, reddish brown with some dark red fat clay lenses, medium stiff, moist.
	100	GM	SILTY GRAVEL, reddish brown to orange with some lenses of red fat clay, loose, moist.
10			@ 11-12 ft bgs color changes to tannish orange.
		GC	CLAYEY GRAVEL, white with oxide staining on fractured surfaces and red fat clay lenses, gravel (<4" dia), dense, moist.
	100	SW	CHERT, white, 12-13.5 ft bgs.
			WELL GRADED SAND with gravel, reddish orange, increasing clay with depth, gravel (<3" dia), loose.
		GC	CLAYEY GRAVEL, reddish brown, loose to medium dense, moist.
		ML	SILT, tan to tannish orange, clayey with some gravel, soft, moist.
20		CL	LEAN CLAY with gravel, gravel (<3" dia), soft, moist.
	100	ML	SILT, tan to tannish orange, clayey with some gravel, soft, moist. @ 22.5 ft bgs gravel increasing with depth.
			CHERT, white with orange and black staining along fractured surfaces, 23.5-24.5 ft bgs.
		GC	CLAYEY GRAVEL, reddish brown, gravel (<2" dia), medium dense, moist.
			CHERT, white to light grey, 26.5-27 ft bgs.
		CH	GRAVELLY FAT CLAY, reddish brown, gravel (<2" dia) with red staining along fractures.
30		GW CL	WELL GRADED GRAVEL, black staining along fractured gravel, loose, moist.
	100		SANDY LEAN CLAY with gravel, reddish orange, gravel (<3" dia), soft, moist.
		CH	GRAVELLY FAT CLAY, reddish brown, gravel (<3" dia) with red staining along fractures.
		GW CH	WELL GRADED GRAVEL, black staining along fractured gravel, loose, moist.
40			GRAVELLY FAT CLAY, reddish brown, gravel (<2" dia) with red staining along fractures.
	80	CL	GRAVELLY LEAN CLAY, tannish orange with lenses of dark red fat clay, gravel (<1.5" dia), soft, moist.



Well Construction

- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 83.5 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.2 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 20.0 ft bgs
- Bentonite chip seal from 20.0 ft bgs to 65.8 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-5W**	WELL ID: **NE-5W**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662680.3**	EASTING, FT SRC: **648146.0**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1225.4**	TOC MP, FT SRE: **1228.62**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **93.7**	INSTALLATION DATES: **7/15-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**	

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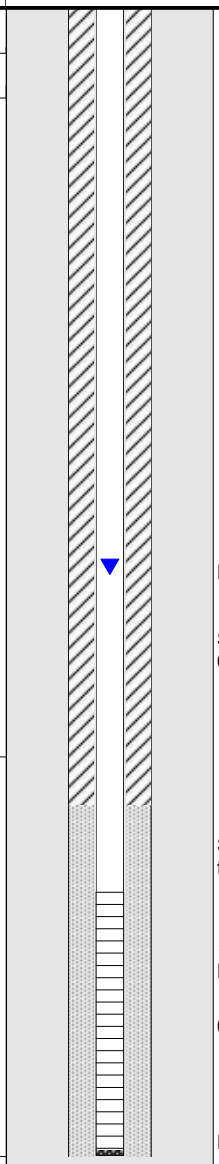
Depth (feet)	% REC	USCS	Description
		GM	SILTY GRAVEL, with some sand, tannish orange, gravel (<3" dia), loose, moist.
		ML	GRAVELLY SILT with clay, tannish orange, gravel (<1" dia). @ 48.5-48.8 ft bgs dark red fat clay.
50	70		WEATHERED CHERT/EPIKARST, chert is weathered into a silty gravel (<2" dia), white with tannish orange staining. @ 49-50 ft bgs chert, white. @ 53.5-55 ft bgs chert, white @ 57.5 ft bgs saturated.
60	64		@ 59.5-70 ft bgs white with tannish orange staining, gravel (<2" dia), saturated.
70	80		@ 70-75 ft bgs white to gray, saturated.
80	100		LIMESTONE AND CHERT, interbedded. Limestone is competent, white and gray. Chert is competent to less competent, white and gray. @ 75-79 ft bgs no loss of air, fractures 21-56° off horizontal. @ 75.6-77.3 ft bgs parted along bedding planes, @ 79-90.2 ft bgs no loss of air, fractures 66-73° off horizontal. Chert is white and light grey, parted along bedding planes.
90	93		



Well Construction

Depth to water: 67.7 ft bgs (7/29/2019)

Slow-release bentonite pellet seal from 65.8 ft bgs to 76.9 ft bgs

Silica size 20/40 filter pack from 76.9 ft bgs to 90.5 ft bgs

10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

0.19 ft, 2 in dia., Sch. 40 PVC end cap

Drilling terminated at 90.5 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

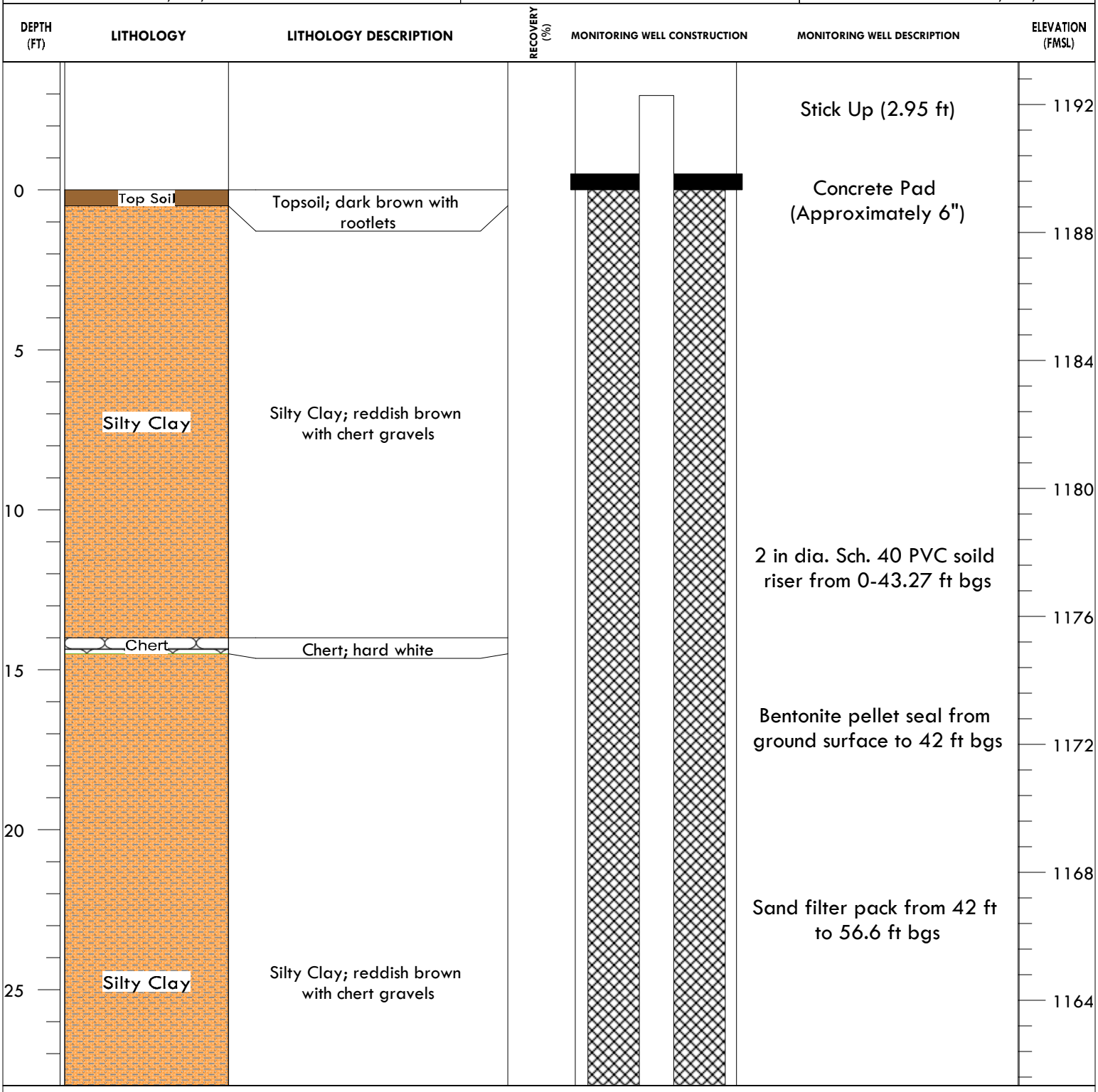
SCS ENGINEERS

LOG OF BORING NO.: **NE-6**

SHEET NUMBER: 1 of 2

11219 Richardson Drive
North Little Rock, AR

	DRILLER: Gary Moyers	SURFACE ELEVATION: 1189.3 fmsl
	DRILLING RIG: CME-55	TOC ELEVATION: 1192.3 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA/Air Rotary	WELL DEPTH COMPLETION: 55.6 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662656.55
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 647424.71
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 30.39 fbgs
START DATE: 12/14/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1156.9 fmsl
FINISH DATE: 12/15/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



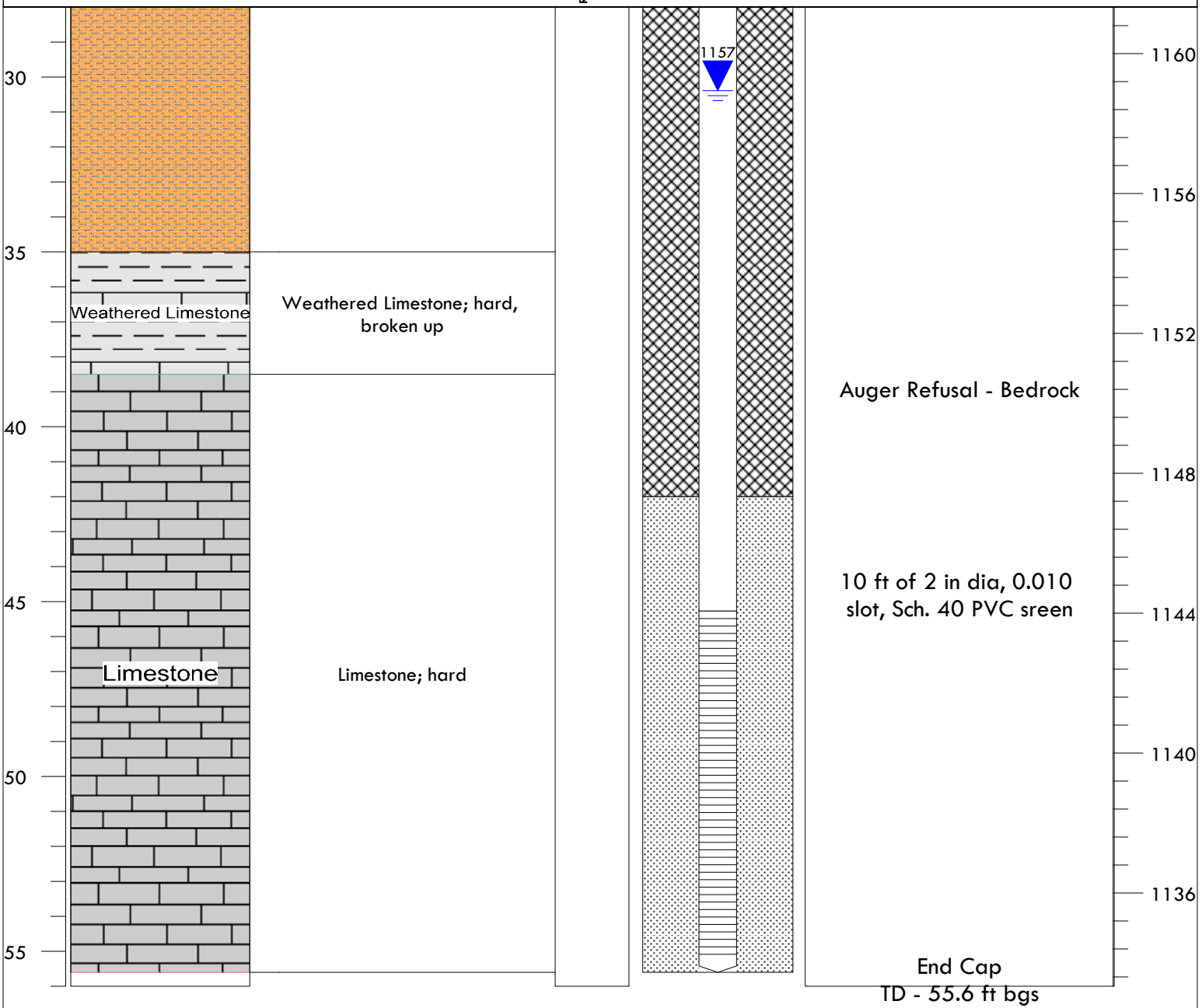
THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS

LOG OF BORING NO.: **NE-6** SHEET NUMBER: 2 of 2

11219 Richardson Drive
North Little Rock, AR

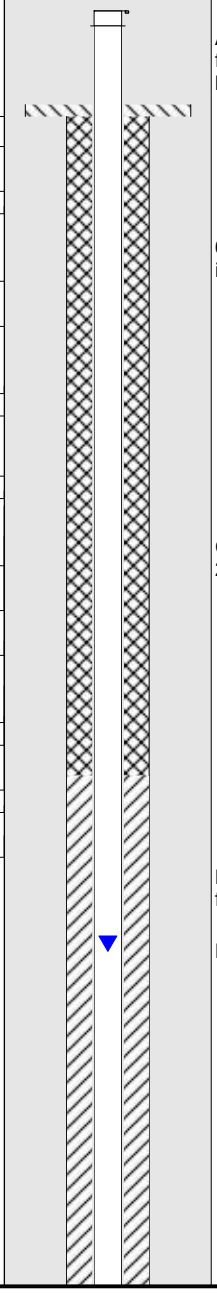
	DRILLER: Gary Moyers	SURFACE ELEVATION: 1189.3 fmsl
	DRILLING RIG: CME 55	TOC ELEVATION: 1192.3 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 55.6 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662656.55
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 647424.71
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 30.39 fbgs
START DATE: 12/14/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1156.9 fmsl
FINISH DATE: 12/15/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-6D**	WELL ID: **NE-6D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662645.6**	EASTING, FT SRC: **647433.5**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1189.9**	TOC MP, FT SRE: **1192.90**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **76.3**	INSTALLATION DATES: **7/24-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**	

Depth (feet)	% REC	USCS	Description
0			FILL
		ML	SILT, brown, very soft, dry. @ 1.5-2.5 ft bgs with gravel, medium stiff, moist. @ 2-2.5 ft bgs clayey.
	100		CHERT, white, 2.5-3 ft bgs.
		CH	GRAVELLY FAT CLAY, dark reddish brown, gravel (<2" dia) with red and black staining along weathered surfaces, moist.
			CHERT, white, 5.5-7 ft bgs.
	80	CH	GRAVELLY FAT CLAY, dark reddish brown, gravel (<2" dia) with red and black staining along weathered surfaces, moist.
10			CHERT, white, 9-10 ft bgs.
		CL	LEAN CLAY, tan to reddish brown, soft, moist.
		CH	CHERT, white, 12-12.5 ft bgs.
		ML	GRAVELLY FAT CLAY, dark reddish brown, gravel (<2" dia) with red and black staining along weathered surfaces, moist.
	100	CL	
		CH	LEAN CLAY, tan to white with thin red clay lenses, soft, moist.
			LEAN CLAY with sand, reddish brown, fine-grained to medium-grained sand, gravel (<1" dia), soft, moist.
		CL	FAT CLAY with gravel, reddish brown with black mottles, gravel is heavily weathered with reddish brown and black staining, medium stiff, moist.
20			CHERT, white, 17.5-19 ft bgs.
		GM	GRAVELLY LEAN CLAY, brown, gravel (<2.5" dia), soft, moist.
			SILTY GRAVEL, tannish white, loose, moist.
		CL	GRAVELLY LEAN CLAY, brown, gravel (<2.5" dia), soft, moist.
	100		WEATHERED CHERT/EPIKARST, chert is weathered into a chert gravel (<2" dia) with sand and silt, white, wet with rapid dilatancy in silt, loose, moist to wet. @26-26.2 ft chert lens.
			@28-29 ft bgs color changes from white to tannish brown.
30			@32 ft bgs lens (1 inch) of dark brown to black clayey layer.
	100		@32.1-34 ft bgs color changes to brown.
			@34-35 ft bgs color changes to white . @35-36 ft bgs color changes to tannish brown.
			@36-41 ft bgs color changes to white.



