CAMELOT LANDFILL
CITY OF LEWISVILLE, DENTON COUNTY
TCEQ PERMIT NO. MSW-1312B

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 4 OF 6

Prepared for

City of Farmers Branch

March 2012

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED PROFESSIONAL ENGINEER

3-23-12

Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 1339-351-11-02-6B

This document is intended for permitting purposes only.

CAMELOT LANDFILL
CITY OF LEWISVILLE, DENTON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1312B

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 4 OF 6

CONTENTS

PART III – SITE DEVELOPMENT PLAN

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

3-23-12

CAMELOT LANDFILL
CITY OF LEWISVILLE, DENTON COUNTY
TCEQ PERMIT NO. MSW-1312B

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIG
GEOLOGY REPORT

Prepared for

City of Farmers Branch

February 2012

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

Robert S. Ferbend

2-27-12

Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 1339-351-11-02-6B.7

This document is intended for permitting purposes only.

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CONTENTS

CONTENTS (Continued)

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

TABLES

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

GEOLOGY REPORT CERTIFICATION

Site Information

Site: Camelot Landfill

Site Location: Denton County

MSW Permit No.: 1312B

Qualified Groundwater Scientist Statement

I, Robert S. Ferbend, am a Texas-licensed professional geoscientist and a qualified groundwater scientist as defined in §330.3(120). I have prepared the Geology Report which constitutes Appendix IIIG of this permit application. In my professional opinion, the geology report is in compliance with the requirements specified in 30 TAC §330.63(e). This report has been completed specifically for the Camelot Landfill. The only warranty made by me in connection with this report is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm/Address:
Weaver Boos Consultants, LLC–Southwest
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109

ROBERT S. FERBEND
GEOLOGY
713

Signature:
Robert S. Ferbend, P.G., Texas License No. 713

Date: 2-27-12

1 REGIONAL GEOLOGIC/HYDROGEOLOGIC INFORMATION

1.1 Regional Physiography and Site Topography

The Camelot Landfill is located in the Black Prairie regional physiographic province (BEG, 1996). This north-south trending belt is underlain by Cretaceous formations east of the Woodbine Formation outcrop. The Black Prairie typically has a relatively flat to undulating surface topography that slopes gently to the east. It is described by the BEG as poorly drained with sparse timber.

This appendix addresses §330.63(e).

According to the USGS 7.5-minute topographic maps of the landfill area (reference Figure IIIG-A-6 in Appendix IIIG-A), the topography in the landfill vicinity generally slopes from northeast to west through south. Based on these maps, the natural ground surface elevations within the existing permit boundary area ranged from a high of approximately 460 feet along the northeastern boundary to a low of approximately 450 ft-msl along the southeastern permit boundary.

The nearest surface water body is Elm Fork Trinity River adjacent to the western and southern permit boundary areas.

1.2 Regional Geology

1.2.1 Geologic History

As reported by the Texas Bureau of Economic Geology on the Geologic Atlas of Texas Sherman Sheet, (Barnes, et al, Revised 1991, Reprinted 1997) on Figure IIIG-A-1, the geologic formations in the site vicinity are largely Cretaceous-age bedrock and younger Quaternary alluvial sediments. The Cretaceous sediments were deposited by northward advancing seas over extensively eroded Paleozoic strata. The landfill is underlain by Cretaceous-age Gulf and Comanche Series sediments, which represent two major Cretaceous sea transgressions. Toward the end of the Cretaceous period, marine deposition ceased after a regional uplift to the west. This resulted in a retreat of the seas gulf ward. Subsequent erosion of the Cretaceous deposits continued from the late Cenozoic Era to present. During the Quaternary period, erosion produced limited areas of Quaternary alluvium and terrace deposits along area stream courses.

1.2.2 Regional Structural Geology

Figure IIIG-A-2 – Regional Structural Features Map presents the major Texas structural geologic features. During the formation of the Pangea supercontinent in the late Paleozoic era, tectonic collisions uplifted and deformed the Laurasia continent. This deformation produced the Ouachita Mountains, which was the source of Trinity and Woodbine aquifer sediments (Caughey, 1977). With the breakup of Pangea, subsidence occurred to the southeast of the Ouachita Fold Belt which created low-lying areas that were subsequently flooded during the Jurassic to form the ancestral Gulf of Mexico (Stearn et al., 1979). At this time, a thick sequence of evaporates were deposited in the Gulf.

As the ancestral Gulf widened, drainage patterns in the area shifted to the southeast, and Trinity Aquifer sediment deposition began in the Early Cretaceous. As the Trinity/Woodbine sediment deposition continued, the East Texas Basin underwent subsidence (Oliver, 1971), which caused the formation of the basin ward thickening wedge of sediments that characterize the Cretaceous formations in the region. As noted by Harden et al. (2004), the continued subsidence of the East Texas Basin during the Cretaceous Period produced the two main fault systems in the area: the Luling-Mexia-Talco and the Balcones Fault Zones. No elements of these fault systems are known to occur within 10 miles of the landfill area.

1.2.3 Regional Stratigraphy

The regional stratigraphy consists of geologic units of the Cretaceous Comanche and Gulf Series sediments, including the Austin and Eagle Ford groups and the Woodbine Formation. Stratigraphic positions of these groups, along with lithologic characteristics and approximate depths to the formations, are presented in Table 1-1 (modified from Nordstrom, 1982 and Langley, 1999). According to the Texas Bureau of Economic Geology (1967), the site is located upon Quaternary Alluvium that is underlain by low permeability shale of the Eagle Ford Group as shown on the Figure IIIG-A-1 – Regional Geologic Map and Figure IIIG-A-3 – Regional Geologic Cross Section (modified from Nordstrom, 1982). Lower portions of the Austin Group crop out and overlie the Eagle Ford Group beginning about 5 miles east of the site. The surface outcrop contact between the Eagle Ford Group and the older underlying Woodbine Formation occurs approximately 3 miles west-southwest of the site at its closest extent.

Table 1-1
Regional Stratigraphy in the Vicinity of the Camelot Landfill

System	Series	Group or Formation	Approximate Formation Depth and (Thickness)	Lithologic Characteristics and Depositional Environment	Estimated Hydraulic Conductivity (cm/sec)
Quaternary	Holocene	Alluvium	Surface (0′ - 53′)	Clay, silt, sand, and gravel in current floodplain deposited in fluvial environment.	10^{-1} to 10^{-9} (Fetter, 1988)
	Pleistocene	Terrace	Surface (0′ - 50′)	Clay, silt, sand, and gravel above current floodplain deposited in fluvial environment.	10^{-1} to 10^{-9} (Fetter, 1988)
Cretaceous	Gulf	Austin Chalk Group	Surface (0′ - 700′)	Chalk, limestone, marl and occasional fine to medium sand deposited in marine environment.	Limestone: 10^{-5} to 10^{-9} Marl/Clay: 10^{-8} to 10^{-11} (Driscoll, 1989)
		Eagle Ford Group	0-49′ below surface (38′ - 91′ thick)	Shale with some thin platy beds of siltstone and sandy limestone deposited in marine environment.	Shale: 10^{-8} to 10^{-12} (Driscoll, 1989)
		Woodbine Formation Aquifer	85' - 125' below surface (250′ thick)	Sand, sandstone, clay, shale, lignite deposited in fluvial and marine deltaic environments.	2×10^{-3} (Langley, 1999)
	Comanche	Washita Group	350′ below surface (300′ thick)	Limestone, marl, and clay; some sand near top deposited in marine environment.	Limestone: 10^{-5} to 10^{-9} Marl/Clay: 10^{-8} to 10^{-11} (Driscoll, 1989)
		Fredericksburg Group	650′ below surface (200′ thick)	Limestone, clay, marl, shale, and shell agglomerates deposited in near shore marine depositional environment.	Limestone: 10^{-5} to 10^{-9} Marl/Clay: 10^{-8} to 10^{-11} Shale: 10^{-8} to 10^{-12} (Driscoll, 1989)
		Trinity Group Aquifer Paluxy Formation	955′ below surface (<100′ thick)	Fine sand, sandy shale, and shale deposited in fluvial, deltaic, and near shore marine environments.	Paluxy: 1×10^{-3} to 3×10^{-3} (Langley, 1999)

Modified from Nordstrom (1982), Langley (1999), and Harden, et al. (2004).

1.3 Geologic Processes

1.3.1 Fault and Seismic Data

Seismic impact zone and fault investigations are discussed in the location restrictions in Parts I/II, Appendix I/IIC (Sections 8 and 9). As discussed in these sections, no geologic processes, including active faults or seismic impact zones, are located within one mile of the site. The geologic processes that could potentially cause unstable areas are discussed in detail in the unstable areas location restriction demonstration located in Section 10 of Appendix I/IIC of Parts I/II.

1.3.2 Erosional Processes

Erosional processes in the landfill area are limited to those produced by the Elm Fork Trinity River drainage system. These include rill and channel erosion and sheet flow. Natural topographic relief across the site is low and erosion from these processes is minimal. No adverse effects on the site are anticipated. No mass wasting was observed.

1.3.3 Wetlands Identification

Details regarding jurisdictional wetland areas are provided in Section 7 of the location restriction demonstrations in Appendix I/IIC.

1.4 Regional Aquifers

Regional Cretaceous aquifers beneath the landfill include the Woodbine and Trinity aquifers. The Woodbine Aquifer is classified by the Texas Water Development Board (TWDB) (Ashworth and Hopkins, 1995) as a minor Texas aquifer, which is located stratigraphically above the underlying Trinity Aquifer. The Paluxy, Glen Rose, and underlying Twin Mountain formations comprise the Trinity Aquifer. The Woodbine and Trinity aquifers are separated by approximately 600 feet of low permeability sediments and are not hydraulically connected (Harden, 2004). Although not classified as a regional aquifer, groundwater also occurs in the uppermost Quaternary Alluvium and Terrace Deposit sediments. The Quaternary Alluvium groundwater is the uppermost aquifer at the site for groundwater monitoring purposes. The uppermost aquifer is discussed in Sections 2 and 3.

1.4.1 Woodbine Aquifer

The Woodbine Formation is classified by the Texas Water Development Board (TWDB, Ashworth and Hopkins, 1995) as a minor Texas aquifer. The Woodbine is composed of fine-grained, cross-stratified, fluvial sand with some gravel that is interbedded with over bank clay and shale (Hopkins, 1996 and Harden, et al., 2004). In the north Texas region, the Woodbine Aquifer is generally confined by the overlying Eagle Ford shale.

Figure IIIG-C-12 provides a Top of Woodbine Strata Elevation Contour map that was developed by Dames and Moore (1989) and Rust Environment and Infrastructure (1998). Dames and Moore produced an initial Elevation of Top of Woodbine contour map based on depths to top of Woodbine Aquifer reported in area water well drillers' logs and area surface elevations at the well locations. Rust revised this map in 1998 using measured top of Woodbine elevations from DFW Recycling and Disposal Facility (DFW RDF) (TCEQ MSW Permit No. 1025-B) boreholes that encountered the Woodbine Formation beneath the DFW RDF property (refer to Section 2.3 of Appendix IIIG for additional information regarding the subsurface information for TCEQ MSW Permit No. 1025-B). WBC adjusted the Rust contour map by incorporating the top of Woodbine elevation at the Camelot borehole WB-4 location (an elevation of 349 ft-msl).

As indicated on Figure IIIG-C-12, the estimated Top of Woodbine elevations beneath the proposed Camelot Landfill permit boundary range from 375 ft-msl along the western boundary to about 340 ft-msl along the eastern permit boundary. This range in top of Woodbine elevations is due to the formation's dip to the east-southeast. Based on local water well water level data obtained from the TWDB (Klemt, et al., 1975 and Harden et al., 2004), the Woodbine potentiometric surface in the landfill area is above the bottom elevation of the confining Eagle Ford Group shale. The Woodbine potentiometric surface is shown on Figure IIIG-A-4 (adapted from Harden, et al., 2004). However, based on WB-4 Woodbine rock sample observations, the uppermost two feet of the Woodbine Strata did not appear to be saturated (e.g., slightly moist).

The Woodbine Formation is divided, from youngest to oldest, into the Arlington, Lewisville, Dexter, and Rush Creek members (Dodge, 1968). The formation ranges in thickness from less than 100 feet in south Texas to over 600 feet in northeast Texas down-dip areas (Harden et al., 2004). The Woodbine is composed of sediments eroded from the Ouachita uplift in Oklahoma and Arkansas that were deposited in fluvial, high-destructive deltaic and stand plain depositional systems (Harden et al., 2004). As noted in Figure IIIG-A-4, the regional Woodbine groundwater flow direction follows the regional dip of the formation to the east-southeast. The average rate of groundwater movement is reported to be about 10 to 20 feet per year (Nordstrom, 1982). The primary source of recharge to the aquifer is precipitation infiltration on the outcrop, which is about three miles to the west of the site at its closest extent.

Groundwater quality in the Woodbine Aquifer is summarized in Table 1-2 (modified from Nordstrom, 1982; Langley, 1999; and Harden, et al., 2004). According to Nordstrom (1982), the Woodbine Aquifer produces fresh, good quality water from wells completed on or near the outcrop. In general, Woodbine water quality deteriorates rapidly down dip from the outcrop with total dissolved solids, sodium, chloride, and bicarbonate increasing (Nordstrom, 1982).

Table 1-2
Regional Hydraulic Properties and Water Quality Parameters in the Woodbine and Paluxy Aquifers[1]

Hydraulic Properties	**Woodbine Aquifer**	**Paluxy Aquifer**
Composition	Sandstone, siltstone, shale	Sandstone, shale
Transmissivity	Average 4,700 gal/day/ft	Range 5,000-10,000 gal/day/ft
Hydraulic Conductivity	Average $2\text{x}10^{-3}$ cm/sec	Range $1\text{-}3\text{x}10^{-3}$ cm/sec
Flow Rate	10-20 ft/yr	1-2 ft/yr
Recharge Zones	Outcrop begins 3 miles west of site	Outcrop begins 31 miles west of site
Potentiometric Surface	See Figure IIIG-A-4	See Figure IIIG-A-5
Present Water Use	Public supply, industrial, irrigation, domestic, iron and sulfate may cause problems	Public supply and domestic, some industrial
Water Wells Within 2 Miles	See Figure IIIG-A-6 and Table 1-3	See Figure IIIG-A-6 and Table 1-3
Water Quality Parameters	**Woodbine Aquifer (76 well average)**	**Paluxy Aquifer (51 well average)**
Total Dissolved Solids (mg/l)	877.39	606.70
Chloride (mg/l Cl)	85.88	36.08
Sodium (mg/l Na)	311.76	187.76
Nitrate (mg/l NO_3)	0.67	1.00
Sulfate (mg/l SO_4)	209.18	101.25
Fluoride (mg/l F)	1.30	1.06

[1] Modified from Nordstrom (1982) and Langley (1999).

1.4.2 Paluxy Formation

The Paluxy and underlying Glen Rose and Twin Mountain formations comprise the Trinity Aquifer. The TWDB classifies the Trinity as a major Texas aquifer (Ashworth and Hopkins, 1995). According to the Harden et al (2004), the elevation of the top of the Paluxy Formation beneath the permit boundary area is about 500 feet below mean sea level and the Paluxy Formation thickness is about 300 feet. A Paluxy Formation water well (id number 18-57-8A) is located about 1,250 feet east of the northernmost permit boundary (reference Figure IIG-A-6). The well driller's log indicates the top of thePaluxy is about 1,110 feet below land surface at this location. The 7.5 minute USGS Lewisville East, TX quadrangle map shows the surface elevation at the well location is about 492 feet msl. Based on this information, the elevation of the top of the Paluxy Formation is about 618 feet below mean sea level at this location.

The Paluxy Formation potentiometric surface elevation beneath the site in 2000 was less than 100 feet above mean sea level (Harden et al., 2004), indicating a confined aquifer condition. The driller's log for Paluxy Formation water well 18-57-8A indicates the well's static water level in 1978 was 360 feet below land surface. This static water level equates to a Paluxy groundwater elevation of 132 feet above mean sea level, which also indicates a confined Paluxy Aquifer condition.

According to Nordstrom (1982), the Paluxy hydraulic gradient is about 27 feet per mile with groundwater flowing to the east at less than two feet per year. The primary source of recharge to the Paluxy Aquifer is infiltration of precipitation and surface water on the outcrop. Recharge areas are to the west, with the closest Paluxy outcrop being about 31 miles west of the landfill. The Paluxy Formation is comprised of sand, silt, shale, and locally, impure limestone. The sands are fine to very fine grained, and well to very well sorted. The sand units are laminated or massive, and are generally poorly cemented and friable (Fisher and Rodda, 1967). The formation's sediments were derived from the Ouachita and Arbuckle Mountain uplifts in Oklahoma and re-deposited in fluvial, deltaic, and stand plain depositional environments (Harden et al, 2004).

Groundwater quality in the Paluxy Formation is summarized in Table 1-2 (modified from Nordstrom, 1982 and Langley, 1999). According to Langley (1999), Paluxy Aquifer wells produce small to moderate quantities of fresh water.

1.5 Water Well Search

A search to identify Texas registered water wells within a one-mile radius of the site included a 2011 water well search by GeoSearch for records and maps on file at the USGS, TWDB, and TCEQ. Twenty-one water wells were reported by GeoSearch in 2011 within one mile of the permit boundary. The 21 Denton County well locations identified by GeoSearch are shown on the Figure IIIG-A-6 – Water Well Location Map and the corresponding well reports are provided in Appendix IIIG-A on pages IIIG-A-8 through IIIG-A-68. Some of these water well locations were based on a TWDB state grid well location map that was maintained between 1966 and 1990. A copy of this map is presented as Figure IIIG-A-69. The water well information is summarized in Table 1-3.

In March 2011, WBC completed a water well reconnaissance from area roadways. The purpose of the reconnaissance was to identify potential unregistered water wells within a one-mile radius of the permit boundary. This visual survey was limited by viewing obstructions including vegetation and structures, and a private property access restrictions. During the reconnaissance, WBC identified one potential water well. The potential water well location is indicated on Figure IIIG-A-6. Indications of potential water wells used for the reconnaissance included elevated water tanks, wellhead equipment, pressure balance tanks, small outlying structures having electrical power drops, and windmills.

As indicated on Figure IIIG-A-6, there are two registered water wells known to exist within 500 feet of the permit boundary. These water wells are hydraulically up groundwater from the proposed limits of waste. The registered water well closest to the landfill is TWDB well number TX18-57-5F, which is located approximately 183 feet north of the landfill's northernmost permit boundary.

1.6 Petroleum Well Search

An online review of Texas Railroad Commission (TRC) geographic information system (GIS) petroleum well database was completed to identify oil and natural gas wells in the landfill vicinity (http://www.rrc.state.tx.us/public). In February 2012, the TRC database indicated no oil wells and one natural gas well within one mile of the landfill's permit boundary. Figure IIIG-A-7 shows the approximate location of the gas well. According to the TRC database, no permitted oil or gas well surface locations are located within the landfill permit boundary. The nearest gas well (API No. 121-33672) is located adjacent to the southwest permit boundary area, which is a horizontal gas well completed into the Barnett Shale.

Table 1-3
Registered Water Wells Within One Mile of the Landfill[1]

Well No.	Total Depth (ft)	Aquifer	Use	Depth to Woodbine (ft)[2]	Depth to Paluxy (ft)[2]
TX176684	69	Alluvium	Industrial	ne	ne
18-57-8B	440	Woodbine	Domestic	390	ne
18-57-801	420	Woodbine	Domestic	158	ne
18-57-5F	345	Woodbine	Domestic	265	ne
18-57-8A	1157	Paluxy	Domestic	120	1110
TX23008	250	Woodbine	Domestic	unknown	ne
18-57-8A	338	Woodbine	Domestic	318	ne
18-57-5G	350	Woodbine	Domestic	325	ne
18-57-501	160	Woodbine	Domestic	132	ne
18-57-5	436	Woodbine	Domestic	175	ne
18-57-5D	485	Woodbine	Domestic	142	ne
18-57-5H	410	Woodbine	Domestic	240	ne
18-57-503	390	Woodbine	Domestic	171	ne
18-57-5	215	Woodbine	Industrial	181	ne
18-57-5A	216	Woodbine	Domestic	175	ne
18-57-7J	320	Woodbine	Domestic	168	ne
18-57-502	500	Woodbine	Industrial	unknown	ne
18-57-8C	240	Woodbine	Domestic	80	ne
18-57-504	494	Woodbine	Domestic	215	ne
18-57-4A	104	Woodbine	Domestic	37	Ne
TX227682	1,513	Paluxy	Irrigation	270	1020

Notes: [1] Water well information obtained from USGS, TWDB and TCEQ records.
[2] "ne" denotes formation "not encountered" according to driller's well log information.

In this area, Barnett Shale gas wells are drilled vertically to depths of about 8,000 to 12,000 feet with horizontal borehole trends through the Barnett Shale natural gas reservoir. Some deep brine groundwater may be produced from the Barnett Shale or the underlying Ellenberger Formation during drilling. The Mississippian-age Barnett Shale reservoir is comprised of very hard, incompressible rock. As part of the Barnett Shale gas well development, high pressure fluids and sand are injected into the borehole to fracture the formation to enhance gas recovery. The injection process replaces potentially removed brine fluids. The incompressible nature of the Barnett Shale and the water injection procedures would make the potential for Barnett subsidence due to groundwater withdrawal insignificant. In addition, no subsidence problems due to Barnett Shale natural gas exploitation have been reported to date.

2 SUBSURFACE INVESTIGATION REPORT

2.1 Site Stratigraphy

The proposed subsurface characterization of the permit boundary area is supported by 107 existing soil borings. The existing borehole data set includes 11 borings completed in 2010 by the Carel Corporation to install new monitoring wells and 16 borings completed in 2010 by WBC to facilitate the landfill's lateral expansion. In 2011, WBC borehole WB-4 was continued deeper into the Woodbine Strata. To illustrate subsurface conditions, 9 geologic cross sections were constructed for this permit amendment using stratigraphic and lithologic data from the borehole logs presented in Appendix IIIG-B. A geologic cross section location map is included as Figure IIIG-C-1 in Appendix IIIG-C. The geologic cross sections are presented as Figures IIIG-C-2 through IIIG-C-10. The geologic cross sections indicate the facility's subsurface geology can be divided into three site-specific strata with Alluvial Strata overlying the Shale and Woodbine strata. The Alluvial Strata are characterized as having an Upper Clay Zone overlying a Lower Sand Zone. The Shale Strata are comprised of Weathered and Unweathered Shale zones. In WBC borehole WB-4 the Woodbine Weathered Shale and Sandstone zones were encountered.

As shown on the Figure IIIG-A-1 Regional Geologic Map, the facility is located on an outcrop of Quaternary-age alluvium (Qal) associated with Elm Fork Trinity River. The alluvium deposits consist of mixtures of clay, silt, sand, and gravel. The stratigraphic relationships presented on Figure IIIG-A-1 indicate the Quaternary Alluvium is underlain by the Cretaceous Eagle Ford Group (Kef), which in turn is underlain by the Cretaceous Woodbine Formation (Kwb).

2.1.1 Alluvial Strata

Consistent with the subsurface characterization included in the Site Development Plan for TCEQ Permit No. MSW-1312A (Reed, 1995), the uppermost site-specific stratigraphic unit at the site is comprised of alluvial sediments designated in this permit application as the Alluvial Strata which contain the permitted uppermost groundwater monitoring zone. Based on borehole data, the Alluvial Strata are continuous beneath the landfill except where these materials have been removed by soil excavation to support site development. This strata has also been affected by sand and gravel mining prior to landfill development, which caused their alteration or removal.

The Alluvial Strata are further characterized as being comprised of two stratigraphic zones, which include in order of increasing depth, the Upper Clay and Lower Sand Zones. Migration of the Elm Fork river channel resulted in the deposition of basal alluvial sands and gravels on top of the underlying Eagle Ford Shale bedrock. These clastic deposits were in turn overlain by the Upper Clay Zone clays and sandy clays typical of overbank and floodplain deposits. The Alluvial Strata are a fining upward stratigraphic sequence. According to the existing boring data set, the Alluvial Strata range in total thickness from 0 to 52.5 feet with a mean thickness of 24.9 feet where the entire alluvial sequence was present and fully penetrated.

2.1.1.1 Upper Clay Zone

The Upper Clay Zone is the uppermost and typically the thickest zone in the Alluvial Strata. It is largely comprised of thickly to massively bedded, moderately to highly plastic, firm to hard, silty clay. Upper Clays are medium to dark brown-colored and are typically slightly moist to moist. The zone's sand content generally increases with depth where the zone's lower portion is typically classified as a sandy clay. The zone's thickness varies from 0 to 49.5 feet with an average thickness of 19.6 feet. The Upper Clay Zone was naturally present across the permit boundary, but is now absent where it has been removed by landfill development or soil borrowing. The Upper Clay is thickest adjacent to the Elm Fork Trinity River and along the southern half of the eastern permit boundary area. Geotechnical laboratory tests indicate the Upper Clay Zone sediments have a vertical hydraulic conductivity range of $5.4\text{x}10^{-8}$ to $1\text{x}10^{-9}$ cm/sec (reference geotechnical data summary in Appendix IIIJ-C and Table 3-4 in Appendix IIIG).

Relatively thin sand and gravel lenses are occasionally described within bounding intervals of Upper Clay. Based on the laterally and vertically discontinuous character of these clastic lenses, they are interpreted as overbank or channel sands and Elm Fork tributary sediments. The sands are typically not saturated.

2.1.1.2 Lower Sand Zone

Within the Alluvial Strata and beneath the clay and sandy clay of the Upper Clay Zone are the sand and gravel dominant sediments of the Lower Sand Zone. As the Alluvial Strata are a coarsening downward stratigraphic sequence, there is a general grain size increase from Upper Clay Zone down to Lower Sand Zone clayey sands, sands, and basal gravels below. Classifications of Lower Sand Zone sediments include various mixtures of sand, gravel, with lesser amounts of silt and clay as listed in Table 2-1.

The Lower Sand Zone is not continuous beneath the facility due to fluvial erosion, sand and gravel mining, soil borrowing, and landfill disposal cell development. Lower Sand Zone descriptions in 11 of 107 borings do not include Lower Sand Zone sediment types. As described in the existing boring logs, isolated locations having no observed Lower Sand Zone sediments are adjacent to borings where the zone is present. Except in the northwestern-most corner of the permitted waste footprint, all waste disposal cells are founded in the underlying Shale Strata where the Alluvial Strata are removed to facilitate liner construction.

Fluvial channel migrations and flood events deposited and reworked the Alluvial Strata. Sediment grain size in the Lower Sand Zone generally coarsens with depth. The zone's bedding thicknesses range from moderate to very thick. The clastic sediments in the Lower Sand Zone are poorly consolidated to unconsolidated (soft to loose) and are poorly sorted. Sand grains range in size from very fine to coarse. Fine to coarse grained gravel, where present, is typically concentrated immediately above the underlying Shale Strata. Minor seams of cohesive sandy and gravelly clays randomly occur within the Lower Sand Zone.

The facility's uppermost aquifer saturated zone occurs in the Lower Sand Zone. In most locations, the zone is completely saturated with its groundwater confined by the overlying Upper Clay Zone. This confined groundwater condition is shown in the in the geologic cross sections, where the static groundwater elevation of most logs is above the groundwater elevation noted at time of well drilling. In other less common zone locations, the uppermost aquifer may a few feet thick and the groundwater is unconfined.

Recharge to the Lower Sand Zone occurs through precipitation infiltration and through surface water infiltration through ponds that penetrate the Upper Clay Zone. Based on groundwater and Elm Fork 100-year flood event elevations, temporary surface water infiltration into the Lower Sand Zone occurs from the Elm Fork during flood events. Lower Sand Zone groundwater typically discharges to the Elm Fork, as evidenced by the groundwater contours presented in Appendix IIIG-D. Slug tests of the Lower Sand Zone sand and gravel dominant sediments indicate an arithmetic mean horizontal hydraulic conductivity of $7.83x10^{-4}$ cm/sec.

Table 2-1
Lower Sand Zone Sediment Distribution Statistics

Zone Sediment Classifications	Total Feet of Sediment Type for Zone (ft)	Sediment Type Percent for Entire Zone
Sand	273.6	38.41
Clayey Sand	174.0	24.43
Clay	55.0	7.72
Sandy Gravel	45.5	6.38
Silty Sand	43.0	6.04
Gravelly Sand	36.8	5.17
Silty Sandy Gravel	26.5	3.72
Gravel	13.5	1.90
Sandy Clay	13.5	1.90
Clayey Gravelly Sand	8.0	1.12
Gravelly Clay	7.8	1.09
Clayey Silt	5.0	0.70
Clayey Gravel	3.5	0.49
Clayey Sandy Gravel	3.3	0.46
Silt	2.0	0.28
Gravelly Sandy Clay	0.8	0.11
Sandy Silt	0.6	0.08
Totals:	712.3 feet	100.0 %

2.1.2 Shale Strata

Beneath the Alluvial Strata, is a thick sequence of dark to medium gray, low permeability, bedrock Shale Strata. Previous Camelot Landfill subsurface investigations largely focused on characterizing the Alluvial Strata and the uppermost few feet of Shale Strata. Three deeper 1995 borings by Reed Engineering penetrated between 52.0 to 65.7 feet of Shale Strata to a minimum elevation of 372.6 ft-msl. In 2010 and in accordance with the Soil Boring Plan, WBC advanced seven deep geotechnical borings to a minimum elevation of 355.1 ft-msl and seven shallower borings to a minimum elevation of 379.7 ft-msl – all within the proposed lateral expansion area. The maximum shale penetration by the 2010 WBC deep soil borings was 87.2 feet.

In 2011, WBC extended borehole WB-4 from the 2010 bottom elevation of 356.0 ft-msl to a 2011 bottom elevation of 341.0 ft-msl (approximately 8 feet into the Woodbine Strata). The WB-4 borehole observations indicate the Shale Strata are 92.4 feet thick at the WB-4 location.

Consistent with the subsurface characterization included in the Site Development Plan for TCEQ Permit No. MSW-1312A (Reed, 1995), the site stratigraphy also includes Shale Strata comprised of an uppermost, discontinuous veneer of weathered shale and a thick underlying sequence of unweathered shale. Based on the stratigraphic relationships presented by Barnes (1991), Nordstrom (1982), and Hayden, et al. (2004), and the stratigraphic nomenclature presented in the previous landfill characterizations, these Shale Strata are part of the Cretaceous-age Eagle Ford Shale Group. This application's subsurface characterization includes the Weathered Shale and Unweathered Shale zones comprising the Shale Strata.

2.1.2.1 Weathered Shale Zone

The Weathered Shale Zone is a discontinuous veneer of weathered shale formed by the in-situ weathering of the Unweathered Shale Zone. The Weathered Shale Zone is brownish dark gray and has been noted as medium brown to tan where extremely weathered to clay. The Weathered Shale is a clayey mudstone-type shale that is typically laminated, firm to hard, slightly moist to wet, and slightly plastic to plastic. Although the Weathered Shale may contain minor amounts of groundwater, its low permeability relative to the overlying Lower Sand Zone sediments makes it an aquitard to uppermost aquifer groundwater. Split spoon blow counts indicate the weathered shale is significantly stronger than the overlying Lower Sand Zone sediments and has less strength than the underlying Unweathered Shale.

The Weathered Shale Zone is not continuous across the site. Forty one of the 107 existing boring logs describe a weathered shale or an interval above the unweathered shale that has the characteristics of the Weathered Shale Zone. Consistent with the previous area landfill characterizations, the weathered shale is not continuously present beneath the landfill due to fluvial erosion. WBC observed a very thin Weathered Shale in all 16 of the 2010 boreholes in thicknesses ranging from 0.1 to 1.0 feet. In the other boring logs, the Weathered Shale Zone ranges in thickness from 0 to 8.0 feet with an average thickness of 1.3 feet in the 41 borings where it was encountered. The top of the Shale Strata generally slopes in all directions from a high point in the north central portion of the permit boundary (see Figure IIIG-C-11 in Appendix IIIG-C).

2.1.2.2 Unweathered Shale Zone

The lower portion of the Weathered Shale Zone, where present, transitions sharply or gradationally to the hard, dark gray, Unweathered Shale Zone. The Unweathered Shale Zone is a thick, continuous shale zone beneath the permit boundary area. According to the 107 existing boring logs, 106 borings penetrated into the low permeability Unweathered Shale Zone (reference Table 2-3 and the geotechnical data summary in Appendix IIIJ-C). The depths of Unweathered Shale borehole penetration ranged from 0.1 to 92.0 feet. Except for the northwestern-most waste footprint, the existing and proposed landfill liner systems are founded in the Unweathered Shale Zone.

The Unweathered Shale Zone is a dark gray, dry, hard, plastic when moistened, laminated to massively bedded shale. Sedimentologically, the Unweathered Shale Zone observed by WBC is comprised of an upper calcareous mudstone unit, a middle calcareous laminated, interbedded, dark gray mudstone and medium gray claystone unit, and a lower, largely non-calcareous claystone unit. The Unweathered Shale Zone is the lower confining unit or aquiclude for the Alluvial Strata's uppermost aquifer because of its low permeability and high strength. The Unweathered Shale has a mean vertical hydraulic conductivity of 2.5×10^{-8} cm/sec, which is a very low permeability. Other Unweathered Shale characteristics observed during the 2010 subsurface investigation include traces of fossils, calcite and gypsum filled bedding planes and fractures, traces of fractures and slickensides, and traces of pyrite nodules or veins.

The subsurface characterization included in the Site Development Plan for TCEQ Permit No. MSW-1312A (Reed, 1995) also describes the Shale Strata as an aquitard with respect to Alluvial Strata uppermost aquifer groundwater. The Shale Strata aquitard hydraulically separates the shallow uppermost aquifer from the underlying Woodbine Strata.

Figure IIIG-C-11 in Appendix IIIG-C presents a top of Shale Strata elevation contour map. This map indicates the top of shale has been modified by ancestral Elm Fork River fluvial erosion. A top of shale surface is elevated beneath the northwest portion of the landfill area. The top of shale surface slopes away from this area in all directions. The grade of the slope is most pronounced (with a maximum slope of about 13.1 percent) to the north through west directions from the elevated area. This area of greatest slope appears to be due to erosion by the Elm Fork river channel where it meandered across this portion of the site and removed a significant thickness of Shale Strata. These erosional areas were later covered by Alluvial Strata.

During the 2010 subsurface investigation, random traces of subsurface water were noted in the Unweathered Shale Zone. Isolated wet horizontal shale partings (parallel to bedding plane) were occasionally observed at varying depths and frequencies in the zone. The wet partings were bounded by thickly to very thickly bedded dry shale intervals. The wet partings are not correlatable within this aquitard zone.

2.1.3 Woodbine Strata

Below the Shale Strata are the Woodbine Strata. Based on the area stratigraphy presented by Barnes (1987), Nordstrom (1982) and Hayden, et al. (2004), the Woodbine Strata are comprised of Woodbine Formation sediments. As described by Dodge (1968), the uppermost Woodbine stratigraphic unit is the Arlington Member. This member is composed of sandstone and calcareous sand lenses interbedded with shale. The Woodbine Formation is considered a minor groundwater aquifer by the Texas Water Development Board.

During the site investigation one of the borings (WB-4) was extended past the planned boring depth to encounter the Woodbine Strata. The Woodbine Strata is largely known from local water well driller's logs presented in Appendix IIIG-A. The driller's logs describe this zone as comprised of sand and sandstone with lesser amounts of shale and limestone. As discussed in Section 1.4.1 of Appendix IIIG, area driller's logs were used by Dames and Moore (1989) and later Rust (1998) in preparing top of Woodbine Formation elevation contour maps. The Rust Top of Woodbine Elevation Contour Map has been reproduced and updated and is provided on Figure IIIG-C-12 in Appendix IIIG-C. The Top of Woodbine elevation contours have been updated to incorporate the measured top of Woodbine Strata elevation at the WB-4 borehole location.

Figure IIIG-C-12 shows the top of the Woodbine Strata ranges from 340 to 375 feet above mean sea level. Based on a natural ground surface elevation of 460 feet above sea level, the top of Woodbine Strata ranges from 85 to 125 feet below ground surface. A comparison of Figure IIIG-C-12 with the Figure IIIG-C-11 – Top of Shale Strata Elevation Contour Map indicates 41 feet (at MW-18A) to 100 feet (at borehole WB-13) of low permeability shale aquitard separates the uppermost alluvial aquifer from the underlying Woodbine Strata.

2.2 Previous Site Exploration Summary

A summary of previous Camelot Landfill site explorations is provided in this section. Information regarding the borings completed at the site since 1979 is listed in Table 2-3. Logs of borings are presented as Figures IIIG-B-3 through IIIG-B-212 (in Appendix IIIG-B) and the borehole locations and surface elevations are shown on Figure IIIG-B-2. Based on a review of previous permit applications and information in the Site Operating Record, it is our understanding that boreholes not completed as wells or piezometers were pressure grouted upon completion. No unplugged boreholes have been reported by WBC or facility personnel.

- A 1979 geotechnical study by Rone Engineers included 10 borings drilled to evaluate the thickness of sediments and soil properties. These borings ranged in depth from 16 to 34 feet below ground surface.
- A 1980 geotechnical study by Rone Engineers included 19 borings drilled to evaluate the thickness of sediments and soil properties. These borings ranged in depth from 18 to 80 feet below ground surface.
- In 1983, Rone Engineers advanced four borings to facilitate the installation of monitoring wells MW-4, MW-5, MW-6, and MW-7.
- Reed Engineering advanced 8 borings in 1994 to facilitate the installation of 8 temporary monitor wells for measuring water levels.
- In 1994, Reed Engineering completed two measured stratigraphic sections (TC-1 and TC-2).
- Reed Engineering completed 11 geotechnical borings in 1994. These borings ranged in depth from 12 to 43 feet below ground surface.
- In 1995, Reed Engineering completed three deep boreholes (DB-1, DB-2 and DB-3) to determine soil properties of the deeper Shale Strata. The deep borings ranged in depth from 65.7 to 80 feet below ground surface.
- Reed Engineering advanced 8 borings in 1995 to facilitate the installation of 8 groundwater monitoring wells.
- Reed Engineering advanced 3 borings in 1998 to facilitate the installation of 3 groundwater monitoring wells.
- In 2000, the Carel Corporation advanced 2 borings to facilitate the installation of 2 groundwater monitoring wells.
- The Carel Corporation advanced 5 borings in 2003 to install 5 observation wells to assess groundwater quality along the south side of the landfill.
- In 2006, the Carel Corporation installed replacement monitor well MW-15A along the west side of the landfill.
- Two assessment monitor wells (MW-10A and MW-12A) were installed in 2007 by the Carel Corporation.
- Two more Carel Corporation assessment monitor wells (MW-10B and MW-12B) were installed in 2008.
- In response to TCEQ 600-foot monitor well spacing requirements, the Carel Corporation advanced 11 borings in August and September 2010 to facilitate the installation of 11 groundwater monitor wells.

2.3 Previous Landfill Stratigraphic Characterizations

The Camelot Landfill site-specific stratigraphy was previously characterized by Reed (1995) and the characterization is included in the Site Development Plan for TCEQ Permit No. MSW-1312A. Reed describes an outcrop of Quaternary-age alluvial sediments containing the facility's uppermost aquifer. Within this alluvial zone (in order of increasing depth), a fining upward sequence of surface clay, sandy clay, clayey sand, sand, and gravel are typically present. These sediments are underlain by the Cretaceous-age Eagle Ford Shale bedrock. The Eagle Ford forms an aquiclude to the uppermost alluvial aquifer. Reed (1995) describes the Eagle Ford as a thick sequence of dark gray, laminated, dry, unweathered shale. In discontinuous locations, a thin veneer of weathered shale is present due to the in situ weathering of the Eagle Ford Shale.

The approved Reed site characterization included in the Site Development Plan for TCEQ Permit No. MSW-1312A includes the proposed Camelot Landfill lateral expansion area described in this MSW-1312B permit application. A 2001 minor amendment to revise the facility's base grades and final cover configuration also reduced the site's waste footprint from 238.0 acres to 207.4-acres. The 2001 minor amendment's waste footprint reduction area is the same area that is proposed for a lateral waste footprint expansion by the TCEQ Permit No. 1312B permit application. For these reasons, this application's lateral expansion area has been previously characterized by Reed.

The DFW Recycling and Disposal Facility (TCEQ Permit No. 1025B) is an adjacent Type 1 landfill located south of the Camelot Landfill. The TCEQ approved the facility's site-specific stratigraphy as part of the permit amendment's Attachment 4 in 1998 (the subsurface characterization was completed by Rust Environment & Infrastructure, Inc.). The subsurface characterization for TCEQ Permit No. 1025B is also consistent with the characterization of the Camelot Landfill. Rust describes unconsolidated alluvial units, and the Eagle Ford Shale and Woodbine Sandstone bedrock units. At the DFW Landfill, the Eagle Ford also functions as an aquitard and lower confining unit to the facility's uppermost Alluvial Aquifer and an upper confining unit to the underlying Woodbine Aquifer. Rust describes the Eagle Ford as dark gray, massive to laminated shale with pyrite seams and occasional shell fragments. Rust's descriptions of the Eagle Ford core samples indicate the shale beneath DFW Landfill is mostly homogeneous, similar to the Eagle Ford material at the Camelot Landfill. Rust noted occasional traces of subsurface water in the Eagle Ford. Rust characterized this water by noting, "While the shale may contain limited quantities of free water, it is generally limited in flow potential, is isolated to bedding planes, and is usually associated with weathered zones."

The Rust subsurface characterization indicates the top of Eagle Ford Shale bedrock surface has been modified by river erosion. Using DFW borehole data, a top of bedrock map was included by Rust in the DFW permit application. This map indicates an elevated central high point in the surface which generally slopes toward the Elm Fork. This map is quite similar to the Camelot Landfill's permit application Figure IIIG-C-11 – Top of Shale Strata Contour Map. On the Camelot Figure, there is a north central top of shale high point the generally slopes toward the Elm Fork.

According to Rust, there is an average thickness of 65 feet of Eagle Ford Shale overlying the Woodbine aquifer at the center of the DFW Landfill. Rust utilized DFW borings that penetrated the Woodbine sediments (and water well information from the 1989 Dames and Moore subsurface investigation) to produce a top of Woodbine structural contour map. This map has been adapted into this permit application as Figure IIIG-C-13 in Appendix IIIG-C.

The site-specific stratigraphic characterization in this application is consistent with the previous stratigraphic characterizations at the site (for TCEQ Permit No. MSW-1312A) and the characterization of the adjacent DFW Landfill. No significant revisions of the previously approved stratigraphic characterization are proposed in this permit application.

2.4 Soil Boring Plan and 2010 WBC Site Exploration

On July 16, 2010, the TCEQ approved a Soil Boring Plan to support the continued development of the Camelot Landfill. Excerpts from the 2010 Soil Boring Plan are presented in Appendix IIIG-E. The TCEQ Soil Boring Plan approval letter (dated July 16, 2010) is also presented in Appendix IIIG-E.

The 2010 Soil Boring Plan proposed the use of 80 existing soil borings to characterize subsurface conditions beneath the facility. The 2010 Soil Boring Plan proposed 14 new borings to be drilled within the proposed 38.5-acre lateral waste footprint expansion area. Note that the 41.8-acre lateral expansion area included a 3.3-acre area that overlaps with the existing permitted waste fill footprint where the excavation depth will be increased. The EDE of the proposed lateral expansion area is 387 ft-msl. In October 2010, WBC completed a site exploration by advancing 14 soil borings within the proposed lateral expansion area at the locations shown on Figure IIIG-B-2. In addition to the SBP requirements, two soil borings were advanced in the southernmost levee structure to obtain geotechnical information to support stability analyses (refer to Appendix IIIJ).

All WBC 2010 borings were initially advanced using Shelby tube samplers until the Lower Sand Zone sediments were identified. Within the Lower Sand Zone, split spoon samplers in conjunction with blow counts were used to obtain soil samples and record soil strength-related data. The split spoon samplers were used until the top of the underlying Shale Strata was encountered.

The WBC expansion area borings included seven deep borings (to bottom elevations greater than 30 feet below the proposed EDE of 387 feet msl) and seven shallower borings (to bottom elevations greater than 5 feet below the proposed EDE of 387 feet msl). The WBC borings were advanced to total depth using mud or air rotary drilling after the top of Shale Strata was encountered using Shelby tube or split spoon samplers. The recovered subsurface material samples were retained for laboratory testing. The results of the geotechnical laboratory analyses are shown on the WBC boring logs and in Appendix IIIJ-C. The subsurface samples obtained from the WBC borings indicated the subsurface conditions beneath the lateral expansion area are consistent with the conditions reported in previous site explorations. In addition to the 14 TCEQ required borings, two geotechnical borings were completed through the levee structure along the southern landfill limits of waste. These borings were advanced to collect material samples for strength testing purposes. All WBC soil borings completed to comply with the 2010 Soil Boring Plan (that were not completed as shallow piezometers), were installed, abandoned, and plugged in accordance with the applicable rules in Title 16 TAC Chapter 76 (water well drillers and water well pump installers' rules as administered by the Texas Department of Licensing and Regulation). Table 2-2 summarizes the SBP and 2010-2011 drilling details.

Table 2-2
Expansion Area Borehole Summary

Item	Soil Borings Proposed in Soil Boring Plan (38.5-Acre Lateral Expansion Area)		Soil Borings Completed (38.5-Acre Lateral Expansion Area)	
Total Borings	14		14	
Number of Borings at Least 30 Feet Below the EDE	Existing soil borings in the expansion area used to assist in characterization	0	Existing soil borings in the expansion area used to assist in characterization	0
	Proposed new borings 30 feet below the EDE within the expansion area	7	Completed new borings 30 feet below the EDE within the expansion area	7
	Total number of borings at least 30 feet below the EDE to characterize expansion area	7	Total number of borings at least 30 feet below the EDE to characterize expansion area	7
Number of Borings at Least 5 Feet Below the EDE	Existing borings within or adjacent to the expansion area used to assist in characterization	0	Existing borings within or adjacent to the expansion area used to assist in characterization	0
	Proposed new borings at least 5 feet below the EDE within or adjacent to the expansion area	14	Completed new borings at least 5 feet below the EDE within or adjacent to the expansion area	14
	Total number of borings at least 5 feet below the EDE to characterize expansion area	14	Total number of borings at least 5 feet below the EDE to characterize expansion area	14
Piezometers Used to Characterize Expansion Area	Proposed piezometers to characterize expansion area	4	Completed piezometers to characterize expansion area	4

Table 2-3
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
B-1	7063566	2445311	454	34	420	33	425.0	5.0	N.R.	424.2
B-2	7062670	2445334	455	31	424	37	429.0	5.0	N.R.	DRY
B-3	7062077	2443435	454	16	438	51	443.5	5.5	DRY	DRY
B-4	7062096	2444123	455	20	435	48	441.0	6.0	DRY	DRY
B-5	7062129	2444828	455	20	435	48	440.5	3.0	DRY	440.0
B-6	7061092	2443453	455	21	434	47	440.5	6.5	DRY	DRY
B-7	7061103	2444211	455	21	434	47	439.5	5.5	DRY	DRY
B-8	7061127	2444875	454	25	429	42	434.0	5.0	19.5	435.5
B-9	7060310	2443479	455	26	429	41	434.5	5.5	21.8	N.M.
B-10	7060490	2444236	454	26	428	41	435.0	7.0	20.8	N.M.

Notes:
N.R. – Not Reported.
N.M. – Not Measured.
DRY – Boring logged as dry.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
1980 RONE ENGINEERS GEOTECHNICAL BORINGS										
B-11	7063896	2444776	457	41	416	29	421.0	5.0	N.R.	N.M.
B-12	7063885	2443645	457.5	40	417.5	30.5	427.0	4.5	DRY	DRY
B-13	7063857	2442830	457.5	55	402.5	15.5	411.0	5.0	8.0	N.M.
B-14	7063802	2441895	456.5	58	398.5	11.5	411.5	5.0	40	N.M.
B-15	7063787	2441219	456.5	60	396.5	9.5	404.0	7.5	N.R.	N.M.
B-16	7063459	2444635	457	28	429	42	434.5	5.5	20	440.5
B-17	7063263	2443735	457	20	437	50	441.0	4.0	DRY	DRY
B-18	7063281	2442885	460	25	435	48	441.0	6.0	DRY	N.M.
B-19	7063231	2441904	457	51	406	19	411.5	5.5	43	418
B-20	7063489	2441227	456.3	55	410.3	23.3	406.3	5.0	45	421.3
B-21	7062713	2444223	455	22	433	46	438.0	5.0	N.R.	N.M.
B-22	7062602	2443270	454	18	436	49	441.5	5.5	DRY	N.M.
B-23	7062282	2441576	458.3	23	435.3	48.3	442.8	5.0	DRY	DRY
B-24	7061480	2443075	454	24	430	43	435.5	5.5	DRY	N.M.
B-25	7061653	2441778	459	23	436	49	441.0	2.0	DRY	441.5
B-26	7060690	2442328	455.5	23	432.5	28.5	438.0	5.5	DRY	DRY
B-27	7060864	2441370	458	25	433	46	438.5	5.5	DRY	DRY
B-28	7060274	2442927	456.5	23	433.5	46.5	438.5	5.0	DRY	DRY
B-29	7060116	2442103	458	23	435	48	439.5	4.5	DRY	DRY

Notes:
N.R. – Not Reported.
N.M. – Not Measured.
DRY – Boring logged as dry.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
1983 RONE ENGINEERS MONITOR WELL BORINGS										
B-1 (MW-4)	7059970	2443972	458.2	31.0	427.2	40.2	432.2	5.0	N.R.	441.55
B-2 (MW-5)	7060110	2441287	457.6	36.0	421.6	34.6	427.6	6.0	N.R.	439.60
B-3 (MW-6)	7061262	2441280	460.1	29.0	431.1	44.1	438.6	7.5	N.R.	440.12
B-4 (MW-7)	7063438	2442469	459.8	44.0	415.8	28.8	420.8	5.0	N.R.	433.75
1994 REED ENGINEERING TEMPORARY WELL BORINGS										
TW-1	7063443	2444275	455.1	20.0	435.1	48.1	435.2	0.1	16	449.3
TW-2	7063420	2441234	457.4	49.5	407.9	20.9	408.0	0.1	27.5	444.0
TW-3	7062239	2444251	456.5	19.0	437.5	51	438.0	0.5	7	448.5
TW-5	7062422	2445215	454.4	24.5	429.9	42.9	431.9	2.0	18	448.9
TW-6	7062324	2441281	458.1	40.0	418.1	31.1	418.6	0.5	35	426.6
TW-7	7060324	2444815	458.9	27.5	431.4	44.4	432.4	1.0	23	442.2
TW-8	7059995	2442790	458.4	28.0	430.4	43.4	431.9	1.5	21	438.9
1994 REED ENGINEERING MEASURED SECTIONS (CUT EXPOSURES) IN BORROW AREA										
TC-1	7060606	2441443	460	25	435	48	437.5	2.5	N.R.	N.M.
TC-2	7061255	2441516	463	23	440	53	442.0	2.0	DRY	N.M.

Notes:
N.R. – Not Reported.
N.M. – Not Measured.
DRY – Boring logged as dry.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
1994 REED ENGINEERING GEOTECHNICAL BORINGS										
TB-1	7063693	2445225	461	34.5	426.5	39.5	428	1.5	13	454.5
TB-2	7063438	2443402	458	17.5	440.5	53.5	441	0.5	13	449.5
TB-3	7061276	2445138	457	25.5	431.5	44.5	433	1.5	20	443.7
TB-4	7062183	2442430	463	19	444	57.0	446	2.0	N.R.	N.M.
TB-5	7061384	2442427	453	12	441	54.0	442.5	1.5	N.R.	N.M.
TB-6	7062764	2441868	458	18	440	53.0	442	2.0	12	N.M.
TB-7	7062792	2442649	460	18	442	55.0	443	1.0	16	N.M.
TB-8	7059397	2443286	455.5	29	426.5	39.5	427	0.5	21	N.M.
TB-9	7059748	2442799	456.5	26	430.5	43.5	430.6	0.1	16	N.M.
TB-10	7063035	2441957	457.5	34.5	423	36.0	424.5	1.5	32.5	N.M.
TB-11	7062268	2441407	458.5	43	415.5	28.5	415.6	0.1	33	N.M.

Notes:
N.R. – Not Reported.
N.M. – Not Measured.
DRY – Boring logged as dry.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
1995 REED ENGINEERING DEEP GEOTECHNICAL BORINGS										
DB-1	7061371	2447322	438.3	65.7	372.6	(14.1)	438.3[1]	65.7	29	N.M.
DB-2	7061483	2443557	459.4	80	379.4	(7.6)	439.8	52.0	9	N.M.
DB-3	7062079	2444042	461.9	79.4	382.5	(4.5)	445.9	52.4	N.R.	N.M.
1995 REED ENGINEERING MONITOR WELL BORINGS										
MW-1R	7063716	2445309	461.8	28.0	433.8	46.8	437.8	4.0	15.7	449.55
MW-3R	7061345	2445148	456.9	30.0	426.9	39.9	429.9	3.0	N.R.	444.38
MW-4R	7059961	2443971	457.7	30.0	427.7	40.7	431.2	3.5	22	441.32
MW-8	7062472	2445185	456.5	28.6	427.9	40.9	431.0	3.1	18	446.47
MW-9	7060064	2444557	455.5	29.2	426.3	39.3	429.5	3.2	17	438.89
MW-10	7059934	2443367	464.3	35.0	429.3	42.3	434.3	5.0	24	440.51
MW-11	7060075	2442742	460.5	30.0	430.5	43.5	433.5	3.0	21	440.43
MW-12	7060202	2442146	460.5	30.4	430.1	43.1	433.5	3.4	22	439.46
1998 REED ENGINEERING MONITOR WELL BORINGS										
MW-13	7060305	2441577	458.9	29	429.9	42.9	433.9	4.0	20.2	438.66
MW-14	7060846	2441328	462.0	25.5	436.5	49.5	440.0	3.5	21.5	440.83
MW-16	7062052	2441310	458.0	39	419	33.0	424.0	4.0	23.7	426.50
2000 CAREL CORPORATION MONITOR WELL BORINGS										
MW-17	7062623	2441300	457.4	48.5	408.9	21.9	409.4	0.5	33.5	430.95
MW-18	7063242	2441286	457.5	50	407.5	20.5	408.2	0.7	43	433.90

Notes:
N.R. – Not Reported.
N.M. – Not Measured.
DRY – Boring logged as dry.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
2003 CAREL CORPORATION OBSERVATION WELL BORINGS										
B-1	7060039	2442772	460.3	29.0	431.3	44.3	431.8	0.5	22	N.M.
B-2	7059968	2442673	458.3	27.3	431.0	44.0	431.9	0.9	22.5	440.26
B-3	7059619	2442558	456.5	30.0	426.5	39.5	426.7	0.2	27	438.63
B-4	7059720	2442282	456.6	30.0	426.6	39.6	427.6	1.0	26.5	N.M.
B-5	7060073	2442674	460.7	20.1	440.6	53.6	NE	NE	N.R.	N.M.
2006 CAREL CORPORATION MONITOR WELL BORING										
MW-15A	7061454	2441344	462.4	26.0	436.4	49.4	441.9	5.5	20.5	443.15

Notes:
N.R. – Not Reported.
N.M. – Not Measured.
DRY – Boring logged as dry.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.
N.E. = Not Encountered according to boring log.
[1] Boring initiated in soil borrow area with alluvium and unknown shale thickness removed.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
2007 CAREL CORPORATION ASSESSMENT MONITOR WELL BORINGS										
MW-10A	7059897	2443371	461.1	30.0	431.1	44.1	432.1	1.0	24.0	440.41
MW-12A	7060177	2442141	460.2	29.0	431.2	44.2	431.2	1.0	23.5	439.65
2008 CAREL CORPORATION ASSESSMENT MONITOR WELL BORINGS										
MW-10B	7059668	2443442	455.2	25.0	430.2	43.2	430.7	0.5	20.0	440.33
MW-12B (new MW-22)	7059856	2441957	459.7	32.0	427.7	40.7	428.7	1.0	29.0	438.82
2010 CAREL CORPORATION MONITOR WELL BORINGS										
MW-18A	7063217	2441286	457.0	50.0	407.0	20.0	408.0	1.0	27.5	431.0
MW-19	7063439	2442917	457.5	20.0	437.5	50.5	440.5	3.0	11.0	445.3
MW-20	7063446	2444379	453.9	21.0	432.9	45.9	436.4	3.5	13.0	446.0
MW-21	7061156	2441326	462.0	23.0	439.0	52.0	441.0	2.0	20.0	441.2
MW-23	7059696	2442524	458.9	32.0	422.9	40.0	428.5	1.5	27.0	439.7
MW-24	7059534	2443100	456.5	30.0	426.5	39.5	427.5	1.0	27.0	433.1
MW-25	7059495	2443696	455.1	29.0	426.1	39.1	427.1	1.0	22.0	436.0
MW-26	7059591	2444271	455.3	29.0	426.3	39.3	426.8	0.5	15.0	438.7
MW-27	7060278	2444880	453.0	25.0	428.0	41.0	430.0	2.0	23.0	437.4
MW-28	7060773	2445092	453.8	29.0	424.8	37.8	427.8	3.0	17.0	441.0
MW-29	7063432	2441689	456.3	51.0	405.3	18.3	407.3	2.0	29.5	446.7

Notes:
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

Table 2-3 (Continued)
Summary of Existing Boring Depths and Elevations

Boring Number	Northing	Easting	Surface Elevation (ft-msl)	Total Depth (ft)	Bottom Elevation of Boring (ft-msl)	Boring Depth Above or (Below) 387 ft-msl EDE (ft)	Top of Shale (ft-msl)	Boring Penetration Into Shale (ft)	Groundwater Depth at Time of Drilling (ft)	Static Groundwater Elevation (ft-msl)
2010 WBC EXPANSION BORINGS										
WB-1[1]	7063184.5	2442845.0	464.2	84.0	380.2	(6.8)	440.1	59.9	22.3	449.9
WB-2	7063232.7	2443476.1	457.2	102.0	355.2	(31.8)	442.4	87.2	10.5	445.7
WB-3[1]	7063286.2	2444184.7	453.5	73.5	380.0	(7.0)	438.8	58.8	12.8	445.7
WB-4[3]	7062903.0	2443003.3	452.0	111.0	341.0	(46.0)	441.4	92.4	8.0/103.0	444.2
WB-5	7062892.5	2443434.5	454.6	74.0	380.6	(6.4)	442.5	61.9	10.8	445.3
WB-6	7062921.9	2443804.0	456.8	76.0	380.8	(6.2)	438.8	58.0	13.8	447.6
WB-7	7062981.6	2444184.6	451.4	96.0	355.4	(31.6)	438.4	83.0	10.0	445.6
WB-8	7062535.1	2443254.4	453.3	98.0	355.3	(31.7)	442.3	87.0	8.5	447.8
WB-9	7062544.6	2443737.5	455.2	75.5	379.7	(7.3)	438.4	58.7	15.0	NA
WB-10	7062549.0	2444236.4	453.3	98.0	355.3	(31.7)	439.3	84.0	9.0	448.1
WB-11[1]	7062164.8	2443693.1	456.8	76.0	380.8	(6.2)	439.8	59.0	15.0	443.7
WB-12	7062174.0	2444249.9	458.3	103.0	355.3	(31.7)	439.8	84.5	18.0	447.1
WB-13[1]	7062176.5	2444708.9	459.5	79.0	380.5	(6.5)	436.5	56.0	17.0	450.4
WB-14	7061817.0	2444098.0	455.1	100.0	355.1	(31.9)	441.4	86.3	11.0	435.6
WB-15[2]	7060184.3	2442224.2	461.3	33.0	428.3	41.3	433.3	5.0	26.0	NA
WB-16[2]	7060508.1	2444848.8	454.3	23.0	431.3	44.3	431.4	0.1	20.0	NA

Notes:
NA – Not Applicable, boring plugged upon completion.
[1] Boring completed as shallow piezometer in accordance with Soil Boring Plan.
[2] Geotechnical boring (in addition to borings listed in Soil Boring Plan) completed for levee strength testing.
[3] Borehole WB-4 extended from 96.0 ft bgs to 111.0 ft-bgs in January 2012.
Borehole coordinates approximated from Reed Engineering subsurface investigation borehole location map, except WBC and existing monitor well boreholes which have been surveyed.
The 107 borings listed in Table 2-2 are also referenced in Section 2.2.

3 GROUNDWATER INVESTIGATION REPORT

3.1 Water Level Measurements

The Camelot Landfill's uppermost aquifer groundwater has been evaluated using historical water-level data from the facility's groundwater monitoring wells. Groundwater elevations from the Subtitle D groundwater monitoring wells in detection and background monitoring events are provided in Tables 3-1 and 3-2, and were measured during these events beginning in January 1996. Monthly groundwater elevations are provided in Table 3-3. Facility potentiometric maps prepared from the groundwater gauging data are presented as groundwater contour maps in Appendix IIIG-D.

3.2 Permeability of the Uppermost Groundwater Zone

Vertical hydraulic conductivity (K_v) tests were performed by geotechnical laboratories on subsurface samples collected by Rone Engineers, Reed Engineering, and WBC. The geotechnical laboratory reports are presented in Appendix IIIJ-C. A summary of the results are listed in Table 3-4. The geotechnical laboratories data indicate nine vertical hydraulic conductivity tests of the Upper Clay Zone sediments have an arithmetic mean K_v of $1.8x10^{-8}$ cm/sec and a maximum K_v of $5.4x10^{-8}$ cm/sec. Two laboratory tests of Lower Sand Zone sand or sandy gravel have an arithmetic mean vertical hydraulic conductivity (K_v) of $2.3x10^{-4}$ cm/sec and a maximum K_v of $4.6x10^{-4}$ cm/sec. The seven Shale Strata samples have a vertical hydraulic conductivity K_v arithmetic mean of $2.5x10^{-8}$ cm/sec and a maximum hydraulic conductivity K_v of $3.9x10^{-8}$ cm/sec. This range of hydraulic conductivities is reasonable for the sediments in each zone. These data indicate the vertical movement of groundwater is 10,000 times slower through the Upper Clay and Shale zones than through the Lower Sand Zone.

Horizontal hydraulic conductivity (K_h) tests were performed by geotechnical laboratories on subsurface samples collected by Rone Engineers, Reed Engineering, and WBC. The geotechnical laboratory reports are presented in Appendix IIIJ-C. A summary of the K_h results is listed in Table 3-5. The data from the geotechnical laboratories have 13 horizontal hydraulic conductivity tests of the Upper Clay Zone sediments indicate an arithmetic mean K_h of $2.7x10^{-7}$ cm/sec and a maximum K_h of $7.8x10^{-7}$ cm/sec. Four laboratory tests of Lower Sand Zone sediments have an arithmetic mean horizontal hydraulic conductivity (K_h) of $1.3x10^{-4}$ cm/sec and a maximum K_h of $5.0x10^{-4}$ cm/sec. The seven Shale Strata samples have a horizontal hydraulic conductivity K_h arithmetic mean of $1.6x10^{-8}$ cm/sec and a maximum hydraulic conductivity K_h of $3.2x10^{-8}$ cm/sec.

Table 3-1
Subtitle D Monitoring Event Groundwater Elevations

	MW-1R	MW-3R	MW-4R	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-13R	MW-14	MW-15	MW-15A	MW-16	MW-17	MW-18
Screened Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone
1/31/1996	455.06	442.15	438.96	444.70	437.95	440.06	439.79	438.71	438.36	ni	ni	440.47	ni	430.47	ni	ni
5/13/1996	455.51	442.26	438.63	444.60	437.70	439.57	439.31	438.33	438.09	ni	ni	441.81	ni	431.26	ni	ni
9/25/1996	452.47	441.20	437.47	443.45	436.11	438.79	438.52	438.00	437.41	ni	440.05	441.72	ni	429.36	ni	ni
12/27/1996	454.26	443.02	438.23	448.21	437.42	438.74	438.36	437.83	437.77	ni	440.70	442.97	ni	429.92	ni	ni
3/30/1997	460.20	447.37	443.21	450.72	443.83	439.01	438.59	438.58	438.66	ni	441.56	444.15	ni	430.74	ni	ni
6/25/1997	458.50	446.10	443.16	450.15	443.96	440.12	439.60	437.66	wr	442.60	443.83	440.45	ni	427.19	ni	ni
9/16/1997	453.20	444.39	440.16	448.77	439.31	440.10	439.74	439.25	wr	439.93	441.85	439.43	ni	425.92	ni	ni
12/23/1997	452.66	444.23	442.87	449.51	438.58	439.64	439.43	438.49	wr	439.16	441.02	438.85	ni	426.17	ni	ni
4/2/1998	460.47	nd	444.56	nd	445.18	440.22	439.38	439.76	wr	nd	nd	nd	ni	nd	ni	ni
12/20/1998	450.89	443.80	443.16	449.68	438.32	439.39	439.35	438.43	wr	439.14	440.43	438.82	ni	425.50	ni	ni
6/28/1999	450.60	444.00	439.20	448.70	438.10	439.10	438.70	437.70	wr	438.50	440.18	438.40	ni	426.10	ni	ni
12/17/1999	446.19	440.03	437.42	442.14	436.28	438.41	438.23	437.55	wr	438.33	439.82	437.18	ni	424.62	ni	ni
7/5/2000	445.79	442.92	437.93	447.41	436.08	438.06	437.78	437.07	wr	437.91	439.58	437.77	ni	425.24	432.41	432.71
12/22/2000	442.82	441.66	437.44	446.13	436.39	437.81	437.61	436.92	wr	437.73	439.40	437.25	ni	423.80	430.75	431.04
6/11/2001	447.17	446.34	441.78	450.91	442.16	438.66	438.04	438.48	wr	440.38	441.19	439.47	ni	424.96	432.33	432.66
12/4/2001	nd	nd	438.54	nd	nd	nd	nd	nd	wr	nd	nd	nd	ni	nd	nd	nd
6/24/2002	nd	nd	440.36	nd	nd	nd	nd	nd	wr	nd	nd	nd	ni	nd	nd	nd
12/16/2002	442.64	444.73	439.29	449.27	438.15	438.85	438.62	437.81	wr	438.51	440.11	436.97	ni	424.02	431.20	431.61
6/3/2003	443.64	445.06	439.23	449.34	438.20	439.39	438.73	437.55	wr	438.54	440.31	439.02	ni	424.75	431.80	432.25
12/3/2003	441.22	443.67	438.11	447.71	436.73	439.08	439.21	436.97	wr	438.16	439.76	438.29	ni	423.47	430.34	430.74
6/16/2004	442.78	443.81	439.41	450.07	437.38	440.69	440.03	440.12	wr	437.57	439.24	438.81	ni	422.67	429.57	430.91
12/20/2004	444.72	448.67	445.54	453.06	445.94	445.23	444.49	442.98	wr	444.43	441.44	439.26	ni	425.96	433.48	433.40
6/22/2005	446.63	446.26	441.35	451.64	440.35	444.01	443.59	441.04	wr	440.76	441.37	439.33	ni	426.13	432.88	433.33
12/14/2005	442.23	444.57	439.22	448.30	437.73	440.31	440.01	438.91	wr	439.24	440.17	438.36	ni	424.40	430.71	431.24
6/26/2006	441.52	443.82	438.94	448.57	437.55	439.84	439.49	438.14	wr	438.45	439.79	wr	439.46	424.25	430.10	430.66
12/13/2006	441.75	441.95	437.66	444.49	436.32	438.93	438.72	437.57	wr	438.05	440.95	wr	441.31	423.90	429.42	429.95
3/5/2007	442.69	444.25	438.36	450.01	437.28	438.72	438.33	437.35	wr	437.84	439.54	wr	442.88	424.21	429.61	430.09
6/25/2007	445.99	447.87	442.16	453.25	443.06	439.29	438.88	437.94	wr	439.22	439.79	wr	442.75	424.81	430.07	431.92
9/13/2007	448.19	447.39	444.10	451.27	445.40	443.01	443.02	442.42	wr	443.63	442.81	wr	444.01	426.61	430.52	431.12
12/17/2007	449.88	445.81	441.56	450.40	441.42	442.97	442.79	441.05	wr	441.10	442.48	wr	443.77	427.12	431.82	432.60
6/9/2008	452.46	446.47	442.33	451.34	441.90	445.30	445.40	442.78	wr	442.29	442.95	wr	443.92	427.94	433.25	434.01
12/1/2008	447.30	442.61	438.79	444.80	437.75	440.24	440.07	439.11	wr	439.44	440.50	wr	443.21	426.17	431.19	431.95
6/22/2009	447.23	444.24	439.63	448.77	439.08	439.69	439.45	438.54	wr	439.44	440.33	wr	442.81	425.96	430.81	431.74
12/21/2009	451.53	445.69	441.58	450.24	441.89	440.60	440.58	440.51	wr	441.33	441.29	wr	443.39	426.83	431.26	432.01
3/29/2010	459.59	447.80	445.99	451.16	447.02	443.96	443.85	443.73	wr	445.47	442.96	wr	444.15	427.53	432.46	433.18
6/1/2010	454.37	445.11	441.32	449.15	441.28	442.14	441.93	440.87	wr	441.09	442.64	wr	444.07	427.70	432.99	433.91
9/20/2010	449.55	444.38	439.46	446.47	438.89	440.51	440.43	439.46	wr	440.73	440.83	wr	443.15	426.50	430.95	nd
12/7/2010	450.95	443.12	439.24	445.95	438.08	439.97	439.77	438.93	wr	439.43	440.63	wr	442.89	426.44	431.22	431.87
3/16/2011	453.09	443.17	nd	447.13	437.77	nd	439.16	438.30	wr	438.95	440.53	wr	BTOP	426.77	432.12	nd
6/6/2011	451.57	443.62	438.66	448.50	437.62	439.14	438.86	438.03	wr	438.85	439.70	wr	BTOP	426.61	432.06	432.83
9/12/2011	447.54	442.00	438.66	444.20	436.28	438.65	438.50	437.84	wr	438.65	439.81	wr	BTOP	425.41	429.62	432.83
12/21/2011	448.48	442.64	437.29	445.71	435.88	438.36	438.20	437.38	wr	438.40	439.86	wr	BTOP	425.37	430.33	431.01

Notes: All groundwater elevations listed above in feet above mean sea level.
ni – monitor well not installed at this date.
wr – monitor well removed prior to this date.
nd – no groundwater elevation in groundwater database for this event.
BTOP – Water level below top of dedicated pump, water level not measured.

Table 3-2
Subtitle D Background Monitoring Event Groundwater Elevations

Screened Zone	MW-18A	MW-19	MW-20	MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-28	MW-29
	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone	Lower Sand Zone
9/20/2010	431.02	445.04	446.04	440.53	438.82	439.66	427.81	436.05	438.36	440.54	440.32	446.78
12/7/2010	431.44	445.32	445.69	BTOP	438.60	439.43	440.50	435.61	436.64	438.69	439.41	446.47
3/16/2011	432.14	446.18	446.88	BTOP	438.02	438.64	441.34	437.73	436.65	438.29	439.03	446.07
6/6/2011	432.26	446.95	448.10	BTOP	437.92	438.95	440.24	434.93	433.21	438.30	439.13	446.86
9/12/2011	429.73	444.01	443.29	BTOP	437.57	437.98	439.61	433.03	434.62	437.36	438.33	445.16
12/21/2011	430.40	443.95	445.02	BTOP	437.33	437.94	439.56	432.82	434.73	436.98	437.95	444.44

Notes: All groundwater elevations listed above in feet above mean sea level
BTOP – Water level below top of dedicated pump, water level not measured.

Table 3-3
Monthly Groundwater Elevations

Well	Zone Screened	TOC Elevation	December-10	January-11	February-11	March-11	April-11	May-11	June-11	July-11	August-11	September 11	October 11	November 11	December 11
PWB-1	Lower Sand Zone	467.55	445.30	446.29	446.17	446.24	446.24	446.85	447.02	446.28	445.26	444.30	445.21	445.33	443.80
PWB-3	Lower Sand Zone	457.12	445.46	446.54	446.81	447.10	447.21	446.94	447.86	446.74	444.82	443.62	444.62	444.87	445.60
PWB-11	Lower Sand Zone	459.79	442.99	444.10	444.37	443.84	444.01	444.01	445.70	443.99	443.85	443.42	443.84	443.76	446.59
PWB-13	Lower Sand Zone	462.52	449.78	450.23	447.76	449.22	449.34	449.23	449.91	449.18	449.95	449.21	449.36	449.52	449.72
MW-1R	Lower Sand Zone	464.74	450.95	452.60	453.05	453.81	453.10	453.03	451.57	452.96	448.20	447.54	448.17	449.04	448.48
MW-3R	Lower Sand Zone	459.92	443.12	443.57	443.31	443.43	443.41	443.64	443.62	443.50	442.50	442.00	442.46	442.92	442.64
MW-4R	Lower Sand Zone	461.21	439.02	439.12	438.77	438.74	438.62	438.60	438.66	438.57	438.07	438.66	438.70	438.76	437.29
MW-8	Lower Sand Zone	459.95	445.95	447.12	447.16	447.52	447.58	448.56	448.50	448.45	445.55	444.20	445.50	446.80	445.71
MW-9	Lower Sand Zone	458.98	438.08	437.95	437.82	437.80	437.73	437.68	437.62	437.66	436.70	436.28	436.59	437.11	435.88
MW-10	Lower Sand Zone	467.79	440.01	439.89	439.57	439.37	439.25	439.23	439.14	439.19	438.96	438.65	438.88	439.09	438.36
MW-10A	Lower Sand Zone	464.42	439.90	439.85	439.47	439.26	439.10	439.07	439.04	439.03	438.83	438.58	438.70	438.98	438.26
MW-10B	Lower Sand Zone	458.65	439.72	440.00	439.35	439.20	438.95	NM	438.89	NM	438.81	438.37	438.78	438.86	438.20
MW-11	Lower Sand Zone	463.95	439.82	439.69	439.32	439.08	438.98	438.92	438.86	438.84	438.70	438.50	438.63	438.80	438.20
MW-12	Lower Sand Zone	463.96	438.97	438.77	438.40	438.24	438.16	438.05	438.03	438.00	437.92	437.84	437.87	439.95	437.38
MW-12A	Lower Sand Zone	463.85	439.13	438.90	438.55	438.39	438.30	438.20	438.67	438.09	438.08	437.99	438.02	438.14	437.58
MW-13R	Lower Sand Zone	462.60	439.45	439.30	439.04	438.98	438.85	438.75	438.85	438.67	438.78	438.65	438.69	438.82	438.40
MW-14	Lower Sand Zone	465.50	440.59	440.71	440.53	440.48	440.33	440.39	439.70	440.34	440.09	439.81	439.90	440.20	439.86

Notes: All groundwater elevations listed in feet above mean sea level.
TOC – Top of Casing
NM – Not Measured

Table 3-3 (continued)
Monthly Groundwater Elevations

Well	Zone Screened	TOC Elevation	December-10	January-11	February-11	March-11	April-11	May-11	June-11	July-11	August-11	September 11	October 11	November 11	December 11
MW-15A	Lower Sand Zone	466.77	442.98	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP
MW-16	Lower Sand Zone	461.02	426.44	426.80	426.80	426.92	426.57	426.76	426.61	426.63	425.89	425.41	425.77	426.19	425.37
MW-17	Lower Sand Zone	459.90	431.22	432.02	432.01	432.40	432.28	432.25	432.06	432.22	430.28	429.62	430.13	431.51	430.33
MW-18	Lower Sand Zone	459.71	431.87	432.72	432.66	433.03	432.90	432.87	432.83	432.83	431.03	432.83	432.91	432.32	431.01
MW-18A	Lower Sand Zone	459.93	431.28	432.23	432.08	432.47	432.35	432.35	432.26	431.89	430.44	429.73	430.46	430.86	430.40
MW-19	Lower Sand Zone	460.63	445.25	445.66	446.13	446.29	447.20	447.18	446.95	447.16	444.95	444.01	444.89	445.55	443.95
MW-20	Lower Sand Zone	456.99	445.44	446.58	446.77	447.16	447.23	447.22	448.10	447.20	443.75	443.29	443.68	444.60	445.02
MW-21	Lower Sand Zone	464.89	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP	BTOP
MW-22	Lower Sand Zone	463.22	438.60	438.64	438.12	437.99	437.79	437.74	437.92	437.71	437.69	437.57	437.60	437.78	437.33
MW-23	Lower Sand Zone	462.05	439.00	439.58	438.86	438.73	438.32	438.31	438.95	438.29	438.14	437.98	438.01	438.58	437.94
MW-24	Lower Sand Zone	459.56	440.39	440.70	441.06	440.01	440.32	440.28	440.24	440.26	439.68	439.61	439.66	439.83	439.56
MW-25	Lower Sand Zone	457.97	435.53	435.82	435.68	435.75	435.45	435.42	434.93	435.34	433.65	439.61	439.72	439.85	432.82
MW-26	Lower Sand Zone	457.94	436.65	436.61	436.66	436.71	436.48	436.45	433.21	436.42	435.20	434.62	435.08	435.40	434.73
MW-27	Lower Sand Zone	456.10	438.60	438.67	438.43	438.38	438.33	438.33	438.30	438.31	437.81	437.36	437.75	438.02	436.98
MW-28	Lower Sand Zone	456.71	439.31	439.41	439.16	439.17	Damaged	Damaged	439.13	439.13	438.78	438.33	438.62	438.97	437.95
MW-29	Lower Sand Zone	459.58	446.18	446.88	446.80	447.10	446.87	446.86	446.86	446.84	446.23	445.16	446.17	446.79	444.44

Notes: All groundwater elevations listed in feet above mean sea level.
TOC – Top of Casing
BTOP – Water level below top of dedicated pump, water level not measured.
Damaged – Well obstructed; water level not measured.

Table 3-4
Summary of Vertical Hydraulic Conductivity (K_v) Laboratory Results[1]

Boring	Test Interval (ft-bgs)	K_v (cm/sec)
Clays in Upper Clay Zone		
B-1	10	1.0E-09
B-1	25	1.0E-09
B-2	2	1.0E-09
B-2	10	1.0E-09
B-13	25	2.0E-08
B-14	30	4.3E-08
B-15	25	3.3E-08
B-20	5	1.2E-08
WB-14	10	5.4E-08
Arithmetic Mean:		**1.8E-08**
Sands/Gravels in Lower Sand Zone		
B-14	19	8.0E-06
WB-7	11	4.6E-04
Arithmetic Mean:		**2.3E-04**
Shale Strata		
DB-1	21	1.2E-08
DB-1	46	7.7E-09
WB-3	16	3.9E-08
WB-4	60	2.8E-08
WB-6	66	3.6E-08
WB-8	56	2.9E-08
WB-9	60	2.3E-08
Arithmetic Mean:		**2.5E-08**

[1] Refer to Tables IIIJ-C-1 through IIIJ-C-6 in Appendix IIIJ-C for geotechnical data summary tables and laboratory reports.

In addition, WBC completed in-situ horizontal hydraulic conductivity tests (slug tests) in March 2011. Six rising head slug tests were completed in three expansion area piezometers (PWB-1, PWB-3 and PWB-13) and three facility monitor wells (MW-16, MW-23 and MW-28). The slug test K_h results are shown in Table 3-5. The horizontal hydraulic conductivities were computed using the Bouwer-Rice methods for confined and unconfined aquifers as implemented by the Aqtesolv® groundwater application. The Aqtesolv® K_h test reports are included in Appendix IIIG-D. All of the slug test wells and piezometers are largely screened across the Lower Sand Zone. The arithmetic mean slug test horizontal hydraulic conductivity (K_h) was $7.83x10^{-4}$ cm/sec with a maximum K_h of $3.03x10^{-3}$ cm/sec.

This range of hydraulic conductivities is reasonable for the sediments in each zone. These data indicate the horizontal movement of groundwater is about 10,000 times faster through the Lower Sand Zone than through the underlying Shale Strata and about 1,000 faster than the overlying Upper Clay Zone. For this reason, monitoring of the Lower Sand Zone provides the lowest possible delay between a potential release and its detection in the groundwater monitoring system. All of the facility groundwater monitoring wells are screened across the Lower Sand Zone.

A site-wide hydraulic gradient was approximated from the IIIG-D-8 (Appendix IIIG-D) groundwater potentiometric surface map between monitor wells MW-20 and MW-25 at 0.002 ft/ft. An effective porosity has been conservatively estimated at 30 percent in the Lower Sand Zone (after Driscoll, 1989). The following groundwater linear velocity calculation uses a hydraulic gradient of 0.002 ft/ft, an arithmetic mean Lower Sand Zone horizontal hydraulic conductivity (K_h) value of 7.83×10^{-4} cm/s, and a Lower Sand Zone effective porosity (n_e) of 0.30. The formula for the velocity calculation is:

$$V = K_h * i * 1{,}034{,}646 / n_e$$

Where:

V = linear velocity
K_h = radial hydraulic conductivity (cm/sec)
i = hydraulic gradient (ft/ft)
1,034,646 = scalar to convert from cm/sec to ft/year
n_e = effective porosity

Using these conservative Lower Sand Zone values and estimates, the maximum horizontal groundwater linear velocity in the uppermost aquifer is estimated at 5.4 ft/yr.

Table 3-5
Summary of Horizontal Hydraulic Conductivity Results (K_h from Laboratory Test Measurements)

Location	Test Interval (ft-bgs)	Test Type	Slug Solution Method	Hydraulic Conductivity (K_h in cm/sec)
Upper Clay Zone (Laboratory K_h Results)				
B-1 (Rone)	10	Lab	NA	1E-09
B-11 (Rone)	15	Lab	NA	6.7E-08
B-12 (Rone)	10	Lab	NA	4.5E-08
B-15 (Rone)	15	Lab	NA	8.0E-07
B-16 (Rone)	10	Lab	NA	6.0E-08
B-17 (Rone)	15	Lab	NA	6.8E-07
B-20 (Rone)	30	Lab	NA	3.9E-07
B-21 (Rone)	2	Lab	NA	3.5E-09
WB-1 (WBC)	12	Lab	NA	6.6E-08
WB-3 (WBC)	9	Lab	NA	2.6E-07
WB-10 (WBC)	4	Lab	NA	9.4E-08
WB-10 (WBC)	7	Lab	NA	1.3E-07
WB-15 (WBC)	24	Lab	NA	8.5E-07
			Arithmetic Mean:	**2.7E-07**
Lower Sand Zone (Laboratory K_h Results)				
B-22 (Rone)	5	Lab	NA	8.4E-07
WB-2 (WBC)	12	Lab	NA	1.2E-06
WB-7 (WBC)	11	Lab	NA	5.0E-04
WB-13 (WBC)	19	Lab	NA	5.7E-08
			Arithmetic Mean:	**1.3E-04**
Shale Strata (Laboratory K_h Results)				
DB-1 (Reed)	23	Lab	NA	1.3E-08
DB-1 (Reed)	47	Lab	NA	1.6E-09
WB-10 (WBC)	45	Lab	NA	3.2E-08
			Arithmetic Mean:	**1.6E-08**

Notes: Rone – Rone Engineers geotechnical laboratory test results from Attachment 4 boring logs in Permit No. MSW-1312 (logs reproduced in Appendix IIIG-B).

Reed – Reed Engineering geotechnical laboratory test results from Attachment 4 boring logs in Permit No. MSW-1312 (logs reproduced in Appendix IIIG-B).

WBC – Weaver Boos geotechnical laboratory results from Appendix IIIJ-C. WBC slug test solutions presented in Appendix IIIG-D.

Table 3-5 (continued)
Summary of Horizontal Hydraulic Conductivity Results
(K_h from Field Slug Test Measurements)

Location	Screen Interval (ft-bgs)	Test Type	Slug Solution Method	Hydraulic Conductivity (K_h in cm/sec)
PWB-1 (WBC)	15-25	Slug	Bouwer-Rice Confined	8.17E-05
PWB-3 (WBC)	5.5-15.5	Slug	Bouwer-Rice Confined	3.03E-03
PWB-13 (WBC)	14-24	Slug	Bouwer-Rice Confined	1.98E-04
MW-16 (WBC)	27.8-35	Slug	Bouwer-Rice Unconfined	7.46E-04
MW-23 (WBC)	26-31	Slug	Bouwer-Rice Confined	4.02E-04
MW-28 (WBC)	20.5-28	Slug	Bouwer-Rice Confined	2.41E-04
			Arithmetic Mean:	**7.83E-04**

Notes: WBC slug test solutions presented in Appendix IIIG-D.

3.3 Hydrogeologic Interpretation

3.3.1 Uppermost Aquifer Flow Patterns

As discussed in Section 2.2.1, the uppermost aquifer occurs in the Alluvial Strata on top of the underlying low-permeability Shale Strata aquiclude. Based on borehole data, the Alluvial Strata are continuous beneath the landfill except where these materials have been removed by soil excavation to support site development.

Groundwater flow patterns have changed as the site has developed. As each landfill disposal cell was developed, the Alluvial Strata material was removed and the floor of the landfill was founded in the low-permeable unweathered shale. Therefore, the landfill development removed a portion of the uppermost aquifer material which redirected groundwater flow around the developed waste disposal footprint.

For example, Figure 3-1 was developed to approximate the groundwater flow pattern that existed prior to the development of the landfill. As shown on Figure 3-1, the groundwater in the uppermost aquifer flowed continuously across the site from the northeast to the Elm Fork.

As shown on Figure 3-2, the majority of the existing landfill disposal area is founded in the unweathered shale. Therefore, the groundwater flow pattern has changed as groundwater from the northeast is redirected around the perimeter of the landfill. Other recent potentiometric contour maps are presented on Figures IIIG-D-1 through IIIG-D-7 in Appendix IIIG-D.

Following the complete development of the landfill (including the slurry wall), groundwater will flow around the perimeter of the landfill toward the Elm Fork Trinity River as shown on Figure 3-3.

The uppermost aquifer is recharged by precipitation infiltration on the areas around the landfill's limits of waste. The uppermost aquifer generally discharges to the Elm Fork Trinity River. The site has collected a substantial amount of groundwater level information since 1996. Based on the facility's monitoring well groundwater elevations presented in Table 3-1, the facility's groundwater elevations are typically higher than the adjacent river base flow elevations. This indicates uppermost aquifer flows toward the Elm Fork.

However, the Elm Fork also temporarily recharges the uppermost aquifer as the river's stage rises following periods of heavy rainfall. As noted in Appendix IIIF, the Elm Fork 100-year flood event elevations range from about 452 above mean sea level to the northwest of the landfill to about 450 feet above mean sea level to the southeast of the landfill. The groundwater elevations for monitoring wells adjacent to the Elm Fork (MW-4R, and MW-9 through MW-18) range from 423 to 447 feet above mean sea level with an average groundwater elevation of 438 feet above mean sea level. These water elevation relationships indicate temporary recharge flow from the Elm Fork into the uppermost aquifer adjacent to the river.

3.3.2 Uppermost Aquifer

As required by TAC §330.401(a), the facility's groundwater monitoring system monitors the Alluvial Strata uppermost aquifer because this aquifer is the closest to the site's natural ground surface. Title 30 TAC §330.3(168) defines the uppermost aquifer as listed below.

> *"The geologic formation nearest the natural ground surface that is an aquifer; includes lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary."*

The uppermost aquifer in the Alluvial Strata at the Camelot Landfill is not connected to any other aquifer. As discussed in Section 2.1.2.2, the Unweathered Shale Zone is a thick, continuous shale zone below the site and represents the lower confining unit or aquiclude for the Alluvial Strata's uppermost aquifer because of its low permeability (mean vertical hydraulic conductivity of $2.5x10^{-8}$ cm/sec).

As discussed in Section 2.1.3, the Woodbine Aquifer is located below the site. However, this aquifer is separated from the uppermost aquifer by the Unweathered Shale Zone. Therefore, the Woodbine Aquifer does not meet the definition of the "uppermost aquifer" listed in §330.3(168) and no monitoring of this aquifer is proposed because the Woodbine Aquifer is not hydraulically connected to the uppermost aquifer at the site.

The facility's groundwater monitoring system has always monitored the Alluvial Strata since it contains the uppermost aquifer at the site. The existing groundwater monitoring system is effective and complies with all the requirements of §330.403 and §330.421. The facility's monitor wells are screened from the top of the Shale Strata aquiclude upward for several feet across the Lower Sand Zone sediments in the Alluvial Strata, as these saturated sediments have the highest hydraulic conductivity within this Strata. Refer to Appendix IIIH for a complete discussion of the design of the groundwater monitoring system.

3.3.3 Effectiveness of the Unweathered Shale Zone as a Barrier Layer

As noted in Section 3.3.2, the uppermost aquifer and the Woodbine Aquifer are hydraulically separated by the Unweathered Shale Zone; therefore, the groundwater monitoring system is designed to monitor the uppermost aquifer located in the Alluvial Strata. However, since the Woodbine Aquifer is located below the site, an assessment was completed to verify that there is no potential for leachate constituents from the landfill to migrate to the Woodbine Aquifer.

This assessment is included in Section 8 of the Point of Compliance Demonstration included in Appendix IIIB. The assessment includes a fate and transport demonstration using MODFLOW to demonstrate that in the unlikely event that there was a release from a waste disposal area, leachate constituents would be prevented from reaching the Woodbine Aquifer during the life of the site plus the 30-year postclosure period. As demonstrated, the Unweathered Shale Zone effectively restricts any potential downward migration from the site. The impact of any potential release, even under the relatively extreme scenario described in Appendix IIIB, is limited to the upper two feet of the Unweathered Shale Zone.

Therefore, since the Woodbine Aquifer does not meet the definition of the uppermost aquifer listed in §330.3(168) and there is no potential for leachate to migrate to the Woodbine Aquifer during the life of the site plus the 30-year postclosure period, no groundwater monitoring of the Woodbine Aquifer is proposed.

4 REFERENCES

Ashworth, J. B. and Hopkins, J., 1995, Major and Minor Aquifers of Texas, Texas Water Development Board.

Barnes, V. E. et al, Revised 1991, Reprinted 1997, Geologic Atlas of Texas, Sherman Sheet, Bureau of Economic Geology, The University of Texas at Austin. Scale 1:250,000.

Bouwer, H. and Rice, R. C., 1976, A Slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, Water Resources Research, Vol. 12, No. 3, pp. 423-428.

Bouwer, Herman, 1989, The Bouwer and Rice Slug Test – An Update, Ground Water, Volume 27, Number 3.

Brune, Gunnar, 2002, The Springs of Texas, Texas A&M University Press, College Station.

Bureau of Economic Geology (BEG), 1996, Physiographic Map of Texas, The University of Texas at Austin (text by E.G. Wermund).

Bureau of Economic Geology (BEG), 1990, Tectonic Map of Texas, the University of Texas at Austin.

Caughey, C.A., 1977, Depositional Systems in the Paluxy Formation (Lower Cretaceous) Northeast Texas – Oil, Gas, and Groundwater Resources: Bureau of Economic Geology, Circular 77-8, University of Texas at Austin.

Dames and Moore, 1989, Hydrogeologic Assessment, DFW Sanitary Landfill.

Dodge, C. E., 1968, Stratigraphic Nomenclature of the Woodbine Formation, Tarrant County, Texas, p. 107-125, in Fieldtrip Guidebook, South-Central Section, Stratigraphy of the Woodbine Formation, Tarrant County, Texas, The Geological Society of America.

Driscoll, Fletcher G., 1986, Groundwater and Wells, Johnson Filtration Systems, St. Paul, Minnesota.

EMCON, 1997, Permit Application and Site Development Plan, BFI-Camelot Landfill Expansion.

Harden et al, 2004, Northern Trinity/Woodbine Aquifer Groundwater Availability Model, Texas Water Development Board.

Hopkins, J., 1996, Water Quality in the Woodbine Aquifer, North Central Texas, Texas Water Development Board, Hydrologic Atlas No. 4.

Carel Corporation, Camelot Landfill monitor well installation reports.

Jackson, M. P., 1982, Fault Tectonics of the East Texas Basin: Bureau of Economic Geology, University of Texas at Austin, Geological Circular 82-4.

Klemt, W. B., Perkins, R.D., and Alvarez, H.J., 1975, Ground-Water Resources of Part of Central Texas with Emphasis on the Antlers and Travis Peak Formations, Texas Water Development Board, Report 195.Langley, L., 1999, Updated Evaluation of Water Resources in Part of North-Central Texas, Texas Water Development Board, Report 349.

Nordstrom, P. L., 1982, Occurrence, Availability, and Chemical Quality of Groundwater in the Cretaceous Aquifers of North-Central Texas, Texas Department of Water Resources Report 269, vols. 1+2.

Oliver, W.B., 1971, Depositional Systems in the Woodbine Formation (Upper Cretaceous), Northeast Texas: Bureau of Economic Geology, Report of Investigations–No. 73, University of Texas at Austin.

Reed Engineering, 1995, Camelot Sanitary Landfill Attachment 4 Geology Report, TCEQ Permit No. MSW-1312.

Rust Environment and InfraStructure, 1998, DFW Recycling and Disposal Facility Permit Amendment Application.

Sellards, E. H., Adkins, W. S., and Plummer, F. B., 1990, The Geology of Texas, Volume 1: Stratigraphy, Bureau of Economic Geology, The University of Texas at Austin, Bulletin 3232.

Stearn, C. W., Carroll, R. L., and Clark, T. H., 1979, Geological Evolution of North America, Third Edition: John Wiley & Sons.

Woodruff, C. M., Caran, S. C., and Thompson, E. J., 1981, Lineaments of Texas, Bureau of Economic Geology, The University of Texas at Austin, prepared for U.S. Department of Energy, Division of Geothermal Energy, Contract No. DE-AS07-79-I012057 Geothermal Resources Assessment for the State of Texas.

APPENDIX IIIG-A

REGIONAL GEOLOGIC DATA

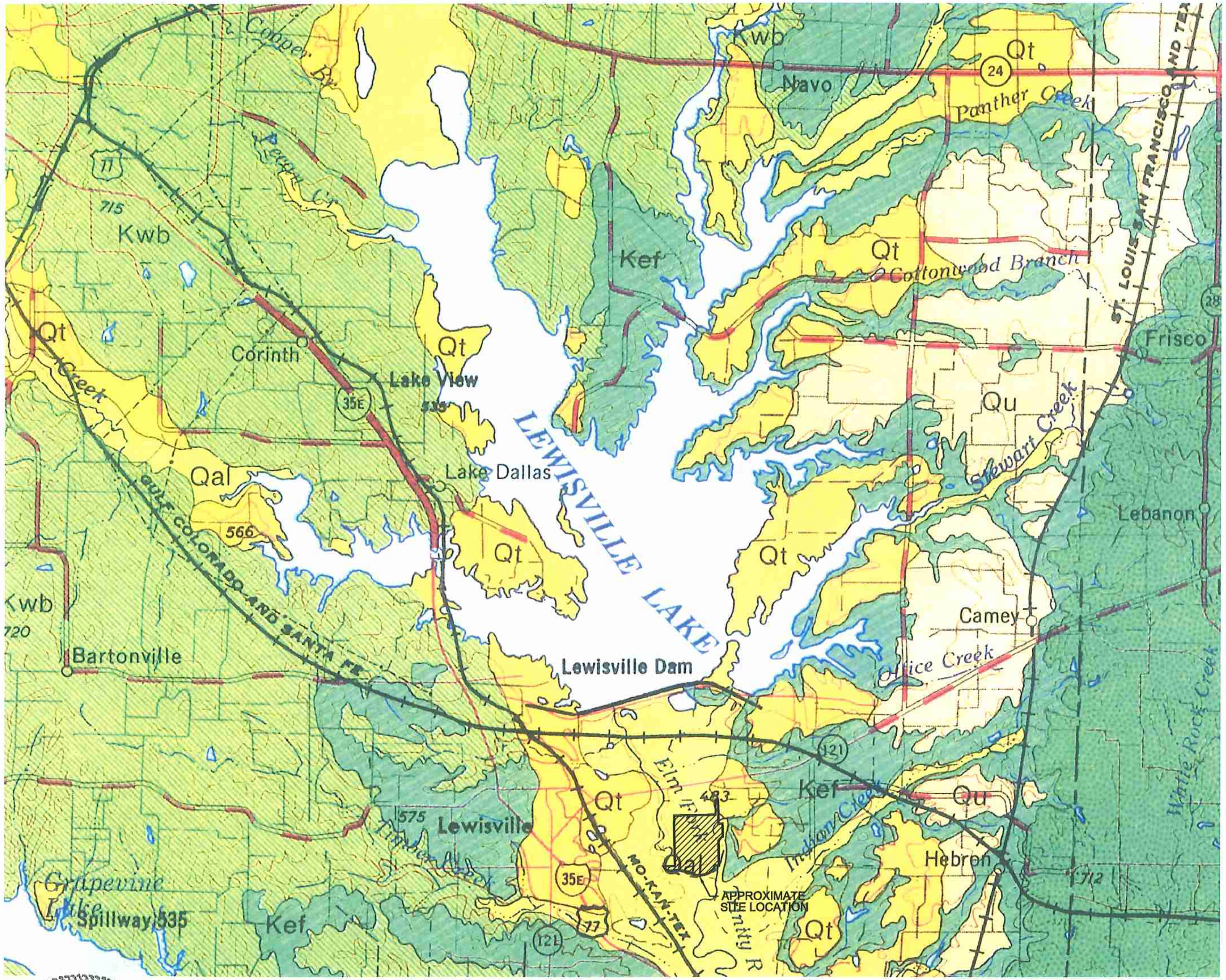
STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

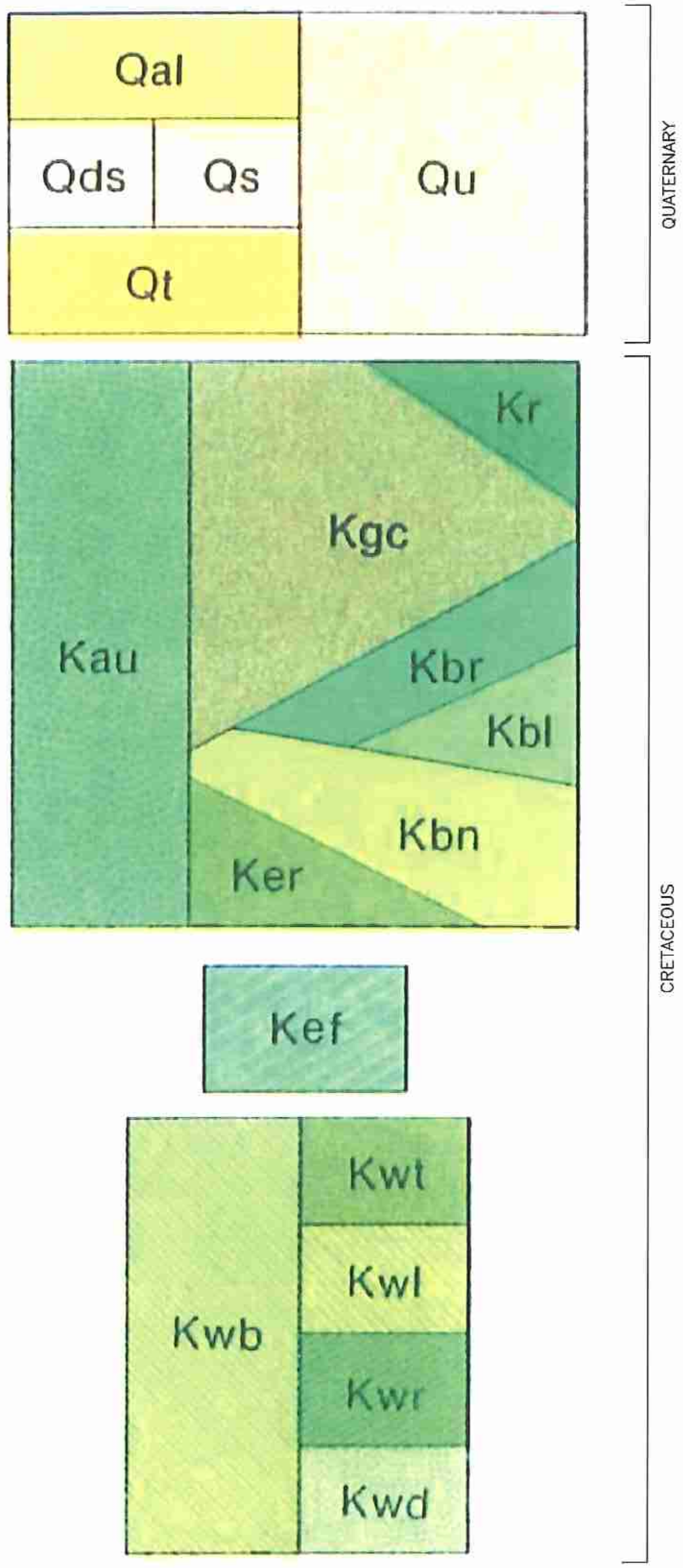
CONTENTS

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12



LEGEND



ALLUVIUM, Qal, WINDBLOWN DEPOSITS, Qds AND Qs, FLUVIATILE TERRACE DEPOSITS, Qt, AND SURFICIAL DEPOSITS UNDIVIDED, Qu

AUSTIN GROUP, Kau, ROXTON LIMESTONE, Kr, GOBER CHALK, Kgc, BROWNSTONE MARL, Kbr, BLOSSOM SAND, Kbl, BONHAM MARL, Kbn, AND ECTOR CHALK, Ker (WHERE DIVIDED)

EAGLE FORD FORMATION, Kef

WOODBINE FORMATION, Kwb AND TEMPLETON, Kwt, LEWISVILLE, Kwl, RED BRANCH, Kwr, AND DEXTER, Kwd, MEMBERS OF THE WOODBINE FORMATION (WHERE DIVIDED)

NOTE:

1. REGIONAL GEOLOGIC MAP REPRODUCED FROM GEOLOGIC ATLAS OF TEXAS, SHERMAN SHEET, WALTER SCOTT ADKINS MEMORIAL ADDITION, V.E. BARNES, ET AL, REVISED 1991, REPRINTED 1997.

N

0 5000 10000
SCALE IN FEET

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-A-1 REG GEO MAP.DWG

DRAWN BY: JDW
DESIGN BY: RSF
REVIEWED BY: RSF

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

MAJOR PERMIT AMENDMENT REGIONAL GEOLOGIC MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

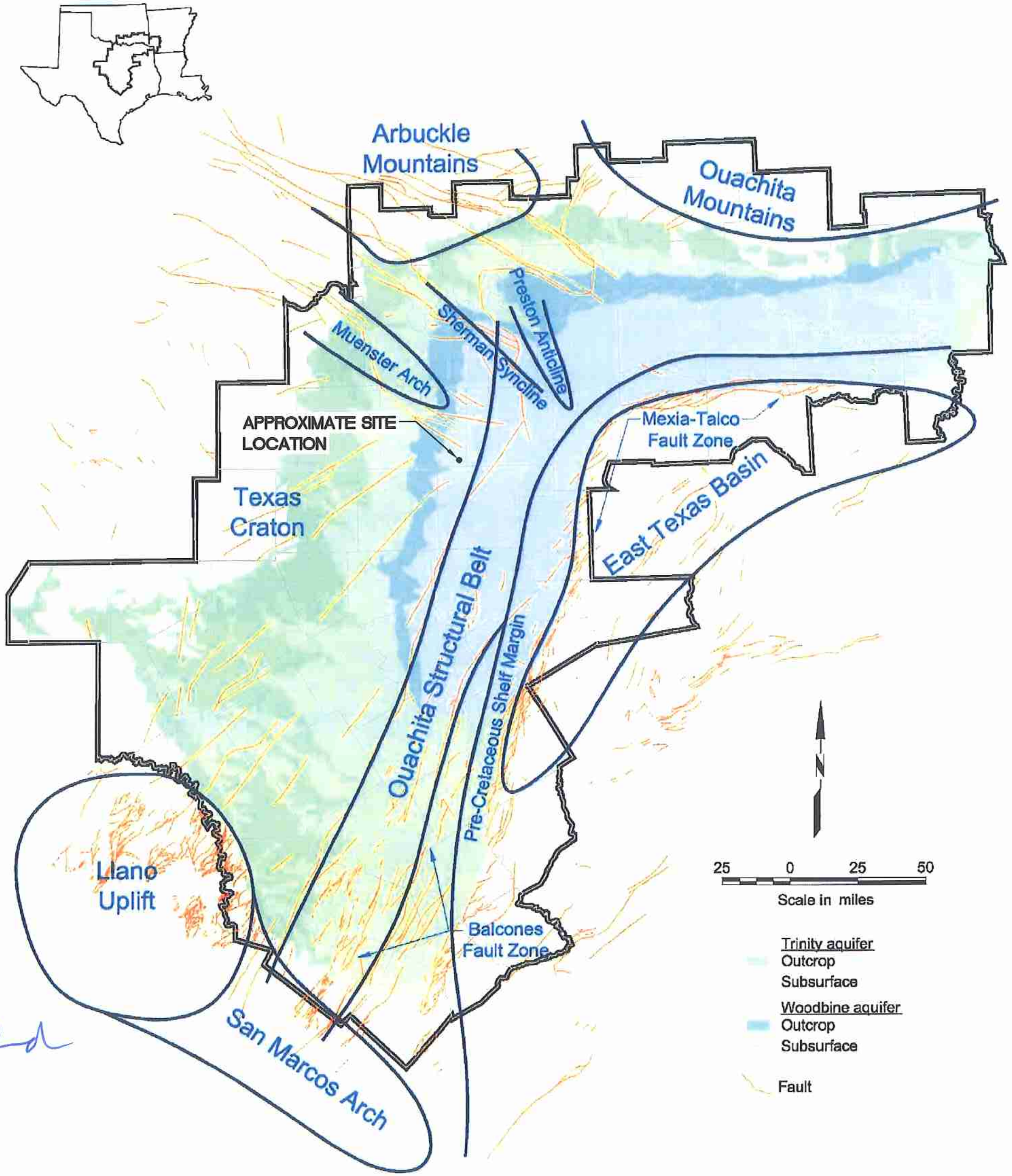
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-A-1



NOTE:

1. REGIONAL STRUCTURAL FEATURES MAP ADAPTED FROM HARDEN ET AL, 2004, NORTHERN TRINITY/WOODBINE AQUIFER GROUNDWATER AVAILABILITY MODEL, TEXAS WATER DEVELOPMENT BOARD.

ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend

2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ______

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-A-2 REG STRUC.DWG

DRAWN BY: SRF
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT REGIONAL STRUCTURAL FEATURES MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

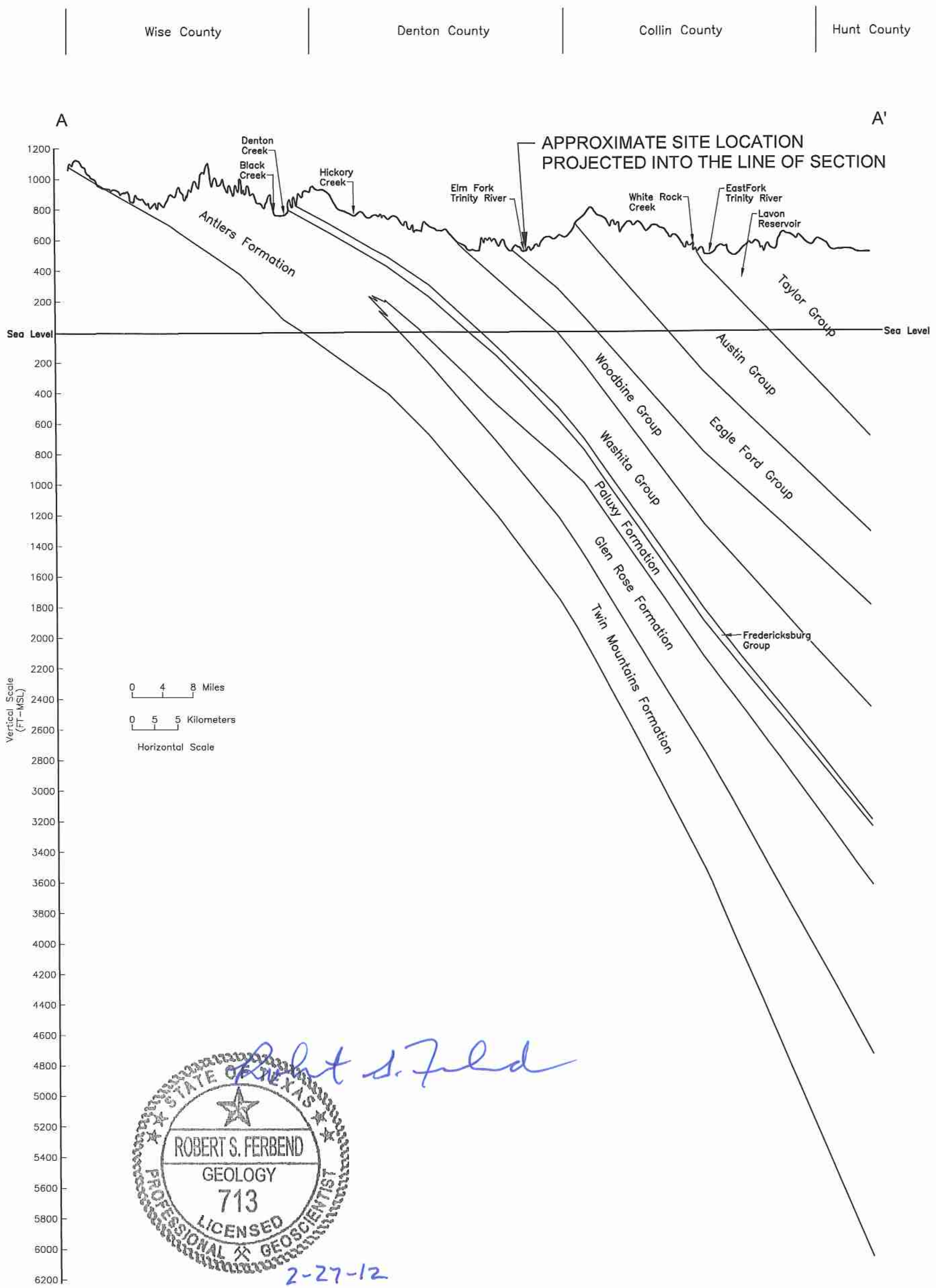
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

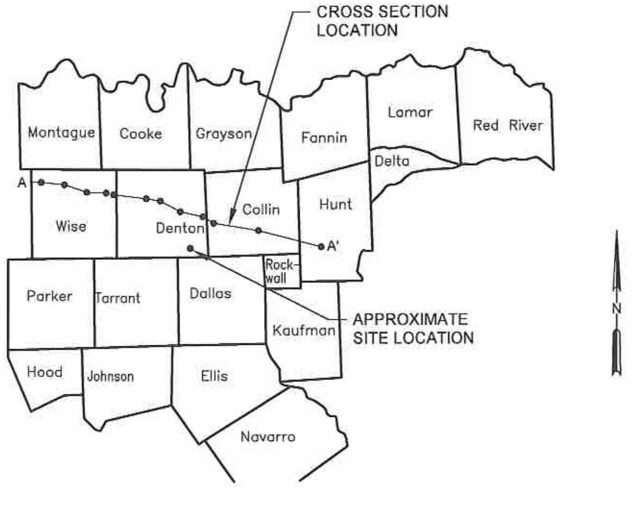
FIGURE IIIG-A-2

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-A-2 REG STRUC FEATURES.dwg, 2/21/2012 3:31:16 PM, rsellers



ROBERT S. FERBEND
GEOLOGY
713

2-27-12



INDEX MAP
NTS

NOTE:

1. REGIONAL GEOLOGIC CROSS–SECTION MODIFIED AFTER NORDSTROM, P.L., 1982, OCCURRENCE, AVAILABILITY, AND CHEMICAL QUALITY OF GROUNDWATER IN CRETACEOUS AQUIFERS OF NORTH–CENTRAL TEXAS, TEXAS WATER DEVELOPMENT BOARD, REPORT 269.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–A–3 REG GEO SEC.DWG

DRAWN BY: SRF
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
REGIONAL GEOLOGIC CROSS SECTION
DIP LINE

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

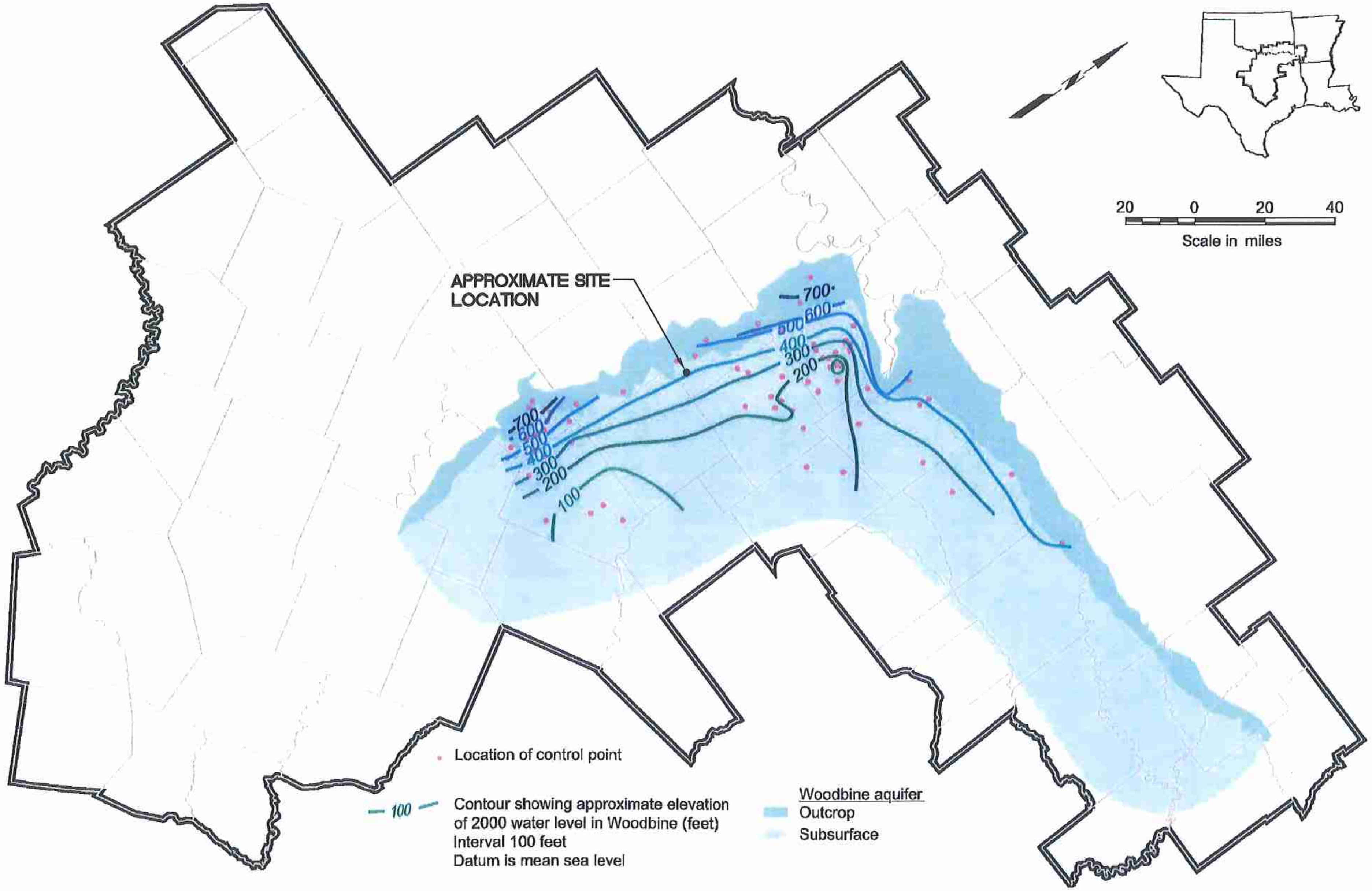
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–A–3

O:\1339\351\EXPANSION 2009\PART III-SDP\IIG\IIIG-A-4 REG WOODBINE AQUIFER.dwg, 2/21/2012 3:32:39 PM, rsellers



NOTES:

1. WOODBINE AQUIFER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED IN 2000 BY TEXAS WATER DEVELOPMENT BOARD.
2. POTENTIOMETRIC SURFACE MAP ADAPTED FROM HARDEN ET AL, 2004, NORTHERN TRINITY/WOODBINE AQUIFER GROUNDWATER AVAILABILITY MODEL, TEXAS WATER DEVELOPMENT BOARD.

ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend
2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-A-4 REG WOODBINE.DWG

DRAWN BY: SRF
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
REGIONAL WOODBINE AQUIFER
POTENTIOMETRIC SURFACE MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

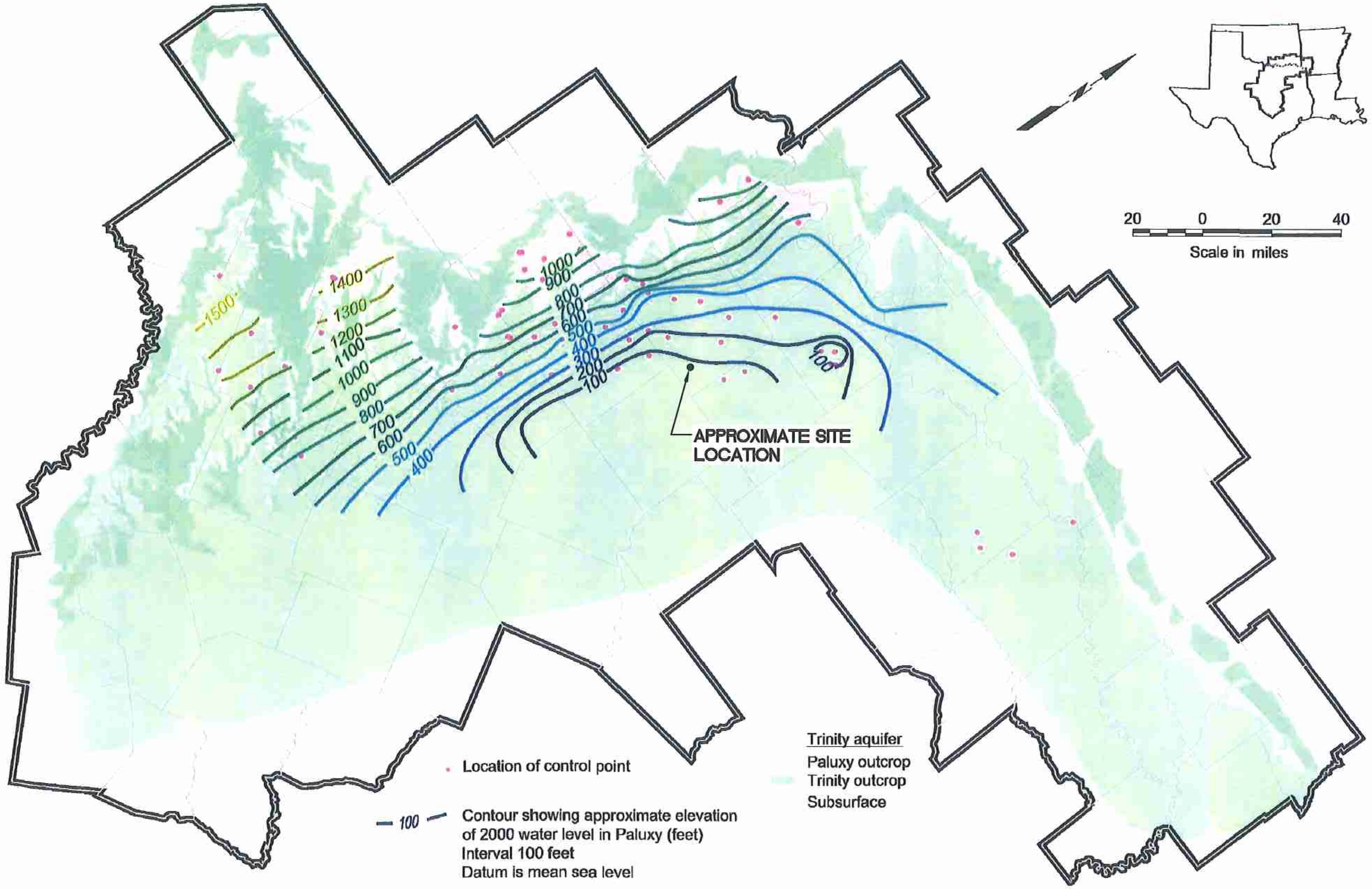
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-A-4

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-A-5 REG PALUXY AQUIFER POTENTIOMETRIC SURFACE.dwg, 2/21/2012 3:33:23 PM, rsellers



NOTES:

1. PALUXY AQUIFER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED IN 2000 BY TEXAS WATER DEVELOPMENT BOARD.
2. POTENTIOMETRIC SURFACE MAP ADAPTED FROM HARDEN ET AL, 2004, NORTHERN TRINITY/WOODBINE AQUIFER GROUNDWATER AVAILABILITY MODEL, TEXAS WATER DEVELOPMENT BOARD.

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-A-5 PALUX. AQU. POT SUR.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
REGIONAL PALUXY AQUIFER
POTENTIOMETRIC SURFACE MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

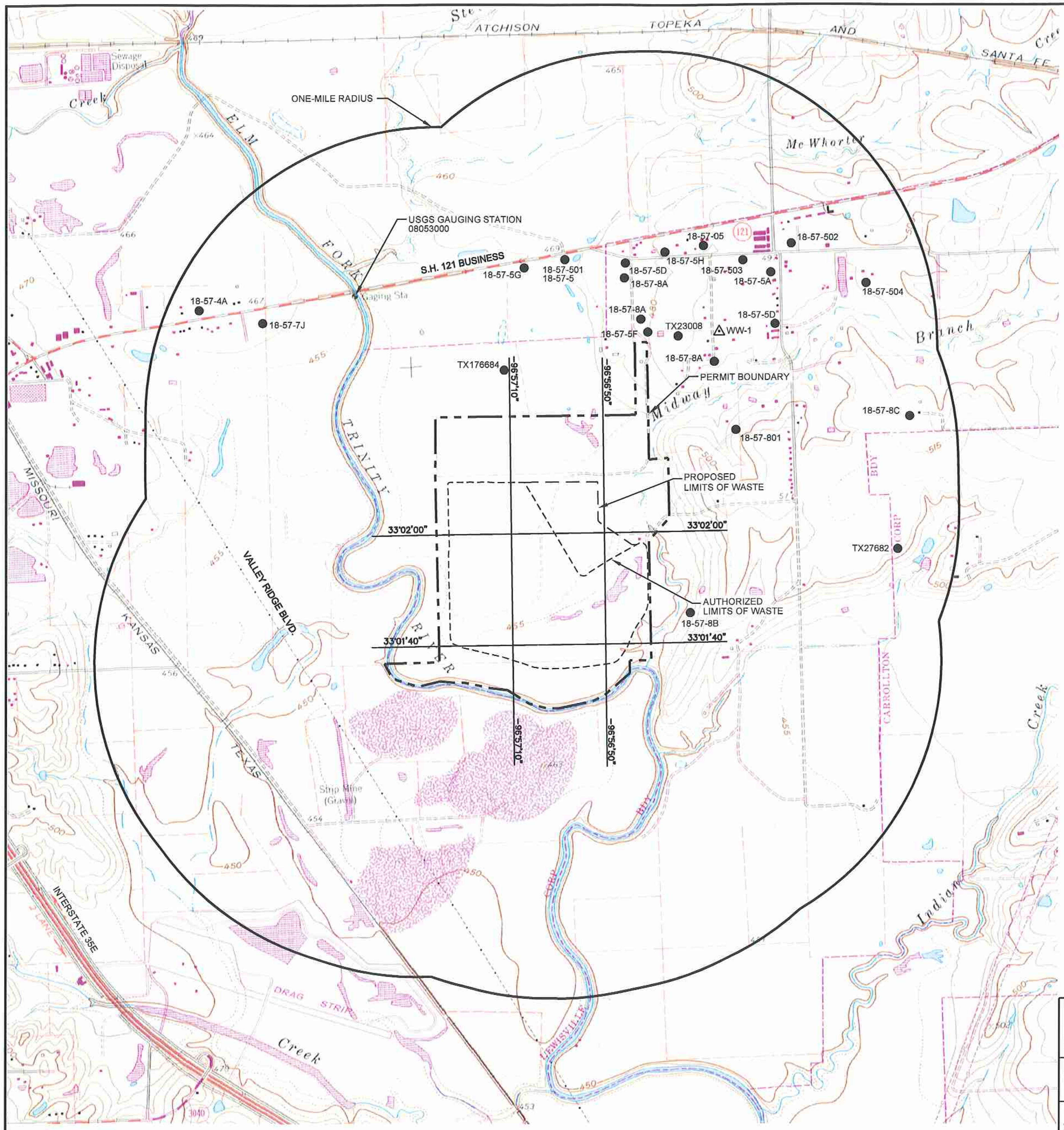
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-A-5



ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend
2-27-12

LEGEND

— - - —	PERMIT BOUNDARY
- - - - - - -	AUTHORIZED LIMITS OF WASTE
— — — — —	PROPOSED LIMITS OF WASTE
33°02'00"	GEODETIC COORDINATE SYSTEM
● 18-57-5D	REGISTERED WATER WELL WITH GRID NUMBER OR WELL ID NUMBER ANNOTATED
△ WW-1	POTENTIAL WATER WELL LOCATION IDENTIFIED BY WBC IN MARCH 2011 FROM ADJACENT ROADWAY

LEWISVILLE EAST, TEX.
N3300–W9652.5/7.5
1960
PHOTOREVISED 1981
DMA 6653 I SW–SERIES V882

CARROLLTON, TEX.
NW/4 CARROLLTON 15' QUADRANGLE
N3252.5–W9652.5/7.5
1959
DMA 6044 IV NW–SERIES V882

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1957. Field checked 1960

Polyconic projection. 10,000-foot grid ticks based on Texas coordinate system, north central zone. 1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue. 1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 10 meters south and 27 meters east as shown by dashed corner ticks

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Red tint indicates areas in which only landmark buildings are shown

Areas covered by dashed light-blue pattern are subject to controlled inundation to 532 feet

NOTES:

1. SITE LOCATION BASE MAP ADAPTED FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS ABOVE.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

☐ FOR INFORMATION PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–A–6 WATER WELL.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT WATER WELL LOCATION MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

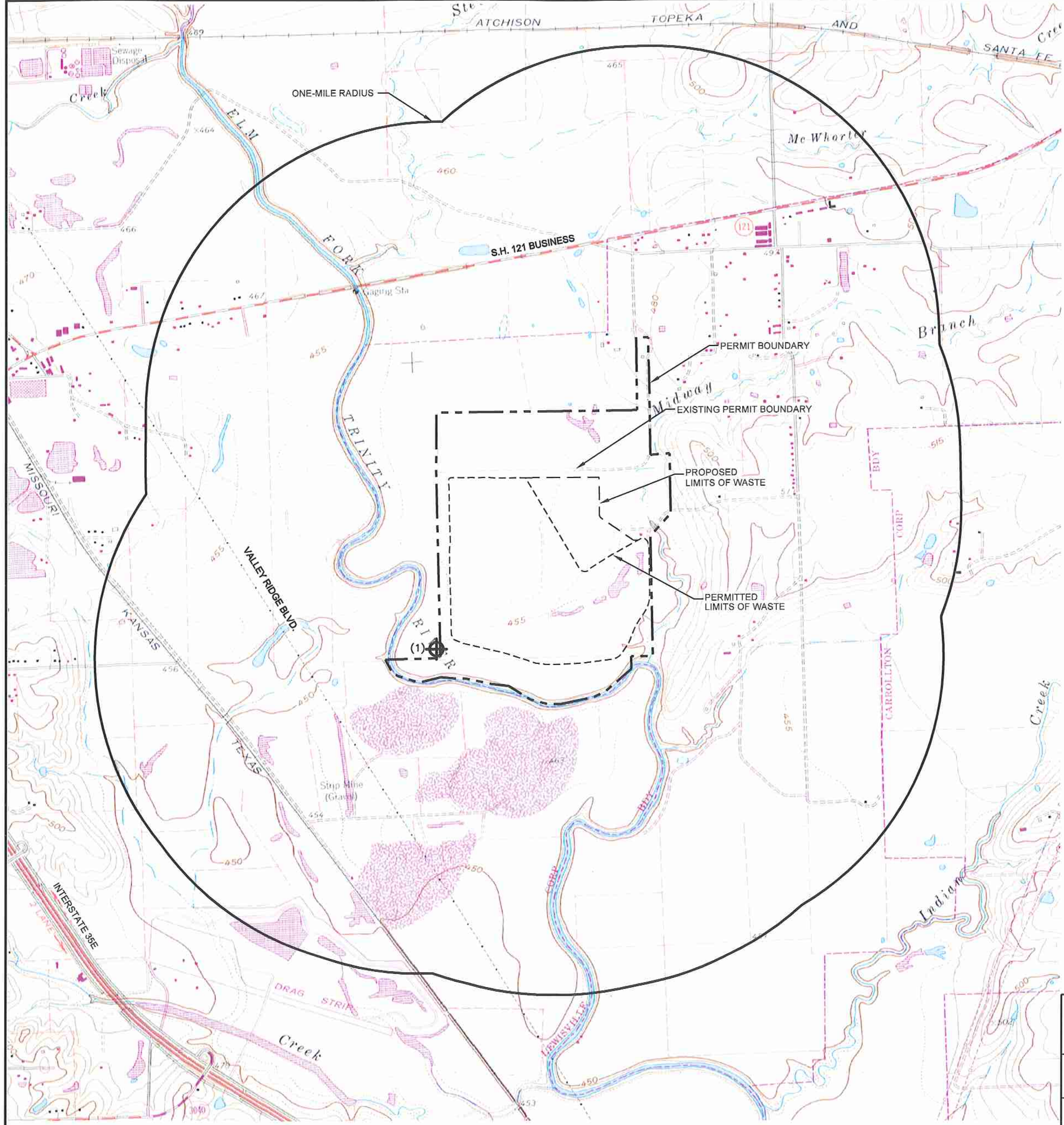
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–A–6

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-A-6 WATER WELL LOC.dwg, 2/27/2012 10:07:29 AM, rsellers



COPYRIGHT © 2012 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-A-7 OIL AND GAS WELL LOC.dwg, 2/24/2012 7:46:39 AM, rsellers

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

N

0 1000 2000
SCALE IN FEET

LEGEND

— - —	PERMIT BOUNDARY
- - - - -	AUTHORIZED LIMITS OF WASTE
— — —	PROPOSED LIMITS OF WASTE
⌖ (1)	GAS WELL LOCATION WITH NUMBER OF SURFACE PENETRATIONS (WELLS) AT LOCATION ANNOTATED

LEWISVILLE EAST, TEX.
N3300-W9652.5/7.5
1960
PHOTOREVISED 1981
DMA 6649 I SW-SERIES V882

CARROLLTON, TEX.
NW/4 CARROLLTON 15' QUADRANGLE
N3252.5-W9652.5/7.5
1959
DMA 6649 IV NW-SERIES V882

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1957. Field checked 1960

Polyconic projection. 10,000-foot grid ticks based on Texas coordinate system, north central zone. 1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue. 1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 10 meters south and 27 meters east as shown by dashed corner ticks

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Red tint indicates areas in which only landmark buildings are shown

Areas covered by dashed light-blue pattern are subject to controlled inundation to 532 feet

NOTES:

1. GAS WELL LOCATION DATA OBTAINED FROM WBC FIELD OBSERVATIONS AND TEXAS RAILROAD COMMISSION RECORDS ON-LINE GIS AT http://gis2.rrc.state.tx.us/public/ IN FEBRUARY 2012.
2. NO RECORDS OF ACTIVE OIL WELLS WITHIN THE ONE MILE SEARCH RADIUS WERE FOUND IN THE RAILROAD COMMISSION DATABASE.
3. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

☐ FOR INFORMATION PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-A-7 GAS WELL LOCS.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR
CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT GAS WELL LOCATION MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-A-7

STATE OF TEXAS WATER WELL REPORTS

GeoSearch

On time. On target. In touch.™

Texas Water Well Report (Extended Radius)

---

http://www.geo-search.net/QuickMap/index.htm?DataID=Standard0000028162

Click on link above to access the map and satellite view of current property

Target Property:

Camelot Landfill
Farmers Branch, Denton County, Texas 75057

Prepared For:

Weaver Boos Consultants-Benbrook

Order #: 12146
Job #: 28162
Date: 04/18/2011

3006 Bee Caves Rd, Suite A-230 · Austin, Texas 78746 · phone: 888-396-0042 · fax: 512-472-9967 · www.geo-search.net

TARGET PROPERTY SUMMARY

Camelot Landfill
Farmers Branch, Denton County, Texas 75057

USGS Quadrangle: ***Lewisville East, TX***
Target Property Geometry: ***Area***

Target Property Longitude(s)/Latitude(s):
(-96.960499, 33.026904), (-96.960293, 33.026458), (-96.959989, 33.026245), (-96.959531, 33.026029), (-96.958640, 33.025780), (-96.958023, 33.025744), (-96.957649, 33.025894), (-96.957275, 33.026018), (-96.956935, 33.026013), (-96.956196, 33.025897), (-96.955613, 33.025731), (-96.954815, 33.025509), (-96.953923, 33.025313), (-96.952939, 33.025114), (-96.952296, 33.024869), (-96.951868, 33.024680), (-96.950824, 33.024377), (-96.949771, 33.024490), (-96.948592, 33.024705), (-96.948064, 33.024826), (-96.947316, 33.025100), (-96.946754, 33.025351), (-96.946253, 33.025655), (-96.946059, 33.026016), (-96.945433, 33.026370), (-96.945427, 33.026631), (-96.944531, 33.026616), (-96.944533, 33.033175), (-96.943460, 33.034147), (-96.943424, 33.037009), (-96.944694, 33.036900), (-96.944631, 33.042912), (-96.945341, 33.042950), (-96.945391, 33.041467), (-96.945415, 33.039124), (-96.957188, 33.039162), (-96.957286, 33.026903), (-96.960499, 33.026904)

County/Parish Covered:
Denton (TX)

Zipcode(s) Covered:
Carrollton TX: 75010
Lewisville TX: 75057
The Colony TX: 75056

State(s) Covered:
TX

****Target property is located in Radon Zone 3.***
Zone 3 areas have a predicted average indoor radon screening level less than 2 pCi/L.

DATABASE FINDINGS SUMMARY

DATABASE	ACRONYM	LOCA-TABLE	UNLOCA-TABLE	SEARCH RADIUS (miles)
FEDERAL				
UNITED STATES GEOLOGICAL SURVEY NATIONAL WATER INFORMATION SYSTEM	NWIS	1	0	1.0000
SUB-TOTAL		**1**	**0**	
STATE (TX)				
SELECT SUBMITTED DRILLERS REPORT DATABASE WELLS	SSDRD	3	0	1.0000
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS	TCEQ	13	0	1.0000
TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE	TWDB	5	0	1.0000
WATER UTILITY DATABASE	WUD	0	0	1.0000
SUB-TOTAL		**21**	**0**	
TOTAL		**22**	**0**	

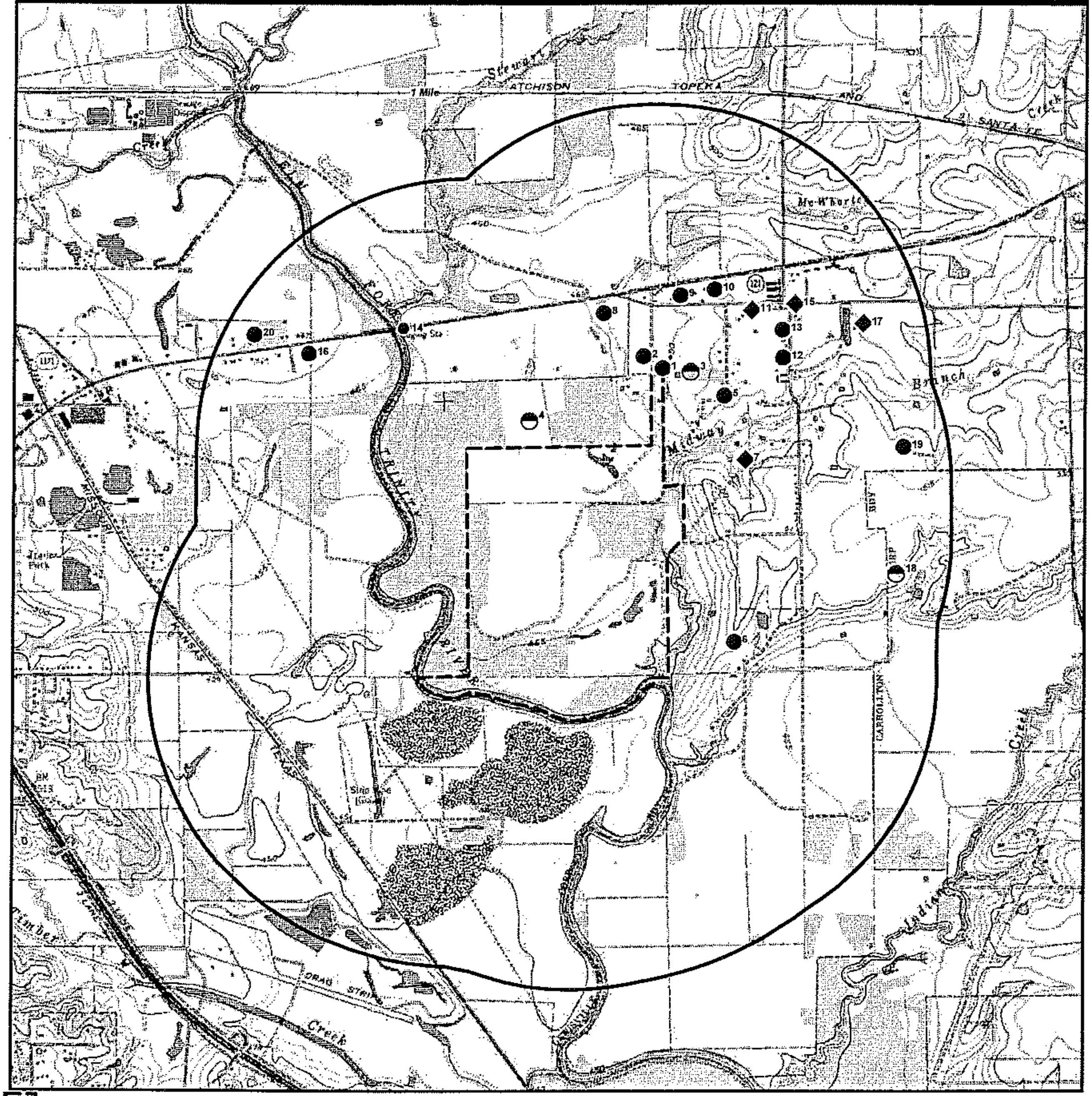
LOCATABLE DATABASE FINDINGS

ACRONYM	Target Property	SEARCH RADIUS (miles)	1/8 Mile (> TP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
FEDERAL								
NWIS		1.000	0	0	0	1	NS	1
SUB-TOTAL			**0**	**0**	**0**	**1**	**0**	**1**
STATE (TX)								
SSDRD		1.000	2	0	0	1	NS	3
TCEQ		1.000	2	2	6	3	NS	13
TWDB		1.000	0	0	3	2	NS	5
WUD		1.000	0	0	0	0	NS	0
SUB-TOTAL			**4**	**2**	**9**	**6**	**0**	**21**
TOTAL			**4**	**2**	**9**	**7**	**0**	**22**

NOTES:

NS = NO SEARCH REQUESTED BY CUSTOMER

WATER WELL MAP



⌐¬ Target Property (TP)
● TCEQ
◒ SSDRD
◆ TWDB
● NWIS

Camelot Landfill
Farmers Branch, Texas
75057

CONTOUR LINES REPRESENTED IN FEET

N
W E
S

0' 1500' 3000' 4500'
SCALE: 1" = 3000'

REPORT SUMMARY OF LOCATABLE SITES

MAP ID#	DATABASE NAME	SITE ID#	DISTANCE FROM SITE	SITE NAME	ADDRESS	CITY, ZIP CODE	PAGE #
1	TCEQ	TX218424	0.040 NE	RAYMON WELLS			1
2	TCEQ	TX218429	0.080 NE	JOE COCKRELL			3
3	SSDRD	TX23008	0.120 NE	SKINNER NURSERIES(TERRA BUILDERS)	521 HUFFINES BLVD	LEWISVILLE, TX, 75077	9
4	SSDRD	TX176684	0.120 NE	BIG CITY CRUSHED CONCRETE			10
5	TCEQ	TX218431	0.230 NE	HARRY GRAY			11
6	TCEQ	TX218430	0.250 E	B L HAMMER			13
7	TWDB	18-57-801	0.260 NE	ROBERT HORTON			15
8	TCEQ	TX218422	0.300 NE	WILMA HALLIBURTON			18
8	TWDB	18-57-501	0.300 NE	JACK CURSON			20
8	TCEQ	TX218421	0.300 NE	L BARTHNECHI			24
9	TCEQ	TX218425	0.320 NE	KENNETH HARCROW			27
10	TCEQ	TX218423	0.380 NE	BILL HOUSMAN			29
11	TWDB	18-57-503	0.420 NE	RAY GRIMES			31
12	TCEQ	TX218427	0.460 NE	RALPH H BARFNECT			34
13	TCEQ	TX218426	0.480 NE	CLAUD M GRIMES			36
14	NWIS	00565975	0.520 N	ELM FK TRINITY RV NR LEWISVILLE, TX			38
15	TWDB	18-57-502	0.570 NE	JESSIE PETERS			39
16	TCEQ	TX218428	0.700 N	MR EDWARD P RENNES			41
17	TWDB	18-57-504	0.780 NE	CLIFTON MYERS			45
18	SSDRD	TX227682	0.820 E	FBC CARROLLTON			48
19	TCEQ	TX218432	0.850 NE	FELLOWSHIP BAPTIST CHURCH			49
20	TCEQ	TX218420	0.910 NW	H B WILLIAMS			51

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 1 **Distance from Property: 0.04 mi. NE**

ID NUMBER:	**TX218424**
STATE ID :	**18-57-5F**
OWNER NAME:	**RAYMON WELLS**
DATE DRILLED:	**06/16/1971**
DEPTH DRILLED:	**345'**
STATIC LEVEL:	**60'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.944628000**
LATITUDE:	**33.043347000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218424

18-57-SE

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

State of Texas

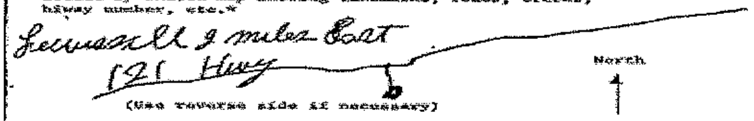
WATER WELL REPORT

For TWDB use only
Well No. 18-57-SE
Located on map Yes
Received: 5-72

1) OWNER:
Person having well drilled Boyman Wells (Name) Address (Street or RFD) Lewisville (City) Texas (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton, 2 miles in E (N.E., S.W., etc.) direction from Lewisville Hwy 121 (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*



(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.
Labor ______ League ______
Block ______ Survey ______
Abstract No. ______
(NW¼ NE¼ SW¼ SE¼) of Section ______

3) TYPE OF WORK (Check): [✓ New Well] Deepening Reconditioning Plugging

4) PROPOSED USE (Check): [✓ Domestic] Industrial Municipal Irrigation Test Well Other

5) TYPE OF WELL (Check): [✓ Rotary] Driven Dug Cable Jetted Bored

6) WELL LOG:
Diameter of hole 6½" in. Depth drilled 345 ft. Depth of completed well 345 ft. Date drilled 6/16/71
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	15	Surface & Clay
15	265	Blue Shale
265	275	Water Sand
275	320	Blue Shale
320	345	Water Sand

(Use reverse side if necessary)

9) Casing:
Type: Old [✓ New] [✓ Steel] Plastic Other
Cemented from 0 ft. to 325 ft.
Diameter (inches) 4½ od From (ft.) 0 Setting To (ft.) 325 Gage 9.5 lb

10) SCREEN:
Type ______
Perforated Slotted
Diameter (inches) Setting From (ft.) To (ft.) Slot Size

7) COMPLETION (Check):
Straight wall Gravel packed Other
Under reamed [✓ Open Hole]

8) WATER LEVEL:
Static level 60 ft. below land surface Date 6/16/71
Artesian pressure ______ lbs. per square inch Date ______
Depth to pump bowls, cylinder, jet, etc., 210 ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes [✓ No] If yes, by whom?
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.
Bailer test ______ gpm with ______ ft. drawdown after ______ hrs.
Artesian flow ______ gpm
Temperature of water ______

12) WATER QUALITY:
Was a chemical analysis made? Yes [✓ No]
Did any strata contain undesirable water? Yes No
Type of water? ______ depth of strata ______

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME Claud A. Boyd (Type or Print) Water Well Drillers Registration No. 481
ADDRESS P.O. Box 344 (Street or RFD) Frisco (City) Texas (State)
(Signed) Claud Boyd (Water Well Driller) Boyd Drilling Co. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-GW-53

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

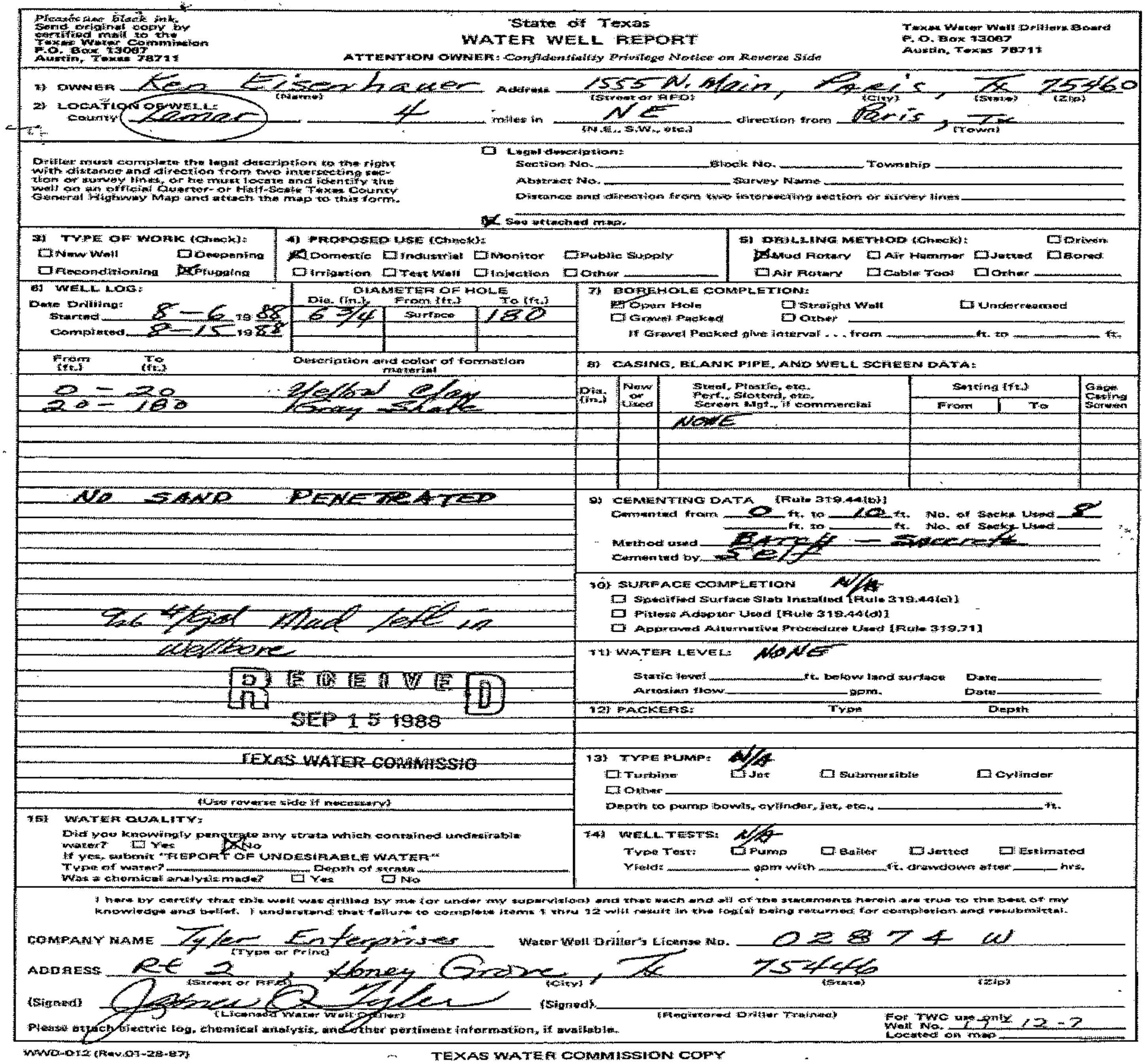
MAP ID# 2 **Distance from Property: 0.08 mi. NE**

ID NUMBER:	**TX218429**
STATE ID :	**17-12-7** Note: This well is located in Lamar County.
OWNER NAME:	**KEN EISENHAUER**
DATE DRILLED:	**08/15/1988**
DEPTH DRILLED:	**180'**
STATIC LEVEL:	**NOT REPORTED**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-95.584825000**
LATITUDE:	**33.758123000**

2 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 2

Water Well ID: 218249



Please use black ink.
Send original copy by certified mail to the
Texas Water Commission
P.O. Box 13087
Austin, Texas 78711

State of Texas
WATER WELL REPORT
ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

Texas Water Well Drillers Board
P. O. Box 13087
Austin, Texas 78711

1) OWNER Ken Eisenhauer (Name) Address 1555 N. Main (Street or RFD), Paris (City), Tx (State) 75460 (Zip)

2) LOCATION OF WELL: County Lamar 4 miles in NE (N.E., S.W., etc.) direction from Paris, Tx (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. ______ Block No. ______ Township ______
Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☒ See attached map.

3) TYPE OF WORK (Check): ☐ New Well ☐ Deepening ☐ Reconditioning ☒ Plugging

4) PROPOSED USE (Check): ☒ Domestic ☐ Industrial ☐ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ Other ______

5) DRILLING METHOD (Check): ☐ Driven ☒ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started 8-6 1988
Completed 8-15 1988

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
6 3/4	Surface	180

7) BOREHOLE COMPLETION: ☒ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from ______ ft. to ______ ft.

From (ft.)	To (ft.)	Description and color of formation material
0	20	Yellow Clay
20	180	Gray Shale

NO SAND PENETRATED

9.6 #/gal Mud left in wellbore

RECEIVED
SEP 15 1988
TEXAS WATER COMMISSIO

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
		NONE			

9) CEMENTING DATA [Rule 319.44(b)]
Cemented from 0 ft. to 10 ft. No. of Sacks Used 2
______ ft. to ______ ft. No. of Sacks Used ______
Method used Batch — Sacrete
Cemented by Self

10) SURFACE COMPLETION N/A
☐ Specified Surface Slab Installed [Rule 319.44(c)]
☐ Pitless Adaptor Used [Rule 319.44(d)]
☐ Approved Alternative Procedure Used [Rule 319.71]

11) WATER LEVEL: NONE
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: Type Depth

13) TYPE PUMP: N/A
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS: N/A
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☒ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 12 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME Tyler Enterprises (Type or Print) Water Well Driller's License No. 02874 W

ADDRESS Rt 2 (Street or RFD), Honey Grove (City), Tx (State) 75446 (Zip)

(Signed) James R Tyler (Licensed Water Well Driller) (Signed) ______ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

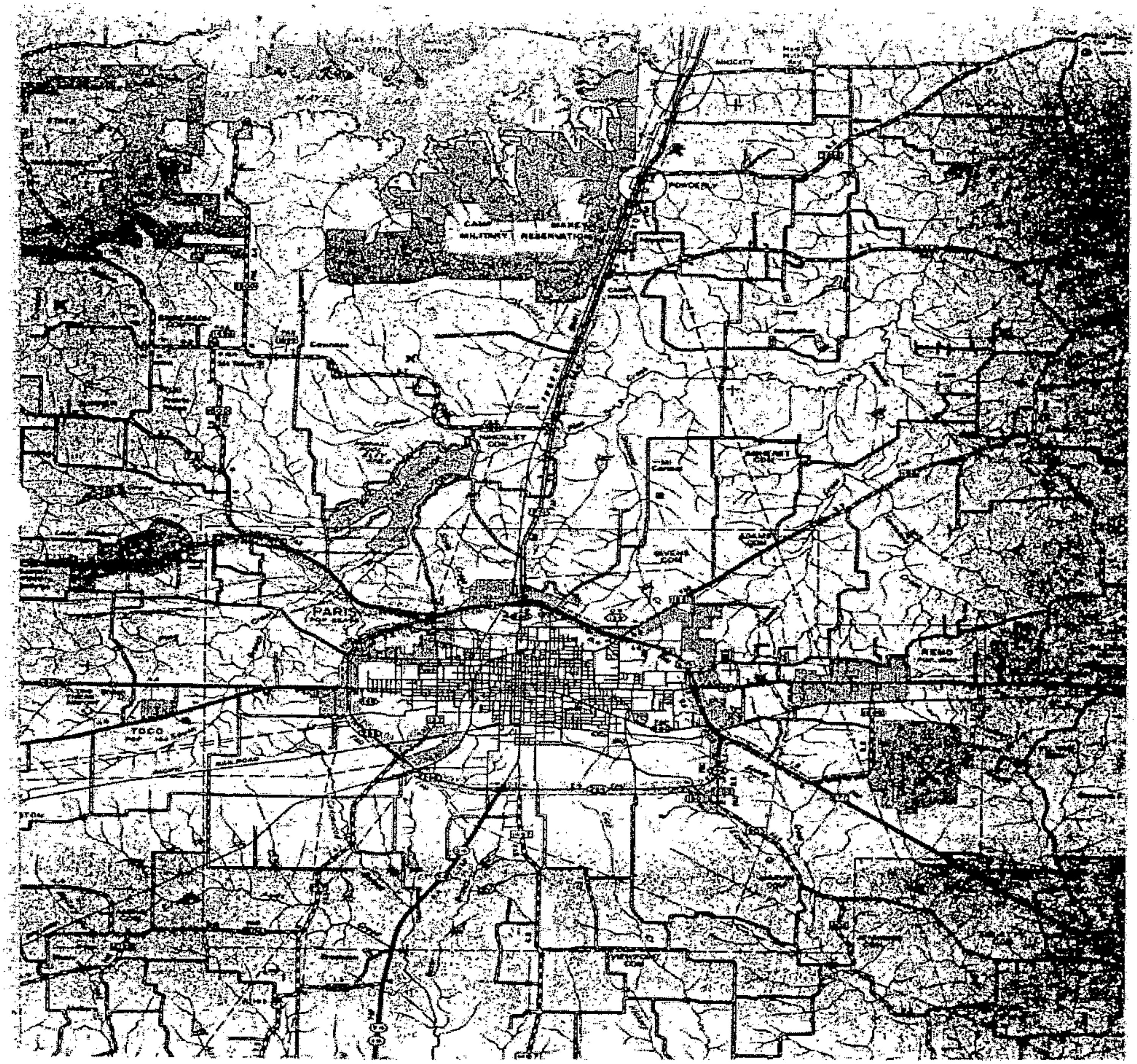
For TWC use only
Well No. 17-12-7
Located on map ______

WWD-012 (Rev.01-28-87) TEXAS WATER COMMISSION COPY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

Page # 2 out of 2

Water Well ID: 218249



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 2 **Distance from Property: 0.08 mi. NE**

ID NUMBER:	**TX218429**
STATE ID :	**18-57-8A**
OWNER NAME:	**JOE COCKRELL**
DATE DRILLED:	**01/05/1980**
DEPTH DRILLED:	**338'**
STATIC LEVEL:	**100'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.945827000**
LATITUDE:	**33.044015000**

2 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 2

Water Well ID: 218429

18-57-8A

Send original copy by
certified mail to the
Texas Department of Water Resources
P. O. Box 13087
Austin, Texas 78711

State of Texas
WATER WELL REPORT

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

For TDWR use only
Well No. 18-57-8A
Located on map yes
Received: C.F.S

1) OWNER Joe Cockrell (Name) Address Rt. # 3 (Street or RFD) Oaktree Estates, Lewisville (City) , Tx (State) 75056

2) LOCATION OF WELL:
County Denton 3 miles in E (N.E., S.W., etc.) direction from Lewisville (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. ______ Block No. ______ Township ______
Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☐ See attached map.

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☒ Domestic ☐ Industrial ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Other ______

5) DRILLING METHOD (Check):
☒ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored
☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other ______

6) WELL LOG:

Date drilled 1-5-80

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
6 1/4	Surface	338

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from 318 ft. to 338 ft.

From (ft.)	To (ft.)	Description and color of formation material
Surface	to 10'	Sand Soil
10'	to 20'	Yellow Clay
~~20'~~	~~to 25'~~	~~Gravel~~
25'	to 318'	Blue-Shale
318'	to 338'	Sand

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
4 1/2	N	Steel	0	318	9 1/

CEMENTING DATA
Cemented from 0 ft. to 318 ft.
Method used Pressure
Cemented by Boyd Drilling Co. (Company or Individual)
D

9) WATER LEVEL:
Static level 100 ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

10) PACKERS: Type Depth

11) TYPE PUMP:
☐ Turbine ☐ Jet ☒ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., 273 ft.

12) WELL TESTS:
☐ Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

13) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☒ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

JAN 28 1982

NAME Boyd Drilling Co. (Type or Print) Water Well Drillers Registration No. 481

ADDRESS P. O. Box # 344 (Street or RFD) Frisco (City) Texas (State) 75034 (Zip)

(Signed) Claud Boyd (Water Well Driller) Boyd Drilling Co. (Company Name)

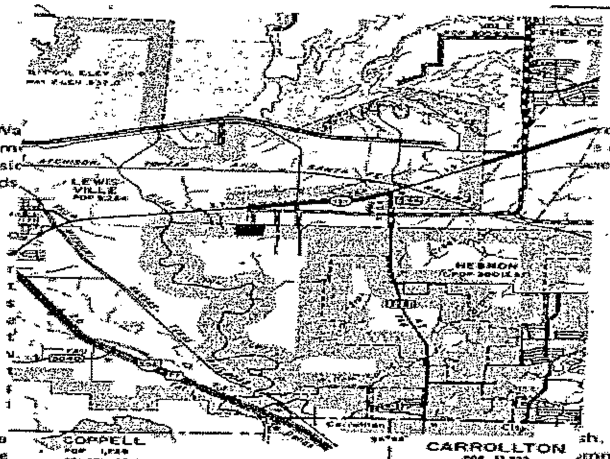
Please attach electric log, chemical analysis, and other pertinent information, if available.

TDWR-0392 (Rev. 1-12-79)

DEPARTMENT OF WATER RESOURCES COPY

Page # 2 out of 2

Water Well ID: 218429



The Wa … rces are concerned that som … s confidentiality privilege provisi … e Reporting of Well Logs, reads

The la … sh, assure that logs of your we … mmission" in the above-quot … y properly means the Texas Department of Water Resources (P. O. Box 13087; Austin, Texas 78711).

SUBMITTED DRILLERS REPORT DATABASE (SDRD)

MAP ID# 3 Distance from Property: 0.12 mi. NE

TRACK #: **23008**
DATE ENTERED: **07/17/2003**
OWNER NAME: **SKINNER NURSERIES(TERRA BUILDERS)**
OWNER ADDRESS: **1400 MOCCASSIN TRAIL, SUITE 14**
LEWISVILLE, TX 75077
COUNTY: **DENTON**
LATITUDE: **33.0433** LONGITUDE: **-96.9428**

WELL LOG:	**WATER LEVEL:**
DRILLING DATE (STARTED): **05/07/03**	STATIC LEVEL: **45'**
DRILLING DATE (COMPLETED): **05/08/03**	WATER LEVEL DATE: **06/26/2003**
DEPTH DRILLED: **250'**	TYPE OF WATER: **GOOD**

TYPE OF WORK:

NEW WELL: **X**	REPLACEMENT WELL:
DEEPENING:	RECONDITIONING:

PROPOSED USE:

MONITOR WELL:	DOMESTIC: **X**	ENVIRONMENTAL SOIL BORING:
TEST WELL:	INDUSTRIAL:	GEOTHERMAL HEAT LOOP:
IRRIGATION:	INJECTION:	PUBLIC SUPPLY:
DE-WATERING:	STOCK:	RIG SUPPLY:

COMPANY INFORMATION:

COMPANY NAME: **ANDERSON WATER WELLS L.P.**
COMPANY ADDRESS: **P.O. BOX 1318**
BRIDGEPORT, TX 76426

SUBMITTED DRILLERS REPORT DATABASE (SDRD)

MAP ID# 4 **Distance from Property: 0.12 mi. NE**

TRACK #: **176684**
DATE ENTERED: **04/30/2009**
OWNER NAME: **BIG CITY CRUSHED CONCRETE**
OWNER ADDRESS: **1580 STONEWALL**
LEWISVILLE, TX 75057
COUNTY: **DENTON**
LATITUDE: **33.0408** LONGITUDE: **-96.9531**

WELL LOG:
DRILLING DATE (STARTED): **04/21/09**
DRILLING DATE (COMPLETED): **04/22/09**
DEPTH DRILLED: **69'**

WATER LEVEL:
STATIC LEVEL: **21'**
WATER LEVEL DATE: **04/22/2009**
TYPE OF WATER: **UNCONFINED SHALLOW**

TYPE OF WORK:
NEW WELL: **X**
REPLACEMENT WELL:
DEEPENING:
RECONDITIONING:

PROPOSED USE:
MONITOR WELL:
TEST WELL:
IRRIGATION:
DE-WATERING:
DOMESTIC:
INDUSTRIAL: **X**
INJECTION:
STOCK:
ENVIRONMENTAL SOIL BORING:
GEOTHERMAL HEAT LOOP:
PUBLIC SUPPLY:
RIG SUPPLY:

COMPANY INFORMATION:
COMPANY NAME: **R.L.WAGSTAFF CO.**
COMPANY ADDRESS: **1212**
SEAGOVILLE, TX 75159

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 5 **Distance from Property: 0.23 mi. NE**

ID NUMBER:	**TX218431**
STATE ID :	**18-57-8A**
OWNER NAME:	**HARRY GRAY**
DATE DRILLED:	**04/12/1978**
DEPTH DRILLED:	**1157'**
STATIC LEVEL:	**360'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.940760000**
LATITUDE:	**33.041808000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218431

RECEIVED
APR 19 1978
DEPT. OF
WATER RESOURCES

18-57-8A

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 13087
Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18-57-8A
Located on map [illegible]
Received: [illegible]

1) OWNER:
Person having well drilled Harry Gray (Name) Address 11500 Stemmons, Dallas, TX 75229 (Street or RFD) (City) (State)
Landowner Same (Name) Address Same (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton, 3 miles in E (N.E., S.W., etc.) direction from Lewisville (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

See Map

North

(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor ______ League ______
Block ______ Survey ______
Abstract No. ______
(NW¼ NE¼ SW¼ SE¼) of Section ______

3) TYPE OF WORK (Check): New Well X Deepening Reconditioning Plugging

4) PROPOSED USE (Check): Domestic X Industrial Municipal Irrigation Test Well Other

5) TYPE OF WELL (Check): Rotary X Driven Dug Cable Jetted Bored

6) WELL LOG:
Diameter of hole 6-3/4 in. Depth drilled 1157 ft. Depth of completed well 1157 ft. Date drilled 4-12-78
See Electric Log
All measurements made from ______ ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	20	Clay with sand & gravel
20	120	Shale
120	225	Shale with sand streaks
225	263	Sandy shale
263	325	Sand
325	418	Shale & sand streaks
418	966	Lime and shale
966	1110	Sand with shale
1110	1150	Sand
1150	1157	Shale

(Use reverse side if necessary)

9) Casing:
Type: Old New X Steel Plastic Other
Cemented from 0 ft. to 1115 ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
8-5/8" O.D.	0	25	24#
5½" O.D.	0	1115	14½#

10) SCREEN:
Type Stainless steel wire wrapped
Perforated Slotted

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
2½" I.D.	1115	1146	20 ga.

7) COMPLETION (Check): Straight wall Gravel packed X Other Under reamed Open Hole

8) WATER LEVEL:
Static level 360 ft. below land surface Date 4-12-78
Artesian pressure ______ lbs. per square inch Date ______
Depth to pump bowls, cylinder, jet, etc., 450 ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No X If yes, by whom?
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.
Bailer test ______ gpm with ______ ft. drawdown after ______ hrs.
Artesian flow ______ gpm
Temperature of water ______

12) WATER QUALITY:
Was a chemical analysis made? Yes No X
Did any strata contain undesirable water? Yes No
Type of water? ______ depth of strata ______

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. E. DOSS (Type or Print) Water Well Drillers Registration No. 1227
ADDRESS 5306 Hines Blvd. (Street or RFD) Dallas (City) Texas 75235 (State)
(Signed) W. E. Doss (Water Well Driller) J. L. MYERS COMPANY (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDB-WD-4

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 6 **Distance from Property: 0.25 mi. E**

ID NUMBER:	**TX218430**
STATE ID :	**18-57-8B**
OWNER NAME:	**B L HAMMER**
DATE DRILLED:	**06/21/1982**
DEPTH DRILLED:	**440'**
STATIC LEVEL:	**280'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.940353000**
LATITUDE:	**33.028552000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218430

Send original copy by
certified mail to the
Texas Department of Water Resources
P. O. Box 13087
Austin, Texas 78711

State of Texas
WATER WELL REPORT

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

For TDWR use only
Well No. 18-57-8B
Located on map 269
Received: CJFS

1) OWNER B L Hammer (Name) Address Rt 1 Box 91A (Street or RFD) Lewisville (City) Tx (State) 75067 (Zip)

2) LOCATION OF WELL:
County Denton 4 miles in SE (N.E., S.W., etc.) direction from Lewisville Texas (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. ______ Block No. ______ Township ______
Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☑ See attached map. #10 on map on 19-6366

3) TYPE OF WORK (Check):
☑ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☑ Domestic ☐ Industrial ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Other: ______

5) DRILLING METHOD (Check):
☑ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored
☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other ______

6) WELL LOG:

Date drilled 6-21-82

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
6¾"	Surface	440

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☑ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from 300 ft. to 440 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Surface
5	25	Clay Yellow
25	105	Shale Gray
105	150	Shale with St. Limestone
150	205	Sandy Clay Gray
205	390	Shale Gray
390	435	Sand Gray
435	440	Shale Gray

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
4"	N	SCH 40 Plastic	0	400'	
		SLOTTED		40'	

CEMENTING DATA
Cemented from 0 ft. to 20 ft.
Method used Slurry
Cemented by Posey (Company or Individual)

RECEIVED
OCT 25 1982
DEPT. OF
WATER RESOURCES

9) WATER LEVEL:
Static level 280 ft. below land surface Date 6-21-82
Artesian flow ______ gpm. Date ______

10) PACKERS: Type Depth

11) TYPE PUMP:
☐ Turbine ☐ Jet ☑ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., 320 ft.

12) WELL TESTS:
☐ Type Test: ☑ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: 15 gpm with 10 ft. drawdown after 4 hrs.

13) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☑ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME ALBERT J Posey (Type or Print) Water Well Drillers Registration No. 1331

ADDRESS BOX 351 (Street or RFD) GRAPeVINe (City) TEXAS (State) 76051 (Zip)

(Signed) Albert J. Posey (Water Well Driller) Posey Drilling Co. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TDWR-0392 (Rev. 1-12-79)

DEPARTMENT OF WATER RESOURCES COPY

TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE (TWDB)

MAP ID# 7 **Distance from Property: 0.26 mi. NE**

STATE ID:	**18-57-801**
OWNER'S NAME:	**ROBERT HORTON**
DATE DRILLED:	**05161975**
DEPTH DRILLED:	**420'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.939440000**
LATITUDE:	**33.038330000**
SOURCE:	**TWDB**

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Woodbine

Field No.

Owner's Well No.

State Well No. 18-57-801

County DENTON

1. Location: 1/4, 1/4 Sec. , Block , Survey
2. Owner: Robert J. HORTON Address: RFD #3, Box 92-A, Lewisville 75067
   Tenant: Address:
   Driller: J. L. MYERS Co. Address: 5306 Harry Hines, Dallas
3. Elevation of LS is 485 ft. above msl, determined by TOPO
4. Drilled: 5-16 1975; Dug, Cable Tool, [✓ Rotary],
5. Depth: Rept. 420 ft. Meas. ft.
6. Completion: Open Hole, [✓ Straight Wall], Underreamed, Gravel Packed
7. Pump: Mfgr. Type Sub
   No. Stages , Bowls Diam. in., Setting 320 ft.
   Column Diam. in., Length Tailpipe ft.
8. Motor: Fuel Elec Make & Model HP.
9. Yield: Flow gpm, Pump gpm, Meas., Rept., Est.
10. Performance Test: Date Length of Test Made by
    Static Level ft. Pumping Level ft. Drawdown ft.
    Production gpm Specific Capacity gpm/ft.
11. Water Level: 240 ft. [✓ rept.] meas. 5-16 1975 above below which is ft. above below surface.
    ft. rept. meas. 19 above below which is ft. above below surface.
    ft. rept. meas. 19 above below which is ft. above below surface.
    ft. rept. meas. 19 above below which is ft. above below surface.
12. Use: [✓ Dom.] Stock, Public Supply, Ind., Irr., Waterflooding, Observation, Not Used,
13. Quality: (Remarks on taste, odor, color, etc.)
    Temp. °F, Date sampled for analysis Laboratory
    Temp. °F, Date sampled for analysis Laboratory
    Temp. °F, Date sampled for analysis Laboratory
14. Other data available as circled: [✓ Driller's Log] Radioactivity Log, [✓ Electric Log],
    Formation Samples, Pumping Test,
15. Record by: B NORDSTROM Date 3-15 1976
    Source of Data obs
16. Remarks:

CASING & BLANK PIPE

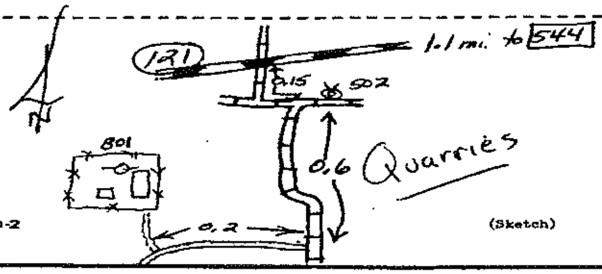
Cemented From 0 ft. to 386 ft.

Diam. (in.)	Type	Setting, ft.	
		from	to
8 5/8	steel	0	10
5 1/2	"	0	386

WELL SCREEN

Screen Openings 15 shots

Diam. (in.)	Type	Setting, ft.	
		from	to
5 1/2	gun perf	360	371



E-log

TWDBE-WD-2

(Sketch)

18-57-801

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 13087
Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18-57-8C
Located on map y.n.c.
Received: 75
dr

1) OWNER:
Person having well drilled Robert J. Horton (Name) Address R.F.D. 3 Box 92-A (Street or RFD) Lewisville, (City) Texas 75067 (State)

Landowner Same (Name) Address Same (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton , 3 3/4 miles in E. (N.E., S.W., etc.) direction from Lewisville, Tex. (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

See map

North ↑

(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.

Labor ____ League ____

Block ____ Survey ____

Abstract No. ____

(NW¼ NE¼ SW¼ SE¼) of Section ____

3) TYPE OF WORK (Check):
New Well X Deepening
Reconditioning Plugging

4) PROPOSED USE (Check):
Domestic X Industrial Municipal
Irrigation Test Well Other

5) TYPE OF WELL (Check):
Rotary X Driven Dug
Cable Jetted Bored

6) WELL LOG:
Diameter of hole 6 3/4 in. Depth drilled 420 ft. Depth of completed well 386 ft. Date drilled 5-16-75

Electric log enclosed All measurements made from 3 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	40	Sand and clay
40'	158'	Shale
158'	172'	Sand and sand rock
172'	224'	Shale
224'	285'	Broken sand
285'	297'	Sand
297'	360'	Sandy shale
360'	371'	Sand
371'	382'	Sandy Shale
382'	403'	Shale
403'	415'	Sand
415'	420'	Shale

(Use reverse side if necessary)

9) Casing:
Type: Old New X Steel X Plastic Other
Cemented from 0 ft. to 386 ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
8 5/8	0	10	24#
5 1/2"	0	386	12#

10) SCREEN:
Type Casing gun perforated
Perforated Slotted

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size

Casing gun perforated with 15 shots from 360-371'

7) COMPLETION (Check):
Straight wall X Gravel packed Other
Under reamed Open Hole

8) WATER LEVEL:
Static level 240 ft. below land surface Date 5-16-75
Artesian pressure ____ lbs. per square inch Date ____
Depth to pump bowls, cylinder, jet, etc., 320 ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No X If yes, by whom?
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.
Bailer test ____ gpm with ____ ft. drawdown after ____ hrs.
Artesian flow ____ gpm
Temperature of water ____

12) WATER QUALITY:
Was a chemical analysis made? Yes No X
Did any strata contain undesirable water? Yes No.
Type of water? ____ depth of strata ____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. E. Doss (Type or Print) Water Well Drillers Registration No. 1227

ADDRESS 5306 Hines Blvd. (Street or RFD) Dallas (City) Texas 75235 (State)

(Signed) W. E. Doss (Water Well Driller) J. L. Myers Co. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available. HW18-57-801

*Additional instructions on reverse side.

[illegible]

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

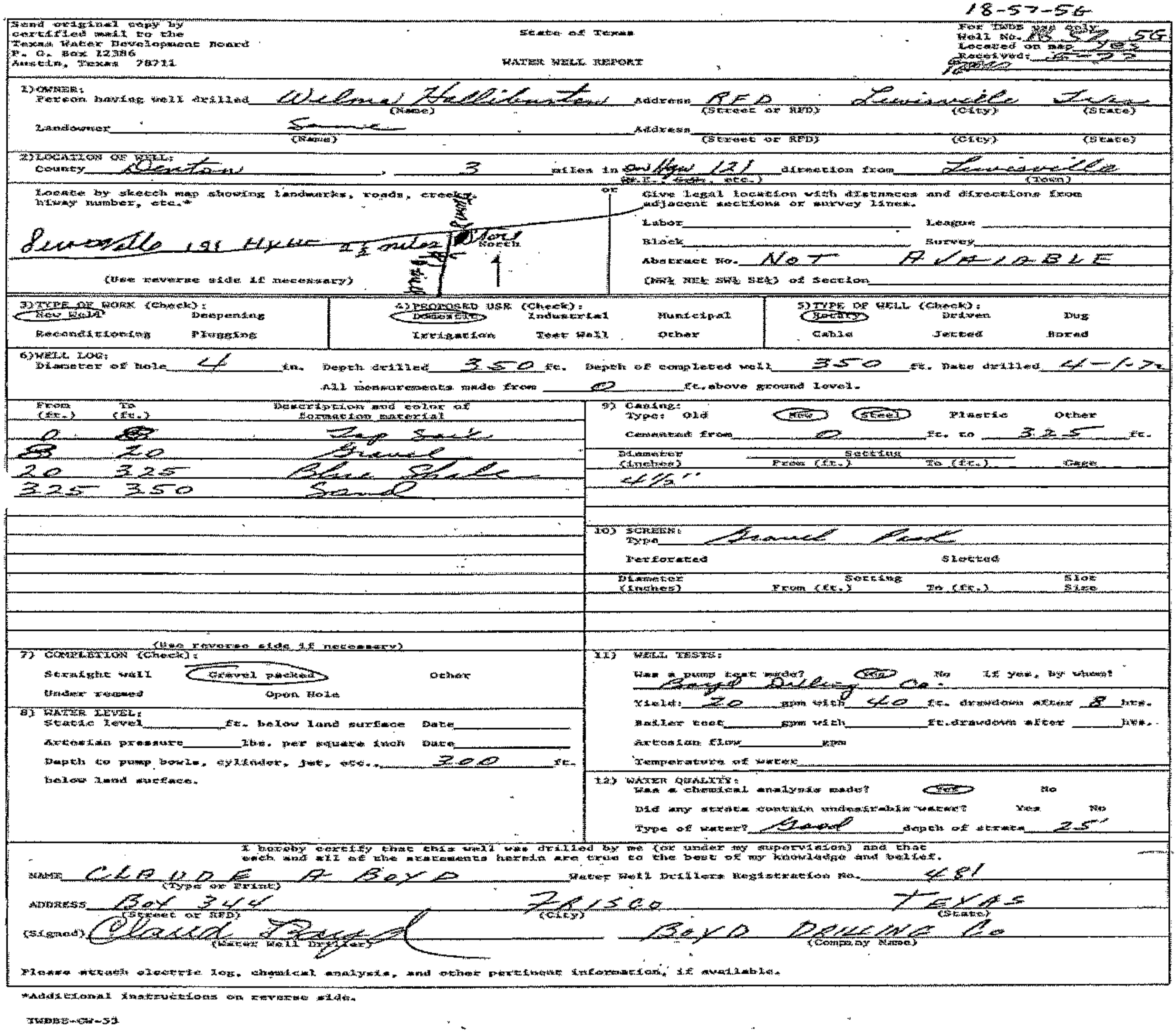
MAP ID# 8 **Distance from Property: 0.30 mi. NE**

ID NUMBER:	**TX218422**
STATE ID :	**18-57-5G**
OWNER NAME:	**WILMA HALLIBURTON**
DATE DRILLED:	**04/01/1972**
DEPTH DRILLED:	**350'**
STATIC LEVEL:	**NOT REPORTED**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.948330000**
LATITUDE:	**33.046390000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218422



18-57-56

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18 57 56
Located on map Yes
Received: 6-72

1) OWNER:
Person having well drilled Wilma Halliburton (Name) Address RFD (Street or RFD) Lewisville (City) Tex (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton, 3 miles in on Hwy 121 (N.E., S.W., etc.) direction from Lewisville (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

Lewisville 121 Hywy 1½ miles Store North

(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor League
Block Survey
Abstract No. NOT AVAIABLE
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): [✓ New Well] Deepening Reconditioning Plugging

4) PROPOSED USE (Check): [✓ Domestic] Industrial Municipal Irrigation Test Well Other

5) TYPE OF WELL (Check): [✓ Rotary] Driven Dug Cable Jetted Bored

6) WELL LOG:
Diameter of hole 4 in. Depth drilled 350 ft. Depth of completed well 350 ft. Date drilled 4-1-72
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	8	Top Soil
8	20	Gravel
20	325	Blue Shale
325	350	Sand

(Use reverse side if necessary)

9) Casing:
Type: Old [✓ New] [✓ Steel] Plastic Other
Cemented from 0 ft. to 325 ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4½"			

10) SCREEN:
Type Gravel Pack
Perforated Slotted

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size

7) COMPLETION (Check):
Straight wall [✓ Gravel packed] Other
Under reamed Open Hole

8) WATER LEVEL:
Static level ft. below land surface Date
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc., 200 ft. below land surface.

11) WELL TESTS:
Was a pump test made? [✓ Yes] No If yes, by whom? Boyd Drilling Co.
Yield: 20 gpm with 40 ft. drawdown after 8 hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? [✓ Yes] No
Did any strata contain undesirable water? Yes No
Type of water? Good depth of strata 25'

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME CLAUDE A BOYD (Type or Print) Water Well Drillers Registration No. 481
ADDRESS Box 344 (Street or RFD) FRISCO (City) TEXAS (State)
(Signed) Claud Boyd (Water Well Driller) BOYD DRILLING Co (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-GW-33

TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE (TWDB)

MAP ID# 8 **Distance from Property: 0.30 mi. NE**

STATE ID:	**18-57-501**
OWNER'S NAME:	**JACK CURSON**
DATE DRILLED:	**12191967**
DEPTH DRILLED:	**160'**
WATER USAGE:	**UNUSED**
LONGITUDE:	**-96.948330000**
LATITUDE:	**33.046390000**
SOURCE:	**TWDB**

/18

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Woodbine

Field No.

Owner's Well No.

State Well No. 18 57 501

County DENTON

1. Location: ___1/4, ___1/4 Sec. ___, Block ___ Survey ___
2. Owner: JACK CRUSON Address: RT. 3 LEWISVILLE, TEXAS
   Tenant: Address:
   Driller: E. C. STONE 470 Address: MANSFIELD, TEXAS
3. Elevation of LAND SURFACE is ~~480~~ ft. above msl, determined by TOPO MAP
4. Drilled: 12-19 1967; Dug, Cable Tool, [✓ Rotary]
5. Depth: Rept. 160 ft. Meas. ___ ft.
6. Completion: [✓ Open Hole], Straight Wall, Underreamed, Gravel Packed
7. Pump: Mfgr. Fairbanks-Morse Type Submersible
   No. Stages ___, Bowls Diam. ___ in., Setting 136 ft.
   Column Diam. ___ in., Length Tailpipe ___ ft.
8. Motor: Fuel elect. Make & Model ___ HP. 1/2
9. Yield: Flow ___ gpm, Pump ___ gpm, Meas., Rept., Est.
10. Performance Test: Date ___ Length of Test ___ Made by ___
    Static Level ___ ft. Pumping Level ___ ft. Drawdown ___ ft.
    Production ___ gpm Specific Capacity ___ gpm/ft.
11. Water Level: 95.76 ft. ~~rept.~~ meas. 9-30 1970 ~~above~~ below Top of casing which is 1.0 ft. above ~~below~~ surface.
    ___ ft. rept. meas. ___ 19___ above below ___ which is ___ ft. above below surface.
    ___ ft. rept. meas. ___ 19___ above below ___ which is ___ ft. above below surface.
    ___ ft. rept. meas. ___ 19___ above below ___ which is ___ ft. above below surface.
12. Use: ~~Dom.~~, Stock, Public Supply, Ind., Irr., Waterflooding, Observation, [✓ Not Used] see note
13. Quality: (Remarks on taste, odor, color, etc.)
    Temp. ___ °F, Date sampled for analysis ___ Laboratory ___
    Temp. ___ °F, Date sampled for analysis ___ Laboratory ___
    Temp. ___ °F, Date sampled for analysis ___ Laboratory ___
14. Other data available as circled: [✓ Driller's Log] Radioactivity Log, Electric Log, Formation Samples, Pumping Test,
15. Record by: D. Cunningham Date ___ 19___
    Source of Data Driller's log and Field work
16. Remarks:

Well caved in - sealed off - new well drilled but unable to insert tape - 1-26-71 D.C.

Should drop this well

CASING & BLANK PIPE

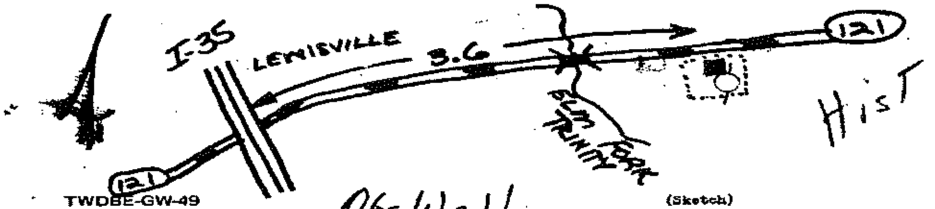
Cemented From ___ ft. to ___ ft.

Diam. (in.)	Type	Setting, ft. from	to
4 1/2	STEEL	0	142

WELL SCREEN

Screen Openings ___

Diam. (in.)	Type	Setting, ft. from	to
		unknown	



Hist

TWDBE-GW-49

ObsWell

(Sketch)

18-57-501

UW 18-57-501

Page # 2 out of 3

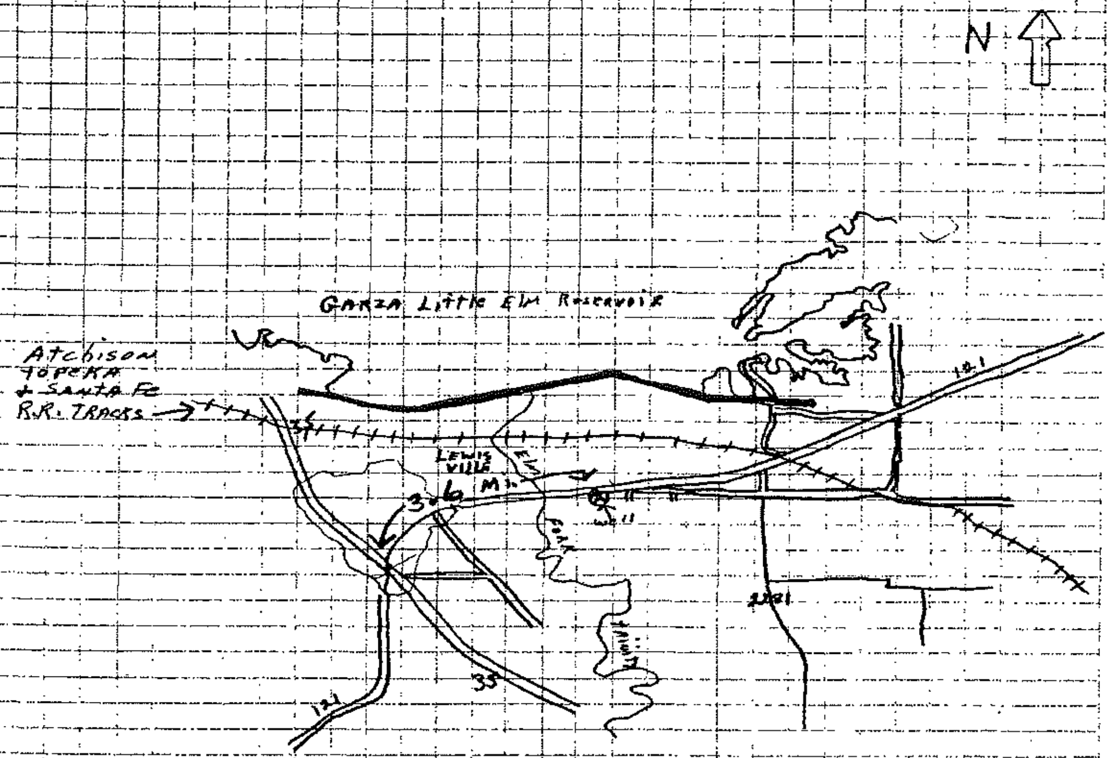
State ID: 18-57-501

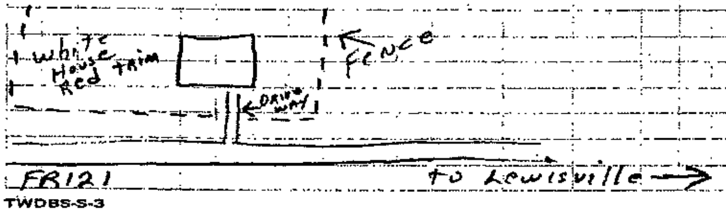
TEXAS WATER DEVELOPMENT BOA

BY_____ DATE_____ DIVISION _____ SHEET NO.____ OF____

CHKD_____ DATE_____ JOB NAME Jack Cruson

18-57-501 JOB NO. Denton Co PROG. CODE Woodbine





TWDBS-S-3

Hist. 1971

18-57-501

GW 7

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18-57-501
Located on map ________
Received: ________
Form GW 8 ________
Form GW 9 ________

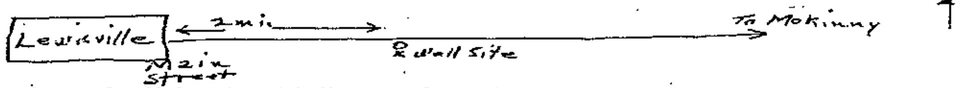
1) OWNER:
Person having well drilled Jack Crusson (Name) Address R.R. 3 (Street or RFD) Lewisville (City), Texas (State)

Landowner Same (Name) Address ________ (Street or RFD) ________ (City) ________ (State)

2) LOCATION OF WELL:
County Denton Labor ________ League ________ Abstract No. ________

NW¼ NE¼ SW¼ SE¼ of Section ________ Block No. ________ Survey ________
(Circle as many as are known)

2 miles in E (NE, S.W., etc.) direction from Lewisville, Tex. (Town)



Sketch map of well location with distances from adjacent section or survey lines, and to landmarks, roads, and creeks.

3) TYPE OF WORK (Check):
New Well ☑ Deepening ☐
Reconditioning ☐ Plugging ☐

4) PROPOSED USE (Check):
Domestic ☑ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

5) TYPE OF WELL (Check):
Rotary ☑ Driven ☐ Dug ☐
Cable ☐ Jetted ☐ Bored ☐

6) WELL LOG:
Diameter of hole 6¼" in. Depth drilled 160 ft. Depth of completed well 160' ft. Date drilled 12-19-67
All measurements made from 1' ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material	From (ft.)	To (ft.)	Description and color of formation material
0	2	Top Soil			
2	20	Yellow Clay			
20	132	Blue Shale			
132	137	Sand			
137	140	Brn. Shly Sand			
40	154	Sand			
54	160	Green Shale			
					(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ☐ Gravel packed ☐ Other ☐
Under reamed ☐ Open hole ☑

8) WATER LEVEL:
Static level 25 ft. below land surface Date 12-21-67
Artesian pressure ________ lbs. per square inch Date ________

9) CASING:
Type: old ☐ New ☑ Steel ☑ Plastic ☐ Other ☐
Cemented from 142' ft. to 0' ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4½"	0'	142'	9#

10) SCREEN:
Type ________
Perforated ☐ Slotted ☐

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot size

11) WELL TESTS:
Was a pump test made? ☐ Yes ☑ No If yes by whom? ________
Yield: ________ gpm with ________ ft. drawdown after ________ hrs
Bailer test 15 gpm with 30' ft. drawdown after 2 hrs
Artesian flow ________ gpm Date ________
Temperature of water ________
Was a chemical analysis made? ☐ Yes ☑ No
Did any strata contain undesirable water? ☐ Yes ☑ No
Type of water? ________ depth of strata ________

12) PUMP DATA:
Manufacturer's Name Fairbanks-Morse
Type Submersible H.P. ½
Designed pumping rate 10 gpm ☑ gph ☐
Type power unit Electric
Depth to bowls, cylinder, jet, etc., 136' ft. below land surface.

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME E. C. Stone (Type or Print) Water Well Drillers Registration No. 838

Address Rt. 1 Box 175E (Street or RFD) Mansfield (City) Texas 76063 (State)

(Signed) E. C. Stone (Water Well Driller) E. C. Stone Water Well Drlg. Co (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

HW 18-57-501

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 8 **Distance from Property: 0.30 mi. NE**

ID NUMBER:	**TX218421**
STATE ID :	**18-57-5**
OWNER NAME:	**L BARTHNECHI**
DATE DRILLED:	**05/??/1990**
DEPTH DRILLED:	**436'**
STATIC LEVEL:	**200'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.948330000**
LATITUDE:	**33.046390000**

2 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 2

Water Well ID: 218421

Send original copy by
certified mail to the
Texas Department of Water Resources
P. O. Box 13087
Austin, Texas 78711

State of Texas
WATER WELL REPORT

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

For TDWR use only
Well No. 18-57-5
Located on map
Received:

1) OWNER Lu Barkknecht (Name) Address 153 Watkin (Street or RFD) Lewisville (City) TX (State) 75062 (Zip)

2) LOCATION OF WELL:
County Denton _____ miles in _____ (N.E., S.W., etc.) direction from _____ (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. _____ Block No. _____ Township _____
Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____

☒ See attached map. DN 19-64-8

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☒ Domestic ☐ Industrial ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Other _____

5) DRILLING METHOD (Check):
☐ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored
☒ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other _____

6) WELL LOG:

Date drilled 5/90

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
6¾	Surface	436

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If Gravel Packed give interval ... from 160 ft. to 436 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	14	Topsoil: Red clay
14	27	Sand & gravel
27	60	Blue Shell
60	90	Blue Shell
90	120	Blue Shell
120	140	Blue Shell
140	175	Blue Shell
175	200	Sand: Blue Shell
200	240	Sand: Blue Shell
240	265	Blue Shell: Sand Streaks
265	280	Sand
280	295	Sand: Blue Shell
295	350	Sand
350	367	Blue Shell
367	390	Sand
390	397	Blue Shell
397	434	Sand
434	436	Blue Shell

(Use reverse side if necessary)

RECEIVED
AUG 9 1990
TEXAS WATER COMMISSION

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
4½	N	Plastic	+2	436	40
		Perf	316	436	3/16
		8⅝ Steel	+1	42	

CEMENTING DATA
Cemented from +1 ft. to 160 ft.
Method used _____
Cemented by _____ (Company or Individual)

9) WATER LEVEL:
Static level 200 ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

10) PACKERS: Type Depth
none

11) TYPE PUMP:
☐ Turbine ☐ Jet ☒ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., 360 ft.

12) WELL TESTS:
☐ Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☒ Estimated
Yield: 15 gpm with _____ ft. drawdown after _____ hrs.

13) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☒ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME Jimmy D. Miller (Type or Print) Water Well Drillers Registration No. 2436

ADDRESS P O Box 7 (Street or RFD) Rhome (City) Tx (State) 76078 (Zip)

(Signed) Jimmy D. Miller (Water Well Driller) Miller Drilling Co (Company Name)

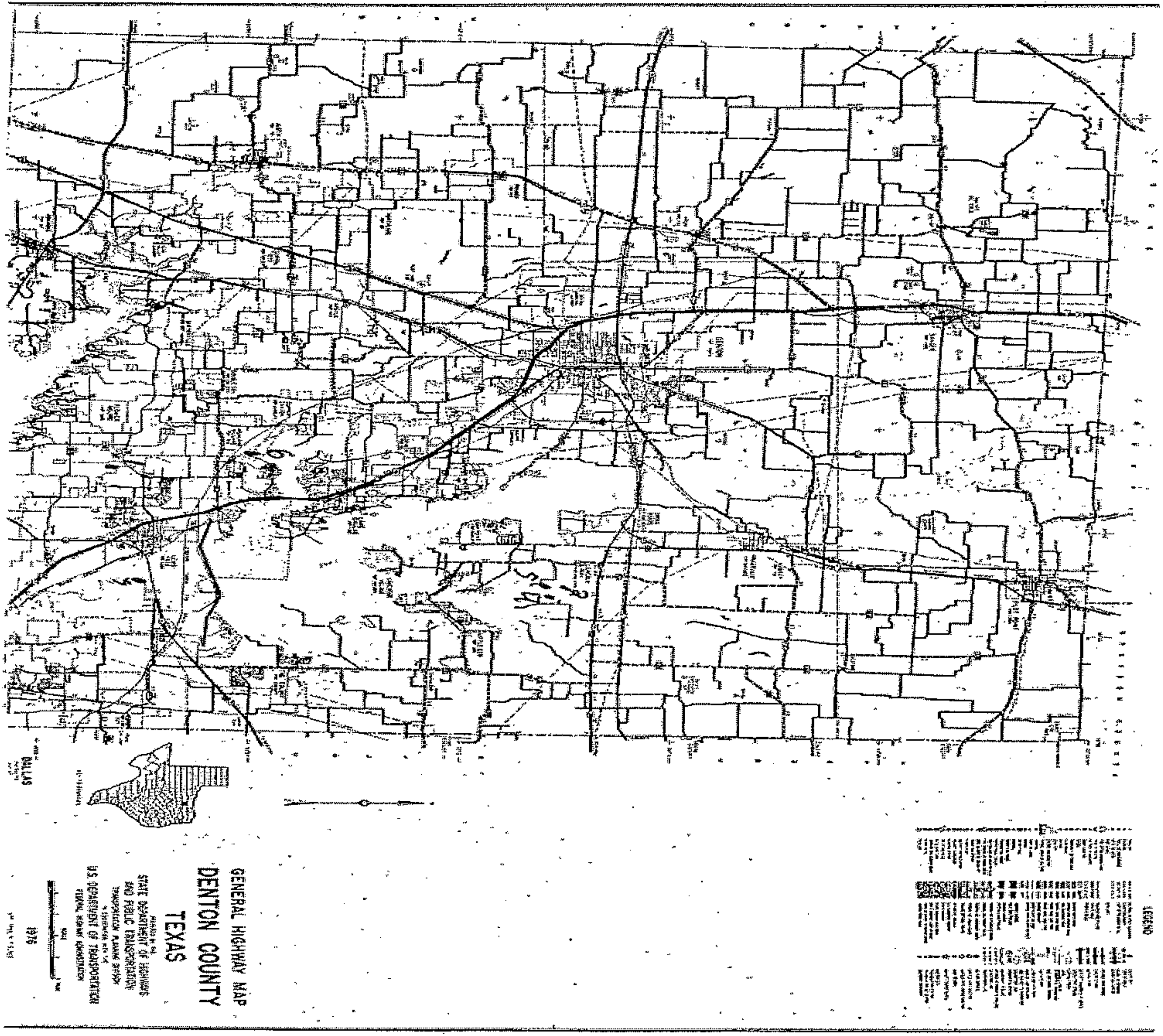
Please attach electric log, chemical analysis, and other pertinent information, if available.

TDWR-0392 (Rev. 1-12-79)

DEPARTMENT OF WATER RESOURCES COPY

Page # 2 out of 2

Water Well ID: 218421



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 9 **Distance from Property: 0.32 mi. NE**

ID NUMBER:	**TX218425**
STATE ID :	**18-57-5H**
OWNER NAME:	**KENNETH HARCROW**
DATE DRILLED:	**04/??/1982**
DEPTH DRILLED:	**410'**
STATIC LEVEL:	**200'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.943439000**
LATITUDE:	**33.047260000**

1 PAGE(S) OF DRILLERS' LOGS

Water Well ID: 218425

Send original copy by
certified mail to the
Texas Department of Water Resources
P. O. Box 13087
Austin, Texas 78711

State of Texas
WATER WELL REPORT
ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

For TDWR use only
Well No. 18-57-5A
Located on map yes
Received: c.f.s.

1) OWNER Kenneth Harcrow (Name) Address Rt 3 Bx 8 (Street or RFD) Lewisville (City) TX (State) (Zip)

2) LOCATION OF WELL:
County Denton ________ miles in ________ (N.E., S.W., etc.) direction from ________ (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

8

☐ Legal description:
Section No. ________ Block No. ________ Township ________
Abstract No. ________ Survey Name ________
Distance and direction from two intersecting section or survey lines ________

☑ See attached map. map on 19-61-9C

3) TYPE OF WORK (Check):
☑ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☑ Domestic ☐ Industrial ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Other ________

5) DRILLING METHOD (Check):
☑ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored
☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other ________

6) WELL LOG:
Date drilled 4-82

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
6 1/4	Surface	

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☑ Gravel Packed ☐ Other
If Gravel Packed give interval . . . from 200 ft. to 410 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	20	Clay & Sand
20	70	Blue Shale
70	140	Lime
140	160	Blue Shale
160	240	Shale & Lime
240	320	Coarse Sand
320	350	Lime
350	390	Coarse Sand
390	410	Lime

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
4½	[✓ New]	[✓ Plastic]	6	410	1/16

CEMENTING DATA
Cemented from 200 ft. to 0 ft.
Method used ________
Cemented by ________ (Company or Individual)

9) WATER LEVEL:
Static level ________ ft. below land surface Date ________
Artesian flow ________ gpm. Date ________

10) PACKERS: Type Depth

11) TYPE PUMP:
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ________
Depth to pump bowls, cylinder, jet, etc., ________ ft.

12) WELL TESTS:
☐ Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ________ gpm with ________ ft. drawdown after ________ hrs.
Not tested

13) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☐ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ________ Depth of strata ________
Was a chemical analysis made? ☐ Yes ☐ No

RECEIVED
AUG 16 1982
DEPT. OF
WATER RESOURCES

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME Joe Miles (Type or Print) Water Well Drillers Registration No. 2156

ADDRESS Box 7 (Street or RFD) Rhome (City) Tx. (State) 76078 (Zip)

(Signed) Joe Miles (Water Well Driller) Miles Drilling Co. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TDWR-0392 (Rev. 1-12-79)

DEPARTMENT OF WATER RESOURCES COPY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 10 **Distance from Property: 0.38 mi. NE**

ID NUMBER:	**TX218423**
STATE ID :	**18-57-5**
OWNER NAME:	**BILL HOUSMAN**
DATE DRILLED:	**11/10/2000**
DEPTH DRILLED:	**215'**
STATIC LEVEL:	**80'**
WATER USAGE:	**INDUSTRIAL**
LONGITUDE:	**-96.941280000**
LATITUDE:	**33.047543000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218423

Send original copy by certified return receipt requested ma[illegible] TNRCC, MC 177, P.O. Box 13087, Austin, TX 78711-30[illegible]

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)

State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
MC 177
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER BILL HOUSMAN (Name) ADDRESS 383 OAK LAWN, DALLAS, TX 75219 (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL: County DENTON HWY 121 LEWISVILLE, TX 75056 (Street, RFD or other) (City) (State) (Zip) GRID # 18 57 05

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Monitor ☐ Environmental Soil Boring ☐ Domestic ☒ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG:
Date Drilling:
Started 1106 2000
Completed 1110 2000

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 7/8	Surface	215

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☒ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☐ Other

N

From (ft.)	To (ft.)	Description and color of formation material
0	4	TOP SOIL
4	50	YELLOW SCALY & gravel
50	170	SHALE
170	171	CAP ROCK
171	175	SHALE
175	180	SHALE
180	181	CAP ROCK
181	197	SAND
197	215	SHALE
215		T.D.