Well Construction

- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 66.1 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.0 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 22.0 ft bgs
- Bentonite chip seal from 22.0 ft bgs to 34.0 ft bgs
- Depth to water: 27.6 ft bgs (7/29/2019)

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-6D**	WELL ID: **NE-6D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662645.6**	EASTING, FT SRC: **647433.5**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1189.9**	TOC MP, FT SRE: **1192.90**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **76.3**	INSTALLATION DATES: **7/24-7/29/2019**
	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		

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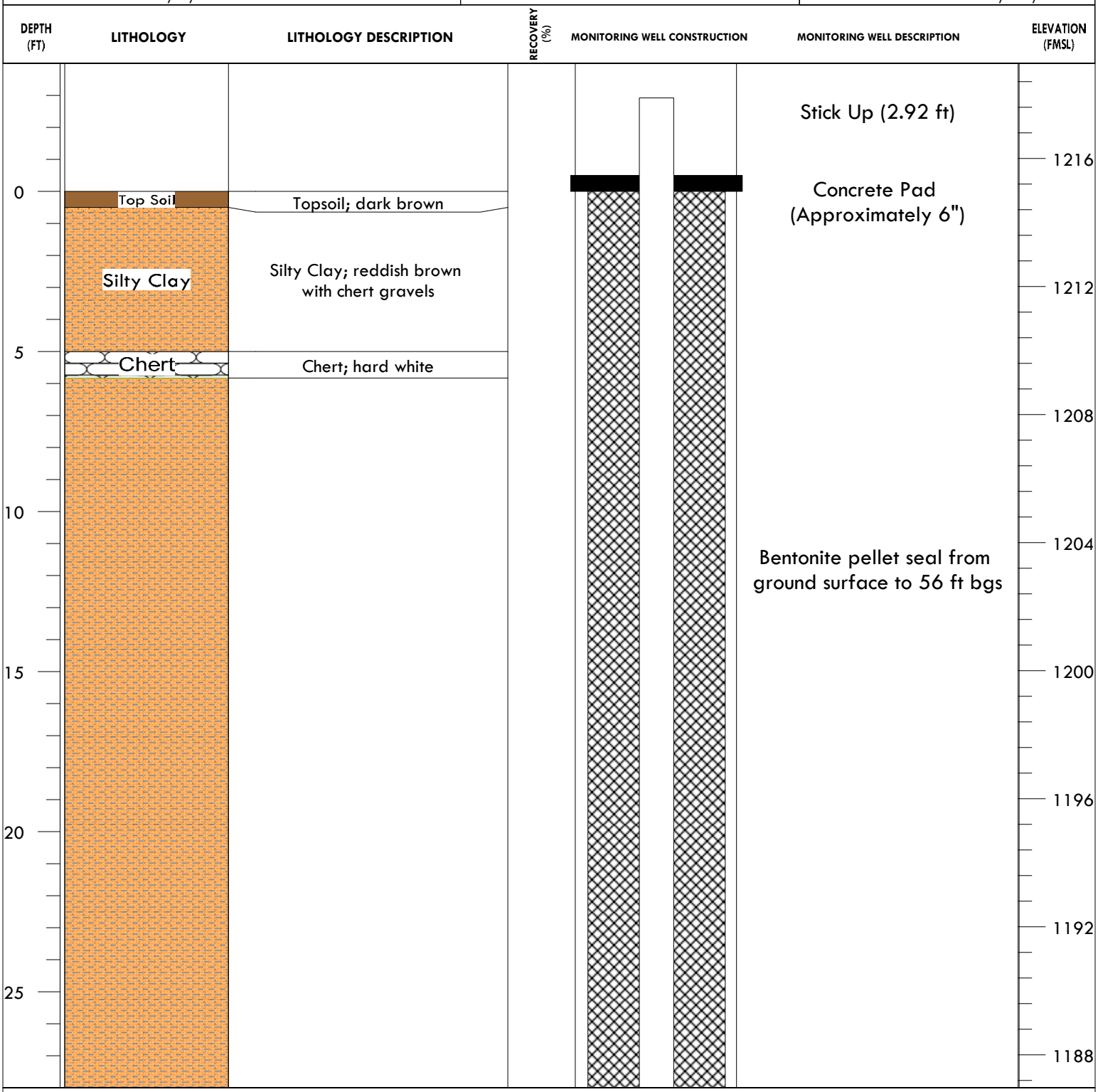
Depth (feet)	% REC	USCS	Graphic Log	Description	Well Construction
40	100				
	100			LIMESTONE AND CHERT, interbedded, less competent. Limestone is white and gray, chert is white. @ 41-44 ft bgs no loss of air, fractures 42-87° off horizontal. @ 43.5-44 ft bgs signs of dissolution, fractures and bedding planes filled with brown clay. @ 44-50.5 ft bgs no loss of air, fractures 0-90° off horizontal. Some fracture and bedding planes filled with brown clay or with microcrystalline limestone. Dendrites and stylolites throughout. @ 49-50.5 ft bgs limestone and chert breccia with gray microcrystalline limestone. @ 50.5-60 ft bgs no loss of air, fractures 0-90° off horizontal.	Slow-release bentonite pellet seal from 34.0 ft bgs to 60.0 ft bgs
	100				
50					
	59				
60				@ 60-68 ft bgs no loss of air, fractures 17-90° off horizontal, fracture thickness up to 0.02 ft. @ 63-65 ft bgs some orange and yellow staining along chert bedding planes.	Silica size 20/40 filter pack from 60.0 ft bgs to 73.3 ft bgs
	100				10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
70	100			@ 68-73 ft bgs no loss of air, fractures 53-90° off horizontal, fracture thickness up to 0.1 ft. @ 70.5-71.9 ft bgs competent gray limestone. @ 72.7-73 ft bgs limestone and chert breccia, fractures contain gray microcrystalline limestone, yellow staining along fractures.	0.19 ft, 2 in dia., Sch. 40 PVC end cap
					Drilling terminated at 73.3 ft bgs
80					

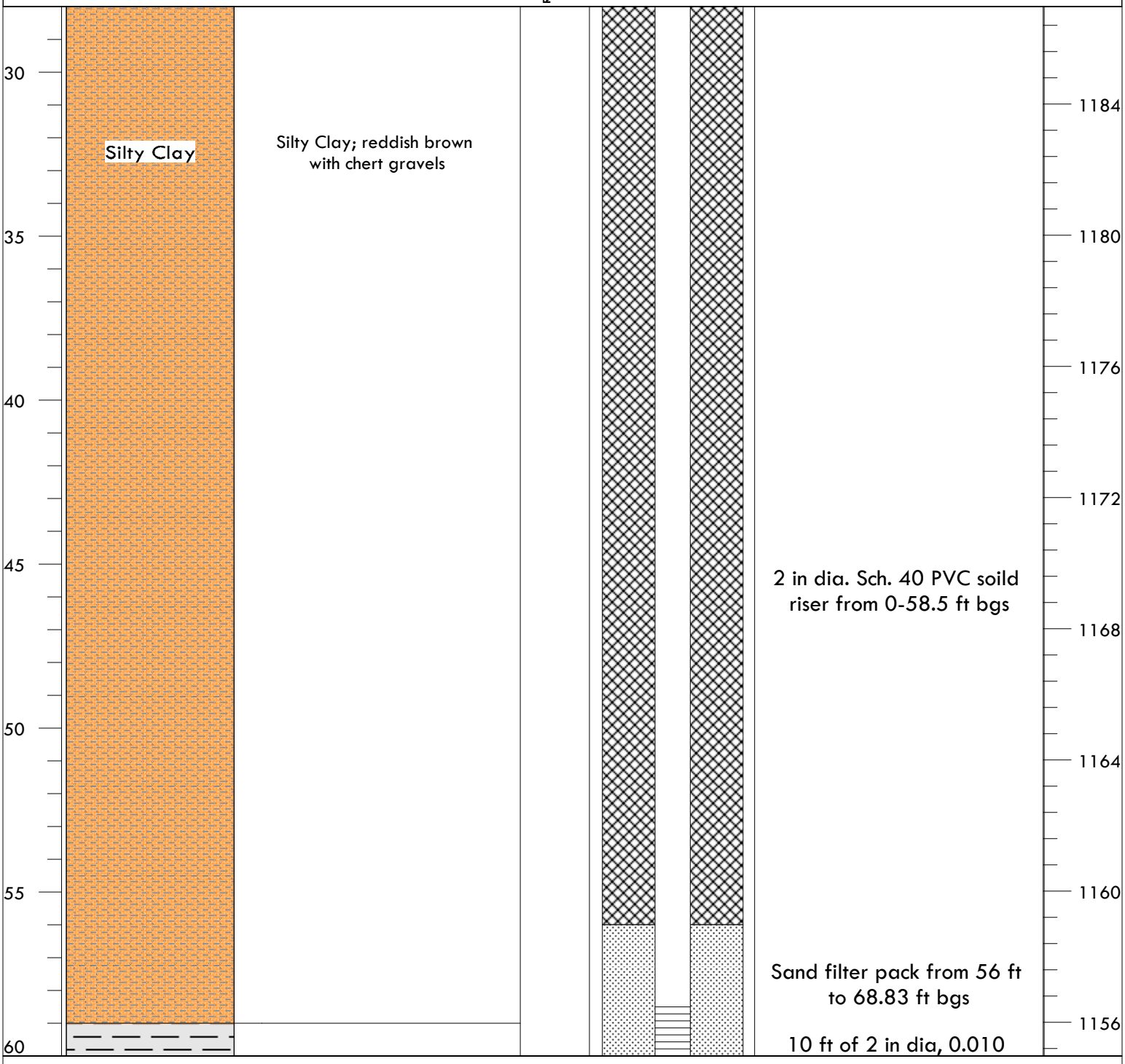
NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

SCS ENGINEERS	LOG OF BORING NO.: **NE-7**	SHEET NUMBER: 1 of 3
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1215 fmsl
	DRILLING RIG: CME 55	TOC ELEVATION: 1217.9 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 61.5 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 662722.18 EASTING: 647732.29
PROJECT NUMBER: 27216360.00		
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 61.49 fbgs
START DATE: 12/7/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1153.7 fmsl
FINISH DATE: 12/8/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



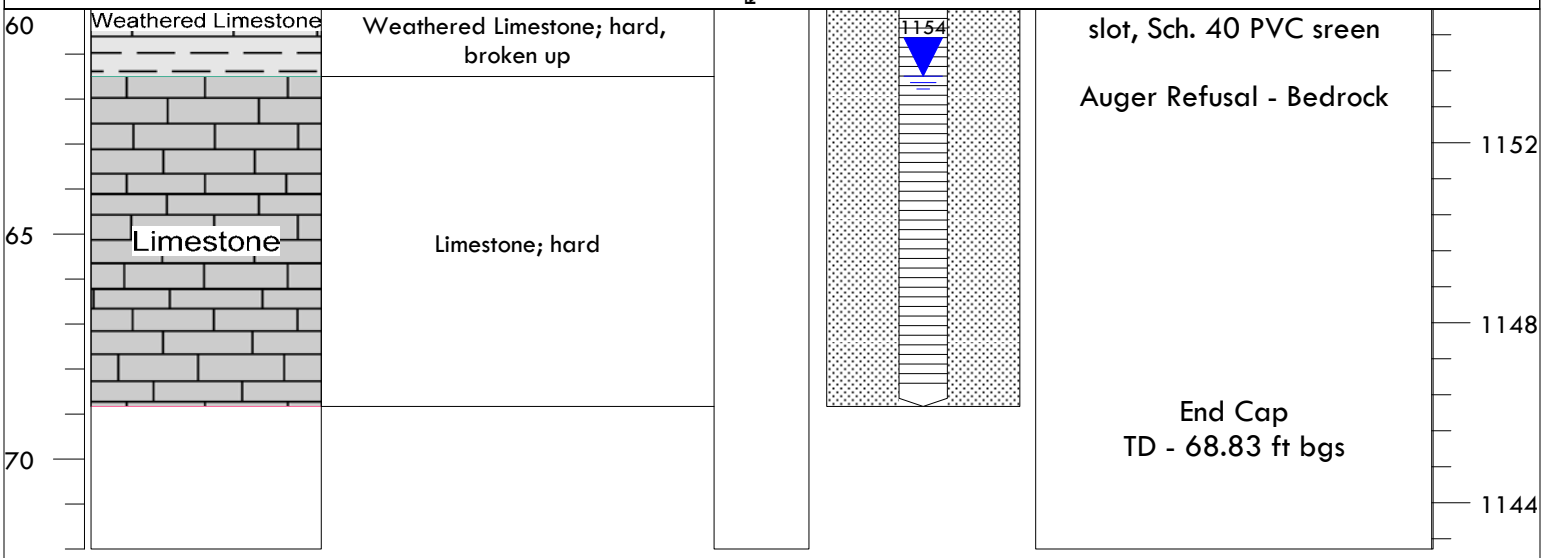
THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-7**	SHEET NUMBER: 2 of 3
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1215 fmsl
	DRILLING RIG: CME 55	TOC ELEVATION: 1217.9 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA Air Rotary	WELL DEPTH COMPLETION: 61.5 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 662722.18 EASTING: 647732.29
PROJECT NUMBER: 27216360.00		
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 61.49 fbgs
START DATE: 12/7/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1153.7 fmsl
FINISH DATE: 12/8/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