(Use reverse side of Well Owner's copy, if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☒ Gravel Packed ☐ Other
If Gravel Packed give interval ... from 160 ft. to 215 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
4	N	PVC CASING	0	177	#40
4	N	PVC SCREEN	177	197	.020

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 0 ft. to 15 ft. No. of sacks used 7
140 ft. to 150 ft. No. of sacks used 2
Method used PRESSURE
Cemented by DRILLER
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance NO SYSTEM

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☒ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☐ Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level 80 ft. below land surface Date 111100
Artesian flow ____ gpm. Date ____

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☒ Submersible ☐ Cylinder
☐ Other
Depth to pump bowls, cylinder, jet, etc., 160 ft.

14) WELL TESTS:
Type test: ☒ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: 30 gpm with 20 ft. drawdown after 5 hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME SEA-LITE DRILLING CO (Type or print) WELL DRILLER'S LICENSE NO. WPKL 1820

ADDRESS 10634 CR#58 (Street or RFD) CELINA (City) TEXAS (State) 75009 (Zip)

(Signed) RE (Licensed Well Driller) (Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 05-21-96)

White - TNRCC *Yellow - DRILLER* *Pink - WELL OWNER*

TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE (TWDB)

MAP ID# 11 **Distance from Property: 0.42 mi. NE**

STATE ID:	**18-57-503**
OWNER'S NAME:	**RAY GRIMES**
DATE DRILLED:	**10061969**
DEPTH DRILLED:	**390'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.938890000**
LATITUDE:	**33.046390000**
SOURCE:	**TWDB**

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Woodbine
Field No. ______
Owner's Well No. 1
State Well No. 18-57-503
County DENTON

1. Location: ___ 1/4, ___ 1/4 Sec. ___, Block ___ Survey ___
3 mi East of Lewisville
2. Owner: Ray Grimes Address: Rt. 3, Lewisville
Tenant: ______ Address: ______
Driller: D. L. MYERS Address: DENTON
3. Elevation of Lsd is 493 ft. above msl, determined by TOPO
4. Drilled: 10-6 19 69; Dug, Cable Tool, [✓ Rotary,]
5. Depth: Rept. 494 ft. Meas. 390 ft. plugged back !
6. Completion: Open Hole, [✓ Straight Wall,] Underreamed, Gravel Packed
7. Pump: Mfgr. Red JACKET Type Submersible
No. Stages ___, Bowls Diam. ___ in., Setting 340 ft.
Column Diam. ___ in., Length Tailpipe ___ ft.
8. Motor: Fuel Electric Make & Model ______ HP. 1 1/2
9. Yield: Flow ___ gpm, Pump 10 gpm, Meas., [✓ Rept.] Est.
10. Performance Test: Date 10/69 Length of Test -- Made by driller
Static Level 140 ft. Pumping Level 190 ft. Drawdown 50 ft.
Production 15 gpm Specific Capacity 0.3 gpm/ft.
11. Water Level: 140 ft. [✓ rept.] meas. 10/6 1969 above [✓ below] ground level which is ___ ft. above below surface.
___ ft. rept. meas. ___ 19 ___ above below ___ which is ___ ft. above below surface.
___ ft. rept. meas. ___ 19 ___ above below ___ which is ___ ft. above below surface.
___ ft. rept. meas. ___ 19 ___ above below ___ which is ___ ft. above below surface.
12. Use: [✓ Dom.] Stock, Public Supply, Ind., Irr., Waterflooding, Observation, Not Used,
13. Quality: (Remarks on taste, odor, color, etc.)
Temp. ___ °F, Date sampled for analysis ___ Laboratory ___
Temp. ___ °F, Date sampled for analysis ___ Laboratory ___
Temp. ___ °F, Date sampled for analysis ___ Laboratory ___
14. Other data available as circled: [✓ Driller's Log,] [✓ Radioactivity Log,] Electric Log,
Formation Samples, Pumping Test,
15. Record by: Gene DAVIS Date 10-14 1970
Source of Data
16. Remarks: well plugged back from 494 to 390 feet above base

CASING & BLANK PIPE

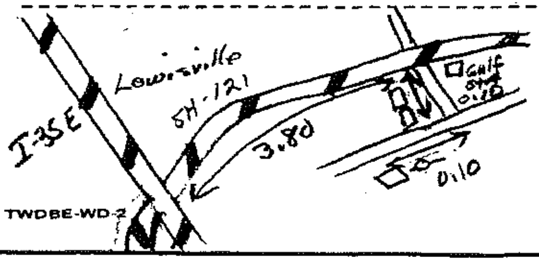
Cemented From 0 ft. to 494 ft.

Diam. (in.)	Type	Setting, ft. from	to
8 5/8	steel	0	30
5 1/2	"	0	494

WELL SCREEN

Screen Openings

Diam. (in.)	Type	Setting, ft. from	to
5 1/2	Gun Perf.	350	358



TWDBE-WD-2

(Sketch)

E - log

18-57-503 ✓

Page # 2 out of 2

State ID: 18-57-503

GW 7

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18-57-5E
Located on map [illegible]
Received: [illegible]
Form GW 8
Form GW 9

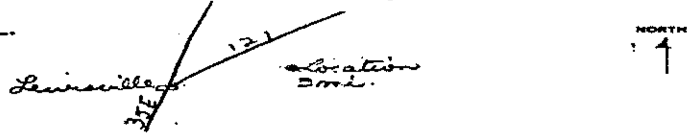
1) OWNER:
Person having well drilled Ray Grimes (Name) Address Route 3 (Street or RFD) Lewisville (City) Texas (State)

Landowner Ray Grimes (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton Labor League Abstract No.

NW¼ NE¼ SW¼ SE¼ of Section Block No. Survey
(Circle as many as are known)

miles in 3 mi. East direction from Lewisville
(NE, SW, etc.) (Town)



Sketch map of well location with distances from adjacent section or survey lines, and to landmarks, roads, and creeks.

3) TYPE OF WORK (Check):
New Well ☒ Deepening ☐
Reconditioning ☐ Plugging ☐

4) PROPOSED USE (Check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

5) TYPE OF WELL (Check):
Rotary ☒ Driven ☐ Dug ☐
Cable ☐ Jetted ☐ Bored ☐

6) WELL LOG:
Diameter of hole 6 3/4 in. Depth drilled 494 ft. Depth of completed well 429-435 ft. Date drilled Oct. 69

All measurements made from 3 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material	From (ft.)	To (ft.)	Description and color of formation material
0	16	Surface Soil	380	429	Sandy Shale
16	171	Sand and Shale	429	494	Sand and Shale
1	260	Sandy Shale			
60	380	Sand and Shale			

(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ☒ Gravel packed ☐ Other ☐ 350'
Under reamed ☐ Open hole ☐ Gun Perforated to
See Gamma Ray 358'

8) WATER LEVEL:
Static level 140 ft. below land surface Date Oct. 1969
Artesian pressure lbs. per square inch Date

9) CASING:
Type: old ☒ New ☐ Steel ☐ Plastic ☐ Other ☐
Cemented from TOP ft. to BOTTOM ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
5½" OD	top	bottom	.275 Wall
8 5/8"	0	30	
	ie Ground	level to 30'	

10) SCREEN:
Type
Perforated ☒ Slotted ☐

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot size

11) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes by whom?
Yield: 15 gpm with 60 ft. drawdown after hrs
Bailer test 15 gpm with 20 ft. drawdown after hrs
Artesian flow gpm Date
Temperature of water
Was a chemical analysis made? ☒ Yes ☐ No
Did any strata contain undesirable water? ☐ Yes ☐ No
Type of water? Fresh depth of strata

12) PUMP DATA:
Manufacturer's Name Red Jacket
Type Submersible H.P. 1½
Designed pumping rate 10 gpm ☒ gph ☐
Type power unit 1 ph. Elec. Motor
Depth to bowls, cylinder, jet, etc., 340 ft. below land surface.

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME D. L. Myers (Type or Print) Water Well Drillers Registration No. 2002

Address RFD #2 (Street or RFD) Denton (City) Texas (State)

(Signed) D L Myers (Water Well Driller) D. L. Myers (Company Name)

Well Plugged back to 390'

Please attach electric log, chemical analysis, and other pertinent information, if available. HW 18-57-503

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 12 **Distance from Property: 0.46 mi. NE**

ID NUMBER:	**TX218427**
STATE ID :	**18-57-5D**
OWNER NAME:	**RALPH H BARFNECT**
DATE DRILLED:	**08/09/1969**
DEPTH DRILLED:	**485'**
STATIC LEVEL:	**125'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.936926000**
LATITUDE:	**33.043798000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218427

18-57-5D

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

State of Texas

WATER WELL REPORT

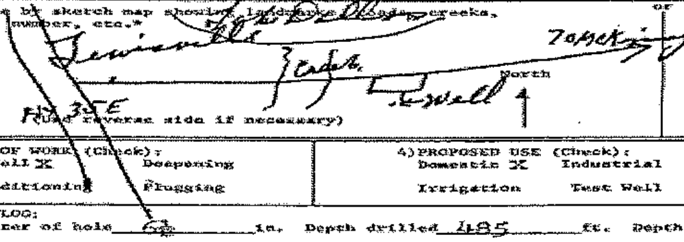
For TWDB use only
Well No. 18-57-5D
Located on map yes
Received: 69
dk

1) OWNER:
Person having well drilled Ralph H. Barfknect (Name) Address Rt Grapevine, Texas (Street or RFD) (City) (State)

Landowner same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton , 3 miles in E (N.E., S.W., etc.) direction from Lewisville (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.* (Use reverse side if necessary)



or

Give legal location with distances and directions from adjacent sections or survey lines.
Labor League
Block Survey
Abstract No.
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check):
New Well X Deepening
Reconditioning Plugging

4) PROPOSED USE (Check):
Domestic X Industrial Municipal
Irrigation Test Well Other

5) TYPE OF WELL (Check):
Rotary X Driven Dug
Cable Jetted Bored

6) WELL LOG:
Diameter of hole 6¾ in. Depth drilled 485 ft. Depth of completed well 485 ft. Date drilled 8-9-69
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	3	red clay
3	10	yellow clay
10	18	gravel
18	42	blue shale
42	142	brown shale
142	160	sand
160	283	broken sand & shale
283	326	sand
326	360	broken sand
360	380	sand
380	399	broken sand
399	430	sand
430	485	shale

(Use reverse side if necessary)

9) Casing:
Type: Old New X Steel X Plastic Other
Cemented from top ft. to 485 ft.
50 sks of cement

Diameter (inches)	Setting From (ft.)	To (ft.)	Gage
4½" OD all the way			

10) SCREEN:
Type
Perforated Slotted

Diameter (inches)	Setting From (ft.)	To (ft.)	Slot Size
4½" OD	414	422	10 shots

7) COMPLETION (Check):
Straight wall X Gravel packed Other
Under reamed Open Hole

8) WATER LEVEL:
Static level 125 ft. below land surface Date 8-9-69
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc., ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No If yes, by whom?
Yield: gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? Yes No
Did any strata contain undesirable water? Yes No
Type of water? depth of strata

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME C. M. Stoner (Type or Print) Water Well Drillers Registration No. 17

ADDRESS Rt. 4 Box 157, Cleburne, Texas (Street or RFD) (City) (State)

(Signed) C M Stoner (Water Well Driller) Stoner Drilling Co. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-GW-53

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 13 **Distance from Property: 0.48 mi. NE**

ID NUMBER:	**TX218426**
STATE ID :	**18-57-5A**
OWNER NAME:	**CLAUD M GRIMES**
DATE DRILLED:	**03/02/1967**
DEPTH DRILLED:	**216'**
STATIC LEVEL:	**85'**
WATER USAGE:	**RURAL HOME**
LONGITUDE:	**-96.936937000**
LATITUDE:	**33.045302000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218426

18-57-5A

File original copy with
Texas Water Development Board
P. O. Box 12386, Capitol Station
Austin, Texas 78711

State of Texas

DRILLERS LOG AND WELL DATA REPORT

For use by TWDB only
Well No. 18-57-5A
Located on map £ C3
By __ Date 67
Map no.

1) Well Owner: Claud M. Grimes (Name) Route # 3, (Street or RFD) ,Lewisville, (City) Texas (State) 75067

2) Land Owner: Same

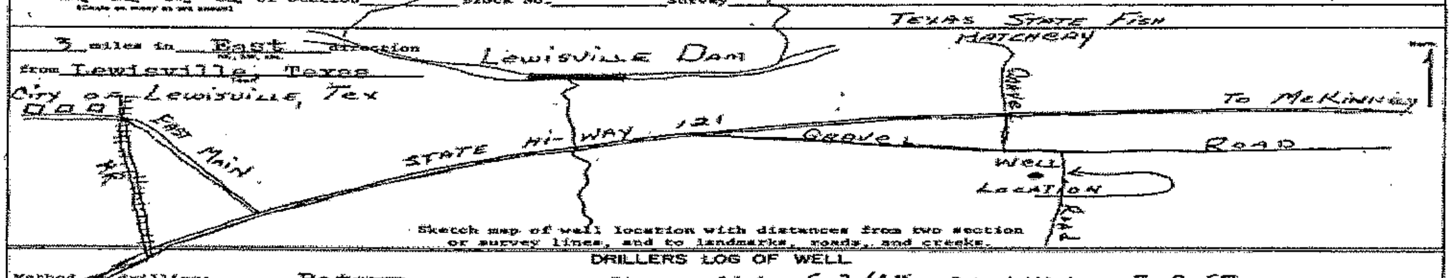
3) Intended use: Industrial ☐ ; Municipal ☐ ; Irrigation ☐ ; Other Rural Home

4) Location of well: County Denton Labor ____ League ____ Abstract No. ____

NW¼ NE¼ SW¼ SE¼ of Section ____ Block No. ____ Survey ____

3 miles in East direction

from Lewisville, Texas (Town)



Sketch map of well location with distances from two section or survey lines, and to landmarks, roads, and creeks.

DRILLERS LOG OF WELL

Method of drilling: Rotary Diameter of hole 6 1/4" in. Date drilled 3-2-67

All measurements made from ____ ft. above ground level.

From (ft)	To (ft)	Description and color of formation material	From (ft)	To (ft)	Description and color of formation material
0	5	Top Soil (Black Clay)	171	175	Gray Shale
5	14	Yellow Clay	175	185	Sand
14	17	Yellow Sandy Clay	185	187	Hard Sand (Sand Stone)
17	36	Sand (Last 6' Coarse Sand)	187	203	Sand
36	87	Gray Shale	203	210	Hard Sand (Not Sand Stone)
87	112	Brown Shale	210	216	Shale (Bottom of Hole)
112	151	Gray Shale			
151	171	Brown Shale			

(Use continuation sheets if necessary)

COMPLETION DATA

COMPLETION

Straight wall ☐
Under reamed ☐
Gravel packed ☐
Open hole ☒
Other ____

CASING

Type: Old ☐ New ☒

Cemented from 176' ft. back to Surface ft.

Diameter (inches)	Setting from (ft)	Setting to (ft)
4 1/2"		
O.D.	Surface	176'
Cemented with 17 sacks		
by pressure process.		

SCREEN

Type None

Perforated ☐ Slotted ☐

Diameter (inches)	Setting from (ft)	Setting to (ft)

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

(Signature) Jack's Water Well Service (Company Name) Reg. No. 328

Please attach electric log, chemical analysis, and other pertinent information if available.

If well was tested by your company or if you installed the permanent pump please complete the following:

WATER LEVEL AND PUMP DATA

Static water level 85' from Surface
ft. below ____

Pumping level feet	hours	gpm
90'	3 hrs.	9 gpm

Pump type 1/2 H.P. Red Jacket Submersible 50 N1 10 MAB
Designed pumping rate 8 gpm gpm ☒ gph ☐
Type power unit 230 Volts, 60 Cy., 1 Phase, 3450 RPM,
Horsepower 5.0 Amps., Max Amps 7.0, KVA/HP M, Cont. Duty, Part # 179-103, Date EB
Depth to bowls, cylinder, jet, etc., [redacted] 147' ft. below [redacted] ground level. Pump # KAM - P - 779

Name of contractor testing well or installing permanent pump if other than your company: ____

UNITED STATES GEOLOGICAL SURVEY NATIONAL WATER INFORMATION SYSTEM (NWIS)

MAP ID# 14 **Distance from Property: 0.52 mi. N**

REPORTING AGENCY: **US GEOLOGICAL SURVEY**
SITE NUMBER: **08053000**
STATION NAME: **ELM FK TRINITY RV NR LEWISVILLE, TX**
SITE TYPE: **STREAM**
LATITUDE: **33.04567730** LONGITUDE: **-96.96111730**
DATE DRILLED: **NOT REPORTED**
WELL DEPTH: **NOT REPORTED**
HOLE DEPTH: **NOT REPORTED**
LOCAL AQUIFER: **NOT REPORTED**

TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE (TWDB)

MAP ID# 15 **Distance from Property: 0.57 mi. NE**

STATE ID:	**18-57-502**
OWNER'S NAME:	**JESSIE PETERS**
DATE DRILLED:	
DEPTH DRILLED:	**500'**
WATER USAGE:	**INDUSTRIAL**
LONGITUDE:	**-96.936110000**
LATITUDE:	**33.046670000**
SOURCE:	**TWDB**

Page # 1 out of 1
State ID: 18-57-502

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Woodbine

Field No.

Owner's Well No.

State Well No. 18-57-502

County DENTON

1. Location: ____ 1/4, ____ 1/4 Sec. ____, Block ____ Survey ____

2. Owner: Jessie Peters Address: Carrolton

Tenant: ____ Address: ____

Driller: ____ Address: ____

3. Elevation of LS is 495 ft. above msl, determined by TOPO

4. Drilled: ____ 19__; Dug, Cable Tool, Rotary, ____

5. Depth: Rept. ±500 ft. Meas. ____ ft.

6. Completion: Open Hole, Straight Wall, Underreamed, Gravel Packed ____

7. Pump: Mfgr. ____ Type Subm

No. Stages ____, Bowls Diam. ____ in., Setting ____ ft.

Column Diam. ____ in., Length Tailpipe ____ ft.

8. Motor: Fuel elect Make & Model ____ HP. ____

9. Yield: Flow ____ gpm, Pump ____ gpm, Meas., Rept., Est. ____

10. Performance Test: Date ____ Length of Test ____ Made by ____

Static Level ____ ft. Pumping Level ____ ft. Drawdown ____ ft.

Production ____ gpm Specific Capacity ____ gpm/ft.

CASING & BLANK PIPE

Cemented From ____ ft. to ____ ft.

Diam. (in.)	Type	Setting, ft.	
		from	to
6	steel		

11. Water Level: ____ ft. rept. meas. ____ 19__ above below ____ which is ____ ft. above below surface.

85.3 ft. rept. [✓ meas.] 3-15 1976 above [✓ below] Top of casing which is 2.4 ft. [✓ above] below surface.

____ ft. rept. meas. ____ 19__ above below ____ which is ____ ft. above below surface.

____ ft. rept. meas. ____ 19__ above below ____ which is ____ ft. above below surface.

12. Use: Dom., Stock, Public Supply, [✓ Ind.] Irr., Waterflooding, Observation, Not Used. Gravel Pit

13. Quality: (Remarks on taste, odor, color, etc.) ____

Temp. ____ °F, Date sampled for analysis ____ Laboratory ____

Temp. ____ °F, Date sampled for analysis ____ Laboratory ____

Temp. ____ °F, Date sampled for analysis ____ Laboratory ____

14. Other data available as circled: Driller's Log, Radioactivity Log, Electric Log, Formation Samples, Pumping Test,

15. Record by: A Nordstrom Date 3-15 1976

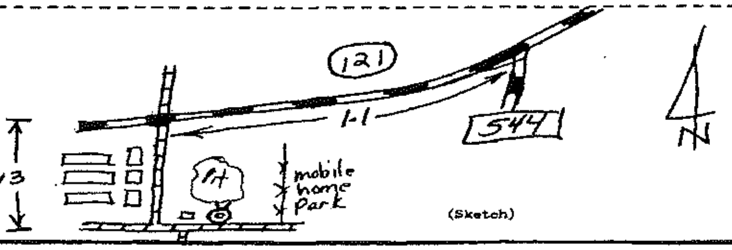
Source of Data obs

16. Remarks: 2½" discharge pipe

WELL SCREEN

Screen Openings ____

Diam. (in.)	Type	Setting, ft.	
		from	to



TWDBE-WD-2 (Sketch)

18-57-502

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 16 **Distance from Property: 0.70 mi. N**

ID NUMBER: **TX218428**

STATE ID : **17-12-7** Note: This well is located in Lamar County.

OWNER NAME: **TRAVIS BARBER**

DATE DRILLED: **04/11/1999**

DEPTH DRILLED: **162'**

STATIC LEVEL: **40'**

WATER USAGE: **DOMESTIC**

LONGITUDE: **-95.589558000**

LATITUDE: **33.750141000**

1 PAGE(S) OF DRILLERS' LOGS

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

Page # 1 out of 1

Water Well ID: 218248

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

139 *Please use black ink.*

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER TRAVIS BARBER (Name) ADDRESS Rt 1 - Box 528E - PARIS, TX, 75460 (Street or RFD) (City) (State) (Zip)

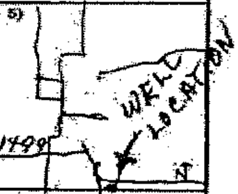
2) ADDRESS OF WELL: County LAMAR SAME AS ABOVE (Street, RFD or other) (City) (State) (Zip) GRID # 17-12-7

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Monitor ☐ Environmental Soil Boring ☒ Domestic ☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell

If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)



6) WELL LOG:
Date Drilling:
Started 4/6 19 99
Completed 4-11 19 99

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8 3/4"	Surface	162

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☒ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☐ Other

From (ft.)	To (ft.)	Description and color of formation material
0	4'	Topsoil & SANDY LOAM
4'	15'	YELLOW CLAY
15'	18'	DRY SAND
18'	35'	YELLOW HARD CLAY
35'	85'	BLUE SHALE
85'	90'	GRAVEL + SAND LAYERS
90'	97'	COARSE GRAVEL + LAYER
97'	104'	BLUE SHALE LAYERS
104'	110'	PACK SAND - (WATER)
110'	119'	SHALE LAYER (BLUE)
119'	127'	ROCK LAYERS + SAND
127'	130'	SAND - PACKED GREY
130'	135'	HARD ROCK LAYERS
135'	160	SAND + GRAVEL LAYERS
160'	162'	BLUE SHALE (BOTTOM)

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☒ Gravel Packed ☐ Other

If Gravel Packed give interval ... from 14 ft. to 160 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
5"	New	60 FT PERF PVC	100'	160'	3/32"
5"	NEW	P/C SOLID ABOVE 2' SURFACE		100	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 0 ft. to 14 ft. No. of sacks used 12
ft. to ft. No. of sacks used
Method used MIXED
Cemented by Melvin E. CATO
Distance to septic system field lines or other concentrated contamination 85 ft.
Method of verification of above distance MEASURED

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☐ Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level 40 ft. below land surface Date 4-11-99
Artesian flow gpm. Date

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☒ Submersible ☐ Cylinder
☐ Other
Depth to pump bowls, cylinder, jet, etc., ft.

14) WELL TESTS:
Type test: ☒ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: 15 gpm with 12 ft. drawdown after 8 hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Good Depth of strata
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME CATO WELL DRILLING (Type or print) WELL DRILLER'S LICENSE NO. 2251-P

ADDRESS Rt 1 - Box 415 (Street or RFD) PARIS (City) TX (State) 75460-9758 (Zip)

(Signed) Melvin E. Cato (Licensed Well Driller) (Signed) (Registered Driller Trainee)

FILE ID
SEQ #
MAY 1999
COMMENT
CB

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

TNRCC COPY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 16 **Distance from Property: 0.70 mi. N**

ID NUMBER:	**TX218428**
STATE ID :	**18-57-7J**
OWNER NAME:	**MR EDWARD P RENNES**
DATE DRILLED:	**05/12/1978**
DEPTH DRILLED:	**320'**
STATIC LEVEL:	**120'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.967172000**
LATITUDE:	**33.044497000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218428

RECEIVED
AUG 24 1978
DEPT. OF
WATER RESOURCES

75 GW 7

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

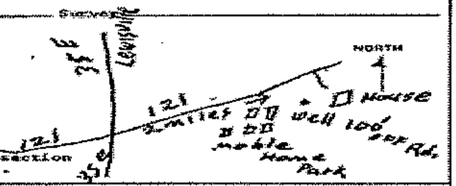
State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18-37-7J
Located on map 403
Received: 787
Form GW 8
Form GW 9

1) OWNER:
Person having well drilled Mr. Edward P. Reeves (Name) Address Lewisville Mobile Home Pk (Street or RFD) (City) (State)
Landowner Same (Name) Address Lewisville, Texas (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Denton Labor League Abstract No.
NW¼ NE¼ SW¼ SE¼ of Section Block No. Survey
(Circle as many as are known)
2 miles in N.E. (NE, SW, etc.) direction from Lewisville (Town)



Sketch map of well location with distances from adjacent section or survey lines, and to landmarks, roads, and creeks.

3) TYPE OF WORK (Check):
New Well ☑ Deepening ☐
Reconditioning ☐ Plugging ☐

4) PROPOSED USE (Check):
Domestic ☑ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

5) TYPE OF WELL (Check):
Rotary ☑ Driven ☐ Dug ☐
Cable ☐ Jetted ☐ Bored ☐

6) WELL LOG:
Diameter of hole 6¼ in. Depth drilled 320 ft. Depth of completed well 320 ft. Date drilled 5-12-78
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material	From (ft.)	To (ft.)	Description and color of formation material
0	20	Sand	281	302	Sand & Shale
20	24	Gravel	302	319	Sand
24	80	Shale	319	320	Shale
80	168	Shale - Rock			
168	190	Sand			
190	201	Shale			
201	216	Sandy shale			
216	281	Shale			(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ☐ Gravel packed ☑ Other ☐
Under reamed ☐ Open hole ☐

8) WATER LEVEL:
Static level 120 ft. below land surface Date 5-15-78
Artesian pressure lbs. per square inch Date

9) CASING:
Type: old ☐ New ☑ Steel ☑ Plastic ☐ Other ☐
Cemented from 0 ft. to 320 ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4½	0	300	10½ lb.

10) SCREEN:
Type
Perforated ☐ Slotted ☐

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot size

11) WELL TESTS:
Was a pump test made? ☐ Yes ☑ No If yes by whom?
Yield: gpm with ft. drawdown after hrs
Bailer test gpm with ft. drawdown after hrs
Artesian flow gpm Date
Temperature of water
Was a chemical analysis made? ☐ Yes ☐ No
Did any strata contain undesirable water? ☐ Yes ☐ No
Type of water? depth of strata

12) PUMP DATA:
Manufacturer's Name Aermotor
Type Aermotor Sub. H.P. 1
Designed pumping rate 12 gpm ☑ gph ☐
Type power unit
Depth to bowls, cylinder, jet, etc., 273 ft. below land surface.

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME Claud Boyd (Type or Print) Water Well Drillers Registration No. 481
Address Frisco Tex Box 344 (Street or RFD) (City) (State)
(Signed) Claud Boyd (Water Well Driller) Boyd Drilling Co (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE (TWDB)

MAP ID# 17 **Distance from Property: 0.78 mi. NE**

STATE ID:	**18-57-504**
OWNER'S NAME:	**CLIFTON MYERS**
DATE DRILLED:	**10001969**
DEPTH DRILLED:	**494'**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.931670000**
LATITUDE:	**33.045560000**
SOURCE:	**TWDB**

State ID: 18-57-504

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Woodbine

Field No.

Owner's Well No.

State Well No. 18-57-504

County DENTON

1. Location: 1/4, 1/4 Sec., Block Survey 3 miles East from Lewisville
2. Owner: CLIFTON W. MYERS Address: 1810 WALNUT, DENTON
   Tenant: Address:
   Driller: D. L. MYERS 492 Address:
3. Elevation of LSD is 495 ft. above msl, determined by TWDB Topo
4. Drilled: Oct 1969; Dug, Cable Tool, [✓ Rotary,]
5. Depth: Rept. 494 ft. Meas. ft.
6. Completion: Open Hole, [✓ Straight Wall,] Underreamed, Gravel Packed
7. Pump: Mfgr. Red JACKET Type SUBM
   No. Stages, Bowls Diam. in., Setting 340 ft.
   Column Diam. in., Length Tailpipe ft.
8. Motor: Fuel ELEC. Make & Model HP. 1 1/2
9. Yield: Flow gpm, Pump 10 gpm, Meas., [✓ Rept.,] Est.
10. Performance Test: Date 10-69 Length of Test Made by driller
    Static Level 150 ft. Pumping Level 200 ft. Drawdown 50 ft.
    Production 15 gpm Specific Capacity gpm/ft.
11. Water Level: 150 ft. [✓ rept.] meas. 10 1969 above [✓ below] ground level which is ft. above below surface.
    ft. rept. meas. 19 above below which is ft. above below surface.
    ft. rept. meas. 19 above below which is ft. above below surface.
    ft. rept. meas. 19 above below which is ft. above below surface.
12. Use: [✓ Dom.], Stock, Public Supply, Ind., Irr., Waterflooding, Observation, Not Used,
13. Quality: (Remarks on taste, odor, color, etc.)
    Temp. °F, Date sampled for analysis Laboratory
    Temp. °F, Date sampled for analysis Laboratory
    Temp. °F, Date sampled for analysis Laboratory
14. Other data available as circled: [✓ Driller's Log,] [✓ Radioactivity Log,] Electric Log, Formation Samples, Pumping Test,
15. Record by: Gene DAVIS Date 10-14 1976
    Source of Data DL, + obs.
16. Remarks: No one home

CASING & BLANK PIPE

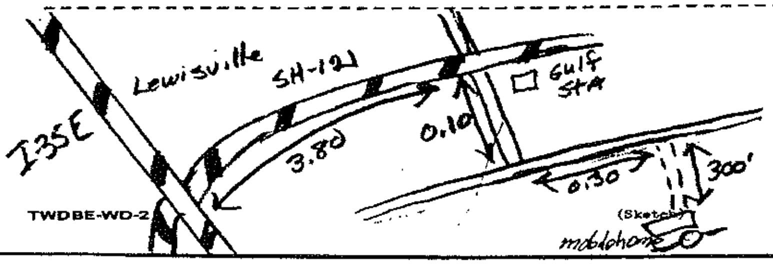
Cemented From 0 ft. to 494 ft.

Diam. (in.)	Type	Setting, ft. from	Setting, ft. to
8 5/8	steel	0	30
5 1/2	"	0	494

WELL SCREEN

Screen Openings

Diam. (in.)	Type	Setting, ft. from	Setting, ft. to
5 1/2	10 Shots gun perf.	454	463



(Sketch)

TWDBE-WD-2

E - log

18-57-504

GW 7

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 12386
Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 18-57-5R
Located on map [illegible]
Received: [illegible]
Form GW 8 ______
Form GW 9 ______

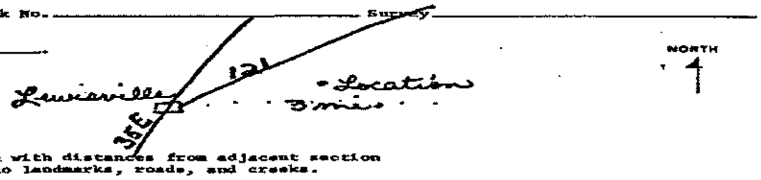
1) OWNER:
Person having well drilled Clifton W. Myers (Name) Address 1810 Walnut (Street or RFD) Denton (City) Texas (State)

Landowner Clifton W. Myers (Name) Address ______ (Street or RFD) ______ (City) ______ (State)

2) LOCATION OF WELL:
County Denton ______ Labor ______ League ______ Abstract No. ______

NW¼ NE¼ SW¼ SE¼ of Section ______ Block No. ______ Survey ______
(Circle as many as are known)

miles in 3 mi. East (N.E., S.W., etc.) direction from Lewisville (Town)



Sketch map of well location with distances from adjacent section or survey lines, and to landmarks, roads, and creeks.

3) TYPE OF WORK (Check):
New Well ☒ Deepening ☐
Reconditioning ☐ Plugging ☐

4) PROPOSED USE (Check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

5) TYPE OF WELL (Check):
Rotary ☒ Driven ☐ Dug ☐
Cable ☐ Jetted ☐ Bored ☐

6) WELL LOG:
Diameter of hole 6 3/4 in. Depth drilled 494 ft. Depth of completed well 454-463 ft. Date drilled Oct. 69

All measurements made from 3 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material	From (ft.)	To (ft.)	Description and color of formation material
0	189	Shale and Sand	271	330	Sandy Shale
189	215	Lime	330	494	Shale and Sand
15	251	Sandy Shale			
251	271	Sand			
					(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ☒ Gravel packed ☐ Other ☐
Under reamed ☐ Open hole ☐ Gun Perforated

8) WATER LEVEL:
Static level 150 ft. below land surface Date Oct. 1969
Artesian pressure ______ lbs. per square inch Date ______

9) CASING: See Gamma Ray
Type: old ☒ New ☐ Steel ☐ Plastic ☐ Other ☐
Cemented from TOP ft. to BOTTOM ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
5½" OD	top	bottom	.275 Wall
8 5/8"	0	30	
	ie Ground	level to 30"	

10) SCREEN:
Type ______
gun Perforated ☒ Slotted ☐

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot size
10 Shots	454	463	

11) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes by whom? ______
Yield: 15 gpm with 50 ft. drawdown after ______ hrs
Bailer test 15 gpm with 20 ft. drawdown after ______ hrs
Artesian flow ______ gpm Date ______
Temperature of water ______
Was a chemical analysis made? ☐ Yes ☐ No
Did any strata contain undesirable water? ☐ Yes ☐ No
Type of water? Fresh depth of strata ______

12) PUMP DATA:
Manufacturer's Name Red Jacket
Type Submersible H.P. 1½
Designed pumping rate 10 gpm ☒ gph ☐
Type power unit 1 ph Elec. Motor
Depth to bowls, cylinder, jet, etc., 340 ft. below land surface.

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME D. L. Myers (Type or Print) Water Well Drillers Registration No. 2002

Address RFD #2 (Street or RFD) Denton (City) Texas (State)

(Signed) D. L. Myers (Water Well Driller) D. L. Myers (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

HW 18-57-504

SUBMITTED DRILLERS REPORT DATABASE (SDRD)

MAP ID# 18 **Distance from Property: 0.82 mi. E**

TRACK #: **227682**
DATE ENTERED: **08/20/2010**
OWNER NAME: **FBC CARROLLTON**
OWNER ADDRESS: **2400 N JOSEY**
CARROLLTON, TX 75006
COUNTY: **DENTON**
LATITUDE: **33.0322** LONGITUDE: **-96.9297**

WELL LOG:	**WATER LEVEL:**
DRILLING DATE (STARTED): **07/08/10**	STATIC LEVEL: **600'**
DRILLING DATE (COMPLETED): **07/20/10**	WATER LEVEL DATE: **07/30/2010**
DEPTH DRILLED: **1513'**	TYPE OF WATER: **PALUXY**

TYPE OF WORK:

NEW WELL: **X**	REPLACEMENT WELL:
DEEPENING:	RECONDITIONING:

PROPOSED USE:

MONITOR WELL:	DOMESTIC:	ENVIRONMENTAL SOIL BORING:
TEST WELL:	INDUSTRIAL:	GEOTHERMAL HEAT LOOP:
IRRIGATION: **X**	INJECTION:	PUBLIC SUPPLY:
DE-WATERING:	STOCK:	RIG SUPPLY:

COMPANY INFORMATION:

COMPANY NAME: **THI WATER WELL**
COMPANY ADDRESS: **P O BOX 1300**
BOWIE, TX 76230

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 19 **Distance from Property: 0.85 mi. NE**

ID NUMBER:	**TX218432**
STATE ID :	**18-57-8C**
OWNER NAME:	**FELLOWSHIP BAPTIST CHURCH**
DATE DRILLED:	**05/04/1983**
DEPTH DRILLED:	**240'**
STATIC LEVEL:	**NOT REPORTED**
WATER USAGE:	**DOMESTIC**
LONGITUDE:	**-96.929200000**
LATITUDE:	**33.038867000**

1 PAGE(S) OF DRILLERS' LOGS

Page # 1 out of 1

Water Well ID: 218432

Send original copy by
certified mail to the
Texas Department of Water Resources
P. O. Box 13087
Austin, Texas 78711

State of Texas
WATER WELL REPORT

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

For TDWR use only
Well No. 18-57-8C
Located on map yes
Received: 6-83

1) OWNER Fellowship Baptist Church (Name) Address P.O. Box 1001 (Street or RFD) Lewisville, (City) TX (State) 75067 (Zip)

2) LOCATION OF WELL:
County Denton ______ miles in ______ (N.E., S.W., etc.) direction from ______ (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. ______ Block No. ______ Township ______
Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☒ See attached map #13 Map on 19-64-2)

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☒ Domestic ☐ Industrial ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Other ______

5) DRILLING METHOD (Check):
☒ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored
☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other ______

6) WELL LOG:

Date drilled 5-4-83

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
6½"	Surface	240

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from ______ ft. to ______ ft.

From (ft.)	To (ft.)	Description and color of formation material
0	9	Surface
9	35	Sand
35	52	Shale
52	61	Sandy Shale
61	67	Sand
67	80	Shale
80	99	Sandy Shale
99	119	Sand
119	124	Sandy Shale
124	141	Sand
141	156	Sandy Shale
156	220	Sand
220	230	Shale
230	238	Sand
238	240	Shale

(Use reverse side if necessary)

RECEIVED
MAY 26 1983
DEPT. OF
WATER RESOURCES

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setting (ft.)		Gage Casing Screen
			From	To	
4½		Steel	0	235	

CEMENTING DATA
Cemented from 0 ft. to 235 ft.
Method used Halliburton
Cemented by Gene's Waterwell Service (Company or Individual)

9) WATER LEVEL:
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

10) PACKERS: Type Depth

11) TYPE PUMP:
☐ Turbine ☐ Jet ☒ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

12) WELL TESTS:
☐ Type Test: ☐ Pump ☒ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

13) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☐ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME Gene Huckabee (Type or Print) Water Well Drillers Registration No. 2197

ADDRESS Rt. 4, 2610 Shady Shores Rd. (Street or RFD) Denton, (City) TX (State) 76201 (Zip)

(Signed) Gene Huckabee (Water Well Driller) Gene's Waterwell Service (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TDWR-0392 (Rev. 1-12-79)

DEPARTMENT OF WATER RESOURCES COPY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

MAP ID# 20 **Distance from Property: 0.91 mi. NW**

ID NUMBER:	**TX218420**
STATE ID :	**18-57-4A**
OWNER NAME:	**H B WILLIAMS**
DATE DRILLED:	**07/11/1965**
DEPTH DRILLED:	**104'**
STATIC LEVEL:	**40'**
WATER USAGE:	**HOUSEHOLD**
LONGITUDE:	**-96.970664000**
LATITUDE:	**33.045573000**

1 PAGE(S) OF DRILLERS' LOGS

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER WELLS (TCEQ)

Page # 1 out of 1

Water Well ID: 218420

18-57-4A

File original copy with
Texas Water Development Board
P. O. Box 12386, Capitol Station
Austin, Texas 78711

State of Texas

DRILLERS LOG AND WELL DATA REPORT

For use by TWDB only
Well No. 18-57-4A
Located on map 1/22
By [illegible] Date 7-66
Map no. 61

1) Well Owner: H. B. Williams (Name) Route # 3, Lewisville, Texas (Street & RFD) (City) (State)

2) Land Owner: Same as Above (Name) (Street or RFD) (City) (State)

3) Intended use: Industrial ☐ Municipal ☐ Irrigation ☐ Other Household

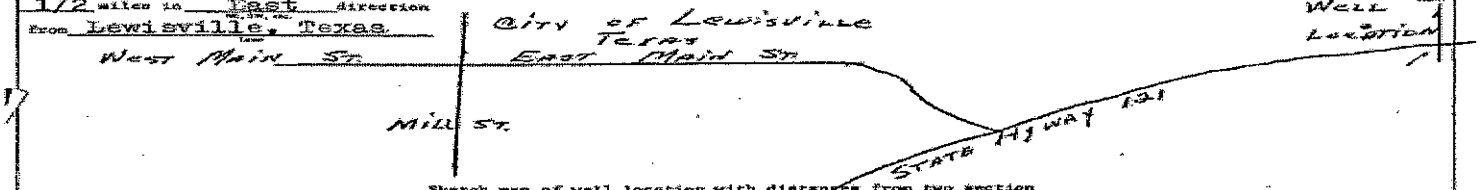
4) Location of well: County Denton Labor ____ League ____ Abstract No. ____

NW¼ NE¼ SW¼ SE¼ of Section ____ Block No. ____ Survey ____ (Circle as many as are known)

1/2 mile East of City Limits of Lewisville, Texas on HYway (STATE) 121

1/2 miles in East (NE, SW, etc.) direction

from Lewisville, Texas (Town)



Sketch map of well location with distances from two section or survey lines, and to landmarks, roads, and creeks.

DRILLERS LOG OF WELL

Method of drilling: Rotary Diameter of hole 6 1/4" in. Date drilled 7-11-65

All measurements made from 0 ft. above ground level.

From (ft)	To (ft)	Description and color of formation material	From (ft)	To (ft)	Description and color of formation material
0	25	Surface Sand	55	57	Sand
25	35	Shale	57	59	Shale
35	37	Small Gravel	59	62	Hard Sand (Sandstone)
37	38	Sandy Shale	62	70	Sandy Shale
38	41	Sand	70	83	Sand
41	49	Shale	83	104	Very sandy shale and sand streaks.
49	54	Sand			
54	55	Shale			

(Use continuation sheets if necessary)

COMPLETION DATA

COMPLETION

Straight wall ☐
Under reamed ☐
Gravel packed ☐
Open hole ☒
Other ____

CASING

Type: Old ☐ New ☒
Cemented from 72 ft. back to surface ft.

Diameter (inches)	Setting from (ft)	Setting to (ft)
4 1/2	Surface	72'

SCREEN

Type None
Perforated ☐ Slotted ☐

Diameter (inches)	Setting from (ft)	Setting to (ft)

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

Jack's Water Well Service (Company Name) Reg. No. 328

Please attach electric log, chemical analysis, and other pertinent information if available.

If well was tested by your company or if you installed the permanent pump please complete the following:

WATER LEVEL AND PUMP DATA

Static water level 40'
ft. below Surface

Pumping level

Feet	hours	gpm
77'	2 Hrs.	3

Pump type 5" Stroke Pump Jack
Designed pumping rate 3 gpm ☒ gph ☐
Type power unit 1/2 HP Electric Motor
Horsepower 1/2
Depth to bowls, cylinder, jet, etc., 77 ft. below pump base.

Name of contractor testing well or installing permanent pump if other than your company: ____

NWIS United States Geological Survey National Water Information System

VERSION DATE: 3/2011

The USGS National Water Information System includes water-resources data for approximately 1.5 million sites across the United States from 1857 to present. The USGS investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing our water resources.

SSDRD Select Submitted Drillers Report Database Wells

VERSION DATE: 10/2010

This Texas Water Development Board database was created from the online Texas Well Report Submission and Retrieval System (a cooperative TDLR, TWDB system) that registered water-well drillers use to submit their required reports. The system was started in February 2001 and is optional for the drillers to use. This data excludes the following well types: Monitor Wells, Environmental Soil Borings, Injections Wells and Test Wells.

TCEQ Texas Commission on Environmental Quality Water Wells

VERSION DATE: NR

The Texas Commission on Environmental Quality (TCEQ) maintains a filing system of plotted and unnumbered water wells. Plotted water wells are filed according to the County indicated by the driller and the state well number assigned by State of Texas personnel. Given the available location information provided by the driller, personnel identify where the approximate well location should be. After well placement a state well number is assigned indicating that the well lies within a specific 2.5' section of a 7.5' quadrangle. This method allows for quicker, more refined, reference when researching a specific area. Unnumbered water wells have not been assigned a state well number. This can occur for a variety of reasons; however it does not mean the well cannot be accurately spotted. Unnumbered water well records are filed according to County and are often broken up by year or by a span of years.

TWDB Texas Water Development Board Groundwater Database

VERSION DATE: 10/2010

The Texas Water Development Board Groundwater Database contains information for more than 123,500 sites in Texas including data on water wells, springs, oil/gas tests, water levels, and water quality. The purpose of the Board's data collection effort over the years has been to gain representative information about aquifers in the state in order to do water planning. It is very important, however, to realize that the wells in the database represent only a small percentage of the wells that actually exist in Texas. A registered water well driller is required by law to send in a report to the State for every well that is drilled. This requirement began in 1965, and we estimate that approximately 500,000 wells have been drilled in Texas since then. Of the 1,000,000 plus water wells drilled in Texas over the past 100 years, more than 130,000 have been inventoried and placed into the TWDB groundwater database. State well numbers have been assigned to these based on their location within numbered 7 1/2 minute quadrangles formed by lines of latitude and longitude. This database contains well information including location, depth, well type, owner, driller, construction and completion data.

WUD Water Utility Database

VERSION DATE: NR

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public

Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health. The information in this report reflects the most current data available from the Water Utility Database at the time of this report.

TWDB WATER WELL GRID MAP
FIGURE IIIG-A-69

APPENDIX IIIG-B

SITE EXPLORATION DATA

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CONTENTS

Robert S. Ferbend

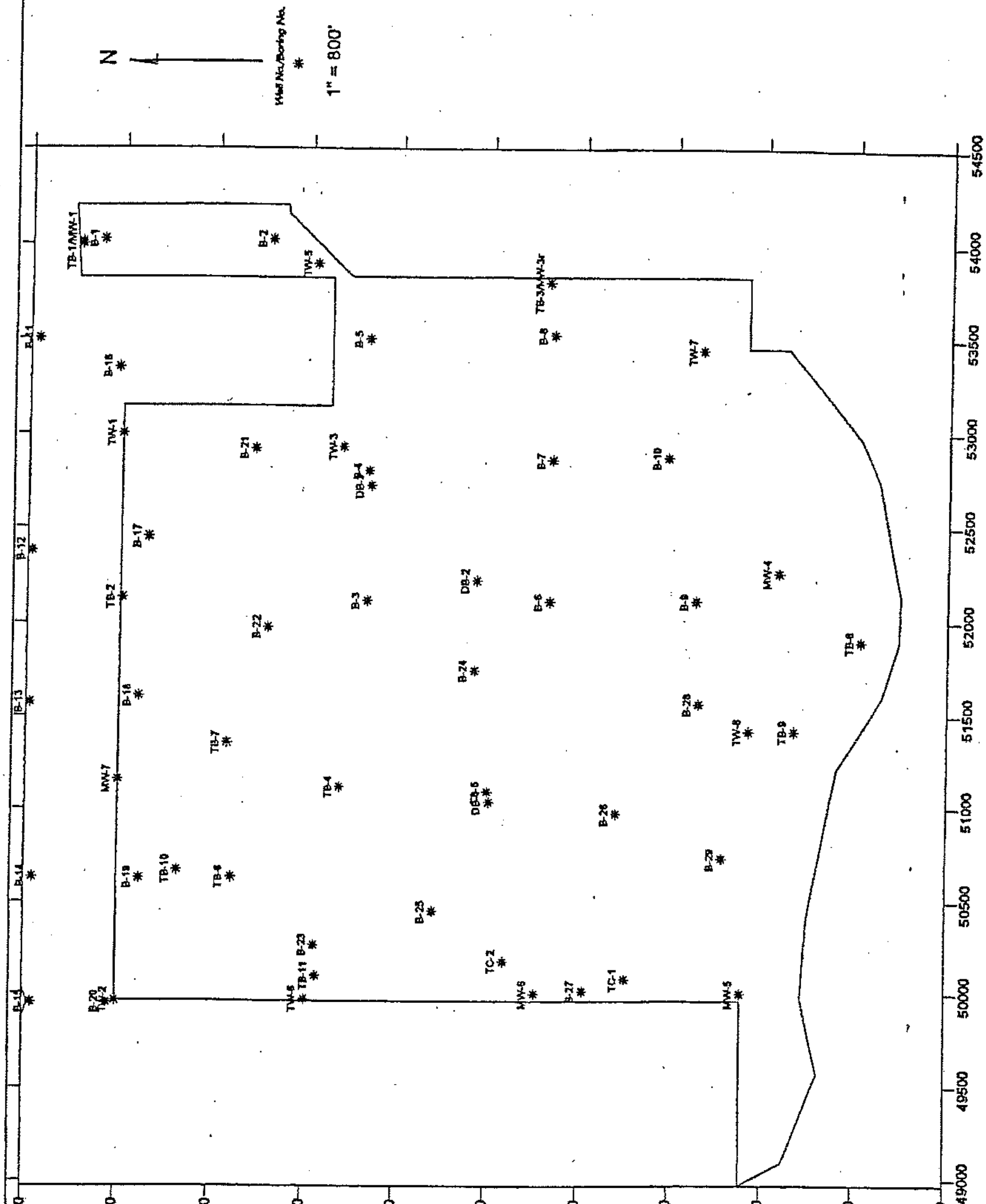
STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

BORING AND MONITORING WELL LOCATION INFORMATION

Figure IIIG-B-1A shows the location of the 57 boreholes used by Reed Engineering for the subsurface characterization in the TCEQ Permit No. 1312A application. The previous subsurface investigation borehole location map was scanned and the existing boring locations were transferred to the Figure IIIG-B-2 Soil Boring Location Map. After transferring the borehole locations to Figure IIIG-B-2, the borehole coordinates were identified and included in Table 2-3 of Section 2 in Appendix IIIG. All existing monitoring wells and WBC-advanced boreholes have been positioned by their WBC-surveyed location coordinates on the WBC borehole logs, in Table 2-3, and the surveyed coordinates were used for borehole locations on Figure IIIG-B-2.

reed engineering
GROUP

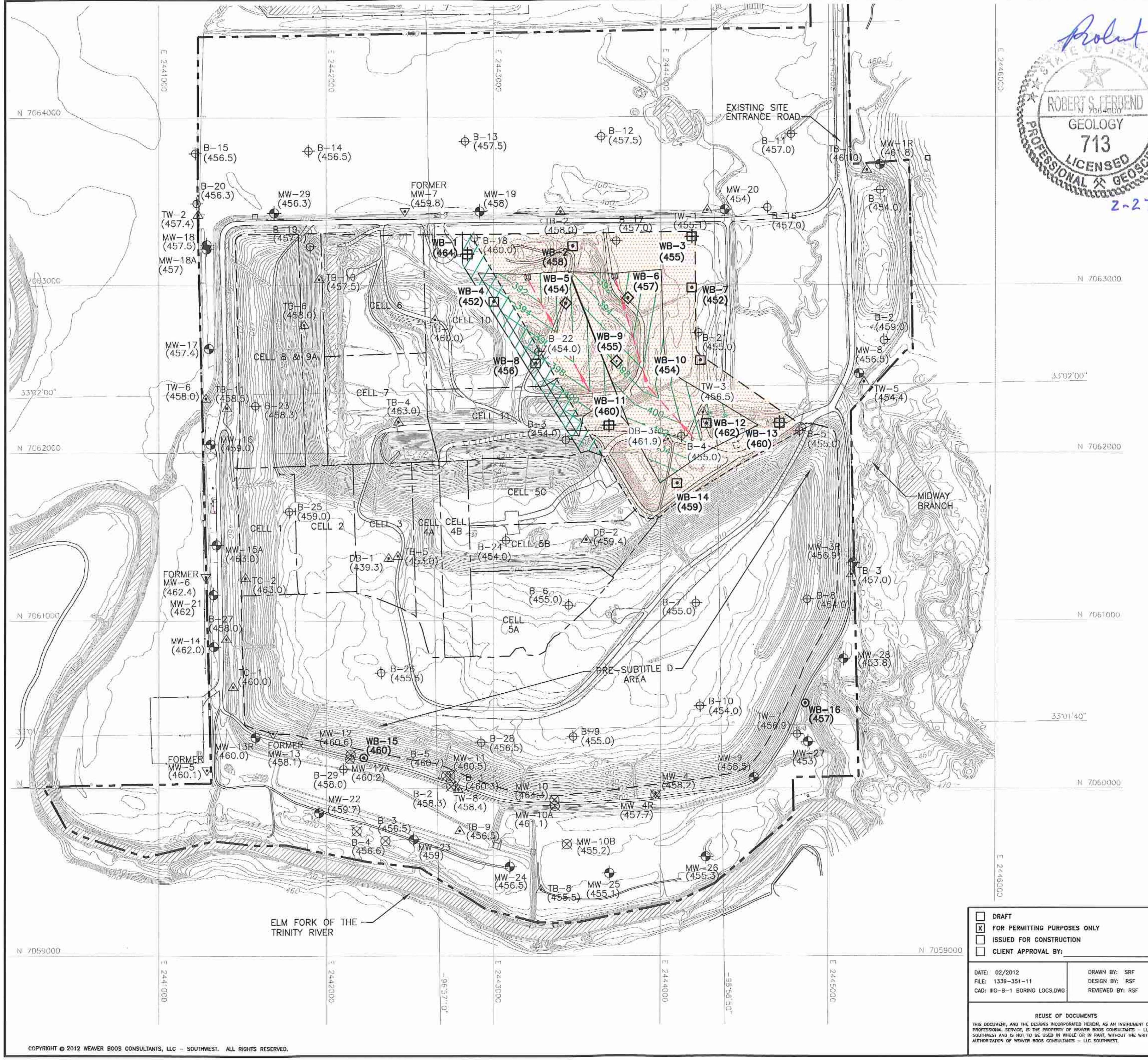


APPENDIX

PLAN OF BORINGS

PLATE B-1

GEOTECHNICAL CONSULTANTS



ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend

2-27-12

N

0 300 600

SCALE IN FEET

LEGEND

— — —	PERMIT BOUNDARY (SEE NOTE 2)
- - - - -	PERMITTED LIMITS OF WASTE
— — — —	PROPOSED LIMITS OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
═	EXISTING ROAD
500	EXISTING TOPOGRAPHIC CONTOUR
394	PROPOSED EXCAVATION
— ◄ —	PROPOSED LEACHATE COLLECTION PIPE
⊡	PROPOSED LEACHATE COLLECTION SUMP
▨	PROPOSED DEEPER EXCAVATION AREA
▨	PROPOSED WASTE FOOTPRINT LATERAL EXPANSION AREA
MW-3R (456.9)	EXISTING MONITORING WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
☒ MW-10 (464.3)	OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
▽ FORMER MW-7	FORMER MONITORING WELL LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
B-22 (454.0)	RONE 1980 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
△ TC-1 (460.0)	REED ENGINEERING 1994 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL.
◇ **WB-5** **(454)**	WBC BORING AT LEAST 5 FEET BELOW EDE WITH SURFACE ELEVATION POSTED IN FT-MSL
⊡ **WB-2** **(460)**	WBC BORING AT LEAST 30 FEET BELOW EDE WITH SURFACE ELEVATION POSTED IN FT-MSL
⊞ **WB-1** **(464)**	WBC BORING AT LEAST 5 FEET BELOW EDE WITH PIEZOMETER INSTALLED AND SURFACE ELEVATION POSTED IN FT-MSL
⊙ **WB-15** **(460)**	WBC GEOTECHNICAL BORING FOR STRENGTH TESTING WITH SURFACE ELEVATION POSTED IN FT-MSL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. NO BORING LOG FOR MONITOR WELL MW-13R HAS BEEN LOCATED. THE LOCATION OF THIS MONITOR WELL HAS BEEN INCLUDED FOR INFORMATION PURPOSES.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-B-1 BORING LOCS.DWG

DRAWN BY: SRF
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
SOIL BORING LOCATION MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-B-2

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-B-2 SOIL BORING LOC MAP.dwg, 2/21/2012 3:41:47 PM, rsellers

1979 RONE ENGINEERS GEOTECHNICAL BORING LOGS

Log of Boring

Number: B-1

Location: see Plan of Borings

Project: Landfill, Farmers Branch

Completion Depth: 34.0'

Date: 2/13/79

Water Observations: Dry @ completion; water @ 29'10" & caved @ 31'4" on 2/15/79

Type: Core

Surface Elevation: ~454

Depth Feet	Stratum Description		N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
	Dark brown clay	(CH)		21		61	25	36	17	
				15						
				12						
10				17		64	25	39	19	
				17						
20	Gray clay	(CH)		26		87	33	54	23	
	Brownish-gray clay	(CH)		28		54	26	28	16	
30	Dark gray shale			18						
40										
50										

APPENDIX

Log of Boring

Number: B-2

Location: see Plan of Borings

Project: Landfill, Farmers Branch

Completion Depth: 31.0'

Date: 2/12/79

Water Observations: Drilled with water; Bailed to 10.0' @ completion; caved @ 30.0' & dry on 2/15/79

Type: Core

Surface Elevation: 455

Depth Feet	Symbol	Samples	Stratum Description		N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
						34						
			Dark brown clay (CH)									
						34	86	74	33	41	21	
						23						
10			Olive-brown clay (CH)			27	96	75	31	44	22	
						33						
20						34		92	29	63	22	
			Gray, tan, and brown clay (jointed) (CH)									
			Gravel (GP)									
			Dark gray shale									
30												
40												
50												

Log of Boring

Number: B-3

Location: see Plan of Borings

Project: Landfill, Farmers Branch

Completion Depth: 16.0'

Date: 2/14/79

Water Observations: dry @ completion; dry on 2/15/79

Type: Core

Surface Elevation: 454

Depth Feet	Symbol	Samples	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
			Dark brown sandy clay (CL)		22						
			Brown and reddish-brown sandy clay (CL)		16		42	19	23	12	
					21						
10											
			Dark gray shale (1" sand seam on top of shale)		22						
					18						
20											
30											
40											
50											

Log of Boring

Number: B-4

Location: see Plan of Borings

Project: Landfill, Farmers Branch

Completion Depth: 20.0'

Date: 2/14/79

Water Observations: dry @ completion; dry on 2/15/79

Type: Core

Surface Elevation: 455

Depth Feet	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
	Dark grayish-brown clay (fill) (CH)		19						
	Tan and gray clayey sand w/sandy clay layers (CL)		25		26	18	8	5	
				(29.4% -#200 Sieve)					
			18						
10	Dark grayish-brown clay w/sandy clay layers (CH)		16						
	Gray clay (CH)								
			17						
	Dark gray shale (2" gravel seam on top of shale)								
20			16						
30									
40									
50									

Log of Boring

Number B-5

Location see Plan of Borings

Project Landfill, Farmers Branch

Completion Depth 20.0'

Date 2/13/79

Water Observations Dry @ completion; water @ 15.0' & caved to 15.5' on 2/15/79

Type Core

Surface Elevation 455

Depth Feet	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
	Dark grayish-brown sandy clay w/clay layers (CL)		22						
			19	109	42	20	22	15	
				(51.3% -#200 Sieve)					
			19						
10	Dark grayish-brown clay w/sandy clay seams (CH)		29		52	22	30	17	
	Dark gray shale w/sand seam @ 15.0'		20						
20			16						
30									
40									
50									

Log of Boring

Number B-6

Location see Plan of Borings

Project Landfill, Farmers Branch

Completion Depth 21.0'

Date 2/14/79

Water Observations dry @ completion; dry on 2/15/79

Type Core

Surface Elevation 455

Feet Depth	Symbol	Samples	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
			Dark grayish-brown clay (fill) (CH)		20						
			Dark brown and gray sandy clay (CL)		26		29	15	14	10	
			Dark brown clay (CH)		18						
10					13		63	26	37	20	
					17						
			Dark gray shale (2" sand and gravel seam on top of shale)								
20											
30											
40											
50											

APPENDIX

Log of Boring

Number: B-7

Location: see Plan of Borings

Project: Landfill, Farmers Branch

Completion Depth: 21.0'

Date: 2/15/79

Water Observations: Dry @ completion; dry on 2/15/79 @ end of day

Type: Core

Surface Elevation: 455

Stratum Description		N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
Dark brown clay	(CH)		16						
Brown and tan sandy clay	(CL)		17						
Dark brown clay	(CH)		20		51	20	31	19	
			27						
Sand and gravel	(GP)		20						
Dark gray shale			17						

APPENDIX

Rone Engineers

Log of Boring

Number: B-8

Location: see Plan of Borings

Project: Landfill, Farmers Branch

Completion Depth: 25.0'

Date: 2/14/79

Water Observations: Seepage @ 19.5'; water @ 18.5' & caved to 19.0' on 2/15/79

Type: Core

Surface Elevation: 464

Depth Feet	Symbol	Samples	Stratum Description		N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
			Dark brown clay	(CH)		35						
						23						
						22		58	24	34	19	
							(79.7% -#200 Sieve)					
10			Dark grayish-brown clay	(CH)		20						
			Tan and brown clayey sand	(SC - CL)		14		25	17	8	4	
20			Dark gray shale			10						
						19						
30												
40												
50												

Log of Boring

Number	B-9
Location	see Plan of Borings
Project	Landfill, Farmers Branch
Completion Depth	26.0'
Date	2/15/79
Water Observations	Water @ 21'9" & caved @ 22.0' at end of day
Type	Core
Surface Elevation	455

Depth Feet	Stratum Description		N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
	Dark grayish-brown clay	(CH)		22						
				36						
				18						
10	Olive and brown clay	(CH)		17						
	Tan clayey sand	(SC - CL)		12		22	13	9	5	
20	Sand and gravel	(GP)		20						
	Gray shale			17						
30										
40										
50										

APPENDIX

Log of Boring

Number B-10

Location see Plan of Borings

Project Landfill, Farmers Branch

Completion Depth 26.0'

Date 2/15/79

Water Observations Water @ 20'10" & caved to 21.0' at end of day

Type Core

Surface Elevation 454

Depth Feet	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Weight Lbs./Cu.Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs./Sq.Ft.
	Tan and brown sandy clay (CL)		21						
	Dark grayish-brown clay (CH)		17						
	Dark brown clay (CH)								
	Brown and gray clay (CH)		23						
10	Brown and tan clay (CH)								
	Tan, gray, and brown sandy clay (CL)		21						
	Tan clayey sand (SC – CL)		13						
20	Dark gray shale		12						
30									
40									
50									

APPENDIX

1980 RONE ENGINEERS GEOTECHNICAL BORING LOGS

Log of Boring

Number B-11

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 41.0'

Date 4/25/80

Water Observations Drilled w/water; caved @ 30' on 4-25-80

Surface El. 457

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		20						
			25						
5			20						
10	Tan to reddish-tan clay w/trace of fine sand & gray clay seams (CH)		18						
15			22		51	21	30	18	
20	Tan and gray clay, w/trace of fine sand (CH)		26						
25			24		60	23	37	20	
30			25						
35	Tan & gray sandy clay (CL)		22		(80% -#200 sieve)				
	Dark gray shale								
40									
45									
50									

APPENDIX

Rone Engineers

Log of Boring

Number B-12

Location see Plan of Borings

Project Landfill, Hebron

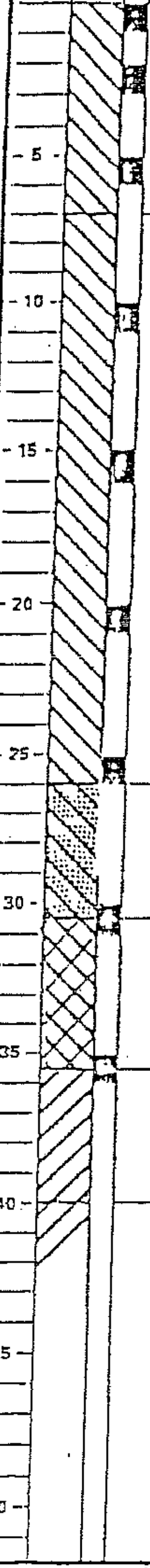
Completion Depth 40.0'

Date 4/24/80

Water Observations Dry @ completion & in 1 hr.; dry & caved to 35' on 4-25-80

Surface El. 457.5

Type Core



Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		23						
			23		67	29	38	21	
					(96% -#200 sieve)				
5			23						
10	Brown to light brown clay w/trace of fine sand & small calcareous nodules (CH)		23		64	27	37	20	
15			15						
20			20						
25			17		56	22	34	19	
	Light brown sandy clay w/some small gravel (CL)								
30	Dark gray and brown shaly clay (weathered shale) (CH)		24						
35	Dark gray shale		17						
40									
45									
50									

Log of Boring

Number B-13

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 55.0'

Date 4/23/80

Water Observations Drilled w/water; water @ 8', caved to 53.5' @ completion

Surface El. 457.5

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		19						
			25						
5			21	103	63	30	33	19	
	- w/thin silt seams @ 9'+								
10			24						
	Brown and gray clay w/some fine sand (CH)								
15			26						
20			22						
25	-w/trace of calcareous nodules below 25'		17	-	45	20	25	16	
					(87% -200 sieve)				
	Reddish-brown sandy clay (CL)								
30	Tan clayey sand (SC)		8						
35			15						
40	Brown and tan sand w/trace small gravel (SP)		21						
45									
			21		(49% -#200 sieve)				
	Gray and brown clayey shale		22						
50									

(Continued) IIIG-B-15

Log of Boring

Number B-13 (Cont'd.)

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth

Date

Water Observations

Surface El.

Type

Depth, Ft.	Symbol	Samples	Stratum Description			N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	▨		Dark gray shale										
-55													
-60													
-65													
-70													
-75													
-80													
-85													
-90													
-95													
-100													

APPENDIX

Log of Boring

Number: B-14

Location: see Plan of Borings

Project: Landfill, Hebron

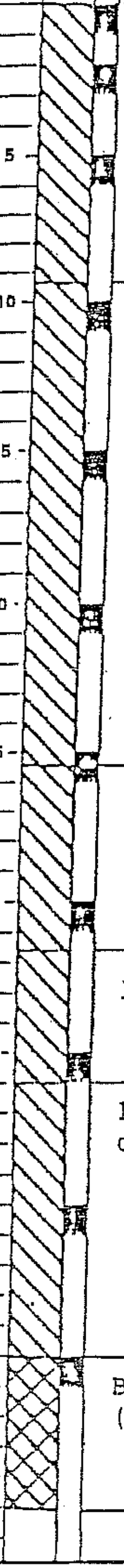
Completion Depth: 58.0'

Date: 4/23/80

Water Observations: Seepage @ 40' during drilling; water @ 39' & caved to 39½' on 4-25-80

Surface El.: 456.5

Type: Core



Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		23						
			25						
5			20						
10	Brown & tan clay w/trace of fine sand (CH)		23						
15			27		67	27	40	22	
20	-w/trace of thin gray clay seams below 20'		27						
25	Light brown to tan clay w/some fine sand (CL-CH)		26						
30			26		47	22	25	16	
					(81% -#200 sieve)				
35	Light brown clayey sand (SC)		15						
	Light brown to tan sand w/some silt & clay (SM)								
40			20		(19% -#200 sieve)				
45	Brown & gray shaly clay (weathered shale) (CH)		25						
50									

(Continued) IIIG-B-17

APPENDIX

Log of Boring

Number B-14 (Cont'd.)

Location . see Plan of Borings

Project Landfill, Hebron

Completion Depth

Date

Water Observations

Surface El.

Type

Depth, Ft.	Symbol	Samples	Stratum Description			N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
			Brown & gray shaly clay (weathered shale) (CH)				27						
-55			Dark gray shale				26						
-60													
-65													
-70													
-75													
-80													
85													
-90													
-95													
-100													

Rone Engineers

Log of Boring

Number: B-15

Location: see Plan of Borings

Project: Landfill - Hebron

Completion Depth: 60.0'

Date: 4-24-80

Water Observations: Drilled w/water; no significant water information obtained

Surface El.: 456.5

Type: Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		34						
			28		73	29	44	22	
5			19						
10			21						
15	Brown sandy clay w/some thin silt & gray clay seams (CH-CL)		20		51	26	25	17	
20	Tan sandy clay w/thin silt seams (CL)		11						
25			13		40 (75% -#200 sieve)	15	25	14	
30			11						
35	Tan to reddish-tan clayey sand w/some small gray clay nodules (SC)		20		(40% -#200 sieve)				
40			17						
45	Brown sand w/some silt & small gravel (SW)		14						
50									

APPENDIX

Log of Boring

Number B-15 Cont'd.)

Location see Plan of Borings

Project Landfill - Hebron

Completion Depth

Date

Water Observations

Surface El.

Type

Depth, Ft.	Symbol	Samples	Stratum Description			N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
			Brown sand w/some silt & small gravel (SW)						(15% -#200 sieve)				
-55			Dark gray shale										
-60													
-65													
-70													
-75													
-80													
-85													
-90													
-95													
-100													

Plate 9

Log of Boring

Number B-16

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 28.0'

Date 4/25/80

Water Observations Seepage @ 20' during drilling; water @ 16½' & caved to 17' @ completion

Surface El. 457

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Brown to dark brown clay (CH)		21						
			23		58	23	35	21	
					(91% sieve)				
5			18						
	Brown sandy clay w/some small gravel & calcareous nodules (CL)								
10			17						
15			21						
	Tan sand w/some silt & gravel (SM)								
20			15		(37% -#200 sieve)				
	Dark gray shale								
25									
30									
35									
40									
45									
50									

APPENDIX

Log of Boring

Number B-17

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 20.0'

Date 4/25/80

Water Observations Dry @ completion; dry & caved to 17' on 4-28-80

Surface El. 457

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay w/trace of fine sand (CH)		16						
			28						
5			18						
10	Brown sandy clay (CL) -w/some small gravel below 12'		13						
15			8						
	Dark gray shale								
20									
25									
30									
35									
40									
45									
50									

Log of Boring

Number B-18

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 25.0'

Date 4/28/80

Water Observations dry at completion

Surface El. 460

Type Core

Depth, Ft.	Symbol	Samples	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
					28						
			Dark brown clay (CH)		28		67	29	38	21	
							(98% -#200 sieve)				
5					21						
10			Brown sandy clay (CL) -w/some gravel below 11'		15		(78% -#200 sieve)				
15					8						
20			Dark gray shale								
25											
30											
35											
40											
45											
50											

APPENDIX

Log of Boring

Number: B-19

Location: see Plan of Borings

Project: Landfill, Hebron

Completion Depth: 51.0'

Date: 4-25-80

Water Observations: Seepage @ 43' during drilling; water @ 39' & caved to 39½' on 4-28-80

Surface El.: 457

Type: Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		24						
			23						
5			22						
10	Brown & tan clay w/trace of small calcareous nodules (CH)		25		65	26	39	21	
15	Brown & tan clay w/some gray clay seams (CH)		26						
20			24		66 (97% -#200 sieve)	27	39	21	
25	-w/trace of fine sand @ 25'		23						
30			21						
35	Tan clay, slightly sandy w/trace of thin gray clay seams (CH)		16						
40	Tan & gray clayey sand w/trace of small gravel (SC)		23		(64% -#200 sieve)				
45	Dark gray shale		22						
50			20						

Log of Boring

Number B-20

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 55.0' Date 4-25-80

Water Observations Seepage @ 45' during drilling; water @ 35' & caved to 38½' on 4-28-80

Surface El. 456.3

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		35						
			34						
5			22		65	30	35	19	
10	Tan & gray clay w/trace of fine sand & small calcareous nodules (CH)		25						
15			24						
20			21		(95% -#200 sieve)				
25			22						
	Brown to tan sandy clay (CL)								
30			17						
35			17						
40	-w/thin fine seams @ 40½' +		23						
45			23		(66% -#200 sieve)				
	Tan & gray clayey sand w/trace of fine gravel (SC)								
50									

(Continued)

APPENDIX

Log of Boring

Number B-20 (Cont'd.)

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth

Date

Water Observations

Surface El.

Type

Depth, Ft.	Symbol	Samples	Stratum Description			N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit *	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
			Dark gray shale				23						
55													
60													
65													
70													
75													
80													
85													
90													
95													
100													

APPENDIX

Rone Engineers

PLATE A-21b

Log of Boring

Number B-21

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 22.0'

Date 4/25/80

Water Observations Drilled w/water; water dropped to 15' & caved to 22' @ completion

Surface El. 455

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		27						
			20		65	30	35	19	
5			18						
10	Tan and gray clayey sand w/some small calcareous nodules (SC)		16		33 (35% -#200 sieve)	13	20	9	
15	Tan sand w/some silt & small gravel (SM)		23		(29% -#200 sieve)				
20	Dark gray shale								
25									
30									
35									
40									
45									
50									

Rone Engineers

Log of Boring

Number B-22

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 18.0'

Date 4/28/80

Water Observations dry at completion

Surface El. 454

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		13						
			21						
5	Reddish-tan & brown clayey sand w/some small gravel (SC)		8		29	16	13	8	
10	Tan sand w/some silt & small gravel (SM)		8		(26% -#200 sieve)				
15	Dark gray shale		18						
20									
25									
30									
35									
40									
45									
50									

APPENDIX

Rone Engineers

PLATE A-23

Log of Boring

Number: B-23

Location: see Plan of Borings

Project: Landfill, Hebron

Completion Depth: 23.0'

Date: 4/25/80

Water Observations: dry at completion; dry & caved @ 19' on 4-28-80

Surface El.: 458.3

Type: Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		25						
			30						
5			21						
10	Reddish-tan clayey sand w/some calcareous nodules & gravel (SC)		9		31	17	14	9	
					(36% -#200 sieve)				
15	Dark gray and brown shaly clay (CH) (weathered shale)		18						
	Dark gray shale								
20									
25									
30									
35									
40									
45									
50									

Rone Engineers

Log of Boring

Number B-24	Location see Plan of Borings	
Project Landfill, Hebron		
Completion Depth 24.0'	Date 4/28/80	Water Observations dry at completion
Surface El. 454	Type Core	

Depth, Ft.	Symbol	Samples	Stratum Description			N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
			Reddish-tan sandy clay w/gravel (CL)				5						
							11						
			Dark brown clay (CH)										
- 5 -							20						
			Reddish-tan sand w/some clay & silt (SC)										
- 10 -							10		(21% -#200 sieve)				
			Reddish-tan sand w/gravel & some silt (SM)										
- 15 -							7		(28% -#200 sieve)				
- 20 -			Dark gray shale				25						
- 25 -													
- 30 -													
- 35 -													
- 40 -													
- 45 -													
- 50 -													

Rone Engineers

Log of Boring

Number B-25

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 23.0'

Date 4/24/80

Water Observations dry at completion ; water @ 17½' & caved to 18½' 4-28-80

Surface El. 457

Type Core

Depth, Ft.	Symbol	Samples	Stratum Description			N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
			Dark brown clay (CH)				26						
							25						
5							19						
10			Reddish-tan clayey sand w/sandy clay seams (SC)				8		24	17	7	5	
15			Tan sand w/some silt & gravel (SM)				7						
20			Dark gray shale				20						
							15						
25													
30													
35													
40													
45													
50													

APPENDIX

Rone Engineers

Log of Boring

Number B-26

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 23.0'

Date 4/24/80

Water Observations dry at completion; dry & caved to 18' on 4-28-80

Surface El. 447

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Reddish-tan sandy clay w/gravel (CL)		6						
	Dark brown clay (CH)		23						
- 5 -			16						
			15						
- 10 -	Reddish-tan clayey sand w/some small gravel (SC)		11		24	18	6	4	
					(27% -#200 sieve)				
	Tan sand w/some silt & gravel (SM)								
- 15 -			3						
- 20 -	Dark gray shale		15						
- 25 -									
- 30 -									
- 35 -									
- 40 -									
- 45 -									
- 50 -									

APPENDIX

Rone Engineers

Log of Boring

Number B-27

Location see Plan of Borings

Project Landfill, Hebron

Completion Depth 25.0'

Date 4/24/80

Water Observations dry at completion ; dry & caved to 20' on 4-28-80

Surface El. 458

Type Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Reddish-tan sandy clay w/some small gravel (CL)		9						
	Dark brown clay (CH)		16						
5			21						
10	Reddish-tan clayey sand w/sandy clay seams & some small gravel (SC)		9						
15			8		23	17	6	4	
					(27% -#200 sieve)				
	Tan sand w/gravel & some silt (SM)		4						
20	Dark gray shale								
			26						
25									
30									
35									
40									
45									
50									

Log of Boring

Number: B-28

Location: see Plan of Borings

Project: Landfill - Hebron

Completion Depth: 23.0'

Date: 4-24-80

Water Observations: dry @ completion ; dry & caved to 18' on 4-28-80

Surface El.: 456.5

Type: Core

Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
Dark brown clay (CH)		27						
		32		60	28	32	20	
				(90% -#200 sieve)				
		19						
Brown & tan sandy clay w/trace of fine gravel (CL)		10						
		4						
Tan sand w/some silt & gravel (SM)		7		(29% -#200 sieve)				
Dark gray shale		15						

Depth, Ft.: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

Log of Boring

Number: B-29

Location: see Plan of Borings

Project: Landfill - Hebron

Completion Depth: 23.0'

Date: 4-24-80

Water Observations: dry @ completion; dry & caved to 18' on 4-28-80

Surface El.: 458

Type: Core

Depth, Ft.	Stratum Description	N Blows/Foot	Moisture Content %	Unit Dry Wgt. Lbs/Cu. Ft.	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage %	Unconfined Compression Lbs/Sq. Ft.
	Dark brown clay (CH)		26						
			27						
5	-w/trace of small calcareous nodules below 5'-		17						
			16		51	21	30	18	
					(76% -#200 sieve)				
10	Brown & tan sandy clay w/some small gravel (CL)		15						
15	Tan sand w/some silt & small gravel (SM)		3						
20	Dark gray shale								
			15						
25									
30									
35									
40									
45									
50									

1983 RONE ENGINEERS MONITOR WELL BORING LOGS

Project No. 8-0063-13

Boring No. MW-4 B-1

Project Installation of Monitoring Wells
Hebron Landfill, Farmers Branch, Denton County, TX

Location See Plan of Borings

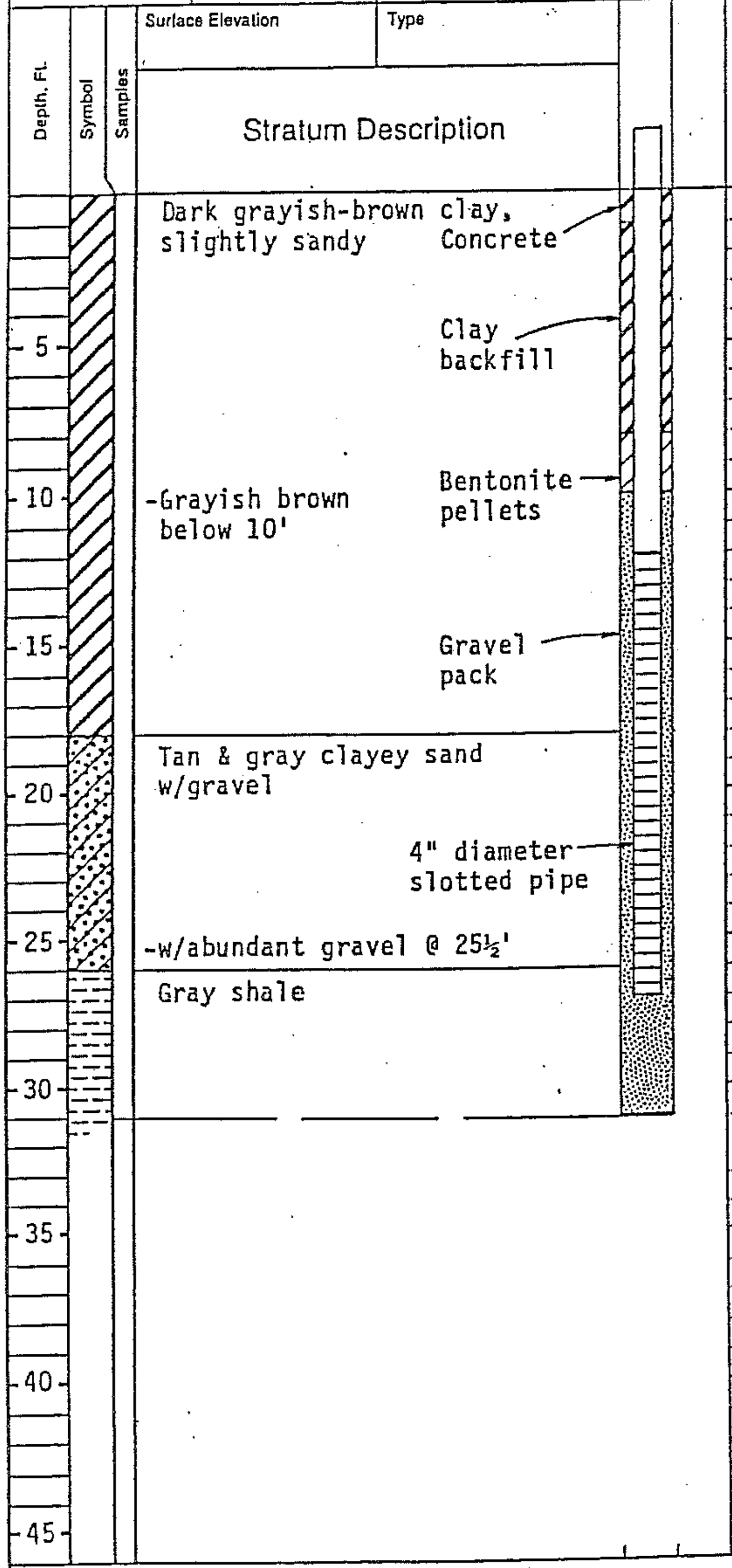
Water Observations

Completion Depth 31'

Completion Date 9/30/83

Surface Elevation

Type



Stratum Description

Dark grayish-brown clay, slightly sandy

-Grayish brown below 10'

Tan & gray clayey sand w/gravel

-w/abundant gravel @ 25½'

Gray shale

Blows/Ft. Pen Reading, T.S.F.	Passing No. 200 Sieve, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Linear Shrinkage, %	Moisture Content, %	Unit Dry Wt. Lbs./Cu. Ft.	Unconfined Compression Lbs./Sq. Ft.

LOG OF BORING NO. B-1

Rone Engineers

PLATE B-32

Monitor Well Data Sheet

Monitor Well I.D. No. MW-4

Permit No. 1312-A

Latitude: 33° 01' 32" N

Longitude: 96° 56' 54" E

Well Boring Diameter: 6"

Report all Depths from Surface Elevation

Ground Surface Elevation: 458.20

Well Depth: 28.1

Water Level Elevation: 441.55

Screen Bottom
(1) Depth: 21'
(2) Elevation: 431.2

Gravel Pack
(1) Depth: 31'
(2) Elevation: 430.1

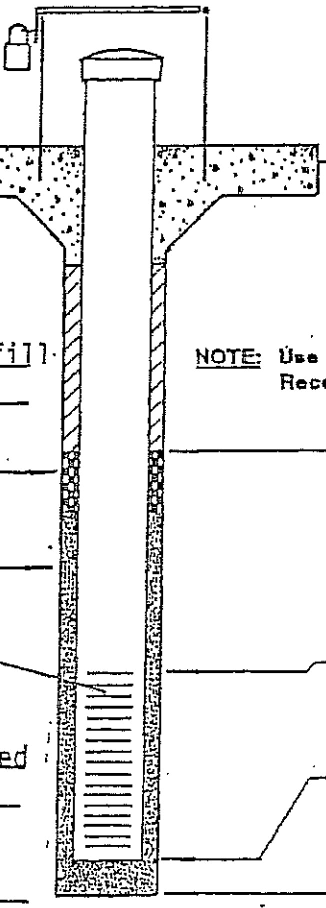
Type of Locking Device: Master Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation: 462.45

Top of Casing Elevation: 461.20



Surface Elevation: 458.2

Type of Surface Grout: Concrete

Depth: 3

Casing Type: Steel Casing

Size (dia.): 6" x 6" (Square)

Guage:

Backfill Material: Clay Backfill

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger
Recommend Teflon Tape of Joints

Bentonite Seal

Bentonite Seal Top Depth: 8
Elev: 450.20

Gravel Pack

Gravel Pack Top Depth: 10'
Elev: 448.2

Well Screen

Top of Screen Depth: 12
Elev: 446.2

Type of Well Screen: Slotted Schedule 40 PVC

Screen Bottom Depth: 27
Elev: 431.20

Screen Opening Size: 1/16"

Total Well Depth: 27.75
Elev: 430.45

Project No.	Boring No.	Project
8-0063-13	MW-5 B-2	Installation of Monitoring Hebron Landfill, Farmers Branch, Denton County, TX

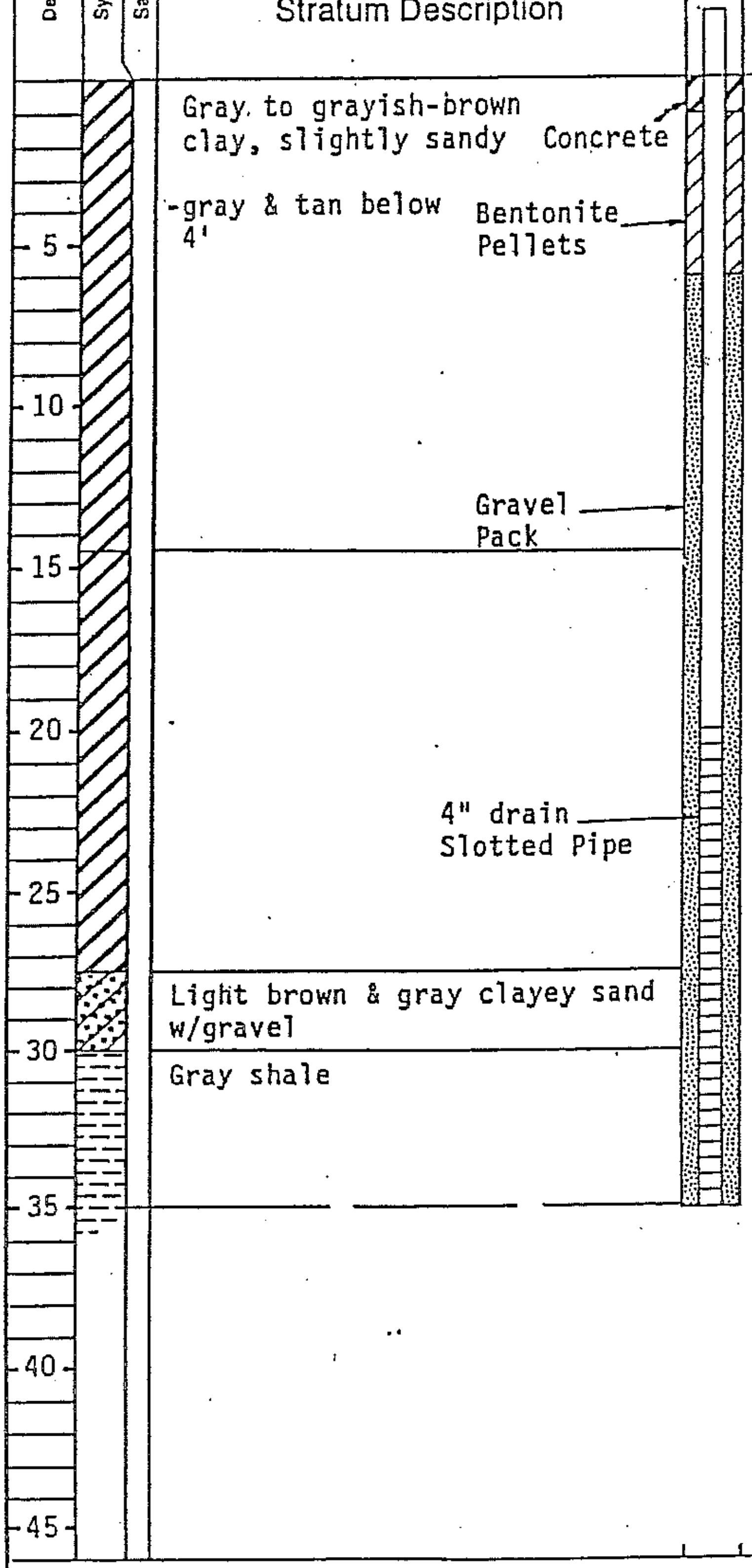
Location	Water Observations
See Plan of Borings	

Completion Depth	Completion Date
36'	10/1/83

Surface Elevation

Type

Depth, Ft.	Symbol	Samples	Stratum Description	Blows/Ft. Pen Reading, T.S.F.	Passing No. 200 Sieve, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Linear Shrinkage, %	Moisture Content, %	Unit Dry Wt. Lbs./Cu. Ft.	Unconfined Compression Lbs./Sq. Ft.
			Gray to grayish-brown clay, slightly sandy -gray & tan below 4'									
			Light brown & gray clayey sand w/gravel									
			Gray shale									



LOG OF BORING NO. B-2

Rone Engineers

PLATE B-33

Monitor Well Data Sheet

Monitor Well I.D. No.. MW-5

Permit No. 1312-A

Latitude: 33^{0} 01 31" N

Longitude: 96^{0} 57' 22" E

Well Boring Diameter: 6 inches

Report all Depths from Surface Elevation

Ground Surface Elevation: 457.60

Well Depth: 35'

Water Level Elevation: 439.60

Screen Bottom (1) Depth: 34'

(2) Elevation: 423.60

Gravel Pack (1) Depth: 35'

(2) Elevation: 422.60

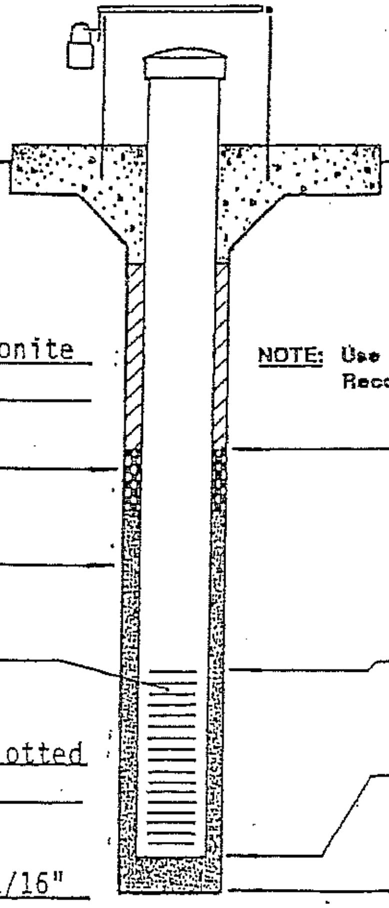
Type of Locking Device: Master Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation: 461.93

Top of Casing Elevation: 460.10



Surface Elevation: 457.60

Type of Surface Grout: Concrete

Depth: 1'

Casing Type: Steel Casing

Size (dia.): 6" x 6"

Guage:

Backfill Material: Bentonite

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints

Bentonite Seal

Bentonite Seal Top Depth: 1' Elev: 455.60

Gravel Pack

Gravel Pack Top Depth: 6' Elev: 451.60

Well Screen

Top of Screen Depth: 20' Elev: 437.60

Type of Well Screen: Slotted Schedule PVC

Screen Bottom Depth: 34' Elev: 423.60

Screen Opening Size: 1/16"

Total Well Depth: 35' Elev: 422.60

Project No.	Boring No. MW-6	Project
8-0063-13	B-3	Installation of Monitoring Wells Hebron Landfill, Farmers Branch, Denton County, TX

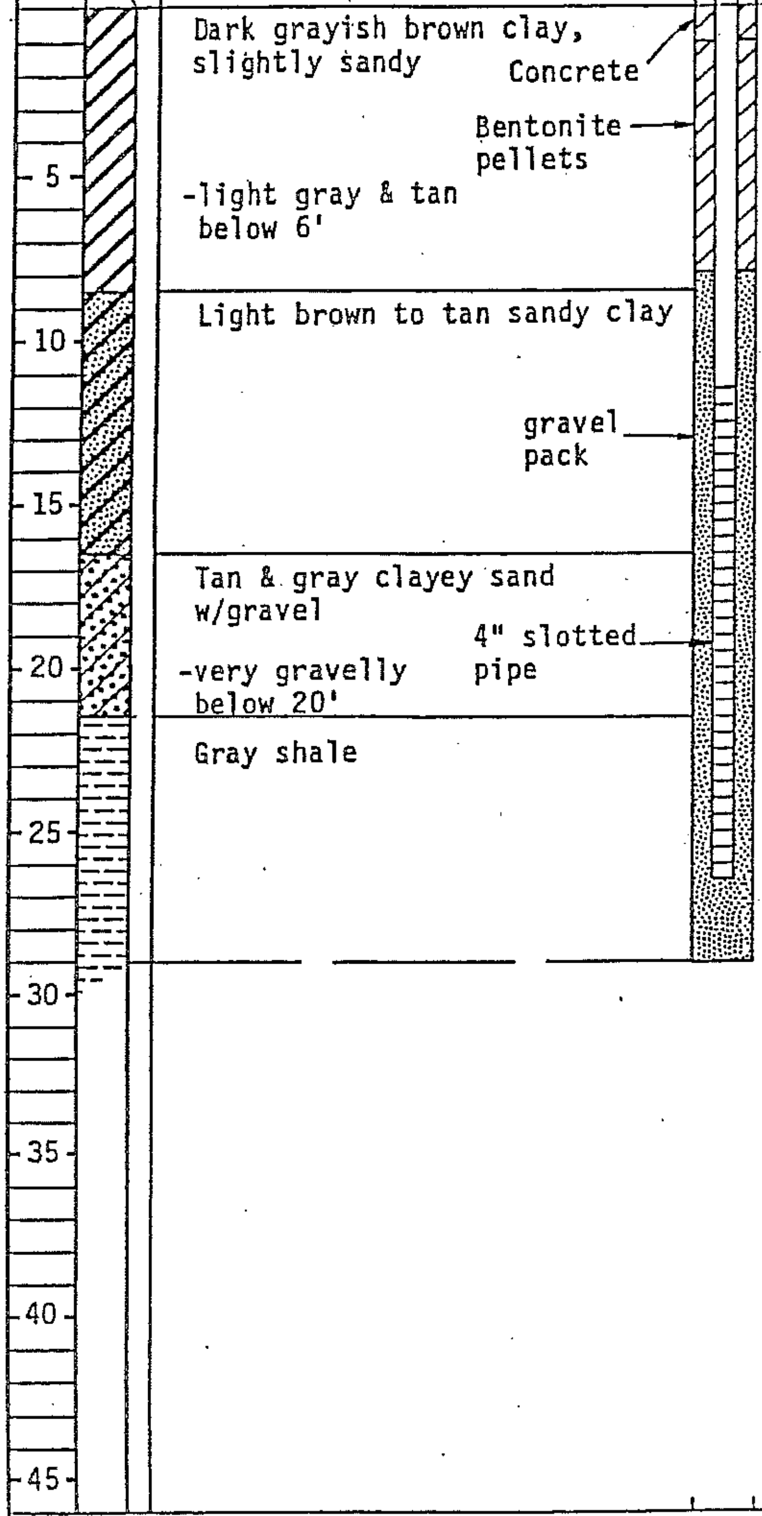
Location	Water Observations
See Plan of Borings	

Completion Depth	Completion Date
29'	10/5/83

Surface Elevation

Type Hollow Stem Sample

Depth, Ft.	Symbol	Samples	Stratum Description	Blows/Ft. Pen Reading, T.S.F.	Passing No. 200 Sieve, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Linear Shrinkage, %	Moisture Content, %	Unit Dry Wt. Lbs./Cu. Ft.	Unconfined Compression Lbs./Sq. Ft.
			Dark grayish brown clay, slightly sandy -light gray & tan below 6'									
			Light brown to tan sandy clay									
			Tan & gray clayey sand w/gravel -very gravelly below 20'									
			Gray shale									



LOG OF BORING NO. B-3

Rone Engineers

PLATE B-34

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-6

Permit No. 1312-A

Latitude: 33° 01' 56" N

Longitude: 96° 57' 23" E

Well Boring Diameter: 6 inches

Report all Depths from Surface Elevation

Ground Surface Elevation: 460.12

Well Depth: 29'

Water Level Elevation: 440.12

Screen Bottom
(1) Depth: 27'
(2) Elevation: 433.12

Gravel Pack
(1) Depth: 29'
(2) Elevation: 431.12

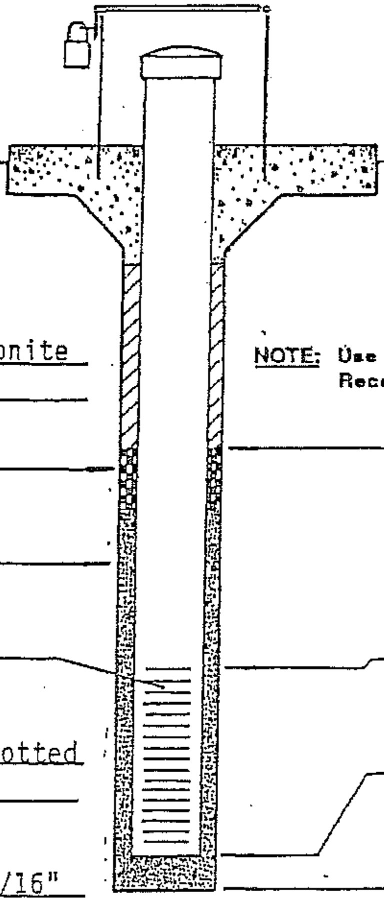
Type of Locking Device: Master Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation: 464.12

Top of Casing Elevation: 463.12



Surface Elevation: 460.12

Type of Surface Grout: Concrete

Depth: 3'

Backfill Material: Bentonite

Casing Type: Steel Casing

Size (dia.): 6" x 6" (Square)

Guage:

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger
Recommend Teflon Tape of Joints

Bentonite Seal Top Depth: 3' Elev: 457.12

Gravel Pack Top Depth: 8' Elev: 452.12

Top of Screen Depth: 11' - 6" Elev: 448.62

Screen Bottom Depth: 27' Elev: 433.12

Total Well Depth: 29' Elev: 431.12

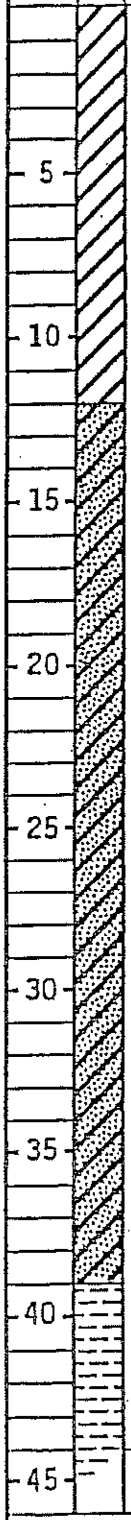
Type of Well Screen: Slotted Schedule 40 PVC

Screen Opening Size: 1/16"

Project No. 8-0063-13	Boring No. MW-7 B-4	Project Installation of Monitoring Wells, Hebron Landfill, Farmers Branch, Denton County, TX
Location See Plan of Borings		Water Observations
Completion Depth 44'	Completion Date 10/5/83	
Surface Elevation	Type Hollow Stem Sample	

Depth, Ft. | Symbol | Samples

Stratum Description



Grayish-brown clay, slightly sandy

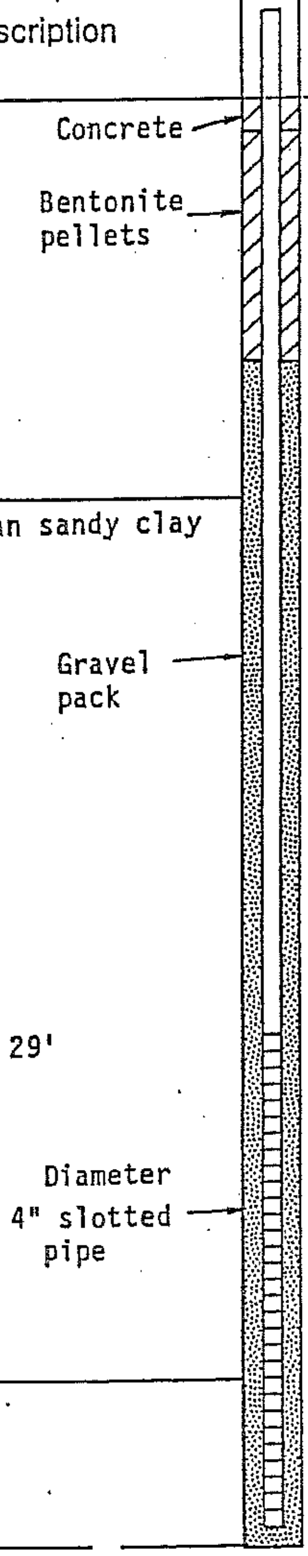
-brown below 9½'

Light brown to tan sandy clay

-tan & gray below 29'

-very sandy below 35'

Gray shale



Blows/Ft. Pen Reading, T.S.F.	Passing No. 200 Sieve, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Linear Shrinkage, %	Moisture Content, %	Unit Dry Wt. Lbs./Cu. Ft.	Unconfined Compression Lbs./Sq. Ft.