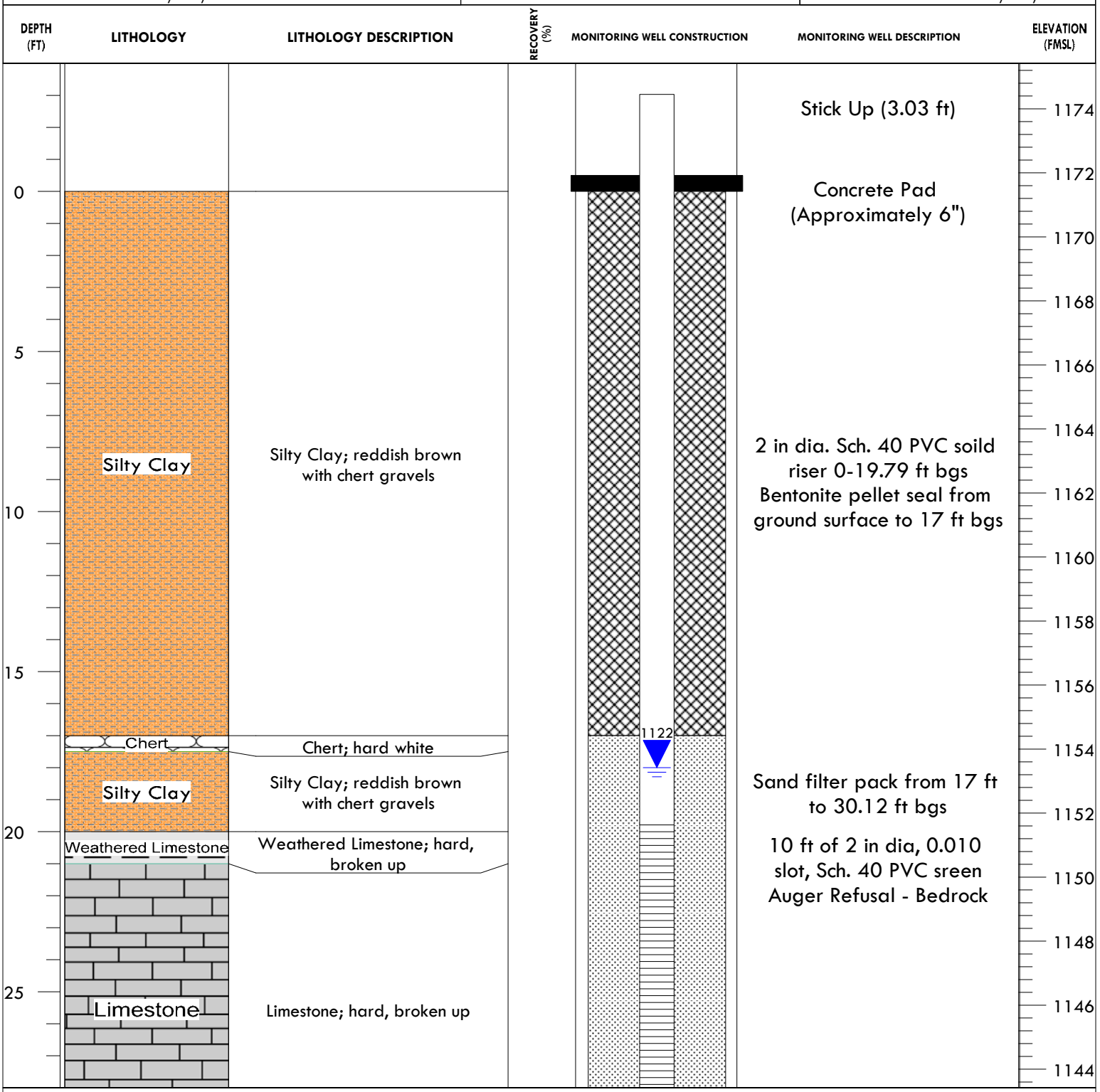
THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-7**	SHEET NUMBER: 3 of 3
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1215 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1217.9 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 61.5 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662722.18
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 647732.29
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 61.49 fbgs
START DATE: 12/7/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1153.7 fmsl
FINISH DATE: 12/8/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



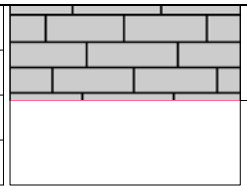
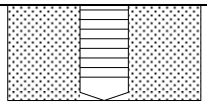
THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-8**	SHEET NUMBER: 1 of 2
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1171.4 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1174.5 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 30.12 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 662090.65 EASTING: 646798.71
PROJECT NUMBER: 27216360.00		
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 18 fbgs
START DATE: 12/20/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1121.8 fmsl
FINISH DATE: 12/20/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-8**	SHEET NUMBER: 2 of 2
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1171.4 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1174.5 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 30.12 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662090.65
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 646798.71
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 18 fbgs
START DATE: 12/20/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1121.8 fmsl
FINISH DATE: 12/20/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016

DEPTH (FT)	LITHOLOGY	LITHOLOGY DESCRIPTION	RECOVERY (%)	MONITORING WELL CONSTRUCTION	MONITORING WELL DESCRIPTION	ELEVATION (FMSL)
30					End Cap TD - 30.12 ft bgs	1142 1140

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

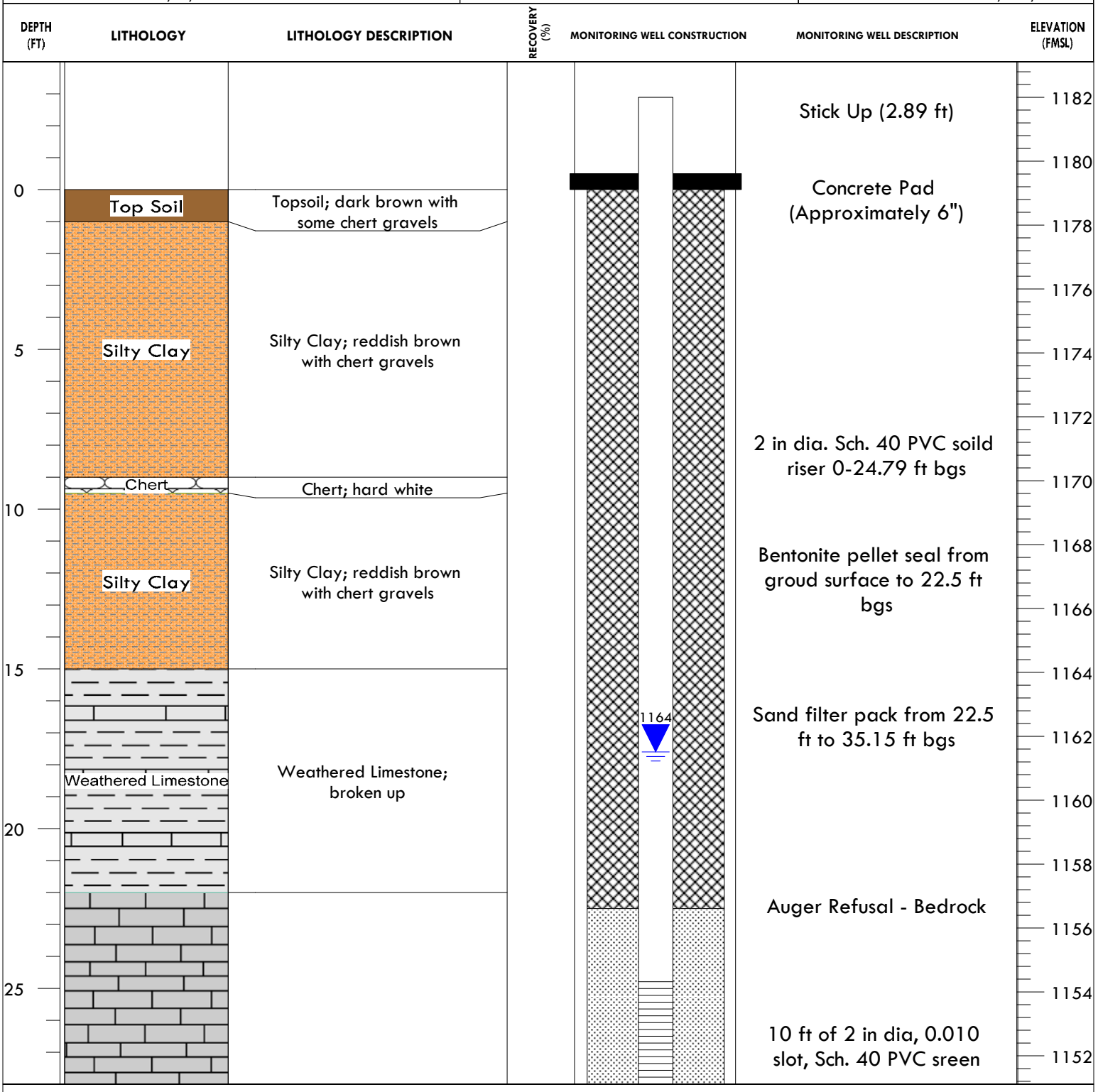
SCS ENGINEERS

LOG OF BORING NO.: **NE-9**

SHEET NUMBER: 1 of 2

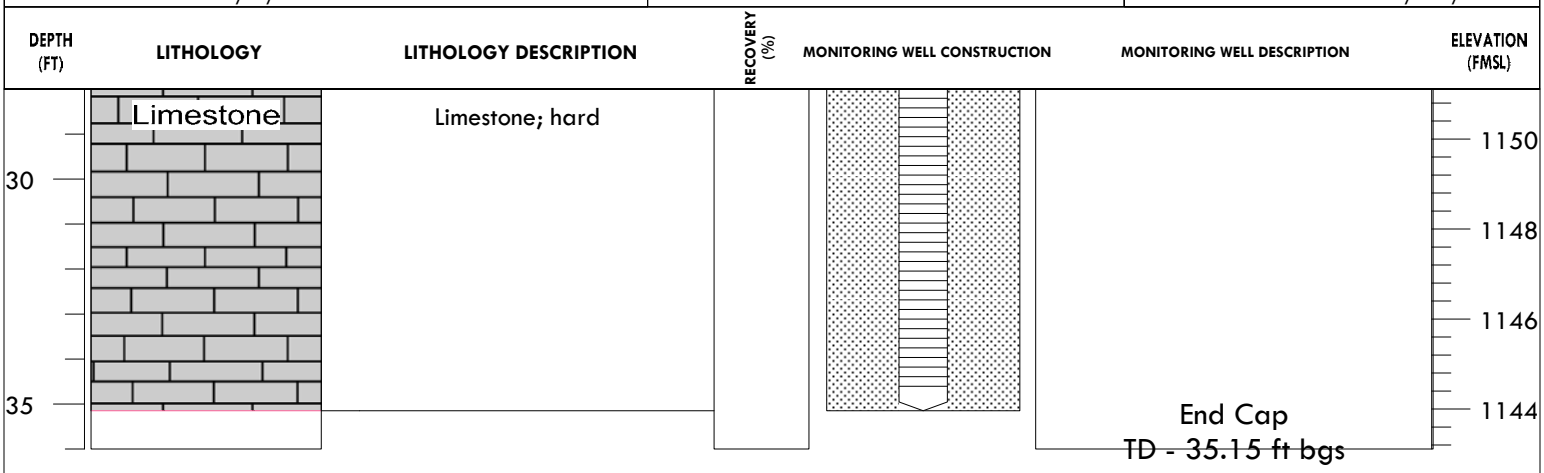
11219 Richardson Drive
North Little Rock, AR

CLIENT: Waste Management	DRILLER: Gary Moyers	SURFACE ELEVATION: 1179.1 fmsl
PROJECT NAME: Eco Vista N&E Investigation	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1182 fmsl
PROJECT NUMBER: 27216360.00	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 35.15 fbgs
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 663996.11 EASTING: 648472.3
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 17.6 fbgs
START DATE: 12/6/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1164.4 fmsl
FINISH DATE: 12/7/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-9**	SHEET NUMBER: 2 of 2
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1179.1 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1182 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 35.15 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 663996.11
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 648472.3
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 17.6 fbgs
START DATE: 12/6/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1164.4 fmsl
FINISH DATE: 12/7/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-10D**	WELL ID: **NE-10D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662187.1**	EASTING, FT SRC: **645410.6**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1258.2**	TOC MP, FT SRE: **1261.10**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **121.4**	INSTALLATION DATES: **7/26-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	

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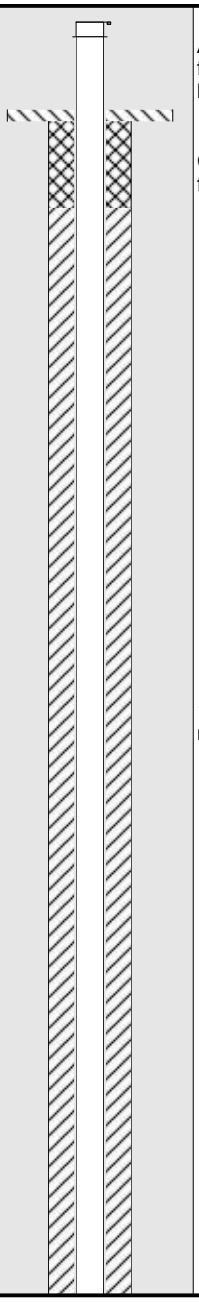
Depth (feet)	% REC	USCS	Description
0		ML	SILT with gravel, tannish gray with white gravel (<1" dia), rootlets, medium stiff, moist.
	100	CH	GRAVELLY FAT CLAY, dark reddish brown, gravel (<1.5" dia), stiff, moist.
		CL	GRAVELLY LEAN CLAY, reddish brown, gravel (<2.5" dia), soft, moist.
		CH	FAT CLAY with gravel, dark reddish brown, gravel (<1" dia), stiff, moist to dry.
	100	ML	SILT with gravel, reddish brown, gravel (<1" dia), medium stiff, moist.
		GC	CHERT, white, reddish orange staining along weathered surfaces, 6-7 ft bgs.
10		GC	CLAYEY GRAVEL, reddish brown, reddish brown staining along weathered surfaces of chert gravel, loose, moist.
		CH	CHERT, white, reddish orange staining along weathered surfaces, 7.5-8 ft bgs.
	100	GC	CLAYEY GRAVEL, reddish brown, reddish brown staining along weathered surfaces of chert gravel, loose, moist. @ 10-12 ft bgs increasing clay with depth.
		CH	FAT CLAY, dark red, stiff, moist.
		CL	CLAYEY GRAVEL with sand, reddish brown, reddish brown staining along weathered surfaces of chert gravel, loose, moist.
		CH	FAT CLAY, dark red, stiff, moist.
20		CH	LEAN CLAY with gravel, reddish brown, gravel (<1.5" dia), soft, moist.
		CH	FAT CLAY, dark red, stiff, moist.
		CH	CHERT, white, reddish orange staining along weathered surfaces, 17-18 ft bgs.
	100	SW-SM	FAT CLAY, dark red, stiff, moist. @19-23.5 ft bgs with gravel.
		CL	WELL GRADED SAND with silt and gravel, tannish orange, loose, moist.
		CH	GRAVELLY LEAN CLAY with sand, gravel (<1" dia). @ 26-26.5 gravel (<2" dia)
30		CH	FAT CLAY, dark red, stiff, moist.
	100	SP	CHERT, white, reddish orange staining along weathered surfaces, 30-31 ft bgs.
		GC	WELL GRADED SAND with silt and gravel, tannish orange, loose, moist.
		CH	CHERT, white, reddish orange staining along weathered surfaces, 32-33 ft bgs.
	60	CH	CLAYEY GRAVEL, reddish brown, heavily weathered gravel (<2.5" dia), loose, moist. @33-33.1 lean clay with gravel, grey, soft, moist.
40			GRAVELLY FAT CLAY, reddish brown with dark reddish brown and black staining along fractured chert, gravel (<2" dia), medium stiff, moist.

Well Construction



Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing

Cement/bentonite grout from 0 ft bgs to 3.0 ft bgs

111.2 ft of 2 in dia., Sch. 40 PVC solid riser, including 2.9 ft of stickup

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-10D**	WELL ID: **NE-10D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **662187.1**	EASTING, FT SRC: **645410.6**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1258.2**	TOC MP, FT SRE: **1261.10**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **121.4**	INSTALLATION DATES: **7/26-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	

Depth (feet)	% REC	USCS	Description
		GM	SILTY GRAVEL, tannish orange, gravel (<1.5" dia), loose, moist.
	80	CH	GRAVELLY FAT CLAY, reddish brown with dark reddish brown and black staining along fractured chert, gravel (<2" dia), medium stiff, moist. @ 43-47 ft bgs gravelly black streaks in clay.
		ML	SILT, white, soft, moist
50			WELL GRADED GRAVEL with silt and sand, white to tannish orange, tripoli, gravel (<2" dia).
	90	GW-GM	@ 57.5-58 ft bgs lean clay, orange, soft, moist.
60			CHERT, white, 60-61 ft bgs.
		GW-GM	WELL GRADED GRAVEL with silt and sand, white to tannish orange, tripoli, gravel (<2" dia).
	60		CHERT, white, 64-65 ft bgs.
		GW-GM	WELL GRADED GRAVEL with silt and sand, white to tannish orange, tripoli, gravel (<2" dia).
70		GM	SILTY GRAVEL, white, gravel (<1.5" dia), very loose, moist.
		GW-GM	WELL GRADED GRAVEL with silt and sand, white to tannish orange, tripoli, gravel (<2" dia).
	80	ML	SILT with gravel, white, loose, moist. @ 76-77 ft bgs color changed to tannish orange.
80			WELL GRADED GRAVEL with silt and sand, tannish orange, tripoli, gravel (<2" dia).
	100		

Well Construction

Bentonite chip seal from 3.0 ft bgs to 90.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**		BORING ID: **NE-10D**	WELL ID: **NE-10D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**		NORTHING, FT SRC: **662187.1**	EASTING, FT SRC: **645410.6**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		GROUND SURFACE, FT SRE: **1258.2**	TOC MP, FT SRE: **1261.10**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**		WELL DEPTH, FT BELOW MP: **121.4**	INSTALLATION DATES: **7/26-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case**			
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**		

Depth (feet)	% REC	USCS	Graphic Log	Description	Well Construction
90	100	GW-GM		@94-94.5 ft bgs fat clay lense, medium stiff.	Slow-release bentonite pellet seal from 90.0 ft bgs to 105.0 ft bgs
		SC		CLAYEY SAND with gravel, brown, gravel (<1" dia), loose, moist to saturated.	Depth to water: 96.1 ft bgs (7/29/2019)
		GW-GC		WELL GRADED GRAVEL with clay, tannish brown, very loose, saturated.	
100		SC		CLAYEY SAND with gravel, tannish brown, gravel (<1" dia), very loose, saturated.	
	70			WELL GRADED GRAVEL with silt and sand, brown, tripoli, gravel (<2" dia) saturated.	Silica size 20/40 filter pack from 105.0 ft bgs to 118.5 ft bgs
				@108 ft bgs lenses of brown clay.	
110		GW-GM		@112 ft bgs lenses of reddish brown clay.	10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
	80			@114-115 color change tannish brown.	
				@116 ft bgs lenses of reddish brown clay.	0.19 ft, 2 in dia., Sch. 40 PVC end cap
					Native materials from 118.5to 119.0 ft bgs
				CHERT, competent, bedrock.	Drilling terminated at 119.0 ft bgs
120					

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

SCS ENGINEERS

LOG OF BORING NO.: **NE-11**

SHEET NUMBER: 1 of 2

11219 Richardson Drive
North Little Rock, AR

	DRILLER: Gary Moyers	SURFACE ELEVATION: 1201.6 ft SRE
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1204.03 ft SRE
CLIENT: Waste Management	DRILLING METHOD: Cuttings	WELL DEPTH COMPLETION: 54.6 ft bgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662698.74 ft SRC
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 648600.86 ft SRC
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 47.65 fbgs
START DATE: 12/6/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1151.9 fmsl
FINISH DATE: 12/6/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016

On July 16, 2019, Walker-Hill Environmental, Inc., removed the outer protective casing and concrete pad. Bentonite/cement grout was used to fill the well annulus from 12.0 ft bgs to the ground surface. On July 17, Walker-Hill Environmental installed the outer protective casing and a new concrete pad. The well was re-surveyed by Mason Surveying & Consulting, Inc. Location data are based on site-referenced coordinates (SRCs) and site-referenced elevations (SREs). All work was supervised by FTN Associates, Ltd.

DEPTH (FT)	LITHOLOGY	LITHOLOGY DESCRIPTION	RECOVERY (%)	MONITORING WELL CONSTRUCTION	MONITORING WELL DESCRIPTION	ELEVATION (FMSL)
0	Top Soil	Topsoil; dark brown			Stick Up 2.4 ft	1204
	Silty Clay	Silty Clay; reddish brown with chert			Concrete Pad (Approximately 6")	1200
	Chert	Chert; hard white				
5		Silty Clay; reddish brown with chert gravels (<5% gravels)				1196
10					2 in dia. Sch. 40 PVC soild riser 0-44.86 ft bgs	1192
15					Bentonite pellet seal from ground surface to 43 ft bgs	1188
						1184
20						1180
	Silty Clay				Sand filter pack from 43 ft to 55.19 ft bgs	
25		Silty Clay; reddish brown with chert gravels			10 ft of 2 in dia, 0.010 slot, Sch. 40 PVC sreen	1176

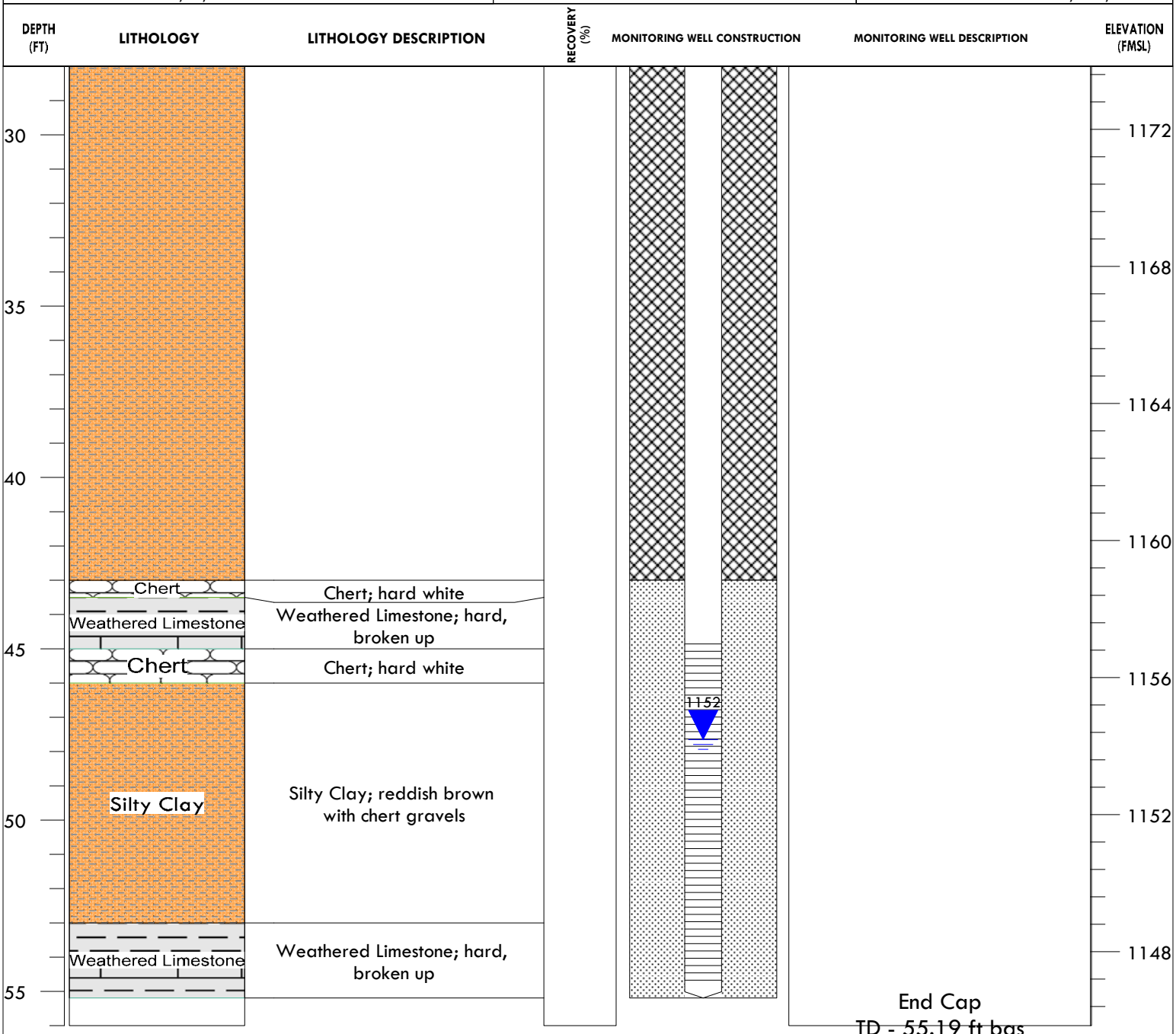
THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS

LOG OF BORING NO.: **NE-11** SHEET NUMBER: 2 of 2

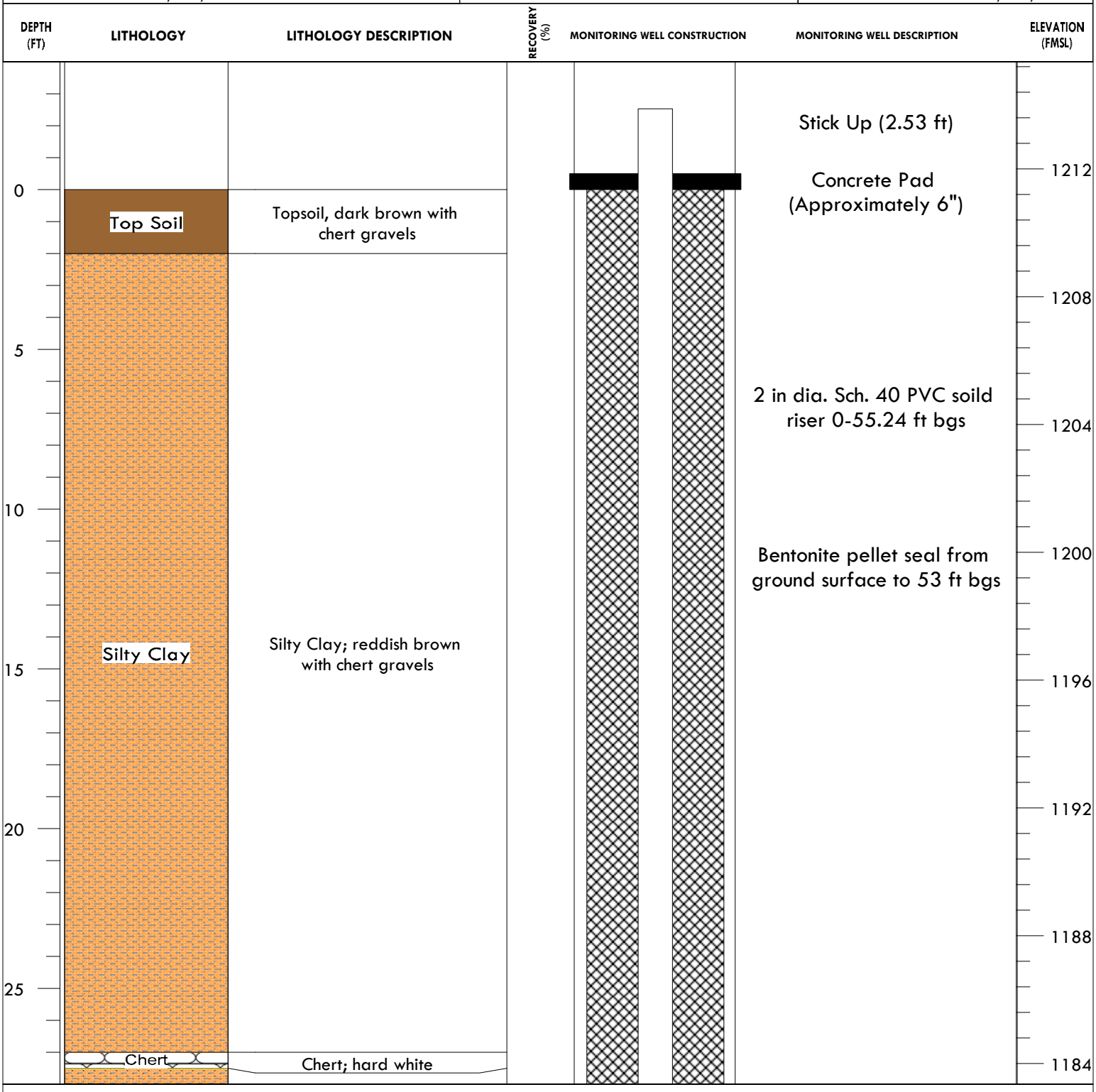
11219 Richardson Drive
North Little Rock, AR

	DRILLER: Gary Moyers	SURFACE ELEVATION: 1201.6 ft SRE
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1204.03 ft SRE
CLIENT: Waste Management	DRILLING METHOD: Cuttings	WELL DEPTH COMPLETION: 54.6 ft bgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662698.74 ft SRC
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 648600.86 ft SRC
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 47.65 fbgs
START DATE: 12/6/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1151.9 fmsl
FINISH DATE: 12/6/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-12**	SHEET NUMBER: 1 of 3
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1211.3 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1213.9 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 75.57 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 662444.99 EASTING: 647725.88
PROJECT NUMBER: 27216360.00		
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 65.09 fbgs
START DATE: 12/12/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1153.3 fmsl
FINISH DATE: 12/13/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS

LOG OF BORING NO.: **NE-12** SHEET NUMBER: 2 of 3

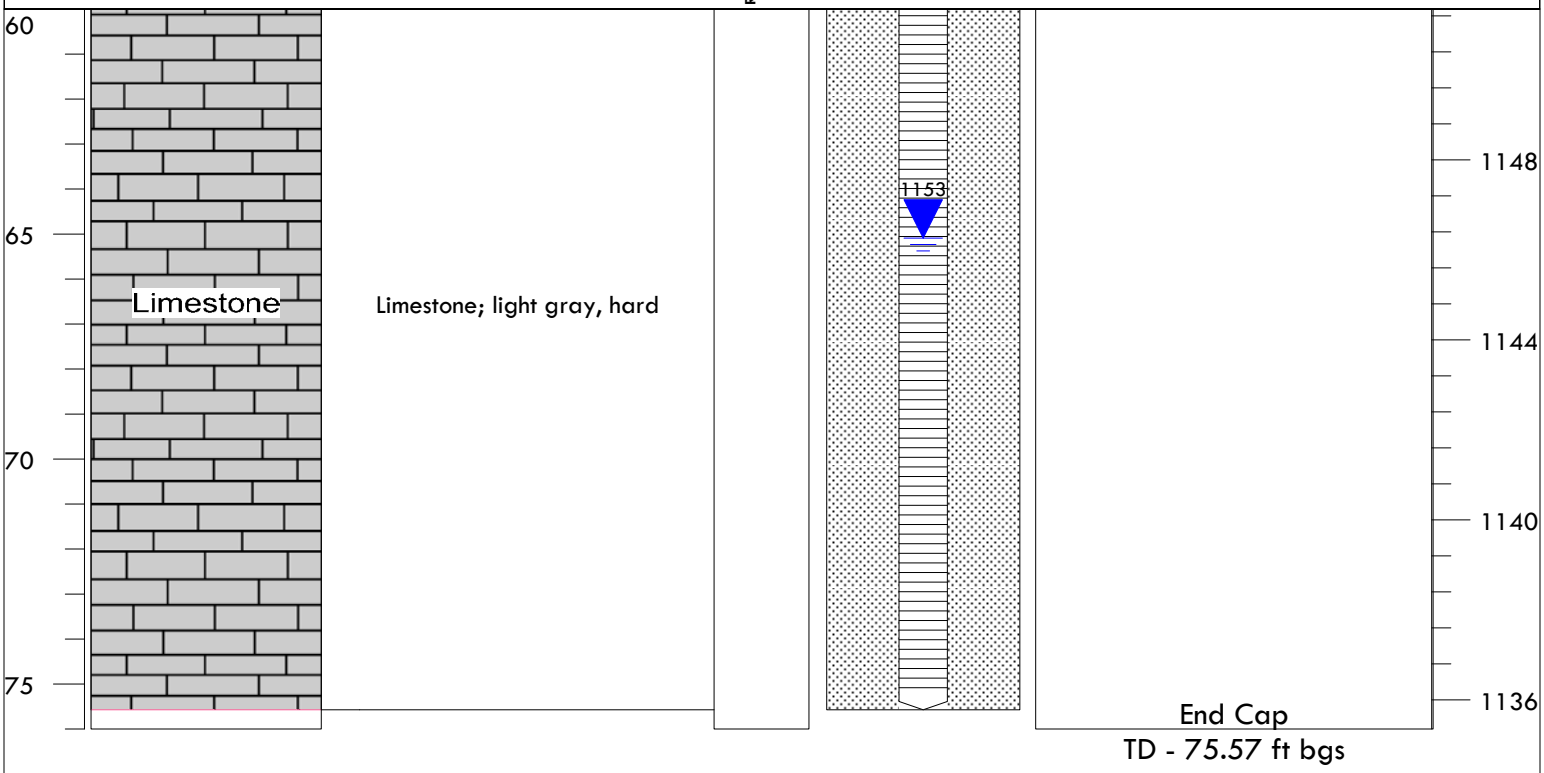
11219 Richardson Drive
North Little Rock, AR