LOG OF BORING NO. B-4

Rone Engineers

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-7

Permit No. 1312-A

Latitude: 33° 02' 09" N

Longitude: 96° 57' 05" E

Well Boring Diameter: 6"

Ground Surface Elevation: 459.75

Report all Depths from Surface Elevation

Well Depth: 44'

Water Level Elevation: 433.75

Screen Bottom
(1) Depth: 43'
(2) Elevation: 416.75

Gravel Pack
(1) Depth: 44'
(2) Elevation: 415.75

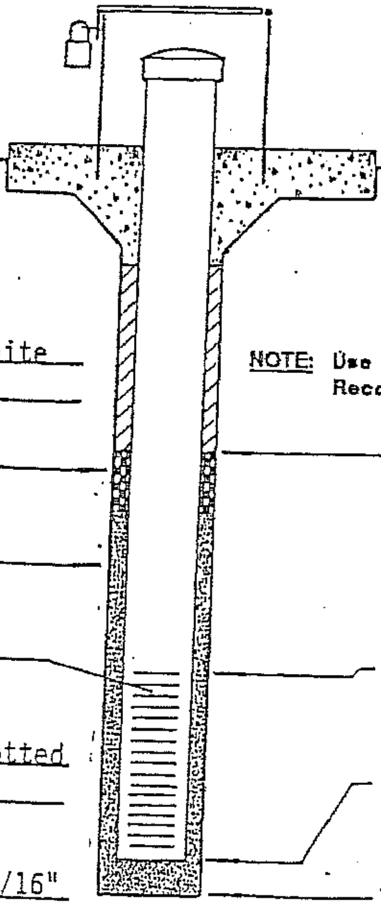
Type of Locking Device: Master Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation: 464.50

Top of Casing Elevation: 462.75



Surface Elevation: 459.75

Type of Surface Grout: Concrete

Depth: 3'

Casing Type: Steel Casing

Size (dia.): 6" x 6" (Square)

Guage:

Backfill Material: Bentonite

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger
Recommend Teflon Tape of Joints

Bentonite Seal

Gravel Pack

Well Screen

Bentonite Seal Top	Depth: 3'	Elev: 456.75
Gravel Pack Top	Depth: 8'	Elev: 451.75
Top of Screen	Depth: 28'	Elev: 431.75
Screen Bottom	Depth: 43'	Elev: 416.75
Total Well	Depth: 44'	Elev: 415.75

Type of Well Screen: Slotted Schedule 40 PVC

Screen Opening Size: 1/16"

1994 REED ENGINEERING TEMPORARY WELL BORING LOGS

reed engineering
GROUP

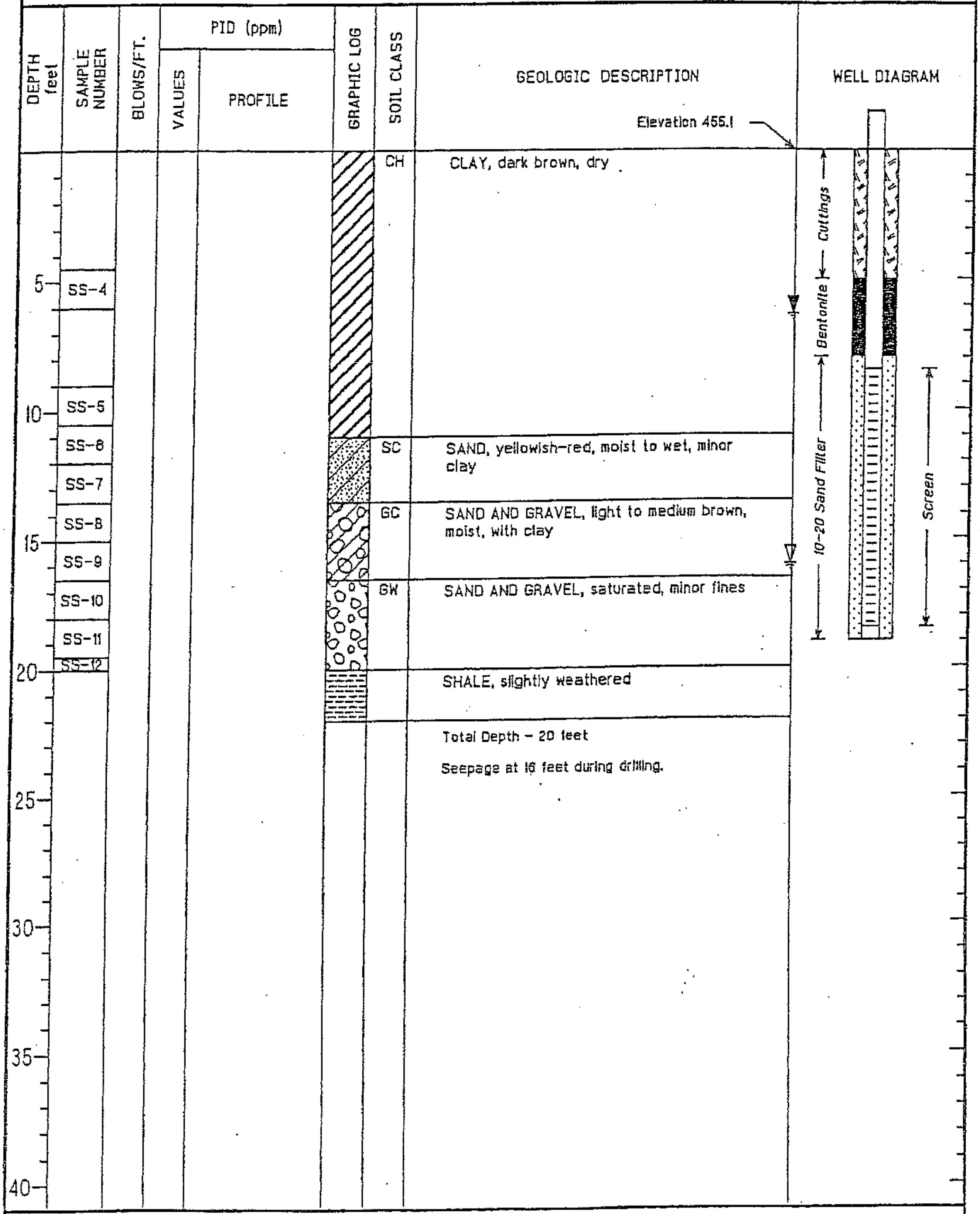
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: June 8, 1994

Location: See Plate A-



CLAY, dark brown, dry

SAND, yellowish-red, moist to wet, minor clay

SAND AND GRAVEL, light to medium brown, moist, with clay

SAND AND GRAVEL, saturated, minor fines

SHALE, slightly weathered

Total Depth - 20 feet

Seepage at 16 feet during drilling.

APPENDIX

BORING LOG TW-1

PLATE A-35

GEOTECHNICAL CONSULTANTS

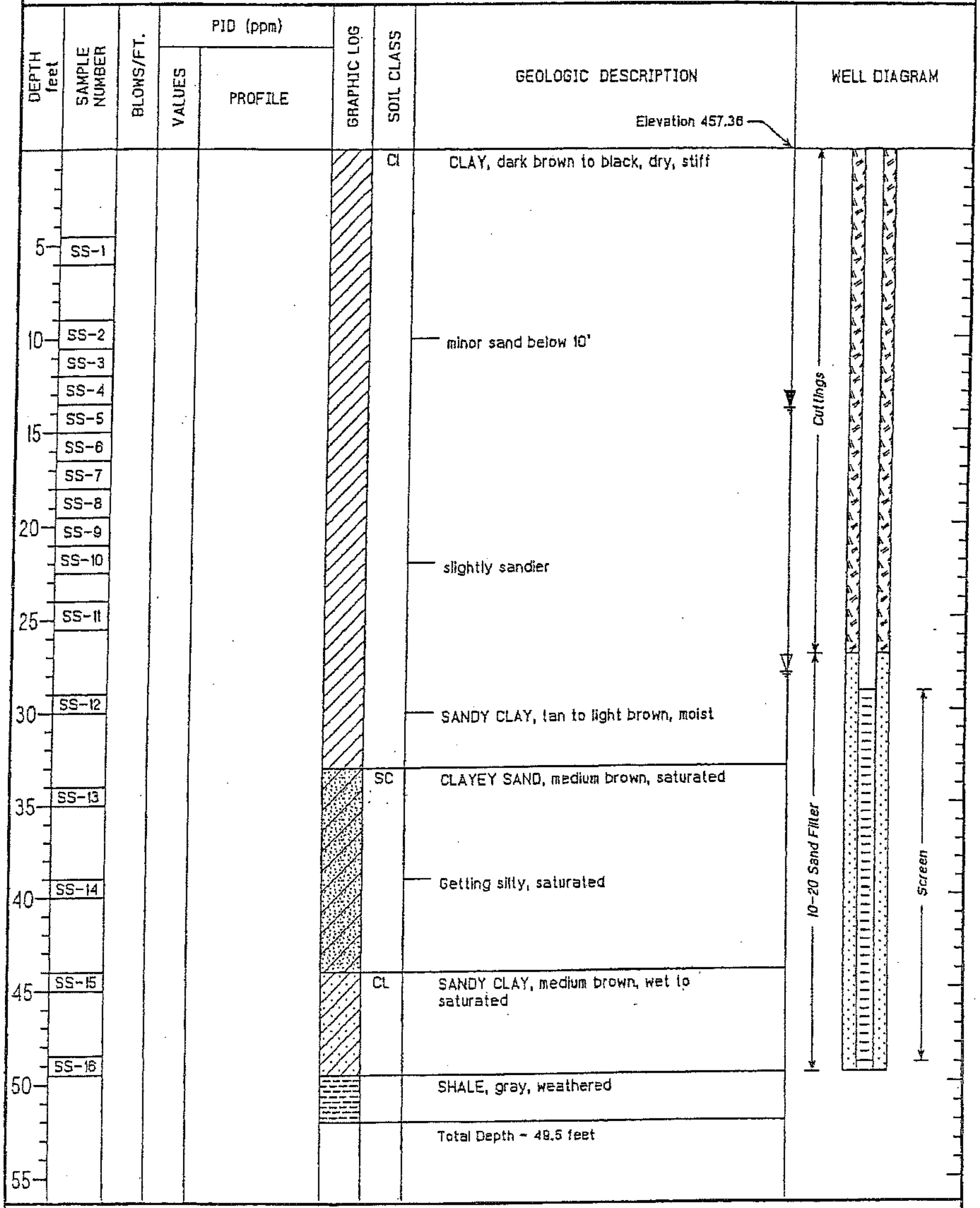
Farmers Branch Landfill

Project No. 136.17

Farmers Branch, Texas

Date: June 8, 1994

Location: See Plate A-



CLAY, dark brown to black, dry, stiff

minor sand below 10'

slightly sandier

SANDY CLAY, tan to light brown, moist

CLAYEY SAND, medium brown, saturated

Getting silty, saturated

SANDY CLAY, medium brown, wet to saturated

SHALE, gray, weathered

Total Depth - 49.5 feet

APPENDIX

BORING LOG TW-2

PLATE A-36

Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: June 8, 1994

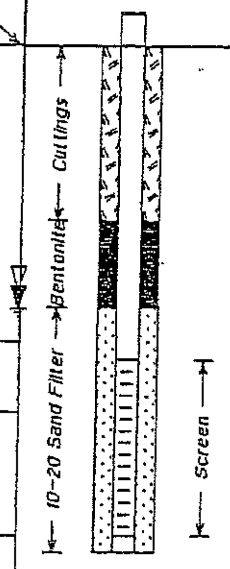
Location: See Plate A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 456.5
	SS-1					CL	CLAY, dark brown to black, slightly moist, firm
	SS-2						
	SS-3						
5	SS-4						@ 4.5, 1 foot sandy clay with gravel lens
	SS-5						
	SS-6						occassional gravel
						SC	CLAYEY SAND, yellowish-red, moist, w/ minor gravel
10	SS-7					SP	SAND, yellowish-red, saturated, w/alternating clayey sand
	SS-8						
	SS-9						
15	SS-10					CL	CLAY, dark gray, extremely weathered shale
	SS-11						
	SS-12						
20							SHALE, dark gray, unweathered
25							
30							
35							
40							

Total Depth - 18 feet

Seepage at 7 feet during drilling.

WELL DIAGRAM



BORING LOG TW-3

PLATE A-37

reed engineering
GROUP

Project No. 136.17

Farmers Branch Landfill

Farmers Branch, Texas

Date: June 8, 1994

Location: See Plate A-

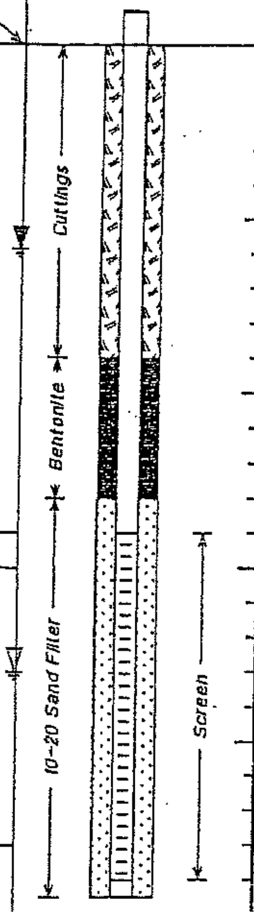
Elevation 454.4

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0						CH	CLAY, dark olive gray to grayish-brown, dry
5	SS-1						
10	SS-2						moist, with some sand below 10'
14						SC	SANDY CLAY, tan, moist
15	SS-3					SP	SAND, yellowish-brown to reddish-brown, w/ minor clay
	SS-4						
	SS-5						
20	SS-6						
21							with some coarse sand and small gravel below 21'
23							SHALE, dark gray, soft to moderately hard
25							
30							
35							
40							

Total Depth - 24.5 feet

Seepage at 18 feet during drilling.

WELL DIAGRAM



BORING LOG TW-5

PLATE A-38

GEOTECHNICAL CONSULTANTS

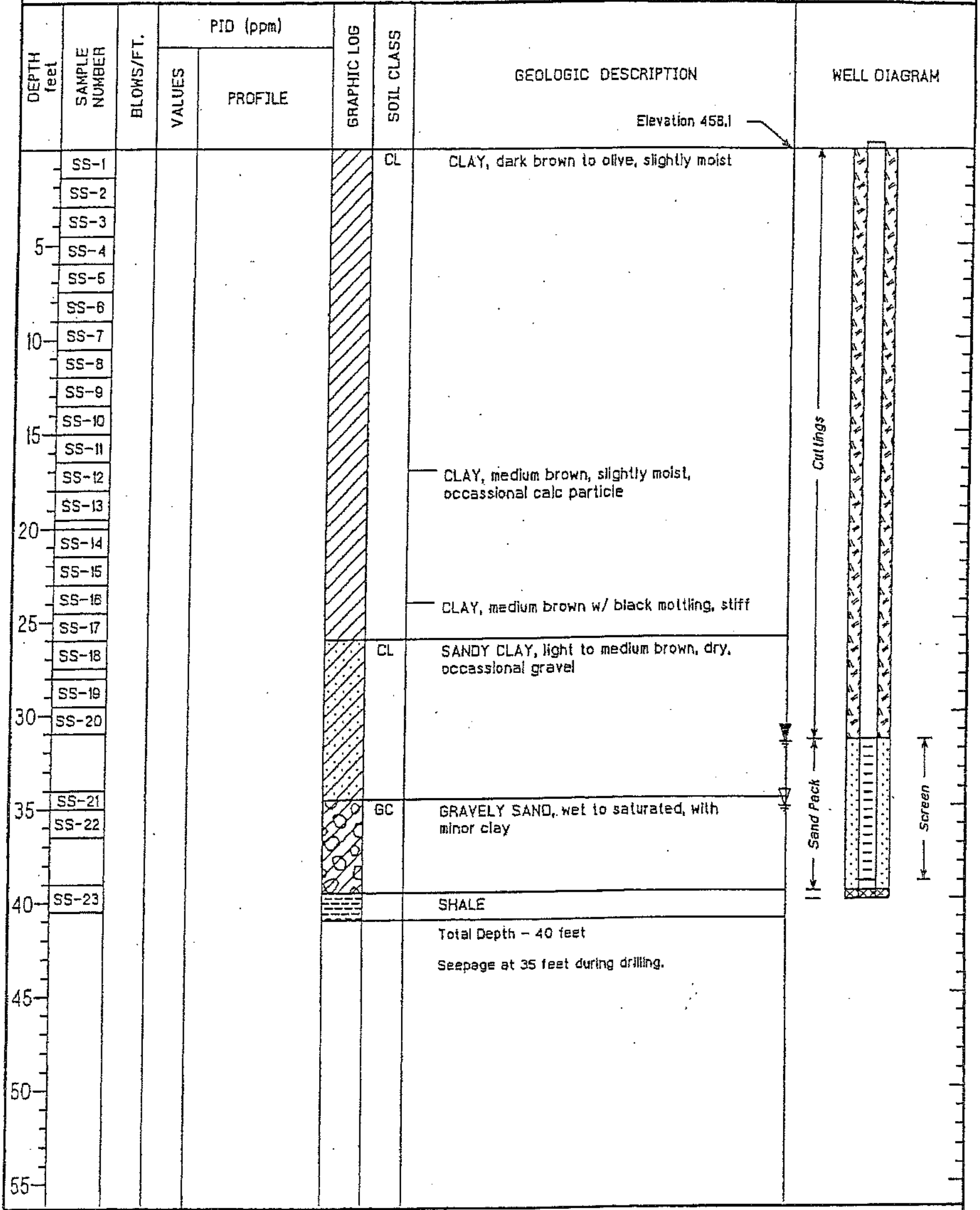
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: July 28, 1994

Location: See Plate A-1



CL — CLAY, dark brown to olive, slightly moist

CLAY, medium brown, slightly moist, occassional calc particle

CLAY, medium brown w/ black mottling, stiff

CL — SANDY CLAY, light to medium brown, dry, occassional gravel

GC — GRAVELY SAND, wet to saturated, with minor clay

SHALE

Total Depth – 40 feet

Seepage at 35 feet during drilling.

reed engineering
GROUP

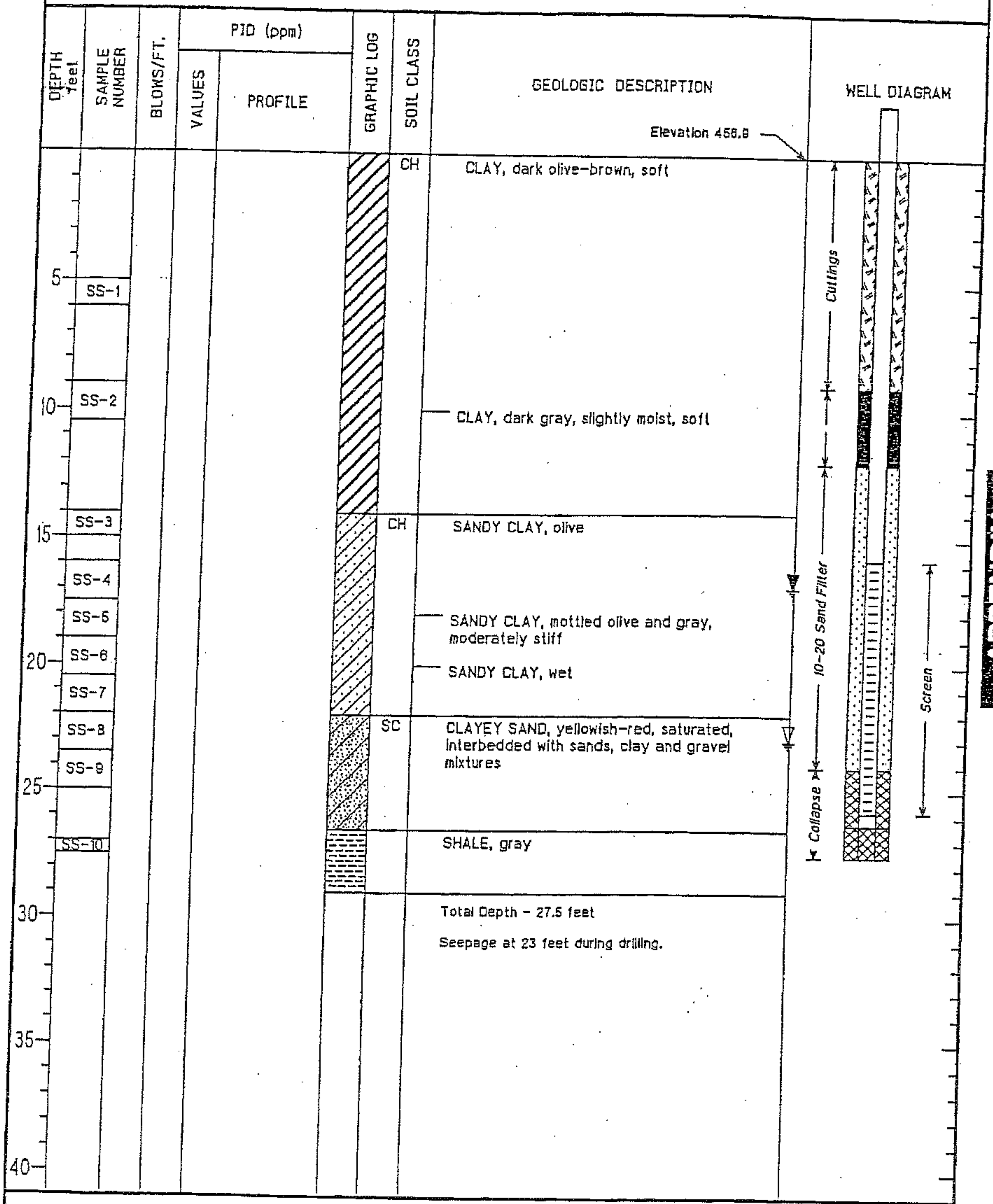
Project No. 136.17

Date: August 3, 1994

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate A-1



CLAY, dark olive-brown, soft

CLAY, dark gray, slightly moist, soft

SANDY CLAY, olive

SANDY CLAY, mottled olive and gray, moderately stiff

SANDY CLAY, wet

CLAYEY SAND, yellowish-red, saturated, interbedded with sands, clay and gravel mixtures

SHALE, gray

Total Depth - 27.5 feet

Seepage at 23 feet during drilling.

APPENDIX

BORING LOG TW-7

PLATE A-40

GEOTECHNICAL CONSULTANTS

reed engineering
GROUP

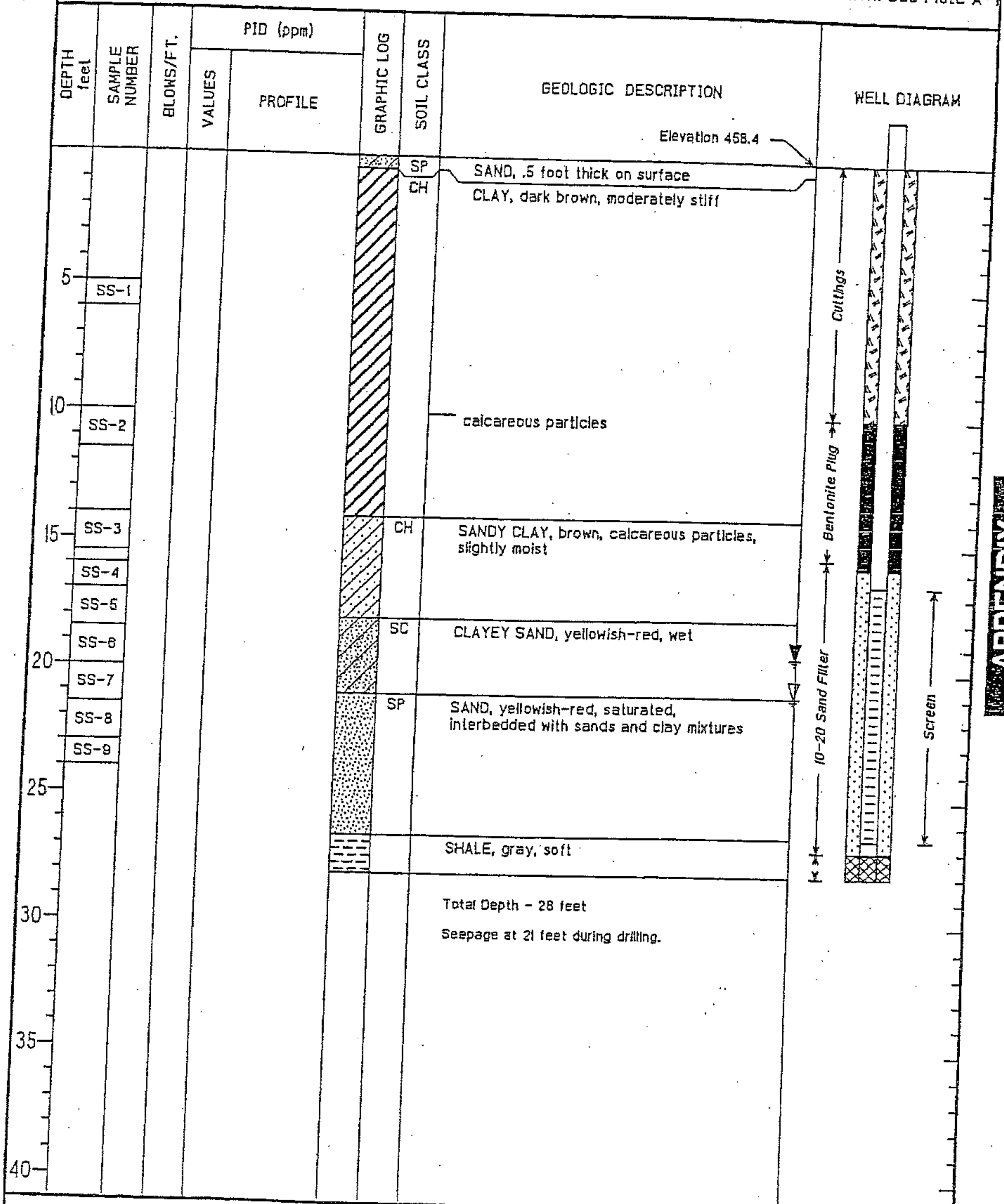
Project No. 136.17

Date: August 5, 1994

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate A-



SAND, .5 foot thick on surface

CLAY, dark brown, moderately stiff

— calcareous particles

SANDY CLAY, brown, calcareous particles, slightly moist

CLAYEY SAND, yellowish-red, wet

SAND, yellowish-red, saturated, interbedded with sands and clay mixtures

SHALE, gray, soft

Total Depth - 28 feet

Seepage at 21 feet during drilling.

BORING LOG TW-8

PLATE A-41

GEOTECHNICAL CONSULTANTS

1994 REED ENGINEERING MEASURED SECTIONS (CUT EXPOSURES) IN BORROW AREA

reed engineering
GROUP

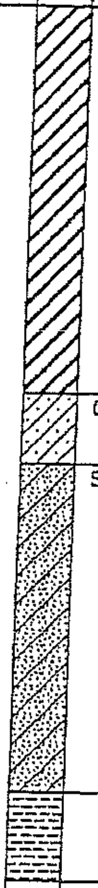
Project No. 136.17

Farmers Branch Landfill

Date: July 27, 1994

Farmers Branch, Texas

Location: See Plate A-

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
							Elevation 460	
						CH	CLAY, dark brown, dry	
5								
10								
						CH	SANDY CLAY, light brown, dry	
						SC	CLAYEY SAND, light brown, fewer fines with depth	
15								
20							SAND, with few fines	
							SHALE, gray	
25								
							Total Depth of Exposure Approx. 25 feet	
30								
35								
40								

BORING LOG TC-1 (Cut Exposure)

PLATE A-42

GEOTECHNICAL CONSULTANTS

APPENDIX

reed engineering
GROUP

Project No. 136.17

Date: 7/27/94

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 463	WELL DIAGRAM
						CH	CLAY, dark to medium brown	
5								
10						CH	SANDY CLAY, light brown, dry	
						SM	SILTY SAND, light brown	
15						SP	SAND, with silt	
							few fines below 18'	
20								
							SHALE, gray	
							Total Depth of Exposure Approx. 23 feet	
25							No free water observed	
30								
35								
40								

BORING LOG TC-2 (Cut Exposure)

PLATE A-43

GEOTECHNICAL CONSULTANTS

1994 REED ENGINEERING GEOTECHNICAL BORING LOGS

reed engineering GROUP

Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: June 8, 1994

Location: See Plate A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 481	WELL DIAGRAM
	SS-1				CL	SANDY CLAY, and clay, dark brown	
	SS-2						
	SS-3						
5	SS-4						
	SS-5						
	SS-6					CLAY, medium brown, occassional calc particle	
10	SS-7						
	SS-8						
	SS-9						
	SS-10				SC	CLAYEY SAND, yellowish red and medium brown, wet to saturated	
15	SS-11						
	SS-12				GC	CLAYEY GRAVEL, with sand, tan to yellowish-red, saturated	
	SS-13				SP	SAND, yellowish-red, saturated, with minor clay	
20	SS-14						
	SS-15				SC	CLAYEY SAND, tan and gray, sturated, with occassional gravel	
	SS-16				SP	SAND, tan to gray, saturated, fine to mdium grained, coarser at depth occassional interbedded clay seam	
25	SS-17						
	SS-18						
30	SS-19						
	SS-20						
	SS-21					SHALE, slightly weathered	
35						Total Depth – 34.5 feet Seepage at 13 feet during drilling.	
40							

BORING LOG TB-1

PLATE A-44

GEOTECHNICAL CONSULTANTS

Project No. 136.17

Farmers Branch Landfill

Farmers Branch, Texas

Date: June 9, 1994

Location: See Plate A-

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 458	WELL DIAGRAM
	SS-1				▨	CL	CLAY, dark brown to dark gray	
	SS-2				▨			
	SS-3				▨			
5	SS-4				▨		minor sand	
					▨	SC	CLAYEY SAND, light brown to yellowish-red, moist	▼
	SS-5				▨			
10	SS-7				▨	GC	CLAYEY GRAVEL, with sand, moist	
	SS-8				▨			▽
	SS-9				░	SW	SAND, with gravel, saturated, poorly sorted	
15	SS-10				░			
	SS-11				░			
					☰		SHALE	
20							Total Depth – 17.5 feet Seepage at 13 feet during drilling.	
25								
30								
35								
40								

BORING LOG TB-2

PLATE A-45

reed engineering
GROUP

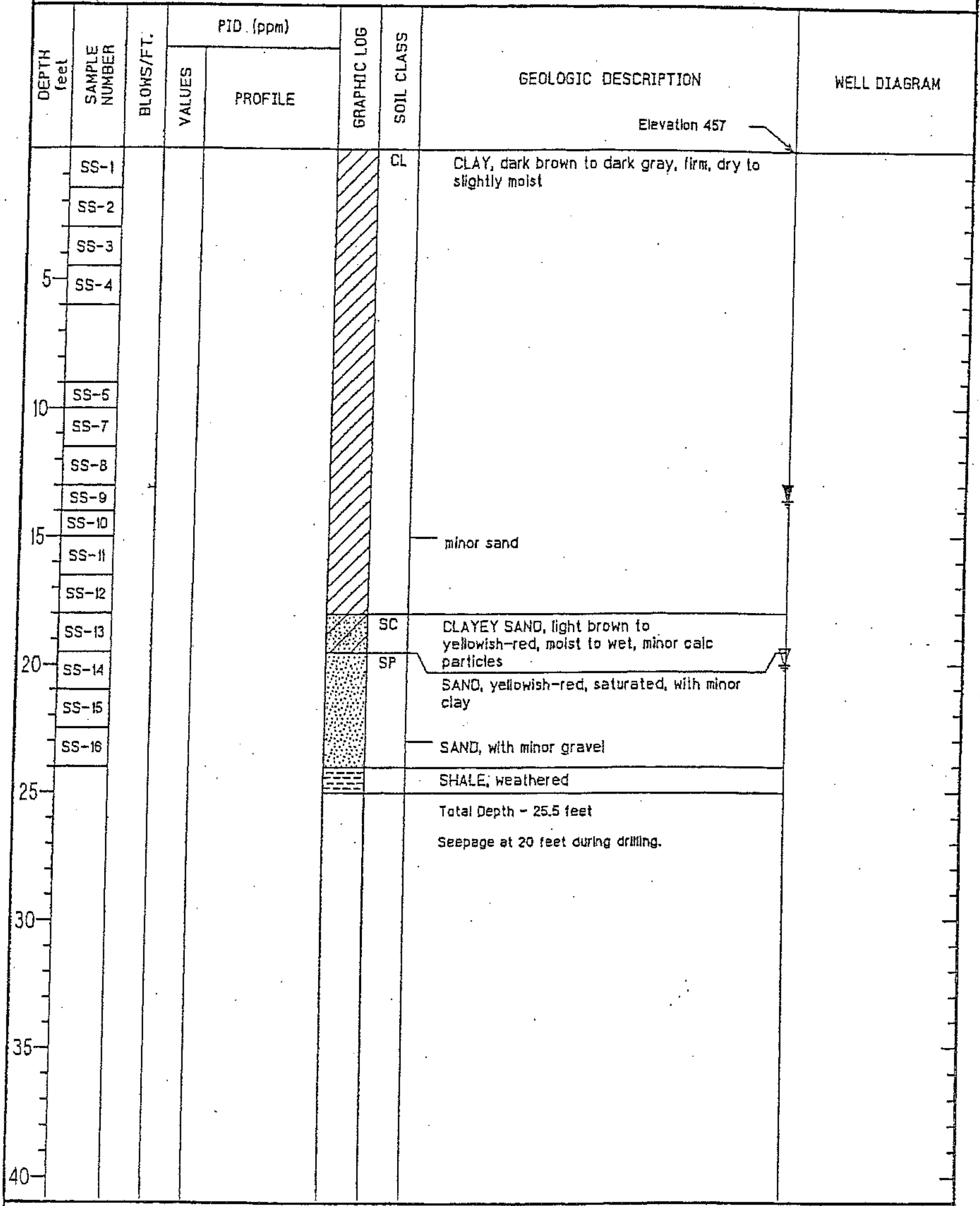
Farmers Branch Landfill

Project No. 136.17

Farmers Branch, Texas

Date: June 9, 1994

Location: See Plate A-



CLAY, dark brown to dark gray, firm, dry to slightly moist

minor sand

CLAYEY SAND, light brown to yellowish-red, moist to wet, minor calc particles

SAND, yellowish-red, saturated, with minor clay

SAND, with minor gravel

SHALE, weathered

Total Depth - 25.5 feet

Seepage at 20 feet during drilling.

BORING LOG TB-3

PLATE A-46

GEOTECHNICAL CONSULTANTS

reed engineering
GROUP

Project No. 136.17

Farmers Branch Landfill

Date: June 9, 1994

Farmers Branch, Texas

Location: See Plate A-

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
							Elevation 463	
0					▨	CL	CLAY, dark gray to black, occassional sand pod	
5	SS-1				▨			
10	SS-2				▨	SC	CLAYEY SAND, yellowish-red	
	SS-3				▨		color change to olive brown, wood fragments, occassional calc pebble (fill?)	
15	SS-4				▨			
	SS-5				☰		CLAY, dark gray, moist, soft, weathered shale ?	
20							Total Depth – 19 feet Drilled on flood berm.	
25								
30								
35								
40								

BORING LOG TB-4

PLATE A-47

GEOTECHNICAL CONSULTANTS

APPENDIX

Farmers Branch Landfill

Project No. 136.17

Farmers Branch, Texas

Date: June 9, 1994

Location: See Plate A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 453	WELL DIAGRAM
	SS-1				░	SP	SAND, yellowish-red, dry	
	SS-2				░			
	SS-3				▨	CL	CLAY, dark gray to olive brown, soft	
5	SS-4				▨		Completely weathered shale	
	SS-5				▨			
					▨			
10	SS-6				▨			
	SS-7				☰		SHALE, weathered	
							Total Depth - 12 feet Drilled in area previously stripped of overlying clay.	
15								
20								
25								
30								
35								
.0								

BORING LOG TB-5

PLATE A-48

GEOTECHNICAL CONSULTANTS

APPENDIX

APPENDIX

reed engineering
GROUP

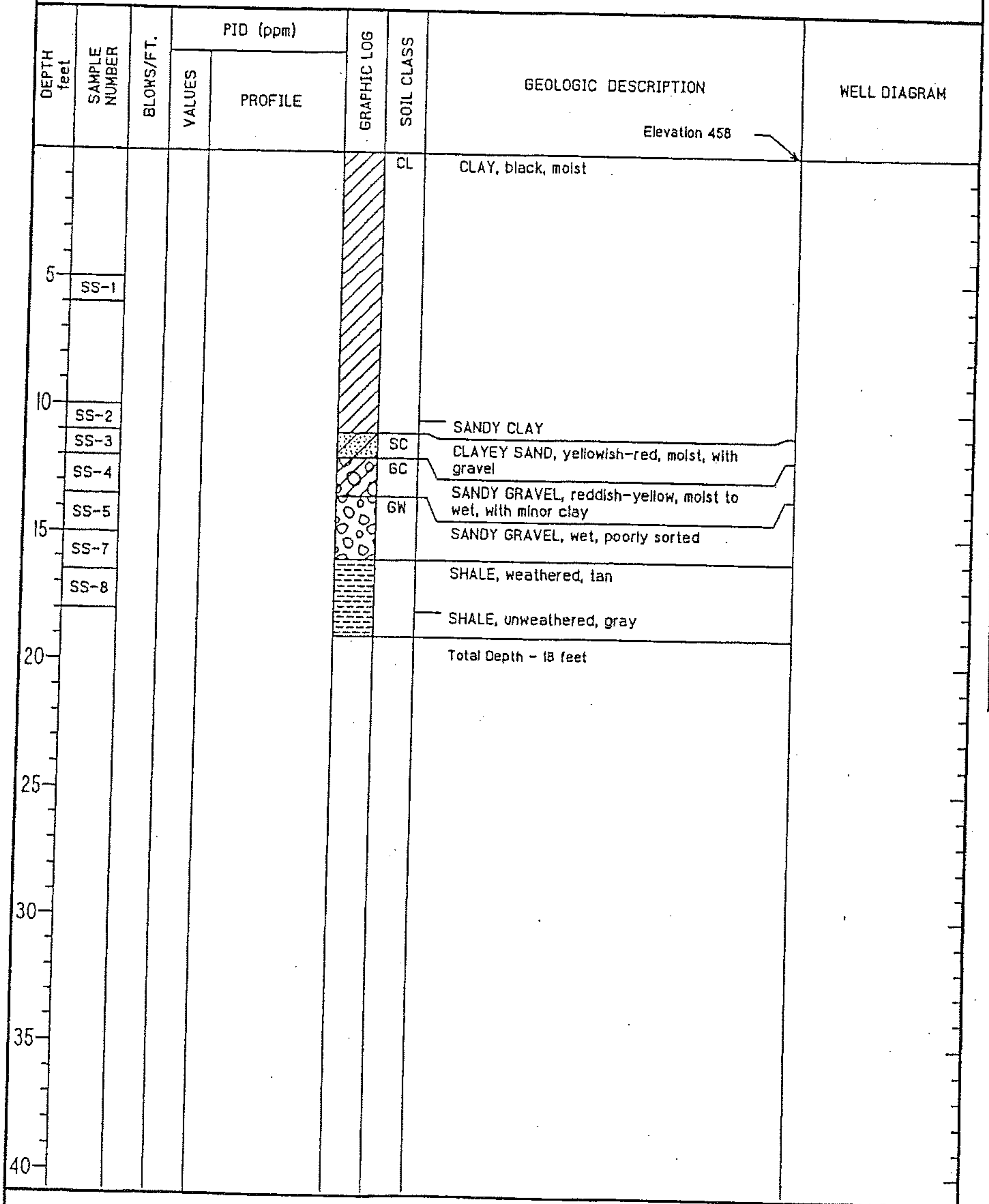
Project No. 136.17

Farmers Branch Landfill

Date: June 10 1994

Farmers Branch, Texas

Location:



CLAY, black, moist

SANDY CLAY

CLAYEY SAND, yellowish-red, moist, with gravel

SANDY GRAVEL, reddish-yellow, moist to wet, with minor clay

SANDY GRAVEL, wet, poorly sorted

SHALE, weathered, tan

SHALE, unweathered, gray

Total Depth – 18 feet

BORING LOG TB-6

PLATE B-49

GEOTECHNICAL CONSULTANTS

Project No. 136.17

Farmers Branch Landfill

Date: July 28, 1994

Farmers Branch, Texas

Location: See Plate A-

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 460	WELL DIAGRAM
					▨	CL	CLAY, and sandy clay, mottled yellowish-red, gray, and brown, slightly moist, mining spoils	
5	SS-1				▨			
	SS-2				▨			
	SS-3				▨			
10	SS-4				▨			
	SS-6				▨			
	SS-7				▨			
	SS-8				▨			
15	SS-9				▨			
	SS-10							
					○	GC	SANDY GRAVEL, with clay, saturated	
	SS-11				▤		SHALE	
20							Total Depth – 18 feet Drilled in former sand mining area.	
25								
30								
35								
40								

BORING LOG TB-7

PLATE A-50

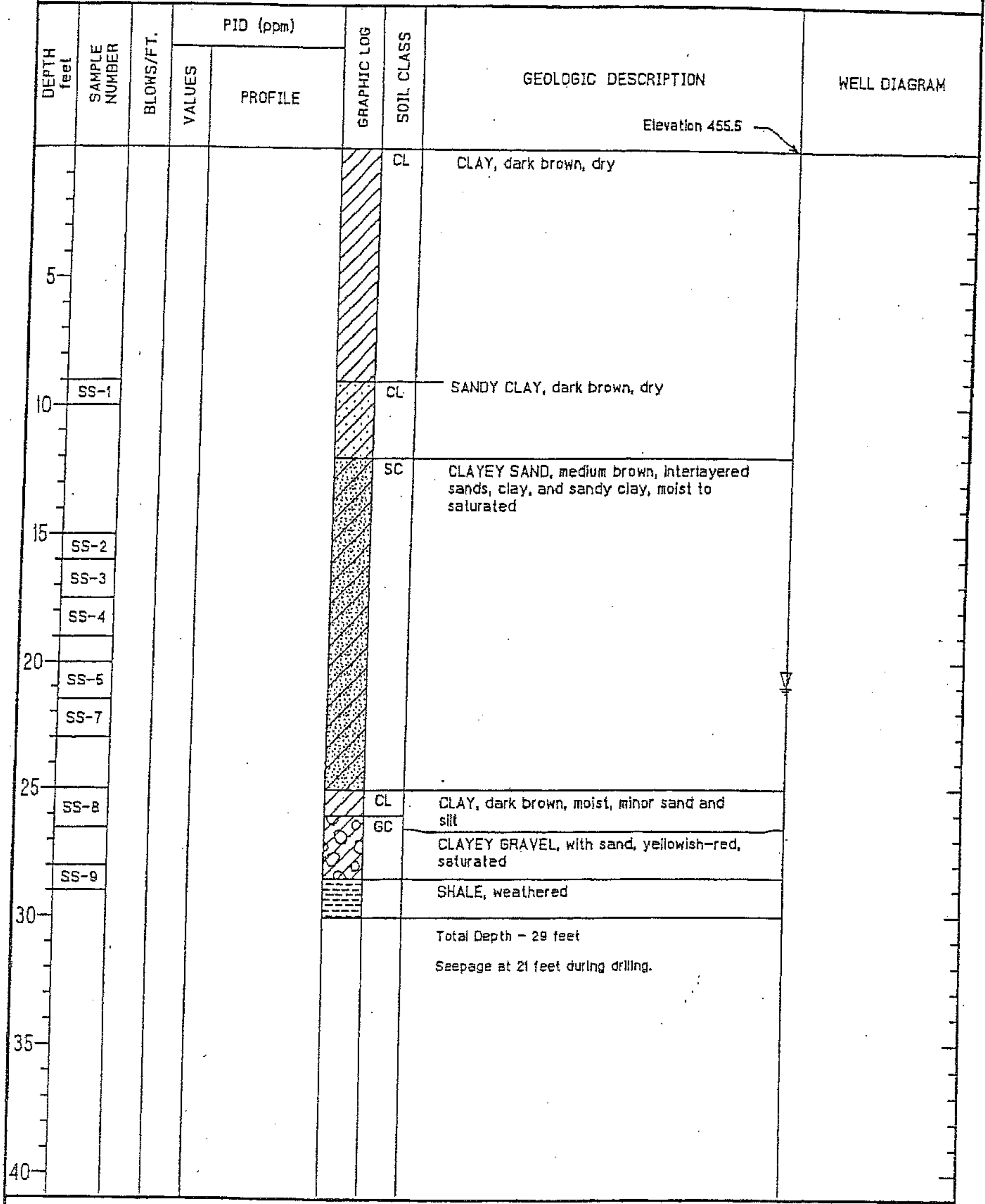
Project No. 136.17

Date: August 3, 1994

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate A-



CLAY, dark brown, dry

SANDY CLAY, dark brown, dry

CLAYEY SAND, medium brown, interlayered sands, clay, and sandy clay, moist to saturated

CLAY, dark brown, moist, minor sand and silt

CLAYEY GRAVEL, with sand, yellowish-red, saturated

SHALE, weathered

Total Depth – 29 feet

Seepage at 21 feet during drilling.

BORING LOG TB-8

PLATE A-51

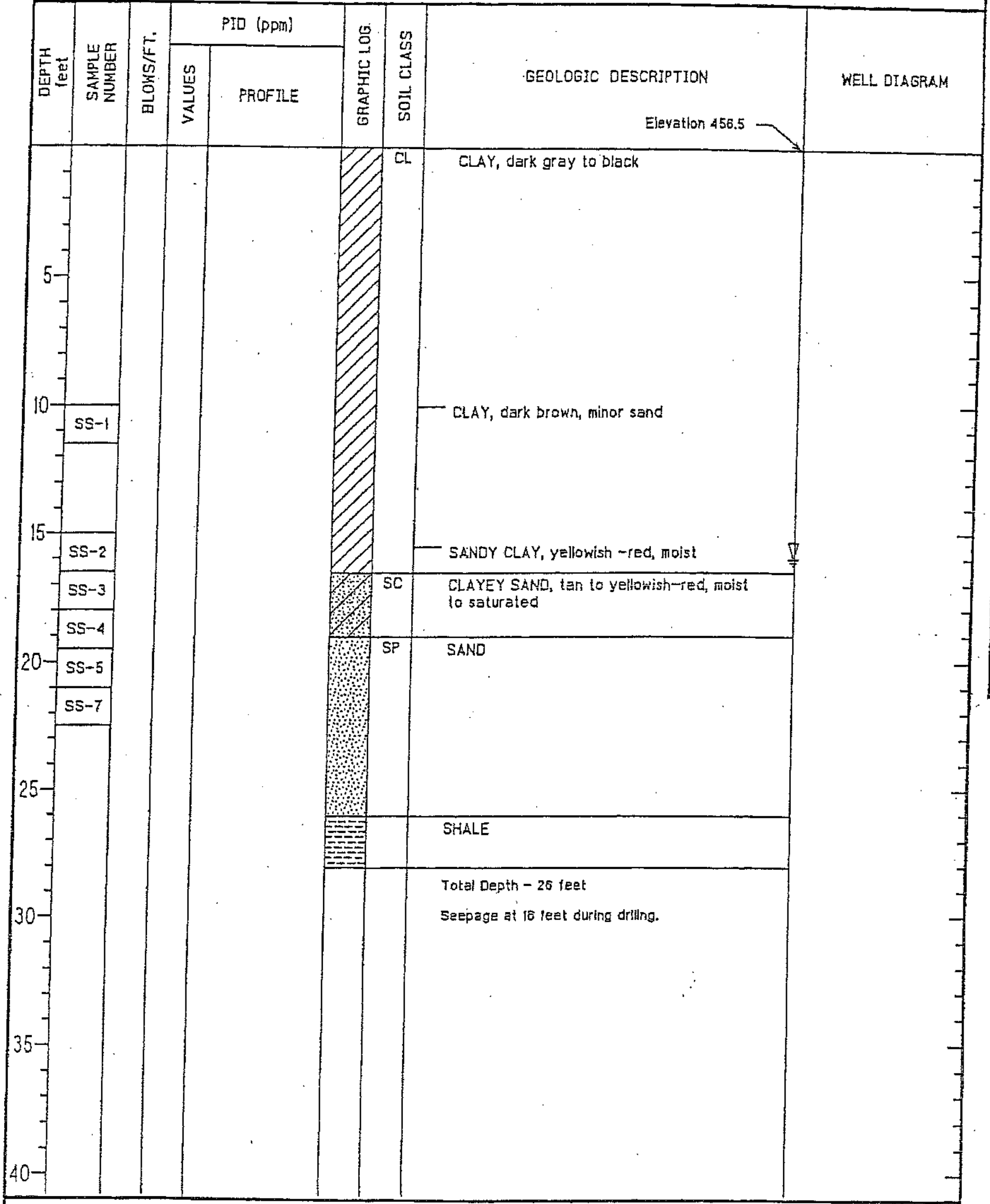
Project No. 136.17

Date: August 3, 1994

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate A-



Elevation 456.5

CL CLAY, dark gray to black

CLAY, dark brown, minor sand

SANDY CLAY, yellowish -red, moist

SC CLAYEY SAND, tan to yellowish-red, moist to saturated

SP SAND

SHALE

Total Depth - 26 feet

Seepage at 16 feet during drilling.

APPENDIX

BORING LOG TB-9

PLATE A-52

GEOTECHNICAL CONSULTANTS

Farmers Branch Landfill

Project No. 136.17

Farmers Branch, Texas

Date: August 5, 1994

Location: See Plate A-

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 457.5	WELL DIAGRAM
						CL	CLAY, medium to dark brown	
5								
10	SS-1							
15	SS-2							
	SS-3							
20	SS-4							
	SS-5							
	SS-7						minor sand	
25	SS-8						color change to olive, slightly moist	
	SS-9							
	SS-10							
	SS-11						occassional gravel	
30	SS-12					CL	SANDY CLAY, medium brown to olive	
	SS-13						1/4 inch sand seam at 32.25'	∇
	ss-14						SHALE, weathered, gray	
35							Total Depth - 34.5 FEET Seepage at 32.5 feet during drilling.	
40								

BORING LOG TB-10

Project No. 136.17

Date: August 5, 1994

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate A-1

Elevation 458.5

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
						CL	CLAY, dark olive-gray, slightly moist	
5								
10	SS-1							
15	SS-2							
	SS-3							
20	SS-4							
	SS-5							
	SS-7					SC	CLAYEY SAND, yellowish-red, slightly moist	
25	SS-8					CL	SANDY CLAY, yellowish-red to medium brown, dry	
	SS-9							
	SS-10					SC	CLAYEY SAND	
	SS-11					CL	SANDY CLAY	
30	SS-12					SC	CLAYEY SAND, with interlayered clay and sandy clay	▽
	SS-13							
	SS-14							
35								
40								
							SHALE, weathered, soft (as reported by driller)	
45							Total Depth – 43 feet Seepage at 33 feet during drilling.	
50								
55								

BORING LOG TB-11

PLATE A-54

1995 REED ENGINEERING DEEP GEOTECHNICAL BORING LOGS

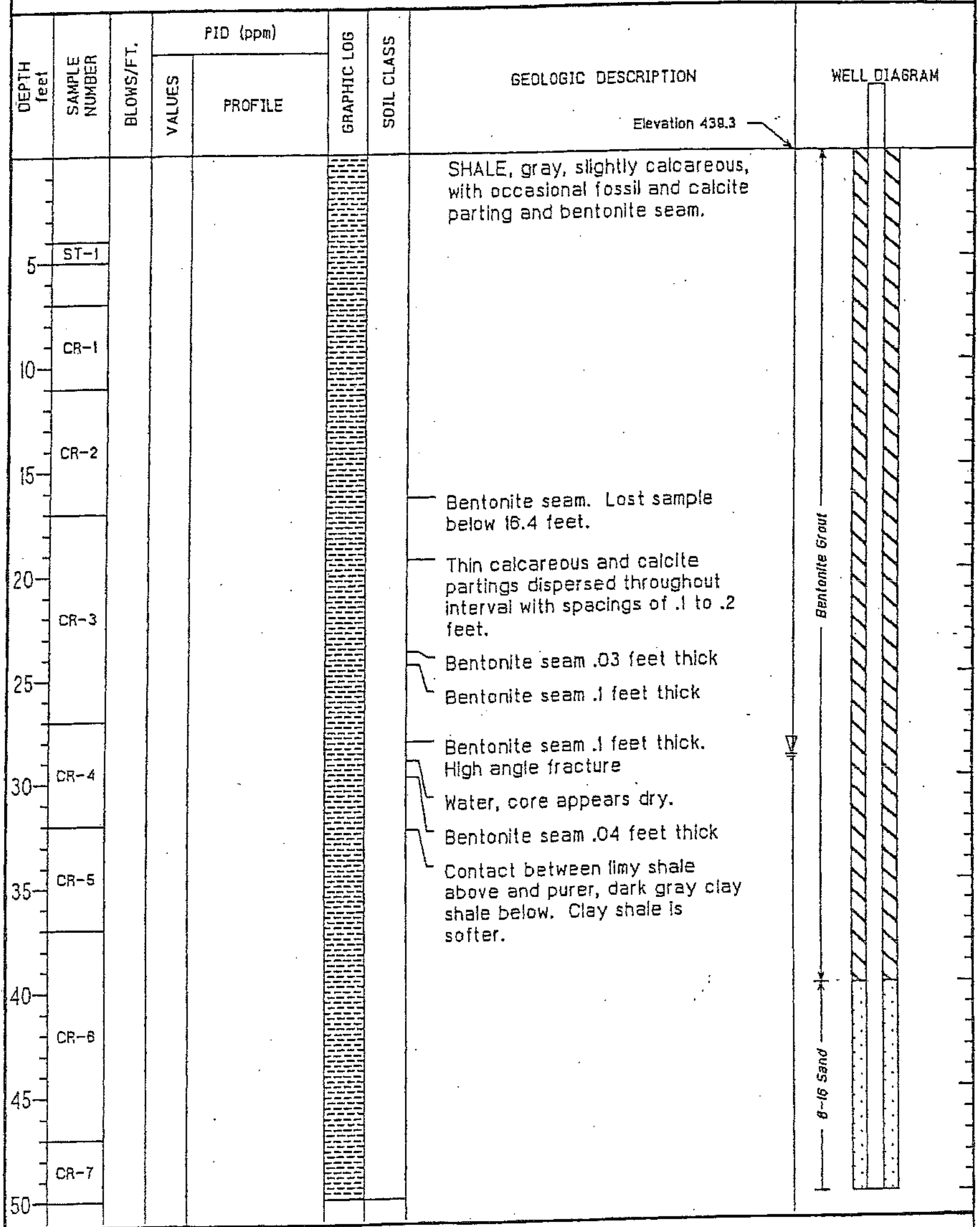
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: July 14, 1995

Location: PLATE A-1



SHALE, gray, slightly calcareous, with occasional fossil and calcite parting and bentonite seam.

Bentonite seam. Lost sample below 16.4 feet.

Thin calcareous and calcite partings dispersed throughout interval with spacings of .1 to .2 feet.

Bentonite seam .03 feet thick

Bentonite seam .1 feet thick

Bentonite seam .1 feet thick. High angle fracture

Water, core appears dry.

Bentonite seam .04 feet thick

Contact between limy shale above and purer, dark gray clay shale below. Clay shale is softer.

BORING LOG DB-1

PLATE 55a

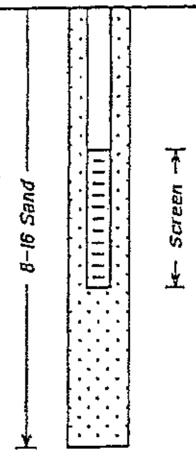
Project No. 136.17

Farmers Branch Landfill

Farmers Branch, Texas

Date: July 14, 1995

Location: PLATE A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
							Elevation 439.3	
							SHALE, dark gray clay shale, with occassional calcareous band	
55	CR-7							
60	CR-8							
							Low angle fracture.	
65							Total Depth – 65.7 feet Drilled in area of site where overburden alluvium has been rmoved. Drilled with air rotary. Encountered water at 28 feet. Redrilled, set casing to 30 feet to seal off water-bearing feature. ST=Shelby tube sample CR=Core run	
70								
75								
80								
85								
90								
95								
100								

BORING LOG DB-1

PLATE 55b

reed engineering
GROUP

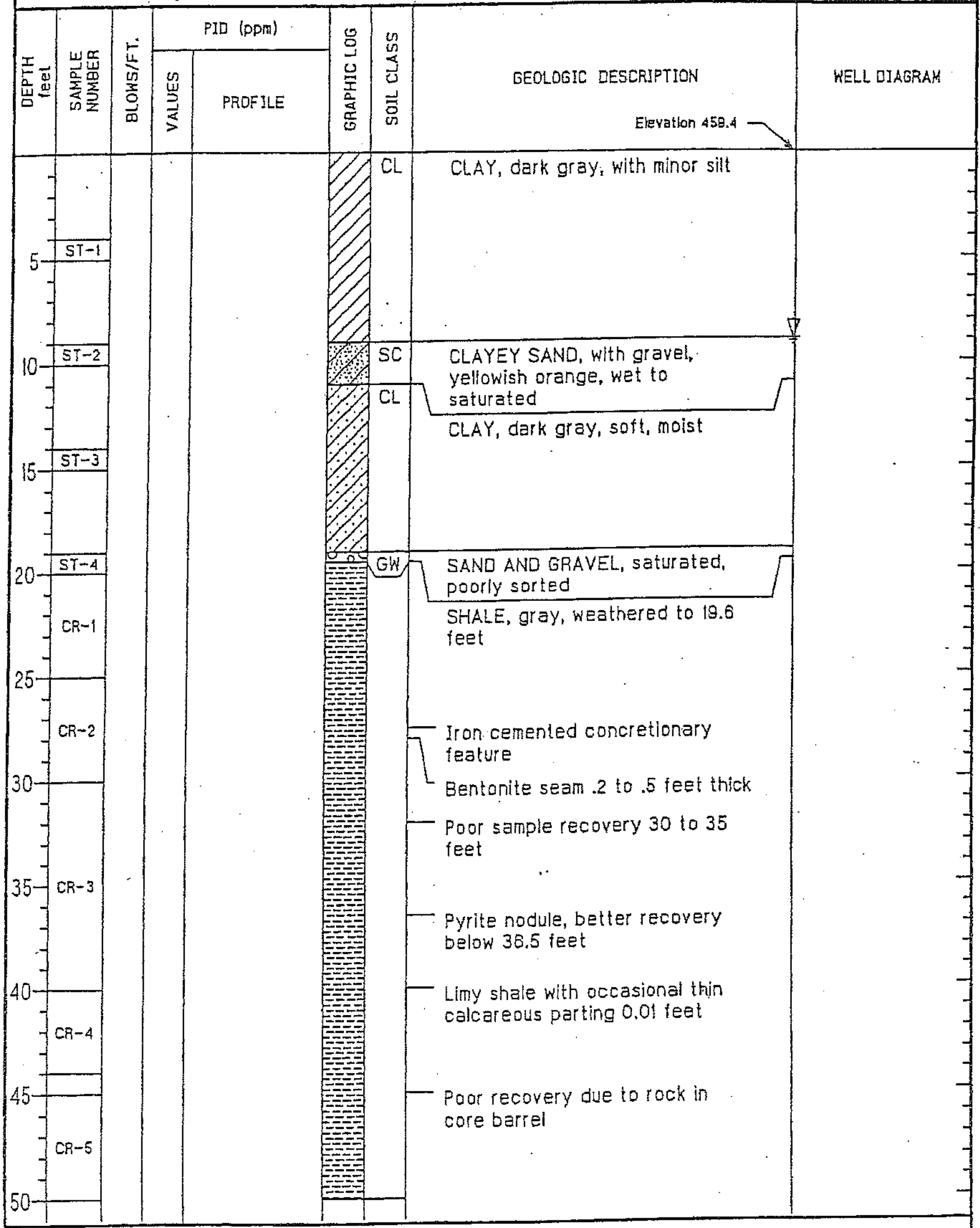
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.16

Date: July 12, 1995

Location: PLATE A-1



CLAY, dark gray, with minor silt

CLAYEY SAND, with gravel, yellowish orange, wet to saturated

CLAY, dark gray, soft, moist

SAND AND GRAVEL, saturated, poorly sorted

SHALE, gray, weathered to 19.6 feet

Iron cemented concretionary feature

Bentonite seam .2 to .5 feet thick

Poor sample recovery 30 to 35 feet

Pyrite nodule, better recovery below 36.5 feet

Limy shale with occasional thin calcareous parting 0.01 feet

Poor recovery due to rock in core barrel

BORING LOG DB-2

PLATE 56a

GEOTECHNICAL CONSULTANTS

APPENDIX

reed engineering
GROUP

Project No. 136.16

Date: July 12, 1995

Farmers Branch Landfill

Farmers Branch, Texas

Location: PLATE A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
							Elevation 459.4	
							Bentonite seam .01 to .15 feet thick	
55	CR-6							
							Bentonite seam 0.03 feet thick	
60								
65	CR-7							
							Contact between limy shale above and more pure clay shale below. Clay shale is dark gray to black.	
70								
75	CR-8						Shale with occassional thin calcareous laminae	
							Bentonite seam .1 to .2 feet thick	
80							Total Depth - 80 feet Set casing to 19.8 feet to seal off alluvium. Drilled with air rotary. Encountered water at 9 feet in alluvial overburden. No water encountered in shale. ST=Shelby tube sample CR=Core run	
85								
90								
95								
00								

APPENDIX

BORING LOG DB-2

PLATE 56b

GEOTECHNICAL CONSULTANTS

reed engineering
GROUP

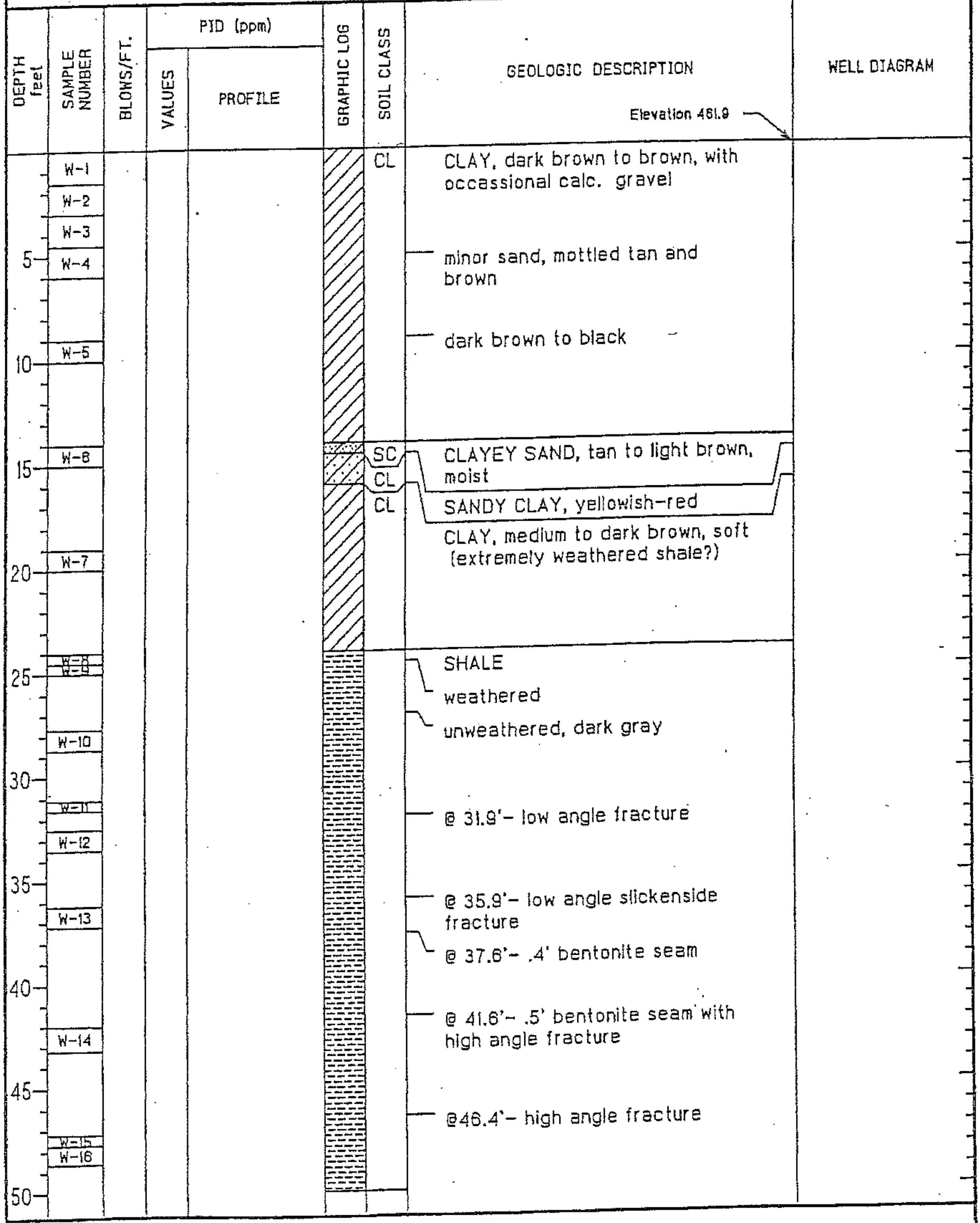
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: October 13,1994

Location: PLATE A-1



CL — CLAY, dark brown to brown, with occassional calc. gravel

minor sand, mottled tan and brown

dark brown to black

SC — CLAYEY SAND, tan to light brown, moist

CL — SANDY CLAY, yellowish-red

CL — CLAY, medium to dark brown, soft (extremely weathered shale?)

SHALE

weathered

unweathered, dark gray

@ 31.9'– low angle fracture

@ 35.9'– low angle slickenside fracture

@ 37.6'– .4' bentonite seam

@ 41.6'– .5' bentonite seam with high angle fracture

@46.4'– high angle fracture

BORING LOG DB-3

PLATE 57a

GEOTECHNICAL CONSULTANTS

APPENDIX

reed engineering
GROUP

Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.17

Date: October 13,1994

Location: PLATE A-1

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 461.9	WELL DIAGRAM
	W-17						@50.2'- high angle slickenside fracture	
							@53.2'- .2' bentonite seam	
55	W-18						@54.1'- high angle slickenside fracture	
	W-19							
60							@60'- low angle fractures	
	W-20							
65								
	W-21							
							@68.3'- thin interbedded limestone bands .01 to .03 feet thick	
	W-22							
70	W-23							
75	W-24							
	W-25							
80							Total Depth - 79.4 feet Drilled with water.	
85								
90								
95								
00								

BORING LOG DB-3

PLATE 57b

GEOTECHNICAL CONSULTANTS

APPENDIX

1995 REED ENGINEERING MONITOR WELL BORING LOGS

reed engineering
GROUP

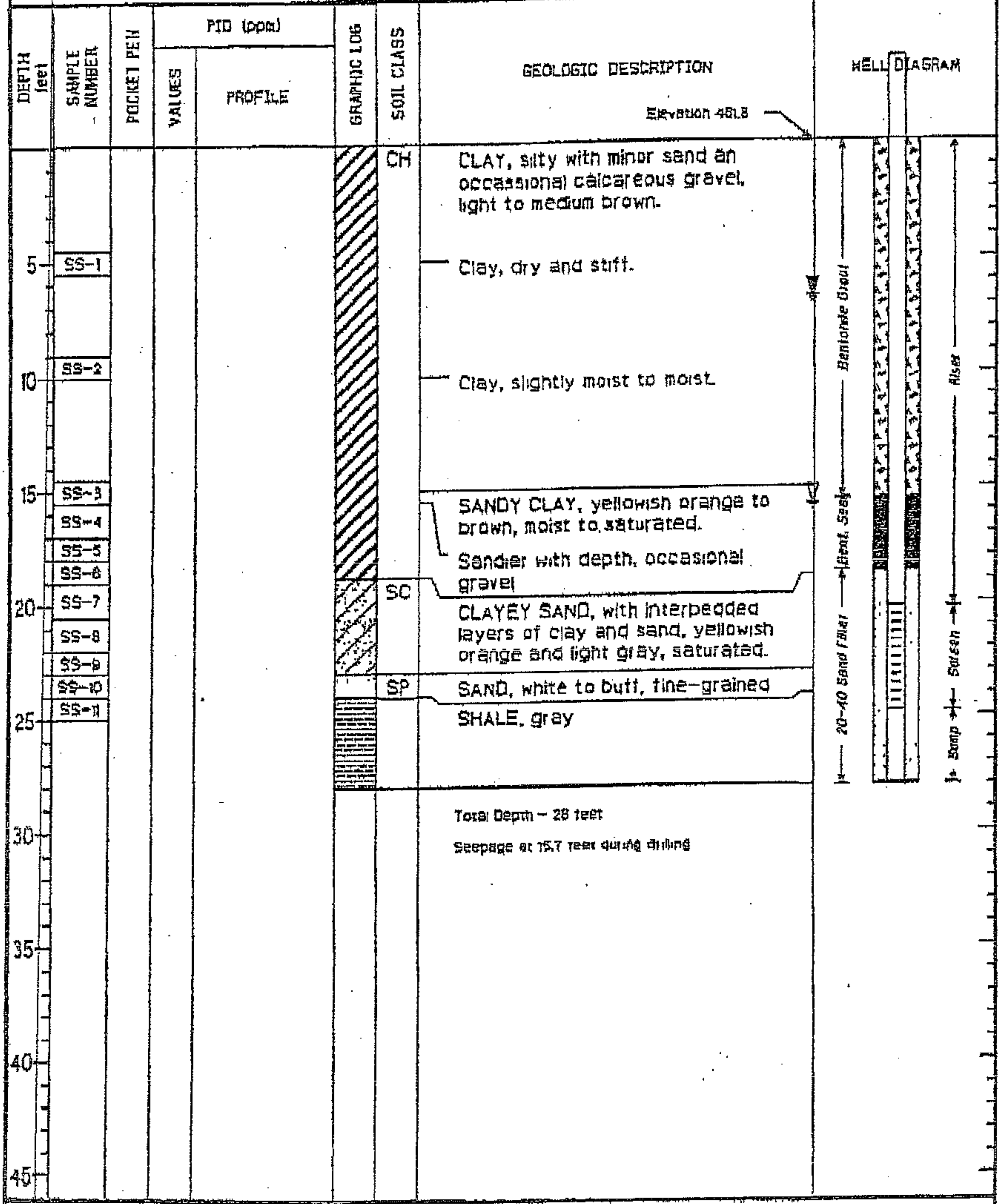
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 138.30

Date: September 19, 1995

Location: See Plate 1



CLAY, silty with minor sand an occassional calcareous gravel, light to medium brown.

Clay, dry and stiff.

Clay, slightly moist to moist.

SANDY CLAY, yellowish orange to brown, moist to saturated.

Sandier with depth, occasional gravel

CLAYEY SAND, with interbedded layers of clay and sand, yellowish orange and light gray, saturated.

SAND, white to buff, fine-grained

SHALE, gray

Total Depth – 28 feet

Seepage at 15.7 feet during drilling

BORING LOG MW-1R

PLATE 2

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-1R

Permit No. 1312-A

Latitude: 33° 02' 11.5" N

Longitude: 96° 56' 37.5" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 461.8'

Well Depth: 28'

Water Level Elevation: 446.1

Screen Bottom (1) Depth: 24.8

(2) Elevation: 437

Gravel Pack (1) Depth: 18.6

(2) Elevation: 443.2

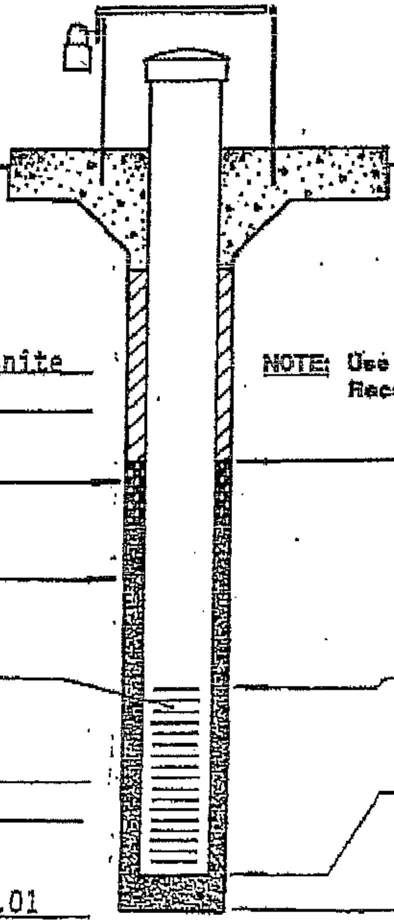
Type of Locking Device: Pad lock

Type of Casing Protection: Steel casing

Type of Surface Pad: concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 464.76



Surface Elevation: 461.8'

Type of Surface Grout: concrete

Depth: 2'

Backfill Material: Bentonite Grout

Casing Type: PVC

Size (dia.): 4"

Guage: SCH 40

NOTE: Use of Flush Screw Joint Casing Only 4" ⌀ or larger Recommend Teflon Tape of Joints

Bentonite Seal Top	Depth: 15.5 ✓	Elev: 446.3 ✓
Gravel Pack Top	Depth: 18.6 ✓	Elev: 443.2 ✓
Top of Screen	Depth: 20.22 ✓	Elev: 441.58 ✓
Screen Bottom	Depth: 24.8 ✓	Elev: 437 ✓
Total Well	Depth: 28 ✓	Elev: 433.8 ✓

Bentonite Seal

Gravel Pack

Well Screen

Type of Well Screen: PVC SCH 40

Screen Opening Size: 0.01

GEOTECHNICAL CONSULTANTS

reed engineering GROUP

Farmers Branch Landfill

Project No. 136.17

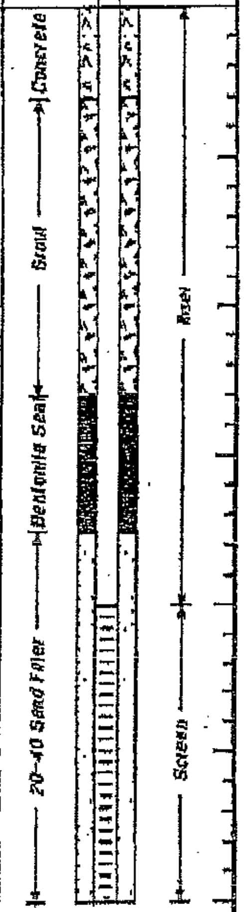
Farmers Branch, Texas

Date: August 30, 1993

Location:

DEPTH feet	SAMPLE NUMBER	POCKET PEN	PID (ppm) VALUES	PID (ppm) PROFILE	SOIL CLASS	GEOLOGIC DESCRIPTION
						Elevation 456.90
					CL	CLAY, dark gray
5	SS-1					
10	SS-2					
					CL	CLAY, olive
15	SS-3					
					CL	SANDY CLAY, tan
20	SS-4					
					SC	CLAYEY SAND, with small gravel, tan
25	SS-5					
						SHALE, gray
30	SS-7					
						Total Depth – 30 feet
35						
40						
45						

WELL DIAGRAM



BORING LOG MW-3R

PLATE

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-3R

Permit No. 1312-A

Latitude:

Longitude:

Well Boring Diameter: 12"

Report all Depths from Surface Elevation

Ground Surface Elevation: 456.90

Well Depth: 30.0

Water Level Elevation: 443.15

Screen Bottom (1) Depth: 30.0

(2) Elevation: 426.90

Gravel Pack (1) Depth: 30

(2) Elevation: 426.90

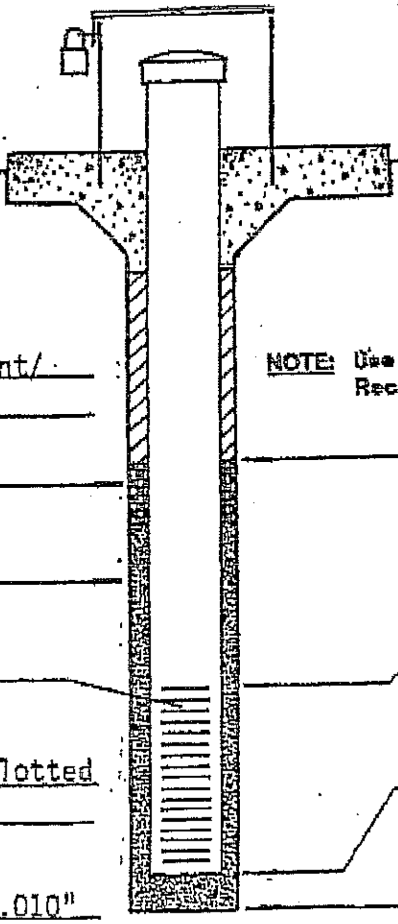
Type of Locking Device: Master Lock

Type of Casing Protection: Steel

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 459.53



Surface Elevation: 456.90

Type of Surface Grout:

Depth: 3

Casing Type: Steel

Size (dia.): 6"x6" (Square)

Guage:

Backfill Material: Cement/ Bentonite

NOTE: Use of Flush Screw Joint Casing Only 4" ⌀ or larger Recommend Teflon Tape of Joints

Bentonite Seal Top Depth: 13.0 Elev: 443.90

Gravel Pack Top Depth: 17.5 Elev: 439.40

Top of Screen Depth: 20.0 Elev: 436.90

Type of Well Screen: Slotted Schedule 40 PVC

Screen Bottom Depth: 30.0 Elev: 426.90

Screen Opening Size: 0.010"

Total Well Depth: 30.0 Elev: 426.90

GEOTECHNICAL CONSULTANTS

reed engineering GROUP

Farmers Branch Landfill

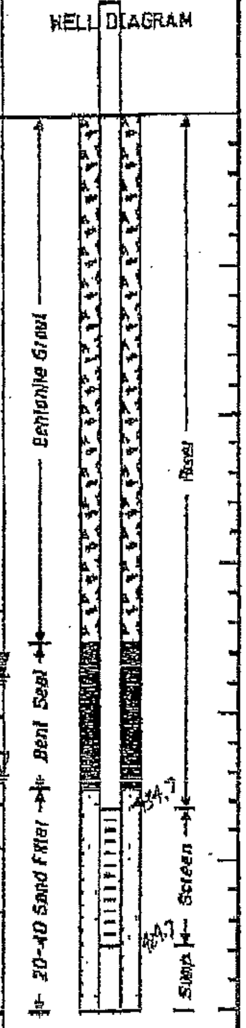
Project No. 136.30

Farmers Branch, Texas

Date: November 28, 1995

Location: See Plate 1

DEPTH feet	SAMPLE NUMBER	POCKET PEN	PID (ppm) VALUES	PID (ppm) PROFILE	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 457.7
0					CH	CLAY, dark to medium brown, stiff.
5	SS-1					Clay, dry and stiff.
10	SS-2					Clay, with calcareous sand and small gravel, stiff.
15	SS-3			441.2		
	SS-4				CL	CLAY, with sand, medium brown, stiff, sandier with depth.
	SS-5			437.7		Sand content about 50%, stiff, moist.
20	SS-6				SC	
	SS-7			434.7		CLAYEY SAND, medium to fine grained, light brown, moist.
	SS-8			433.2	SP	SAND, with gravel, few fines.
25	SS-9			431.2	GW	SAND AND GRAVEL, few fines, tan and brown, saturated.
	SS-10					SHALE, gray
30				427.7		Total Depth ~ 30 feet Seepage at 22 feet during drilling.
35						
40						
45						



BORING LOG MW-4R

PLATE 3

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-4R

Permit No. 1312-A

Latitude: 33° 01' 36" N

Longitude: 96° 56' 48" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 457.7

Well Depth: 30

Water Level Elevation: 435.7

Screen Bottom
(1) Depth: 27.8
(2) Elevation: 429.9

Gravel Pack
(1) Depth: 22.5
(2) Elevation: 435.2

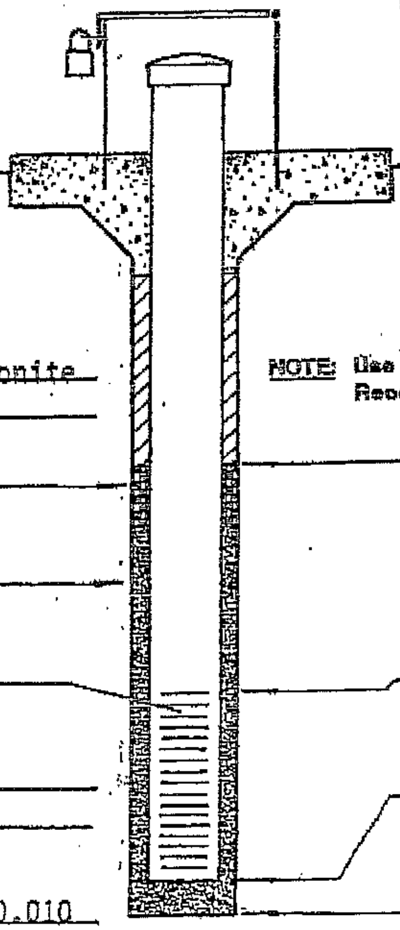
Type of Locking Device: Pad lock

Type of Casing Protection: Steel casing

Type of Surface Pad: concrete

Top of Protective Collar Elevation: 461.21

Top of Casing Elevation:



Surface Elevation: 457.7

Type of Surface Grout: concrete
Depth: 2'

Casing Type: PVC
Size (dia.): 4 inch
Guage: SCH 40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints

Bentonite Seal

Gravel Pack

Well Screen

Bentonite Seal Top Depth: 17.6 ✓ Elev: 440.1 ✓

Gravel Pack Top Depth: 22.5 Elev: 435.2 ✓

Top of Screen Depth: 23.21 ✓ Elev: 434.49 ✓

Type of Well Screen: PVC

Screen Bottom Depth: 27.8 ✓ Elev: 429.9 ✓

Screen Opening Size: 0.010

Total Well Depth: 30 Elev: 427.7

reed engineering
GROUP

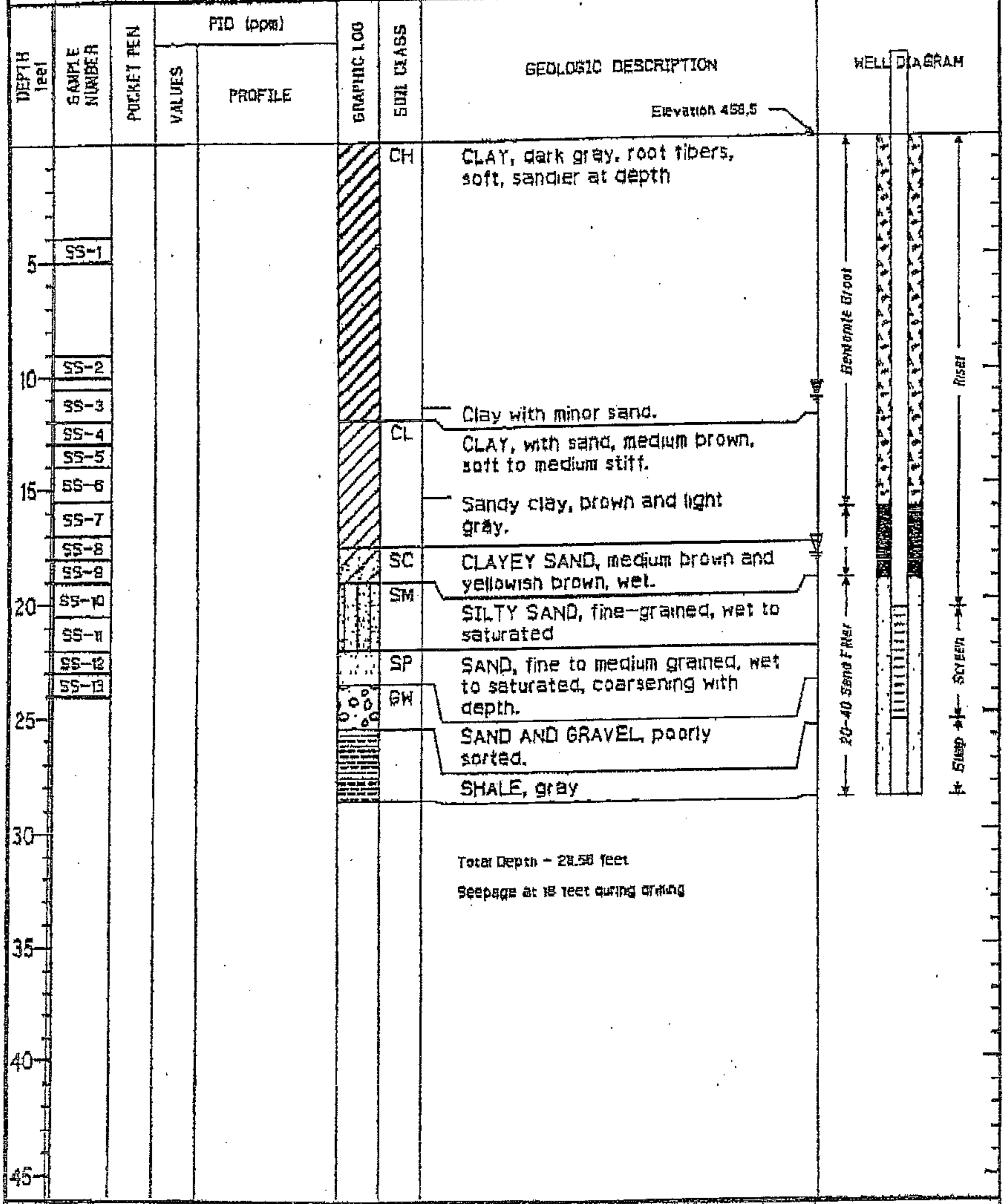
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 136.30

Date: September 20, 1995

Location: See Plate 1



CLAY, dark gray, root fibers, soft, sandier at depth

Clay with minor sand.

CLAY, with sand, medium brown, soft to medium stiff.

Sandy clay, brown and light gray.

CLAYEY SAND, medium brown and yellowish brown, wet.

SILTY SAND, fine-grained, wet to saturated

SAND, fine to medium grained, wet to saturated, coarsening with depth.

SAND AND GRAVEL, poorly sorted.

SHALE, gray

Total Depth – 28.58 feet

Seepage at 18 feet during drilling

BORING LOG MW-8

PLATE 4

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-8

Permit No. 1312-A

Latitude: 33° 02' 0.6" N

Longitude: 96° 56' 39' E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 456.5

Well Depth: 28.56

Water Level Elevation: 438.5'

Screen Bottom (1) Depth: 25.3

(2) Elevation: 431.2

Gravel Pack (1) Depth: 19

(2) Elevation: 437.5

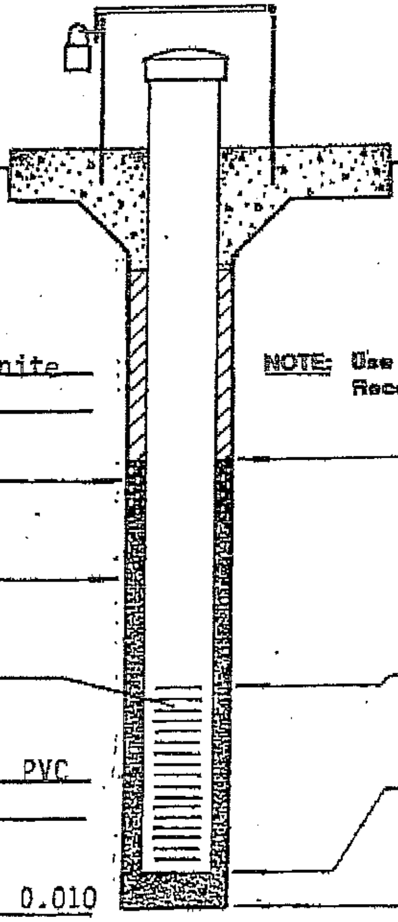
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 459.95



Surface Elevation: 456.5'

Type of Surface Grout: Concrete

Depth: 2'

Casing Type: PVC

Size (dia.): 4"

Guage: SCH 40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger
Recommend Teflon Tape of Joints

Bentonite Seal

Bentonite Seal Top Depth: 16 Elev: 440.5

Gravel Pack

Gravel Pack Top Depth: 19 Elev: 437.5

Well Screen

Top of Screen Depth: 20.68 Elev: 435.82

Type of Well Screen: PVC

Screen Bottom Depth: 25.3 Elev: 431.2

Screen Opening Size: 0.010

Total Well Depth: 28.56 Elev: 427.94

GEOTECHNICAL CONSULTANTS

reed engineering GROUP

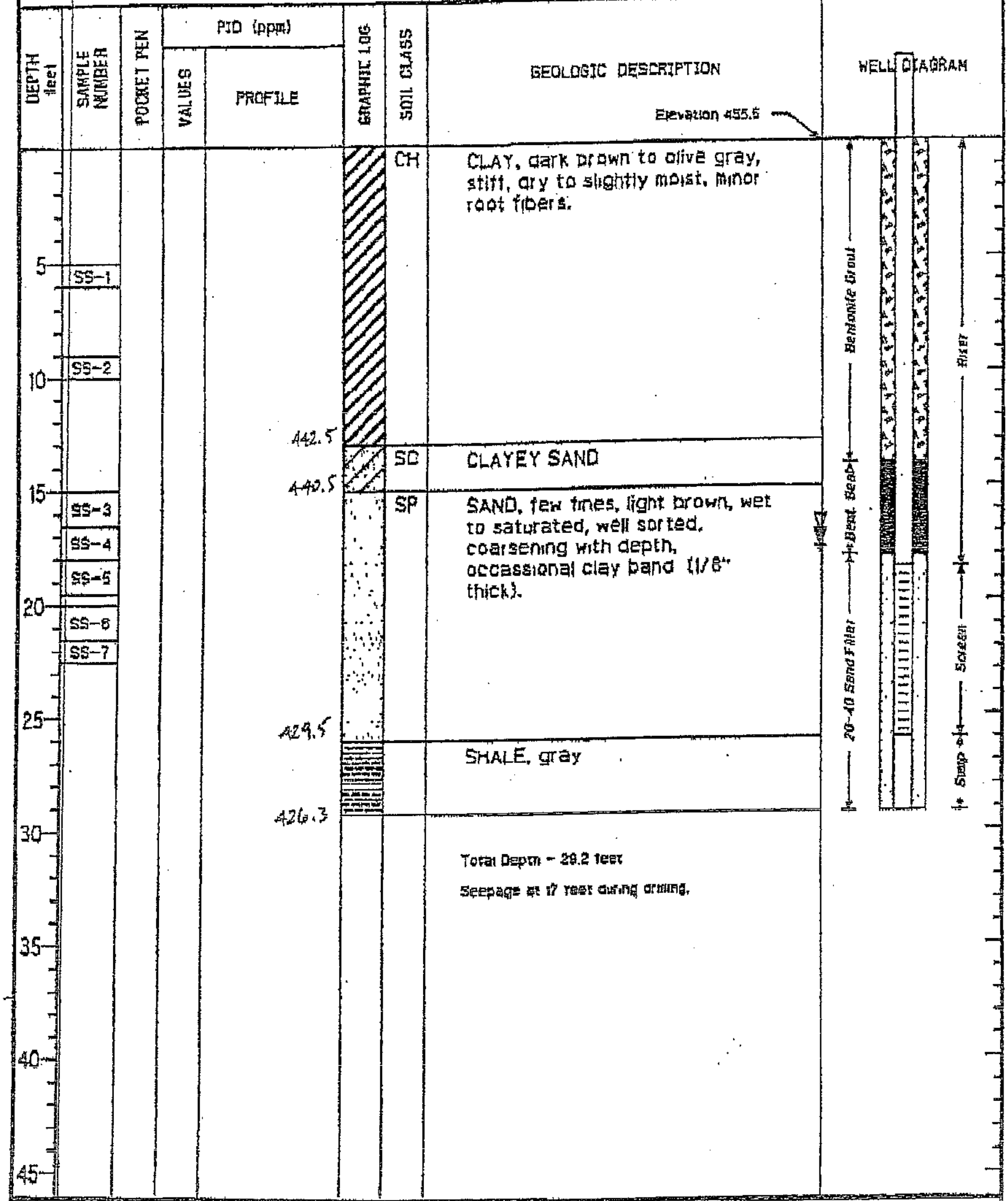
Farmers Branch Landfill

Project No. 136.30

Farmers Branch, Texas

Date: November 27, 1995

Location: See Plate I



CLAY, dark brown to olive gray, stiff, dry to slightly moist, minor root fibers.

CLAYEY SAND

SAND, few fines, light brown, wet to saturated, well sorted, coarsening with depth, occassional clay band (1/8" thick).

SHALE, gray

Total Depth - 29.2 feet

Seepage at 17 feet during drilling.

BORING LOG MW-9

PLATE 5

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-9

Permit No. 1312-A

Latitude: 33° 01' 36" N

Longitude: 96° 56' 55" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 455.5

Well Depth: 29.2

Water Level Elevation: 438.5

Screen Bottom (1) Depth: 26

(2) Elevation: 429.5

Gravel Pack (1) Depth: 18

(2) Elevation: 437.5

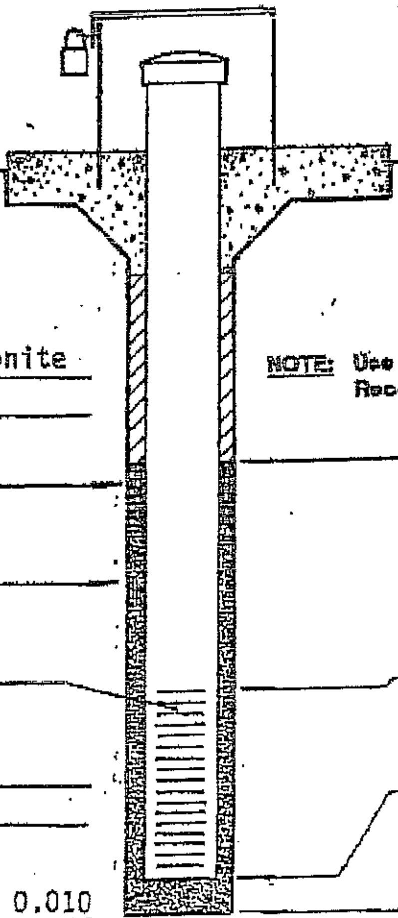
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 458.98



Surface Elevation: 455.5

Type of Surface Grout: Concrete

Depth: 2'

Casing Type: PVC

Size (dia.): 4"

Guage: SCH40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger
Recommend Teflon Tape of Joints

Bentonite Seal

Gravel Pack

Well Screen

Type of Well Screen: PVC

Screen Opening Size: 0.010

Bentonite Seal Top	Depth: 14	Elev: 441.5
Gravel Pack Top	Depth: 18	Elev: 437.5
Top of Screen	Depth: 18.78	Elev: 436.72
Screen Bottom	Depth: 26	Elev: 429.5
Total Well	Depth: 29.2	Elev: 426.3

reed engineering
GROUP

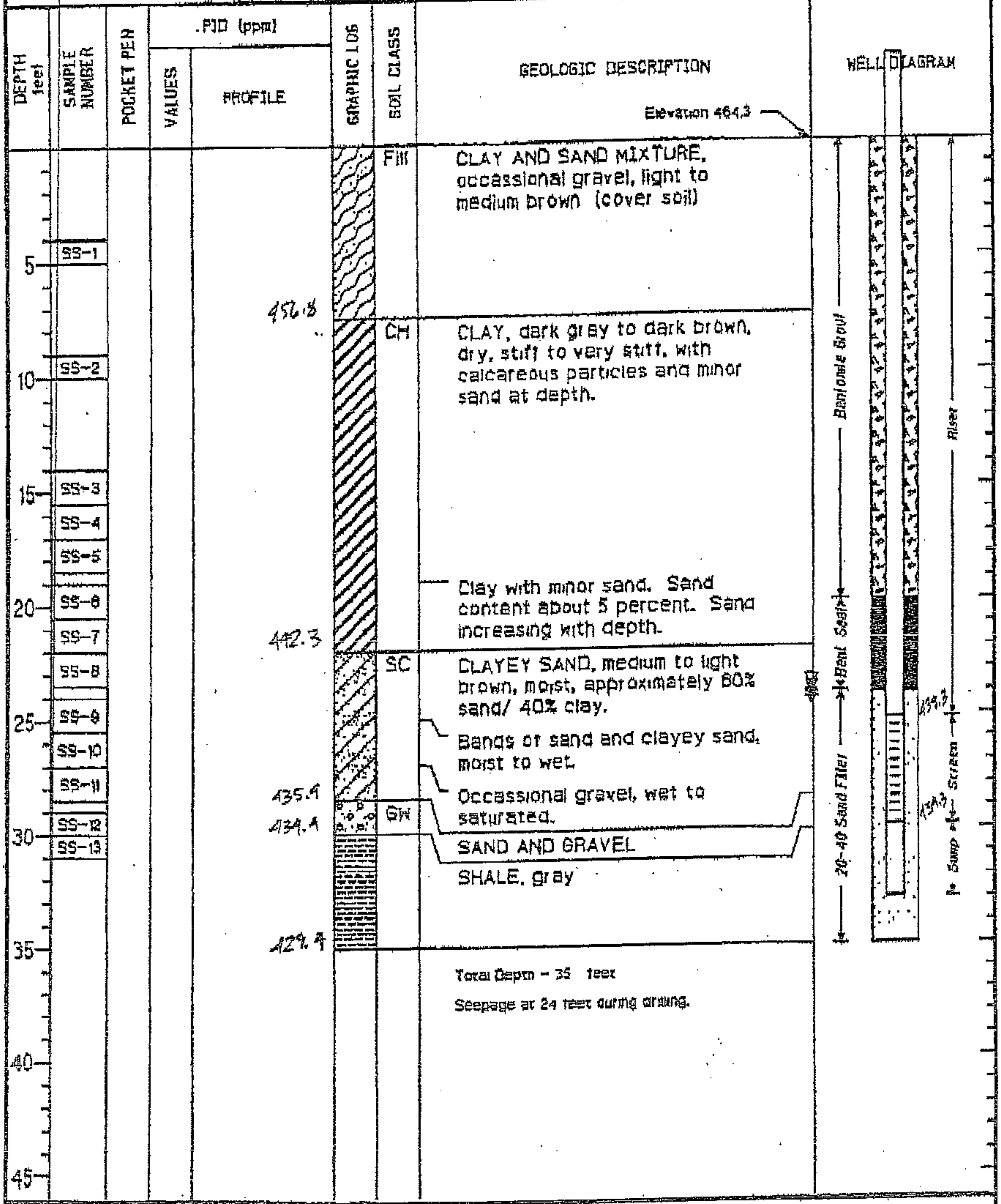
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 138.30

Date: December 1, 1995

Location: See Plate 1



CLAY AND SAND MIXTURE, occassional gravel, light to medium brown (cover soil)

CLAY, dark gray to dark brown, dry, stiff to very stiff, with calcareous particles and minor sand at depth.

Clay with minor sand. Sand content about 5 percent. Sand increasing with depth.

CLAYEY SAND, medium to light brown, moist, approximately 60% sand/ 40% clay.

Bands of sand and clayey sand, moist to wet.

Occassional gravel, wet to saturated.

SAND AND GRAVEL

SHALE, gray

Total Depth – 35 feet

Seepage at 24 feet during drilling.

BORING LOG MW-10

PLATE 6

GEOTECHNICAL CONSULTANTS

Monitor Well Data Sheet

Monitor Well I.D. No. MW-10

Permit No. 1312-A

Latitude: 33° 01' 35.5' N

Longitude: 96° 57' 3" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 464.3

Well Depth: 35

Water Level Elevation: 440.3'

Screen Bottom (1) Depth: 29.8

(2) Elevation: 434.5

Gravel Pack (1) Depth: 24

(2) Elevation: 440.3

Type of Locking Device: Pad lock

Type of Casing Protection: Steel casing

Type of Surface Pad: concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 467.79

Surface Elevation: 464.3

Type of Surface Grout: concrete

Depth: 2'

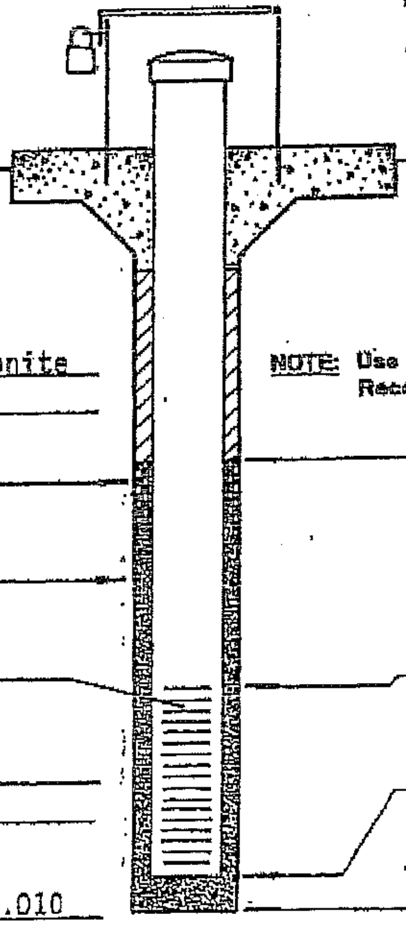
Casing Type: PVC

Size (dia.): 4 inch

Guage: SCH 40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints



Bentonite Seal Top: Depth: 20 Elev: 444.3

Gravel Pack Top: Depth: 24 Elev: 440.3

Top of Screen: Depth: 25.18 Elev: 439.12

Type of Well Screen: PVC

Screen Bottom: Depth: 29.8 Elev: 434.5

Screen Opening Size: 0.010

Total Well: Depth: 35 Elev: 429.3

reed engineering GROUP

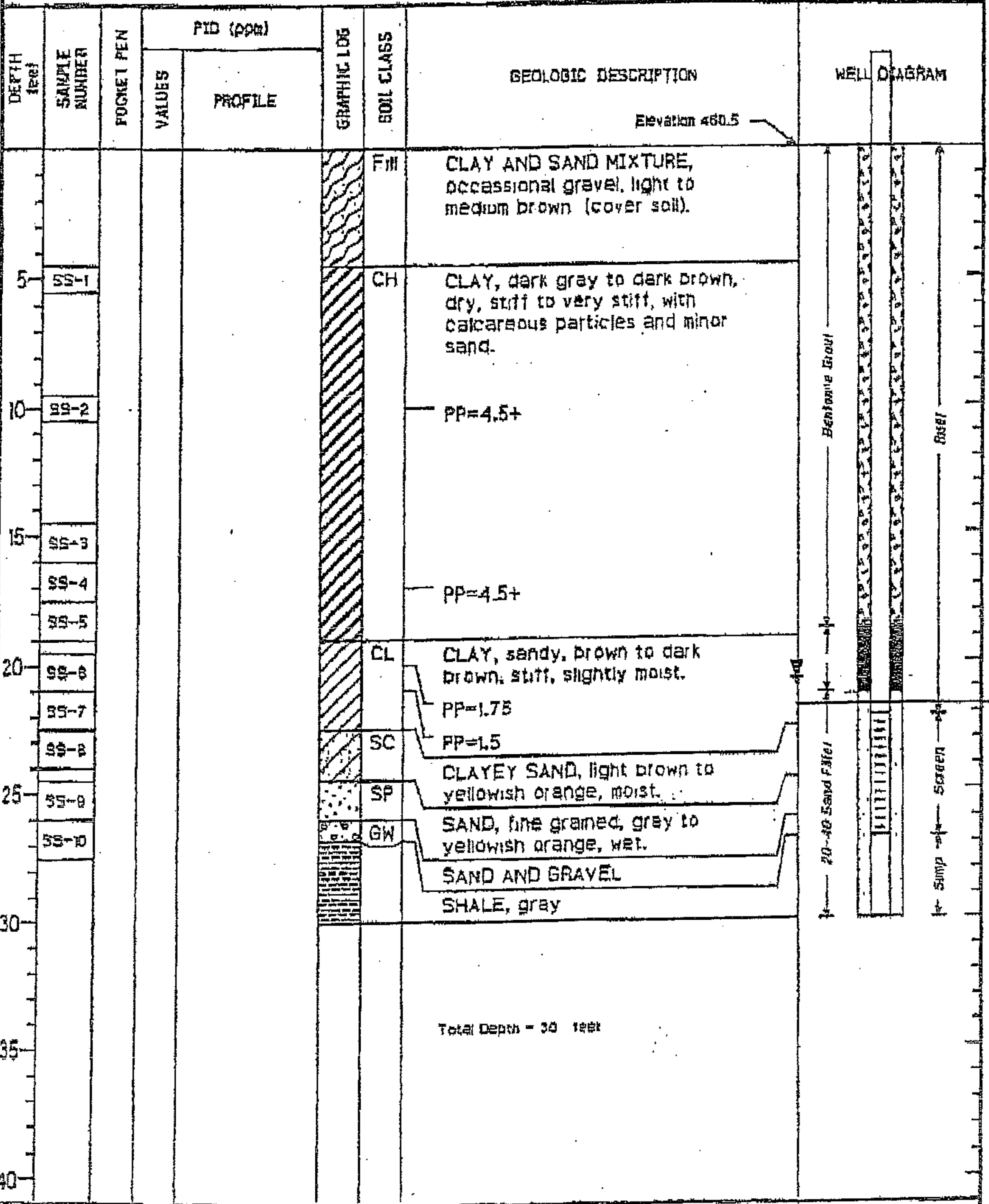
Project No. 136.30

Farmers Branch Landfill

Farmers Branch, Texas

Date: December 5, 1985

Location: See Plate 1



DEPTH feet	SAMPLE NUMBER	POCKET PEN	PID (ppm) VALUES	PID (ppm) PROFILE	SOIL CLASS	GEOLOGIC DESCRIPTION
0					Fill	CLAY AND SAND MIXTURE, occassional gravel, light to medium brown (cover soil).
5	SS-1				CH	CLAY, dark gray to dark brown, dry, stiff to very stiff, with calcareous particles and minor sand.
10	SS-2					PP=4.5+
15	SS-3					
	SS-4					PP=4.5+
	SS-5					
20	SS-6				CL	CLAY, sandy, brown to dark brown, stiff, slightly moist.
	SS-7					PP=1.75
	SS-8				SC	PP=1.5
						CLAYEY SAND, light brown to yellowish orange, moist.
25	SS-9				SP	SAND, fine grained, grey to yellowish orange, wet.
	SS-10				GW	SAND AND GRAVEL
						SHALE, gray
30						
35						Total Depth = 30 feet
40						

BORING LOG MW-11

PLATE 7

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-11

Permit No. 1312-A

Latitude: 33° 01' 37" N

Longitude: 96° 57' 10" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 460.5

Well Depth: 30

Water Level Elevation: 439.85

Screen Bottom (1) Depth: 26.8

(2) Elevation: 433.7

Gravel Pack (1) Depth: 21.2

(2) Elevation: 439.3

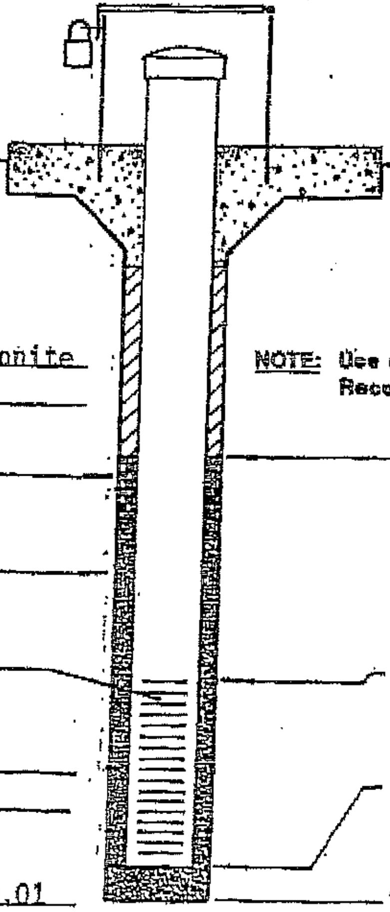
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 463.95



Surface Elevation: 460.5

Type of Surface Grout: Concrete

Depth: 2'

Casing Type: PVC

Size (dia.): 4"

Guage: SCH 4

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints

Bentonite Seal

Bentonite Seal Top Depth: 18.66 Elev: 441.84

Gravel Pack

Gravel Pack Top Depth: 21.2 Elev: 439.3

Well Screen

Top of Screen Depth: 22.41 Elev: 438.09

Type of Well Screen: PVC

Screen Bottom Depth: 26.8 Elev: 433.7

Screen Opening Size: 0.01

Total Well Depth: 30 Elev: 430.5

GEOTECHNICAL CONSULTANTS

reed engineering GROUP

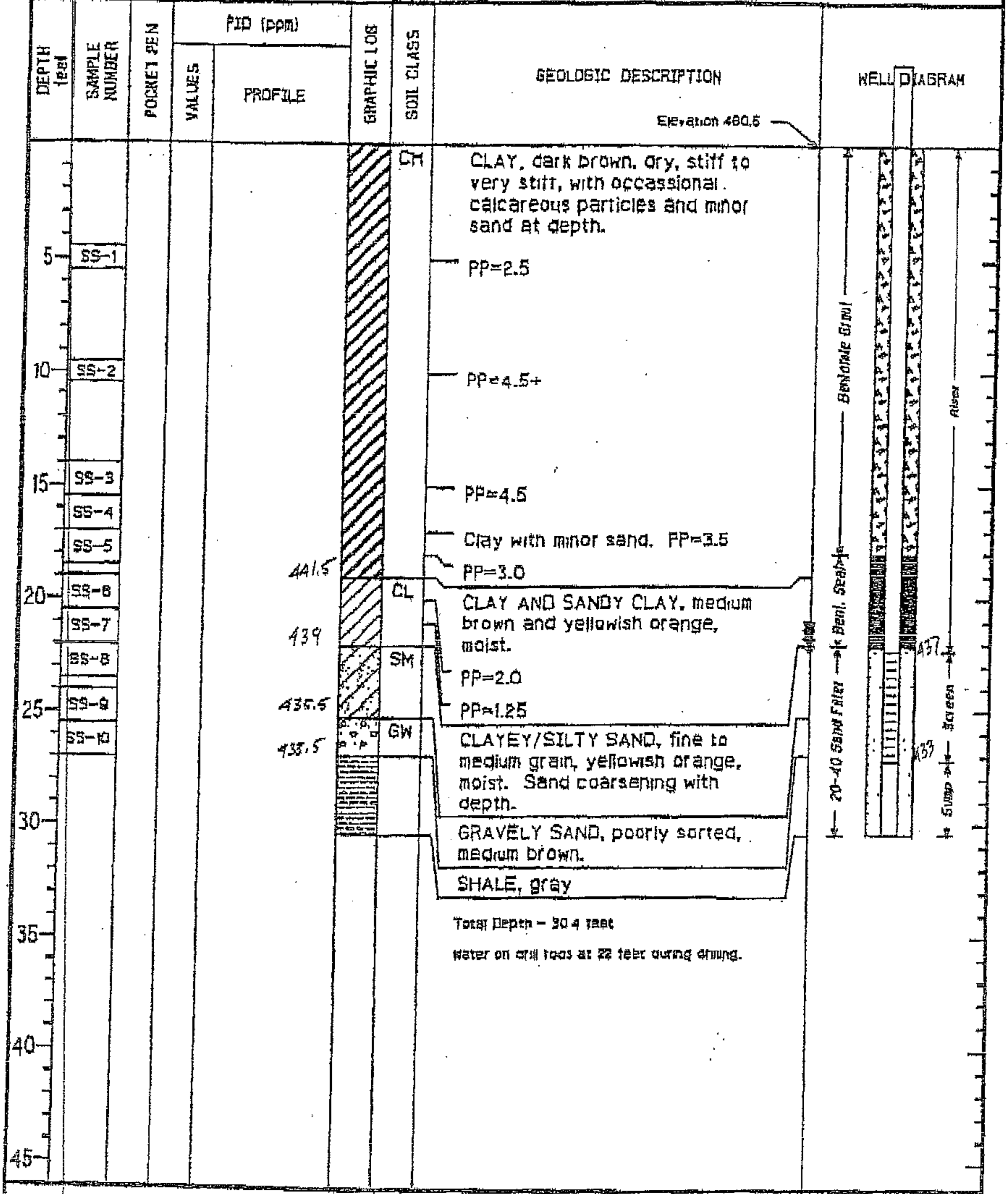
Project No. 136.30

Date: December 6, 1995

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate 1



CLAY, dark brown, dry, stiff to very stiff, with occassional calcareous particles and minor sand at depth.

PP=2.5

PP=4.5+

PP=4.5

Clay with minor sand. PP=3.5

PP=3.0

CLAY AND SANDY CLAY, medium brown and yellowish orange, moist.

PP=2.0

PP=1.25

CLAYEY/SILTY SAND, fine to medium grain, yellowish orange, moist. Sand coarsening with depth.

GRAVELY SAND, poorly sorted, medium brown.

SHALE, gray

Total Depth – 30.4 feet

Water on drill rods at 22 feet during drilling.

BORING LOG MW-12

PLATE 8

GEOTECHNICAL CONSULTANTS

Monitor Well Data Sheet

Monitor Well I.D. No. MW-12

Permit No. 1312-A

Latitude: 33° 01' 38" N

Longitude: 96° 57' 17" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 460.5

Well Depth: 30.4

Water Level Elevation: 438.5

Screen Bottom (1) Depth: 27.2

(2) Elevation: 433.3

Gravel Pack (1) Depth: 22

(2) Elevation: 438.5

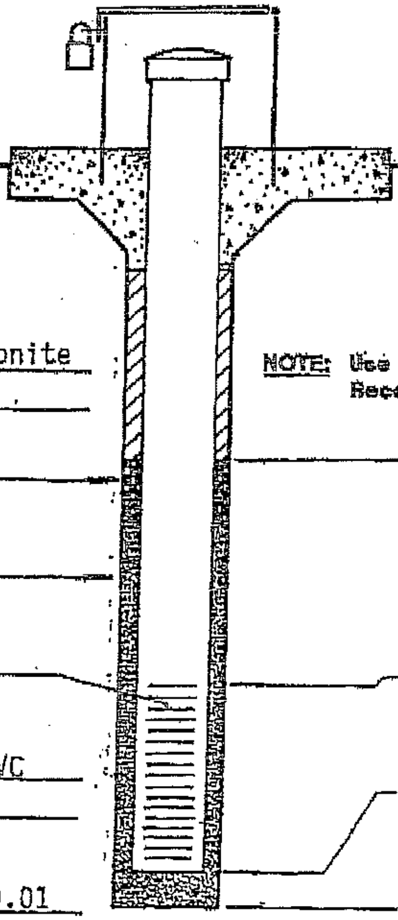
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 463.96



Surface Elevation: 460.5

Type of Surface Grout: Concrete

Depth: 2'

Casing Type: PVC

Size (dia.): 4"

Guage: SCH 40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints

Bentonite Seal

Gravel Pack

Well Screen

Bentonite Seal Top Depth: 18 Elev: 442.5

Gravel Pack Top Depth: 22 Elev: 438.5

Top of Screen Depth: 22.58 Elev: 437.92

Type of Well Screen: PVC

Screen Bottom Depth: 27.2 Elev: 433.3

Screen Opening Size: 0.01

Total Well Depth: 30.4 Elev: 430.1

1998 REED ENGINEERING MONITOR WELL BORING LOGS

reed engineering
GROUP

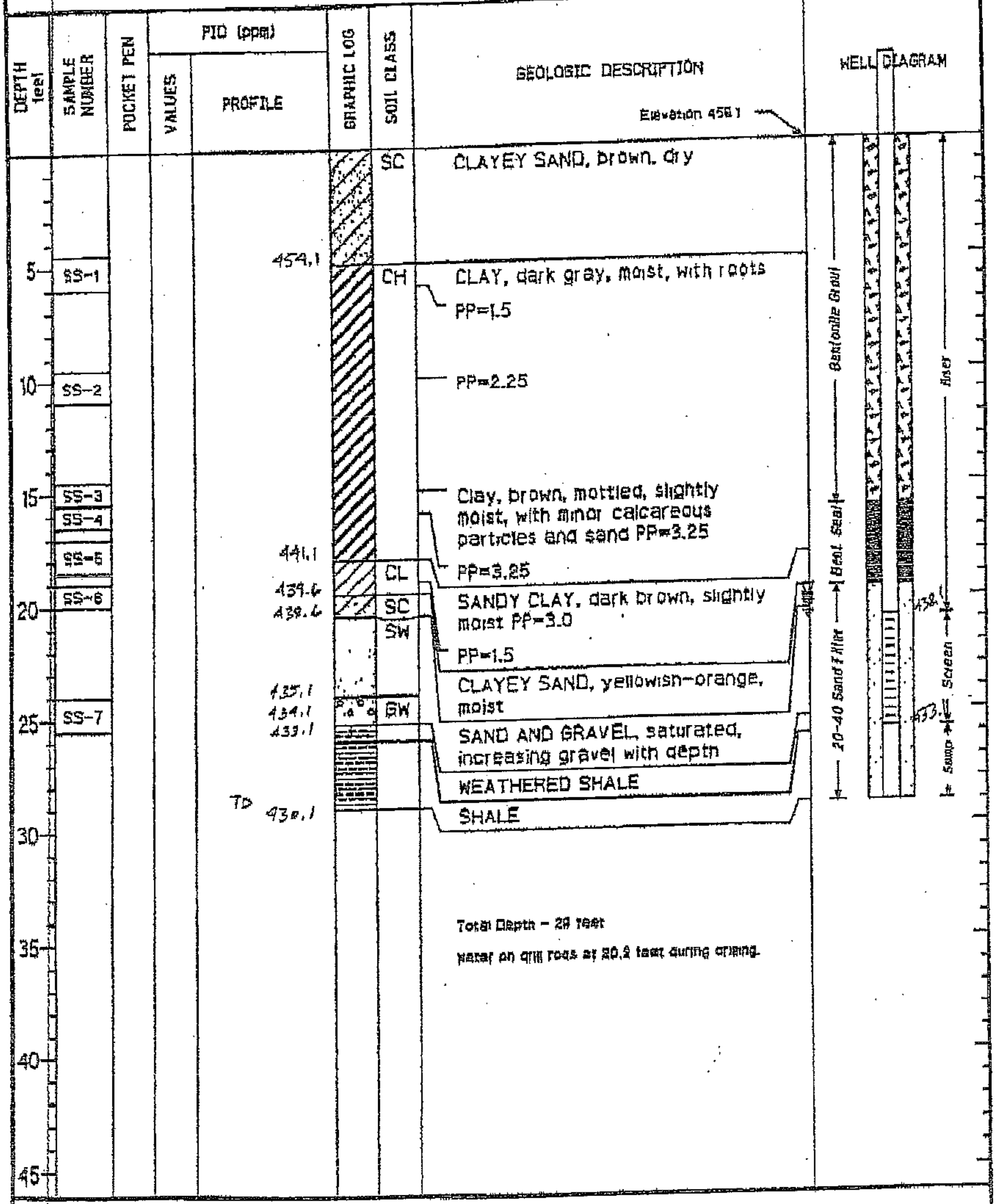
Farmers Branch Landfill

Farmers Branch, Texas

Project No. 138.30

Date: January 17, 1998

Location: See Plate 1



CLAYEY SAND, brown, dry

CLAY, dark gray, moist, with roots

PP=1.5

PP=2.25

Clay, brown, mottled, slightly moist, with minor calcareous particles and sand PP=3.25

PP=3.25

SANDY CLAY, dark brown, slightly moist PP=3.0

PP=1.5

CLAYEY SAND, yellowish-orange, moist

SAND AND GRAVEL, saturated, increasing gravel with depth

WEATHERED SHALE

SHALE

Total Depth – 29 feet

Water on drill rods at 20.2 feet during drilling.

BORING LOG MW-13

PLATE 9

GEOTECHNICAL CONSULTANTS

Monitor Well Data Sheet

Monitor Well I.D. No. MW-13R

Permit No. 1312A

Latitude: 33°01'45"N

Longitude: 96°57'23"E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 458.9

Well Depth: 30'

Water Level Elevation: 438.9

Screen Bottom (1) Depth: 27.1

(2) Elevation: 431.8

Gravel Pack (1) Depth: 21

(2) Elevation: 437.9

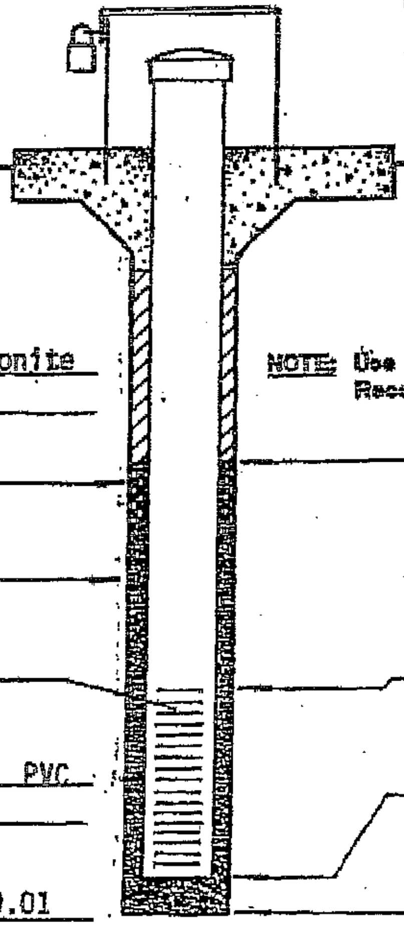
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 461.50



Surface Elevation: 458.9

Type of Surface Grout: Concrete

Depth: 2'

Casing Type: PVC

Size (dia.): 4 inch

Guage: SCH 40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints

Bentonite Seal

Gravel Pack

Well Screen

Bentonite Seal Top Depth: 17.4' Elev: 441.5

Gravel Pack Top Depth: 21' Elev: 437.9

Top of Screen Depth: 22.1 Elev: 436.8

Type of Well Screen: PVC

Screen Bottom Depth: 27.1 Elev: 431.8

Screen Opening Size: 0.01

Total Well Depth: 30 Elev: 428.9

reed engineering GROUP

Farmers Branch Landfill

Project No. 138.30

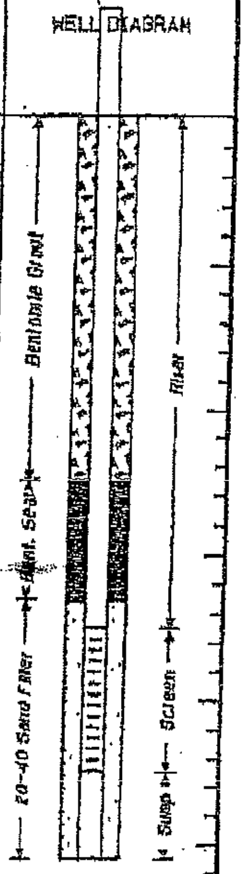
Farmers Branch, Texas

Date: January 25, 1996

Location: See Plate 1

DEPTH feet	SAMPLE NUMBER	POCKET PEN	PID (ppm) VALUES	PID (ppm) PROFILE	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION Elevation 462.0 462
						CH	CLAY, dark brown, with roots, dry PP=4.5+
5	SS-1					CH	CLAY, dark brown PP=4.5+
10	SS-2					CL	SANDY CLAY, brown
15	SS-3					SW	SAND, with rock fragments
20	SS-4					SW	GRAVELLY SAND, yellowish brown, medium to coarse grained
25							SHALE
30							Total Depth – 25.5 feet Water on drill rods at 21.5 feet during drilling.
35							
40							
45							

WELL DIAGRAM



BORING LOG MW-14

PLATE 10

GEOTECHNICAL CONSULTANTS

REED ENGINEERING GROUP

Monitor Well Data Sheet

Monitor Well I.D. No. MW-14

Permit No. 1312-A

Latitude: 33° 01' 45" N

Longitude: 96° 57' 24" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 462.0

Well Depth: 25.5

Water Level Elevation: 440.5

Screen Bottom (1) Depth: 22.5

(2) Elevation: 439.5

Gravel Pack (1) Depth: 16.5

(2) Elevation: 445.5

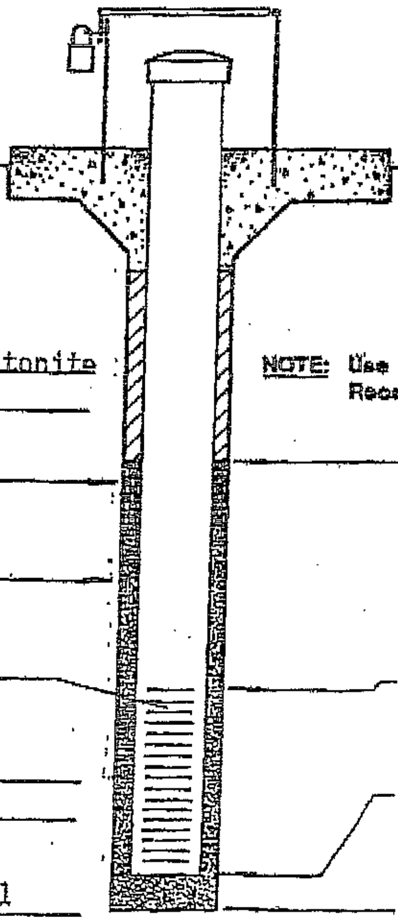
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 465.5



Surface Elevation: 462.0

Type of Surface Grout: Concrete

Depth: 2'

Casing Type: PVC

Size (dia.): 4"

Guage: SCH 40

Backfill Material: Bentonite Grout

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger Recommend Teflon Tape of Joints

Bentonite Seal Top Depth: 12.5 Elev: 449.5

Gravel Pack Top Depth: 16.5 Elev: 445.5

Top of Screen Depth: 17.78 Elev: 444.22

Type of Well Screen: PVC

Screen Bottom Depth: 22.5 Elev: 439.5

Screen Opening Size: 0.01

Total Well Depth: 25.5 Elev: 436.5

reed engineering GROUP

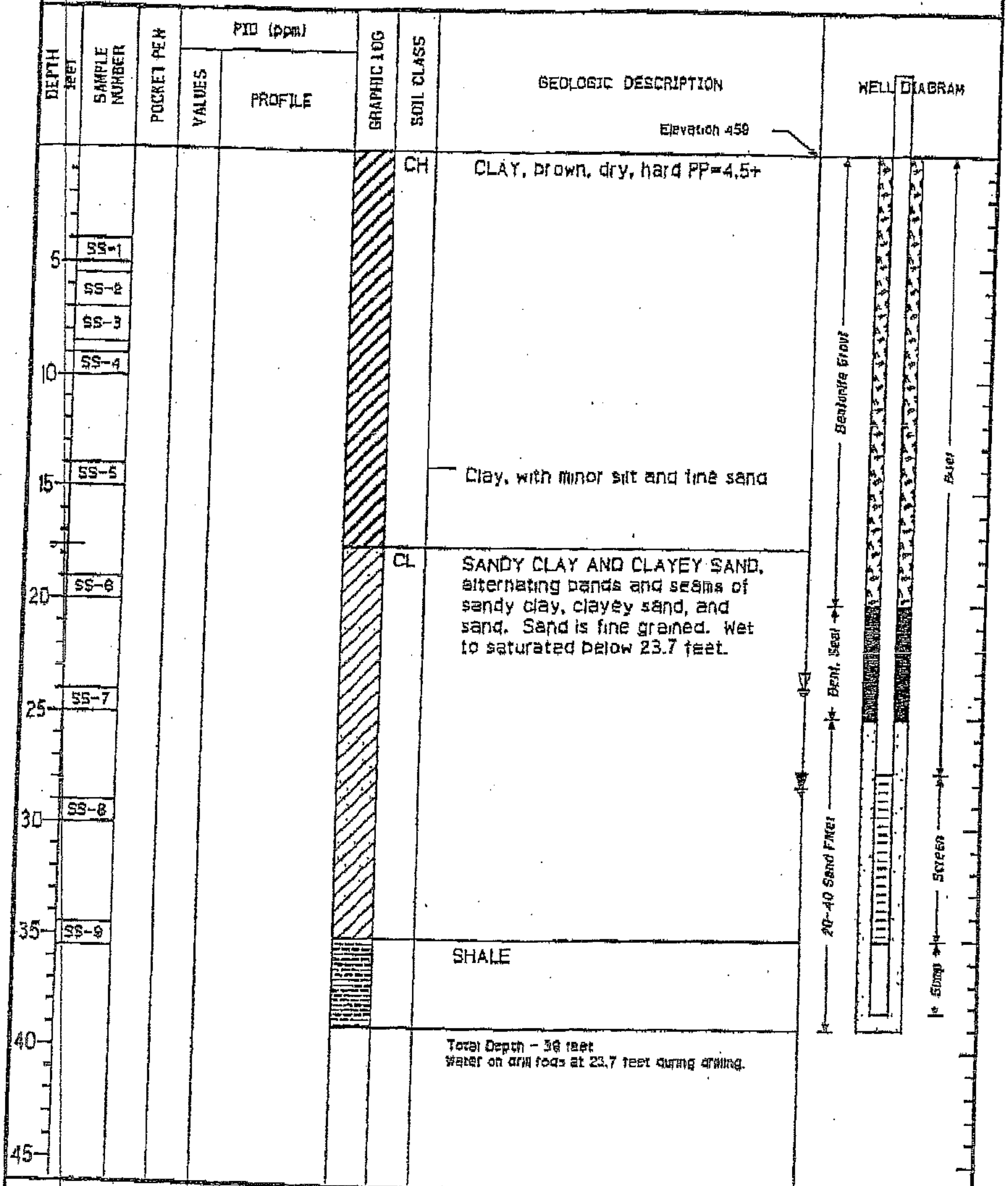
Project No. 138,30

Date: January 22, 1996

Farmers Branch Landfill

Farmers Branch, Texas

Location: See Plate 1



CLAY, brown, dry, hard PP=4.5+

Clay, with minor silt and fine sand

SANDY CLAY AND CLAYEY SAND, alternating bands and seams of sandy clay, clayey sand, and sand. Sand is fine grained. Wet to saturated below 23.7 feet.

SHALE

Total Depth – 39 feet
Water on drill rods at 23.7 feet during drilling.

BORING LOG MW-16

PLATE 12

GEOTECHNICAL CONSULTANTS

Monitor Well Data Sheet

Monitor Well I.D. No. MW-16

Permit No. 1312-A

Latitude: 33° 01' 57" N

Longitude: 96° 57' 23" E

Well Boring Diameter: 10"

Report all Depths from Surface Elevation

Ground Surface Elevation: 459

Well Depth: 39

Water Level Elevation: 435.3

Screen Bottom
(1) Depth: 35
(2) Elevation: 424

Gravel Pack
(1) Depth: 25
(2) Elevation: 434

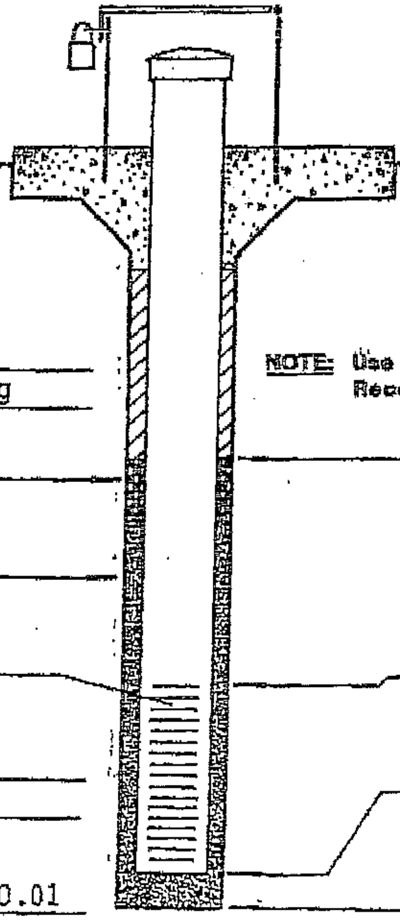
Type of Locking Device: Pad Lock

Type of Casing Protection: Steel Casing

Type of Surface Pad: Concrete

Top of Protective Collar Elevation:

Top of Casing Elevation: 466.03



Surface Elevation: 466.03

Type of Surface Grout: Concrete
Depth: 2'

Casing Type: PVC
Size (dia.): 4"
Guage: SCH 40

Backfill Material: Bentonite Grouting

NOTE: Use of Flush Screw Joint Casing Only 4" ø or larger
Recommend Teflon Tape of Joints

Bentonite Seal

Gravel Pack

Well Screen

Bentonite Seal Top Depth: 20 Elev: 439

Gravel Pack Top Depth: 25 Elev: 434

Top of Screen Depth: 27.78 Elev: 431.22

Type of Well Screen: PVC

Screen Bottom Depth: 35 Elev: 424

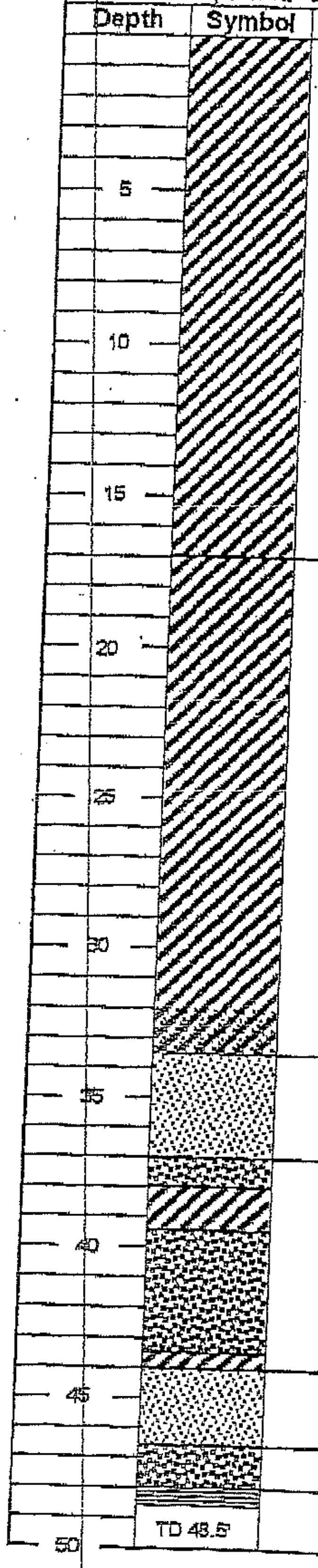
Screen Opening Size: 0.01

Total Well Depth: 39 Elev: 420

2000 CAREL CORPORATION MONITOR WELL BORING LOGS

Boring/ Well No.: MW-17
Facility/Location: Camelot Landfill
Northing: 22,266.7
Easting: 50,001.7
Surface Elev.: 457.40
Project: Monitor Well Installation
Total Depth: 48.5 feet
Geologist: K. Carel / B. Stevens
Drilling Method: Hollow Stem Auger
Hole Dia.: 8 5/8
Drilling Contractor: Andrews and Foster Drilling Co.
Dated Completed: 5/3/00
Remarks:

Depth | Symbol | Lithology



CLAY, dark brown, slightly moist, stiff

CLAY, gray and medium brown, moist, plastic, with calcareous pebbles

Becoming sandy at 32 feet

SAND AND GRAVEL, coarse with some clay, saturated

GRAVEL, brown, saturated with pebbles up to one-inch
SILTY CLAY, gray, wet, plastic

CLAY, 43.5' – 44'

SAND AND CLAYEY SAND, brown, saturated

GRAVEL, brown, wet

SHALE, dark gray, weathered, slightly moist, brittle

FIGURE 2

MONITORING WELL DATA SHEET

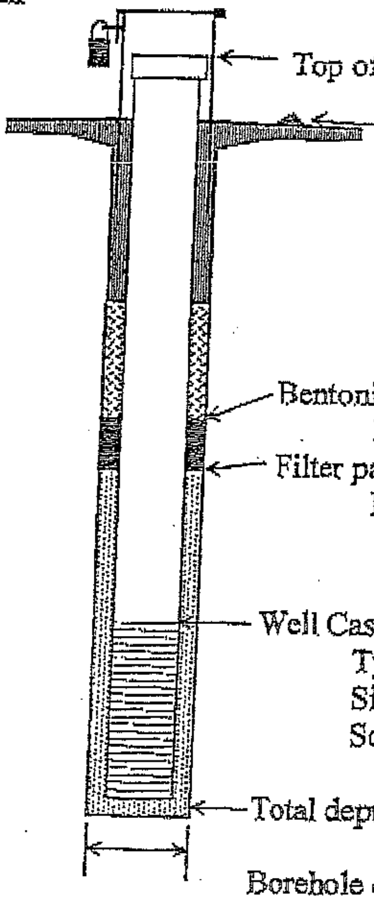
TNRCC SE 67

Permittee or site name: Camelot Landfill TX, L.P.
MSW Permit No.: 1312 County: Denton County, Texas
Monitoring Well I.D. No.: MW-17
Date of Monitoring well installation: May 2, 2000
Date of Monitoring well development: May 5 and 12, 2000
Well location: Latitude (or Northing): 22,266.7 Longitude (or Easting): 50,001.7
Monitoring well groundwater gradient: Upgradient ? No Downgradient? Yes
Monitoring well driller name:Tommy Hilton License No.: 4981
Geologist or engineer supervising well installation: Kevin Carel and Barry Stevens, Geologists
Static water-level elevation (feet above mean sea level) after well development: 433.00
Name of geologic formation(s) in which well is completed: Quaternary Alluvium

Type of locking device: Padlock

Type of well casing protection: 4 in x 4 in. x 5 ft. aluminum

Concrete surface pad dimensions: 4-ft. x 4-ft. x 4-in. thick



Top of well casing elevation: 459.90 ft.

Surface Elevation: 457.40 ft.

Surveyor's pin elevation: 457.88 ft.

Concrete seal depth: 1 ft.
Casing seal material: Bentonite Grout

Bentonite seal top:
Depth: 25 ft. Elevation: 432.4

Filter pack top:
Depth: 29.11 ft. Elevation: 428.29

Filter pack material: Silica sand 20-40 mesh

Well Screen

Screen top depth: 32.1 ft.
Top elevation: 425.30 ft.
Screen bottom depth: 47.1 ft.
Bottom elevation: 410.30
Type of well screen: factory slotted
Screen opening size:0.010 in.

Well Casing
Type: Threaded, flush-joint PVC
Size (diameter): 2-in.
Schedule or thickness: Schedule 40

Total depth of well: 48.5 ft.

Borehole diameter: 8 5/8 in.

FIGURE 4

Project/Facility: Camelot LF

Project No.

Drilling Company: Andrews + Foster

Driller Tommy Hilton

Rig Type Failing F-#6

Other Comments

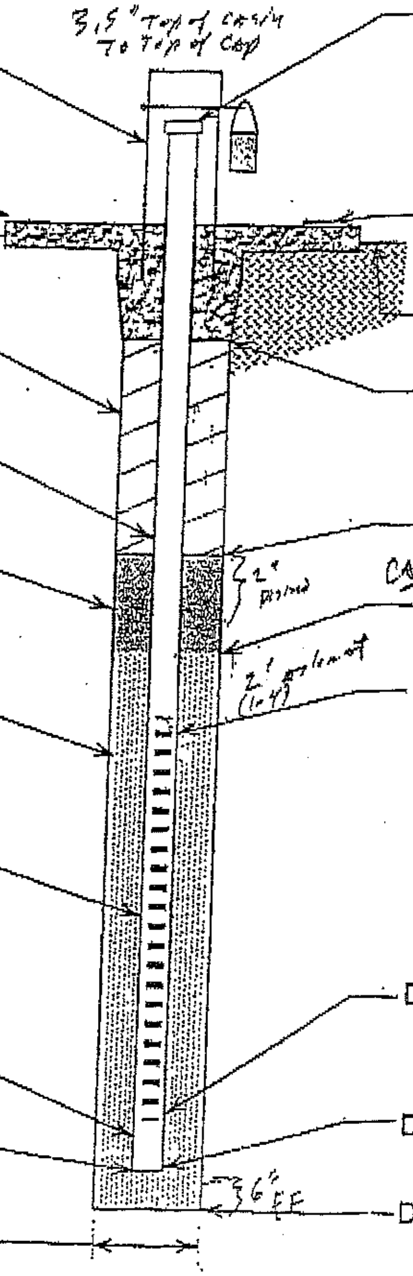
MONITOR WELL INSTALLATION FIELD FORM

Well Number MW-17

Date(s) Installed 5-2-00

Carel Corp Representative K. Carel

Drilling Method Hollow Stem Auger



Protective casing w/ lock
4 x 4 x 25
Material Alum.

Concrete pad
4 x 4 x 4"

Anular seal
Type Bentonite Grout Bags 2

Casing
Dia. 2" Length

Bentonite seal
size 1/2" bags 1 bucket

Silica sand
size 20-40 bags ~~8~~ 11.5
11/12 32.9

Screen
length 14' slot size 0.10

Sump section
length 0.2 ft.

Bottom cap depth 47.3 ft

Bore hole dia 8 5/8 in.

Top of Casing Elev. 459.90

Depth from top of casing to bottom of well 51.0

Length of casing above ground ~~24.5~~ 2.5

Brass marker elev 457.88

Ground elev. 457.40

Depth surface Elev. 457.40

Depth ~~28~~ 25 Elev. 432.4

Caving

Depth 29.11' top of sand Elev. 428.29

Depth 32.1 Elev. 425.30

Depth 47.1 Elev. 410.30

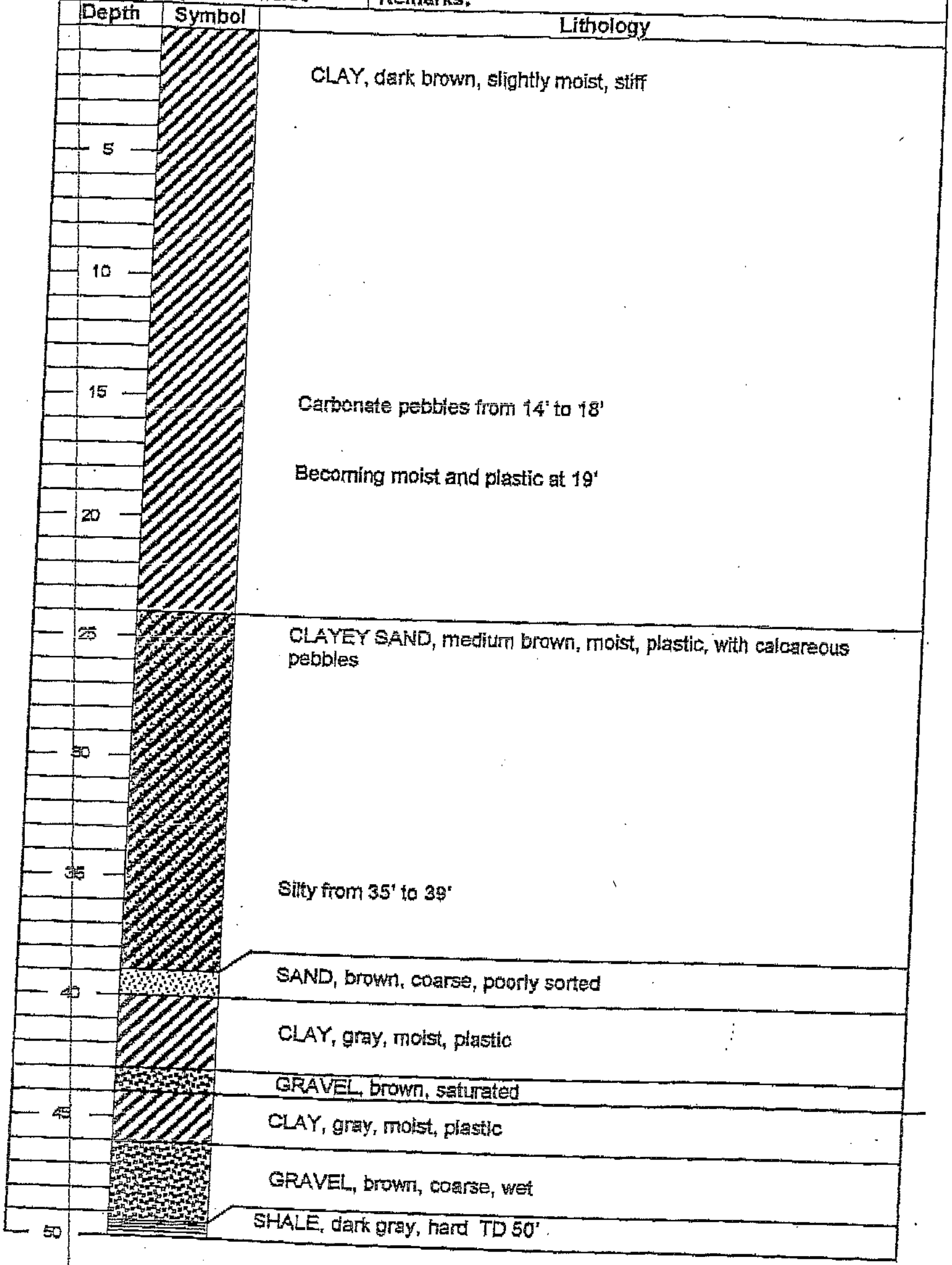
Depth 47.3 Elev. 410.10

Depth 48.5 Elev. 408.9

Tommy Hilton

3019

Boring/ Well No.: MW-18
Facility/Location: Camelot Landfill
Northing: 22,885.8
Easting: 50,006.6
Surface Elev.: 457.50
Project: Monitor Well Installation
Total Depth: 50 feet
Geologist: K. Carel
Drilling Method: Hollow Stem Auger
Hole Dia.: 8 5/8
Drilling Contractor: Andrews and Foster Drilling Co.
Dated Completed: 5/3/00
Remarks:



CLAY, dark brown, slightly moist, stiff

Carbonate pebbles from 14' to 18'

Becoming moist and plastic at 19'

CLAYEY SAND, medium brown, moist, plastic, with calcareous pebbles

Silty from 35' to 39'

SAND, brown, coarse, poorly sorted

CLAY, gray, moist, plastic

GRAVEL, brown, saturated

CLAY, gray, moist, plastic

GRAVEL, brown, coarse, wet

SHALE, dark gray, hard TD 50'

FIGURE 3

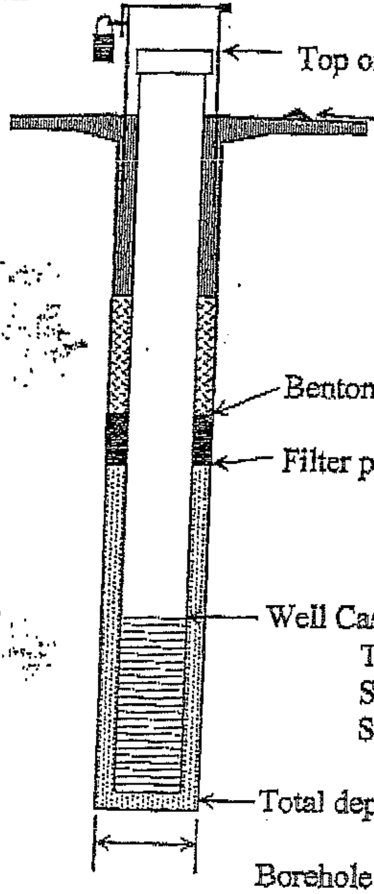
MONITORING WELL DATA SHEET

Permittee or site name: Camelot Landfill TX, L.P.
MSW Permit No.: 1312 County: Denton County, Texas
Monitoring Well I.D. No.: MW-18
Date of Monitoring well installation: May 1, 2000
Date of Motitoring well development: May 12 and 18, 2000
Well location: Latitude (or Northing): 22,885.8 Longitude (or Easting): 50,006.6
Monitoring well groundwater gradient: Upgradient ? No Downgradient? Yes
Monitoring well driller name:Tommy Hilton License No.: 4981
Geologist or engineer supervising well installation: Kevin Carel, Geologist
Static water-level elevation (feet above mean sea level) after well development: 433.23
Name of geologic formation(s) in which well is completed: Quaternary Alluvium

Type of locking device: Padlock

Type of well casing
protection: 4 in x 4 in. x 5 ft. aluminum

Concrete surface pad
dimensions: 4-ft. x 4-ft. x 4-in. thick



Top of well casing elevation: 459.71 ft.

Surface Elevation: 457.50 ft.

Surveyor's pin elevation: 457.53 ft.

Concrete seal
depth: 1 ft.
Casing seal
material: Bentonite Grout

Bentonite seal top:
Depth: 30.8 ft. Elevation: 426.70

Filter pack top:
Depth: 35.7 ft. Elevation: 421.80

Filter pack material: Silica sand
20-40 mesh

Well Screen

Screen top depth: 39.6 ft.
Top elevation: 417.9 ft.
Screen bottom depth: 49.6 ft.
Bottom elevation: 407.90
Type of well screen: factory slotted
Screen opening size:0.010 in.

Well Casing
Type: Threaded, flush-joint PVC
Size (diameter): 2-in.
Schedule or thickness: Schedule 40

Total depth of well: 50 ft.

Borehole diameter: 8 5/8 in.

FIGURE 5

MONITOR WELL INSTALLATION FIELD FORM

Project/Facility: Camelot ~~Mill Creek~~ Landfill

Project No. ________

Drilling Company: Andrews & Foster

Driller Tommy Hilton

Rig Type Failing F-6

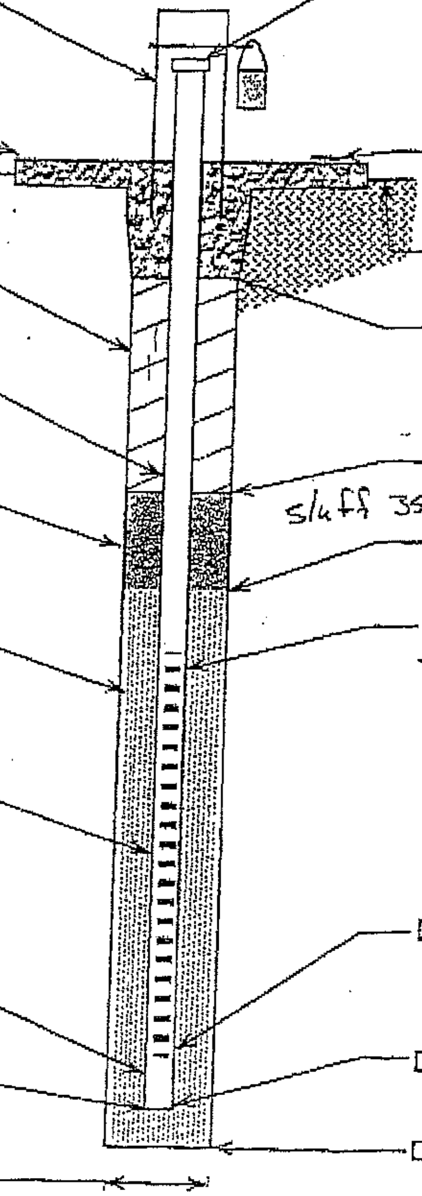
Other Comments ________

Well Number MW-18

Date(s) Installed 5-1-00

Carel Corp Representative K. Carel

Drilling Method Hollow Stem Auger



Protective casing w/ lock
4 x 4 x 26.5
Material Alum.

Concrete pad
4 x 4 x 4"

Anular seal
Type Bentonite Grout Bags 2

Casing
Dia. 2" Length ____

Bentonite seal
size 1/2" bags 1 bucket

Silica sand
size 20-40 bags 8

Screen
length 10' slot size 0.10

Sump section
length 0.2 ft.

Bottom cap depth 49.8 ft

Bore hole dia 8 6/8 in.

Top of Casing Elev. 459.71

Depth from top of casing to bottom of well 52.21

Length of casing above ground ~~2.2~~ 2.18

Brass marker elev 457.53

Ground elev. 457.50

Depth Surface Elev. 457.50

Depth 30.8 Elev. 426.70

sluff 35.7-33.6

Depth 35.7 Elev. 421.80

Depth 39.6 Elev. 417.90
Top Screen

Depth 49.6 Elev. 407.90

Depth 49.8 Elev. 407.70

Depth 50' Elev. 407.50

WATER LEVEL @0830 5-2-00 24.8' bgs

2003 CAREL CORPORATION
OBSERVATION WELL BORING LOGS

The Carel Corporation

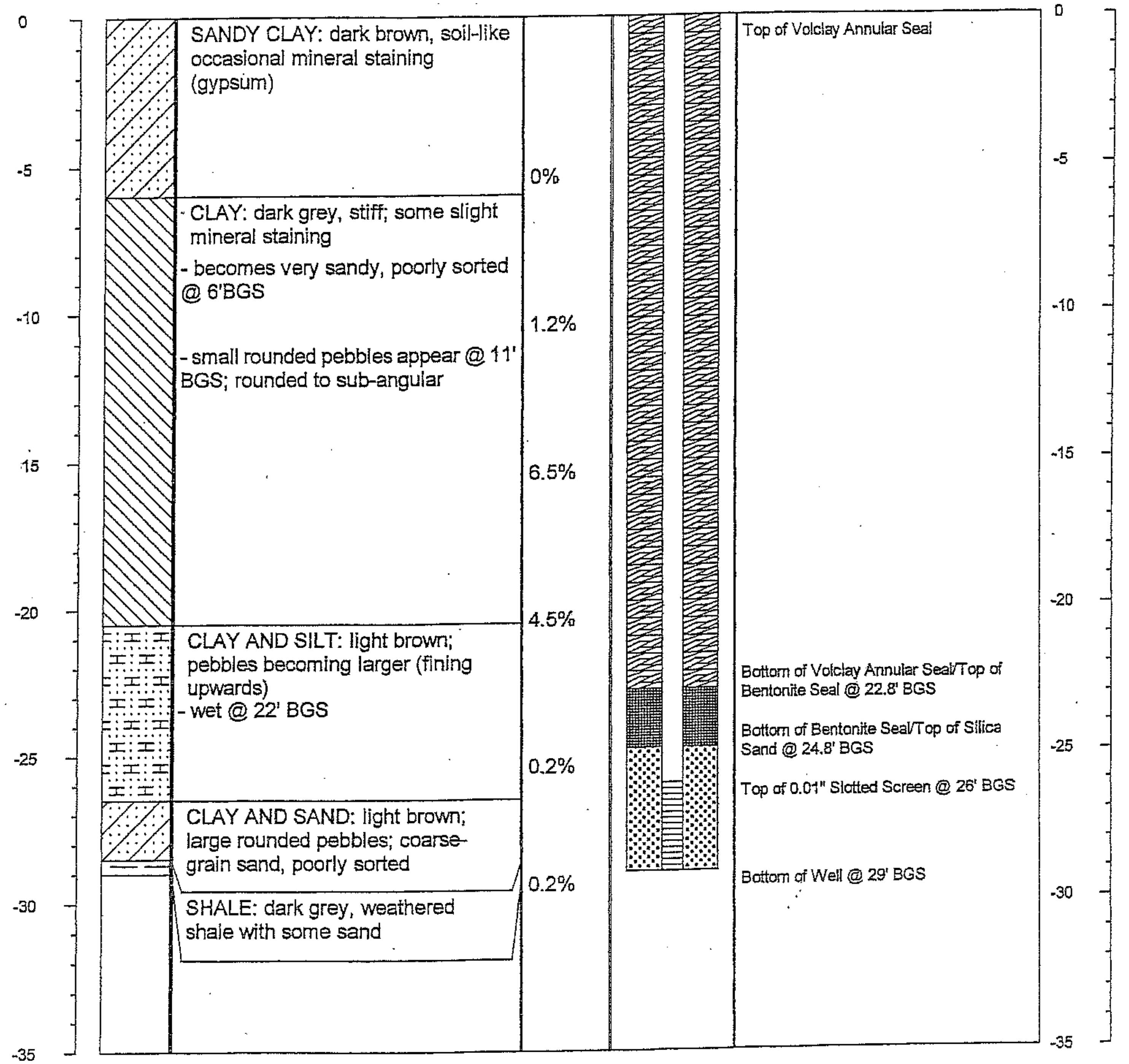
Providing Environmental, Ground-Water, and Waste Management Services

WELL NUMBER
B-1

PROJECT NAME: MW-11 Nature & Extent
LOCATION: Camelot Landfill
RILLING CO: Associated Industries
ILLING METHOD: Hollow Stem Auger
EOLOGIST: Damon Johnson

BORING DIAMETER: 8 3/4"
TOTAL DEPTH: 29' BGS *
SURFACE ELEVATION: 460.28' MSL*
DATE COMPLETED: August 25, 2003

Depth (feet BGS)	Lithology	Lithology Description	% Methane	Well Construction	Annulus Materials	Depth (feet BGS)



SANDY CLAY: dark brown, soil-like occasional mineral staining (gypsum)

0%

CLAY: dark grey, stiff; some slight mineral staining
- becomes very sandy, poorly sorted @ 6'BGS

1.2%

- small rounded pebbles appear @ 11' BGS; rounded to sub-angular

6.5%

4.5%

CLAY AND SILT: light brown; pebbles becoming larger (fining upwards)
- wet @ 22' BGS

0.2%

CLAY AND SAND: light brown; large rounded pebbles; coarse-grain sand, poorly sorted

0.2%

SHALE: dark grey, weathered shale with some sand

Top of Volclay Annular Seal

Bottom of Volclay Annular Seal/Top of Bentonite Seal @ 22.8' BGS

Bottom of Bentonite Seal/Top of Silica Sand @ 24.8' BGS

Top of 0.01" Slotted Screen @ 26' BGS

Bottom of Well @ 29' BGS

* BGS - Below Ground Surface
* MSL - Mean Sea Level

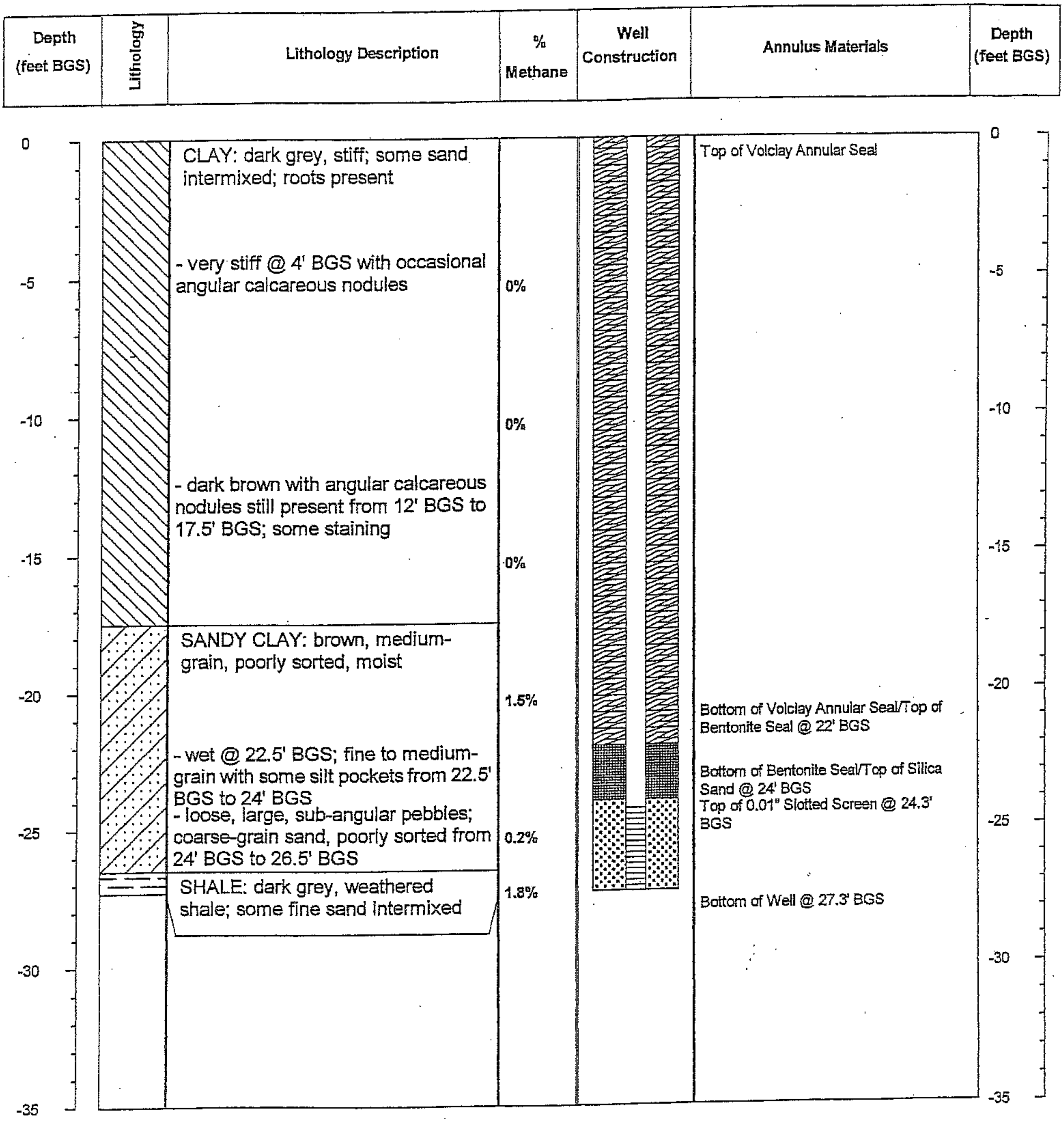
The Carel Corporation

Providing Environmental, Ground-Water, and Waste Management Services

WELL NUMBER
B-2

PROJECT NAME: MW-11 Nature & Extent
LOCATION: Camelot Landfill
DRILLING CO: Associated Industries
DRILLING METHOD: Hollow Stem Auger
EOLOGIST: Damon Johnson

BORING DIAMETER: 8 3/4"
TOTAL DEPTH: 27.3' BGS *
SURFACE ELEVATION: 458.34' MSL*
DATE COMPLETED: August 26, 2003



CLAY: dark grey, stiff; some sand intermixed; roots present

- very stiff @ 4' BGS with occasional angular calcareous nodules

- dark brown with angular calcareous nodules still present from 12' BGS to 17.5' BGS; some staining

SANDY CLAY: brown, medium-grain, poorly sorted, moist

- wet @ 22.5' BGS; fine to medium-grain with some silt pockets from 22.5' BGS to 24' BGS

- loose, large, sub-angular pebbles; coarse-grain sand, poorly sorted from 24' BGS to 26.5' BGS

SHALE: dark grey, weathered shale; some fine sand intermixed

Top of Volclay Annular Seal

Bottom of Volclay Annular Seal/Top of Bentonite Seal @ 22' BGS

Bottom of Bentonite Seal/Top of Silica Sand @ 24' BGS

Top of 0.01" Slotted Screen @ 24.3' BGS

Bottom of Well @ 27.3' BGS

* BGS - Below Ground Surface
* MSL - Mean Sea Level

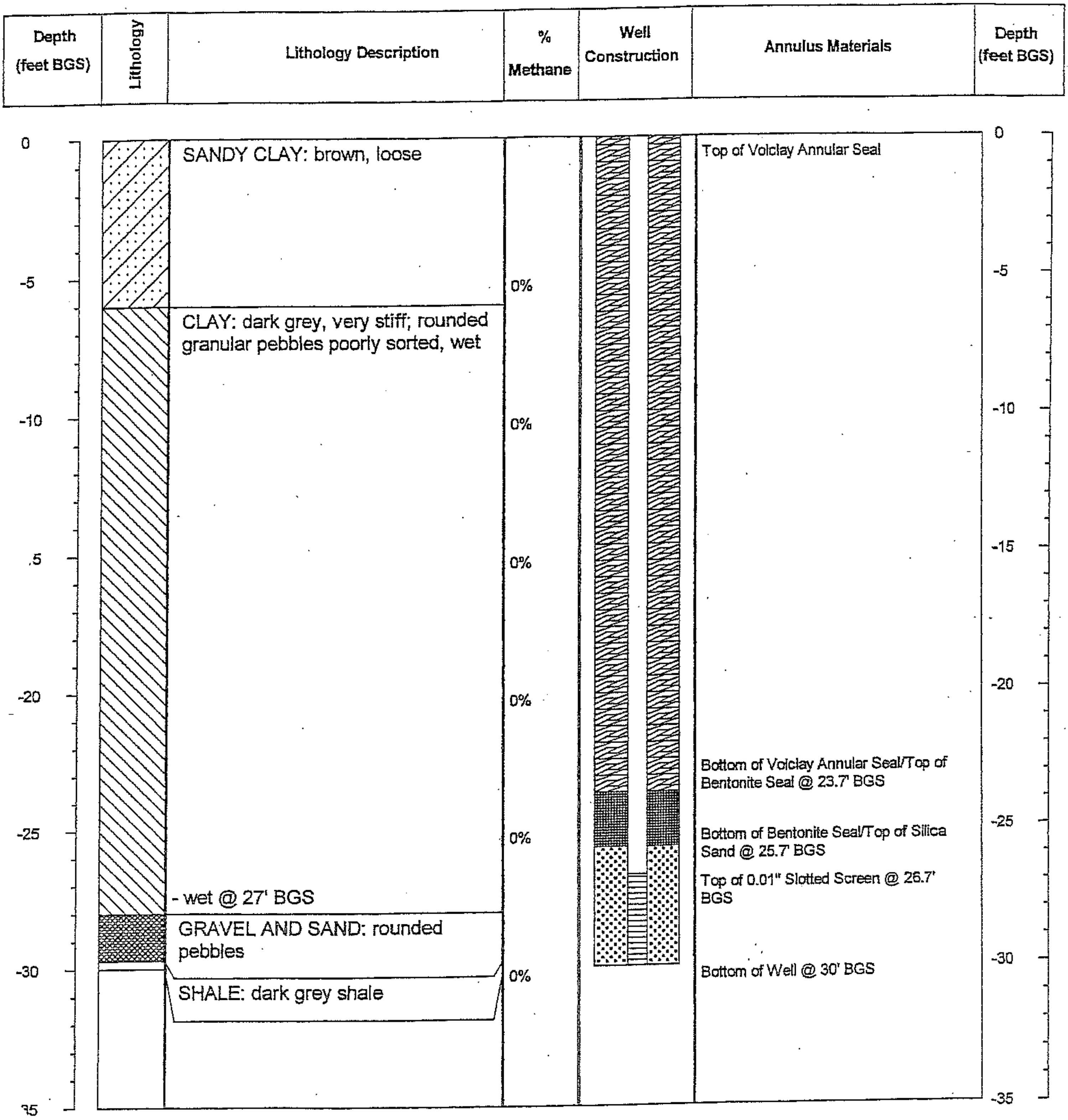
The Carel Corporation

Providing Environmental, Ground-Water, and Waste Management Services

WELL NUMBER
B-3

PROJECT NAME:	MW-11 Nature & Extent
LOCATION:	Camelot Landfill
ILLING CO:	Associated Industries
ILLING METHOD:	Hollow Stem Auger
OLOGIST:	Damon Johnson

BORING DIAMETER:	8 3/4"
TOTAL DEPTH:	30' BGS *
SURFACE ELEVATION:	456.46' MSL*
DATE COMPLETED:	August 25, 2003



* BGS - Below Ground Surface
* MSL - Mean Sea Level

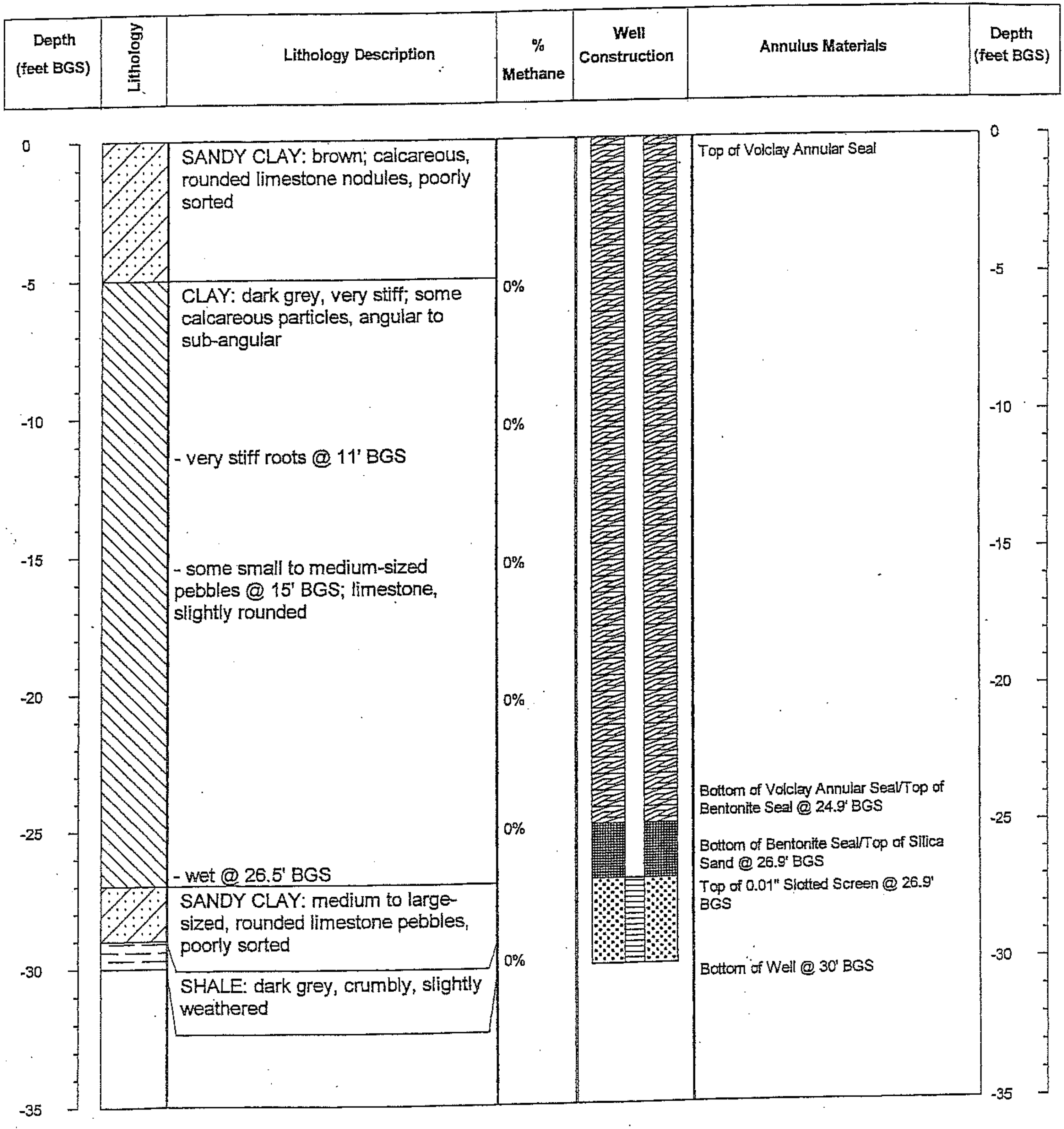
The Carel Corporation

Providing Environmental, Ground-Water, and Waste Management Services

WELL NUMBER
B-4

PROJECT NAME: MW-11 Nature & Extent
LOCATION: Camelot Landfill
RILLING CO: Associated Industries
RILLING METHOD: Hollow Stem Auger
EOLOGIST: Damon Johnson

BORING DIAMETER: 8 3/4"
TOTAL DEPTH: 30' BGS *
SURFACE ELEVATION: 456.64' MSL*
DATE COMPLETED: August 25, 2003



SANDY CLAY: brown; calcareous, rounded limestone nodules, poorly sorted

CLAY: dark grey, very stiff; some calcareous particles, angular to sub-angular

- very stiff roots @ 11' BGS

- some small to medium-sized pebbles @ 15' BGS; limestone, slightly rounded

- wet @ 26.5' BGS

SANDY CLAY: medium to large-sized, rounded limestone pebbles, poorly sorted

SHALE: dark grey, crumbly, slightly weathered

Top of Volclay Annular Seal

Bottom of Volclay Annular Seal/Top of Bentonite Seal @ 24.9' BGS

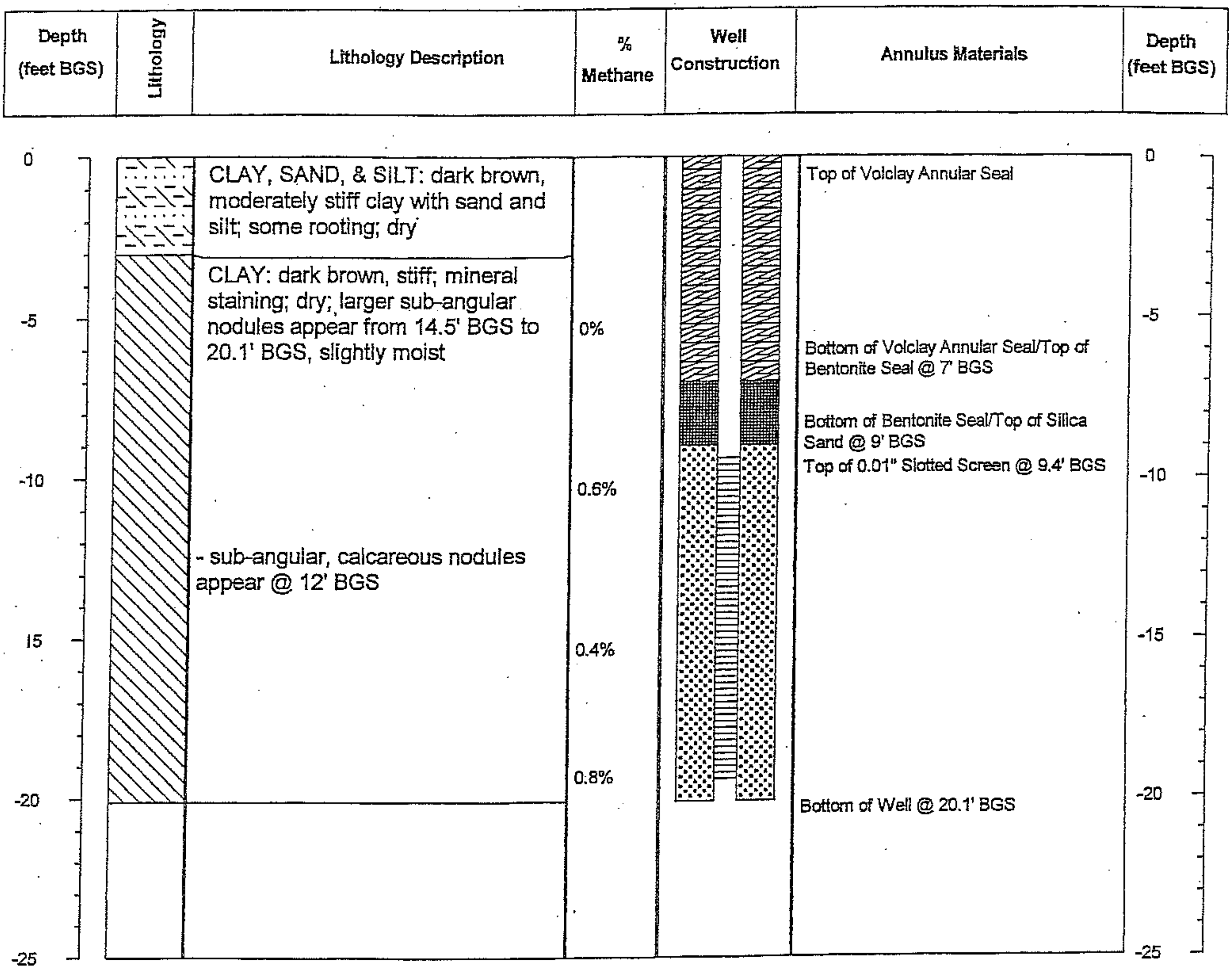
Bottom of Bentonite Seal/Top of Silica Sand @ 26.9' BGS

Top of 0.01" Slotted Screen @ 26.9' BGS

Bottom of Well @ 30' BGS

* BGS - Below Ground Surface
* MSL - Mean Sea Level

PROJECT NAME:	MW-11 Nature & Extent	BORING DIAMETER:	8 3/4"
LOCATION:	Camelot Landfill	TOTAL DEPTH:	20.1' BGS *
RILLING CO:	Associated Industries	SURFACE ELEVATION:	460.69' MSL*
RILLING METHOD:	Hollow Stem Auger	DATE COMPLETED:	August 26, 2003
EOLOGIST:	Damon Johnson		



CLAY, SAND, & SILT: dark brown, moderately stiff clay with sand and silt; some rooting; dry

CLAY: dark brown, stiff; mineral staining; dry; larger sub-angular nodules appear from 14.5' BGS to 20.1' BGS, slightly moist

- sub-angular, calcareous nodules appear @ 12' BGS

Top of Volclay Annular Seal

Bottom of Volclay Annular Seal/Top of Bentonite Seal @ 7' BGS

Bottom of Bentonite Seal/Top of Silica Sand @ 9' BGS

Top of 0.01" Slotted Screen @ 9.4' BGS

Bottom of Well @ 20.1' BGS

* BGS - Below Ground Surface
* MSL - Mean Sea Level

2006 CAREL CORPORATION
MONITOR WELL BORING LOGS

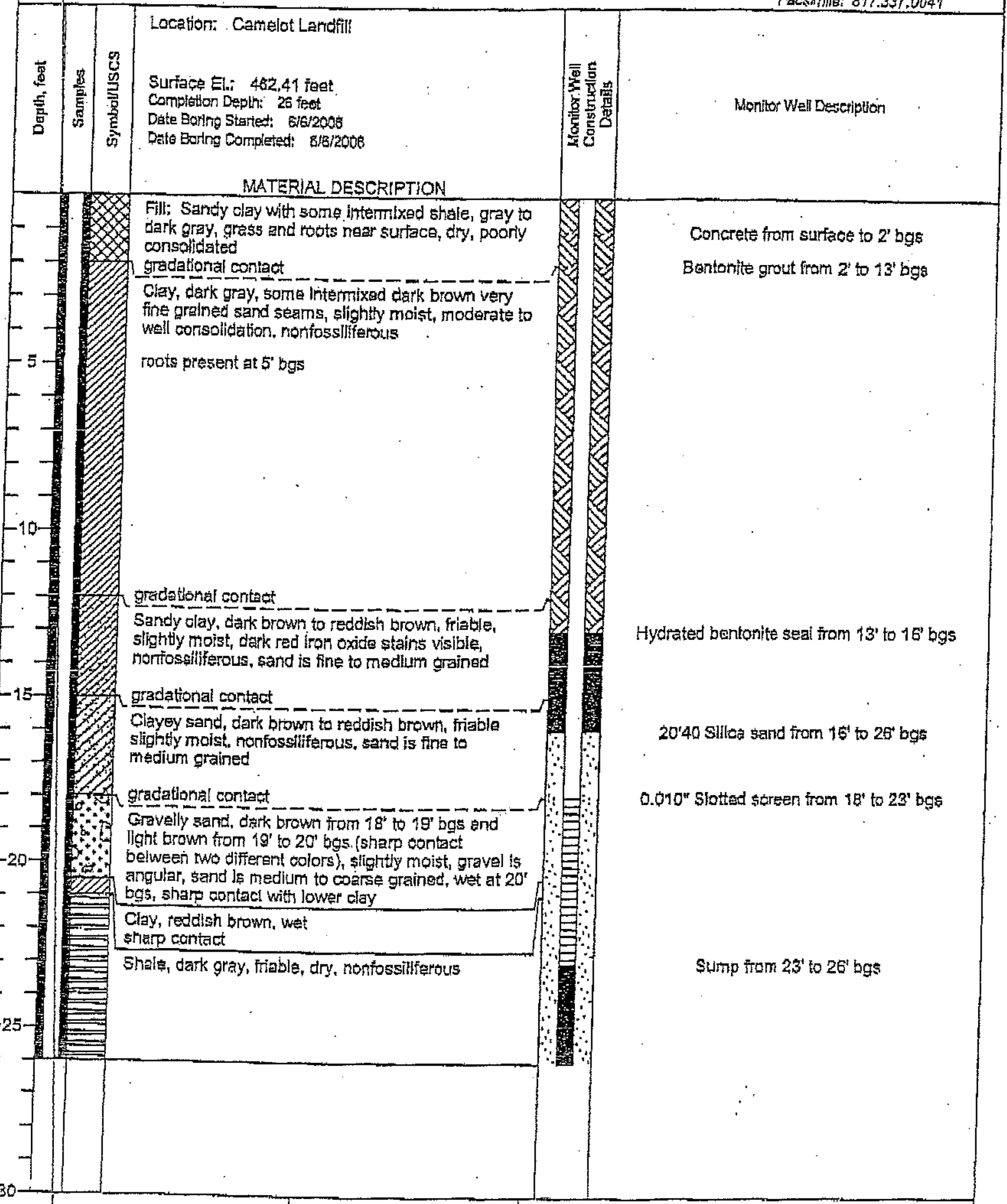
LOG OF MONITOR WELL NO. MW-15A

Project Description: Plugging and Replacement of MW-15

The Carel Corporation
136 Pecan Street
Keller, Texas 76248
Telephone: 817.337.0112
Facsimile: 817.337.0041

Location: Camelot Landfill

Surface El.: 462.41 feet
Completion Depth: 26 feet
Date Boring Started: 6/6/2006
Date Boring Completed: 6/6/2006



MATERIAL DESCRIPTION

Fill: Sandy clay with some intermixed shale, gray to dark gray, grass and roots near surface, dry, poorly consolidated

gradational contact

Clay, dark gray, some intermixed dark brown very fine grained sand seams, slightly moist, moderate to well consolidation, nonfossiliferous

roots present at 5' bgs

gradational contact

Sandy clay, dark brown to reddish brown, friable, slightly moist, dark red iron oxide stains visible, nonfossiliferous, sand is fine to medium grained

gradational contact

Clayey sand, dark brown to reddish brown, friable slightly moist, nonfossiliferous, sand is fine to medium grained

gradational contact

Gravelly sand, dark brown from 18' to 19' bgs and light brown from 19' to 20' bgs (sharp contact between two different colors), slightly moist, gravel is angular, sand is medium to coarse grained, wet at 20' bgs, sharp contact with lower clay

Clay, reddish brown, wet

sharp contact

Shale, dark gray, friable, dry, nonfossiliferous

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 13' bgs

Hydrated bentonite seal from 13' to 16' bgs

20/40 Silica sand from 16' to 26' bgs

0.010" Slotted screen from 18' to 23' bgs

Sump from 23' to 26' bgs

Drilling Contractor: Groundwater Monitoring
Drilling Method: HSA
Sampling Method: Continuous
Geologist/Engineer: Steven Wimmer
Project No.: 05-02-40

Groundwater Observations

Date	Depth

Remarks:

MW WITH WELL DETAILS CAM.GPJ CAREL.GDT 10/22/08

LOG OF MONITOR WELL NO. MW-15A
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

$\underline{\nabla}$ Water level at time of drilling.
$\underline{\nabla}$ Water level at end of drilling.
$\underline{\nabla}$ Water level after drilling.

MONITORING WELL DATA SHEET

Permitee or Site Name: Camelot Landfill

County: Denton County

Date of Monitor Well Installation: 06/06/2006

Well Location: Latitude: 33°01'51.20"N

Monitor Well Groundwater Gradient

Gradient: Upgradient: ______ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-15A

Date of Monitor Well Development:

Longitude: 96°57'25.30"W

Monitor Well Driller

Name: Mario Robles

License No.: 52694-M

Notes:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to the nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2" diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommended).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Steven Wimmer

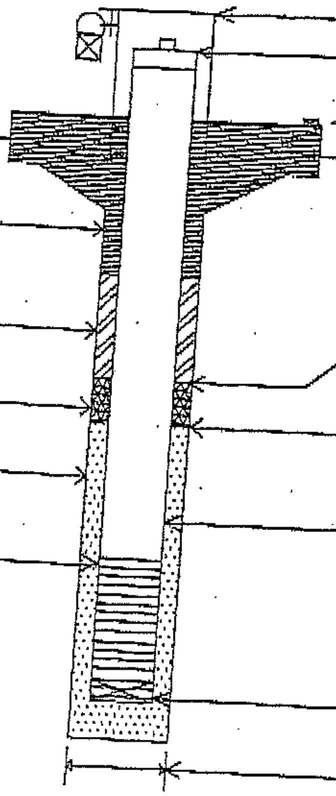
Static Water Level Elevation (with respect to MSL) after Well Development: 437.20' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of locking device: Padlock

Concrete surface pad dimensions: 6'x6'x6"

Type of Well Casing Protection: Steel



Top of Protective Collar Elevation: 466.77' MSL

Top of Well Casing Elevation: 466.23' MSL

Surface elevation: 462.41' MSL

Surveyors Pin Elevation: 462.82' MSL

Concrete Seal Depth: 2'

Casing seal material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 13' Elevation: 449.41' MSL

Filter pack Material: 20/40 Sand

Filter Pack Top Depth: 16' Elevation: 446.41' MSL

Well screen
Screen top depth: 18'
Top Elevation: 444.41' MSL
Type of well Screen: PVC
Screen Opening Size: 0.010"
Screen Bottom depth: 23'
Bottom Elevation: 439.41' MSL

Well casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Bottom Cap Depth: 26 ft.

Borehole Diameter: 8.25 in.

-10308

2007 CAREL CORPORATION ASSESSMENT
MONITOR WELL BORING LOGS

LOG OF MONITOR WELL NO. MW-10A

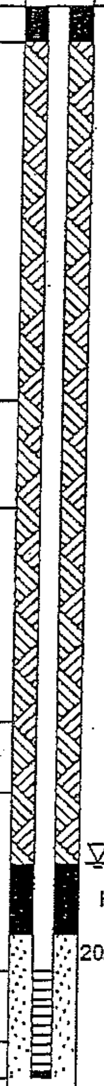
Project Description: VOC Nature and Extent Investigation

The Carel Corporation
136 Pecan Street
Keller, Texas 76248
Telephone: 817.337.0112
Facsimile: 817.337.0041

Location: Camelot Landfill

Surface El.: 461.07 feet
Completion Depth: 30 feet
Date Boring Started: 8/23/2007
Date Boring Completed: 8/23/2007

Depth, feet	Samples	Symbol/USCS	MATERIAL DESCRIPTION	Monitor Well Construction Details	Monitor Well Description
0			FILL, silty loom and gravel, brown to dark brown		Concrete from surface to 1' bgs
1			CLAY, dark brown		
5					
6			dark gray to black and firm at 6' bgs		
10					
11			Sandy CLAY, dark gray to black, firm, moist		Cement-bentonite grout from 1' bgs to 24'bgs
14			CLAY, dark gray to black, firm, moist		
15					
16			dark green and slightly moist at 16' bgs		
19			yellow to green, soft, and slightly moist at 19' bgs		
20			SILTSTONE, brown and gray		
22			SANDSTONE, yellow to brown, very fine to fine grained, moderately sorted and subrounded grains, wet		
24				▽	Hydrated bentonite seal from 24' bgs to 26' bgs
25					
26					20/40 Silica sand filter pack from 26' bgs to 30' bgs
27			GRAVEL, yellow to brown, subangular to subrounded, poorly sorted		0.010" Screen from 26'10" to 29'10"
29			Silty SHALE, gray		
30					2" bottom cap
35					



Drilling Contractor:	Groundwater Monitoring
Drilling Method:	HSA
Sampling Method:	Continuous
Geologist/Engineer:	Mike Hull
Project No.:	05-18-18

Groundwater Observations

Date	Depth
8/23/07	24.00

Remarks: bgs - below ground surface

KEVIN T. CAREL
GEOLOGY
#960

Kevin T. Carel
1-11-08

LOG OF MONITOR WELL NO. MW-10A
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level after drilling.
▼ Water level at end of drilling.

MONITORING WELL DATA SHEET

Permitee or Site Name: Camelot Landfill

County: Denton County

Date of Monitor Well Installation: 08/23/2007

Well Location: Latitude: 33°01'35.5"N

Monitor Well Groundwater Gradient

Gradient: Upgradient: ______ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-10A

Date of Monitor Well Development: 09/11/2007

Longitude: 96°57'01.7"W

Monitor Well Driller

Name: Jon M. Storm

License No.: 5003

Notes:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to the nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2" diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommended).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull

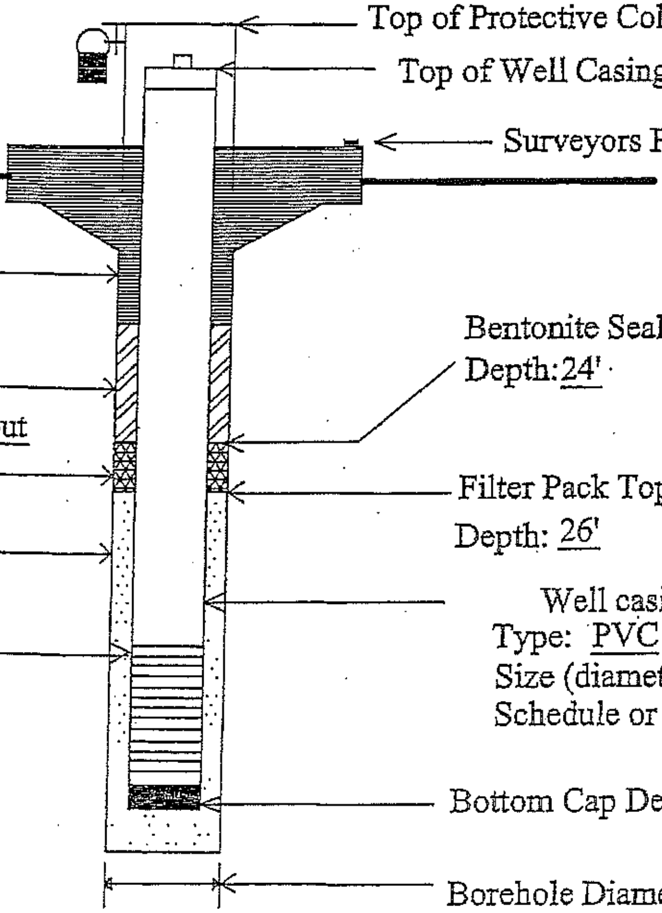
Static Water Level Elevation (with respect to MSL) after Well Development: 442.88' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of locking device: Padlock

Type of Well Casing Protection: Steel

Concrete surface pad dimensions: 4'x4'x6"



Top of Protective Collar Elevation: 464.78' MSL

Top of Well Casing Elevation: 464.42' MSL

Surface elevation: 461.07' MSL

Surveyors Pin Elevation: 461.34' MSL

Concrete Seal Depth: 1'

Bentonite Seal Top Depth: 24' Elevation: 437.07' MSL

Casing seal material: Cement-Bentonite Grout

Bentonite Seal

Filter Pack Top Depth: 26' Elevation: 435.07 MSL

Filter pack Material: 20/40 Sand

Well casing

Type: PVC

Size (diameter): 2"

Schedule or Thickness: Sch. 40

Well screen

Screen top depth: 26.83'

Top Elevation: 434.24' MSL

Type of well Screen: PVC

Screen Opening Size: 0.010"

Screen Bottom depth: 29.83'

Bottom Elevation: 431.24' MSL

Bottom Cap Depth: 30 ft.

Borehole Diameter: 8.25 in.

STATE OF TEXAS WELL REPORT for Tracking #122197

Owner:	**Allied Waste - Camalot Landfill**	Owner Well #:	**MW# 10A**
Address:	**Huffines Rd. Lewisville , TX**	Grid #:	**18-57-8**
Well Location:	**Huffines Rd. Lewisville , TX**	Latitude:	**33° 01' 39" N**
Well County:	**Dallas**	Longitude:	**096° 57' 16" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:
Started: **8/23/2007**
Completed: **8/27/2007**

Diameter of Hole: Diameter: **8 1/4 in From Surface To 30 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **Sand Packed**

Annular Seal Data:
1st Interval: **From 30 ft to 26 ft with 3 Sacks Sand (#sacks and material)**
2nd Interval: **From 26 ft to 24 ft with 1 Bentonite (#sacks and material)**
3rd Interval: **From 24 ft to 0 ft with 4 Sacks Cement (#sacks and material)**
Method Used: **TCEQ Standards**
Cemented By: **Groundwater Monitoring Inc.**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level:
Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality:
Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Groundwater Monitoring Inc.
3322 Gilbert Rd.

	Grand Prairie , TX 75050
Driller License Number:	5003
Licensed Well Driller Signature:	Jon M. Storm
Registered Driller Apprentice Signature:	No Data
Apprentice Registration Number:	No Data
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #122197) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 23.5' Dk Brown to Black Silty Clay
23.5 - 29' Med Brown Sandy Clay
29 - 30' Dk Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Screen 30 - 27.5 .010
2" N PVC Riser 27.5 - 0 Sch 40

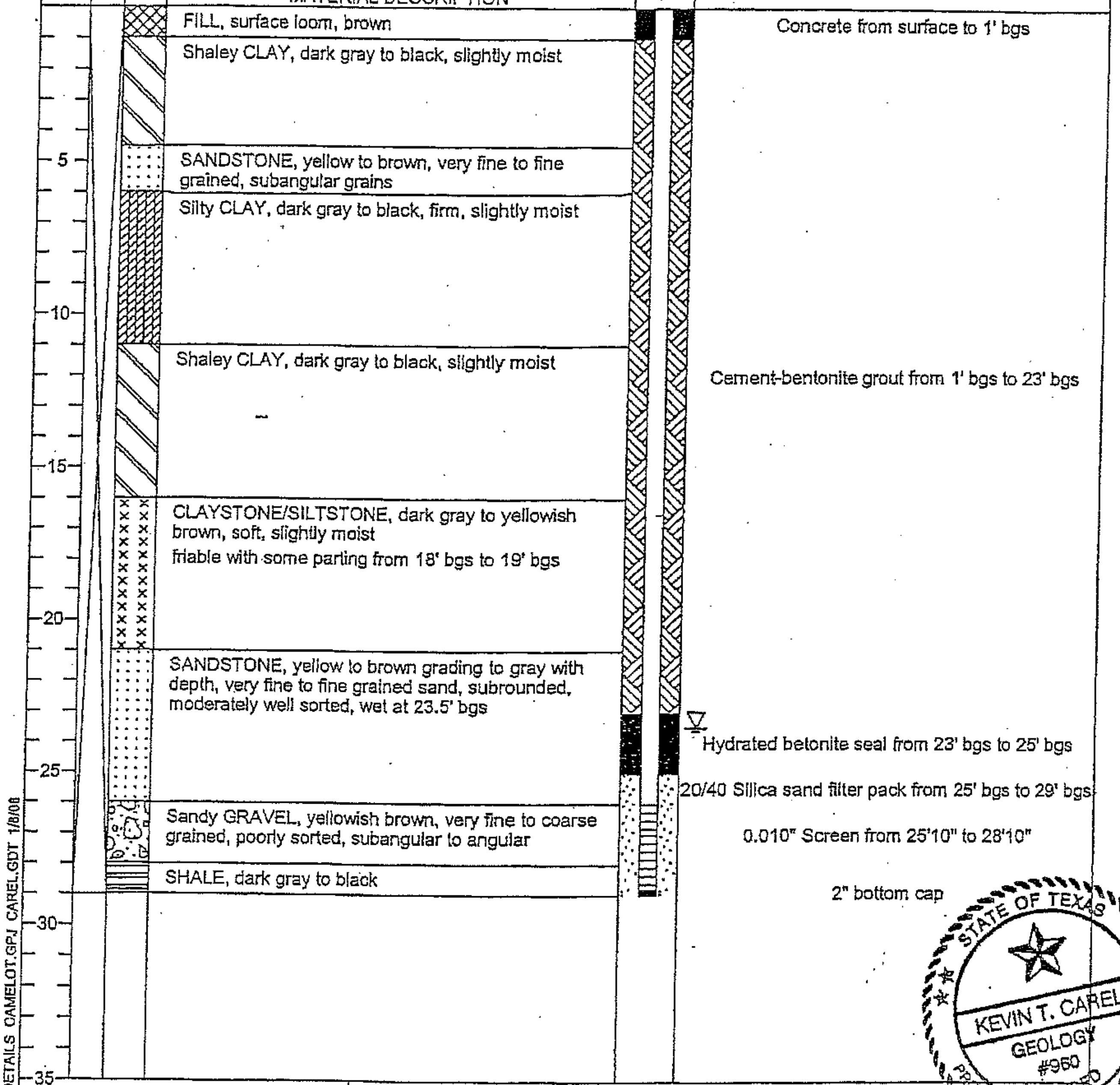
LOG OF MONITOR WELL NO. MW-12A

The Carel Corporation
136 Pecan Street
Keller, Texas 76248
Telephone: 817.337.0112
Facsimile: 817.337.0041

Project Description: VOC Nature and Extent Investigation

Location: Camelot Landfill

Surface El.: 460.19 feet
Completion Depth: 29 feet
Date Boring Started: 8/23/2007
Date Boring Completed: 8/23/2007



MATERIAL DESCRIPTION

FILL, surface loom, brown

Shaley CLAY, dark gray to black, slightly moist

SANDSTONE, yellow to brown, very fine to fine grained, subangular grains

Silty CLAY, dark gray to black, firm, slightly moist

Shaley CLAY, dark gray to black, slightly moist

CLAYSTONE/SILTSTONE, dark gray to yellowish brown, soft, slightly moist
friable with some parting from 18' bgs to 19' bgs

SANDSTONE, yellow to brown grading to gray with depth, very fine to fine grained sand, subrounded, moderately well sorted, wet at 23.5' bgs

Sandy GRAVEL, yellowish brown, very fine to coarse grained, poorly sorted, subangular to angular

SHALE, dark gray to black

Monitor Well Description

Concrete from surface to 1' bgs

Cement-bentonite grout from 1' bgs to 23' bgs

Hydrated betonite seal from 23' bgs to 25' bgs

20/40 Silica sand filter pack from 25' bgs to 29' bgs

0.010" Screen from 25'10" to 28'10"

2" bottom cap

Drilling Contractor: Groundwater Monitoring
Drilling Method: HSA
Sampling Method: Continuous
Geologist/Engineer: Mike Hull
Project No.: 05-18-18

Groundwater Observations	
Date	Depth
8/23/07	23.50

Remarks: bgs - below ground surface

STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST

1-11-08

ITH WELL DETAILS CAMELOT.GPJ CAREL.GDT 1/8/08

LOG OF MONITOR WELL NO. MW-12A
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level after drilling.
▼ Water level at end of drilling.