	DRILLER: Gary Moyers	SURFACE ELEVATION: 1211.3 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1213.9 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 75.57 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662444.99
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 647725.88
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 65.09 fbgs
START DATE: 12/12/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1153.3 fmsl
FINISH DATE: 12/13/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016

DEPTH (FT)	LITHOLOGY	LITHOLOGY DESCRIPTION	RECOVERY (%)	MONITORING WELL CONSTRUCTION	MONITORING WELL DESCRIPTION	ELEVATION (FMSL)
30	Silty Clay	Silty Clay; reddish brown with chert gravels				1180
35						1176
40						1172
45						1168
50						1164
55					Sand filter pack from 53 to 75.57 ft bgs 20 ft of 2 in dia, 0.010 slot, Sch. 40 PVC sreen Auger Refusal - Bedrock	1160
60						1156
						1152

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS	LOG OF BORING NO.: **NE-12**	SHEET NUMBER: 3 of 3
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1211.3 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1213.9 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA\Air Rotary	WELL DEPTH COMPLETION: 75.57 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION:
PROJECT NUMBER: 27216360.00		NORTHING: 662444.99
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		EASTING: 647725.88
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: 65.09 fbgs
START DATE: 12/12/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: 1153.3 fmsl
FINISH DATE: 12/13/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

SCS ENGINEERS

LOG OF BORING NO.: **NE-13**

SHEET NUMBER: 1 of 2

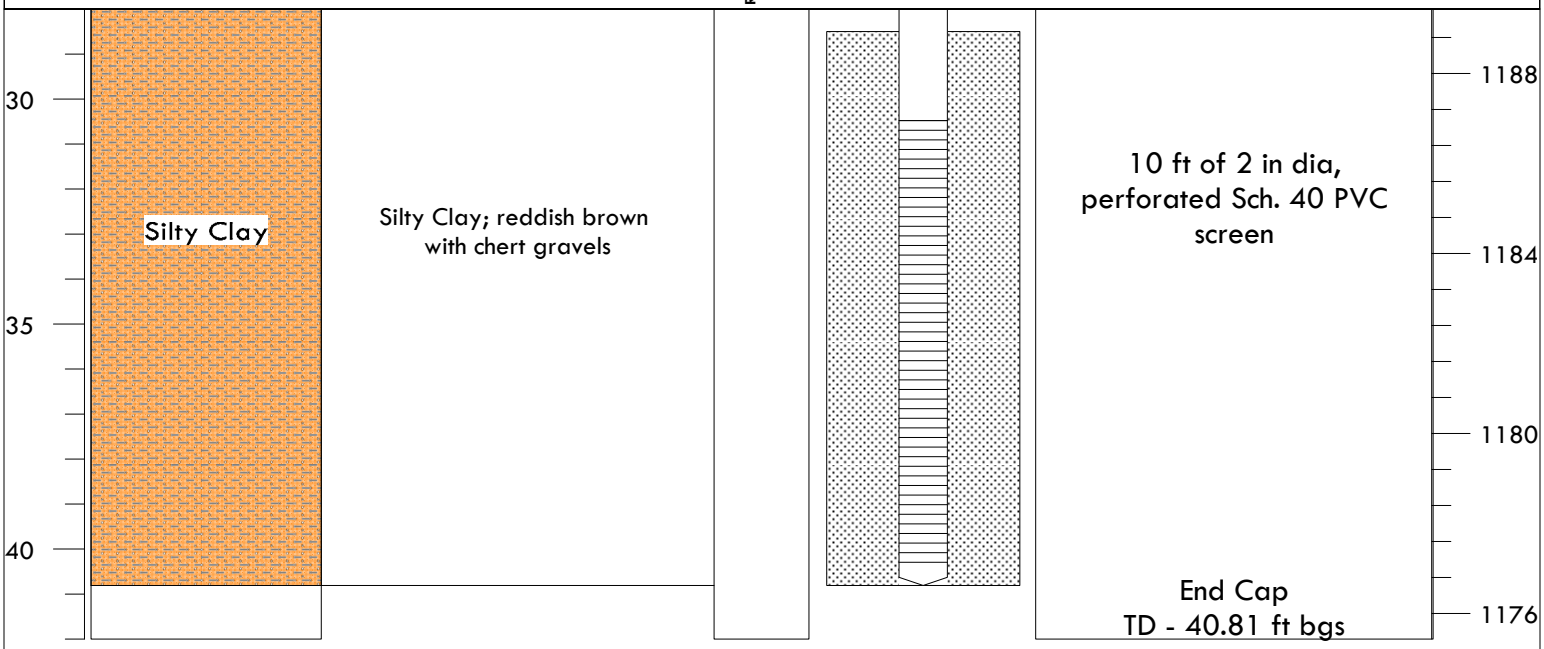
11219 Richardson Drive
North Little Rock, AR

CLIENT: Waste Management	DRILLER: Gary Moyers	SURFACE ELEVATION: 1217.4 fmsl
PROJECT NAME: Eco Vista N&E Investigation	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1220.2 fmsl
PROJECT NUMBER: 27216360.00	DRILLING METHOD: HSA	WELL DEPTH COMPLETION: 40.81 fbgs
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 662826.62 EASTING: 645321.31
GEOLOGIST: Robert Fowler	SAMPLING METHOD:	WATER LEVEL: NA fbgs
START DATE: 12/29/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: NA fmsl
FINISH DATE: 12/29/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016

DEPTH (FT)	LITHOLOGY	LITHOLOGY DESCRIPTION	RECOVERY (%)	MONITORING WELL CONSTRUCTION	MONITORING WELL DESCRIPTION	ELEVATION (FMSL)
0	Silty Clay	Silty Clay; reddish brown with chert gravels		Stick Up (2.73 ft)	Stick Up (2.73 ft) Concrete Pad (Approximately 6")	1220
5				Bentonite pellet seal	Bentonite pellet seal from ground surface to 28.81 ft bgs	1216
10				Sand pack	Sand pack from 28.81 to 40.81 ft bgs	1212
15	Chert	Chert; hard white		2 in dia. Sch. 40 PVC soild riser	2 in dia. Sch. 40 PVC soild riser 0-30.48 ft bgs	1208
20	Silty Clay	Silty Clay; reddish brown with chert gravels				1204
25	Chert	Chert; hard white				1200
						1196
						1192

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

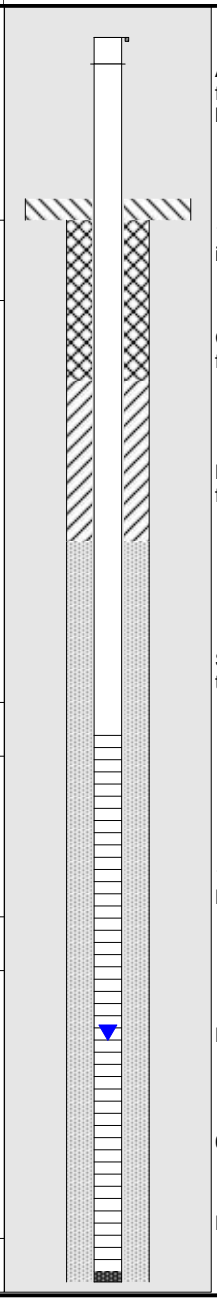
SCS ENGINEERS	LOG OF BORING NO.: **NE-13**	SHEET NUMBER: 2 of 2
11219 Richardson Drive North Little Rock, AR	DRILLER: Gary Moyers	SURFACE ELEVATION: 1217.4 fmsl
	DRILLING RIG: CME-55 Rig	TOC ELEVATION: 1220.2 fmsl
CLIENT: Waste Management	DRILLING METHOD: HSA	WELL DEPTH COMPLETION: 40.81 fbgs
PROJECT NAME: Eco Vista N&E Investigation	DRILLING CONTRACTOR: Anderson Engineering Consultants, Inc.	LOCATION: NORTHING: 662826.62 EASTING: 645321.31
PROJECT NUMBER: 27216360.00		
PROJECT LOCATION: EcoVista Lanfill, Tontitown, AR		
GEOLOGIST: Robert Fowler	SAMPLING METHOD: Cuttings	WATER LEVEL: NA fbgs
START DATE: 12/29/2016	BORING DIAMETER: 8.25"	WATER ELEVATION: NA fmsl
FINISH DATE: 12/29/2016	WELL DIAMETER: 2"	WATER LEVEL DATE: 12/29/2016



THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: ACTUAL TRANSITIONS MAY BE GRADUAL

	PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-14S**	WELL ID: **NE-14S**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664751.7**	EASTING, FT SRC: **648494.6**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1196.3**	TOC MP, FT SRE: **1199.25**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **22.7**	INSTALLATION DATES: **7/13-7/29/2019**
	DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**		

Depth (feet)	% REC	USCS	Description
0			
		ML	GRAVELLY SILT, dark brown, rootlets, gravel (<2" dia), increasing gravel with depth, medium stiff, moist.
	60		SILTY GRAVEL with sand, weathered gravel (<3" dia) with oxidation along fractures. medium stiff, moist.
		GM	@5-7 ft bgs with clay.
	100		@7 ft bgs color changes to tan to orangish tan, tripoli chert, moist to somewhat wet.
		ML	SILT, orangish tan to tan, medium stiff, moist.
10			
		GM	SILTY GRAVEL with sand, tan to orangish tan, weathered gravel (<3" dia) with oxidation along fractures, tripoli chert, moist to somewhat wet.
		CL	LEAN CLAY with gravel, orangish brown, very soft, saturated.
	89		CLAYEY GRAVEL with sand, reddish brown to tan, saturated.
		GC	@16-17 ft bgs silty.
20			



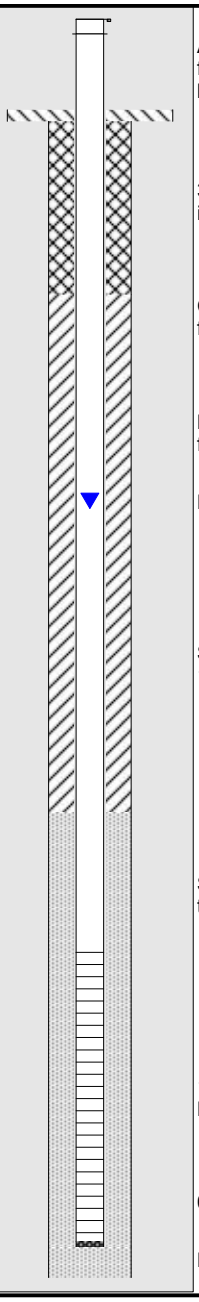
Well Construction

- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 12.5 ft of 2 in dia., Sch. 40 PVC solid riser, including 2.9 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 6.0 ft bgs
- Bentonite chip seal from 20.0 ft bgs to 35.0 ft bgs
- Silica size 20/40 filter pack from 74.1 ft bgs to 89.0 ft bgs
- 10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
- Depth to water: 15.2 ft bgs (7/29/2019)
- 0.19 ft, 2 in dia., Sch. 40 PVC end cap
- Drilling terminated at 19.7 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-14D**	WELL ID: **NE-14D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664751.9**	EASTING, FT SRC: **648503.2**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1195.7**	TOC MP, FT SRE: **1198.76**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **42.0**	INSTALLATION DATES: **7/2-7/29/2019**
	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		

Depth (feet)	% REC	USCS	Description
0		ML	GRAVELLY SILT, dark brown, rootlets, gravel (<2" dia), increasing gravel with depth, medium stiff, moist.
	80		SILTY GRAVEL with sand, weathered gravel (<3" dia) with oxidation along fractures, medium stiff, moist.
		GM	@5-7 ft bgs with clay.
	100		@7 ft bgs color changes to tan to orangish tan, tripoli chert, moist to somewhat wet.
10		ML	SILT, orangish tan to tan, medium stiff, moist.
		GM	SILTY GRAVEL with sand, tan to orangish tan, weathered gravel (<3" dia) with oxidation along fractures, tripoli chert, moist to somewhat wet.
		CL	LEAN CLAY with gravel, orangish brown, very soft, saturated.
	80		CLAYEY gravel with sand, reddish brown to tan, saturated.
		GC	@16-17 ft bgs silty.
			@19-19.2 ft bgs dark brown clay coated gravel.
20			LIMESTONE AND CHERT, interbedded. Limestone is white and gray, chert is white.
	100		@ 20-28 ft bgs no loss of air, fractures 0-75° off horizontal, fractures contain sparry calcite. Stylolites throughout.
			@ 20-23.5 ft bgs limestone breccia.
	100		@ 28-30 ft bgs no loss of air, fractures 0-75° off horizontal, fractures up to 0.02 ft and filled with sparry calcite.
30			@ 30-40 ft bgs no loss of air. Fractures 45-81° off horizontal, up to 0.02 ft thick, and filled with sparry calcite. Bedrock is white microcrystalline limestone, gray sparry limestone, and white chert. Stylolites throughout.
	92		@ 33 ft bgs water level noted during drilling.
			@ 36.5-36.7 ft bgs signs of dissolution
			@ 40 ft bgs air compressor was shut down for approximately 1.25 hours. Water level in borehole measured at approximately 19 ft bgs.
40			



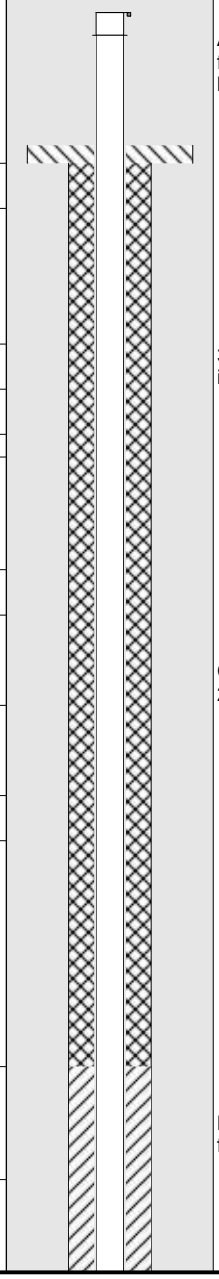
Well Construction

- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 31.8 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.0 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 6.0 ft bgs
- Bentonite chip seal from 6.0 ft bgs to 13.0 ft bgs
- Depth to water: 13.1 ft bgs (7/29/2019)
- Slow-release bentonite pellet seal from 13.0 ft bgs to 23.9 ft bgs
- Silica size 20/40 filter pack from 23.9 ft bgs to 40.0 ft bgs
- 10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
- 0.19 ft, 2 in dia., Sch. 40 PVC end cap
- Drilling terminated at 40.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-15S**	WELL ID: **NE-15S**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **663665.8**	EASTING, FT SRC: **648250.4**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1212.5**	TOC MP, FT SRE: **1215.29**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **45.3**	INSTALLATION DATES: **7/24-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	

Depth (feet)	% REC	USCS	Description
0		ML	GRAVELLY SILT, tannish brown, gravel (<2" dia) weathered with brown and red staining, soft, moist.
	100	CH	GRAVELLY FAT CLAY, reddish brown, gravel (<1.5" dia),stiff, moist.
			CHERT, white with orange staining along weathered surfaces, 4-5 ft bgs
		GC	CLAYEY GRAVEL, dark red fat clay, increasing silt with depth, gravel (<1.5" dia), loose, moist.
		CL	LEAN CLAY with sand, reddish brown, soft, moist.
	100	GC	CLAYEY GRAVEL, dark red fat clay, gravel (<1.5" dia), loose, moist. @8-9 ft bgs silt increasing with depth.
		GM	GRAVELLY SILT, tannish orange, loose, moist.
10		ML	SILT with gravel and clay, tan to white with orange staining, some lenses of reddish brown clay, gravel (<1" dia), soft, moist.
	100	GC	CLAYEY GRAVEL, reddish brown, gravel (<2" dia) orange and black staining along weathered chert, loose moist.
			CHERT, white to reddish orange, 14-15 ft bgs.
		CH	GRAVELLY FAT CLAY, reddish brown, gravel (<1.5" dia),stiff, moist. @17-20 ft bgs gravel (<3" dia) with black staining along weathered gravel.
20		CL	GRAVELLY LEAN CLAY, tannish brown, gravel (<1" dia), soft, moist.
	100	CH	FAT CLAY with gravel, dark reddish brown, gravel (<4" dia) heavily weathered, soft to medium stiff, moist.