MONITORING WELL DATA SHEET

P nitee or Site Name: Camelot Landfill

ıty: Denton County

Date of Monitor Well Installation: 08/23/2007

Well Location: Latitude: 33°01'38.4"N

Monitor Well Groundwater Gradient

Gradient: Upgradient: ____ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-12A

Date of Monitor Well Development: 09/12/2007

Longitude: 96°57'16.1"W

Monitor Well Driller

Name: Jon M. Storm

License No.: 5003

Notes:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to the nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2" diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommended).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull

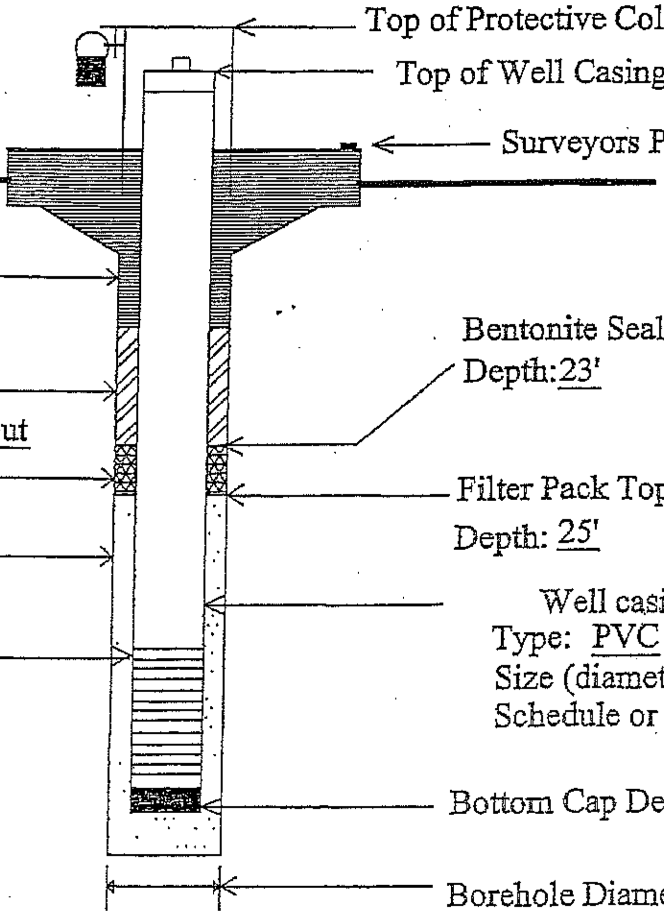
Static Water Level Elevation (with respect to MSL) after Well Development: 442.62' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of locking device: Padlock

Type of Well Casing Protection: Steel

Concrete surface pad
d nsions: 4'x4'x6"



Top of Protective Collar Elevation: 464.31' MSL

Top of Well Casing Elevation: 463.85' MSL

urface elevation: 460.19' MSL

Surveyors Pin Elevation: 460.47' MSL

oncrete Seal
epth: 1'

Bentonite Seal Top
Depth: 23' Elevation: 437.19' MSL

asing seal
aterial: Cement-Bentonite Grout

entonite Seal

Filter Pack Top
Depth: 25' Elevation: 435.19' MSL

ilter pack
aterial: 20/40 Sand

Well casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

ell screen
Screen top depth: 25.83'
Top Elevation: 434.36' MSL
Type of well Screen: PVC
en Opening Size: 0.010"
en Bottom depth: 28.83'
Bottom Elevation: 431.36' MSL

Bottom Cap Depth: 29 ft.

Borehole Diameter: 8.25 in.

STATE OF TEXAS WELL REPORT for Tracking #122199

Owner:	**Allied Waste - Camalot Landfill**	Owner Well #:	**MW# 12A**
Address:	**Huffines Rd. Lewisville , TX**	Grid #:	**18-57-8**
Well Location:	**Huffines Rd. Lewisville , TX**	Latitude:	**33° 01' 39" N**
Well County:	**Dallas**	Longitude:	**096° 57' 16" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **8/23/2007**
Completed: **8/23/2007**

Diameter of Hole: Diameter: **8 1/4 in From Surface To 29 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **Sand Packed**

Annular Seal Data: 1st Interval: **From 29 ft to 25 ft with 3 Sacks Sand (#sacks and material)**
2nd Interval: **From 25 ft to 23 ft with 1 Bentonite (#sacks and material)**
3rd Interval: **From 23 ft to 0 ft with 4 Sacks Cement (#sacks and material)**
Method Used: **TCEQ Standards**
Cemented By: **Groundwater Monitoring Inc.**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **Groundwater Monitoring Inc.**
3322 Gilbert Rd.

	Grand Prairie , TX 75050
Driller License Number:	5003
Licensed Well Driller Signature:	Jon M. Storm
Registered Driller Apprentice Signature:	No Data
Apprentice Registration Number:	No Data
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #122199) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 23.5' Dk Brown to Black Silty Clay
23.5 - 29' Dk Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Screen 29 - 26.5 .010
2" N PVC Riser 26.5 - 0 Sch 40

2008 CAREL CORPORATION
ASSESSMENT MONITOR WELL BORING LOGS

LOG OF MONITOR WELL NO. MW-10B

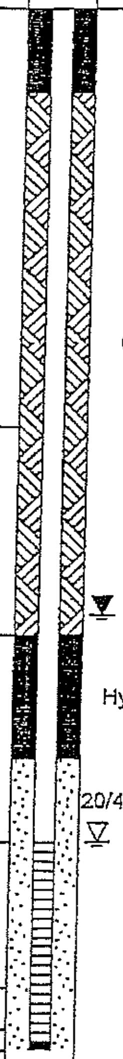
The Carel Corporation
136 Pecan Street
Keller, Texas 76248
Telephone: 817.337.0112
Facsimile: 817.337.0041

Project Description: VOC Nature and Extent Investigation

Location: Camelot Landfill

Surface El.: 455.16 feet
Completion Depth: 25 feet
Date Boring Started: 8/26/2008
Date Boring Completed: 8/26/2008

Depth, feet	MATERIAL DESCRIPTION	Monitor Well Description
0	CLAY, dark brown, low moisture	Concrete from surface to 2' bgs
5	moist from 5' to 10' bgs	Cement-bentonite grout from 2' bgs to 15'bgs
10	Silty CLAY, light grey to light brown, moist	
15	Sandy CLAY, yellow to light brown, moist to wet at bottom	Hydrated bentonite seal from 15' bgs to 18' bgs
18		20/40 Silica sand filter pack from 18' bgs to 25' bgs
20	Silty SAND to SAND, , yellow to brown, poorly sorted, moist to wet	0.010" Screen from 20' to 25' bgs
24	GRAVEL, yellow to brown, poorly sorted, moist to wet	
25	SHALE, dark grey - EAGLE FORD FORMATION	



KEVIN T. CAREL
GEOLOGY
#960

12-2-08

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist/Engineer: Mike Hull
Project No.: 05-18-18

Groundwater Observations	
Date	Depth
8/26/08	20.00
8/28/08	14.53

Remarks: bgs - below ground surface

MW WITH WELL DETAILS CAMELOT.GPJ CAREL.GDT 11/18/08

LOG OF MONITOR WELL NO. MW-10B
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

MONITORING WELL DATA SHEET

Permitee or Site Name: Camelot Landfill

nty: Denton County

Date of Monitor Well Installation: 08/26/2008

Well Location: Latitude: 33°01'33.2"N

Monitor Well Groundwater Gradient

Gradient: Upgradient: ____ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-10B

Date of Monitor Well Development: 08/27/2008

Longitude: 96°57'00.9"W

Monitor Well Driller

Name: Roddy Qualls

License No.: 3121

Notes:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to the nearest hundredth of a foot
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2" diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommended).
- Well development should continue until water is clear, and pH and conductivity are stable.

STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST

12-2-08

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull

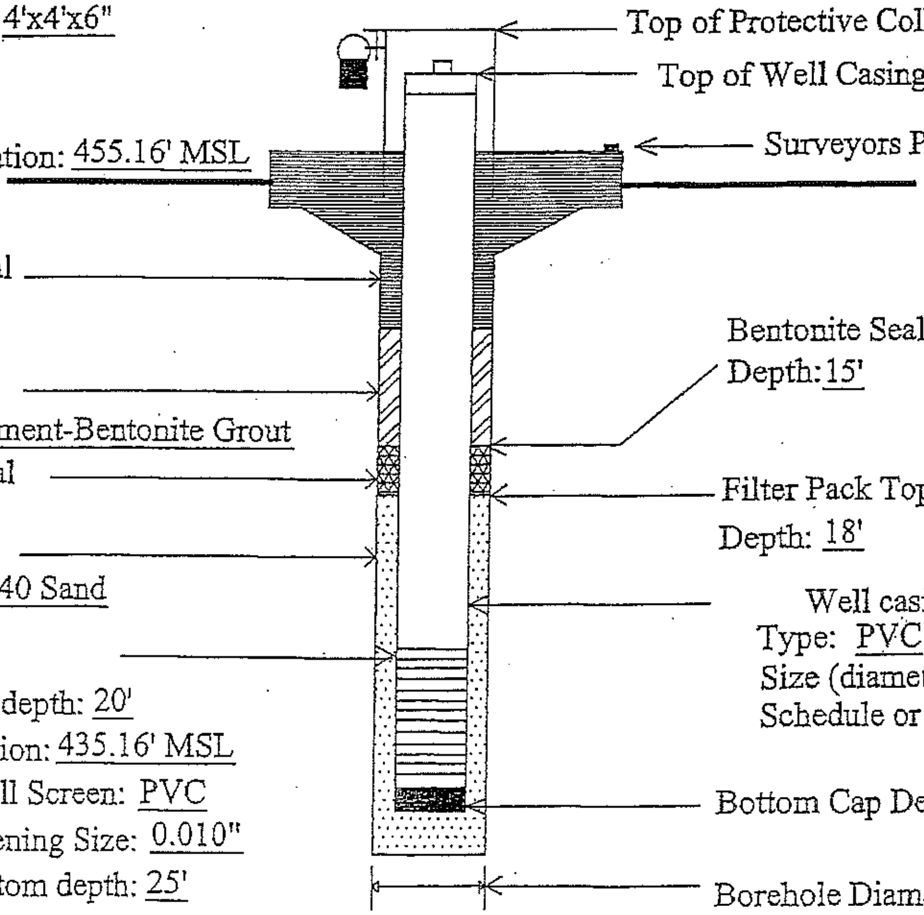
Static Water Level Elevation (with respect to MSL) after Well Development: 440.63' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of locking device: Padlock

Type of Well Casing Protection: Steel

Concrete surface pad dimensions: 4'x4'x6"



Top of Protective Collar Elevation: 459.09' MSL

Top of Well Casing Elevation: 458.65' MSL

Surface elevation: 455.16' MSL

Surveyors Pin Elevation: 455.45' MSL

Concrete Seal Depth: 2'

Bentonite Seal Top Depth: 15' Elevation: 440.16' MSL

Casing seal material: Cement-Bentonite Grout

Bentonite Seal

Filter Pack Top Depth: 18' Elevation: 437.16' MSL

Filter pack Material: 20/40 Sand

Well casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well screen
Screen top depth: 20'
Top Elevation: 435.16' MSL
Type of well Screen: PVC
creen Opening Size: 0.010"
reen Bottom depth: 25'
Bottom Elevation: 430.16' MSL

Bottom Cap Depth: 25'

Borehole Diameter: 8.25"

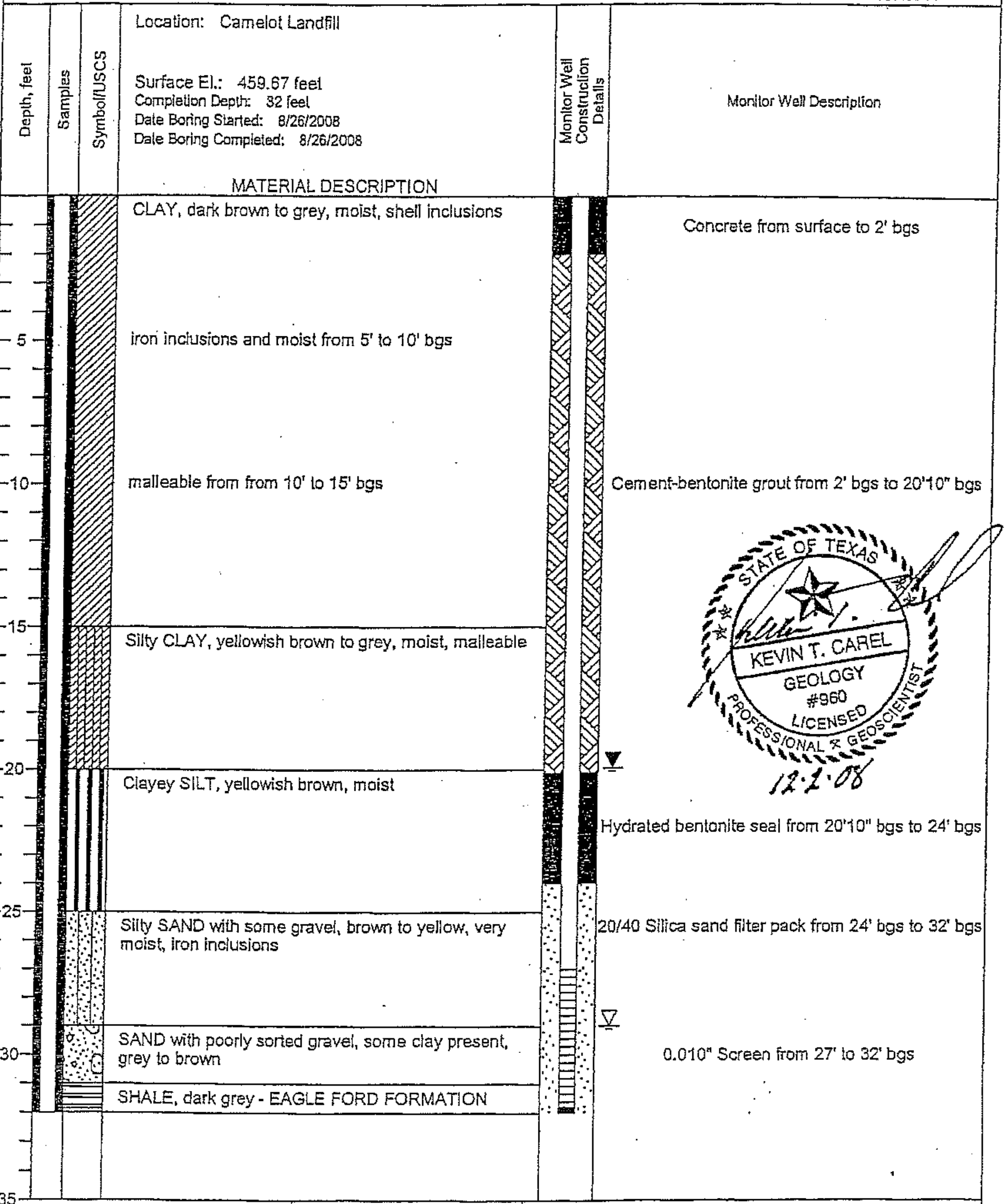
LOG OF MONITOR WELL NO. MW-12B

Project Description: VOC Nature and Extent Investigation

The Carel Corporation
136 Pecan Street
Keller, Texas 76248
Telephone: 817.337.0112
Facsimile: 817.337.0041

Location: Camelot Landfill

Surface El.: 459.67 feet
Completion Depth: 32 feet
Date Boring Started: 8/26/2008
Date Boring Completed: 8/26/2008



Depth, feet	MATERIAL DESCRIPTION	Monitor Well Description
0	CLAY, dark brown to grey, moist, shell inclusions	Concrete from surface to 2' bgs
5	iron inclusions and moist from 5' to 10' bgs	
10	malleable from from 10' to 15' bgs	Cement-bentonite grout from 2' bgs to 20'10" bgs
15	Silty CLAY, yellowish brown to grey, moist, malleable	
20	Clayey SILT, yellowish brown, moist	Hydrated bentonite seal from 20'10" bgs to 24' bgs
25	Silty SAND with some gravel, brown to yellow, very moist, iron inclusions	20/40 Silica sand filter pack from 24' bgs to 32' bgs
29	SAND with poorly sorted gravel, some clay present, grey to brown	0.010" Screen from 27' to 32' bgs
31	SHALE, dark grey - EAGLE FORD FORMATION	

STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST

12-2-08

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist/Engineer: Mike Hull
Project No.: 05-18-18

Groundwater Observations	
Date	Depth
8/26/08	29.00
8/28/08	19.95

Remarks: bgs - below ground surface

MW WITH WELL DETAILS CAMELOT.GPJ CAREL.GDT 11/18/08

LOG OF MONITOR WELL NO. MW-12B
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

$\underline{\nabla}$ Water level at time of drilling.
$\underline{\blacktriangledown}$ Water level at end of drilling.
$\underline{\blacktriangledown}$ Water level after drilling.

MONITORING WELL DATA SHEET

Permitee or Site Name: Camelot Landfill

nty: Denton County

Date of Monitor Well Installation: 08/26/2008

Well Location: Latitude: 33°01'35.3"N

Monitor Well Groundwater Gradient

Gradient: Upgradient: ______ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-12B

Date of Monitor Well Development: 08/27/2008

Longitude: 96°57'18.3"W

Monitor Well Driller

Name: Roddy Qualls

License No.: 3121

Notes:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to the nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2" diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommended).
- Well development should continue until water is clear, and pH and conductivity are stable.

STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST
12-2-08

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull

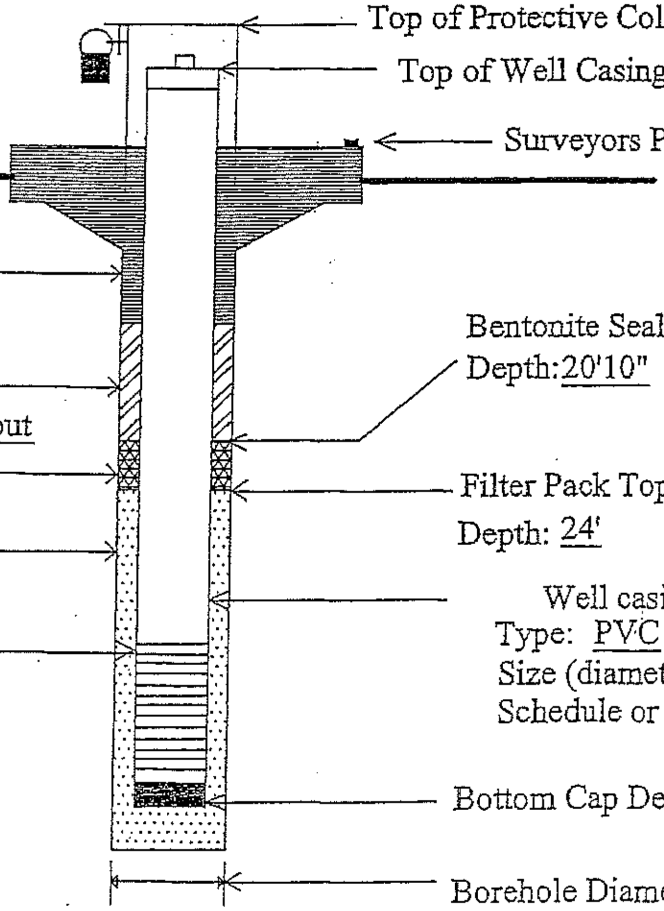
Static Water Level Elevation (with respect to MSL) after Well Development: 439.72' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of locking device: Padlock

Type of Well Casing Protection: Steel

Concrete surface pad dimensions: 4'x4'x6"



Top of Protective Collar Elevation: 463.62' MSL

Top of Well Casing Elevation: 463.22' MSL

Surface elevation: 459.67' MSL

Surveyors Pin Elevation: 459.96' MSL

Concrete Seal Depth: 2'

Casing seal material: Cement-Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 20'10" Elevation: 438.84' MSL

Filter pack Material: 20/40 Sand

Filter Pack Top Depth: 24' Elevation: 435.67' MSL

Well casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well screen
Screen top depth: 27'
Top Elevation: 432.67' MSL
Type of well Screen: PVC
Screen Opening Size: 0.010"
reen Bottom depth: 32'
Bottom Elevation: 427.67' MSL

Bottom Cap Depth: 32'

Borehole Diameter: 8.25"

TCEQ-10308

2010 CAREL CORPORATION
MONITOR WELL BORING LOGS

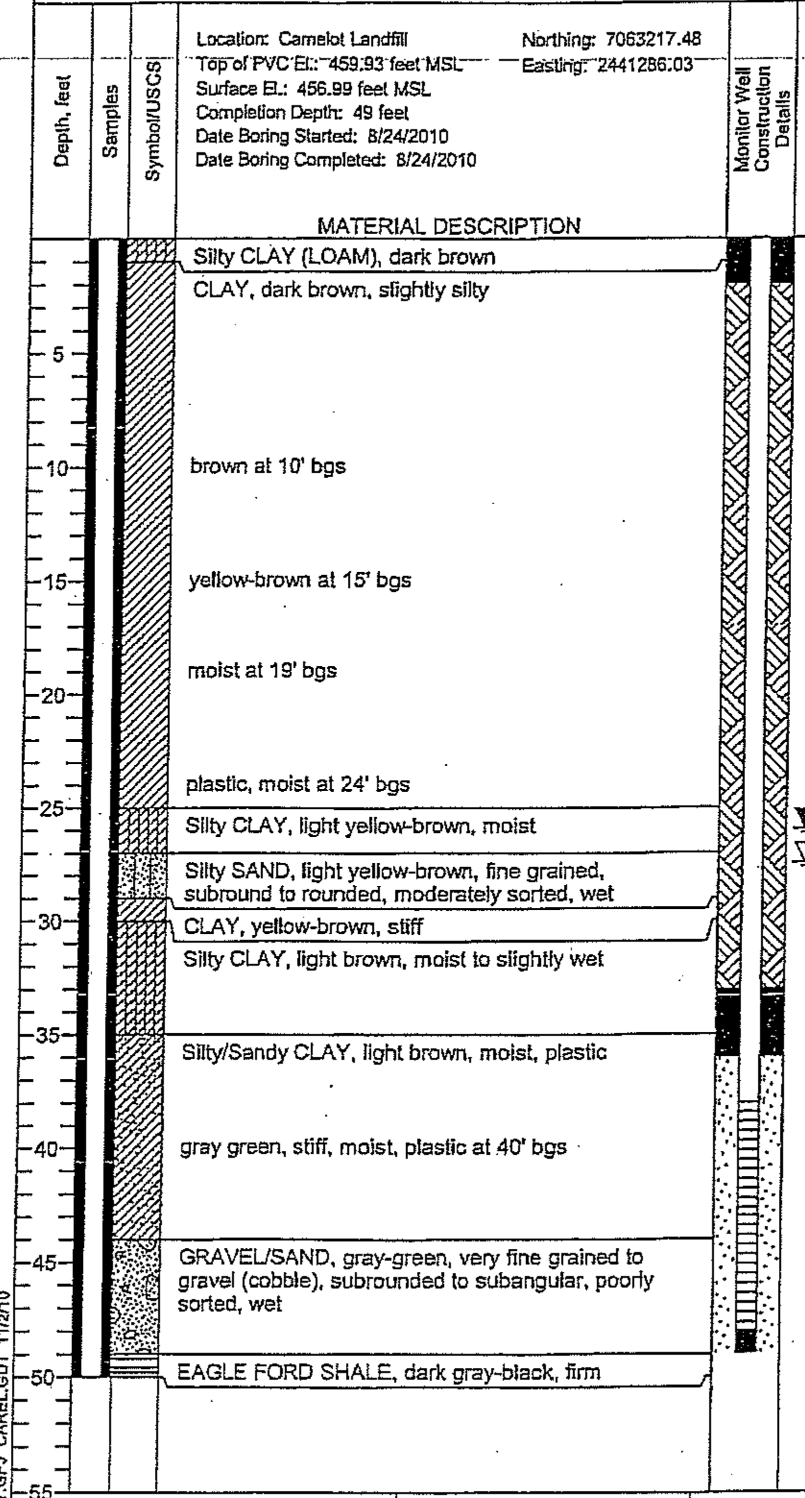
LOG OF MONITOR WELL NO. MW-18A

Project Description: 600' Spacing Monitor Well Installations

CAREL

Location: Camelot Landfill
Top of PVC El.: 459.93 feet MSL
Surface El.: 456.99 feet MSL
Completion Depth: 49 feet
Date Boring Started: 8/24/2010
Date Boring Completed: 8/24/2010

Northing: 7063217.48
Easting: 2441286.03



MATERIAL DESCRIPTION

Silty CLAY (LOAM), dark brown

CLAY, dark brown, slightly silty

brown at 10' bgs

yellow-brown at 15' bgs

moist at 19' bgs

plastic, moist at 24' bgs

Silty CLAY, light yellow-brown, moist

Silty SAND, light yellow-brown, fine grained, subround to rounded, moderately sorted, wet

CLAY, yellow-brown, stiff

Silty CLAY, light brown, moist to slightly wet

Silty/Sandy CLAY, light brown, moist, plastic

gray green, stiff, moist, plastic at 40' bgs

GRAVEL/SAND, gray-green, very fine grained to gravel (cobble), subrounded to subangular, poorly sorted, wet

EAGLE FORD SHALE, dark gray-black, firm

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 33' bgs

MICHAEL J. HULL
4152

8/24/10

Hydrated bentonite seal from 33' to 36' bgs

20/40 Silica sand from 36' to 49' bgs

0.01" Slotted screen from 38' to 48' bgs

One foot sump

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations

Date	Elevation (ft. MSL)
8/24/10	429.49
8/24/10	430.99
9/21/10	431

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

10/2010 CAMELOT.GPJ CAREL.GDT 11/2/10

LOG OF MONITOR WELL NO. MW-18A
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

∇ Water level at time of drilling.
▼ Water level at end of drilling.
∇ Water level after drilling.

Monitor Well Data Sheet

Permittee or Site Name: Camelot Landfill
nty: Denton
Date of Monitor Well Installation: 8/24/2010
Monitor Well Northing: 7063217.476 Easting: 2441286.028
Monitor Well Groundwater Gradient Position:
Upgradient: ______ Downgradient: X

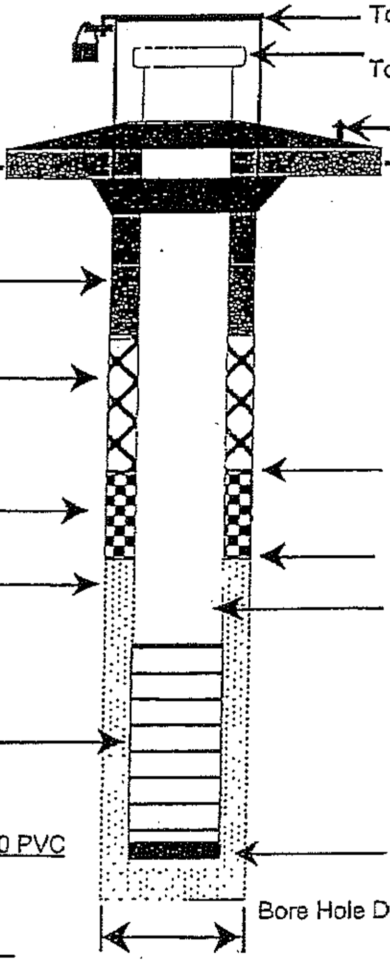
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-18A
Date of Monitor Well Development: 9/16/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: 431.02' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock
Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 460.27' MSL
Top of Casing Elevation: 459.93' MSL
Surface Elevation: 456.99' MSL
Surveyor's Pin Elevation: 457.31' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 33' Elevation: 423.99' MSL

Filter Pack Top
Depth: 36' Elevation: 420.99' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 38'
Top Elevation: 418.99' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 48'
Bottom Elevation: 408.99' MSL

Bottom Cap Depth: 49'

Bore Hole Diameter: 8.25"

MICHAEL J. HULL
GEOLOGY
4152
8/24/10

STATE OF TEXAS WELL REPORT for Tracking #232540

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-18A
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date: Started: 8/24/2010
Completed: 8/24/2010

Diameter of Hole: Diameter: 8 1/4 in From Surface To 49 ft

Drilling Method: Hollow Stem Auger

Borehole Completion: Other: Sand Packed

Annular Seal Data: 1st Interval: From 49 ft to 36 ft with 7 Sacks Sand (#sacks and material)
2nd Interval: From 36 ft to 33 ft with 1 Bent. Pelets (#sacks and material)
3rd Interval: From 33 ft to 2 ft with 1 Grout (#sacks and material)
Method Used: TCEQ Standards
Cemented By: Strata Core
Distance to Septic Field or other Concentrated Contamination: No Data
Distance to Property Line: No Data
Method of Verification: No Data
Approved by Variance: No Data

Surface Completion: Surface Slab Installed

Water Level: Static level: No Data
Artesian flow: No Data

Packers: No Data

Plugging Info: Casing or Cement/Bentonite left in well: No Data

Type Of Pump: No Data

Well Tests: No Data

Water Quality: Type of Water: No Data
Depth of Strata: No Data
Chemical Analysis Made: No Data
Did the driller knowingly penetrate any strata which contained undesirable constituents: No

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: Strata Core Drilling Co.
5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232540) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 1' Silty Loam Clay Dk Brown
1 - 10' Brown Dark Brown Silty Clay
10 - 15' Brown Clay
15 - 25' Yellow Brown Clay
25 - 27' Yellow Brown Silty Clay
27 - 29' Yellow Brown Silty Sand
29 - 35' Lt. Brown Silty Clay
35 - 40' Lt. Brown Silty Sandy Clay
40 - 44' Gray Green Silty Dandy Clay
44 - 49' Gray Green Gravel & Sand

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 49 - 48 Sch 40
2" N PVC Screen 48 - 38' .010
2" N PVC Riser 38 - 0 Sch 40

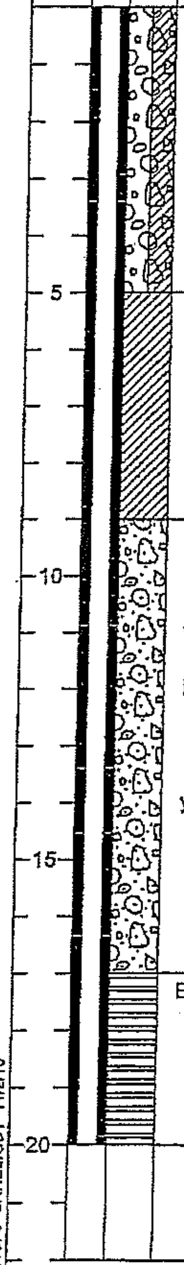
LOG OF MONITOR WELL NO. MW-19

Project Description: 600' Spacing Monitor Well Installations

Location: Camelot Landfill
Top of PVC El.: 460.63 feet MSL
Surface El.: 457.51 feet MSL
Completion Depth: 20 feet
Date Boring Started: 8/23/2010
Date Boring Completed: 8/23/2010

Northing: 7063438.83
Easting: 2442917.04

Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description



Silty CLAY (LOAM) with some sand and gravel, brown, subrounded and poorly sorted, dry

CLAY, slightly silty, dark gray brown

Silty/Sandy GRAVEL, red-yellow, brown (rusty), subrounded and poorly sorted, dry

wet at 11' bgs

light brown at 12' bgs

yellow-orange at 14' bgs

EAGLE FORD SHALE, dark gray to black, firm

Concrete from surface to 2' bgs

Bentonite grout from 2' to 9' bgs

MICHAEL J. HULL
GEOLOGY
#152
8/23/10

Hydrated bentonite seal from 9' to 12' bgs

20/40 Silica sand from 12' to 20' bgs

0.01" Slotted screen from 14' to 19' bgs

One foot sump

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/23/10	446.51
8/23/10	446.51
9/15/10	445.31

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

LOG OF MONITOR WELL NO. MW-19
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

∇ Water level at time of drilling.
▼ Water level at end of drilling.
∇ Water level after drilling.

Monitor Well Data Sheet

Permittee or Site Name: Camelot Landfill

nty: Denton

Date of Monitor Well Installation: 8/23/2010

Monitor Well Northing: 7063438.827 Easting: 2442917.041

Monitor Well Groundwater Gradient Position:

Upgradient: X Downgradient: ______

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-19

Date of Monitor Well Development: 9/15/2010

Monitor Well Driller

Name: Roddy Qualls

License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.

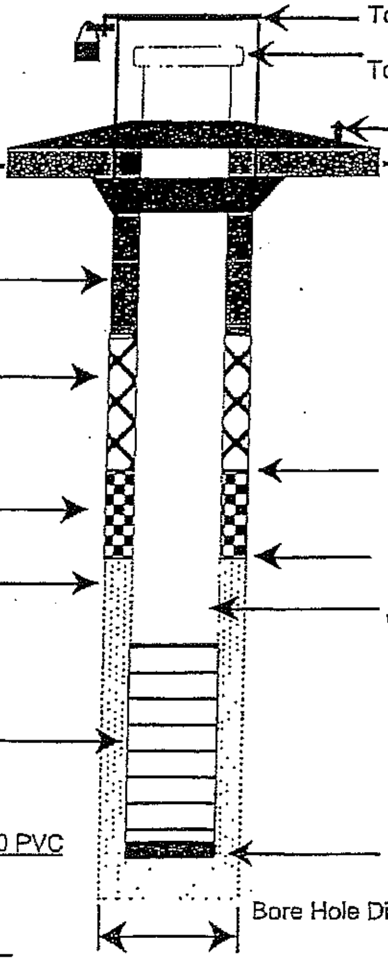
Static Water Level Elevation (with respect to MSL) after Well Development: ' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock

Type of Casing Protection: Aluminum

Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 460.83' MSL

Top of Casing Elevation: 460.63' MSL

Surface Elevation: 457.51' MSL

Surveyor's Pin Elevation: 457.91' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 9' Elevation: 448.51' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Filter Pack Top
Depth: 12' Elevation: 445.51' MSL

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 14'
Top Elevation: 443.51' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 19'
Bottom Elevation: 438.51' MSL

Bottom Cap Depth: 20'

Bore Hole Diameter: 8.25"

Michael J. Hull

MICHAEL J. HULL
4152

8/25/10

TCEQ-10308

STATE OF TEXAS WELL REPORT for Tracking #232576

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-19
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date: Started: 8/23/2010
Completed: 8/23/2010

Diameter of Hole: Diameter: 8 1/4 in From Surface To 20 ft

Drilling Method: Hollow Stem Auger

Borehole Completion: Other: Sand Packed

Annular Seal Data: 1st Interval: From 20 ft to 12 ft with 3.5 Sacks Sand (#sacks and material)
2nd Interval: From 12 ft to 9 ft with 1 Bent. Pelets (#sacks and material)
3rd Interval: From 9 ft to 2 ft with 1 Grout (#sacks and material)
Method Used: TCEQ Standards
Cemented By: Strata Core
Distance to Septic Field or other Concentrated Contamination: No Data
Distance to Property Line: No Data
Method of Verification: No Data
Approved by Variance: No Data

Surface Completion: Surface Slab Installed

Water Level: Static level: No Data
Artesian flow: No Data

Packers: No Data

Plugging Info: Casing or Cement/Bentonite left in well: No Data

Type Of Pump: No Data

Well Tests: No Data

Water Quality: Type of Water: No Data
Depth of Strata: No Data
Chemical Analysis Made: No Data
Did the driller knowingly penetrate any strata which contained undesirable constituents: No

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: Strata Core Drilling Co.
5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232576) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 5' Silty Sandy Gravel Clay
5 - 9' Gray Brown Silty Clay
9 - 12' Red Yellow Sandy Silty Gravel
12 - 16' Lt Brown Sandy Silty Gravel
16 - 17' Yellow Orange Sandy Silty Gravel
17 - 20' Black Dk Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 20 - 19 Sch 40
2" N PVC Screen 19 - 14' .010
2" N PVC Riser 14 - 0 Sch 40

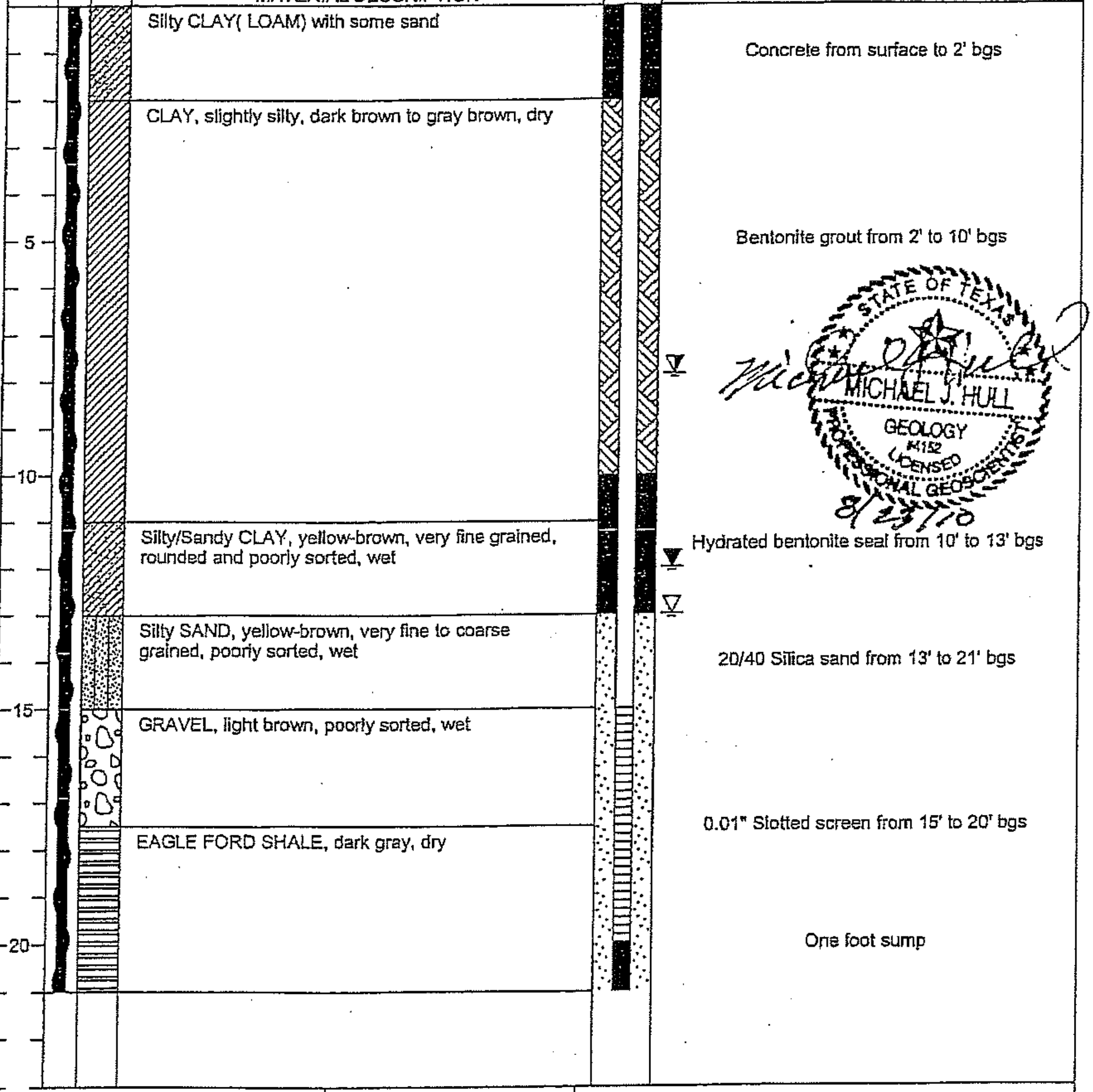
LOG OF MONITOR WELL NO. MW-20

Project Description: 600' Spacing Monitor Well Installations

CAREL CORPORATION

Location: Camelot Landfill
Top of PVC El.: 456.99 feet MSL
Surface El.: 453.9 feet MSL
Completion Depth: 21 feet
Date Boring Started: 8/23/2010
Date Boring Completed: 8/23/2010

Northing: 7063446.19
Easting: 2444378.70



MATERIAL DESCRIPTION

Silty CLAY(LOAM) with some sand

CLAY, slightly silty, dark brown to gray brown, dry

Silty/Sandy CLAY, yellow-brown, very fine grained, rounded and poorly sorted, wet

Silty SAND, yellow-brown, very fine to coarse grained, poorly sorted, wet

GRAVEL, light brown, poorly sorted, wet

EAGLE FORD SHALE, dark gray, dry

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 10' bgs

Hydrated bentonite seal from 10' to 13' bgs

20/40 Silica sand from 13' to 21' bgs

0.01" Slotted screen from 15' to 20' bgs

One foot sump

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
4152
LICENSED
PROFESSIONAL GEOSCIENTIST

8/23/10

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/23/10	440.9
8/23/10	441.9
9/21/10	446.04

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

LOG OF MONITOR WELL NO. MW-20
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▽ Water level after drilling.

Monitor Well Data Sheet

Permittee or Site Name: Camelot Landfill
unty: Denton
.e of Monitor Well Installation: 8/23/2010
Monitor Well Northing: 7063446.186 Easting: 2444378.700
Monitor Well Groundwater Gradient Position:
Upgradient: X Downgradient: ____

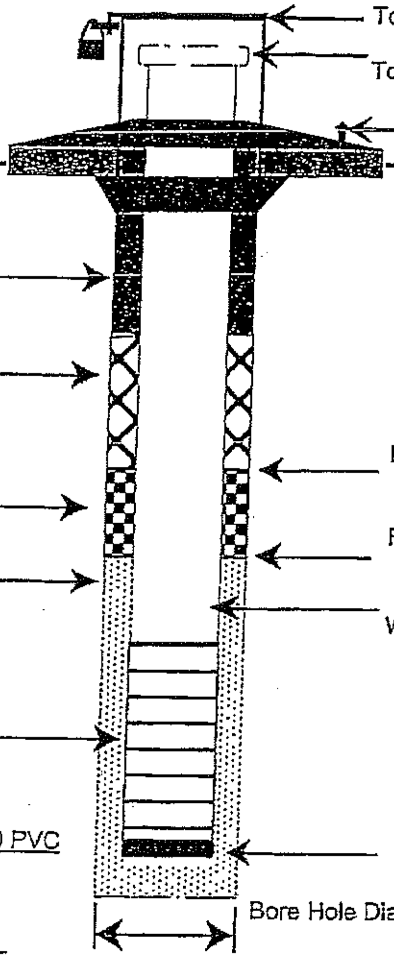
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-20
Date of Monitor Well Development: 9/15/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: 446.04' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock
Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 457.11' MSL
Top of Casing Elevation: 456.99' MSL
Surveyor's Pin Elevation: 454.37' MSL

Surface Elevation: 453.90' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Filter Pack
Filter Pack Material: 20/40 Silica Sand

Well Screen
Top Depth: 15'
Top Elevation: 438.90' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 20'
Bottom Elevation: 433.90' MSL

Michael J. Hull

MICHAEL J. HULL
GEOLOGY
4152

8/23/10

Bentonite Seal Top
Depth: 10' Elevation: 443.90' MSL

Filter Pack Top
Depth: 13' Elevation: 440.90' MSL

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Bottom Cap Depth: 21'

Bore Hole Diameter: 8.25"

TCEQ-10308

STATE OF TEXAS WELL REPORT for Tracking #232581

Owner:	**Republic Waste Camelot Landfill**	Owner Well #:	**MW-20**
Address:	**580 Huffines Blvd. Lewisville , TX 75065**	Grid #:	**18-57-8**
Well Location:	**580 Huffines Blvd. Lewisville , TX 75056**	Latitude:	**33° 02' 04" N**
Well County:	**Denton**	Longitude:	**096° 57' 02" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **8/23/2010**
Completed: **8/23/2010**

Diameter of Hole: Diameter: **8 1/4 In From Surface To 21 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **Sand Packed**

Annular Seal Data:
1st Interval: **From 21 ft to 13 ft with 3.5 Sacks Sand (#sacks and material)**
2nd Interval: **From 13 ft to 10 ft with 1 Bent. Pelets (#sacks and material)**
3rd Interval: **From 10 ft to 2 ft with 1 Grout (#sacks and material)**
Method Used: **TCEQ Standards**
Cemented By: **Strata Core**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality:
Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Strata Core Drilling Co.
5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232581) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 2' Silty Sandy Clay Loam
2 - 11' Gray Brown Silty Clay
11 - 13' Yellow Brown Sandy Silty Clay
13 - 17.5' Lt Brown Sandy Silty Sand
17.5 - 21' Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 21 - 20 Sch 40
2" N PVC Screen 20 - 15' .010
2" N PVC Riser 15 - 0 Sch 40

LOG OF MONITOR WELL NO. MW-21

Project Description: 600' Spacing Monitor Well Installations

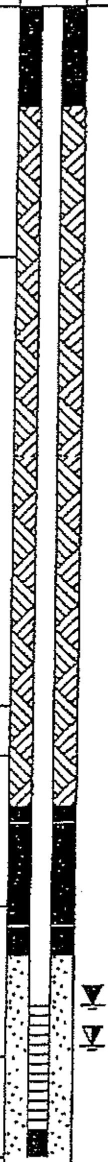
CAREL CORPORATION

Location: Camelot Landfill
Top of PVC El.: 464.89 feet MSL
Surface El.: 461.99 feet MSL
Completion Depth: 23 feet
Date Boring Started: 8/25/2010
Date Boring Completed: 8/25/2010

Northing: 7061156.36
Easting: 2441325.86

Depth, feet	MATERIAL DESCRIPTION
0	Silty CLAY(LOAM) with some sand, dark brown
5	CLAY, brown to dark brown, slightly moist
14	Silty CLAY, yellow-brown, slightly moist
15	Silty SAND, yellow-brown with limonite staining, very fine to medium grained, subrounded, moderately sorted, slightly moist
18	Silty/Sandy GRAVEL, yellow brown, very fine grained to cobble, poorly sorted, unconsolidated, wet
21	EAGLE FORD SHALE, dark gray to black, dry

Monitor Well Construction Details



Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 16' bgs

MICHAEL J. HULL
GEOLOGY
4152
8/25/10

Hydrated bentonite seal from 16' to 19' bgs

20/40 Silica sand from 19' to 23' bgs

0.01" Slotted screen from 20' to 22.5' bgs

Six inch sump

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations

Date	Elevation (ft. MSL)
8/25/10	441.99
8/25/10	441.99
9/22/10	441.17

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▽ Water level after drilling.

Monitor Well Data Sheet

ermittee or Site Name: Camelot Landfill
unty: Denton
Date of Monitor Well Installation: 8/25/2010
Monitor Well Northing: 7061156.358 Easting: 2441325.860
Monitor Well Groundwater Gradient Position:
Upgradient: ______ Downgradient: X

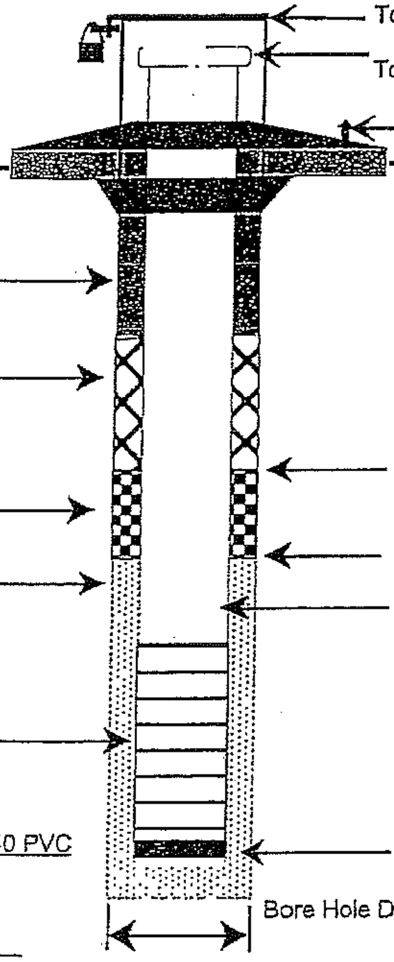
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-21
Date of Monitor Well Development: 9/22/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: ' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 465.11' MSL
Top of Casing Elevation: 464.89' MSL
Surface Elevation: 461.99' MSL
Surveyor's Pin Elevation: 462.33' MSL

Michael J. Hull
MICHAEL J. HULL
M152
8/25/10

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 16' Elevation: 445.99' MSL

Filter Pack Top
Depth: 19' Elevation: 442.99' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 20'
Top Elevation: 441.99' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 22.5'
Bottom Elevation: 439.49' MSL

Bottom Cap Depth: 23'
Bore Hole Diameter: 8.25"

TCEQ-10308

STATE OF TEXAS WELL REPORT for Tracking #232583

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-21
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date:	Started: 8/25/2010 Completed: 8/25/2010
Diameter of Hole:	Diameter: 8 1/4 In From Surface To 23 ft
Drilling Method:	Hollow Stem Auger
Borehole Completion:	Other: Sand Packed
Annular Seal Data:	1st Interval: From 23 ft to 19 ft with 1.5 Sacks Sand (#sacks and material) 2nd Interval: From 19 ft to 16 ft with 1 Bent. Pelets (#sacks and material) 3rd Interval: From 16 ft to 2 ft with 1 Grout (#sacks and material) Method Used: TCEQ Standards Cemented By: Strata Core Distance to Septic Field or other Concentrated Contamination: No Data Distance to Property Line: No Data Method of Verification: No Data Approved by Variance: No Data
Surface Completion:	Surface Slab Installed
Water Level:	Static level: No Data Artesian flow: No Data
Packers:	No Data
Plugging Info:	Casing or Cement/Bentonite left in well: No Data
Type Of Pump:	No Data
Well Tests:	No Data
Water Quality:	Type of Water: No Data Depth of Strata: No Data Chemical Analysis Made: No Data Did the driller knowingly penetrate any strata which contained undesirable constituents: No
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	Strata Core Drilling Co. 5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232583) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 5' Silty Sandy Clay Loam
5 - 12' Dk Brown Clay
12 - 14' Brown Clay
14 - 15' Yellow Brown Silty Clay
15 - 18' Yellow Brown Silty Sand
18 - 21' Yellow Brown Silty Sandy Gravel
21 - 23' Gray to Black Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 23 - 22.5 Sch 40
2" N PVC Screen 22.5 - 20' .010
2" N PVC Riser 20 - 0 Sch 40

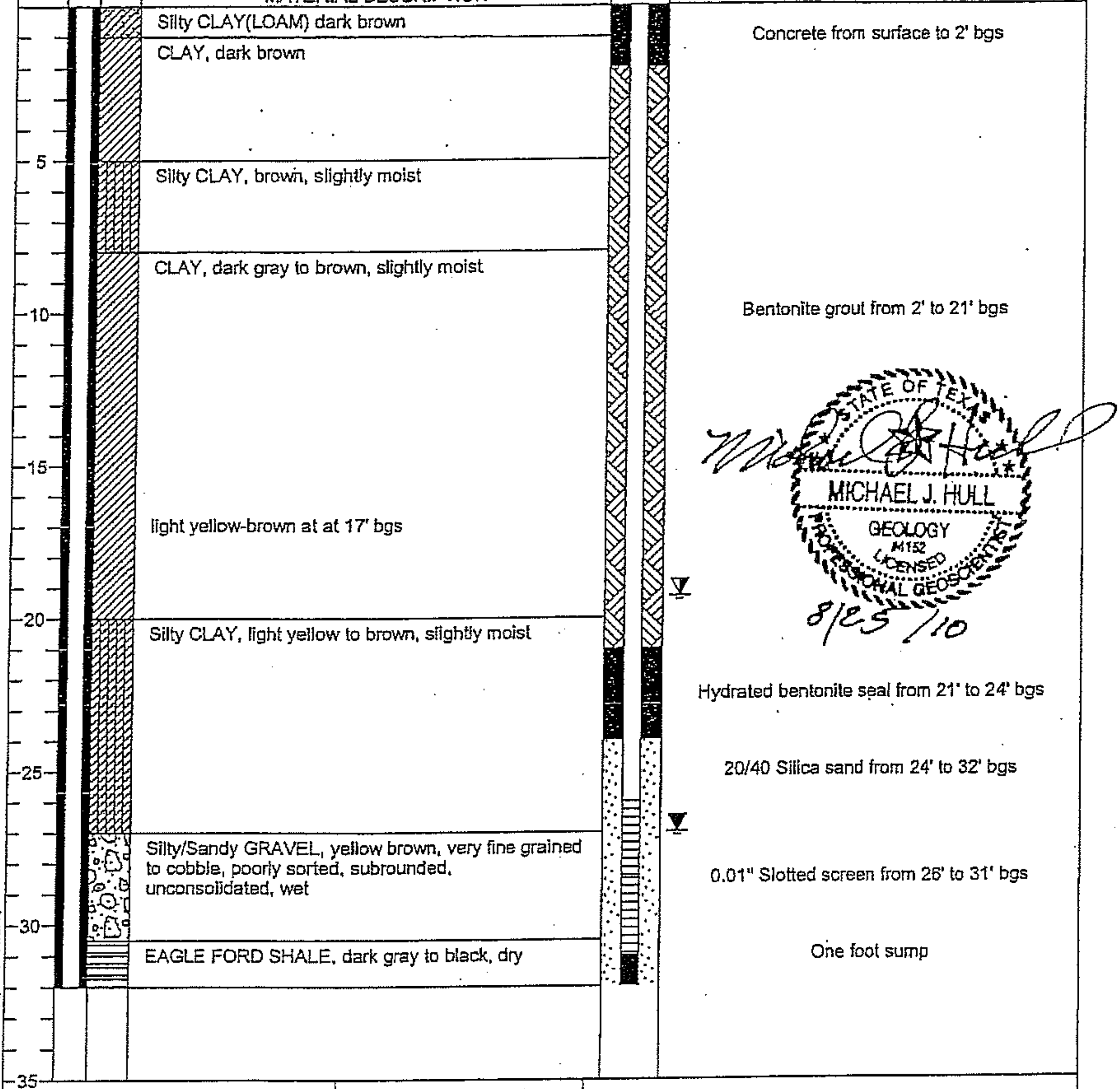
LOG OF MONITOR WELL NO. MW-23

CAREL Corporation

Project Description: 600' Spacing Monitor Well Installations

Location: Camelot Landfill
Top of PVC El.: 462.05 feet MSL
Surface El.: 458.98 feet MSL
Completion Depth: 32 feet
Date Boring Started: 8/25/2010
Date Boring Completed: 8/25/2010

Northing: 7059695.66
Easting: 2442523.59



Silty CLAY(LOAM) dark brown

CLAY, dark brown

Silty CLAY, brown, slightly moist

CLAY, dark gray to brown, slightly moist

light yellow-brown at at 17' bgs

Silty CLAY, light yellow to brown, slightly moist

Silty/Sandy GRAVEL, yellow brown, very fine grained to cobble, poorly sorted, subrounded, unconsolidated, wet

EAGLE FORD SHALE, dark gray to black, dry

Concrete from surface to 2' bgs

Bentonite grout from 2' to 21' bgs

Hydrated bentonite seal from 21' to 24' bgs

20/40 Silica sand from 24' to 32' bgs

0.01" Slotted screen from 26' to 31' bgs

One foot sump

Michael Hull

MICHAEL J. HULL
GEOLOGY
#152

8/25/10

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/25/10	431.98
8/25/10	431.98
9/21/10	439.66

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

LOG OF MONITOR WELL NO. MW-23
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▽ Water level after drilling.

Monitor Well Data Sheet

rmittee or Site Name: Camelot Landfill

unty: Denton

Date of Monitor Well Installation: 8/25/2010

Monitor Well Northing: 7059695.656 Easting: 2442523.590

Monitor Well Groundwater Gradient Position:

Upgradient: ______ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-23

Date of Monitor Well Development: 9/21/2010

Monitor Well Driller

Name: Roddy Qualls

License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.

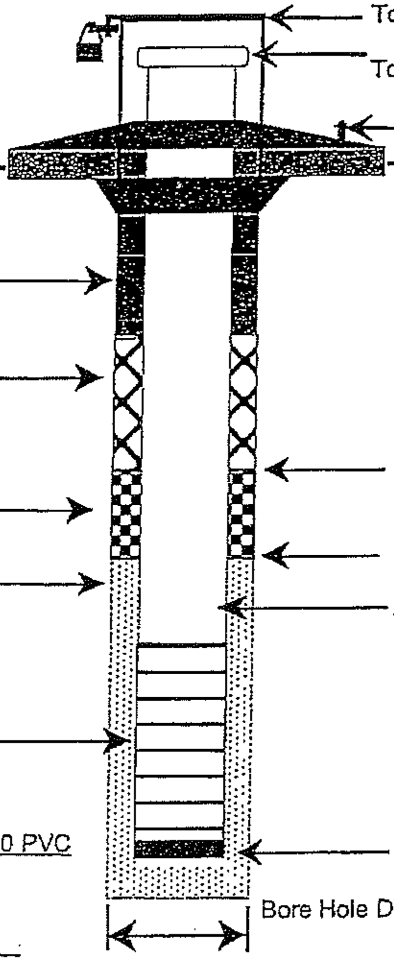
Static Water Level Elevation (with respect to MSL) after Well Development: 439.66' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock

Type of Casing Protection: Aluminum

Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 462.38' MSL

Top of Casing Elevation: 462.05' MSL

Surface Elevation: 458.94' MSL

Surveyor's Pin Elevation: 459.33' MSL

Concrete Seal Depth: 2'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 21' Elevation: 437.94' MSL

Filter Pack

Filter Pack Material: 20/40 Silica Sand

Filter Pack Top Depth: 24' Elevation: 434.94' MSL

Well Casing

Type: PVC

Size (diameter): 2"

Schedule or Thickness: 40

Well Screen

Top Depth: 26'

Top Elevation: 432.94' MSL

Type of Well Screen: 2" Sched. 40 PVC

Screen Opening Size: 0.01"

Bottom Depth: 31'

Bottom Elevation: 427.94' MSL

Bottom Cap Depth: 32'

Bore Hole Diameter: 8.25"

Michael J Hull

MICHAEL J. HULL

4152

8/25/10

STATE OF TEXAS WELL REPORT for Tracking #232588

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-23
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date:	Started: 8/25/2010 Completed: 8/25/2010
Diameter of Hole:	Diameter: 8 1/4 in From Surface To 32 ft
Drilling Method:	Hollow Stem Auger
Borehole Completion:	Other: Sand Packed
Annular Seal Data:	1st Interval: From 32 ft to 24 ft with 3.5 Sacks Sand (#sacks and material) 2nd Interval: From 24 ft to 21 ft with 1 Bent. Pelets (#sacks and material) 3rd Interval: From 21 ft to 2 ft with 1 Grout (#sacks and material) Method Used: TCEQ Standards Cemented By: Strata Core Distance to Septic Field or other Concentrated Contamination: No Data Distance to Property Line: No Data Method of Verification: No Data Approved by Variance: No Data
Surface Completion:	Surface Slab Installed
Water Level:	Static level: No Data Artesian flow: No Data
Packers:	No Data
Plugging Info:	Casing or Cement/Bentonite left in well: No Data
Type Of Pump:	No Data
Well Tests:	No Data
Water Quality:	Type of Water: No Data Depth of Strata: No Data Chemical Analysis Made: No Data Did the driller knowingly penetrate any strata which contained undesirable constituents: No
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	Strata Core Drilling Co. 5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232588) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 1' Dk Brown Silty Clay
1 - 5' Dk Brown Clay
5 - 8' Brown Silty Clay
8 - 14' Dk Gray Brown Clay
14 - 16' Brown Clay
16 - 20' Lt Yellow Brown Clay
20 - 25' Lt. Yellow Brown Silty Clay
25 - 27' Lt. Brown Silty Clay
27 - 30.5' Lt. Yellow Brown Silty Sandy Gravel
30.5 - 32' Dk Gray To Black Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 32 - 31 Sch 40
2" N PVC Screen 31 - 26' .010
2" N PVC Riser 26 - 0 Sch 40

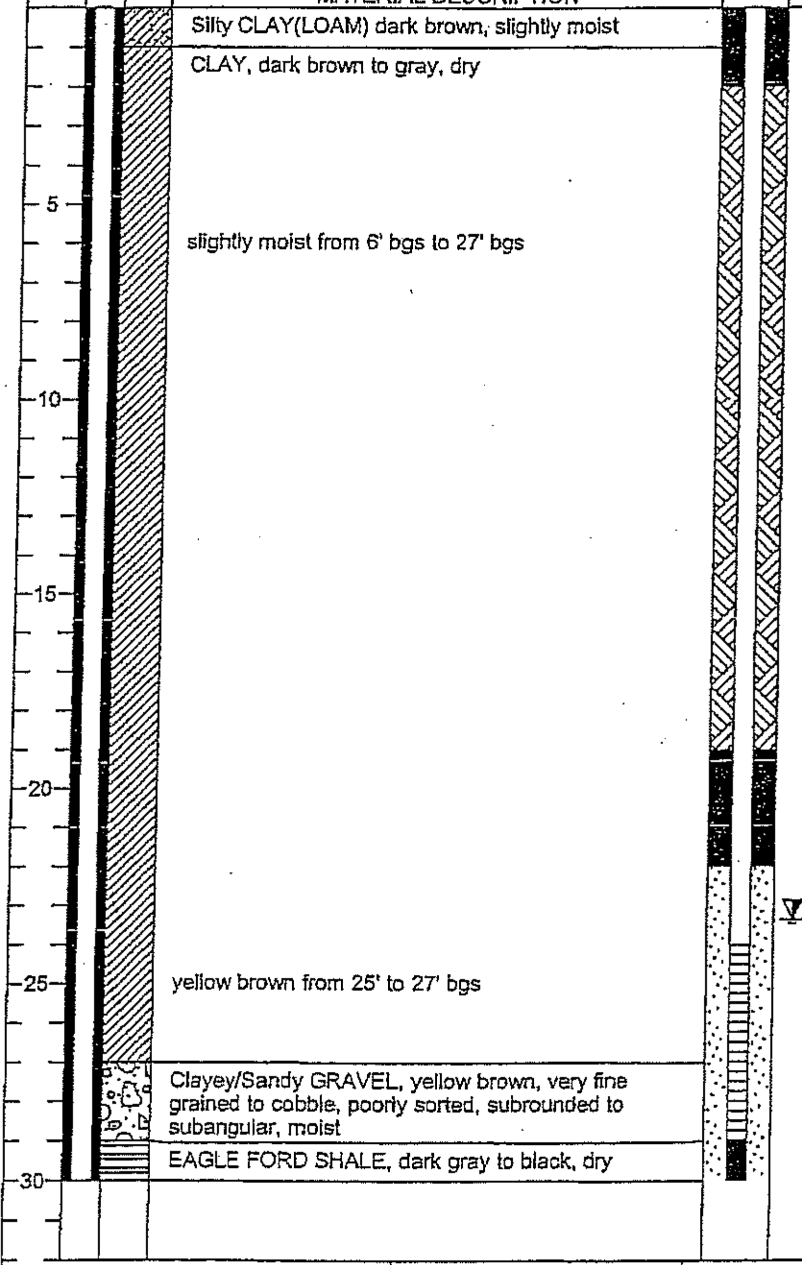
LOG OF MONITOR WELL NO. MW-24

Project Description: 600' Spacing Monitor Well Installations

CAREL CORPORATION

Location: Camelot Landfill
Top of PVC El.: 459.56 feet MSL
Surface El.: 456.47 feet MSL
Completion Depth: 30 feet
Date Boring Started: 8/25/2010
Date Boring Completed: 8/25/2010

Northing: 7059534.45
Easting: 2443100.09



MATERIAL DESCRIPTION	Monitor Well Description
Silty CLAY(LOAM) dark brown, slightly moist	Concrete from surface to 2' bgs
CLAY, dark brown to gray, dry slightly moist from 6' bgs to 27' bgs yellow brown from 25' to 27' bgs	Bentonite grout from 2' to 19' bgs Hydrated bentonite seal from 19' to 22' bgs 20/40 Silica sand from 22' to 30' bgs 0.01" Slotted screen from 24' to 29' bgs
Clayey/Sandy GRAVEL, yellow brown, very fine grained to cobble, poorly sorted, subrounded to subangular, moist	One foot sump
EAGLE FORD SHALE, dark gray to black, dry	

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
4152
LICENSED
PROFESSIONAL GEOSCIENTIST

8/25/10

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
9/21/10	433.11

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface: Well dry during drilling and at end of drilling.

10/2010 CAMELOT.GPJ CAREL.GDT 11/2/10

LOG OF MONITOR WELL NO. MW-24
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

∇ Water level at time of drilling.
▼ Water level at end of drilling.
∇ Water level after drilling.

Monitor Well Data Sheet

rmittee or Site Name: Camelot Landfill

nty: Denton

Date of Monitor Well Installation: 8/25/2010

Monitor Well Northing: 7059534.447 Easting: 2443100.090

Monitor Well Groundwater Gradient Position:

Upgradient: ______ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-24

Date of Monitor Well Development: 9/21/2010

Monitor Well Driller

Name: Roddy Qualls

License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

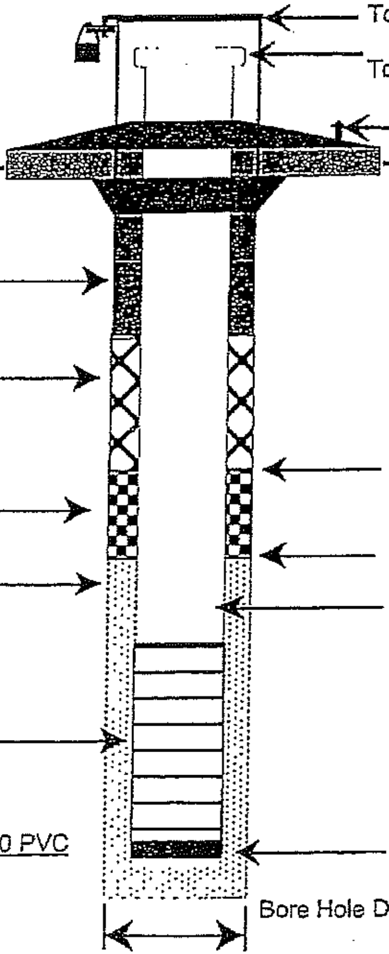
Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.

Static Water Level Elevation (with respect to MSL) after Well Development: ' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock Type of Casing Protection: Aluminum

Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 459.85' MSL

Top of Casing Elevation: 459.56' MSL

Surface Elevation: 456.47' MSL

Surveyor's Pin Elevation: 456.80' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 19' Elevation: 437.47' MSL

Filter Pack Top
Depth: 22' Elevation: 434.47' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 24'
Top Elevation: 432.47' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 29'
Bottom Elevation: 427.47' MSL

Bottom Cap Depth: 30'

Bore Hole Diameter: 8.25"

Michael J. Hull

MICHAEL J. HULL
GEOLOGY
4152

8/25/10

STATE OF TEXAS WELL REPORT for Tracking #232595

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-24
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date:	Started: 8/25/2010 Completed: 8/25/2010
Diameter of Hole:	Diameter: 8 1/4 in From Surface To 30 ft
Drilling Method:	Hollow Stem Auger
Borehole Completion:	Other: Sand Packed
Annular Seal Data:	1st Interval: From 30 ft to 22 ft with 3.5 Sacks Sand (#sacks and material) 2nd Interval: From 22 ft to 19 ft with 1 Bent. Pelets (#sacks and material) 3rd Interval: From 19 ft to 2 ft with 1 Grout (#sacks and material) Method Used: TCEQ Standards Cemented By: Strata Core Distance to Septic Field or other Concentrated Contamination: No Data Distance to Property Line: No Data Method of Verification: No Data Approved by Variance: No Data
Surface Completion:	Surface Slab Installed
Water Level:	Static level: No Data Artesian flow: No Data
Packers:	No Data
Plugging Info:	Casing or Cement/Bentonite left in well: No Data
Type Of Pump:	No Data
Well Tests:	No Data
Water Quality:	Type of Water: No Data Depth of Strata: No Data Chemical Analysis Made: No Data Did the driller knowingly penetrate any strata which contained undesirable constituents: No
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	Strata Core Drilling Co. 5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232595) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 1' Dk Brown Silty Clay
1 - 4' Dk Brown Clay
4 - 10' Dk Gray Brown Clay
10 - 15' Dk Brown Clay
15 - 25' Med Brown Clay
25 - 27' Yellow Brown Clay
27 - 29' Yellow Brown Silty Sand Gravel Clay
29 - 30' Dk Gray Black Silty Clay

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 30 - 29 Sch 40
2" N PVC Screen 29 - 24' .010
2" N PVC Riser 24 - 0 Sch 40

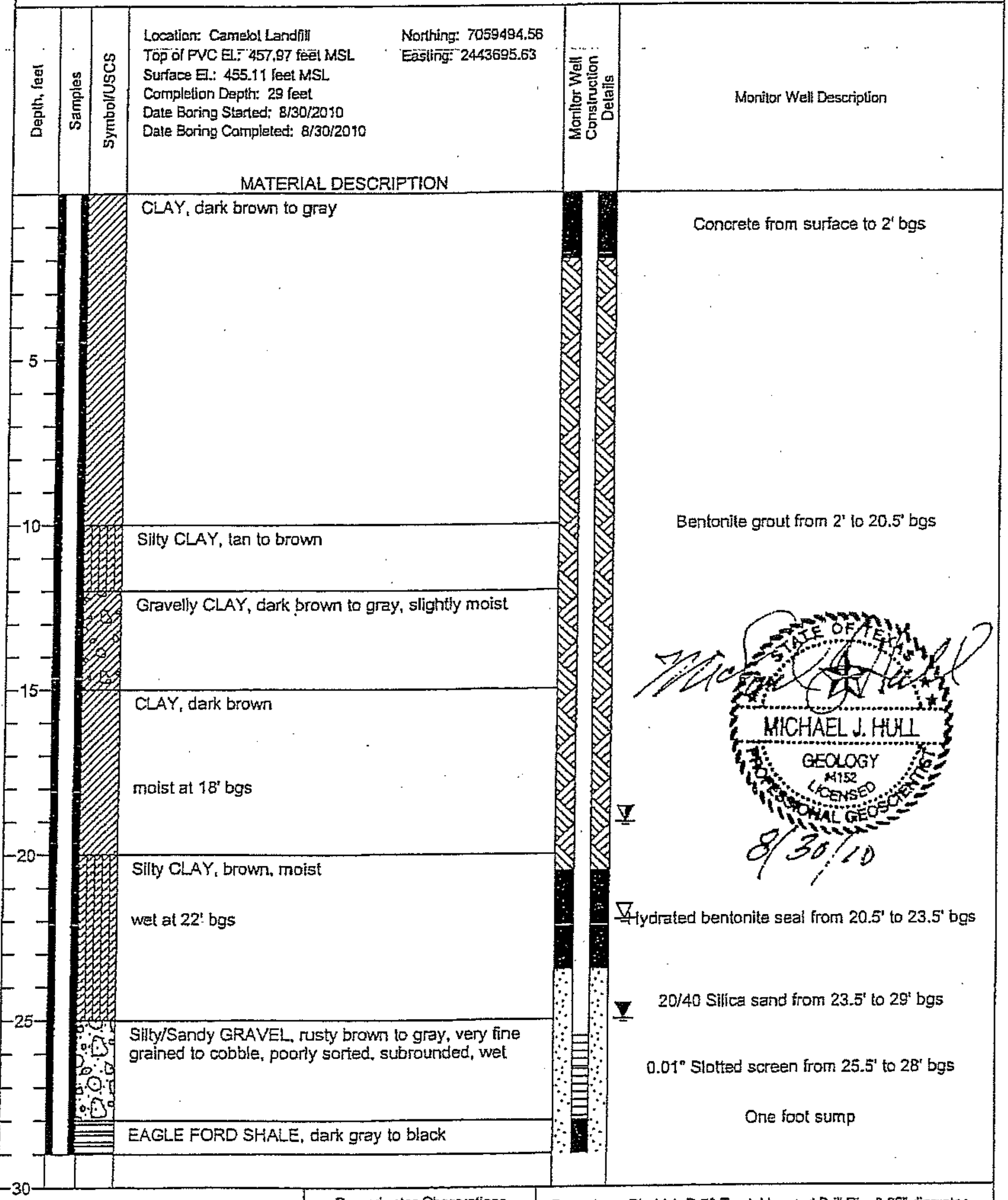
LOG OF MONITOR WELL NO. MW-25

Project Description: 600' Spacing Monitor Well Installations

CAREL

Location: Camelot Landfill
Top of PVC El.: 457.97 feet MSL
Surface El.: 455.11 feet MSL
Completion Depth: 29 feet
Date Boring Started: 8/30/2010
Date Boring Completed: 8/30/2010

Northing: 7059494.56
Easting: 2443695.63



MATERIAL DESCRIPTION

CLAY, dark brown to gray

Silty CLAY, tan to brown

Gravelly CLAY, dark brown to gray, slightly moist

CLAY, dark brown

moist at 18' bgs

Silty CLAY, brown, moist

wet at 22' bgs

Silty/Sandy GRAVEL, rusty brown to gray, very fine grained to cobble, poorly sorted, subrounded, wet

EAGLE FORD SHALE, dark gray to black

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 20.5' bgs

Hydrated bentonite seal from 20.5' to 23.5' bgs

20/40 Silica sand from 23.5' to 29' bgs

0.01" Slotted screen from 25.5' to 28' bgs

One foot sump

Michael J. Hull

MICHAEL J. HULL
GEOLOGY
4152

8/30/10

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/30/10	433.11
8/30/10	430.11
9/23/10	436.05

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

LOG OF MONITOR WELL NO. MW-25
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▽ Water level after drilling.

Monitor Well Data Sheet

Permittee or Site Name: Camelot Landfill
unty: Denton
Date of Monitor Well Installation: 8/30/2010
Monitor Well Northing: 7059494.562 Easting: 2443695.634
Monitor Well Groundwater Gradient Position:
Upgradient: ______ Downgradient: X

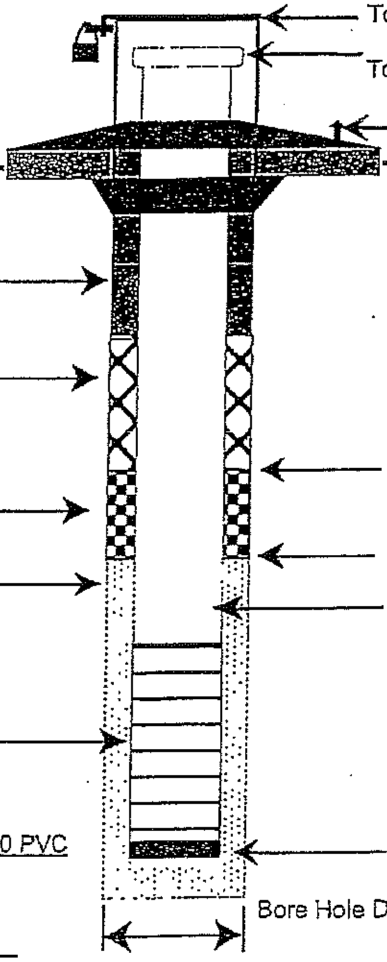
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-25
Date of Monitor Well Development: 9/15/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: 436.05' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock
Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 458.24' MSL
Top of Casing Elevation: 457.97' MSL
Surface Elevation: 455.11' MSL
Surveyor's Pin Elevation: 455.63' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 20.5' Elevation: 434.61' MSL

Filter Pack Top
Depth: 23.5' Elevation: 431.61' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 25.5'
Top Elevation: 429.61' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 28'
Bottom Elevation: 427.11' MSL

Bottom Cap Depth: 29'

Bore Hole Diameter: 8.25"

Michael Hull

MICHAEL J. HULL
4152

8/30/10

TCEQ-10308

STATE OF TEXAS WELL REPORT for Tracking #232598

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-25
Address:	580 Huffines Blvd. Lewisville, TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville, TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date: Started: **8/30/2010**
Completed: **8/30/2010**

Diameter of Hole: Diameter: **8 1/4 in From Surface To 29 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **Sand Packed**

Annular Seal Data:
1st Interval: **From 29 ft to 23.5 ft with 3 Sacks Sand (#sacks and material)**
2nd Interval: **From 23.5 ft to 20.5 ft with 1 Bent. Pelets (#sacks and material)**
3rd Interval: **From 20.5 ft to 2 ft with 1 Grout (#sacks and material)**
Method Used: **TCEQ Standards**
Cemented By: **Strata Core**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **Strata Core Drilling Co.**
5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232598) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 5' Dk Brown Clay
5 - 10' Dk Gray Brown Clay
10 - 12' Dk Brown Lt. Tan Clay
12 - 15' Dk Gray Brown Clay
15 - 20' Dk Brown Clay
20 - 25' Brown Silty Clay
25 - 28' Brown & Gray Silty Sand & Gravel
28 - 29' Dk Gray Black Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 29 - 28 Sch 40
2" N PVC Screen 28 - 25.5' .010
2" N PVC Riser 25.5 - 0 Sch 40

IIIG-B-144

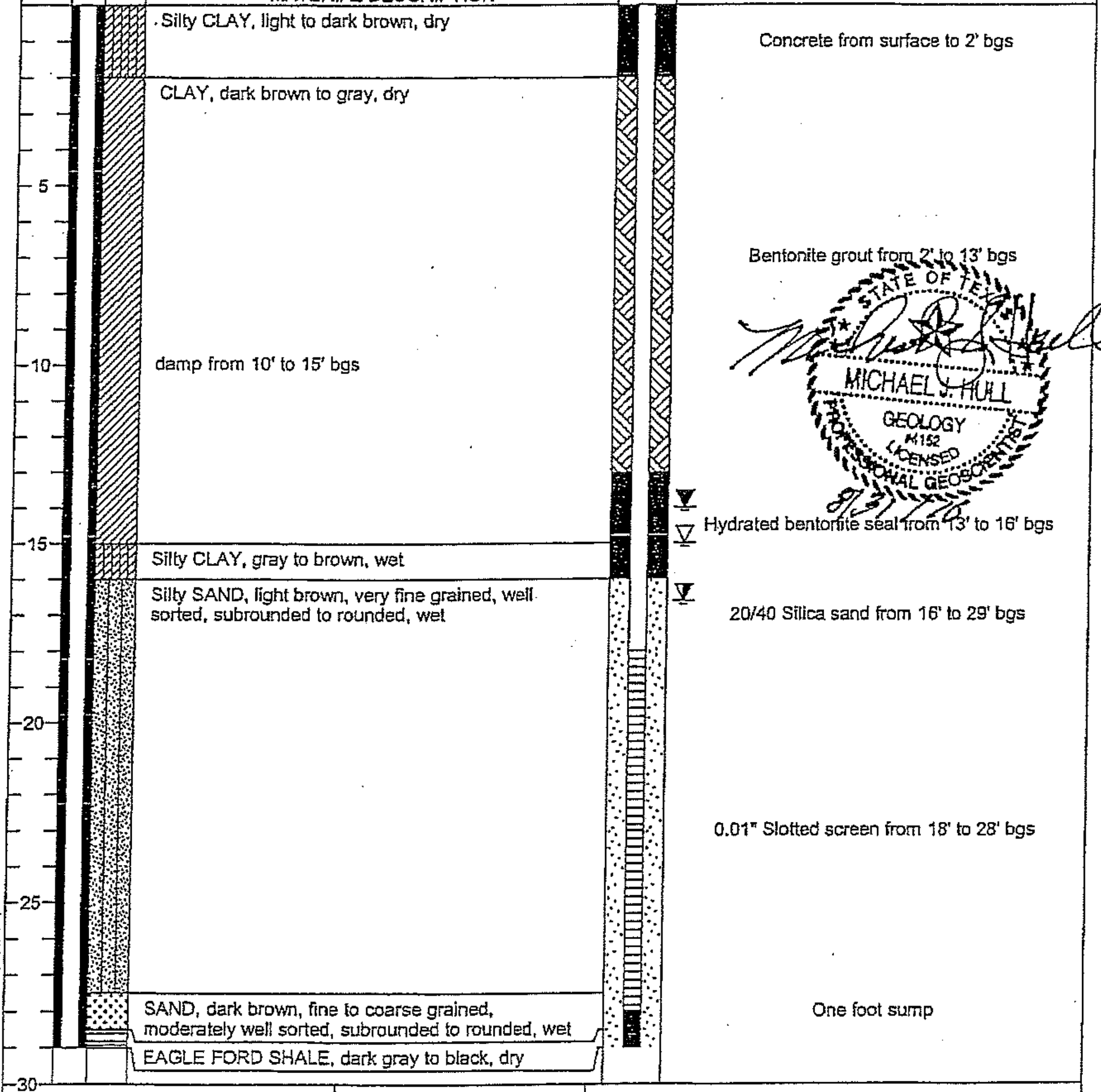
LOG OF MONITOR WELL NO. MW-26

Project Description: 600' Spacing Monitor Well Installations

CAREL Corporation

Location: Camelot Landfill
Top of PVC El.: 457.94 feet MSL
Surface El.: 455.28 feet MSL
Completion Depth: 29 feet
Date Boring Started: 8/31/2010
Date Boring Completed: 8/31/2010

Northing: 7059590.96
Easting: 2444270.77



MATERIAL DESCRIPTION

Silty CLAY, light to dark brown, dry

CLAY, dark brown to gray, dry

damp from 10' to 15' bgs

Silty CLAY, gray to brown, wet

Silty SAND, light brown, very fine grained, well sorted, subrounded to rounded, wet

SAND, dark brown, fine to coarse grained, moderately well sorted, subrounded to rounded, wet

EAGLE FORD SHALE, dark gray to black, dry

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 13' bgs

Hydrated bentonite seal from 13' to 16' bgs

20/40 Silica sand from 16' to 29' bgs

0.01" Slotted screen from 18' to 28' bgs

One foot sump

MICHAEL J. HULL
GEOLOGY
152
LICENSED

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/31/10	440.28
8/31/10	441.28
9/21/10	438.66

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

10/2010 CAMELOT.GPJ CAREL.GDT 11/2/10

LOG OF MONITOR WELL NO. MW-26
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

∇ Water level at time of drilling.
▼ Water level at end of drilling.
∇ Water level after drilling.

Monitor Well Data Sheet

nittee or Site Name: Camelot Landfill
nty: Denton
Date of Monitor Well Installation: 8/31/2010
Monitor Well Northing: 7059494.562 Easting: 2443695.634
Monitor Well Groundwater Gradient Position:
Upgradient: ______ Downgradient: X

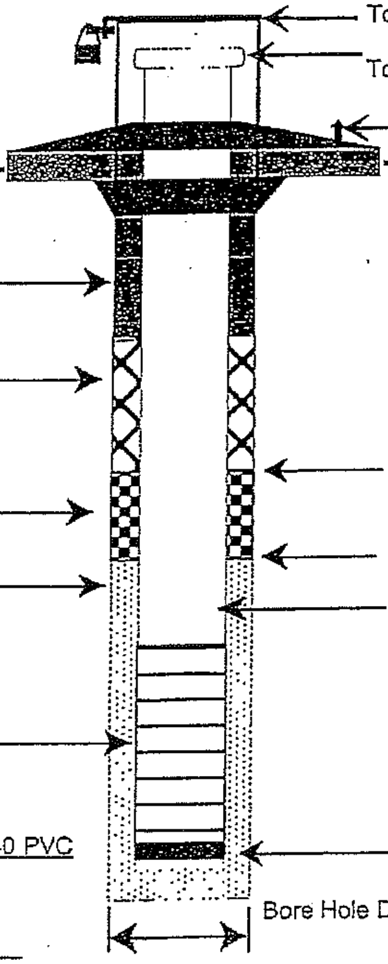
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-26
Date of Monitor Well Development: 9/21/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: ' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock
Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 457.96' MSL
Top of Casing Elevation: 457.94' MSL
Surveyor's Pin Elevation: 455.35' MSL
Surface Elevation: 455.28' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 13' Elevation: 442.28' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Filter Pack Top
Depth: 16' Elevation: 439.28' MSL

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 18'
Top Elevation: 437.28' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 28'
Bottom Elevation: 427.28' MSL

Bottom Cap Depth: 29'

Bore Hole Diameter: 8.25"

Michael Hull

MICHAEL J. HULL
GEOLOGY
4152

8/31/10

TCEQ-10308

STATE OF TEXAS WELL REPORT for Tracking #232602

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-26
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date: Started: 8/31/2010
Completed: 8/31/2010

Diameter of Hole: Diameter: 8 1/4 in From Surface To 29 ft

Drilling Method: Hollow Stem Auger

Borehole Completion: Other: Sand Packed

Annular Seal Data: 1st Interval: From 29 ft to 16 ft with 5 Sacks Sand (#sacks and material)
2nd Interval: From 16 ft to 13 ft with 1 Bent. Pelets (#sacks and material)
3rd Interval: From 13 ft to 2 ft with 1 Grout (#sacks and material)
Method Used: TCEQ Standards
Cemented By: Strata Core
Distance to Septic Field or other Concentrated Contamination: No Data
Distance to Property Line: No Data
Method of Verification: No Data
Approved by Variance: No Data

Surface Completion: Surface Slab Installed

Water Level: Static level: No Data
Artesian flow: No Data

Packers: No Data

Plugging Info: Casing or Cement/Bentonite left in well: No Data

Type Of Pump: No Data

Well Tests: No Data

Water Quality: Type of Water: No Data
Depth of Strata: No Data
Chemical Analysis Made: No Data
Did the driller knowingly penetrate any strata which contained undesirable constituents: No

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: Strata Core Drilling Co.
5066 Brush Creek Rd.

Fort Worth , TX 76119

Driller License Number: 3121

Licensed Well Driller Signature: Roddy Qualls

Registered Driller Apprentice Signature: Joseph Ray

Apprentice Registration Number: 58017

Comments: No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232602) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 2' Dk & Lt. Brown Silty Clay
2 - 10' Brown Clay
10 - 14' Gray Brown Clay
14 - 27.5' Gray Brown Silty Clay
27.5 - 28.5' Dk Brown Sand
28.5 - 29' Dk Gray Black Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 29 - 28 Sch 40
2" N PVC Screen 28 - 18' .010
2" N PVC Riser 18 - 0 Sch 40

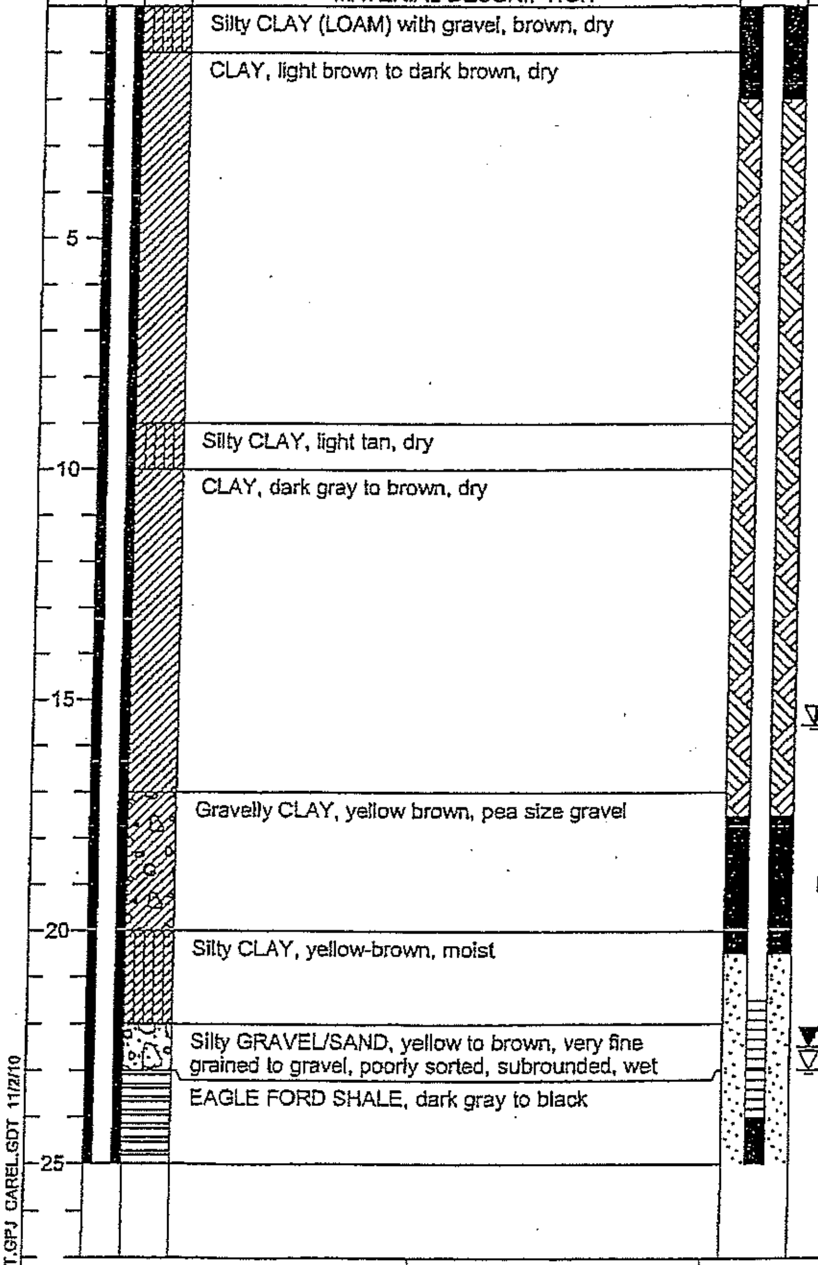
LOG OF MONITOR WELL NO. MW-27

Project Description: 600' Spacing Monitor Well Installations

CAREL CORPORATION

Location: Camelot Landfill
Top of PVC EL: 456.10 feet MSL
Surface EL: 453.01 feet MSL
Completion Depth: 25 feet
Date Boring Started: 8/30/2010
Date Boring Completed: 8/30/2010

Northing: 7060278.38
Easting: 2444879.50



MATERIAL DESCRIPTION

Silty CLAY (LOAM) with gravel, brown, dry

CLAY, light brown to dark brown, dry

Silty CLAY, light tan, dry

CLAY, dark gray to brown, dry

Gravelly CLAY, yellow brown, pea size gravel

Silty CLAY, yellow-brown, moist

Silty GRAVEL/SAND, yellow to brown, very fine grained to gravel, poorly sorted, subrounded, wet

EAGLE FORD SHALE, dark gray to black

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 17.5' bgs

MICHAEL J. HULL
#1152
8/30/10

Hydrated bentonite seal from 17.5' to 20.5' bgs

20/40 Silica sand from 20.5' to 25' bgs

0.01" Slotted screen from 21.5' to 24' bgs

One foot sump

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/30/10	430.01
8/30/10	430.51
9/23/10	437.45

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

∇ Water level at time of drilling.
▼ Water level at end of drilling.
∇ Water level after drilling.

Monitor Well Data Sheet

rmittee or Site Name: Camelot Landfill
inty: Denton
Date of Monitor Well Installation: 8/30/2010
Monitor Well Northing: 7060278.381 Easting: 2444879.504
Monitor Well Groundwater Gradient Position:
Upgradient: ______ Downgradient: X

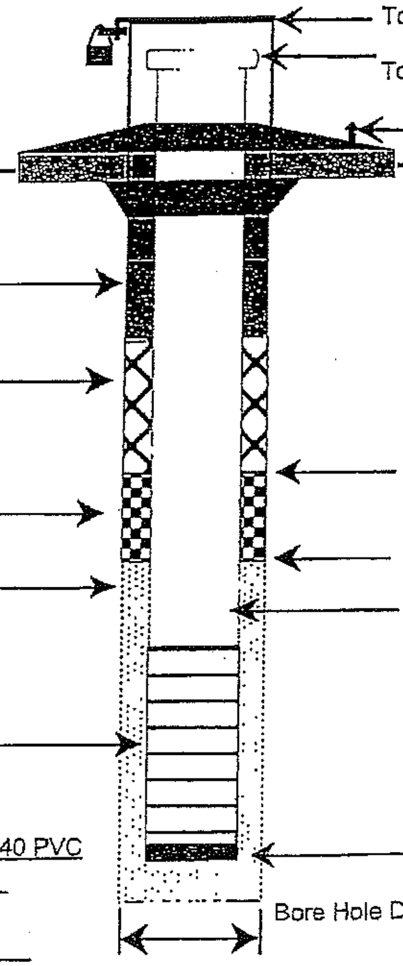
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-27
Date of Monitor Well Development: 9/14/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: 440.54' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock
Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 456.46' MSL
Top of Casing Elevation: 456.10' MSL
Surface Elevation: 453.01' MSL
Surveyor's Pin Elevation: 453.53' MSL

MICHAEL J. HULL
GEOLOGY
4152
8/30/10

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal Top
Depth: 17.5' Elevation: 435.51' MSL

Bentonite Seal

Filter Pack Top
Depth: 20.5' Elevation: 432.51' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 21.5'
Top Elevation: 431.51' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 24'
Bottom Elevation: 429.01' MSL

Bottom Cap Depth: 25'

Bore Hole Diameter: 8.25"

STATE OF TEXAS WELL REPORT for Tracking #232604

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-27
Address:	580 Huffines Blvd. Lewisville, TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville, TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date:	Started: 8/30/2010 Completed: 8/30/2010
Diameter of Hole:	Diameter: 8 1/4 in From Surface To 25 ft
Drilling Method:	Hollow Stem Auger
Borehole Completion:	Other: Sand Packed
Annular Seal Data:	1st Interval: From 25 ft to 20.5 ft with 2.5 Sacks Sand (#sacks and material) 2nd Interval: From 20.5 ft to 17.5 ft with 1 Bent. Pelets (#sacks and material) 3rd Interval: From 17.5 ft to 2 ft with 1 Grout (#sacks and material) Method Used: TCEQ Standards Cemented By: Strata Core Distance to Septic Field or other Concentrated Contamination: No Data Distance to Property Line: No Data Method of Verification: No Data Approved by Variance: No Data
Surface Completion:	Surface Slab Installed

Water Level:	Static level: No Data Artesian flow: No Data
Packers:	No Data
Plugging Info:	Casing or Cement/Bentonite left in well: No Data
Type Of Pump:	No Data
Well Tests:	No Data

Water Quality:	Type of Water: No Data Depth of Strata: No Data Chemical Analysis Made: No Data Did the driller knowingly penetrate any strata which contained undesirable constituents: No
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	Strata Core Drilling Co. 5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232604) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 1' Brown Silty Gravel Clay
1 - 5' Dk Brown Clay
5 - 8' Brown Lt. Brown Clay
8 - 9' Dk Brown Clay
9 - 10' Tan Silty Clay
10 - 17' Dk Gray Brown Clay
17 - 22' Yellow Brown Clay w/ Gravel
22 - 25' Yellow Brown Silty Gravel Sand

CASING, BLANK PIPE & WELL SCREEN DATA

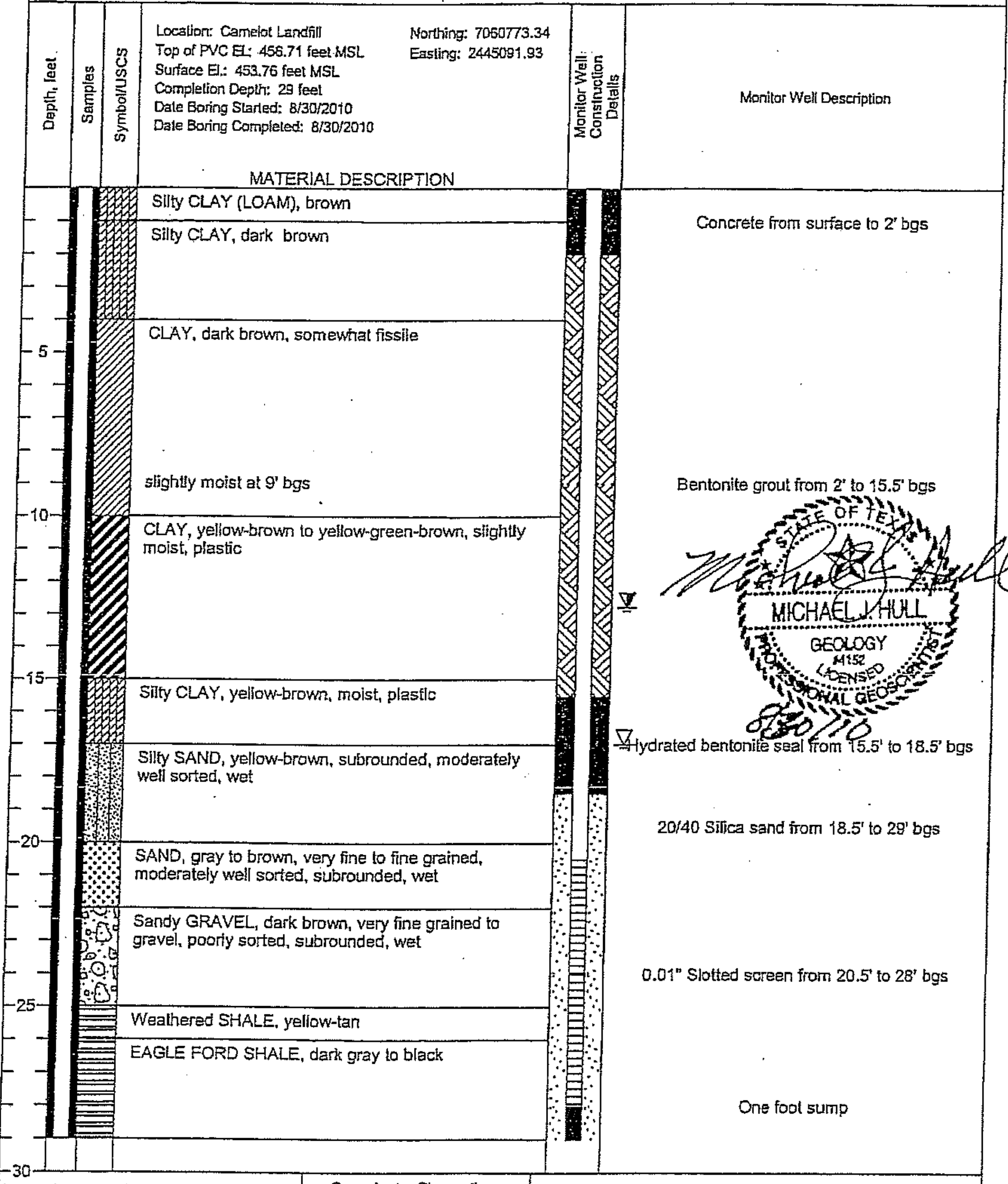
Dia. New/Used Type Setting From/To
2" N PVC Sump 25 - 24 Sch 40
2" N PVC Screen 24 - 21.5' .010
2" N PVC Riser 21.5 - 0 Sch 40

LOG OF MONITOR WELL NO. MW-28

Project Description: 600' Spacing Monitor Well Installations

CAREL CORPORATION

Location: Camelot Landfill	Northing: 7060773.34
Top of PVC EL: 456.71 feet MSL	Easting: 2445091.93
Surface El.: 453.76 feet MSL	
Completion Depth: 29 feet	
Date Boring Started: 8/30/2010	
Date Boring Completed: 8/30/2010	



MATERIAL DESCRIPTION

Silty CLAY (LOAM), brown

Silty CLAY, dark brown

CLAY, dark brown, somewhat fissile

slightly moist at 9' bgs

CLAY, yellow-brown to yellow-green-brown, slightly moist, plastic

Silty CLAY, yellow-brown, moist, plastic

Silty SAND, yellow-brown, subrounded, moderately well sorted, wet

SAND, gray to brown, very fine to fine grained, moderately well sorted, subrounded, wet

Sandy GRAVEL, dark brown, very fine grained to gravel, poorly sorted, subrounded, wet

Weathered SHALE, yellow-tan

EAGLE FORD SHALE, dark gray to black

Monitor Well Description

Concrete from surface to 2' bgs

Bentonite grout from 2' to 15.5' bgs

Michael J. Hull

MICHAEL J. HULL GEOLOGY 4152

8/30/10

Hydrated bentonite seal from 15.5' to 18.5' bgs

20/40 Silica sand from 18.5' to 29' bgs

0.01" Slotted screen from 20.5' to 28' bgs

One foot sump

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations	
Date	Elevation (ft. MSL)
8/30/10	436.76
9/23/10	440.97

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

LOG OF MONITOR WELL NO. MW-28
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

∇ Water level at time of drilling.
▼ Water level at end of drilling.
∇ Water level after drilling.

Monitor Well Data Sheet

Permittee or Site Name: Camelot Landfill
nty: Denton
ate of Monitor Well Installation: 8/30/2010
Monitor Well Northing: 7060773.335 Easting: 2445091.928
Monitor Well Groundwater Gradient Position:
Upgradient: ______ Downgradient: X

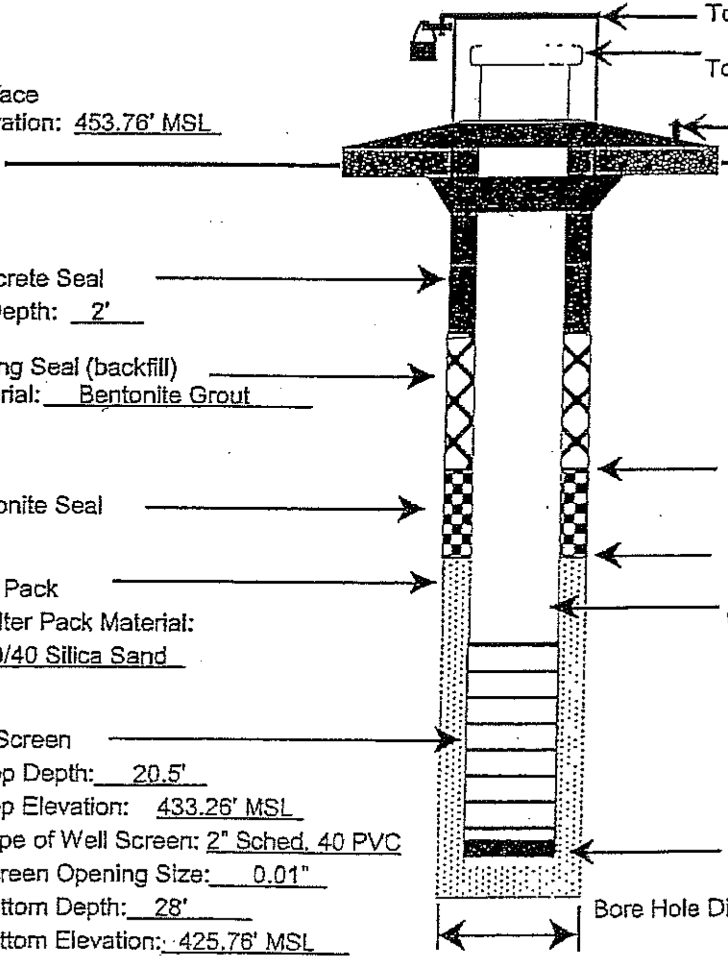
MSW Permit No.: 1312-A
Monitor Well I.D. No.: MW-28
Date of Monitor Well Development: 9/14/2010
Monitor Well Driller
Name: Roddy Qualls
License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.
Static Water Level Elevation (with respect to MSL) after Well Development: 440.32' MSL
Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock
Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 456.95' MSL
Top of Casing Elevation: 456.71' MSL
Surface Elevation: 453.76' MSL
Surveyor's Pin Elevation: 454.13' MSL

Michael Hull
MICHAEL J. HULL
8/30/10

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal Top
Depth: 15.5' Elevation: 438.26' MSL

Bentonite Seal

Filter Pack Top
Depth: 18.5' Elevation: 435.26' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 20.5'
Top Elevation: 433.26' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 28'
Bottom Elevation: 425.76' MSL

Bottom Cap Depth: 29'

Bore Hole Diameter: 8.25"

TCEQ-10308

STATE OF TEXAS WELL REPORT for Tracking #232606

Owner:	Republic Waste Camelot Landfill	Owner Well #:	MW-28
Address:	580 Huffines Blvd. Lewisville , TX 75065	Grid #:	18-57-8
Well Location:	580 Huffines Blvd. Lewisville , TX 75056	Latitude:	33° 02' 04" N
Well County:	Denton	Longitude:	096° 57' 02" W
Elevation:	No Data	GPS Brand Used:	Garmin
Type of Work:	New Well	Proposed Use:	Monitor

Drilling Date:
Started: 8/30/2010
Completed: 8/30/2010

Diameter of Hole: Diameter: 8 1/4 in From Surface To 25 ft

Drilling Method: Hollow Stem Auger

Borehole Completion: Other: Sand Packed

Annular Seal Data:
1st Interval: From 29 ft to 18.5 ft with 4.5 Sacks Sand (#sacks and material)
2nd Interval: From 18.5 ft to 15.5 ft with 1 Bent. Pelets (#sacks and material)
3rd Interval: From 15.5 ft to 2 ft with 1 Grout (#sacks and material)
Method Used: TCEQ Standards
Cemented By: Strata Core
Distance to Septic Field or other Concentrated Contamination: No Data
Distance to Property Line: No Data
Method of Verification: No Data
Approved by Variance: No Data

Surface Completion: Surface Slab Installed

Water Level:
Static level: No Data
Artesian flow: No Data

Packers: No Data

Plugging Info: Casing or Cement/Bentonite left in well: No Data

Type Of Pump: No Data

Well Tests: No Data

Water Quality:
Type of Water: No Data
Depth of Strata: No Data
Chemical Analysis Made: No Data
Did the driller knowingly penetrate any strata which contained undesirable constituents: No

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Strata Core Drilling Co.
5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	**3121**
Licensed Well Driller Signature:	**Roddy Qualls**
Registered Driller Apprentice Signature:	**Joseph Ray**
Apprentice Registration Number:	**58017**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232606) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 1' Brown Sandy Loam
1 - 4' Dk Brown Silty Clay
4 - 9' Dk Brown Clay
9 - 15' Gray Brown Clay
15 - 20' Yellow Brown Silty Clay
20 - 22' Gray Brown Sand
22 - 25' Dk Brown Sandy Gravel
25 - 26' Yellow Tan Clay
26 - 29' Dk Gray Black Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 29 - 28 Sch 40
2" N PVC Screen 28 - 20.5' .010
2" N PVC Riser 20.5 - 0 Sch 40

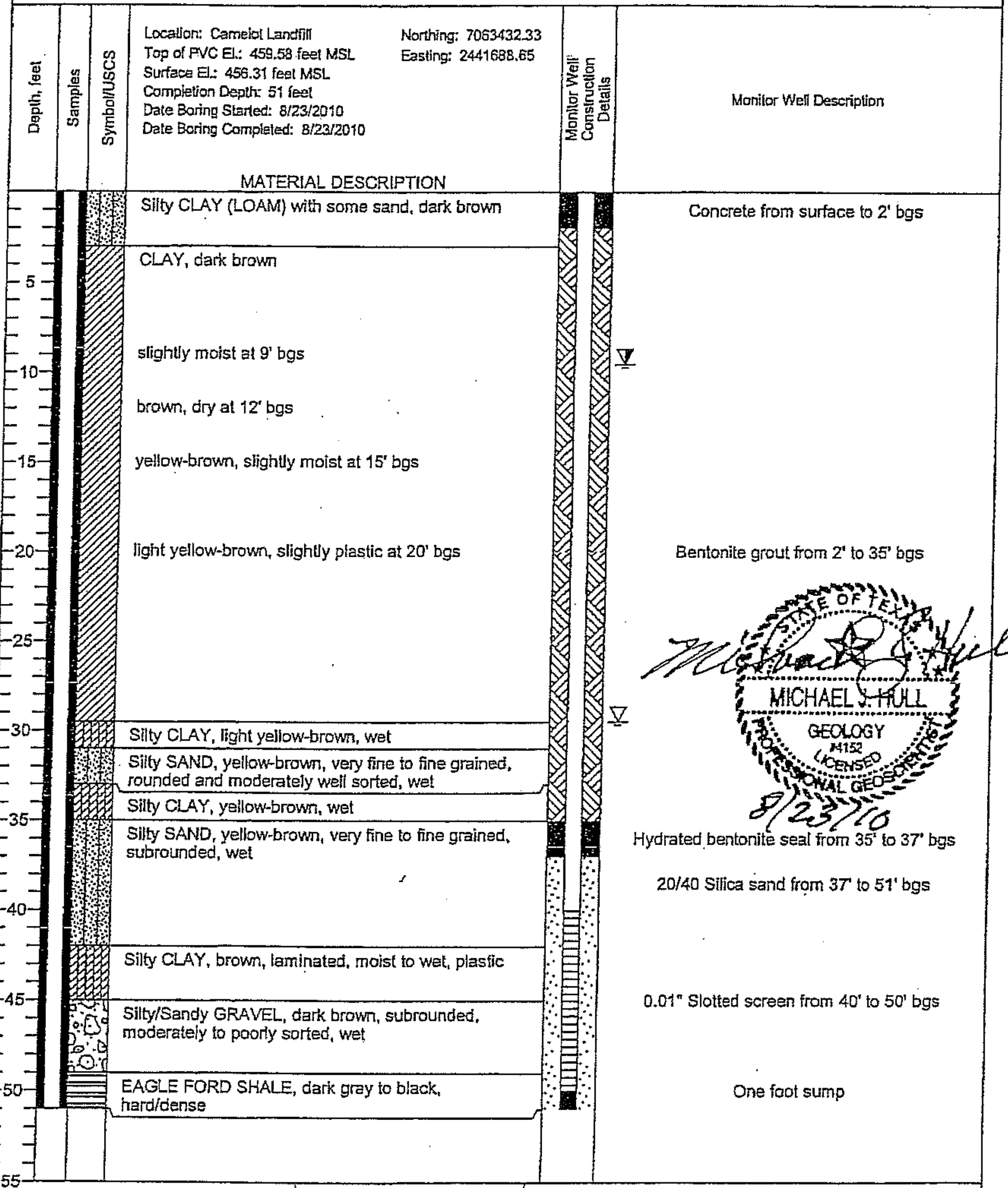
LOG OF MONITOR WELL NO. MW-29

Project Description: 600' Spacing Monitor Well Installations

CAREL Corporation

Location: Camelot Landfill
Top of PVC El.: 459.58 feet MSL
Surface El.: 456.31 feet MSL
Completion Depth: 51 feet
Date Boring Started: 8/23/2010
Date Boring Completed: 8/23/2010

Northing: 7063432.33
Easting: 2441688.65



Silty CLAY (LOAM) with some sand, dark brown

CLAY, dark brown

slightly moist at 9' bgs

brown, dry at 12' bgs

yellow-brown, slightly moist at 15' bgs

light yellow-brown, slightly plastic at 20' bgs

Silty CLAY, light yellow-brown, wet

Silty SAND, yellow-brown, very fine to fine grained, rounded and moderately well sorted, wet

Silty CLAY, yellow-brown, wet

Silty SAND, yellow-brown, very fine to fine grained, subrounded, wet

Silty CLAY, brown, laminated, moist to wet, plastic

Silty/Sandy GRAVEL, dark brown, subrounded, moderately to poorly sorted, wet

EAGLE FORD SHALE, dark gray to black, hard/dense

Concrete from surface to 2' bgs

Bentonite grout from 2' to 35' bgs

Hydrated bentonite seal from 35' to 37' bgs

20/40 Silica sand from 37' to 51' bgs

0.01" Slotted screen from 40' to 50' bgs

One foot sump

Michael J. Hull

MICHAEL J. HULL
GEOLOGY
4152

8/23/10

Drilling Contractor: Strata Core Drilling
Drilling Method: HSA
Sampling Method: Continuous
Geologist: Michael Hull, P.G.
Project No.: 10-04-31

Groundwater Observations

Date	Elevation (ft. MSL)
8/23/10	426.81
9/23/10	446.74

Remarks: Diedrich D-50 Track Mounted Drill Rig, 8.25" diameter boring with 2" diameter casing and screen, bgs - below ground surface

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▽ Water level after drilling.

Monitor Well Data Sheet

Permittee or Site Name: Camelot Landfill

inty: Denton

ate of Monitor Well Installation: 8/23/2010

Monitor Well Northing: 7063432.329 Easting: 2441688.646

Monitor Well Groundwater Gradient Position:

Upgradient: ______ Downgradient: X

MSW Permit No.: 1312-A

Monitor Well I.D. No.: MW-29

Date of Monitor Well Development: 9/22/2010

Monitor Well Driller

Name: Roddy Qualls

License No. 3121

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Michael Hull, P.G.

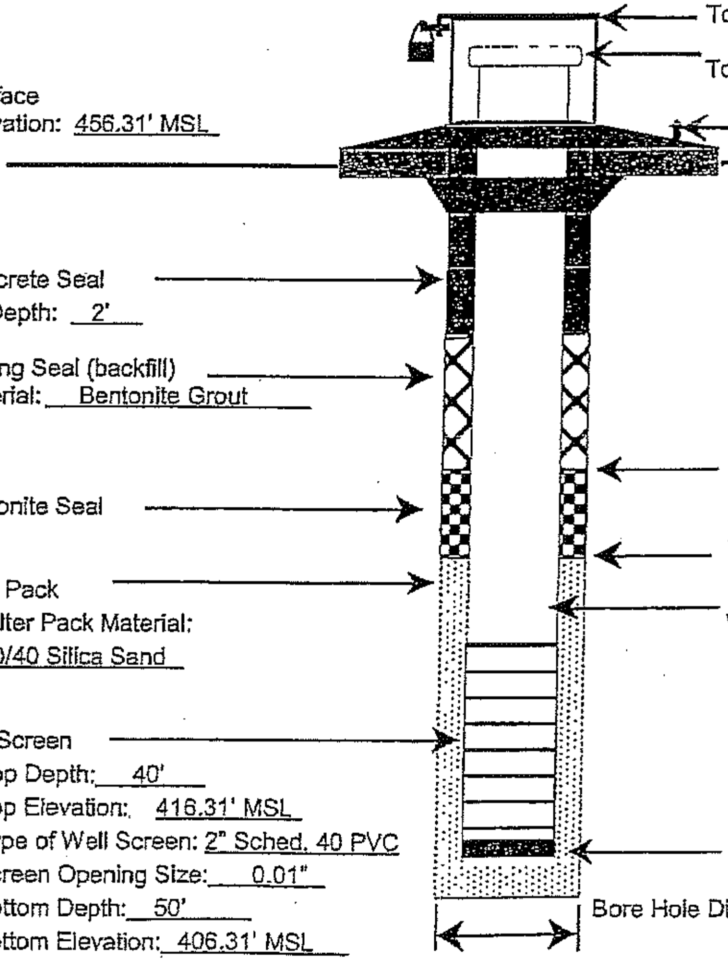
Static Water Level Elevation (with respect to MSL) after Well Development: 446.78' MSL

Name of Geologic Formation(s) in which Well is completed: Alluvium

Type of Locking Device: Pad Lock

Type of Casing Protection: Aluminum

Concrete Surface Pad (with steel reinforcement) Dimensions: 4' x 4' x 6"



Top of Protective Collar Elevation: 459.60' MSL

Top of Casing Elevation: 459.58' MSL

Surface Elevation: 456.31' MSL

Surveyor's Pin Elevation: 456.77' MSL

Concrete Seal
Depth: 2'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 35' Elevation: 421.31' MSL

Filter Pack Top
Depth: 37' Elevation: 419.31' MSL

Filter Pack
Filter Pack Material:
20/40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: 40

Well Screen
Top Depth: 40'
Top Elevation: 416.31' MSL
Type of Well Screen: 2" Sched. 40 PVC
Screen Opening Size: 0.01"
Bottom Depth: 50'
Bottom Elevation: 406.31' MSL

Bottom Cap Depth: 51'

Bore Hole Diameter: 8.25"

MICHAEL J. HULL
GEOLOGY
4152

8/23/10

STATE OF TEXAS WELL REPORT for Tracking #232608

Owner:	**Republic Waste Camelot Landfill**	Owner Well #:	**MW-29**
Address:	**580 Huffines Blvd.** **Lewisville , TX 75065**	Grid #:	**18-57-8**
Well Location:	**580 Huffines Blvd.** **Lewisville , TX 75056**	Latitude:	**33° 02' 04" N**
Well County:	**Denton**	Longitude:	**096° 57' 02" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:
Started: **8/23/2010**
Completed: **8/23/2010**

Diameter of Hole: Diameter: **8 1/4 in From Surface To 51 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **Sand Packed**

Annular Seal Data:
1st Interval: **From 51 ft to 37 ft with 6 Sacks Sand (#sacks and material)**
2nd Interval: **From 37 ft to 35 ft with 1 Bent. Pelets (#sacks and material)**
3rd Interval: **From 35 ft to 2 ft with 1 Grout (#sacks and material)**
Method Used: **TCEQ Standards**
Cemented By: **Strata Core**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level:
Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality:
Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Strata Core Drilling Co.
5066 Brush Creek Rd.

	Fort Worth , TX 76119
Driller License Number:	3121
Licensed Well Driller Signature:	Roddy Qualls
Registered Driller Apprentice Signature:	Joseph Ray
Apprentice Registration Number:	58017
Comments:	No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #232608) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 - 3' Dk Brown Silty Sandy Loam
3 - 12' Dk Brown Clay
12 - 20' Brown Clay
20 - 29.5' Lt. Yellow Brown Clay
29.5 - 33' Lt. Yellow Brown Silty Clay
33 - 35' Yellow Brown Clay
35 - 42' Yellow Brown Silty Sand
42 - 45' Brown Silty Clay
45 - 49' Dk Brown Silt
49 - 51' Gray Black Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2" N PVC Sump 51 - 50 Sch 40
2" N PVC Screen 50 - 40' .010
2" N PVC Riser 40 - 0 Sch 40

2010-2011 WBC BORING LOGS

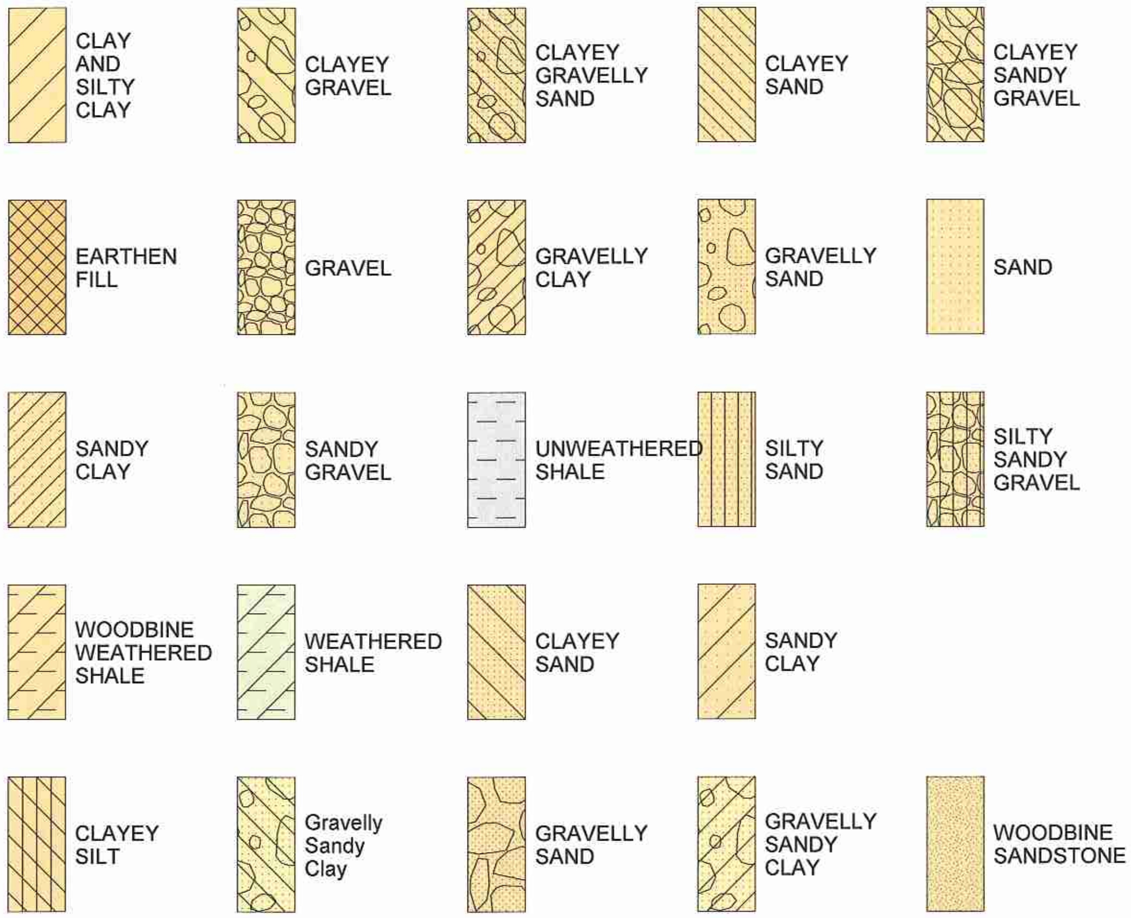
WEAVER BOOS CONSULTANTS LLC SOUTHWEST

WBC GEOLOGIC LOG LEGEND
CAMELOT LANDFILL

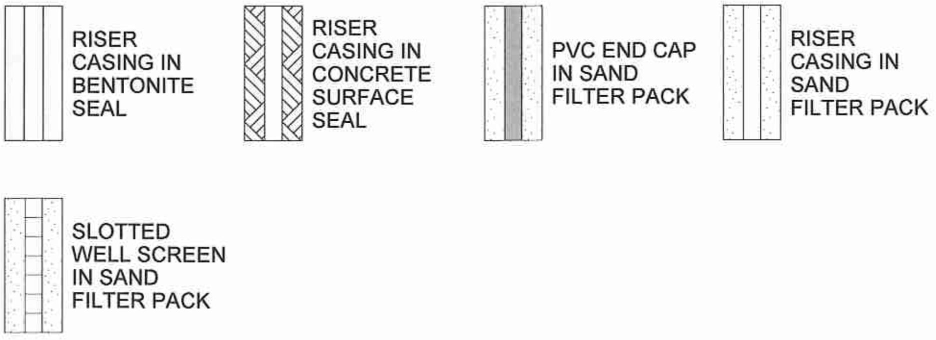
SUBSURFACE CONDITIONS:

The lithologic log soil and rock descriptions are based on visual field observations and, where indicated on the logs, geotechnical testing. The geotechnical classifications are based only on the samples analyzed. Where no geotechnical classification or analysis is indicated, the stratum classifications are based on visual field classifications only. The lithologic unit contacts shown on the logs indicate approximate boundaries between materials. The actual contacts may be gradational and vary between borehole locations. The visual/manual procedures used for the field classification of soils were performed in general accordance with ASTM Standard D-2488. Soil classifications based on geotechnical laboratory results were performed in general accordance with ASTM Standard D-2487. Water level observations were made at the time of drilling and at subsequent times, as indicated. Future water levels may vary significantly from those indicated due to climatic factors, construction activity, or other factors.

LITHOLOGIC UNITS ENCOUNTERED



PIEZOMETER AND SURFACE CASING SUBSURFACE CONSTRUCTION



WEAVER BOOS
CONSULTANTS
LLC
SOUTHWEST

WBC GEOLOGIC LOG DESCRIPTIONS
CAMELOT LANDFILL

SAMPLING METHODS:

Symbol:	Sampling Method:
U	Thin Walled Shelby Tube
S	Split Spoon Barrel
C	Double Tube Core Barrel
P	Pitcher Barrel
A	Auger Sample
W	Rotary Wash Sample

RELATIVE DENSITY OF COARSE GRAINED SOILS:

Penetration Resistance: (Blows/Foot)	Relative Density:
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
Over 50	Very Dense

CONSISTENCY OF FINE-GRAINED SOILS:

Unconfined Compressive Strength: (Tons per Square Foot)	Consistency:	Field Criteria:
Less than 0.25	Very Soft	Squeezes between fingers when fist is closed.
0.25 to 0.50	Soft	Easily molded by fingers.
0.50 to 1.00	Firm	Molded by strong pressure of fingers.
1.00 to 2.00	Stiff	Imprinted very slightly by finger pressure.
2.00 to 4.00	Very Stiff	Cannot imprint with finger pressure / can penetrate w/ pencil.
4.00 and Up	Hard	Imprinted only slightly by pencil point.

MOISTURE:

Description:	Criteria:
Dry	Absence of moisture.
Moist	Damp, but no visible water.
Wet	Very damp to visible water.

PLASTICITY

Description:	Criteria:
Non-plastic	1/8" Thread Can't Be Rolled.
Low	1/8" Thread Difficult to Roll / No Lump.
Medium	1/8" Thread Easy to Roll / No reroll / No Lump.
High	Long time to 1/8" Thread at Plastic Limit.

STRATIFICATION:

Description:	Thickness:
Massive Bedding	> 10 ft.
Very Thickly Bedded	3 ft. to 10 ft.
Thickly Bedded	1 ft. to 3 ft.
Moderately Bedded	3 in. to 1 ft.
Thinly Bedded	1.2 in. to 3 in.
Very Thinly Bedded	3/8 in. to 1.2 in.
Laminated	< 3/8 in.

SEDIMENTARY TEXTURES:

Description:	Definition:
Slickensides	Polished fracture surface seen in stiff clay.
Fractures	Failure plane, commonly with mineralization.
Blocky	Angular lumps that resist further breakdown.
Brecciated	Angular fragments commonly due to faulting.
Fissures	Cracks from shrinkage and frost with definite fracture plane.
Weathered	Discoloration and/or diminished texture.
Calcareous	Contains calcium carbonate, commonly as cement.

HCL REACTION:

Description:	Definition:
None	No reaction with HCL.
Weak	Effervesces slightly with HCL.
Strong	Effervesces greatly with HCL.

ANGULARITY OF COARSE GRAINED SOILS:

Description:	Criteria: (coarse sand and larger only)
Angular	Sharp edges / relatively plane sides / unpolished surfaces.
Subangular	Similar to angular with rounded edges.
Subrounded	Well-rounded edges with plane sides.
Rounded	Smoothly curved sides with no edges.

ADDITIONAL COMPONENT TERMS:

Description:	Percentage of total:
Trace	Present but < 5 %
Few	5 to 10 %
Little	15 to 25 %
Some	30 to 45 %
Mostly	50 to 100 %

SHAPE OF GRAVEL AND LARGER PARTICLES:

Description:	Criteria:
Flat	Particles with width/thickness >3.
Elongated	Particles with length/width >3.
Flat and elongated	Particles meet criteria for flat and elongated.

CEMENTATION OF COARSE GRAINED SOILS:

Description:	Criteria:
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-1

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 1 of 3

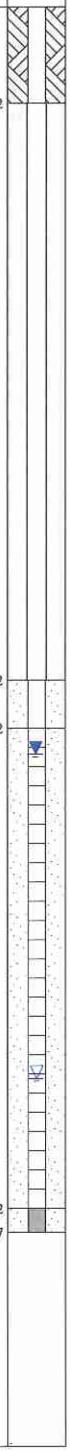
Boring Start Date: 10/11/2010
Boring End Date: 10/11/2010
Ground Elevation: 464.2 ft-msl
Northing: 7063184.50
Easting: 2442845.00
T.O.C.: 467.55 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 441.9 ft-msl
▼ = Static Water Level: 445.3 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)
	U		Clay Fill, silty, dark yellow brown, moist, hard to very stiff, plastic, very thickly bedded, trace rootlets (0-6.5'), trace fine to coarse, subangular to subrounded gravel, and trace fine, subangular to subrounded sand, with laminated shale fragments throughout.		4.5+									
					4									462.2
	U				2									
					2									
5	U				2.5									
					3.5		90	26.6	102.0	64	27	37	7.7x10^{-8} H	
	U			456.2										
			Clay, silty, dark yellow brown, moist, very stiff to hard, very thickly bedded, plastic, moderate HCL reaction, trace calcareous nodules.		4									
	U				4									
10					1.5									
	U				1.5									
					3		95	26.7	96.1	63	24	39	6.6x10^{-8} H	
	U				2.5									
					2.5									450.2
15	U			448.6	2.5									449.2
			Clay, sandy, dark yellow brown and dark yellow orange mottled, moist, stiff to very stiff, plastic, very thickly bedded, sand is fine grained.		2.5	6/9/10								
	S				2									
					2	3/5/8								
	S				2		73	25.2	94.7	53	20	33		
20					2	3/6/8								
	S			442.2	1.5									
			Sand, gravelly, dark yellow brown, wet, unconsolidated to soft, very thickly bedded, slightly plastic with few clay, poorly sorted, sand is fine to coarse subangular to rounded grains, gravel is less than 1", subangular to subrounded grain.		1.5	6/13/13								
	S				0		13	10.7		26	17	9		
				440.1 439.7	0	20/48/50+								
25	S		Shale, silty (mudstone), weathered, dark gray, moist, clayey, hard, plastic when moistened, laminated.											439.2
														438.7
			Shale, silty (mudstone), unweathered, dark gray, dry, hard, strong HCL reaction, plastic when moistened, laminated, trace fossils and gypsum veins, few thin limey shale laminations. Begin mud rotary drilling at 28'.											
	NR													
			- Trace wet shale horizontal partings bounded by dry moderate to thickly bedded shale intervals from 28' to 35.6'.		4.5+									
	C													

Well Detail



LOG OF BORING WB-1

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/11/2010 Northing: 7063184.50
Boring End Date: 10/11/2010 Easting: 2442845.00
Ground Elevation: 464.2 ft-msl T.O.C.: 467.55 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 441.9 ft-msl
▼ = Static Water Level: 445.3 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
35	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 35.6', dry, hard, laminated.		4.5+										
	C				4.5+										
40	C		Shale, mudstone with interbedded claystone laminations, continued.		4.5+										
	C				4.5+										
45	C		- 1.5" bentonite seams at 44.0 and 44.9 feet.		4.5+										
	C				4.5+										
50	C		- 1.0" bentonite seam at 49.0 feet.		4.5+										
	C		- Shale very hard and limey from 52-52.8 feet. - Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 52.8'.		4.5+										
55	C		- High angle mechanical fracture at 53.8 feet. - High angle mechanical fractures at 55.3 and 55.9 feet.		4.5+										
	C				4.5+										
					4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-1

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date:	10/11/2010	Northing:	7063184.50
Boring End Date:	10/11/2010	Easting:	2442845.00
Ground Elevation:	464.2 ft-msl	T.O.C.:	467.55 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 441.9 ft-msl
▼ = Static Water Level: 445.3 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
					4.5+										
	C														
					4.5+										
65	C														
					4.5+										
	C														
					4.5+										
70	C														
					4.5+										
	C														
75					4.5+										
	C														
					4.5+										
80	C		Shale (claystone), continued.												
					4.5+										
	C			380.0											
85			Total Borehole Depth = 84.2'.												

CAMELOT 2/22/2012 8:58:31 AM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-2

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010 Northing: 7063232.70
Boring End Date: 10/6/2010 Easting: 2443476.10
Ground Elevation: 457.2 ft-msl

Remarks: Begin air rotary coring at 17'. Switch to mud rotary coring at 56'.

▽ = Water Level at Time of Drilling: 446.7 ft-msl
▼ = Static Water Level: 446.9 ft-msl

					Field Tests		Laboratory Tests									
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U		Clay Fill, silty, dark brown, moist, stiff, plastic, trace fine to coarse, subangular gravel.		2										
	U				2										
5	U				2		64	22.1	103.5	50	19	31			
	U				2										
	U			448.2											
			Clay, silty, dark brown, moist to wet at 10.5', firm, plastic, thickly bedded, trace to few fine gravel.												
10	U			446.7	1			29.6	88.6						▼
			Gravel, sandy, tan and dark brown mottled, wet, loose, non-plastic, thickly bedded, coarse sand to large gravel grains.		1										
	U						12	8.7	134.3	21	14	7	$1.2x10^{-6}$ H		
	S				1	10/9/14									
15			Shale, clayey, weathered, dark brown and gray mottled, moist, stiff, plastic, laminated.	442.4 442.2											
	NR		Shale, silty (mudstone), unweathered, dark gray, dry, hard, laminated, plastic when moistened, with traces of fossils and calcite crystals. Begin air rotary drilling at 17'.												
	C				4.5+										
20	C				4.5+										
25	C				4.5+										
	C				4.5+										
	C		- One wet horizontal shale bedding plane parting bounded by dry shale at 29'.		4.5+										

CAMELOT 2/22/2012 8:58:38 AM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-2

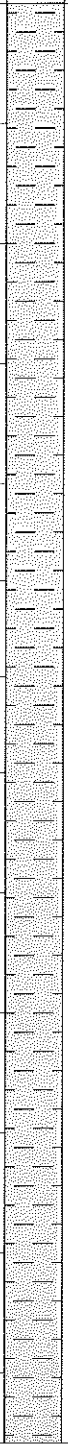
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date:	9/20/2010	Northing:	7063232.70
Boring End Date:	10/6/2010	Easting:	2443476.10
Ground Elevation:	457.2 ft-msl		

Remarks: Begin air rotary coring at 17'. Switch to mud rotary coring at 56'.

▽ = Water Level at Time of Drilling: 446.7 ft-msl
▼ = Static Water Level: 446.9 ft-msl



Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
				4.5+										
	C													
				4.5+										
	C													
35				4.5+										
	C	- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 40', dry, hard, laminated.												
				4.5+										
	C													
40		Shale, mudstone with claystone laminations, continued.		4.5+										
	C													
				4.5+										
	C													
				4.5+										
45	C													
				4.5+										
	C													
				4.5+										
50	C	- Trace wet horizontal shale bedding plane partings from 49 to 55 feet depth bounded by moderately to thickly bedded dry shale intervals.												
				4.5+										
	C													
				4.5+										
55	C													
		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 56'. Begin mud rotary drilling at 56'.		4.5+										
	C													
				4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-2

Project Title: Camelot Landfill Expansion

Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010
Boring End Date: 10/6/2010
Ground Elevation: 457.2 ft-msl
Northing: 7063232.70
Easting: 2443476.10

Remarks: Begin air rotary coring at 17'. Switch to mud rotary coring at 56'.

▽ = Water Level at Time of Drilling: 446.7 ft-msl
▼ = Static Water Level: 446.9 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
					4.5+										
	C														
					4.5+										
65	C														
					4.5+										
	C		- Thin (<1/8") bentonite seam.												
					4.5+										
70	C														
					4.5+										
	C														
					4.5+										
75	C														
					4.5+										
	C														
					4.5+										
80	C		Shale, claystone, continued.												
					4.5+										
	C		- Shale, mudstone, dark gray, dry, hard, laminated, beginning at 82'.												
					4.5+										
85	C														
			- Thin (<1/8") bentonite seam at 68'.												
					4.5+										
	C														
					4.5+										

LOG OF BORING WB-2

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 4 of 4

Boring Start Date:	9/20/2010	Northing:	7063232.70
Boring End Date:	10/6/2010	Easting:	2443476.10
Ground Elevation:	457.2 ft-msl		

Remarks: Begin air rotary coring at 17'. Switch to mud rotary coring at 56'.

▽ = Water Level at Time of Drilling: 446.7 ft-msl
▼ = Static Water Level: 446.87 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
					4.5+										
	C		- High angle mechanical fracture at 93.3 feet.												
					4.5+										
95	C														
			- Trace limestone (up to 1") interbedded with mudstone shale from 96.5 to 98 feet depth.		4.5+										
	C														
					4.5+										
100	C														
				355.2											
			Total Borehole Depth = 102'.												
105															
110															
115															

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-3

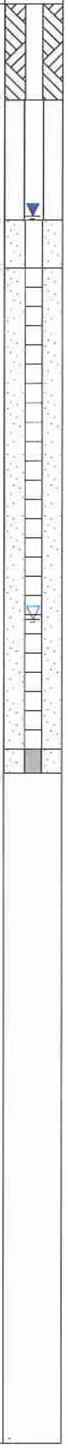
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date:	10/8/2010	Northing:	7063286.20
Boring End Date:	10/8/2010	Easting:	2444184.70
Ground Elevation:	453.5 ft-msl	T.O.C.:	457.12 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 440.7 ft-msl
▼ = Static Water Level: 445.5 ft-msl



Depth (ft)	Samples	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)
	U	Clay, silty, dark grey, moist, hard to stiff, plastic, very thickly bedded, with few rootlets.		4.5+									
				4									451.5
	U			4									
				3									449.0
5	U			4.5		79	23.1	101.3	60	21	39		448.0
				4									
	U		445.5	4									
		SAND, clayey, dark yellow brown with dark gray mottling, moist, stiff to soft with depth, very thickly bedded, plastic, sand content increases with depth.		2									
	U			2		36	15.3	113.6	37	15	22	$2.6x10^{-7}$	
10				2	3/3/3								
	S		442.0	1	4/6/9		15.1	112.5					
	S	Gravel, sandy, clayey, dark yellow orange and dark gray mottled, moist, soft to unconsolidated, very loose, thickly bedded, non-plastic, poorly sorted, gravel is angular to subrounded, <1.25" grain size, sand is fine to very fine grained.	440.7	0.5									
	S			0	7/9/9	17	14.9		24	15	9		
		Gravel, sandy, dark yellow orange and dark gray mottled, wet, unconsolidated, very loose, very thickly bedded, poorly sorted, non-plastic, gravel and sand grain sizes as above.	438.8 438.4		34/50/50								
15	S						20.1 21.6	113.7				$3.9x10^{-8}$ V	438.0 437.5
		Shale, silty (mudstone), clayey, weathered, yellow brown and dark gray mottled, moist, hard, plastic, laminated, friable, with trace fossils and calcite crystals.											
	NR	Shale, silty (mudstone), unweathered, dark gray, dry, hard, laminated, with trace fossils and calcite crystals. Begin mud rotary drilling at 18'.		4.5+								$3.9x10^{-8}$ V	
20	C												
				4.5+									
	C												
				4.5+									
25	C												
				4.5+									
	C	- 5" Bentonite seam at 28.4'.											
				4.5+									

LOG OF BORING WB-3

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/8/2010
Boring End Date: 10/8/2010
Ground Elevation: 453.5 ft-msl
Northing: 7063286.20
Easting: 2444184.70
T.O.C.: 457.12 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 440.7 ft-msl
▼ = Static Water Level: 445.5 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
					4.5+										
	C														
					4.5+										
35	C														
			- High angle mechanical fracture at 36.8'.		4.5+										
	C														
					4.5+										
40	C		Shale, mudstone, continued.												
					4.5+										
45	C														
50															
			- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 51.5', dry, hard, laminated.		4.5+										
	C														
			- Six thin (1/2 to 1") bentonite seams from 53.8 to 59.5'.		4.5+										
55	C														
					4.5+										
	C														
					4.5+										

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-3

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/8/2010 Northing: 7063286.20
Boring End Date: 10/8/2010 Easting: 2444184.70
Ground Elevation: 453.5 ft-msl T.O.C.: 457.12 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 440.7 ft-msl
▼ = Static Water Level: 445.5 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C		- High angle mechanical fractures at 60.0 and 60.5'.												
	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 61.5'. - Three high angle mechanical fractures between 66.3 to 67.0'.		4.5+										
65	C				4.5+										
	C				4.5+										
70	C				4.5+										
	C			380.0	4.5+										
			Total Borehole Depth = 73.5'.												
75															
80															
85															

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-4

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core / Sunbelt

Boring Start Date: 9/20/2010
Boring End Date: 1/4/2012
Ground Elevation: 452.0 ft-msl
Northing: 7062903.00
Easting: 2443003.30

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 51'. Initial total depth = 96' on 9/22/11. Borehole extended from 96' to 111' on 1/3-4/12.

▽ = Water Level at Time of Drilling: 444.0 ft-msl
▼ = Static Water Level: 446.34 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U		Clay, silty, dark brown and medium brown mottled, slightly moist, hard, plastic, thickly bedded, plastic, strong HCL reaction, trace fine and and rootlets.	449.0	4 2										
	U		Sand, silty, brown and dark brown mottled, slightly moist and clayey, clay content increasing with depth, firm to hard, low plasticity, thickly bedded, trace pea gravel, strong HCL reaction, sand is very fine grained.		4 2.75										
5	U			446.0											▼
	U		Clay, sandy, light and dark brown mottled, slightly moist, soft to firm, strong HCL reaction, moderate to high plasticity, trace of silt and iron stains, gradational thickly bedded.	444.0	4.5+ 1.5										▽
	U		Sand, silty, medium to light brown mottled, moist to wet, unconsolidated, no HCL reaction or plasticity, thickly bedded.	442.0	0.5										
10	S		Silt, sandy, medium brown, wet, moderate dilatency, loose, thinly bedded.	441.4 441.0	0	13/23/40									
			Shale, silty, clayey (mudstone), weathered, dark brown gray, slightly moist, hard, high plasticity, laminated, strong HCL reaction, trace fossils and calcite crystals.												
	A		Shale, silty (mudstone), unweathered, dark gray, dry, hard, high plasticity when moistened, laminated, strong HCL reaction, trace fossils and calcite crystals. Drilled with air rotary coring from 15' to 51'.												
15	C				4.5+										
	C				4.5+										
20	C				4.5+										
	C		- Wet shale bedding plane partings bounded by dry mudstone shale intervals from 24' to 28'.		4.5+										
25	C				4.5+										
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 28', dry, hard, laminated.		4.5+										

CAMELOT 2/27/2012 2:09:03 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-4

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core / Sunbelt

Boring Start Date: 9/20/2010 Northing: 7062903.00
Boring End Date: 1/4/2012 Easting: 2443003.30
Ground Elevation: 452.0 ft-msl

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 51'. Initial total depth = 96' on 9/22/11. Borehole extended from 96' to 111' on 1/3-4/12.

▽ = Water Level at Time of Drilling: 444.0 ft-msl
▼ = Static Water Level: 446.34 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
					4.5+										
	C														
					4.5+										
35															
	C														
					4.5+										
	C														
40			Shale, mudstone with claystone laminations, continued.		4.5+										
	C														
			- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 43'.		4.5+										
	C														
45															
					4.5+										
	C														
					4.5+										
	C														
50															
			- Begin mud rotary coring at 51'.		4.5+										
	C														
					4.5+										
55	C														
					4.5+										
	C														
					4.5+										
	C														

CAMELOT 2/27/2012 2:09:03 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-4

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core / Sunbelt

Boring Start Date: 9/20/2010 Northing: 7062903.00
Boring End Date: 1/4/2012 Easting: 2443003.30
Ground Elevation: 452.0 ft-msl

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 51'. Initial total depth = 96' on 9/22/11. Borehole extended from 96' to 111' on 1/3-4/12.

▽ = Water Level at Time of Drilling: 444.0 ft-msl
▼ = Static Water Level: 446.34 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+			15.6	113.1				$2.8x10^{-8}$ V		
	C				4.5+										
65	C				4.5+										
	C				4.5+										
70	C				4.5+										
	C				4.5+										
75	C				4.5+										
	C				4.5+										
80	C		Shale, claystone, continued.		4.5+										
	C		- Shale, dry mudstone with shaley limestone seams (1/8" to 3" thick) beginning at 82'.		4.5+										
85	C				4.5+										
	C				4.5+										
	NR				4.5+										

LOG OF BORING WB-4

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core / Sunbelt

Page 4 of 4

Boring Start Date: 9/20/2010
Boring End Date: 1/4/2012
Ground Elevation: 452.0 ft-msl
Northing: 7062903.00
Easting: 2443003.30

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 51'. Initial total depth = 96' on 9/22/11. Borehole extended from 96' to 111' on 1/3-4/12.

▽ = Water Level at Time of Drilling: 444.0 ft-msl
▼ = Static Water Level: 446.34 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
95	C				4.5+										
100	A		- Shale, mudstone, as before, logged from cuttings.	349.0											
			Sandstone, medium gray, slightly moist, dense, soft, uncemented, no HCl reaction, fine rounded grains, well sorted.	347.0											
105			Shale, clayey, sandy, dark brown gray, slightly moist, firm, high plasticity.	346.5											▽
	S		Sandstone, medium gray, wet, dense, hard, uncemented, no HCl reaction, fine rounded grains, well sorted.		4.0	50/2"//									
110	C			341.0											
			Total Borehole Depth = 111.0'.												
115															

CAMELOT 2/27/2012 2:09:03 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-5

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010 Northing: 7062892.50
Boring End Date: 9/27/2010 Easting: 2443434.50
Ground Elevation: 454.6 ft-msl

Remarks: Begin mud rotary coring at 13'.

▽ = Water Level at Time of Drilling: 443.8 ft-msl
▼ = Static Water Level: 445.3 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U		Shale Fill, clayey, dark gray, moist, hard.												
					2.5										
	U		Clay Fill, sandy, gravelly, tan and dark gray mottled, moist, stiff, varying sand and gravel content.		1.5										
5	U				1										
	U				1										
					1.5										
	U				2										▼
10				443.8		5/7/14									▽
	S		Sand, gravelly, clayey, tan and medium brown, wet, coarsens downward, thickly bedded, very loose to loose, fine sand grains become coarse at bottom of interval, no clay below 11.2 feet.	442.5 442.2		12/18/33									
	S														
			Shale, silty (mudstone), clayey, weathered, dark brown and gray mottled, wet, hard, friable, laminated, calcareous.		4.5+										
15	C		Shale, silty (mudstone), unweathered, dark gray, dry, hard, laminated, calcareous, with trace calcite crystals and fossils. Begin rotary mud coring at 13'.												
					4.5+										
	C														
					4.5+										
20	C														
					4.5+										
	C		- High angle mechanical fracture at 22.3' - Trace wet horizontal shale bedding plane partings bounded by dry mudstone shale intervals from 22.5 to 29.2 feet depth.												
					4.5+										
25	C														
					4.5+										
	C														
					4.5+										

CAMELOT 2/24/2012 3:02:20 PM

LOG OF BORING WB-5

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010　Northing: 7062892.50
Boring End Date: 9/27/2010　Easting: 2443434.50
Ground Elevation: 454.6 ft-msl

Remarks: Begin mud rotary coring at 13'.

▽ = Water Level at Time of Drilling: 443.8 ft-msl
▼ = Static Water Level: 445.3 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 29.8', dry, hard, laminated.												
					4.5+										
	C														
35			- Common thin (<1/8") gypsum laminations at 35 to 40 feet.		4.5+										
	C														
					4.5+										
40			Shale, mudstone with interbedded claystone, continued.												
	C														
					4.5+										
	C														
					4.5+										
45	C		- Trace wet horizontal shale bedding plane partings bounded by dry mudstone and claystone laminated shale intervals from 44.8 to 50.6 feet.												
					4.5+										
	C														
					4.5+										
50	C														
			- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 50.6'.		4.5+										
	C														
					4.5+										
55	C														
					4.5+										
	C														
					4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-5

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010 Northing: 7062892.50
Boring End Date: 9/27/2010 Easting: 2443434.50
Ground Elevation: 454.6 ft-msl

Remarks: Begin mud rotary coring at 13'.

▽ = Water Level at Time of Drilling: 443.8 ft-msl
▼ = Static Water Level: 445.3 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C							17.2	112.6						
					4.5+										
								18.4	114.7						
	C														
					4.5+										
65	C														
			- Shale, mudstone with few very thin gypsum laminations beginning at 66.5', dark gray, dry, hard, laminated.		4.5+										
	C														
					4.5+										
70	C														
					4.5+										
	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 72.5'.	380.6											
			Total Borehole Depth = 74.0'.												
75															
80															
85															

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-6

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/13/2010
Boring End Date: 10/14/2010
Ground Elevation: 456.8 ft-msl
Northing: 7062921.90
Easting: 2443804.00

Remarks: Begin mud rotary coring at 19'.

▽ = Water Level at Time of Drilling: 443.1 ft-msl
▼ = Static Water Level: 447.6 ft-msl

				Field Tests		Laboratory Tests								
Depth (ft)	Samples	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U	Clay Fill, sandy, gravelly, tan and dark gray mottled, moist, soft to hard, sand is fine rounded grain and varies from 15 to 40% content, variable gravel content from 5 to 20% with sizes 1/8 to 3/4 inch.		0										
	U			0										
5	U	- Clay Fill, silty, gravelly, medium brown, moist, hard, plastic at 5'.		4.5+										
	U	- Gravelly Fill at 6.5'. Clay, silty (non-fill), dark yellow orange and dark yellow brown mottled, moist, hard, high plasticity, thickly bedded, trace calcareous nodules and very fine gained sand.		4.5+										
	U		446.8											▼
10	U	Clay, sandy, dark yellow orange and dark yellow brown mottled, moist, stiff, medium to high plasticity, thickly bedded, sand is very fine to fine grained with trace silt.	446.0 445.1	2										
	U	Gravel, clayey, dark yellow brown, moist, firm, poorly sorted, slightly plastic, thickly bedded, gravel has fine to medium, subangular to subrounded grain.	443.1	0										▽
	U	Gravel, sandy, dark yellow brown, wet, loose, non-plastic, very thickly bedded, trace clay, gravel has subangular to subrounded grain.												
15	S				7/20/15									
	S		438.8	0	4/5/45									
	A	Shale, silty (mudstone), weathered, dark brown and gray mottled, moist, hard, friable, laminated, calcareous.	438.7											
20	C	Shale, silty (mudstone), unweathered, dark gray, dry, hard, laminated, calcareous, with trace calcite crystals and fossils. Begin rotary mud coring at 19'.		4.5+										
	C			4.5+										
25	C			4.5+										
	C			4.5+										
		- Loss of 60 gallons drilling mud at 29'. Fractures not apparent in core samples recovered.		4.5+										

CAMELOT 2/24/2012 3:02:20 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-6

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/13/2010
Boring End Date: 10/14/2010
Ground Elevation: 456.8 ft-msl
Northing: 7062921.90
Easting: 2443804.00

Remarks: Begin mud rotary coring at 19'.

▽ = Water Level at Time of Drilling: 443.1 ft-msl
▼ = Static Water Level: 447.6 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
	C				4.5+										
35	C				4.5+										
	C				4.5+										
40	C		Shale, mudstone, continued.		4.5+										
	C				4.5+										
45	C		- Trace wet horizontal shale bedding plane partings bounded by dry mudstone and claystone laminated shale intervals from 44.8 to 50.6 feet. - Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 45', dry, hard, laminated.		4.5+										
	C				4.5+										
50	C				4.5+										
	C				4.5+										
55	C		- Three thin (0.25" to 1.5") bentonite seams from 50.5 to 54.8 feet.		4.5+										
	C				4.5+										
					4.5+										

CAMELOT 2/24/2012 3:02:21 PM

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-6

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/13/2010 Northing: 7062921.90
Boring End Date: 10/14/2010 Easting: 2443804.00
Ground Elevation: 456.8 ft-msl

Remarks: Begin mud rotary coring at 19'.

▽ = Water Level at Time of Drilling: 443.1 ft-msl
▼ = Static Water Level: 447.6 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
			- Some laminated gypsum seams at 61.5 to 63.5 feet.		4.5+										
	C														
			- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 63.5'.		4.5+										
65	C							16.3	112.3						
								16.3	125.8				3.6×10^{-8} V		
					4.5+										
	C														
					4.5+										
70	C														
					4.5+										
	C														
					4.5+										
75	C														
				380.3											
			Total Borehole Depth = 76.5 Feet.												
80															
85															

CAMELOT 2/24/2012 3:02:21 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-7

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010
Boring End Date: 9/23/2010
Ground Elevation: 451.4 ft-msl
Northing: 7062981.60
Easting: 2444184.60

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 64'.

▽ = Water Level at Time of Drilling: 441.4 ft-msl
▼ = Static Water Level: 445.1 ft-msl

Depth (ft)	Samples	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
				Field Tests		Laboratory Tests								
	U	Clay, silty, dark and medium brown mottled, slightly moist to moist, very stiff to firm, plastic, very thickly bedded, trace rootlets and fine to medium subangular gravel.		3										
	U			2.5										
5	U	- No rootlets below 4'.		2.5		44	14.2	121.1	29	12	17			
	U		443.4	1										▼
	U	Sand, gravelly, clayey, dark and medium brown mottled, slightly moist to moist, very stiff to firm, medium plasticity, thick bedded with clay content decreasing with depth, poorly sorted, fine to coarse grained sand, fine to medium grained gravel, both subangular to rounded.	441.4	3 0.5		20	13.1	131.6	40	18	22			▽
10	U	Gravel, sandy, tan and light brown mottled, wet, non-plastic, loose, unbedded, gravel is fine to medium, subangular to angular grain, sand is coarse subangular to subrounded grain, trace clay.	438.4	0		15	13.4		23	15	8	5.0x10⁻⁴ H 4.6x10⁻⁴ V		
	S	Shale, silty (mudstone), clayey, dark gray, moist, weathered, very stiff, plastic, laminated, friable, strong HCL reaction (calcareous), trace of calcite crystals and fossils.	437.9		12/23/30									
	A	Shale, silty (mudstone), dark gray, dry, unweathered, hard, plastic when moistened, laminated, strong HCL reaction (calcareous), trace of calcite crystals and fossils. Begin air rotary coring at 15'.												
15	C			4.5+										
	C	- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 18', dry, hard, laminated.		4.5+										
20	C			4.5+										
	C			4.5+										
25	C			4.5+										
	C			4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-7

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010 Northing: 7062981.60
Boring End Date: 9/23/2010 Easting: 2444184.60
Ground Elevation: 451.4 ft-msl

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 64'.

▽ = Water Level at Time of Drilling: 441.4 ft-msl
▼ = Static Water Level: 445.1 ft-msl

					Field Tests		Laboratory Tests									
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
					4.5+										
	C														
					4.5+										
	C														
35					4.5+										
	C														
					4.5+										
	C														
40			Shale, mudstone with claystone laminations, continued.		4.5+										
	C														
					4.5+										
	C														
45					4.5+										
	C														
					4.5+										
	C														
50					4.5+										
	C														
			- 4 wet shale bedding plane partings bounded by 6" to 1' dry shale intervals from 52.2' to 55.6', trace solution cavities.		4.5+										
	C														
					4.5+										
55	C														
			- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 56'.		4.5+										
	C														
					4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-7

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010 Northing: 7062981.60
Boring End Date: 9/23/2010 Easting: 2444184.60
Ground Elevation: 451.4 ft-msl

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 64'.

▽ = Water Level at Time of Drilling: 441.4 ft-msl
▼ = Static Water Level: 445.1 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
					4.5+										
	C														
			- Begin mud rotary coring at 64'.		4.5+										
65	C														
					4.5+										
	C														
					4.5+										
	C														
70					4.5+										
	C														
					4.5+										
	C														
					4.5+										
75	C														
					4.5+										
	C														
80			Shale, claystone, continued.												
					4.5+										
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 82.5', dry, hard, laminated.												
					4.5+										
85	C														
					4.5+										
	C														
					4.5+										

CAMELOT 2/24/2012 3:02:22 PM

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-7

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010
Boring End Date: 9/23/2010
Ground Elevation: 451.4 ft-msl
Northing: 7062981.60
Easting: 2444184.60

Remarks: Begin air rotary coring at 15'. Switch to mud rotary coring at 64'.

▽ = Water Level at Time of Drilling: 441.4 ft-msl
▼ = Static Water Level: 445.1 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
	C				4.5+										
95	C			355.4											
			Total Borehole Depth = 96.0'.												
100															
105															
110															
115															

CAMELOT 2/24/2012 3:02:22 PM

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-8

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

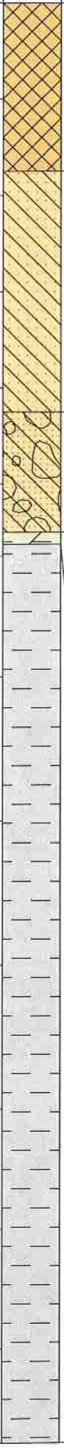
Geologist: BF/AKE
Driller: Strata Core

Page 1 of 4

Boring Start Date: 9/27/2010
Boring End Date: 9/30/2010
Ground Elevation: 453.3 ft-msl
Northing: 7062535.10
Easting: 2443254.40

Remarks: Begin mud rotary coring at 14'.

▽ = Water Level at Time of Drilling: 444.8 ft-msl
▼ = Static Water Level: 448.2 ft-msl



Depth (ft)	Samples	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U	Clay Fill, sandy, dark and medium brown mottled, moist, hard, with trace fine to medium gravel.		4.5+										
	U	Sand, clayey, dark and medium brown mottled, moist, very thickly bedded, firm, trace silt, with few interbedded sandy clay seams (<2" thick).	449.8	4.5+										
5	U			1.5										▼
	U			1.5 1										
	U	Sand, gravelly, clayey, dark brown, wet, unconsolidated to soft seams, low to no plasticity, thickly bedded, fine to coarse sand, 1/4" to 3/4" gravel grain.	444.8	2 1										▽
10	S	Shale, silty (mudstone), weathered, brown gray, moist, stiff, laminated, plastic when moistened.	442.3 442.1	0	12/11/14									
	A	Shale, silty (mudstone), unweathered, dark gray, dry, hard, plastic when moistened, with few limey shale laminations. Begin mud rotary drilling at 14'.												
15	C			4.5+										
	C			4.5+										
20	C			4.5+										
	C	- 6" Bentonite seam at 22.5'.		4.5+										
25	C			4.5+										
	C	- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 28', dry, hard, laminated.		4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-8

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010 Northing: 7062535.10
Boring End Date: 9/30/2010 Easting: 2443254.40
Ground Elevation: 453.3 ft-msl

Remarks: Begin mud rotary coring at 14'.

▽ = Water Level at Time of Drilling: 444.8 ft-msl
▼ = Static Water Level: 448.2 ft-msl

				Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
					4.5+										
	C														
35															
					4.5+										
	C														
40															
			Shale, mudstone with interbedded claystone laminations, continued. - Trace wet shale bedding plane partings bounded by 6" to 1' dry shale intervals from 41' to 43.3'.		4.5+										
	C														
					4.5+										
45	C														
					4.5+										
	C														
					4.5+										
50	C														
					4.5+			12.8	117.9						
55															
								16.8	102.3				$2.9x10^{-8}$ V		
	C														

CAMELOT 2/24/2012 3:02:23 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-8

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010
Boring End Date: 9/30/2010
Ground Elevation: 453.3 ft-msl
Northing: 7062535.10
Easting: 2443254.40

Remarks: Begin mud rotary coring at 14'.

▽ = Water Level at Time of Drilling: 444.8 ft-msl
▼ = Static Water Level: 448.2 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
			- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations, dry, hard, laminated.		4.5+										
	C														
					4.5+										
65	C														
					4.5+										
	C														
					4.5+										
70	C														
					4.5+										
	C														
					4.5+										
75	C														
					4.5+										
	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 77.3'.												
					4.5+										
80	C		Shale, claystone, continued.												
					4.5+										
	C														
85			- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 84.3', dry, hard, laminated.		4.5+										
	C														
					4.5+										
	C														
					4.5+										

CAMELOT 2/24/2012 3:02:23 PM

LOG OF BORING WB-8

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010
Boring End Date: 9/30/2010
Ground Elevation: 453.3 ft-msl
Northing: 7062535.10
Easting: 2443254.40

Remarks: Begin mud rotary coring at 14'.

▽ = Water Level at Time of Drilling: 444.8 ft-msl
▼ = Static Water Level: 448.2 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
					4.5+										
	C														
					4.5+			14.8	117.8						
95	C														
					4.5+										
	C			355.3											
			Total Borehole Depth = 98.0'.												
100															
105															
110															
115															

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-9

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/14/2010 Northing: 7062544.60
Boring End Date: 10/15/2010 Easting: 2443737.50
Ground Elevation: 455.2 ft-msl

Remarks: Begin mud rotary coring at 17.25'.

▽ = Water Level at Time of Drilling: 440.2 ft-msl
▼ = Static Water Level: 443.7 ft-msl

Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U	Clay Fill, silty, dark yellow brown, moist, hard to very stiff, plastic, with few seams of sand and fine gravel.		4.5+										
	U			4										
5	U			4.5+										
	U			4.5+										
	U		445.7	2										
10	U	Clay, silty, dark yellow brown and dark yellow orange mottled, moist, firm, plastic, moderately bedded, with trace of fine grained sand.	445.0	1										▼
	U	Clay, sandy, dark yellow brown and dark yellow orange mottled, moist, very soft to stiff, highly plastic, very thickly bedded, with very fine to fine grained sand.		0.5 0										
15	U	Gravel, sandy, dark yellow orange, wet, loose, non-plastic, with trace of clay from 15' to 16.2'.	440.2	2 0										▽
	S	Shale, silty (mudstone), weathered, dark gray, hard, slightly moist, plastic when moistened, friable, laminated.	438.4 438.3		10/44/50/3"									
20	C	Shale, silty (mudstone), unweathered, dark gray, hard, dry, plastic when moistened, strong HCL reaction (calcareous), laminated. Begin mud rotary coring at 17.25'. - High angle mechanical fracture at 19.8'.		4.5+										
	C			4.5+										
25	C			4.5+										
	C	- 1" bentonite seam at 26.5'.		4.5+										
	C	- High angle mechanical fracture at 27.75'. - Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 77.3'.		4.5+										

CAMELOT 2/24/2012 3:02:23 PM

LOG OF BORING WB-9

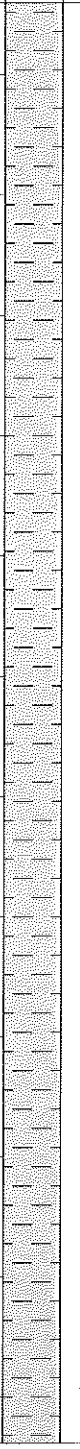
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/14/2010
Boring End Date: 10/15/2010
Ground Elevation: 455.2 ft-msl
Northing: 7062544.60
Easting: 2443737.50

Remarks: Begin mud rotary coring at 17.25'.

▽ = Water Level at Time of Drilling: 440.2 ft-msl
▼ = Static Water Level: 443.7 ft-msl



					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	NR				4.5+										
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 32', dry, hard, laminated.		4.5+										
					4.5+										
35	C														
			- Few gypsum laminations below 36'.		4.5+										
	C				4.5+										
40	C		Shale, mudstone with claystone laminations, continued.												
					4.5+										
	C														
					4.5+										
45	C														
					4.5+										
	C														
			- 1.5" bentonite seam at 48.5'.		4.5+										
50	C		- Low angle mechanical fracture at 50'.												
					4.5+										
	C		- Many mechanical core fractures from 52.5' to 54'.												
					4.5+										
55	C														
					4.5+										
	C														
			- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 58.2'.		4.5+										

CAMELOT 2/24/2012 3:02:23 PM

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-9

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/14/2010
Boring End Date: 10/15/2010
Ground Elevation: 455.2 ft-msl
Northing: 7062544.60
Easting: 2443737.50

Remarks: Begin mud rotary coring at 17.25'.

▽ = Water Level at Time of Drilling: 440.2 ft-msl
▼ = Static Water Level: 443.7 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C							17.9	111.2				2.3×10^{-8} V		
					4.5+										
	C														
					4.5+										
65	C														
					4.5+										
	C														
70					4.5+										
	C														
					4.5+			15.9	116.3						
	C														
75				379.7											
			Total Borehole Depth = 75.5'.												
80															
85															

CAMELOT 2/24/2012 3:02:24 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-10

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 1 of 4

Boring Start Date: 9/27/2010
Boring End Date: 10/6/2010
Ground Elevation: 453.3 ft-msl
Northing: 7062549.00
Easting: 2444236.40

Remarks: Begin air rotary coring at 16'. Switch to mud rotary coring at 24'.

▽ = Water Level at Time of Drilling: 444.3 ft-msl
▼ = Static Water Level: 448.4 ft-msl

Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U	Clay, silty, dark and medium brown mottled, moist, massive bedded, plastic, firm to hard, trace rootlets, calcareous.		1.5										
				2.5										
	U			4.5+										
				4.5+		72	18	115.9	48	18	30	$9.4\text{x}10^{-8}$ H		
5	U			4.5+										▼
			447.3											
		Sand, clayey, moist, massive bedded, plastic, firm to hard, sand is medium grained with trace of silt.		4.5+										
	U			2		35	13.3	124.1	29	13	16	$1.3\text{x}10^{-7}$ H		
				2										
			444.3											▽
	U	Clay, gravelly, sandy, tan and dark brown, wet, plastic, gradational sand content increase to sand interval below.	443.5	1.5										
10		Sand, gravelly, clayey, tan, wet, non-plastic, sand and gravel poorly sorted and fine to coarse grained. Clay content 5-15%.			6/9/13									
	S					11	9.9		18	14	4			
			441.3		16/20/16									
	S	Gravel, sandy, tan, wet, unconsolidated, non-plastic, fine to coarse grained sand, fine to 3/4" gravel, sand and gravel grains angular to rounded, with trace of silt.												
					16/37/36	11	12		15	11	4			
	S		439.3											
		Shale, clayey, weathered, brown, moist, hard, plastic when moistened.	439.1											
15	A	Shale, silty, (mudstone), unweathered, dark gray, dry, hard, plastic when moistened, laminated. Begin air rotary coring at 16'.												
				4.5+										
	C													
				4.5+										
20	C													
	NR													
		- Begin mud rotary coring at 24'.		4.5+										
25	C													
				4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-10

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010
Boring End Date: 10/6/2010
Ground Elevation: 453.3 ft-msl
Northing: 7062549.00
Easting: 2444236.40

Remarks: Begin air rotary coring at 16'. Switch to mud rotary coring at 24'.

▽ = Water Level at Time of Drilling: 444.3 ft-msl
▼ = Static Water Level: 448.4 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 32.5', dry, hard, laminated.		4.5+										
35	C				4.5+										
	C				4.5+										
40	C		Shale, mudstone with claystone laminations, continued.		4.5+										
	C				4.5+										
45	C				4.5+			17	97.1				$3.2\text{x}10^{-8}$ H		
	C				4.5+										
50	C				4.5+										
	C				4.5+										
55	C		- Trace wet shale bedding plane partings bounded by moderately to thickly bedded dry shale intervals from 55' to 59'.		4.5+										
	C				4.5+										

CAMELOT 2/24/2012 3:02:13 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-10

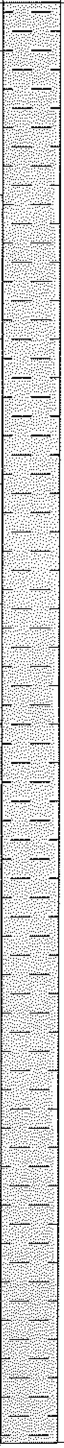
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010
Boring End Date: 10/6/2010
Ground Elevation: 453.3 ft-msl
Northing: 7062549.00
Easting: 2444236.40

Remarks: Begin air rotary coring at 16'. Switch to mud rotary coring at 24'.

▽ = Water Level at Time of Drilling: 444.3 ft-msl
▼ = Static Water Level: 448.4 ft-msl



Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 60.5'.		4.5+										
	C													
				4.5+										
65	C													
				4.5+										
	C													
		- 6" moderately bedded mudstone shale seam at 69'.												
70				4.5+										
	C													
				4.5+										
		- 6" moderately bedded mudstone shale seam at 73'.												
	C													
75		- Few gypsum laminations (<1/8") from 75' to 80'. - 1" limestone seam at 75.2'.		4.5+										
	C													
				4.5+										
80	C	Shale, claystone, continued.												
				4.5+										
							17.9	107.5						
	C													
85				4.5+										
	C													
				4.5+										
	C													

CAMELOT 2/24/2012 3:02:13 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-10

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/27/2010 Northing: 7062549.00
Boring End Date: 10/6/2010 Easting: 2444236.40
Ground Elevation: 453.3 ft-msl

Remarks: Begin air rotary coring at 16'. Switch to mud rotary coring at 24'.

▽ = Water Level at Time of Drilling: 444.3 ft-msl
▼ = Static Water Level: 448.4 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
	C				4.5+										
95			- High angle mechanical fracture at 94.5'.												
	C			354.3	4.5+										
100			Total Borehole Depth = 99.0'.												
105															
110															
115															

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-11

Project Title: Camelot Landfill Expansion

Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 1 of 3

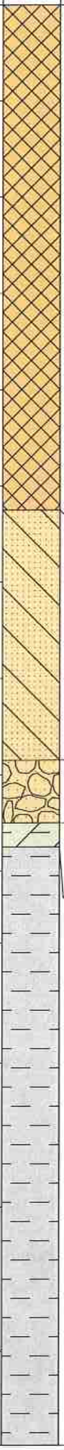
Boring Start Date:	10/12/2010	Northing:	7062164.80
Boring End Date:	10/13/2010	Easting:	2443693.10
Ground Elevation:	456.8 ft-msl	T.O.C.:	459.79 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

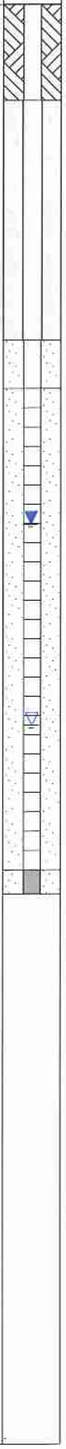
▽ = Water Level at Time of Drilling: 441.8 ft-msl
▼ = Static Water Level: 443.0 ft-msl

Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)
		Shale Fill, dark gray, dry, slighly plastic, hard.		4.5+									
	U												
													454.8
				4.5									
	U												
				4									
5	U	- Fill is clayey sand (5'-6'), reddish brown, dry, slightly plastic.											
		- Fill is shale (6'-9.5'), dark gray, dry, slighly plastic, stiff.		2									
													449.8
	U												
													448.8
				2.5									
	U			1									
10		- Fill is mostly sand with shale mixture (9.5'-10.5'), medium brown and dark gray, dry, soft, with few gravel.	446.3	0.5									
	U	Sand, clayey, dark yellow brown, slightly moist to moist, becomes wet at 15', stiff to very soft with depth, low plasticity, very thickly bedded, sand content increases with depth, sand is fine, subrounded grains.											
				1									
	U	- Thickly bedded silty clay seam from 13' to 14.5'.											
				0.5									
15	U		441.1										
		Gravel, sandy, dark brown, wet, loose, poorly sorted, non-plastic, fine to coarse grained sand and gravel.	439.8	1									
	U	Shale, silty (mudstone), weathered, brownish gray, slighly moist, hard, laminated, friable, with trace fossils and calcite crystals.	439.3	0.5									
					18/25/44								438.8
													438.3
	S	Shale, silty (mudstone), unweathered, dark gray, dry, hard, laminated, with trace fossils. Begin mud rotary coring at 22'.											
20													
	NR												
				4.5+									
	C												
25				4.5+									
	C												
				4.5+									
	C												

Graphic Log



Well Detail



CAMELOT 2/24/2012 3:02:14 PM

LOG OF BORING WB-11

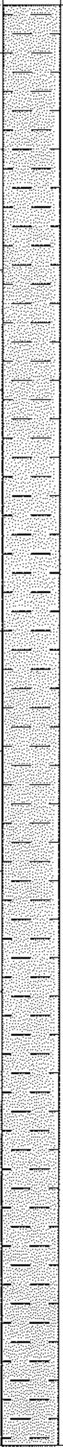
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/12/2010
Boring End Date: 10/13/2010
Ground Elevation: 456.8 ft-msl
Northing: 7062164.80
Easting: 2443693.10
T.O.C.: 459.79 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 441.8 ft-msl
▼ = Static Water Level: 443.0 ft-msl



					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C		- Lost all drilling mud between 30.5' - 32', fractures not apparent in core recovered.		4.5+										
35	C		- Few gypsum filled laminations (1/16" thick) from 34' to 37'.		4.5+										
	C				4.5+										
40	C				4.5+										
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 40', dry, hard, laminated.		4.5+										
45	C		- 1" Bentonite seam at 44'.		4.5+										
	C				4.5+										
50	C				4.5+										
	C				4.5+										
55	C				4.5+										
	C				4.5+										
	C				4.5+			13.6	125.5				$3.7x10^{-8}$ V		

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-11

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 10/12/2010
Boring End Date: 10/13/2010
Ground Elevation: 456.8 ft-msl
Northing: 7062164.80
Easting: 2443693.10
T.O.C.: 459.79 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 441.8 ft-msl
▼ = Static Water Level: 443.0 ft-msl

Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
		- Common 1/16" thick gypsum seams from 60' to 60.5'. - Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 60.5'.					20.3	104.5						
	C			4.5+										
	C			4.5+										
65							16.6	119.8						
	C			4.5+										
	C			4.5+										
70														
	C			4.5+										
	C			4.5+										
75	C		379.8											
		Total Borehole Depth = 77.0'.												
80														
85														

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-12

Project Title: Camelot Landfill Expansion

Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE

Driller: Strata Core

Boring Start Date: 9/20/2010 Northing: 7062174.00

Boring End Date: 10/5/2010 Easting: 2444249.90

Ground Elevation: 458.3 ft-msl

Remarks: Begin air rotary coring at 22'. Switch to mud rotary coring at 32'.

▽ = Water Level at Time of Drilling: 440.3 ft-msl

▼ = Static Water Level: 445.6 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	U		Clay Fill, gravelly, dark and medium brown mottled, slightly moist, hard to stiff with depth, plastic, with trace fine sand and gravel content decreasing with depth.		4.5+										
	U				4.5										
5	U				4										
	U				2										
	U			449.3	2.5										
			Clay, sandy, dark and medium brown mottled, moist, firm, plastic, very thickly bedded, sand is fine to very fine grained and content decreasing with depth.		1										
10	U				0.5										
	U				1										▼
15	U				0.5										
	U			440.3	1 0.5										▽
	S		Sand, gravelly, light brown and reddish brown, wet, loose, non-plastic, wery thinly bedded, with few clayish seams and trace rounded shale clasts.	439.8 439.3		18/25/44									
20	NR		Shale, silty (mudstone), weathered, brown and dark gray mottled, moist, very stiff, friable, plastic when moistened, laminated, strong HCL reaction.												
	C		Shale, silty (mudstone), unweathered, dark gray, moist, hard, plastic when moistened, laminated, strong HCL reaction. Begin air rotary coring at 22'. - Two wet shale bedding plane partings bounded by dry mudstone shale intervals from 23.5' to 24'.		4.5+										
25	C				4.5+										
					4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-12

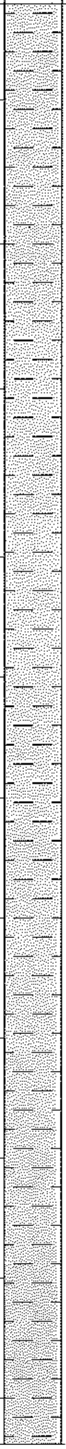
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010
Boring End Date: 10/5/2010
Ground Elevation: 458.3 ft-msl
Northing: 7062174.00
Easting: 2444249.90

Remarks: Begin air rotary coring at 22'. Switch to mud rotary coring at 32'.

∇ = Water Level at Time of Drilling: 440.3 ft-msl
▼ = Static Water Level: 445.6 ft-msl



Depth (ft)	Samples	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C	- 5" bentonite seam at 30.5'.												
		- Begin mud rotary coring on 10/4/10 at 32'.		4.5+										
	C													
35				4.5+										
	C	- 2" bentonite seam at 36.3'.												
				4.5+										
40	C	Shale, mudstone, continued.												
				4.5+										
	C													
				4.5+										
45	C													
				4.5+										
	C													
		- 1" bentonite seam at 48.2'.		4.5+										
50	C													
				4.5+										
	C													
				4.5+										
55	C	- 1" bentonite seam at 54.9'.												
				4.5+										
	C													
				4.5+			12.9	99.1						

CAMELOT 2/24/2012 3:02:15 PM

LOG OF BORING WB-12

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010
Boring End Date: 10/5/2010
Ground Elevation: 458.3 ft-msl
Northing: 7062174.00
Easting: 2444249.90

Remarks: Begin air rotary coring at 22'. Switch to mud rotary coring at 32'.

▽ = Water Level at Time of Drilling: 440.3 ft-msl
▼ = Static Water Level: 445.6 ft-msl

				Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 60', dry, hard, laminated.					20.2	95.7				$2.5x10^{-8}$ V		
	C		- Trace wet, clayey shale bedding plane partings at 62' to 63.3' bounded by moderately to thickly bedded dry shale.		4.5+										
65	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 64.8'.		4.5+										
	C				4.5+										
70	C				4.5+										
	C				4.5+										
75	C				4.5+										
	C				4.5+										
80	C		Shale, claystone, continued.		4.5+										
	C				4.5+										
85	C				4.5+										
	C				4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-12

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/20/2010
Boring End Date: 10/5/2010
Ground Elevation: 458.3 ft-msl
Northing: 7062174.00
Easting: 2444249.90

Remarks: Begin air rotary coring at 22'. Switch to mud rotary coring at 32'.

▽ = Water Level at Time of Drilling: 440.3 ft-msl
▼ = Static Water Level: 445.6 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C	▨			4.5+										
95	C	▨			4.5+										
	C	▨			4.5+										
100	C	▨			4.5+										
	C	▨		355.3	4.5+										
			Total Borehole Depth = 103.0'.												
105															
110															
115															

CAMELOT 2/24/2012 3:02:15 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-13

Project Title: Camelot Landfill Expansion

Project No: 1339-351-11-2-6B.7

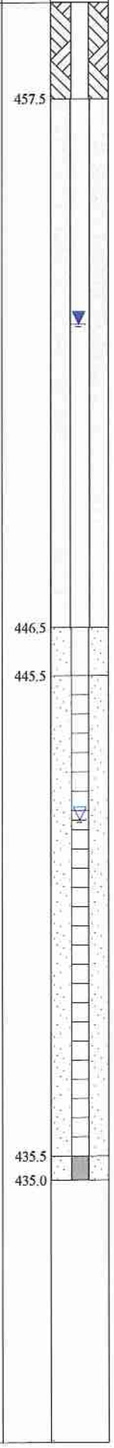
Geologist: BF/AKE
Driller: Strata Core

Page 1 of 3

Boring Start Date: 10/12/2010
Boring End Date: 10/13/2010
Ground Elevation: 459.5 ft-msl
Northing: 7062176.50
Easting: 2444708.90
T.O.C.: 462.52 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 442.5 ft-msl
▼ = Static Water Level: 449.8 ft-msl



Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)
	U	Clay, silty, medium brown, slightly moist, hard to very stiff, plastic, very thickly bedded, with few medium rounded gravel and trace fine sand.		4.5+								
	U			4.5+								
5	U			3		93	27.6	97.7	68	25	43	
	U		452.5	1.5								
	U	Clay, sandy, dark brown and reddish brown mottled, moist, stiff, plastic, thickly bedded.	450.0	1.5								
10	S	Sand, clayey, dark brown, moist, firm to stiff, plastic, massively bedded, sand is fine grained and content increases with depth.		0.5	4/5/6							
	NR											
	U			1.5								
15	U			2			25.8	96.4				
				1								
	U			1.5								
		- Clayey sand is loose and very moist at 18'.	440.5	1								5.7x10^{-8} H
20	U	Clay, sandy, dark brown and reddish brown mottled, wet, stiff, plastic, thickly bedded.	438.5	0.5		73	27.1	99.5	50	17	33	8.1x10^{-8} V
	S	CLAY, gravelly, dark yellow brown, wet, stiff, thickly bedded, medium plasticity.	436.5		3/4/4	64	23.9	103.6	47	19	28	
	S	Shale, silty (mudstone), weathered, dark brown gray, slightly moist and clayey, hard, friable, plastic when moistened, laminated.	436.0		6/28/50/4"	56			54	19	35	
25	C	Shale, silty (mudstone), unweathered, dark gray, dry, hard, plastic when moistened, laminated. Begin rotary mud coring at 24'.		4.5+								
	C			4.5+								

CAMELOT 2/24/2012 3:02:16 PM

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-13

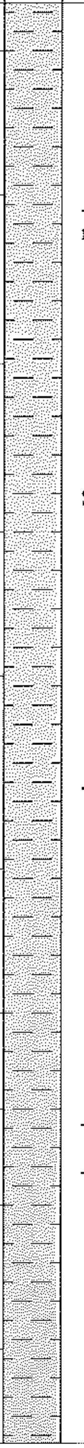
Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date:	10/12/2010	Northing:	7062176.50
Boring End Date:	10/13/2010	Easting:	2444708.90
Ground Elevation:	459.5 ft-msl	T.O.C.:	462.52 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

▽ = Water Level at Time of Drilling: 442.5 ft-msl
▼ = Static Water Level: 449.8 ft-msl



Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
35	C		- Few rounded solution cavities (<1/8" each) in dry mudstone from 34' to 51'.		4.5+										
40	C		Shale, mudstone, continued.		4.5+										
	C				4.5+										
45	C		- 6" bentonite seam at 46'.		4.5+										
50	C				4.5+										
	C				4.5+										
	C		- 2" bentonite seam at 53'. - Trace gypsum laminations at 54' to 59'.		4.5+										
55	C				4.5+										
	C				4.5+										

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-13

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 3 of 3

Boring Start Date: 10/12/2010
Boring End Date: 10/13/2010
Ground Elevation: 459.5 ft-msl
Northing: 7062176.50
Easting: 2444708.90
T.O.C.: 462.52 ft-msl

Remarks: 2.0 inch i.d. PVC piezometer set with 0.010" slotted, ten foot length screen interval and 20/40 mesh washed silica filter pack.

∇ = Water Level at Time of Drilling: 442.5 ft-msl
▼ = Static Water Level: 449.8 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
65	C				4.5+										
	C				4.5+										
70	C				4.5+										
	C		- Some gypsum and limestone laminations from 73' to 74'.		4.5+										
75	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 74'.		4.5+										
	C		Total Borehole Depth = 80.0'.	379.5	4.5+										
80															
85															

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-14

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/24/2010
Boring End Date: 10/4/2010
Ground Elevation: 455.1 ft-msl
Northing: 7061817.00
Easting: 2444098.00

Remarks:

▽ = Water Level at Time of Drilling: 444.1 ft-msl
▼ = Static Water Level: 439.2 ft-msl

Depth (ft)	Samples	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
		Shale Fill, silty, dark brown, dry, slightly plastic, soft, friable.												
	NR													
				0										
5	U		449.1											
		Clay Fill, silty, dark brown and tan mottled, moist, soft, plastic, with trace sandy clay zones.		1										
	U		447.1				17.8	108.7				5.5×10^{-8} V		
		Clay, silty, dark brown and tan mottled, non-fill, moist, firm, plastic, thickly bedded.		2										
	U													
10			444.1	1		91	33.3	97.0	55	21	34	5.4×10^{-8} V		▽
	U	CLAY, gravelly, tan and dark brown mottled, moist, soft, plastic, thickly bedded, with little fine grained sand and gravel grain 1/4" to 3/4".		1										
	U		441.4			84	29.7	94.2	56	20	36	4.5×10^{-8} V		
		Shale, clayey, weathered, brown gray, moist, stiff, plastic, laminated, core with mechanic fractures.	441.1											
15	NR	Shale, silty (mudstone), unweathered, dark gray, dry, hard, plastic when moistened, laminated. Begin air rotary coring at 16'. - Begin rotary air coring at 16'.												▼
				4.5+										
	C													
				4.5+										
	C													
20				4.5+										
	C													
				4.5+										
	C													
				4.5+		47	21.4	112.0	31	13	18	8.5×10^{-7} H		
25	C													
		- Begin mud rotary coring at 26'.		4.5+										
	C													
				4.5+										

CAMELOT 2/24/2012 3:02:17 PM

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-14

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/24/2010
Boring End Date: 10/4/2010
Ground Elevation: 455.1 ft-msl
Northing: 7061817.00
Easting: 2444098.00

Remarks:

▽ = Water Level at Time of Drilling: 444.1 ft-msl
▼ = Static Water Level: 439.2 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C														
			- 3" bentonite seam at 31'.		4.5+										
	C				4.5+										
35	C														
			- 3" bentonite seam at 36.1'.		4.5+										
	C		- Lost drilling mud into 12" fracture zone at 38'.		4.5+										
40			Shale, mudstone, continued.												
	C				4.5+										
	C				4.5+										
45	C				4.5+										
	C				4.5+										
50	C				4.5+										
	C														
55					4.5+										
	C				4.5+										
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations beginning at 58.1', dry, hard, laminated.												

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-14

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date: 9/24/2010
Boring End Date: 10/4/2010
Ground Elevation: 455.1 ft-msl
Northing: 7061817.00
Easting: 2444098.00

Remarks:

▽ = Water Level at Time of Drilling: 444.1 ft-msl
▼ = Static Water Level: 439.2 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Laboratory Tests Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C				4.5+										
65	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 62'.		4.5+										
	C				4.5+										
70	C				4.5+										
	C				4.5+										
75	C				4.5+										
	C		- Shale, mostly laminated dark gray dry shale (mudstone) with varying frequencies of medium gray dry claystone laminations from 76.5' to 87', dry, hard, laminated.		4.5+										
80	C		Shale, mudstone with claystone laminations, continued.		4.5+										
	C				4.5+										
85	C				4.5+										
	C		- Shale, claystone, dark gray, dry, plastic, hard, massively bedded, weak HCL reaction, trace to no silt, beginning at 87'.		4.5+										
					4.5+										

LOG OF BORING WB-14

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Boring Start Date:	9/24/2010	Northing:	7061817.00
Boring End Date:	10/4/2010	Easting:	2444098.00
Ground Elevation:	455.1 ft-msl		

Remarks:

▽ = Water Level at Time of Drilling: 444.1 ft-msl
▼ = Static Water Level: 439.2 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests Hand Penetrometer Test (tsf)	Field Tests Penetration (Blow Count Per 6" or as noted)	Laboratory Tests Percent Passing No. 200	Laboratory Tests Percent Moisture Content	Laboratory Tests Unit Dry Weight (pcf)	Laboratory Tests Liquid Limit	Laboratory Tests Plastic Limit	Laboratory Tests Plasticity Index	Laboratory Tests Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	C	▨													
	C	▨			4.5+										
95	C	▨			4.5+										
	C	▨			4.5+										
100				355.1											
			Total Borehole Depth = 100.5'.												
105															
110															
115															

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

LOG OF BORING WB-15

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 1 of 2

Boring Start Date: 10/13/2010 Northing: 7060184.30
Boring End Date: 10/13/2010 Easting: 2442224.20
Ground Elevation: 461.3 ft-msl

Remarks: Additional geotechnical boring advanced using shelby tubes to top of shale for levee strength testing. Borehole neat cement grouted upon completion.

▽ = Water Level at Time of Drilling: 435.3 ft-msl
▼ = Static Water Level:

Graphic Log

				Field Tests		Laboratory Tests								
Depth (ft)	Samples	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
		Clay Fill, silty, dark reddish brown and dark gray mottled, moist, hard, with trace to few sand and gravel.		4.5+										
	U													
			458.3	4.5+										
	U	Shale Fill, silty, clayey, dark gray, moist, hard to stiff, plastic, with traces of sand and gravel.												
				4.5+										
5	U													
				3										
	U													
				1.5										
	U			3										
10				2			27.1	95.3						
	U			2.5										
				2.5										
	U			4.5+										
				4.5+		91	25.1	97.4	70	23	47			
15	U			4.5+										
				4.5+										
	U			4										
			442.3	3.5										
	U	Clay, silty (non-fill), dark yellow brown and moderate yellow brown mottled, moist, stiff, plastic, thickly bedded, traces of rootlets, few calcareous nodules, trace fine sand with iron stains.		3.5										
20		- Sand content increasing with depth.	440.3	1.5										
	U	Clay, sandy, dark yellow brown and moderate yellow brown mottled, moist, stiff, low plasticity, very thickly bedded, sand is fine to very fine grained with trace of silt.		1.5										
				1.5										
	U			1.5										
			436.8	1.5		47	21.4	112.0	31	13	18	$8.5x10^{-7}$ H		
25	U	Sand, clayey, dark yellow brown and moderate yellow brown mottled, moist, stiff, slightly plastic to non-plastic, very thickly bedded, sand is fine to very fine grained with trace of silt.	435.3											▽
	S	Sand, dark yellow brown, wet, loose, non-plastic, moderately bedded, with trace fine gravel and clay.	434.3		8/14/13									
		Gravel, sandy, dark yellow brown, wet, loose, non-plastic, moderately bedded.	433.3		10/15/23									
	S	Shale, silty, clayey (highly weathered), dark gray, dry, stiff, laminated, high plasticity, calcareous.	432.3											

CAMELOT 2/24/2012 3:02:17 PM

WEAVER BOOS CONSULTANTS LLC SOUTHWEST

LOG OF BORING WB-16

Project Title: Camelot Landfill Expansion
Project No: 1339-351-11-2-6B.7

Geologist: BF/AKE
Driller: Strata Core

Page 1 of 1

Boring Start Date: 10/13/2010 Northing: 7060508.10
Boring End Date: 10/13/2010 Easting: 2444848.80
Ground Elevation: 454.3 ft-msl

Remarks: Additional geotechnical boring advanced using shelby tubes to top of shale for levee strength testing. Borehole neat cement grouted upon completion.