Well Construction

- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 35.1 ft of 2 in dia., Sch. 40 PVC solid riser, including 2.8 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 20.0 ft bgs
- Bentonite chip seal from 20.0 ft bgs to 24.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

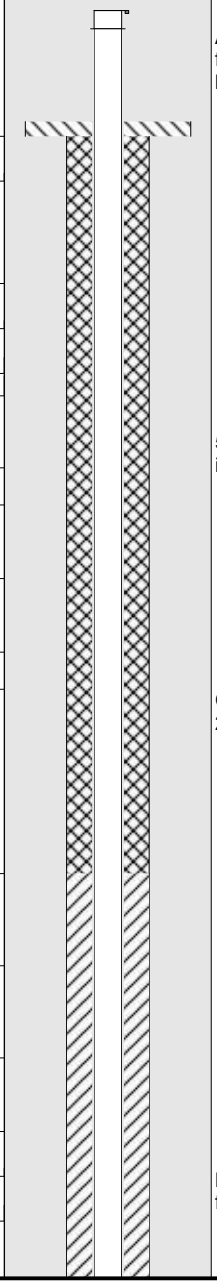
PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-15S**	WELL ID: **NE-15S**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **663665.8**	EASTING, FT SRC: **648250.4**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1212.5**	TOC MP, FT SRE: **1215.29**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **45.3**	INSTALLATION DATES: **7/24-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	

Depth (feet)	% REC	USCS	Description	Well Construction
		CL	GRAVELLY LEAN CLAY with sand, tannish brown, gravel (<1" dia), soft, moist.	Slow-release bentonite pellet seal from 24.0 ft bgs to 29.0 ft bgs
		CH	FAT CLAY with gravel, dark reddish brown, gravel (<4" dia) heavily weathered, soft to medium stiff, moist.	
		GC	CLAYEY GRAVEL, dark reddish brown, gravel (<3" dia), loose, moist.	
30		CH	FAT CLAY with gravel, dark reddish brown, gravel (<1.5" dia), soft, moist.	Silica size 20/40 filter pack from 29.0 ft bgs to 42.1 ft bgs
	60		WEATHERED CHERT/EPIKARST, chert is weathered to well-graded gravel with silt and sand, tan to white, loose, moist.	
			@35-36 ft bgs with some brown clay.	
			@37-41.5 ft wet, rapid dilatancy.	10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
40	100			0.19 ft, 2 in dia., Sch. 40 PVC end cap
			LIMESTONE AND CHERT, interbedded.	Drilling terminated at 42.1 ft bgs Monitoring well dry on 7/29/2019.
50				

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-15D**	WELL ID: **NE-15D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **663675.0**	EASTING, FT SRC: **648523.4**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1212.8**	TOC MP, FT SRE: **1215.73**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **60.6**	INSTALLATION DATES: **7/23-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**	

Depth (feet)	% REC	USCS	Description
0		ML	GRAVELLY SILT, tannish brown, gravel (<2" dia) weathered with brown and red staining, soft, moist.
	80	CH	GRAVELLY FAT CLAY, reddish brown, gravel (<1.5" dia),stiff, moist.
			CHERT, white with orange staining along weathered surfaces, 4-5 ft bgs.
		GC	CLAYEY GRAVEL, dark red fat clay, increasing silt with depth, gravel (<1.5" dia), loose, moist.
		CL	LEAN CLAY with sand, reddish brown, soft, moist.
	100	GC	CLAYEY GRAVEL, dark red fat clay, gravel (<1.5" dia), loose, moist. @8-9 ft bgs silt increasing with depth.
		GM	GRAVELLY SILT, tannish orange, loose, moist.
10		ML	SILT with gravel and clay, tan to white with orange staining, some lenses of reddish brown clay, gravel (<1" dia), soft, moist.
	100	GC	CLAYEY GRAVEL, reddish brown, gravel (<2" dia) orange and black staining along weathered chert, loose moist.
			CHERT, white to reddish orange, 14-15 ft bgs.
		CH	GRAVELLY FAT CLAY, reddish brown, gravel (<1.5" dia), stiff, moist. @17-20 ft bgs gravel (<3" dia) with black staining along weathered gravel
20		CL	GRAVELLY LEAN CLAY, tannish brown, gravel (<1" dia), soft, moist.
	100	CH	FAT CLAY with gravel, dark reddish brown, gravel (<4" dia) heavily weathered, soft to medium stiff, moist.
		CL	GRAVELLY LEAN CLAY with sand, tannish brown, gravel (<1" dia), soft, moist.
		CH	FAT CLAY with gravel, dark reddish brown, gravel (<4" dia) heavily weathered, soft to medium stiff, moist.
		GC	CLAYEY GRAVEL, dark reddish brown, gravel (<3" dia), loose, moist.
30		CH	FAT CLAY with gravel, dark reddish brown, gravel (<1.5" dia), soft, moist.



Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing

50.4 ft of 2 in dia., Sch. 40 PVC solid riser, including 2.9 ft of stickup

Cement/bentonite grout from 0 ft bgs to 20.0 ft bgs

Bentonite chip seal from 20.0 ft bgs to 35.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill NEI Well Installation**	BORING ID: **NE-15D**	WELL ID: **NE-15D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **663675.0**	EASTING, FT SRC: **648523.4**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1212.8**	TOC MP, FT SRE: **1215.73**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **60.6**	INSTALLATION DATES: **7/23-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**	

ftn Associates Ltd.
water resources / environmental consultants

Depth (feet)	% REC	USCS	Graphic Log	Description	Well Construction
	70			WEATHERED CHERT/EPIKARST, chert weathered to gravel with silt and sand, tan to white, loose, moist.	
				@35-36 ft bgs with some brown clay.	
				@36-40 ft bgs wet, rapid dilatancy.	
	100				Slow-release bentonite pellet seal from 35.0 ft bgs to 43.0 ft bgs
40				LIMESTONE AND CHERT, interbedded, competent. Limestone is white and gray, chert is white. Stylolites throughout.	
				@ 40-42 ft bgs sample destroyed by 6-inch override casing.	Depth to water: 42.8 ft bgs (7/29/2019)
				@ 42.0-49.5 ft bgs no loss of air, fractures 18-90° off horizontal, up to 0.01 ft thick, fractures are filled with calcite.	
	100			@ 44 ft bgs staining along fractured surfaces.	Silica size 20/40 filter pack from 43.0 ft bgs to 59.0 ft bgs
				@ 48-49 ft bgs sparry calcite.	
50				@ 49.5-59 ft bgs no loss of air, fractures 0-90° off horizontal, fractures up to 0.01 ft thick and filled with calcite, stylolites throughout.	
				@ 49.5-53 ft bgs thinly bedded and parted along bedding planes.	
				@ 49.8-55.2 ft bgs range of water levels measured during drilling.	10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
	100			@ 56 ft bgs fracture filled with brown clay.	
				@ 57-58.5 ft bgs dissolution along fractures.	
				@59 ft bgs air compressor shut off. Water level measured at 56.3 ft bgs. Downhole camera used to confirm water-bearing fractures. Twenty-two minutes lapsed and water level measured at 50.7 ft bgs.	0.19 ft, 2 in dia., Sch. 40 PVC end cap
					Drilling terminated at 59.0 ft bgs
60					

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc. report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

Survey of Existing Monitoring Wells
Waste Management - Eco Vista Landfill
Permit No.0290-S1-R2; AFIN 72-00144
MSCI Project No.: 21115

mason
SURVEYING & CONSULTING, INC.

Table 1. Surveyed Locations of Monitoring Wells (MW)

MW ID	Northing (1,4)	Easting (1,4)	Top of PVC Pipe Elevation(2)	Top of Adjacent Ground Elevation (3)
LGW-2	666,641.20	646,396.28	1302.23	1299.14
LGW-3R	666,590.83	647,167.96	1289.24	1286.13
LGW-4	665,925.07	647,545.10	1267.93	1265.82
LGW-5	665,325.97	647,602.26	1271.91	1269.94
LGW-6	664,913.65	648,172.75	1244.78	1242.13
LGW-7	664,257.39	648,160.17	1220.69	1219.29
LGW-8R	664,011.57	648,287.11	1186.33	1184.67
LGW-9	663,904.39	647,800.96	1237.56	1235.41
LGW-10	663,943.41	647,347.50	1240.66	1238.66
LGW-14R	665,280.95	648,182.74	1250.83	1247.94
MW-1N	665,516.54	644,923.24	1298.57	1296.32
MW-2N	664,194.55	644,251.38	1289.59	1286.79
MW-3N	662,823.05	645,309.94	1222.09	1219.29
MW-7N	663,318.62	647,895.76	1247.31	1244.53
MW-8N	662,664.63	647,425.41	1191.74	1189.16
MW-10N	662,360.96	646,348.24	1193.74	1191.05
MW-11N	666,560.22	647,130.04	1284.50	1281.73
MW15	666,696.30	645,547.33	1291.51	1288.64
MW16	666,692.70	645,038.83	1289.75	1286.31
MW17	666,159.64	644,919.06	1288.99	1285.55
MW19	664,867.17	645,156.12	1293.89	1291.20
MW20	664,201.03	644,267.33	1289.55	1286.29
MW21	662,562.61	646,405.86	1188.90	1186.06

MW ID	Northing (1,4)	Easting (1,4)	Top of PVC Pipe Elevation(2)	Top of Adjacent Ground Elevation (3)
NE-1	662,064.30	647,307.43	1201.55	1199.14
NE-2	662,259.16	647,576.88	1176.89	1174.12
NE-4	666,189.30	644,305.25	1293.26	1290.55
NE-5	662,676.06	648,172.91	1227.13	1224.24
NE-5E	662,678.21	648,201.83	1224.34	1221.27
NE-5W	662,680.42	648,145.97	1228.63	1225.66
NE-6	662,656.53	647,424.68	1192.33	1189.27
NE-6D	662,645.64	647,433.40	1192.94	1189.92
NE-7	662,722.35	647,732.18	1217.89	1214.99
NE-8	662,090.56	646,798.68	1174.51	1171.70
NE-9	663,996.09	648,472.24	1182.02	1179.01
NE-10D	662,187.10	645,410.61	1261.07	1258.17
NE-11	662,698.72	648,600.84	1203.96	1202.21
NE-12	662,444.94	647,725.83	1213.83	1211.24
NE-13	662,826.59	645,321.32	1220.18	1217.39
NE-14D	664,751.77	648,503.05	1198.81	1196.02
NE-14S	664,751.71	648,494.49	1199.24	1196.24
NE-15D	663,674.98	648,253.32	1215.67	1212.88
NE-15S	663,665.82	648,250.32	1215.36	1212.65

Notes:

1. Northing and Easting Locations were measured on the lock side at marked location.
2. Top of PVC pipe elevation was measured on the lock side at marked location.
3. Top of adjacent ground elevation was measured at the lock side of casing just beyond the concrete pad.

4. Field measurements were surveyed by MSCI and completed on 06-29-2021 and are based on site specific control data as provided by WM to MSCI. Site specific control datum is scaled and rotated to State Plane Projection NAD83, Arkansas North and NAVD88 as provided to MSCI. No independent survey has been performed by MSCI to verify the correctness of the site control datum to NAD83 and NAVD88. Table 2 below shows site benchmarks used to control the survey.

Table 2. Landfill Permanent Benchmarks

Point	Northing	Easting	Elevation
1	665,349.93	645,326.51	1298.10
2	666,639.51	646,397.86	1299.17
21	662,089.30	647,253.71	1195.31

Digitally signed by Johnny Mason
Reason: I have reviewed this document in sufficient depth to accept full responsiblity for its contents.
Date: 2021-07-01 15:41-05:00

APPENDIX B

Rule No. 22 Analytical Lists for Groundwater

Plus chloride, total dissolved solids, sulfate, total organic carbon, pH, specific conductance, iron, and manganese per the requirements of 22.1204(d)

APPENDIX 1

Appendix I to Part 258 - Constituents for Detection Monitoring [1]

Common name2 CAS RN3

Common Name	157 CAX RN
Inorganic Constituents:	
(1) Antimony	(Total)
(2) Arsenic	(Total)
(3) Barium	(Total)
(4) Beryllium	(Total)
(5) Cadmium	(Total)
(6) Chromium	(Total)
(7) Cobalt	(Total)
(8) Copper	(Total)
(9) Lead	(Total)
(10) Nickel	(Total)
(11) Selenium	(Total)
(12) Silver	(Total)
(13) Thallium	(Total)
(14) Vanadium	(Total)
(15) Zinc	(Total)
Organic Constituents:	
(16) Acetone	67-64-1
(17) Acrylonitrile	107-13-1
(18) Benzene	71-43-2
(19) Bromochloromethane	74-97-5
(20) Bromodichloromethane	75-27-4
(21) Bromoform; Tribromomethane	75-25-2
(22) Carbon disulfide	75-15-0
(23) Carbon tetrachloride	56-23-5
(24) Chlorobenzene	108-90-7
(25) Chloroethane; Ethyl chloride	75-00-3
(26) Chloroform; Trichloromethane	67-66-3
(27) Dibromochloromethane; Chlorodibromomethane	124-48-1
(28) 1,2-Dibromo-3-chloropropane; DBCP	96-12-8
(29) 1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4
(30) o-Dichlorobenzene; 1,2 Dichlorobenzene -	95-50-1
(31) p-Dichlorobenzene; 1,4 Dichlorobenzene -	106-46-7
(32) trans-1,4-Dichloro-2-butene	110-57-6
(33) 1,1-Dichloroethane; Ethylidene chloride	75-34-3
(34) 1,2-Dichloroethane; Ethylene dichloride	107-06-2
(35) 1,1-Dichloroethylene; 1,1Dichloroethene; Vinylidene chloride -	75-35-4
(36) cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2
(37) trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5
(38) 1,2-Dichloropropane; Propylene dichloride	78-87-5
(39) cis-1,3-Dichloropropene	10061-01-5
(40) trans-1,3-Dichloropropene	10061-02-6
(41) Ethylbenzene	100-41-4
(42) 2-Hexanone; Methyl butyl ketone	591-78-6
(43) Methyl bromide; Bromomethane	74-83-9
(44) Methyl chloride; Chloromethane	74-87-3
(45) Methylene bromide; Dibromomethane	74-95-3
(46) Methylene chloride; Dichloromethane	75-09-2
(47) Methyl ethyl ketone; MEK; 2-Butanone	78-93-3
(48) Methyl iodide; Iodomethane	74-88-4
(49) 4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1
(50) Styrene	100-42-5
(51) 1,1,1,2-Tetrachloroethane	630-20-6
(52) 1,1,2,2-Tetrachloroethane	79-34-5
(53) Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4
(54) Toluene	108-88-3
(55) 1,1,1-Trichloroethane; Methylchloroform	71-55-6
(56) 1,1,2-Trichloroethane	79-00-5
(57) Trichloroethylene; Trichloroethene	79-01-6
(58) Trichlorofluoromethane; CFC-11	75-69-4
(59) 1,2,3-Trichloropropane	96-18-4
(60) Vinyl acetate	108-05-4
(61) Vinyl chloride	75-01-4
(62) Xylenes	1330-20-7
(63) Chloride	
(64) Sulfate	
(65) Total Dissolved Solids	
(66) Specific Conductance (field measurement)	
(67) pH (field measurement)	
(68) Turbidity	

1. This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW-846, Test Methods for Evaluating Solid Waste, third edition, November 1986, as revised December 1987, includes Method 8260; and 15 metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods.
2. Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.
3. Chemical Abstracts Service registry number. Where Total is entered, all species in the ground water that contain this element are included.
4. Practical Quantitation Limit values must not be reported as detection limits. All values above the Method Detection Limit must be reported.

Plus chloride, total dissolved solids, sulfate, total organic carbon, pH, specific conductance, iron, and manganese per the requirements of 22.1204(d)

APPENDIX 2 Appendix II to Part 258 - List of Hazardous Inorganic and Organic Constituents [1]

Common Name2 CAS RN3 CASI Suggested PQL methods 3 (τ /L)6

Common Name	CAS RN	Chemical abstracts service index name	Suggested Methods; PQL (τ/L)
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-	8100 200; 8270 10
Acenaphthylene	208-96-8	Acenaphthylene	8100 200; 8270 10
Acetone	67-64-1	2-Propanone	8260 100
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8015 100
Acetophenone	98-86-2	Ethanone1-phenyl-	8270 10
2-Acetylaminofluorene, 2-AAF	53-96-3	Acetamide N-9H- fluoren-2-yl	8270 20
Acrolein	107-02-8	2-Propenal	8030 5; 8260 100
Acrylonitrile	107-13-1	2-Propenenitrile	8030 5; 8260 200
Aldrin	309-00-2	1,4:5,8- Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1,4,4a,5,8,8a)-	8080 0.05; 8270 10
Allyl chloride	107-05-1	Propene, 3-chloro-	8010 5; 8260 10
4-Aminobiphenyl	92-67-1	1,1^11-Biphenyl]- 4-amine	8270 20
Anthracene	120-12-7	Anthracene	8100 200; 8270 10
Antimony	(Total)	Antimony	6010 300; 7040 2000; 7041 30
Arsenic	(Total)	Arsenic	6010 500; 7060 10; 7061 20
Barium	(Total)	Barium	6010 20; 7080 1000
Benzene	71-43-2	Benzene	8020 2; 8021 0.1; 8260 5
Benzo[a]anthracene Benzanthracene	56-55-3	Benz[a]anthracene	8100 200; 8270 10
Benzo[b]fluoranthene;	205-99-2	Benz[e]acephenanthrylene	8100 200; 8270 10
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8100 200; 8270 10
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8100 200; 8270 10
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8100 200; 8270 10
Benzyl alcohol	100-51-6	Benzenemethanol	8270 20
Beryllium	(Total)	Beryllium	6010 3; 7090 50; 7091 2
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6- hexachloro-,(1,2,3,4,5,6)-	8080 0.05; 8270 10
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6- hexachloro-,(1,2,3,4,5,6)-	8080 0.05; 8270 20
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6- hexachloro-,(1,2,3,4,5,6)-	8080 0.1; 8270 20
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1,2,3,4,5,6)-	8080 0.05; 8270 20
Bis-(2-chloroethoxy)methane	111-91-1	Ethane, 1,1^1- [methylenebis(oxy)] bis[2-chloro-	8110 5; 8270 10
Bis(2-chloroethyl) ether; Dichloroethyl ether	111-44-4	Ethane, 1,1^1- oxybis[2-chloro-	8110 3 8270 10
Bis-(2-chloro-1 -methylethyl) ether; 2,2^1-Dichlorodiisopropyl ether; DCIP,See note 7	108-60-1	Propane, 2,2^1- 1- oxybis[1-chloro-	8110 10; 8270 10
Bis(2-ethylhexyl) phthalate	117-81-7	1,2- Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	8060 20
Bromochloromethane Chlorobromomethane	74-97-5	Methane, bromochloro-	8021 0.1/ 8260 5
Bromodichloromethane; Dibromochloromethane	75-27-4	Methane, bromodichloro-	8010 1; 8021 0.2; 8260 5
Bromoform; Tribromomethane	75-25-2	Methane tribromo-	8010 2; 8021 15; 8260 5
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-	8110 25; 8270 10
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2- Benzenedicarboxyli c acid, butyl phenylmethyl ester	8060 5; 8270 10
Cadmium	(Total)	Cadmium	6010 40; 7130 50; 7131 1
Carbon disulfide	75-15-0	Carbon disulfide	8260 100
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	8010 1; 8021 0.1; 8260 10
Chlordane	See Note 8	4,7-Methano-1H- indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a - hexahydro	8080 0.1; 8270 50;
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270 20
Chlorobenzene	108-90-7	Benzene, chloro-	8010 2; 8020 2; 8021 0.1; 8260 5
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro—(4-chlorophenyl)—hydroxy-, ethyl ester	8270 10
p-Chloro-m- cresol; 4-Chloro-3	59-50-7	Phenol, 4-chloro- 3-methyl-	8040 5; 8270 20

APPENDIX 2 Appendix II to Part 258 - List of Hazardous Inorganic and Organic Constituents [1]

Common Name2 CAS RN3 CASI Suggested PQL methods 3 (τ /L)6

Common Name	CAS RN	Chemical abstracts service index name	Suggested Methods; PQL (τ/L)
methylphenol			
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-	8010 5; 8021 1; 8260 10
Chloroform; Trichloromethane	67-66-3	Methane, trichloro-	8010 0.5; 8021 0.2; 8260 5
2- Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	8120 10; 8270 10
2- Chlorophenol	95-57-8	Phenol, 2-chloro-	8040 5; 8270 10
4- Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-	8110 40; 8270 10
Chloroprene	126-99-8	1,3-Butadiene, 2- chloro-	8010 50; 8260 20
Chromium	(Total)	Chromium	6010 70; 7190 500; 7191 10
Chrysene	218-01-9	Chrysene	8100 200; 8270 10
Cobalt	(Total)	Cobalt	6010 70; 7200 500; 7201 10
Copper	(Total)	Copper	6010 60; 7210 200;7211 10
m-Cresol; 3- methylphenol	108-39-4	Phenol, 3-methyl-	8270 10
o-Cresol; 2- methylphenol	95-48-7	Phenol, 2-methyl-	8270 10
p-Cresol; 4- methylphenol	106-44-5	Phenol, 4-methyl-	8270 10
Cyanide	57-12-5	Cyanide	9010 200
2,4-D; 2,4- Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4- dichlorophenoxy-	8150 10
4,4^1-DDD	72-54-8	Benzene 1,1^1- (2,2- dichloroethylidene)bis[4-chloro-	8080 0.1; 8270 10
4,4^1-DDE	72-55-9	Benzene, 1,1^1- (dichloroethyenylidene)bis[4-chloro-	8080 0.05; 8270 10
4,4^1-DDT	50-29-3	Benzene, 1,1^1-(2,2,2- trichloroethylidene)bis[4-chloro-	8080 0.1; 8270 10
Diallate	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-,S-(2,3-dichloro-2-propenyl) ester	8270 10
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	8100 200; 8270 10
Dibenzofuran	132-64-9	Dibenzofuran	8270 10
Dibromochloromethane; Chlorodibromomethane	124-48-1	Methane, dibromochloro-	8010 1; 8021 0.3; 8260 5
1,2-Dibromo-3- chloropropane; DBCP	96-12-8	Propane, 1,2- dibrome-3-chloro-	8011 0.1; 8021 30; 8260 25
1,2- Dibromoethane; Ethylene dribromide; EDB	106-93-4	Ethane, 1,2- dibromo-	8011 0.1; 8021 10; 8260 5
Di-n-butyl phthalate	84-74-2	1,2- Benzenedicarboxylic acid, dibutyl ester	8060 5; 8270 10
o- Dichlorobenzene;1,2-Dichlorobenzene	95-50-1	Benzene, 1,2- dichloro1-	8010 2; 8020 5; 8021 0.5; 8120 10; 8260 5; 8270 10
m- Dichlorobenzene; 1,3-Dichlorobenzene	541-73-1	Benzene, 1,3- Dichloro-	8010 5; 8020 5; 8021 0.2; 8120 10; 8260 5; 8270 10
p - Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7	Benzene, 1,4- dichloro-	8010 2; 8020 5; 8021 0.1; 8120 15 260 5; 8270 10
3,3^1- Dichlorobenzidine	91-94-1	[1,1^1-Biphenyl]- 4,4^1-diamine, 3,3^1-dichloro-	8270 20
trans-1,4- Dichloro-2- butene	110-57-6	2-Butene, 1,4- dichloro-, (E)-	8260 100
Dichlorodifluoro methane; CFC 12;	75-71-8	Methane, dichlorodifluoro-	8021 0.5; 8260 5
1,1-Dichloroethane; Ethyldidene chloride	75-34-3	Ethane, 1,1- dichloro-	8010 1; 8021 0.5; 8260 5
1,2 - Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,1- dichloro-	8010 0.5; 8021 0.3; 8260 5
1,1- Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4	Ethene, 1,1- dichloro-	8010 1; 8021 0.5; 8260 5
cis-1,2- Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	Ethene, 1,2- dichloro-, (Z)-	8021 0.2; 8260 5
trans-1,2- Dichloroethylene trans-1,2- Dichloroethene	156-60-5	Ethene, 1,2- dichloro-, (E)-	8010 1; 8021 0.5; 8260 5
2,4- Dichlorophenol	120-83-2	Phenol, 2,4- dichloro-	8040 5; 8270 10
2,6- Dichlorophenol	87-65-0	Phenol, 2,6- dichloro-	8270 10
1,2- Dichloropropane; Propylene	78-87-5	Propane, 1,2- dichloro-	8010 0.5; 8021 0.05; 8260 5

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Common Name2 CAS RN3 CASI Suggested PQL methods 3 (τ /L)6

Common Name	CAS RN	Chemical abstracts service index name	Suggested Methods; PQL (τ/L)
dichloride			
1,3- Dichloropropane; Trimethylene dichloride	142-28-9	Propane, 1,3- dichloro-	8021 0.3; 8260 5
2,2- Dichloropropane; Isopropylidene chloride	594-20-7	Propane, 2,2- dichloro-	8021 0.5; 8260 15
1,1- Dichloropropene	563-58-6	1-Propene, 1,1- dichloro-	8021 0.2; 8260 5
cis-1,3- Dichloropropene	10061-01-5	1-Propene, 1,3- dichloro-, (Z)-	8010 20; 8260 10
trans-1,3- Dichloropropene	10061-02-6	1-Propene, 1,3- dichloro-, (E)-	8010 5; 8260 10
Dieldrin	60-57-1	2,7:3,6- Dimethanonaphth[2, 3-b]oxirene, 3,4,5,6,9,9-hexa, chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1a,2,2a,3,6,6a ,7,7a)-	8080 0.05; 8270 10
Diethyl phthalate	84-66-2	1,2- Benzenedicarboxylic acid, diethyl ester	8060 5; 8270 10
0,0-Diethyl 0-2- pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, 0,0-diethyl 0-pyrazinyl ester	8141 5; 8270 20
Dimethoate	60-51-5	Phosphorodithioic acid, 0,0-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	8141 3; 8270 20
p- (Dimethylamino) azobenzene	60-11-7	Benzenamine, N,N- dimethyl-4- (phenylazo)-	8270 10
7,12- Dimethylbenz[a] anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	8270 10
3,3^1- Dimethylbenzidine	119-93-7	[1,1^1-Biphenyl]- 4,4^1-diamine,3,3^1-dimethyl-	8270 10
2,4- Dimethylphenol; m-Xylenol	105-67-9	Phenol, 2,4- dimethyl-	8040 5; 8270 10
Dimethyl phthalate	131-11-3	1,2- Benzenedicarboxylic acid, dimethyl ester	8060 5; 8270 10
m-Dinitrobenzene	99-65-0	Benzene, 1,3- dinitro-	8270 20
4,6-Dinitro-o- cresol 4,6- Dinitro-2- methylphenol	534-52-1	Phenol, 2-methyl-4,6-dinitro	8040 150; 8270 50
2,4- Dinitrophenol;	51-28-5	Phenol, 2,4- dinitro-	8040 150; 8270 50
2,4- Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	8090 0.2; 8270 10
2,6- Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-	8090 0.1; 8270 10
Dinoseb; DNBP; 2- sec-Butyl-4,6-dinitrophenol	88-85-7	Phenol, 2-(1- methylpropyl)-4,6- dinitro-	8150 1; 8270 20
Di-n-octyl phthalate	117-84-0	1,2- Benzenedicarboxylic acid, dioctyl ester	8060 30; 8270 10
Diphenylamine	122-39-4	Benzenamine, N- phenyl-	8270 10
Disulfoton	298-04-4	Phosphorodithioic acid, 0,0-diethyl S-[2- (ethylthio)ethyl ester	8140 2; 8141 0.5; 8270 10
Endosulfan I	959-98-8	6,9-Methano-2,4,3- benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a hexahydro-,3-oxide,	8080 0.1; 8270 20
Endosulfan II	33213-65-9	6,9-Methano-2,4,3- benzodioxathiepin, 6,7,8,9,10,10-hexachloro- 1,5,5a,6,9,9a hexahydro-, 3-oxide, (3,5a,6,9,9a)-	8080 0.05; 8270 20
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3- benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a hexahydro-,3-3-dioxide	8080 0.5; 8270 10
Endrin	72-20-8	2,7:3,6- Dimethanonaphth[2, 3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7 a-octahydro-, (1a, 2,2a,3,6,6a,7,7a)-	8080 0.1; 8270 20
Endrin aldehyde	7421-93-4	1,2,4- Methenocyclopenta[cd]pentalene-5-carboxaldehyde,2,2a,3,3,4,7-hexachlorodecahydro-,(1,2,2a,4,4a,5,6a,6b,7R*)-	8080 0.2; 8270 10
Ethylbenzene	100-41-4	Benzene, ethyl-	8020 2; 8221 0.05; 8260 5
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester	8015 5; 8260 10; 8270 10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester	8270 20
Famphur	52-85-7	Phosphorothioic acid, 0-[4-[(dimethylamino)sulfonyl]phenyl] 0,0-dimethyl ester	8270 20
Fluoranthene	206-44-0	Fluoranthene	8100 200; 8270 10

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Common Name2 CAS RN3 CASI Suggested PQL methods 3 (τ /L)6

Common Name	CAS RN	Chemical abstracts service index name	Suggested Methods; PQL (τ/L)
Fluorene	86-73-7	9H-Fluorene	8100 200; 8270 10
Heptachlor	76-44-8	4,7-Methano-1H- indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a tetrahydro-	8080 0.05; 8270 10
Heptachlor epoxide	1024-57-3	2,5-Methano-2H- indeno[1,2- b]oxirene,2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a hexahydro-,(1a,1b, 2, 5, 5a, 6, 6a)	8080 1; 8270 10
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8120 0.5; 8270 10
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4- hexachloro-	8021 0.5; 8120 5; 8260 10; 8270 10
Hexachlorocyclopentadiene	77-47-4	1,3- Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	8120 5; 8270 10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8120 0.5; 8260 10; 8270 10
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-	8270 10
2-Hexanone; Methyl butyl ketone	591-78-6	2-Hexanone	8260 50
Indeno(1,2,3- cd)pyrene	193-39-5	Indeno(1,2,3- cd)pyrene	8100 200; 8270 10
Isobutyl alcohol	78-83-1	1-Propanol, 2- methyl-	8015 50; 8240 100
Isodrin	465-73-6	1,4,5,8- Dimethanonaphthalene,1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a hexahydro-(1,4,4a,5,8,8a)-	8270 20; 8260 10
Isophorone	78-59-1	2-Cyclohexen-1- one, 3,5,5- trimethyl-	8090 60; 8270 10
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	8270 10
Kepone	143-50-0	1,3,4-Metheno-2H- cyclobuta[cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-	8270 20
Lead	(Total)	Lead	6010 400; 7420 1000 7421 10
Mercury	(Total)	Mercury	7470 2
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	8015 5; 8260 100
Methapyrilene	91-80-5	1,2- Ethanediamine, N.Ndimethyl-N^1-2-pyridinyl-N1/2-thienylmethyl)-	8270 100
Methoxychlor	72-43-5	Benzene,1,1^1- (2,2,2,trichloroet hylidene)bis[4-methoxy-	8080 2; 8270 10
Methyl bromide; Bromomethane	74-83-9	Methane, bromo-	8010 20; 8021 10
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-	8010 1; 8021 0.3
3- Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	8270 10
Methyl ethyl ketone; MEK; 2-Butanone	78-93-3	2-Butanone	8015 10; 8260 100
Methyl iodide; Iodomethane	74-88-4	Methane, iodo-	8010 40; 8260 10
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester	8015 2; 8260 30
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester	8270 10
2- Methylnaphthalene	91-57-6	Naphthalene, 2- methyl-	8270 10
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, 0,0-dimethyl	8140 0.5; 8141 1; 8270 10
4-Methyl-2- pentanone; Methyl isobutyl ketone	108-10-1	2-Pentanone, 4- methyl-	8015 5; 8260 100
Methylene bromide; Dibromomethane	74-95-3	Methane, dibromo-	8010 15; 8021 20; 8260 10
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-	8010 5; 8021 0.2; 8260 10
Naphthalene	91-20-3	Naphthalene	8021 0.5; 8100 200; 8260 5; 8270 10
1,4- Naphthoquinone	130-15-4	1,4- Naphthalenedione	8270 10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270 10

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Common Name2 CAS RN3 CASI Suggested PQL methods 3 (τ /L)6

Common Name	CAS RN	Chemical abstracts service index name	Suggested Methods; PQL (τ/L)
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270 10
Nickel	(Total)	Nickel	6010 150; 7520 400
o-Nitroaniline; 2-Nitroaniline	88-74-4	Benzenamine, 2- nitro	8270 50
m-Nitroaniline; 3-Nitroanile	99-09-2	Benzenamine, 3- nitro	8270 50
p-Nitroaniline; 4-Nitroaniline	100-01-6	Benzenamine, 4- nitro	8270 20
Nitrobenzene	98-95-3	Benzene, nitro-	8090 40; 8270 10
o-Nitrophenol; 2- Nitrophenol	88-75-5	Phenol, 2-nitro-	8040 5; 8270 10
p-Nitrophenol; 4- Nitrophenol	100-02-7	Phenol, 4-nitro-	8040 10; 8270 50
N-Nitrosodi-n- butylamine	924-16-3	1-Butanamine, N- butyl-N-nitroso-	8270 10
N- Nitrosodiethylamine	55-18-5	Ethanamine, N- ethyl-N-nitroso-	8270 20
N- Nitrosodimethylamine	62-75-9	Methanamine, N- methyl-N-nitroso	8070 2
N- Nitrosodiphenylamine	86-30-6	Benzenamine, N- nitroso-N-phenyl-	8070 5
N- Nitrosodipropylamine N-Nitroso-N-dipropylamine;Di-n-propylnitrosamine	621-64-7	1-Propanamine, N- nitroso-N-propyl;	8070 10
N- Nitrosomethylethalamine	10595-95-6	Ethanamine, N- methyl-N-nitroso	8270 10
N- Nitrosopiperidine	100-75-4	Piperidine, 1- nitroso-	8270 20
N- Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1- nitroso-	8270 40
5-Nitro-o- toluidine	99-55-8	Benzenamine, 2- methyl-5-nitro-	8270 10
Parathion	56-38-2	Phosphorothioic acid, 0,0-diethyl 0-(4-nitrophenyl) ester	8141 0.5; 8270 10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270 10
Pentachloronitro benzene	82-68-8	Benzene, pentachloronitro	8270 20
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040 5; 8270 50
Phenacetin	62-44-2	Acetamide, N-(4- ethoxyphenyl)	8270 20
Phenanthrene	85-01-8	Phenanthrene	8100 200; 8270 10
Phenol	108-95-2	Phenol	8040 1
p- Phenylenediamine	106-50-3	1,4- Benzenediamine	8270 10
Phorate	298-02-2	Phosphorodithioic acid, 0,0-diethyl S-[(ethylthio)methyl] ester	8140 2; 8141 0.5; 8270 10
Polychlorinated biphenyls; PCBs; Aroclors	See Note 9	1,1'-Biphenyl, chloro derivatives	8080 50; 8270 200
Pronamide	23950-58-5	Benzamide, 3,5- dichloro-N-(1,1-dimethyl-2-propynyl)-	8270 10
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8015 60; 8260 150
Pyrene	129-00-0	Pyrene	8100 200; 8270 10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-	8270 10
Selenium	(Total)	Selenium	6010 750; 7740 20; 7741 20
Silver	(Total)	Silver	6010 70; 7760 100; 7761 10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2- (2,4,5-trichlorophenoxy)-	8150 2
Styrene	100-42-5	Benzene, ethenyl-	8020 1; 8021 0.1; 8260 10
Sulfide	18496-25-8	Sulfide	9030 4000
2,4,5-T; 2,4,5- Trichlorophenoxy acetic acid	93-76-5	Acetic acid, (2,4,5- trichlorophenoxy)-	8150 2
1,2,4,5- Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5- tetrachloro-	8270 10
1,1,1,2- Tetrachloroethane	630-20-6	Ethane, 1,1,1,2- tetrachloro-	8010 5; 8021 0.05; 8260 5
1,1,2,2- Tetrachloroethne	79-34-5	Ethane, 1,1,2,2- tetrachloro-	8010 0.5; 8021 0.1; 8260 5
Tetrachloroethylene Tetrachloroethene; Perchloroethylene	127-18-4	Ethene, tetrachloro-	8010 0.5; 8021 0.5; 8260 5
2,3,4,6- Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6- tetrachloro-	8270 10
Thallium	(Total)	Thallium	6010 400; 7840 1000; 7841 10
Tin	(Total)	Tin	6010 40
Toluene	108-88-3	Benzene, methyl-	8020 2; 8021 0.1; 8260 5
o-Toluidine	95-53-4	Benzenamine, 2- methyl-	8270 10
Toxaphene	See Note 10	Toxaphene	8080 2
1,2,4- Trichlorobenzene	120-82-1	Benzene, 1,2,4- trichloro-	8021 0.3; 8120 0.5; 8260 10; 8270 10
1,1,1- Trichloroethane;	71-55-6	Ethane, 1,1,1- trichloro-	8010 0.3; 8021 0.3; 8260 5

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Common Name2 CAS RN3 CASI Suggested PQL methods 3 (τ /L)6

Common Name	CAS RN	Chemical abstracts service index name	Suggested Methods; PQL (τ/L)
Methylchloroform			
1,1,2- Trichloroethane	79-00-5	Ethane, 1,1,2- trichloro-	8010 0.2; 8260 5
Trichloroethylene;	79-01-6	Ethene, trichloro-	8010 1; 8021 0.2; 8260 5
Trichloroethene			
Trichlorofluoromethane; CFC-11	75-69-4	Methane, trichlorofluoro-	8010 10; 8021 0.3; 8260 5
2,4,5- Trichlorophenol	95-95-4	Phenol, 2,4,5- trichloro-	8270 10
2,4,6- Trichlorophenol	88-06-2	Phenol, 2,4,6- trichloro-	8040 5; 8270 10
1,2,3- Trichloropropane	96-18-4	Propane, 1,2,3- trichloro-	8010 10; 8021 5; 8260 15
0,0,0- Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, 0,0,0-triethylester	8270 10
sym- Trinitrobenzene	99-35-4	Benzene, 1,3,5- trinitro-	8270 10
Vanadium	(Total)	Vanadium	6010 80; 7910 2000; 7911 40
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8260 50
Vinyl chloride; Chloroethene	75-01-4	Ethene, chloro-	8010 2; 8021 0.4; 8260 10
Xylene(total)	See Note11	Benzene, dimethyl-	8020 5; 8021 0.2; 8260 5
Zinc	(Total)	Zinc	6010 20; 7950 50; 7951 0.5

Notes

1. The regulatory requirements pertain only to the list of substances; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.
2. Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.
3. Chemical Abstracts Service registry number. Where Total is entered, all species in the ground water that contain this element are included.
4. CAS index are those used in the 9th Collective Index.
5. Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 Test Methods for Evaluating Solid Waste, third edition, November 1986, as revised, December 1987. Analytical details can be found in SW-846 and in documentation on file at the agency. CAUTION: The methods listed are representative SW-846 procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.
6. Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground waters that can be realiably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.
7. This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2-oxybis[2-chloro- (CAS RN 39638-32-9).
8. Chlordane: This entry includes alpha-chlordane (CAS RN 5103- 71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6). PQL shown is for technical chlordane. PQLs of specific isomers are about 20 (r)g/L by method 8270.
9. Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor 1016 CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097- 69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.
10. Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.
11. Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 8021 are 0.2 for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 (r)g/L by method 8020 or 8260.

APPENDIX C

Groundwater Sampling Forms

FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name:

Site No.: | Sample Point: (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark changes, record field data, below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment … Dedicated: Y or N

Filter Device: Y or N | 0.45 µ **or** ____ µ (circle or fill in)

Purging Device ____ | Sampling Device ____

A- Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Filter Type: ____ (A-In-line Disposable, B-Pressure, C-Vacuum, X-Other ____)

X-Other: ____

Sample Tube Type: ____ (A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other: ____)

WELL DATA

Well Elevation (at TOC) ____ (ft/msl) | **Depth to Water (DTW) (from TOC)** ____ (ft) | **Groundwater Elevation (site datum, from TOC)** ____ (ft/msl)

Total Well Depth (from TOC) ____ (ft) | Stick Up (from ground elevation) ____ (ft) | Casing ID ____ (in) | Casing Material ____

Note: Total Well Depth, Stick Up, Casing Id, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and Groundwater Elevation must be current.

STABILIZATION DATA (Optional)

	Sample Time (2400 Hr Clock)	Rate/Unit _____	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25 °C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
1st									
2nd									
3rd									
4th									
Suggested range for 3 consec. readings or note Permit/State requirements:			+/- 0.2	+/- 3%	--	--	+/- 10%	+/- 25 mV	Stabilize

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (umhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L-ppm)	eH/ORP (mV)	Other: _____ Units _____

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.*

FIELD COMMENTS

Sample Appearance: ____ Odor: ____ Color: ____ Other: ____

Weather Conditions (required daily, or as conditions change)**:** Direction/Speed: ____ Outlook: ____ Precipitation: Y or N

Specific Comments (including purge/well volume calculations if required): ____

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
_____/_____/_____			
_____/_____/_____			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

WASTE MANAGEMENT

Well Condition Summary Form

Facility: _____ Well/Piezometer Name: _____

Evaluator: _____ Evaluation Date: _____

	Y	N	N/A
Is the well's location appropriately shown on a facility map?			
Is the well adequately flagged if hard to find?			
Is the well elevation information inscribed at or on the well correct?			
Is the well: ❑ flush with surface? ❑ above ground?			
Is the well free of physical damage?			
Is the well labeled on the inside?			
Is the well labeled on the outside?			
Does the well have protective posts, if necessary?			
Do above ground wells have weep holes at the base of the protective casing?			
Does the area around the well appear clean?			
Is the casing secure (attempt to move along two perpendicular axes)?			
Is the surface seal void of differential erosion around and under the base?			
Is the surface seal free of cracks that might affect the integrity of the seal?			
Is the surface seal sloped to prevent ponding around the well?			
Is the well free from standing or ponded water?			
Is the well locked to prevent unauthorized access?			
Is the protective casing cap void of large gaps which would breach security?			
Is the locking cap free of rust?			
Is there a survey mark on the riser/wellhead assembly cap?			
Is the riser cap vented?			
Is the annular space free of animal/insect nests?			
Is the annular space appropriately filled with filtering material?			
If a pump, can it be lifted a few inches? (do not test prior to sampling)			
Is the well free of kinks or bends?			

COMMENTS: _____

_____

_____

WELL CONDITION INSPECTION FORM

Site: ______________________________ Personnel: ______________________________

Date: ______________________________ Page ______ of ______

Well ID	Protective Casing	Well Casing	Label	Lock	Sample Equipment Type	General Turbidity	Well Yield	Comments/Observations *
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	

* Note ponding water, weep holes, or any other information pertaining to well condition. Provide additional details on listed items.

Return this form to Site Manager - FOR INTERNAL USE ONLY.

Groundwater Elevation Data Sheet

Project Name:	Project Number:	Investigator:	Page ___ of___
Weather Conditions:	Measuring Device:		

Well ID	Date	Time	Depth to Water (feet below TOC)		Comments

Daily Log

Site Location:		Date:
Project Number:	Initials:	Page of

FTN Associates Calibration Form

Date/Time: _____

Prepared By: _____

Location: _____

Project #: _____

Instrument Type	Instrument ID	Parameter	Standard (su)	Units	Temp. of Standard (degrees C)	Reading Prior to Calibration	Calibrated	Post Calibration Reading	Comments
		pH	7	su			Y N		Lot# Exp#
↓	↓	pH	4	su			Y N		Lot# Exp#
↓	↓	pH	10	su			Y N		Lot# Exp#
↓	↓	Cond		uS/cm			Y N		Lot# Exp#
↓	↓	DO		mm/Hg		mg/l	Y N	mg/l	
↓	↓	Temp		Degrees C			Y N	N/A	
↓	↓	ORP		mv			Y N		Lot# Exp#
		Turbidity		NTU	N/A		Y N		Lot# Exp#
↓	↓	Turbidity		NTU	N/A		Y N		Lot# Exp#
↓	↓	Turbidity		NTU	N/A		Y N		Lot# Exp#
↓	↓	Turbidity		NTU	N/A		Y N		Lot# Exp#
							Y N		
							Y N		
							Y N		

Notes:

pH Calibration (pH Method: EPA 150.1)

DO Calibration: Use 100% air saturation method. Use pressure in mm/Hg as standard to calibrate in DO% saturation. Record readings in mg/l.

Temperature Calibration: No calibration is necessary. Simply record temperature of standard using thermometer while in calibration cup. Then record sonde temperature reading.

Precision and accuracy targets are commonly based on relative percent differences. Precision is either based on a relative percent difference between replicates (analytical precision) or duplicate samples (method precision) as follows:

$$\text{Relative Percent Difference (RPD)} = 100 * (\text{rep1} - \text{rep2})/(\text{rep1} + \text{rep2})/2$$

The standard deviation of the average of a group of replicate (or duplicate) pairs represents the precision for a measurement parameter. For accuracy, percent difference is determined relative to a known or target value and is as follows:

$$\text{Percent Difference} = 100 * (\text{observed} - \text{target})/\text{target}$$

CALCULATING THE VOLUME OF WATER IN A WELL

Calculate the total volume of water in the well using the following equation:

$$\mathbf{V = (0.041)d^2 \times h}$$

Where: V = volume in gallons
d = well diameter in inches
h = height of the water column in feet

The total volume of water in the well may also be determined with the following equation by using a casing volume per foot factor (gallons per foot of water) for the appropriate internal well diameter:

V = [Gallons per Foot of Water] x h

Where: V = volume in gallons
h = height of the water column in feet

Casing Internal Diameter	Approximate Gallons per Foot of Water
0.75"	0.02
1"	0.04
1.25"	0.06
2"	0.16
3"	0.37
4"	0.65
5"	1.02
6"	1.47
12"	5.88

CALCULATING VOLUME-OF-WATER PURGED

Measuring the purge volume —The volume of water that is removed during purging must be recorded. Therefore, you must measure the volume during the purging operation.

Determine the pumping rate by measuring the amount of water using a graduated cylinder (or other container with a known volume) that is pumped for a fixed period of time and constant rate, or use a flow meter.

1. Calculate the discharge rate (D):

$$D = \frac{\text{Volume measured}}{\text{Time}}$$

2. Calculate the time needed to purge one well volume (V):

$$\text{Time} = \frac{V}{D}$$

3. Make new measurements and associated calculations if the pumping rate is changed.