▽ = Water Level at Time of Drilling: 434.3 ft-msl
▼ = Static Water Level:

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
			Clay Fill, sandy, gravelly, dark yellow brown and dark gray mottled, moist, hard, high plasticity.		4.5+										
	U				4.5+										
					4.5+										
	U				4.5+										
					4.5+		88	19.4	112.2	67	21	46			
5	U			448.3	4.5+										
			Clay, silty, dark yellow brown, moist, very stiff to stiff with depth, high plasticity, very thickly bedded, with trace very fine grained sand and calcareous nodules.		3.0										
	U				3.0										
					3.5			27.5	96.1						
	U				3.5										
10					2.0										
	U				2.0		87	27.7	98.2	60	22	38			
					2.0										
	U			440.3	2.0										
			Clay, sandy, dark yellow brown and moderate yellow brown mottled, moist, very stiff to very soft, high plasticity, thickly bedded, with traces of silt and calcareous nodules. Sand is very fine to fined grained with sand content increasing with depth.		1.0										
15	U				3.0										
				437.3	2.0										
	U		Sand, clayey, dark yellow brown and moderate yellow brown mottled, moist, soft to loose to soft, low plasticity to non-plastic, thickly bedded, with traces of silt and calcareous nodules, clay content decreases with depth.		0										
					0										
	U			434.3	0										
20	S		Sand, dark yellow brown, wet, very loose to loose, non-plastic, thickly bedded, trace of gravel (<1" each). Sand is fine to coarse grained.			5/8/21									▽
				432.3		18/24/37									
	S		Gravel, sandy, dark yellow brown, wet, non-plastic, loose, poorly sorted with fine to coarse grained sand and gravel, moderately bedded.	431.4 431.3											
			Shale, silty, clayey, weathered (mudstone), dark brown, moist, laminated, friable.												
			Total Borehole Depth = 23.0'.												
25															

CAMELOT 2/24/2012 3:02:18 PM

APPENDIX IIIG-C

SITE GEOLOGIC DATA

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CONTENTS

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

0 300 600
SCALE IN FEET

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

LEGEND

— — —	PERMIT BOUNDARY
- - - - - -	AUTHORIZED LIMITS OF WASTE
— — — —	PROPOSED LIMITS OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
⁀	EXISTING ROAD
- - 500 - -	EXISTING TOPOGRAPHIC CONTOUR
—394—	PROPOSED EXCAVATION
— ◄ —	PROPOSED LEACHATE COLLECTION PIPE
⊡	PROPOSED LEACHATE COLLECTION SUMP
▨	PROPOSED DEEPER EXCAVATION AREA WITHIN AUTHORIZED DISPOSAL AREA
▨	PROPOSED WASTE FOOTPRINT LATERAL EXPANSION AREA
A ——— A'	GEOLOGIC CROSS SECTION LOCATION
MW-3R (456.9)	EXISTING MONITORING WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
MW-10 (464.3)	OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
FORMER MW-7	FORMER MONITORING WELL LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
B-22 (454.0)	RONE 1980 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
TC-1 (460.0)	REED ENGINEERING 1994 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL.
WB-5 **(454)**	WBC BORING AT LEAST 5 FEET BELOW EDE WITH SURFACE ELEVATION POSTED IN FT-MSL
WB-2 **(460)**	WBC BORING AT LEAST 30 FEET BELOW EDE WITH SURFACE ELEVATION POSTED IN FT-MSL
WB-1 **(464)**	WBC BORING AT LEAST 5 FEET BELOW EDE WITH PIEZOMETER INSTALLED AND SURFACE ELEVATION POSTED IN FT-MSL
WB-15 **(460)**	WBC GEOTECHNICAL BORING FOR STRENGTH TESTING WITH SURFACE ELEVATION POSTED IN FT-MSL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-C-1 SECTION LOCS.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT GEOLOGIC CROSS SECTION LOCATION MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F-3727

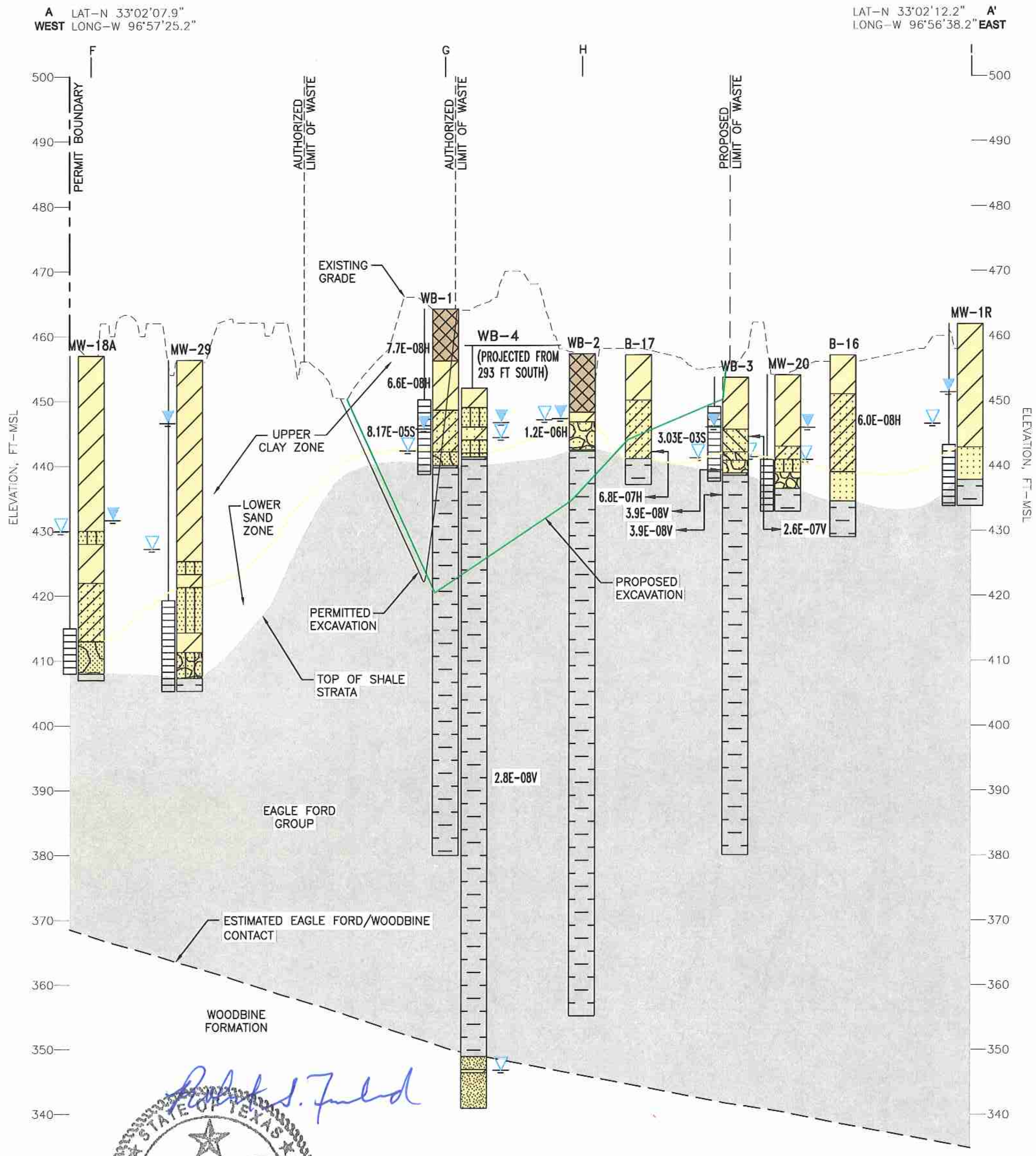
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-C-1

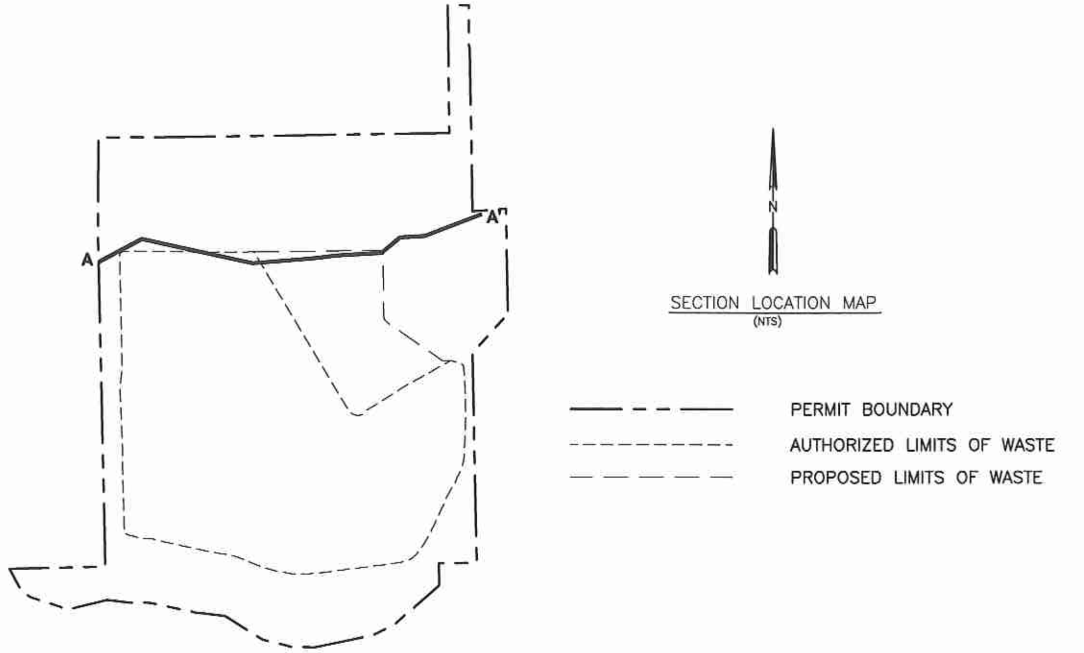
O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-1 CROSS SEC LOC.dwg, 2/21/2012 3:42:45 PM, rsellers



0 300 600
SCALE IN FEET
HORIZONTAL

0 10 20
SCALE IN FEET
VERTICAL

ROBERT S. FERBEND
GEOLOGY
713
Robert S. Ferbend
2-27-12



BORING LEGEND

ALLUVIAL STRATA
- UPPER CLAY ZONE
  - ▨ CLAY AND SILTY CLAY
  - ▨ SANDY CLAY
- LOWER SAND ZONE
  - ▨ SAND
  - ▨ CLAYEY SAND
  - ▨ SILTY SAND
  - ▨ GRAVELLY SAND
  - ▨ GRAVEL

ALLUVIAL STRATA
- LOWER SAND ZONE
  - ▨ SANDY GRAVEL
  - ▨ SILTY SANDY GRAVEL
  - ▨ CLAYEY SANDY GRAVEL
  - ▨ CLAYEY GRAVEL

- ▨ EARTHEN FILL

SHALE STRATA
- ▨ WEATHERED SHALE
- ▨ UNWEATHERED SHALE

WOODBINE STRATA
- ▨ WEATHERED SHALE
- ▨ SANDSTONE

▯ MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)

▼ STATIC GROUNDWATER ELEVATION (FT–MSL) FROM GROUNDWATER MONITORING GAUGING DATA

▽ GROUNDWATER ELEVATION AT TIME OF DRILLING (FT–MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG–C–1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E–04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E–04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E–04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–C–2 SECTION A–A'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS–SECTION A–A'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

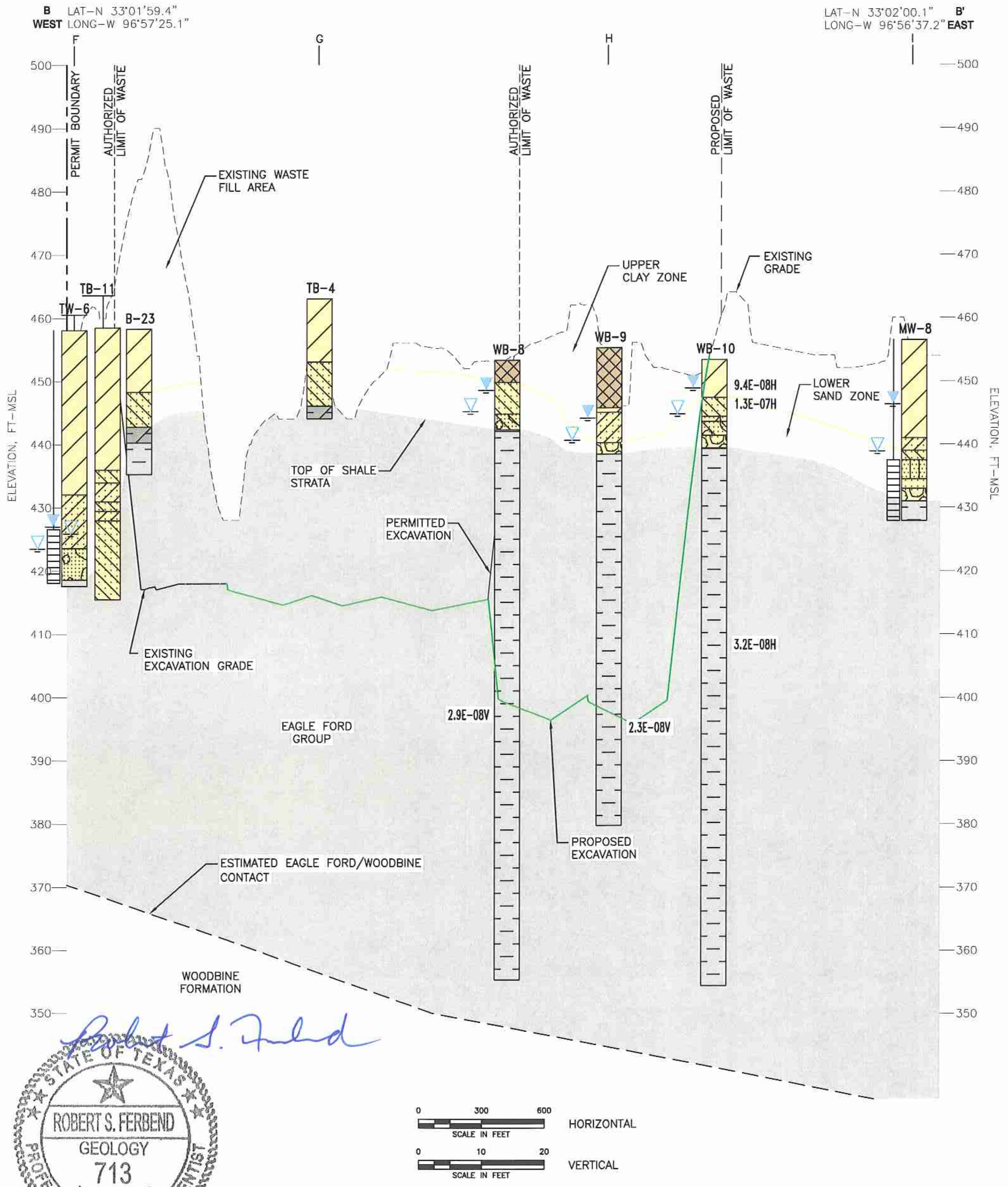
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–C–2

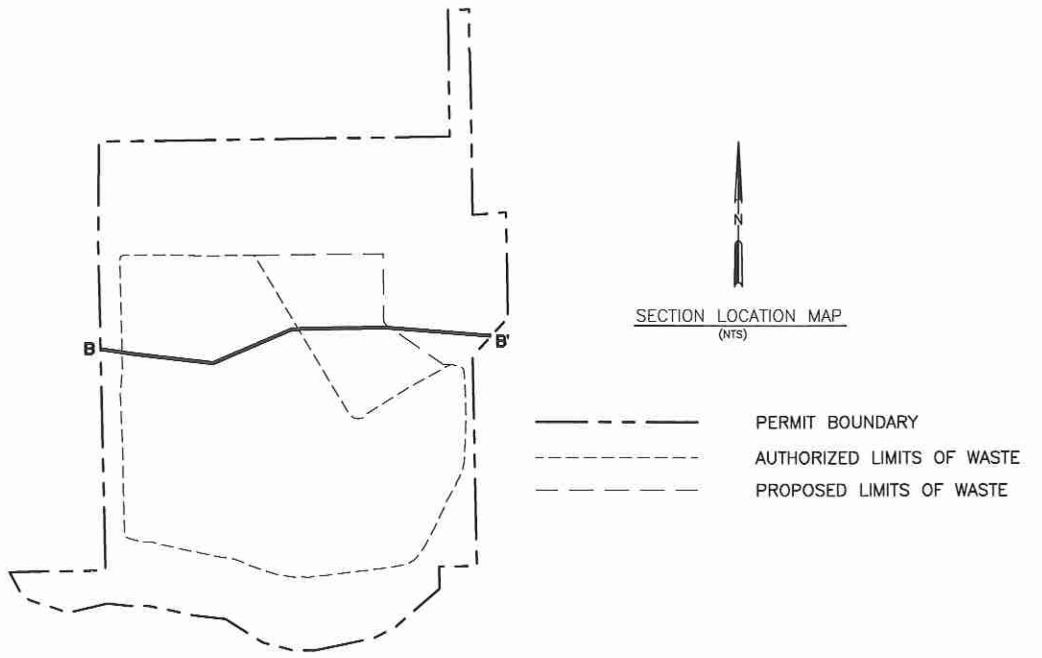
O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-2_C-10 CROSS SECTIONS.dwg, 2/24/2012 12:33:44 PM, rsellers



Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12



PERMIT BOUNDARY
AUTHORIZED LIMITS OF WASTE
PROPOSED LIMITS OF WASTE

BORING LEGEND

ALLUVIAL STRATA
- UPPER CLAY ZONE
  - ▨ CLAY AND SILTY CLAY
  - ▨ SANDY CLAY
- LOWER SAND ZONE
  - ▨ SAND
  - ▨ CLAYEY SAND
  - ▨ SILTY SAND
  - ▨ SANDY GRAVEL

ALLUVIAL STRATA
- LOWER SAND ZONE
  - ▨ GRAVELLY SANDY CLAY
  - ▨ GRAVELLY SAND

▨ EARTHEN FILL

SHALE STRATA
- ▨ WEATHERED SHALE
- ▨ UNWEATHERED SHALE

MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)

▼ STATIC GROUNDWATER ELEVATION (FT–MSL) FROM GROUNDWATER MONITORING GAUGING DATA

▽ GROUNDWATER ELEVATION AT TIME OF DRILLING (FT–MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG–C–1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E–04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E–04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E–04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

PREPARED FOR

CITY OF FARMERS BRANCH

MAJOR PERMIT AMENDMENT GEOLOGIC CROSS–SECTION B–B'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–C–3 SECTION B–B'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REVISIONS

NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

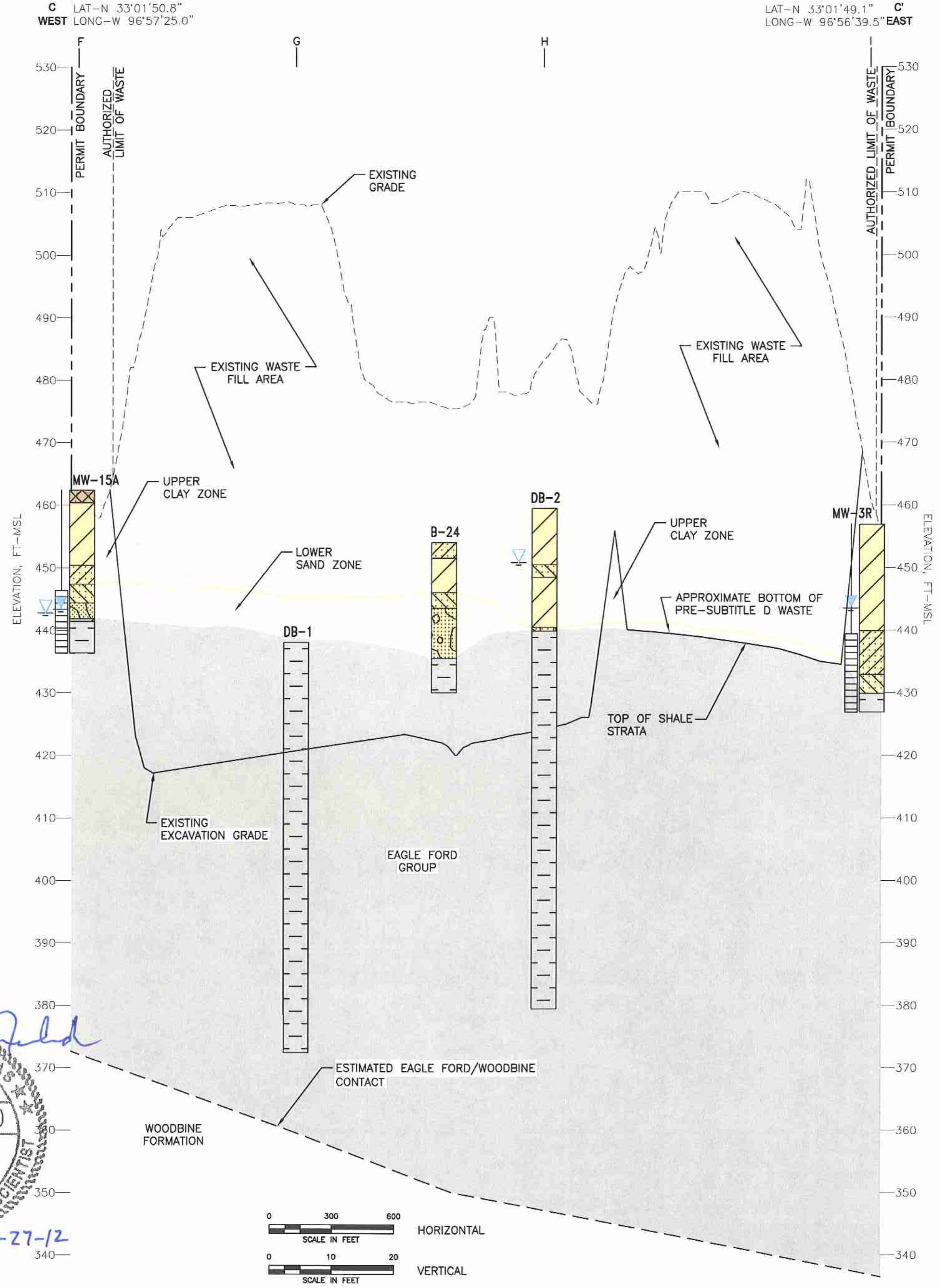
Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

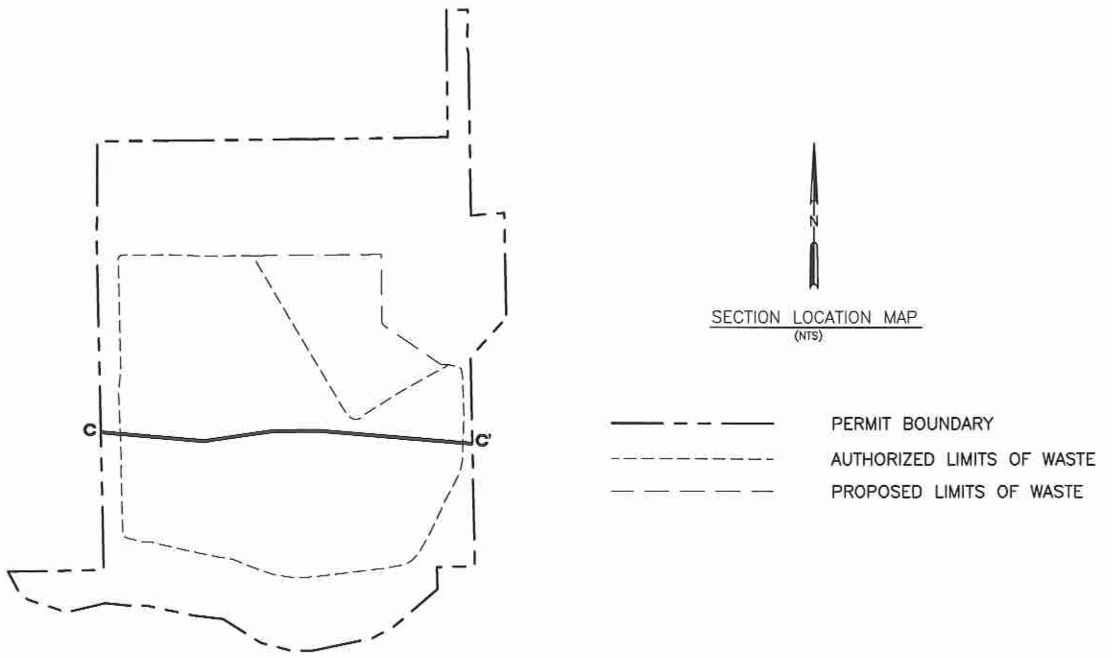
FIGURE IIIG–C–3



Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12



SECTION LOCATION MAP
(NTS)

BORING LEGEND

ALLUVIAL STRATA

UPPER CLAY ZONE
- ▨ CLAY AND SILTY CLAY
- ▨ SANDY CLAY

LOWER SAND ZONE
- ▨ CLAYEY SAND
- ▨ GRAVELLY SAND
- ▨ SANDY GRAVEL

- ▨ EARTHEN FILL

SHALE STRATA
- ▨ WEATHERED SHALE
- ▨ UNWEATHERED SHALE

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

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-C-4 SECTION C-C'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS-SECTION C-C'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F-3727

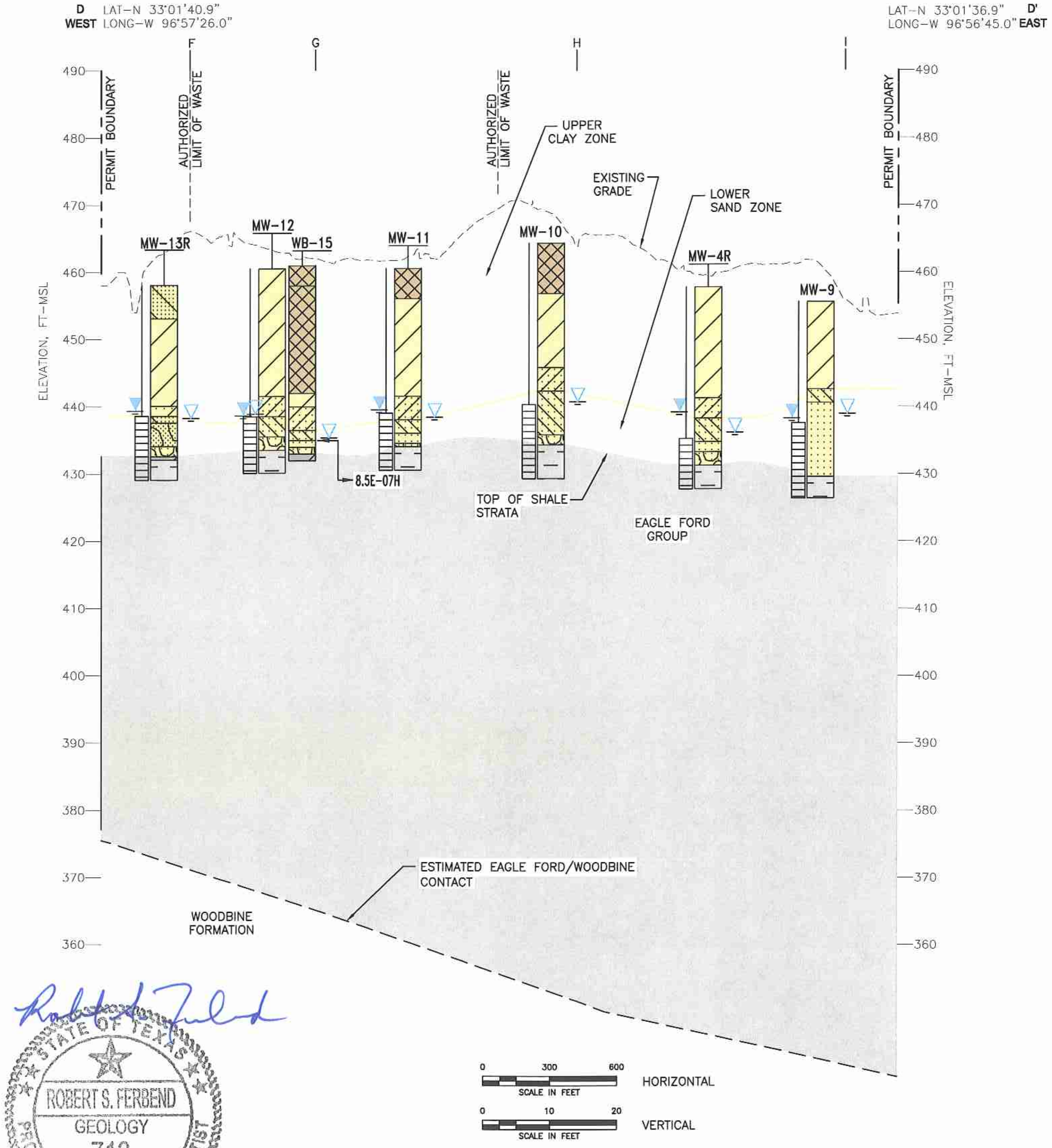
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

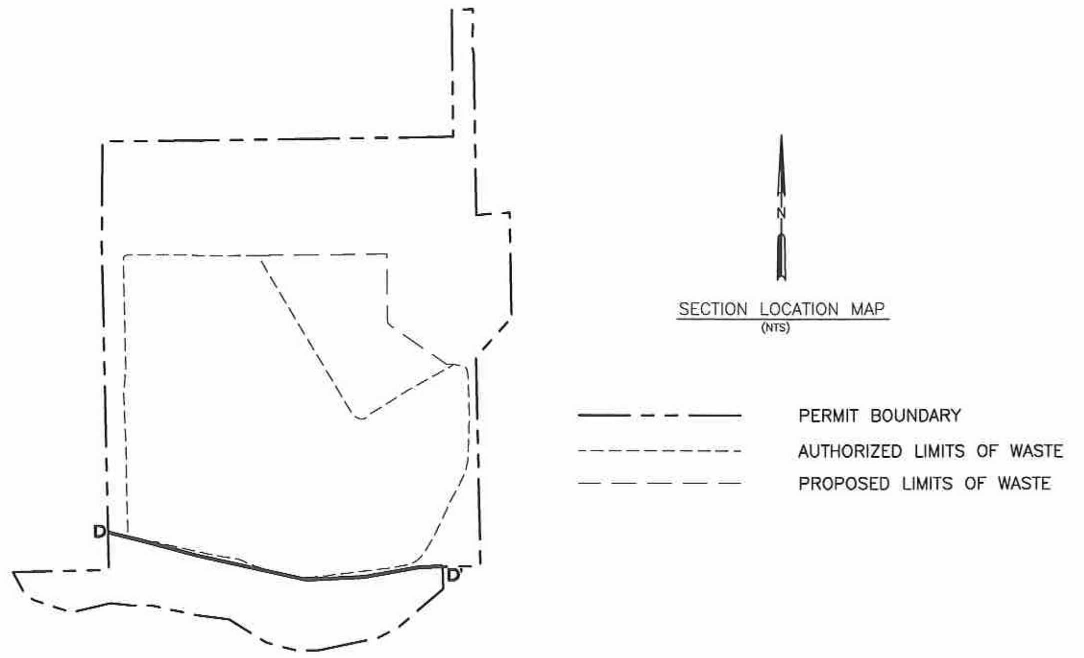
FORT WORTH, TX
(817) 735-9770

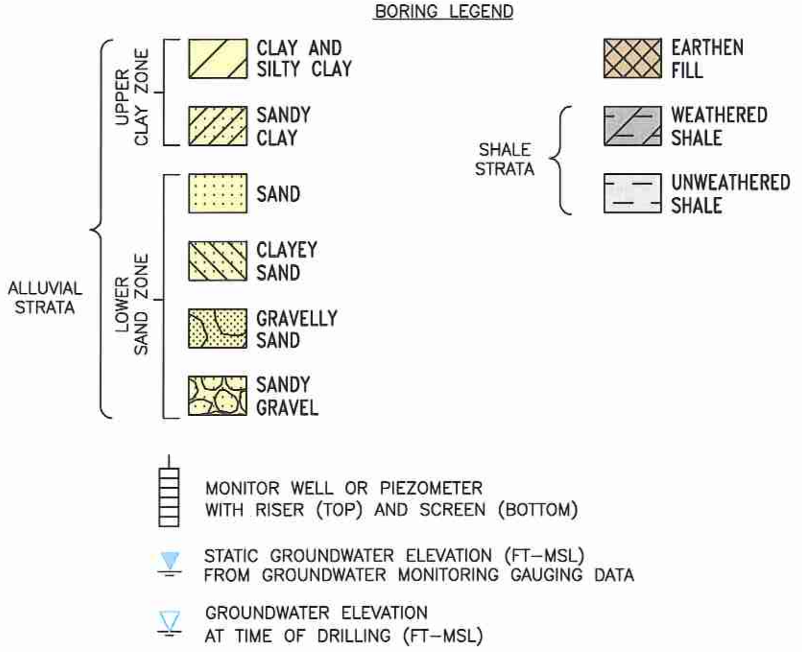
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-C-4

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-2_C-10 CROSS SECTIONS.dwg, 2/21/2012 4:32:20 PM, rsellers







NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E–04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E–04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E–04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

ROBERT S. FERBEND
GEOLOGY
713
2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–C–5 SECTION D–D'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS–SECTION D–D'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

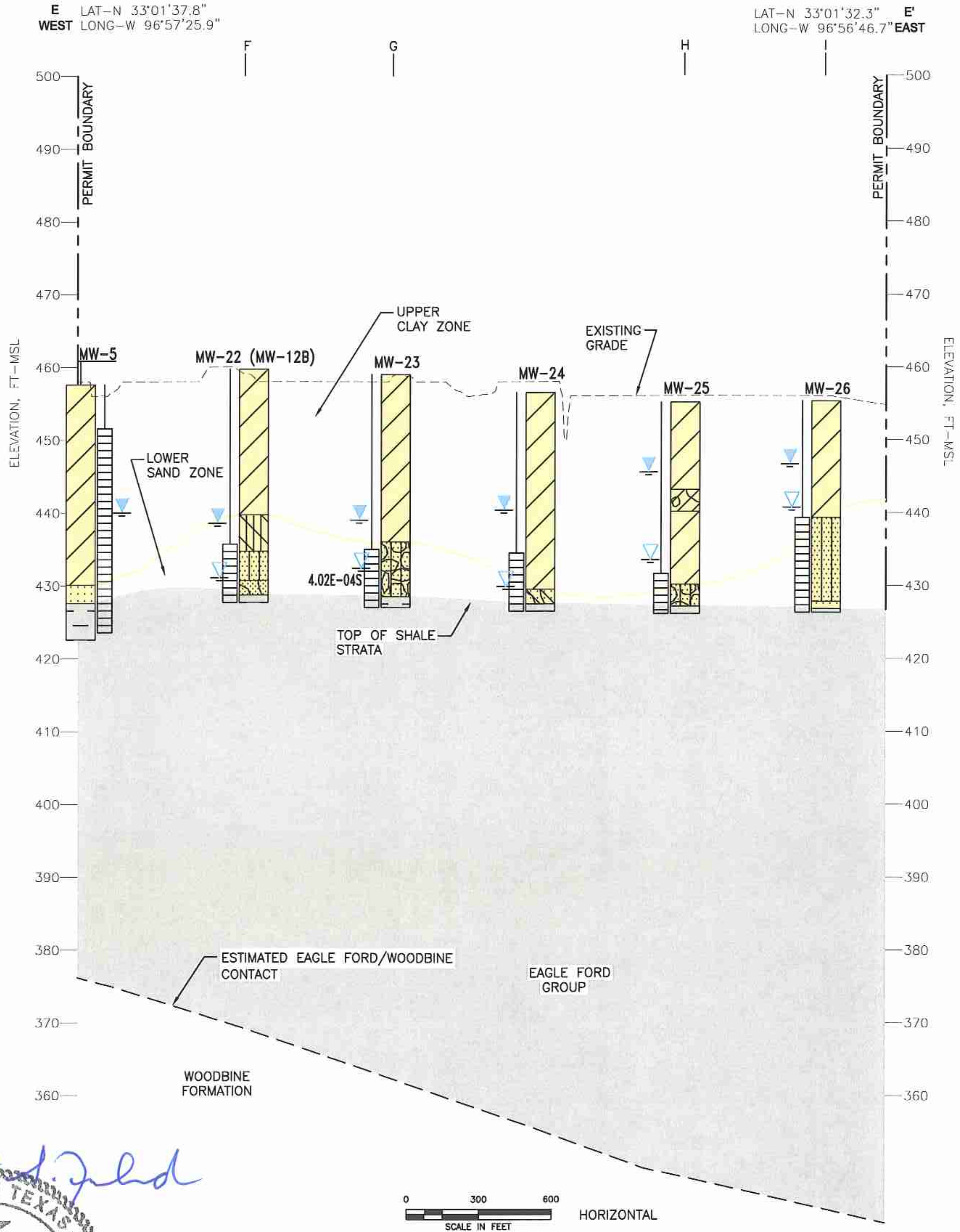
Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

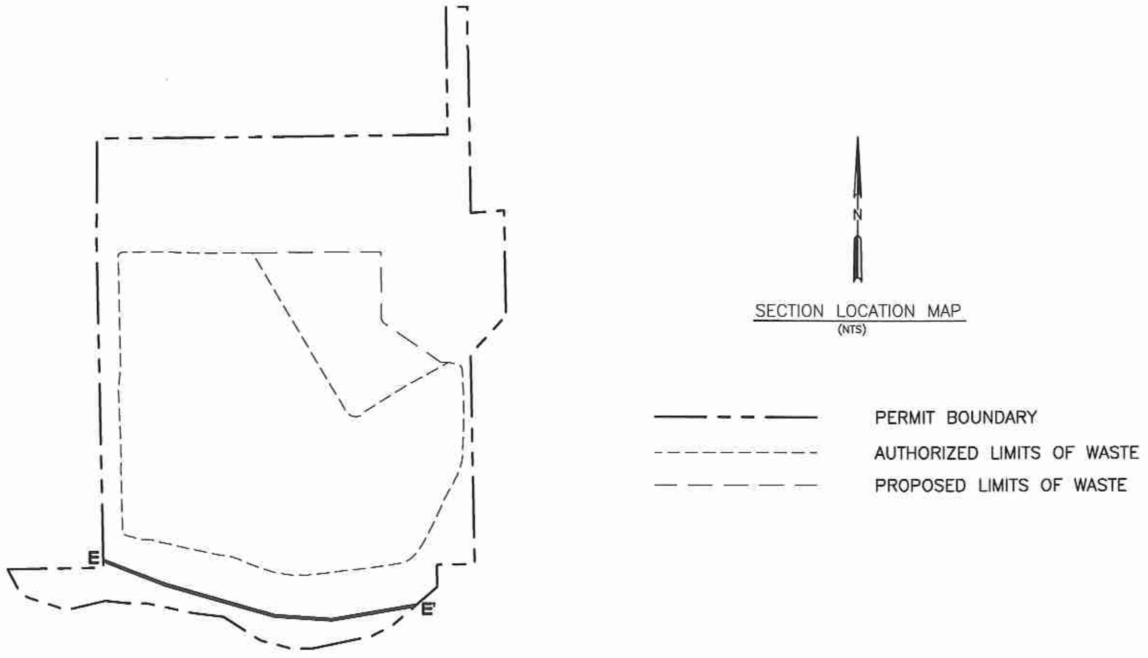
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–C–5



0 300 600
SCALE IN FEET
HORIZONTAL

0 10 20
SCALE IN FEET
VERTICAL



BORING LEGEND

ALLUVIAL STRATA
- UPPER CLAY ZONE
  - ▨ CLAY AND SILTY CLAY
  - ▨ GRAVELLY CLAY
- LOWER SAND ZONE
  - ▨ SAND
  - ▨ SILTY SAND
  - ▨ CLAYEY SILT

ALLUVIAL STRATA
- LOWER SAND ZONE
  - ▨ CLAYEY SANDY GRAVEL
  - ▨ GRAVELLY SAND
  - ▨ SILTY SANDY GRAVEL

SHALE STRATA
- ▨ UNWEATHERED SHALE

MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)

▼ STATIC GROUNDWATER ELEVATION (FT–MSL) FROM GROUNDWATER MONITORING GAUGING DATA

▽ GROUNDWATER ELEVATION AT TIME OF DRILLING (FT–MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG–C–1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E–04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E–04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E–04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

ROBERT S. FERBEND
GEOLOGY
713
2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–C–6 SECTION E–E'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT GEOLOGIC CROSS–SECTION E–E'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

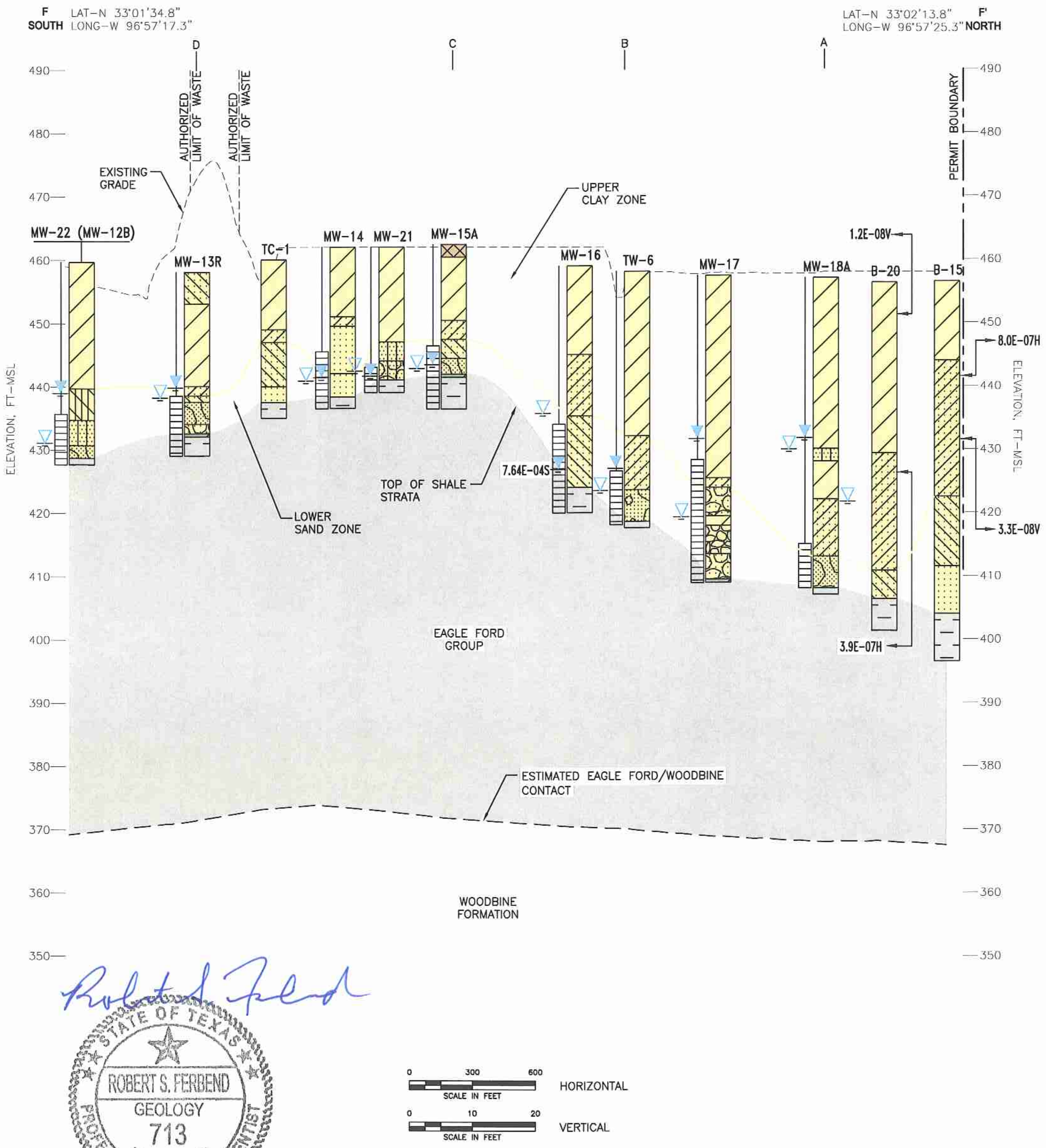
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

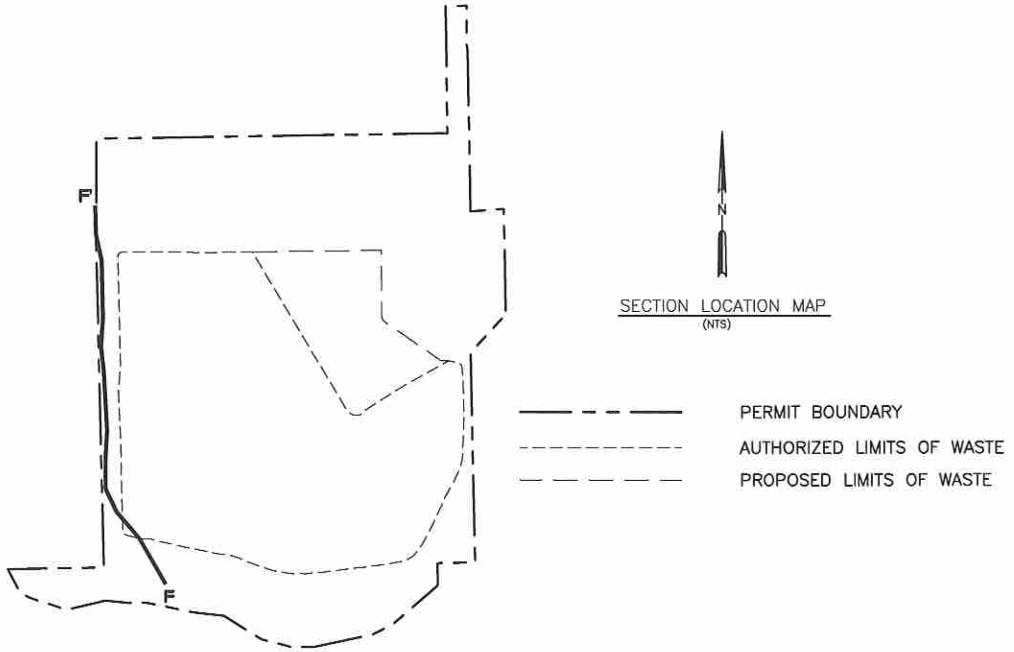
FORT WORTH, TX
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–C–6

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-2_C-10 CROSS SECTIONS.dwg, 2/21/2012 4:32:57 PM, rsellers





ROBERT S. FERBEND
GEOLOGY
713
2-27-12

BORING LEGEND

ALLUVIAL STRATA
- UPPER CLAY ZONE
  - ▨ CLAY AND SILTY CLAY
  - ▨ SANDY CLAY
- LOWER SAND ZONE
  - ▨ SAND
  - ▨ CLAYEY SAND
  - ▨ SILTY SAND
  - ▨ GRAVELLY SAND
  - ▨ GRAVEL

ALLUVIAL STRATA
- LOWER SAND ZONE
  - ▨ SILTY SANDY GRAVEL
  - ▨ SANDY GRAVEL
  - ▨ CLAYEY SILT
- ▨ EARTHEN FILL

SHALE STRATA
- ▨ WEATHERED SHALE
- ▨ UNWEATHERED SHALE

MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)

▼ STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER MONITORING GAUGING DATA

▽ GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E-04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E-04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E-04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

PREPARED FOR
CITY OF FARMERS BRANCH

MAJOR PERMIT AMENDMENT GEOLOGIC CROSS-SECTION F-F'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-C-7 SECTION F-F'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REVISIONS

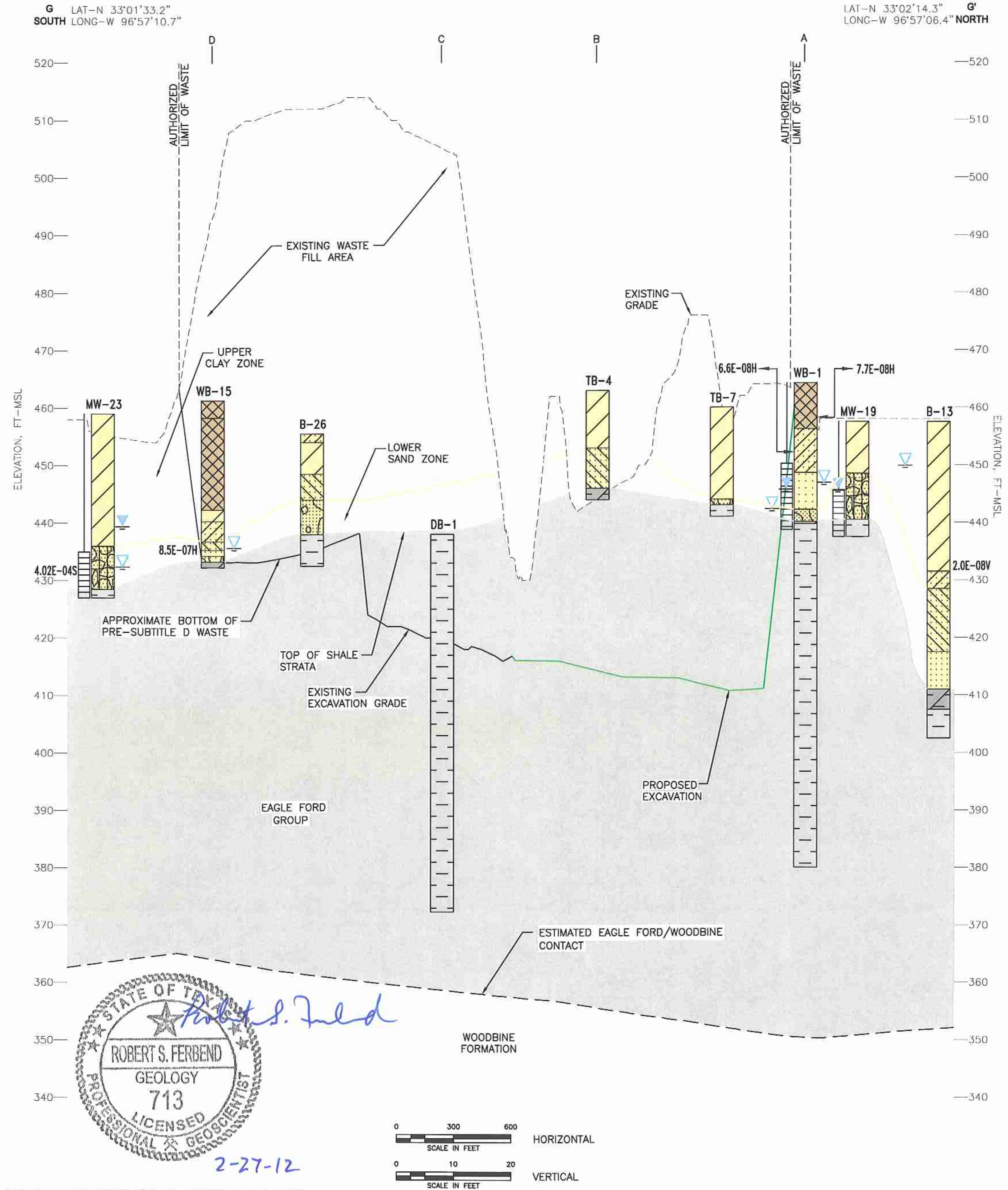
NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-C-7

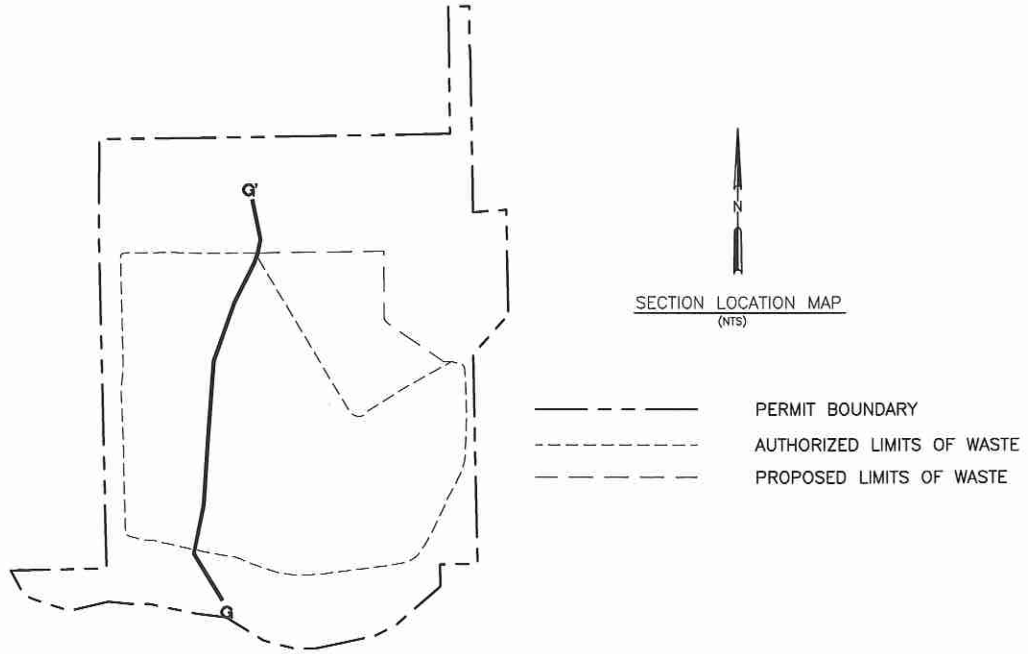
O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-2_C-10 CROSS SECTIONS.dwg, 2/21/2012 4:35:17 PM, rsellers

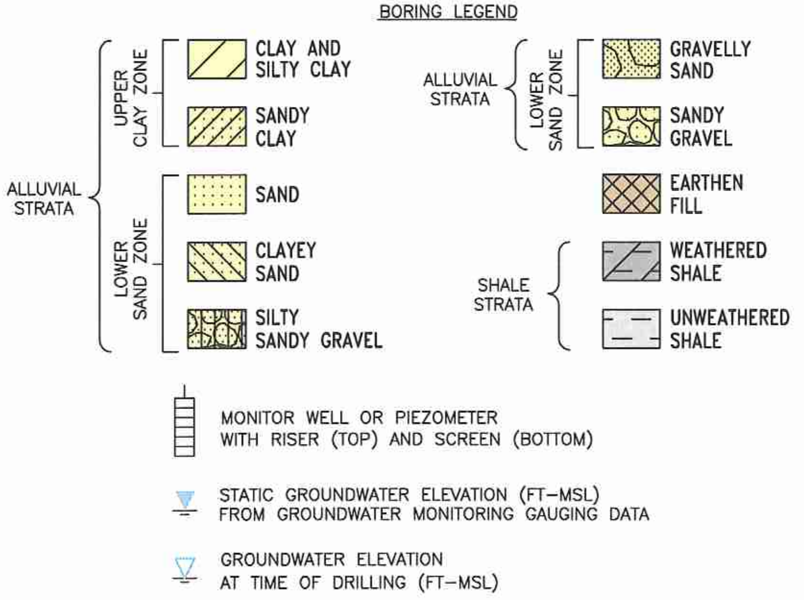


ROBERT S. FERBEND
713

Robert S. Ferbend

2-27-12





NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG–C–1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E–04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E–04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E–04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–C–B SECTION G–G'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

PREPARED FOR
CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS–SECTION G–G'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F–3727

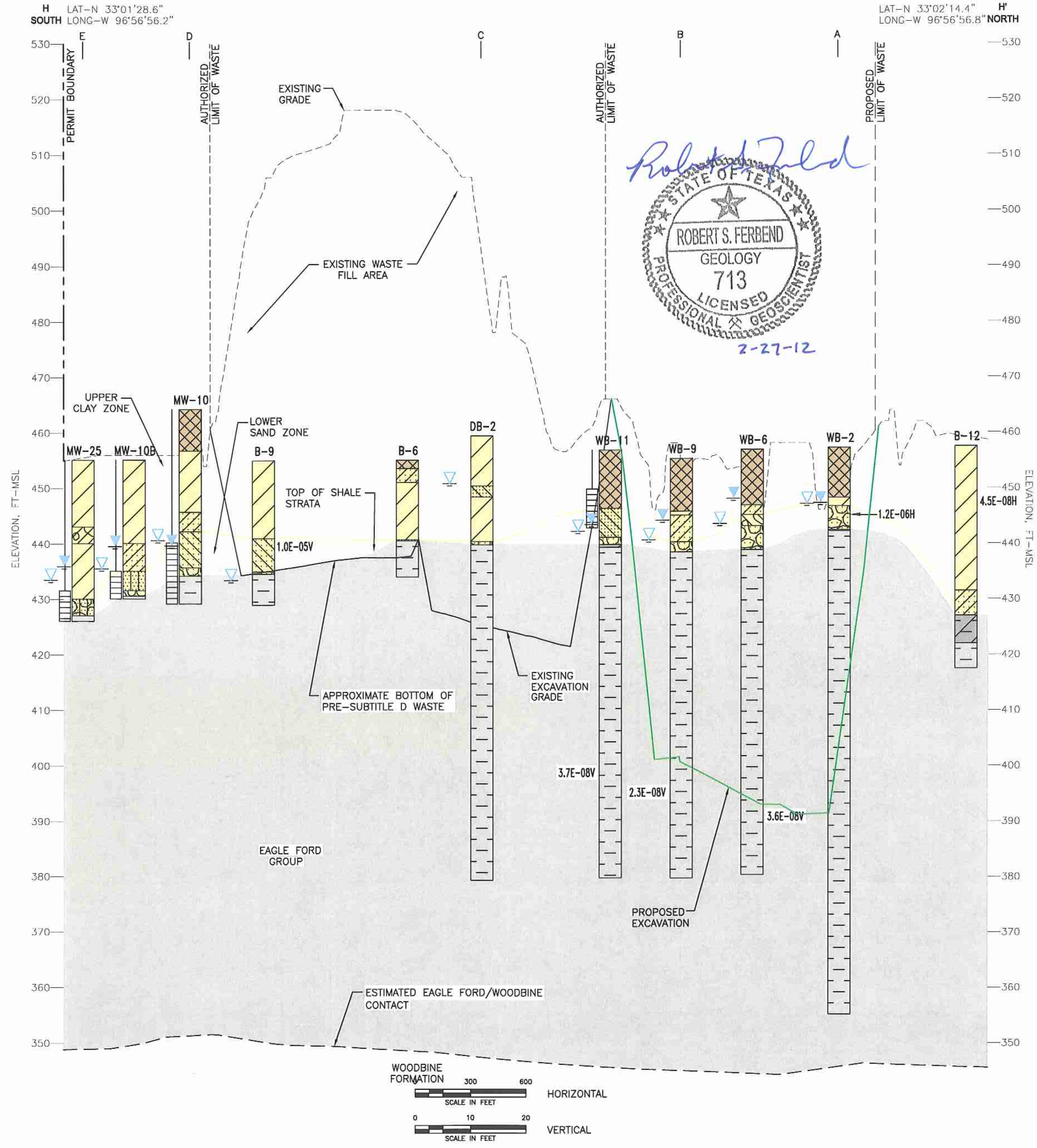
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

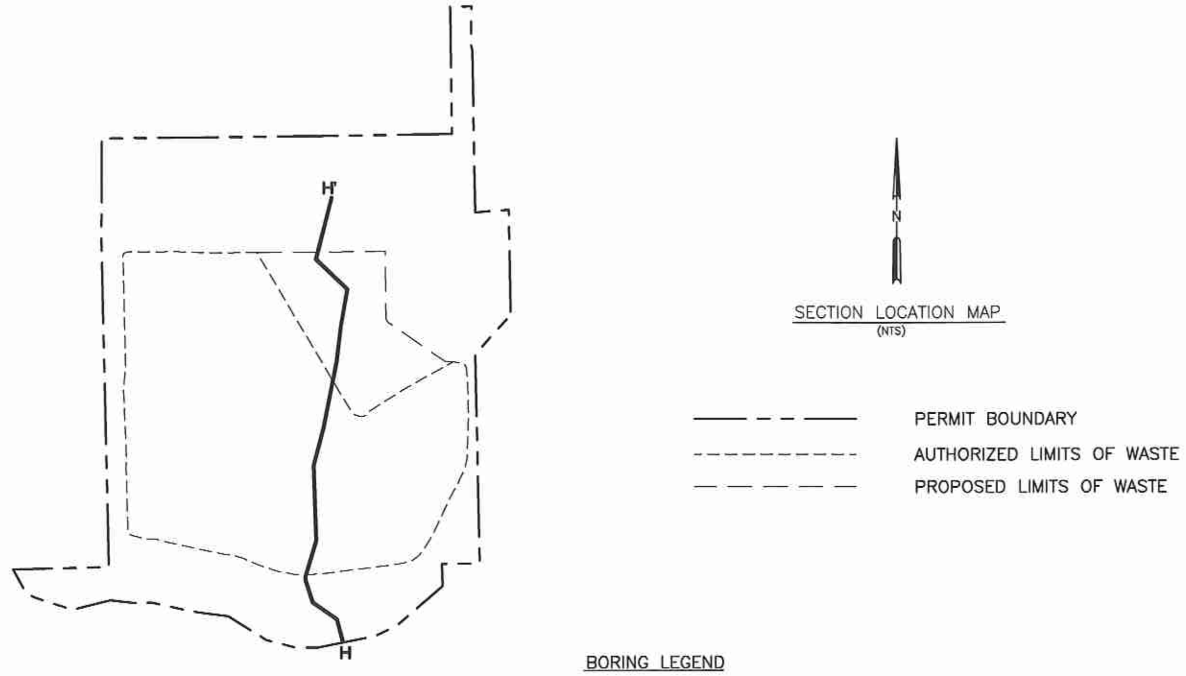
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–C–8

0:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-2_C-10 CROSS SECTIONS.dwg, 2/21/2012 4:35:28 PM, rsellers



ROBERT S. FERBEND
GEOLOGY
713
2-27-12



BORING LEGEND

ALLUVIAL STRATA
- UPPER CLAY ZONE
  - ▨ CLAY AND SILTY CLAY
  - ▨ SANDY CLAY
- LOWER SAND ZONE
  - ▨ SAND
  - ▨ CLAYEY SAND
  - ▨ SILTY SAND
  - ▨ SILTY SANDY GRAVEL
  - ▨ GRAVEL

ALLUVIAL STRATA
- LOWER SAND ZONE
  - ▨ SANDY GRAVEL
  - ▨ CLAYEY GRAVEL
  - ▨ GRAVELLY CLAY
- ▨ EARTHEN FILL

SHALE STRATA
- ▨ WEATHERED SHALE
- ▨ UNWEATHERED SHALE

▤ MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)

▼ STATIC GROUNDWATER ELEVATION (FT–MSL) FROM GROUNDWATER MONITORING GAUGING DATA

▽ GROUNDWATER ELEVATION AT TIME OF DRILLING (FT–MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG–C–1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
4. HYDRAULIC CONDUCTIVITY (K) MEASUREMENTS POSTED IN CM/SEC IN SCIENTIFIC NOTATION ADJACENT TO MEASUREMENT LOCATION/DEPTH. AN 'H' AT THE END OF THE K VALUE (i.e. 1.1E–04H) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY HORIZONTAL K MEASUREMENT. A 'V' AT THE END OF THE K VALUE (i.e. 2.2E–04V) INDICATES MEASUREMENT IS GEOTECHNICAL LABORATORY VERTICAL K MEASUREMENT. AN 'S' AT THE END OF THE K VALUE (i.e. 3.3E–04S) INDICATES K IS DERIVED FROM INSITU RISING HEAD SLUG TEST DATA WHICH REPRESENTS THE HYDRAULIC CONDUCTIVITY OF A WELL SCREEN INTERVAL

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIG–C–9 SECTION H–H'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS–SECTION H–H'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

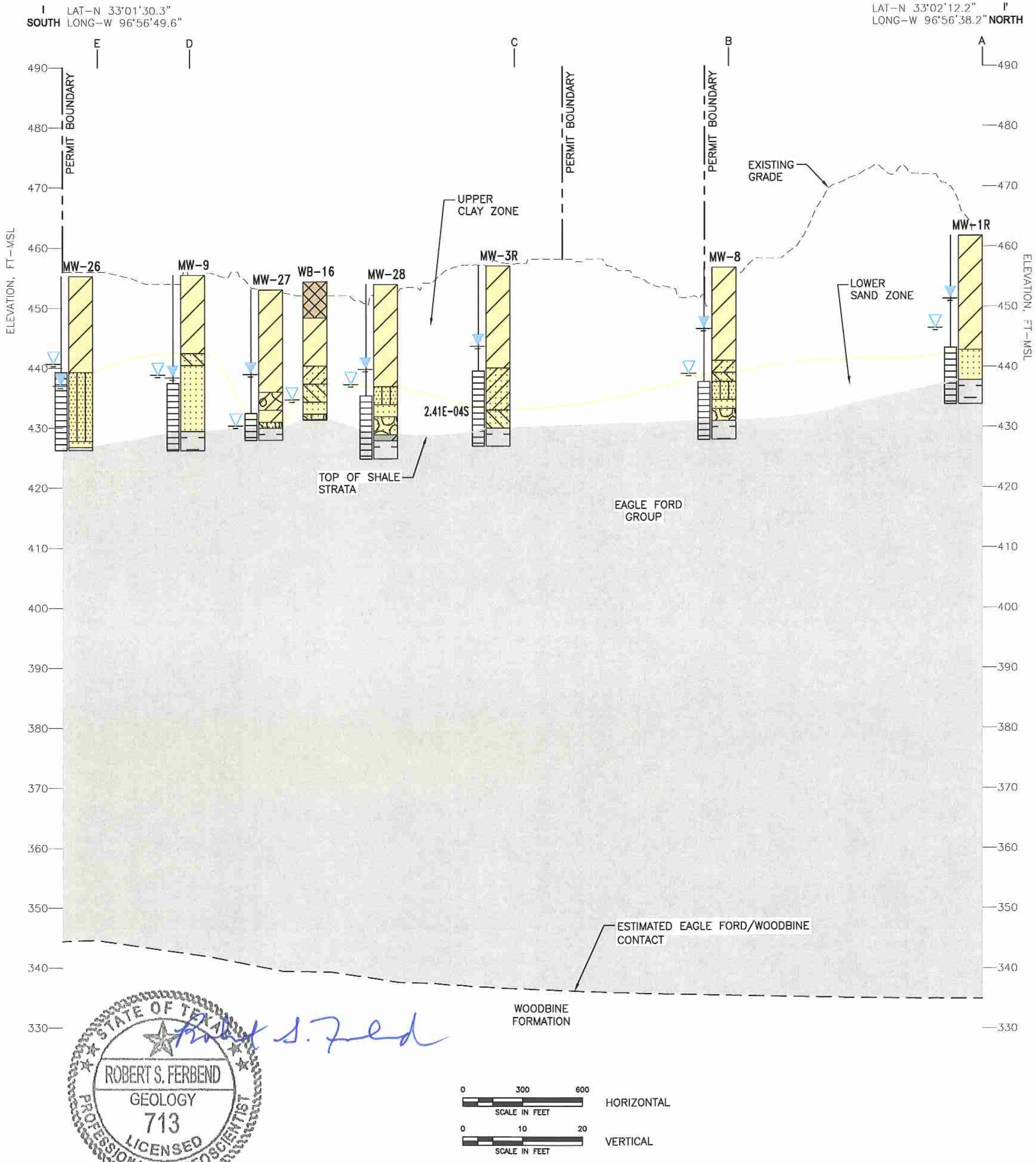
Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

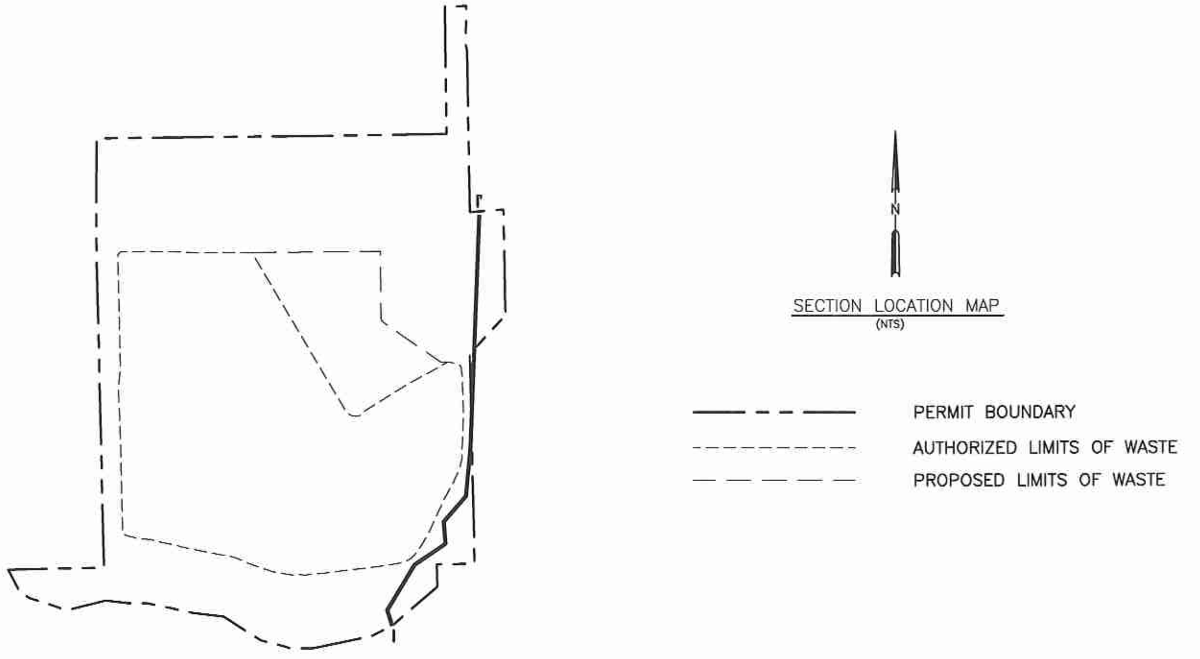
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–C–9



ROBERT S. FERBEND
GEOLOGY
713

2-27-12



BORING LEGEND

ALLUVIAL STRATA
- UPPER CLAY ZONE
  - ▨ CLAY AND SILTY CLAY
  - ▨ SANDY CLAY
- LOWER SAND ZONE
  - ▨ SAND
  - ▨ CLAYEY SAND
  - ▨ SILTY SAND
  - ▨ SANDY GRAVEL

ALLUVIAL STRATA
- LOWER SAND ZONE
  - ▨ SILTY SANDY GRAVEL
  - ▨ GRAVELLY CLAY
  - ▨ CLAYEY GRAVEL

▨ EARTHEN FILL

SHALE STRATA
- ▨ WEATHERED SHALE
- ▨ UNWEATHERED SHALE

▤ MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREEN (BOTTOM)

▼ STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER MONITORING GAUGING DATA

▽ GROUNDWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION BORING LOGS AND GROUNDWATER MONITORING RECORDS. IN BOREHOLES WHERE NO GROUNDWATER HAS BEEN REPORTED, NO STATIC OR AT TIME OF DRILLING GROUNDWATER SYMBOL IS SHOWN. STATIC GROUNDWATER ELEVATIONS IN EXISTING MONITORING WELLS AND EXPANSION AREA BOREHOLES MEASURED ON DECEMBER 5, 2010.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
3. STRATIGRAPHIC ZONES INTERPOLATED BETWEEN BOREHOLE LOCATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-C-10 SECTION I-I'.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS - LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS - LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS-SECTION I-I'

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

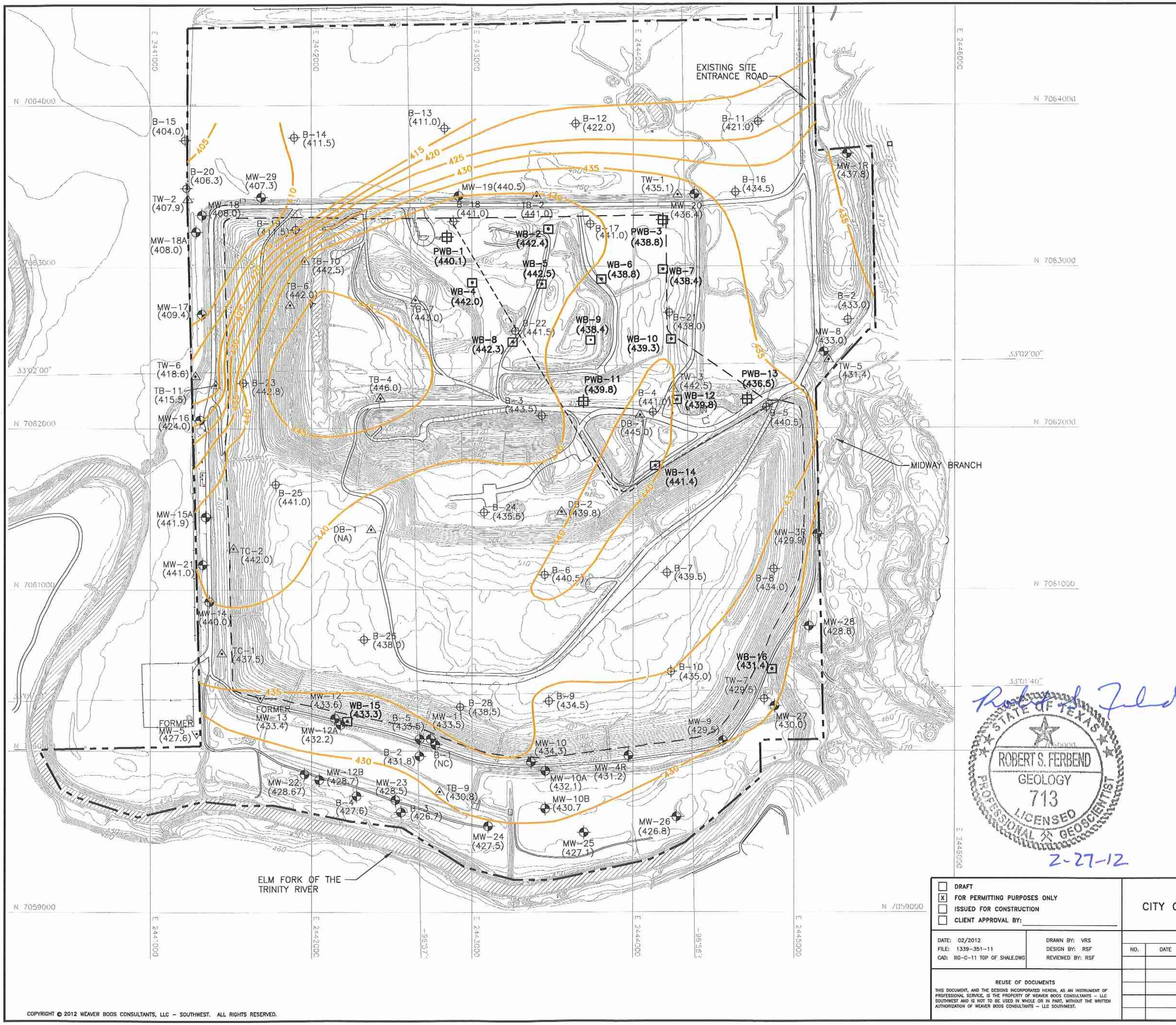
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

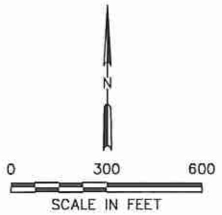
FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-C-10

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-2_C-10 CROSS SECTIONS.dwg, 2/21/2012 4:38:03 PM, rsellers





LEGEND

— · — · —	PERMIT BOUNDARY
- - - - - -	AUTHORIZED LIMITS OF WASTE
— — — —	PROPOSED LIMITS OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
500	EXISTING TOPOGRAPHIC CONTOUR
440	TOP OF SHALE ELEVATION CONTOUR IN FT–MSL
	EXISTING ROAD
MW-3R (456.9)	EXISTING MONITORING WELL WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL
MW-10A (461.1)	TEMPORARY CAREL CORPORATION MONITORING WELL WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL
FORMER MW-7	FORMER MONITORING WELL LOCATION WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL
B-22 (454.0)	RONE 1980 BORING LOCATION WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL
TC-1 (460.0)	REED ENGINEERING 1994 BORING LOCATION WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL.
(NC)	NOT CONTOURED, SHALE NOT ENCOUNTERED
WB-2 (442.4)	WBC 2010 BORING LOCATION WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL
PWB-1 (440.1)	WBC 2010 PIEZOMETER LOCATION WITH TOP OF SHALE ELEVATION POSTED IN FT–MSL

NOTES:

1. EXISTING TOPOGRAPHIC CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 08–28–10.
2. TOP OF SHALE STRATA ELEVATION DATA FROM DOCUMENTS COMPILED BY RONE, REED, AND CAREL AND WBC BOREHOLE LOGS.
3. NA; BOREHOLE ADVANCED FROM BOTTOM OF BOREHOLE EXCAVATION. TRUE TOP OF SHALE UNKNOWN.

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–11
CAD: IIIG–C–11 TOP OF SHALE.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: RSF

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT TOP OF SHALE STRATA ELEVATION CONTOUR MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

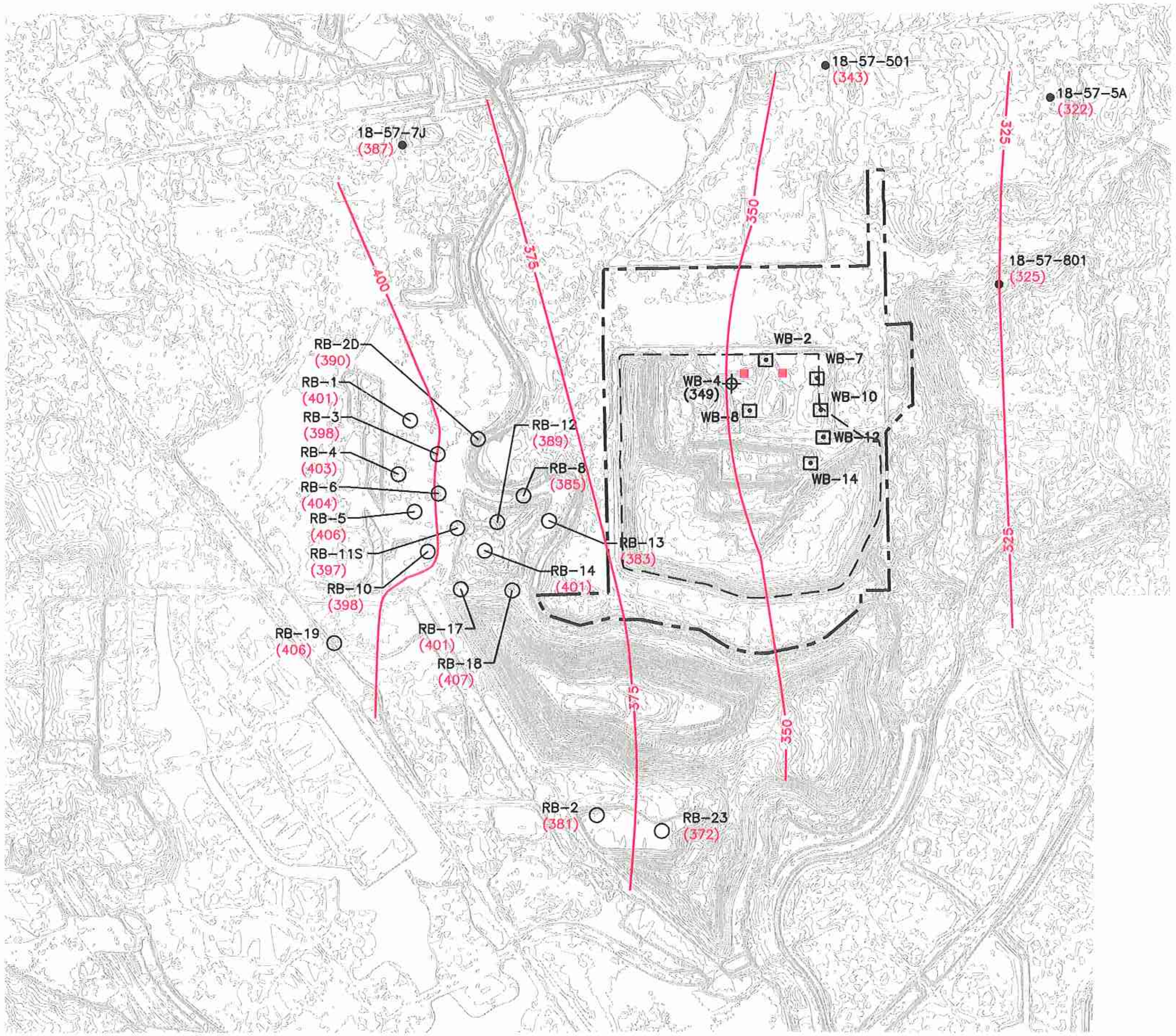
FORT WORTH, TX
(817) 735–9770

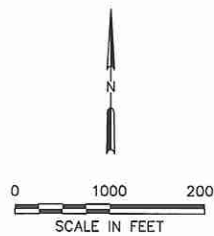
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG–C–11

O:\1339\351\EXPANSION 2009\PART III–SDP\IIIG\IIIG–C–11 TOP OF SHALE.dwg, 2/21/2012 4:38:26 PM, rsellers

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-C-12 TOP OF WOODBINE SANDSTONE.dwg, jwilson, 1:2





LEGEND

— · —	PERMIT BOUNDARY
— — —	PROPOSED LIMIT OF WASTE
450	EXISTING CONTOUR
— 250 —	TOP OF WOODBINE ELEVATION CONTOUR IN FT-MSL (SEE NOTE 2)
(327)	APPROXIMATE ELEVATION OF TOP OF WOODBINE (FT-MSL)
○	DFW LANDFILL BORING OR MONITOR WELL
●	REGISTERED WATER WELL
WB-10 ⊡	WBC DEEP BORING WITH BOTTOM ELEVATION LESS THAN 357 FT-MSL
🟥	PROPOSED LEACHATE COLLECTION SUMPS EACH WITH 387 FT-MSL EDE
WB-4 ⌖ (349)	WBC DEEP BORING WITH BOTTOM ELEVATION EQUAL TO 341 FT-MSL

NOTES:

1. EXISTING CONTOURS PROVIDED BY DFWMAPS.COM FROM AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN JANUARY TO MARCH 2007.
2. TOP OF WOODBINE STRATA ELEVATION CONTOUR MAP ADAPTED FROM FIGURE 5-5 OF THE WASTE MANAGEMENT OF TEXAS, INC. DFW LANDFILL MAJOR PERMIT AMENDMENT APPLICATION (PREPARED BY RUST ENVIRONMENTAL & INFRASTRUCTURE) WHICH REPORTS ITS SOURCE OF REGIONAL WELL DATA AS "HYDROGEOLOGIC ASSESSMENT – DFW SANITARY LANDFILL," DAMES & MOORE, SEPTEMBER 22, 1989, AND ADJUSTED BASED ON WATER WELL AND BOREHOLE INFORMATION WITHIN (WB-4) AND AROUND CAMELOT LANDFILL.

ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend
2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

PREPARED FOR
CITY OF FARMERS BRANCH

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIG-C-12 TOP WOODBINE.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REVISIONS

NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

MAJOR PERMIT AMENDMENT TOP OF WOODBINE STRATA ELEVATION CONTOUR MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-C-12

APPENDIX IIIG-D

SITE HYDROGEOLOGIC DATA

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

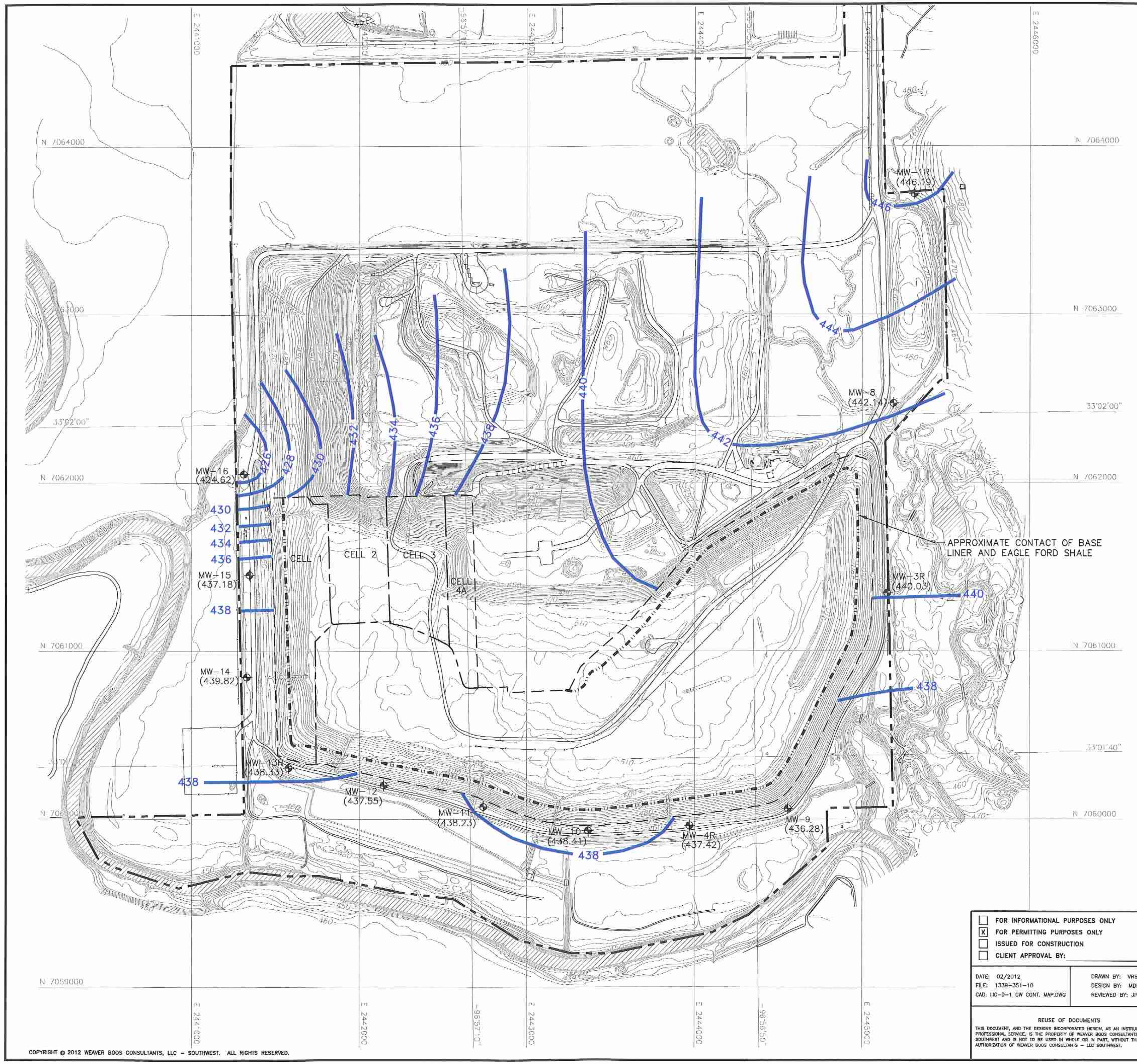
2-27-12

CONTENTS

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-D-1 GW DEC 1999.dwg, 2/21/2012 4:39:32 PM, rsellers



0 300 600
SCALE IN FEET

LEGEND

— - —	PERMIT BOUNDARY
— — —	LIMIT OF WASTE
510	EXISTING CONTOUR
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
— - —	CELL BOUNDARY
MW-8 (442.14)	GROUNDWATER MONITORING WELL WITH WATER LEVELS POSTED IN FT-MSL
430	GROUNDWATER CONTOUR (SEE NOTE 3)
—·—·—	APPROXIMATE CONTACT WITH EAGLE FORD SHALE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. POTENTIOMETRIC CONTOURS AND WATER LEVEL MEASUREMENTS REPRODUCED FROM GROUNDWATER CONTOUR MAP - DECEMBER 1999 PREPARED BY THE CAREL CORPORATION. WATER LEVELS MEASURED DECEMBER 17, 1999.

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-1 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS - LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS - LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT POTENTIOMETRIC SURFACE MAP DECEMBER 1999

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

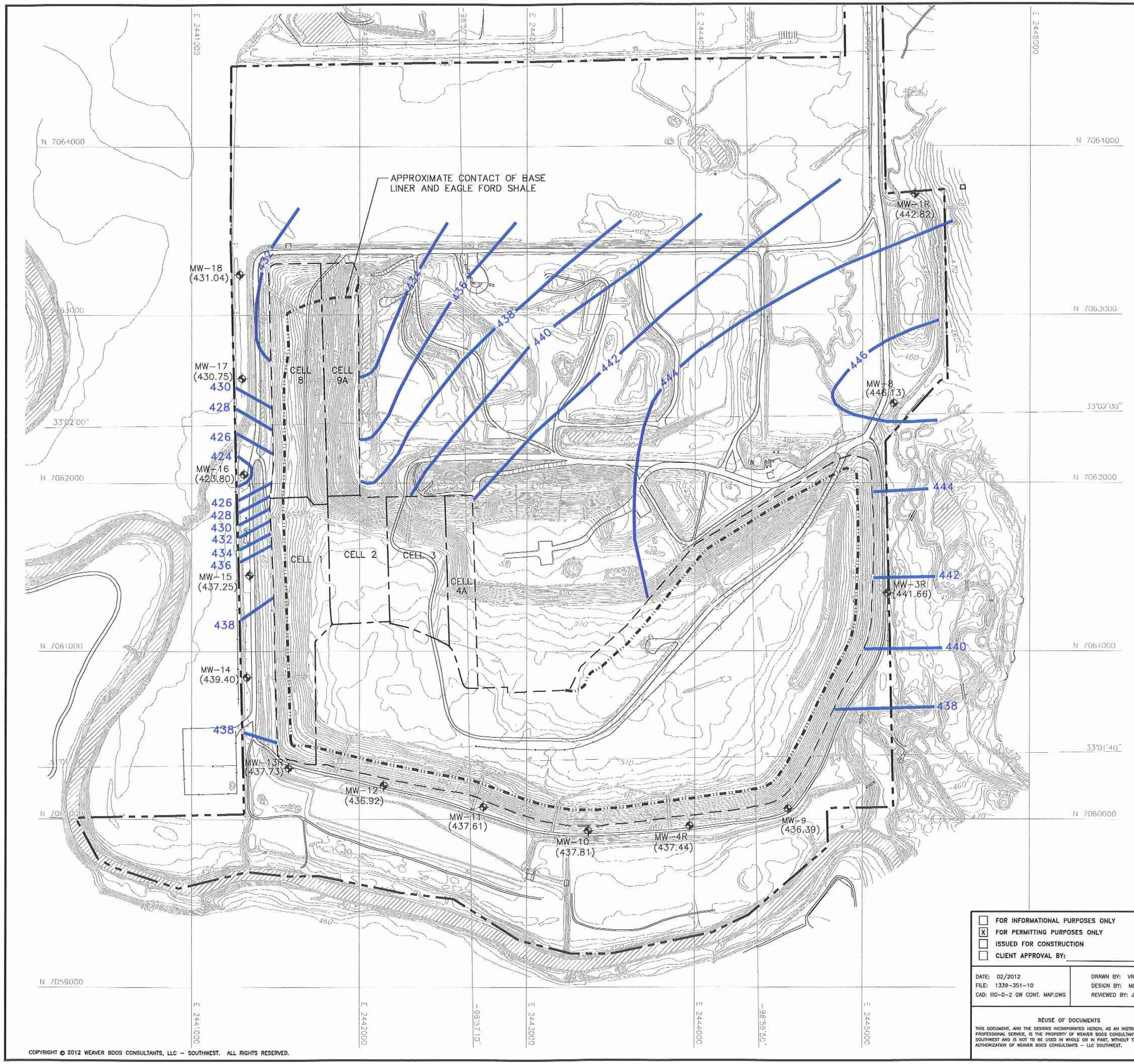
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-1



N

0 300 600
SCALE IN FEET

LEGEND

— · — · —	PERMIT BOUNDARY
— — — —	LIMIT OF WASTE
——510——	EXISTING CONTOUR
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
—— · ——	CELL BOUNDARY
MW-8 (446.13)	GROUNDWATER MONITORING WELL WITH WATER LEVELS POSTED IN FT-MSL
——430——	GROUNDWATER CONTOUR (SEE NOTE 3)
—·—·—·—	APPROXIMATE CONTACT WITH EAGLE FORD SHALE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. POTENTIOMETRIC CONTOURS AND WATER LEVEL MEASUREMENTS REPRODUCED FROM GROUNDWATER CONTOUR MAP – DECEMBER 2000 PREPARED BY THE CAREL CORPORATION. WATER LEVELS MEASURED DECEMBER 22, 2000.

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY:

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-2 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT POTENTIOMETRIC SURFACE MAP DECEMBER 2000

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

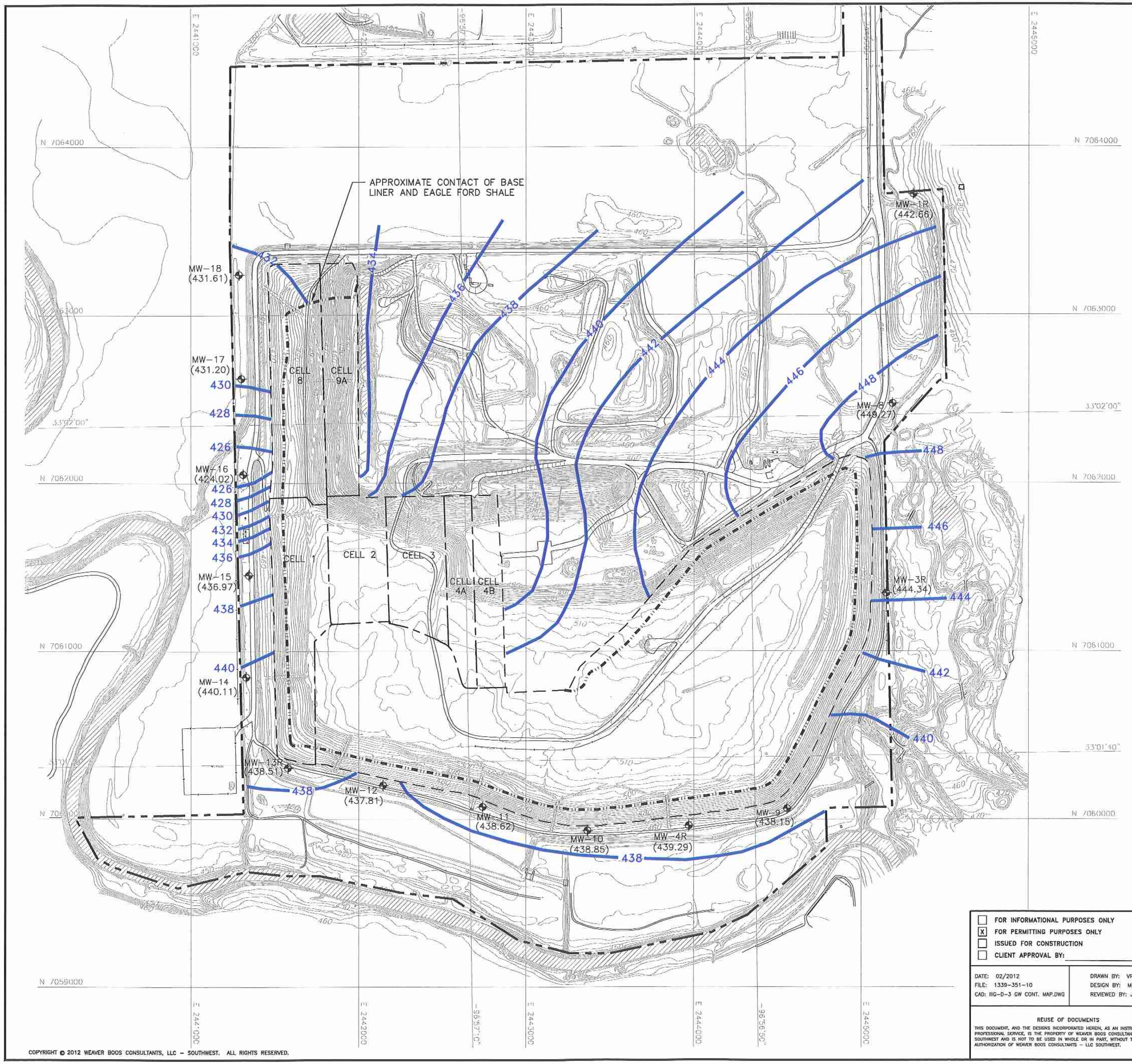
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

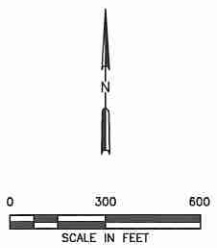
FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-2

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG-D-2 GW DEC 2000.dwg, 2/21/2012 4:40:22 PM, rsellers





LEGEND

— - - —	PERMIT BOUNDARY
— — — —	LIMIT OF WASTE
——510——	EXISTING CONTOUR
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
— - —	CELL BOUNDARY
MW-8 (449.27)	GROUNDWATER MONITORING WELL WITH WATER LEVELS POSTED IN FT-MSL
—430—	GROUNDWATER CONTOUR (SEE NOTE 3)
-·-·-·-	APPROXIMATE CONTACT WITH EAGLE FORD SHALE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. POTENTIOMETRIC CONTOURS AND WATER LEVEL MEASUREMENTS REPRODUCED FROM GROUNDWATER CONTOUR MAP – DECEMBER 2002 PREPARED BY THE CAREL CORPORATION. WATER LEVELS MEASURED DECEMBER 16-17, 2002.

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ______

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-3 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

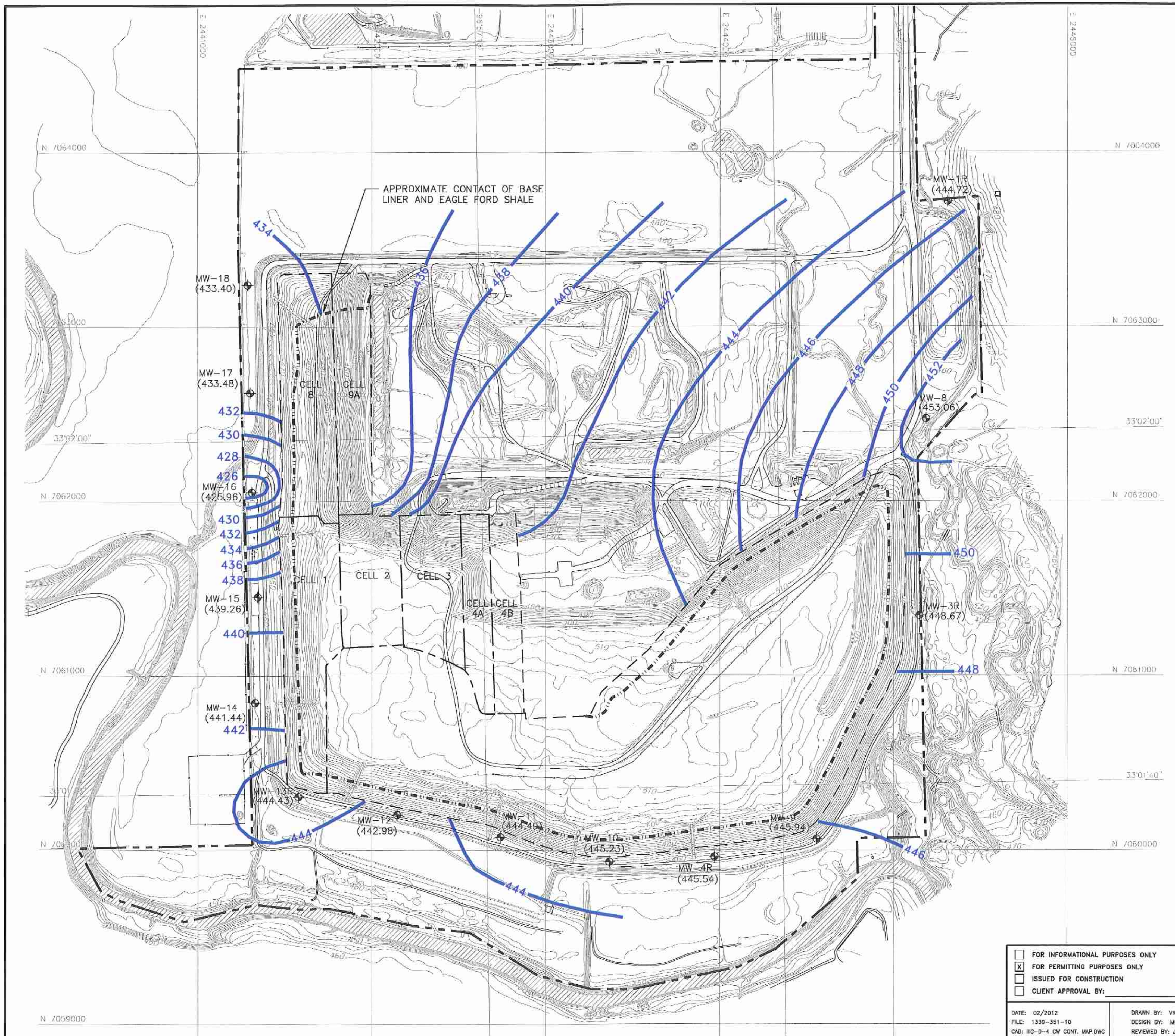
NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
POTENTIOMETRIC SURFACE MAP
DECEMBER 2002

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-3



N

0 300 600
SCALE IN FEET

LEGEND

— · —	PERMIT BOUNDARY
— — —	LIMIT OF WASTE
510	EXISTING CONTOUR
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
— - —	CELL BOUNDARY
MW-8 ⊕ (453.06)	GROUNDWATER MONITORING WELL WITH WATER LEVELS POSTED IN FT-MSL
—430—	GROUNDWATER CONTOUR (SEE NOTE 3)
-·-··-·-	APPROXIMATE CONTACT WITH EAGLE FORD SHALE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. POTENTIOMETRIC CONTOURS AND WATER LEVEL MEASUREMENTS REPRODUCED FROM GROUNDWATER CONTOUR MAP – DECEMBER 2004 PREPARED BY THE CAREL CORPORATION. WATER LEVELS MEASURED DECEMBER 20-21, 2004.

ROBERT S. FERBEND
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-4 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
POTENTIOMETRIC SURFACE MAP
DECEMBER 2004

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

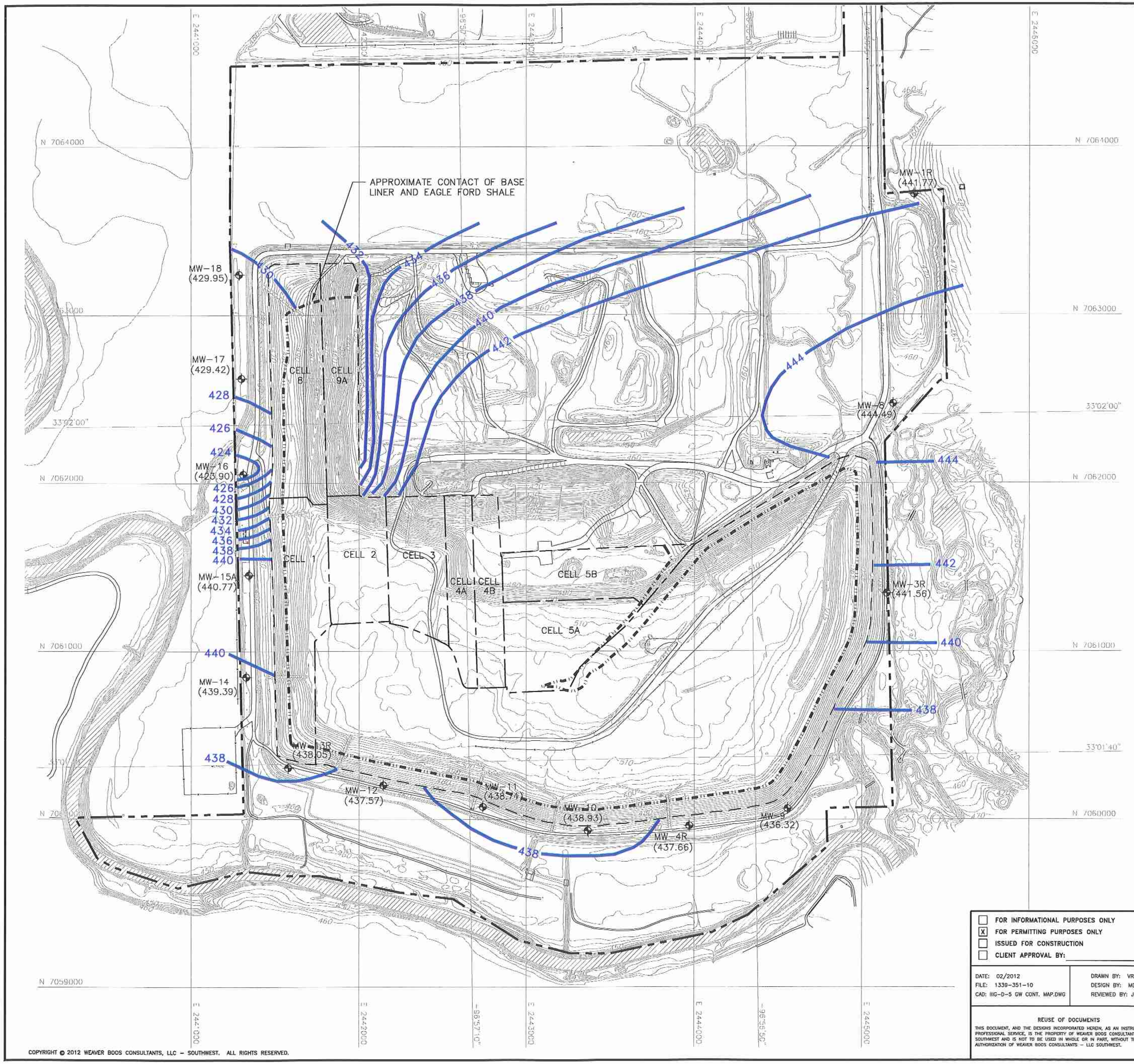
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

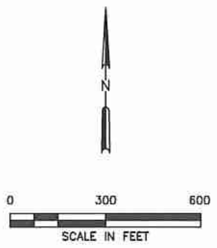
FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-4

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-D-4 GW DEC 2004.dwg, 2/21/2012 4:41:57 PM, rsellers





LEGEND

— · —	PERMIT BOUNDARY
— — —	LIMIT OF WASTE
510	EXISTING CONTOUR
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
— - —	CELL BOUNDARY
MW-8 ⊕ (444.49)	GROUNDWATER MONITORING WELL WITH WATER LEVELS POSTED IN FT-MSL
—430—	GROUNDWATER CONTOUR (SEE NOTE 3)
-·-··-·-	APPROXIMATE CONTACT WITH EAGLE FORD SHALE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. POTENTIOMETRIC CONTOURS AND WATER LEVEL MEASUREMENTS REPRODUCED FROM GROUNDWATER CONTOUR MAP – DECEMBER 2006 PREPARED BY THE CAREL CORPORATION. WATER LEVELS MEASURED DECEMBER 13-14, 2006.

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-5 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
POTENTIOMETRIC SURFACE MAP
DECEMBER 2006

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

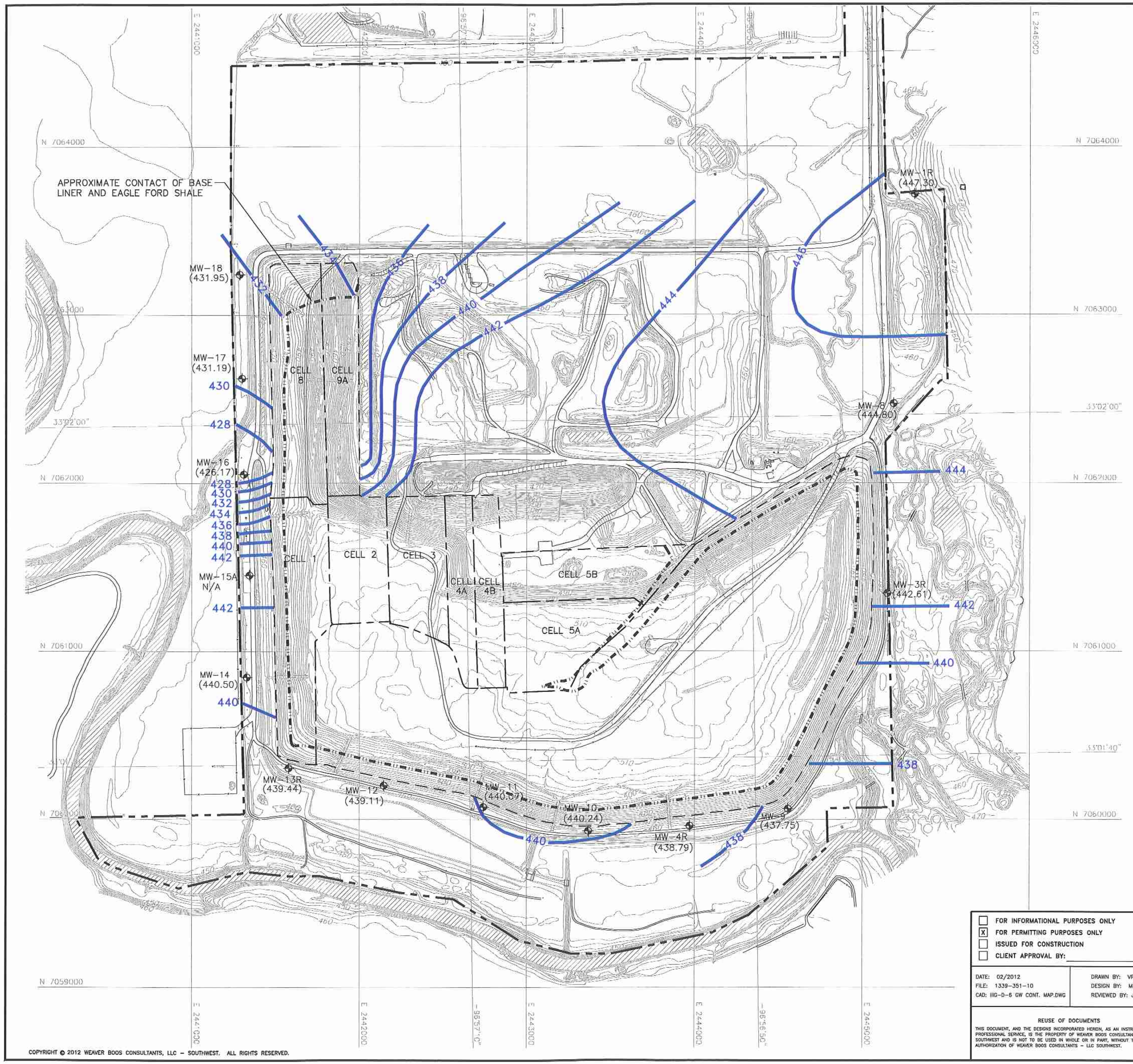
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-5

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-D-5 GW DEC 2006.dwg, 2/21/2012 4:42:41 PM, rsellers



N

0 300 600
SCALE IN FEET

LEGEND

——— - - ———	PERMIT BOUNDARY
— — — — —	LIMIT OF WASTE
——510——	EXISTING CONTOUR
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
——— - ———	CELL BOUNDARY
MW-8 ⌖ (444.80)	GROUNDWATER MONITORING WELL WITH WATER LEVELS POSTED IN FT-MSL
——430——	GROUNDWATER CONTOUR (SEE NOTE 3)
N/A	WATER LEVEL BELOW TOP OF PUMP
‒··‒··‒··‒	APPROXIMATE CONTACT WITH EAGLE FORD SHALE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. POTENTIOMETRIC CONTOURS AND WATER LEVEL MEASUREMENTS REPRODUCED FROM GROUNDWATER CONTOUR MAP – DECEMBER 2008 PREPARED BY THE CAREL CORPORATION. WATER LEVELS MEASURED DECEMBER 1-3, 2008.

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

PREPARED FOR

CITY OF FARMERS BRANCH

MAJOR PERMIT AMENDMENT POTENTIOMETRIC SURFACE MAP DECEMBER 2008

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-6 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REVISIONS

NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

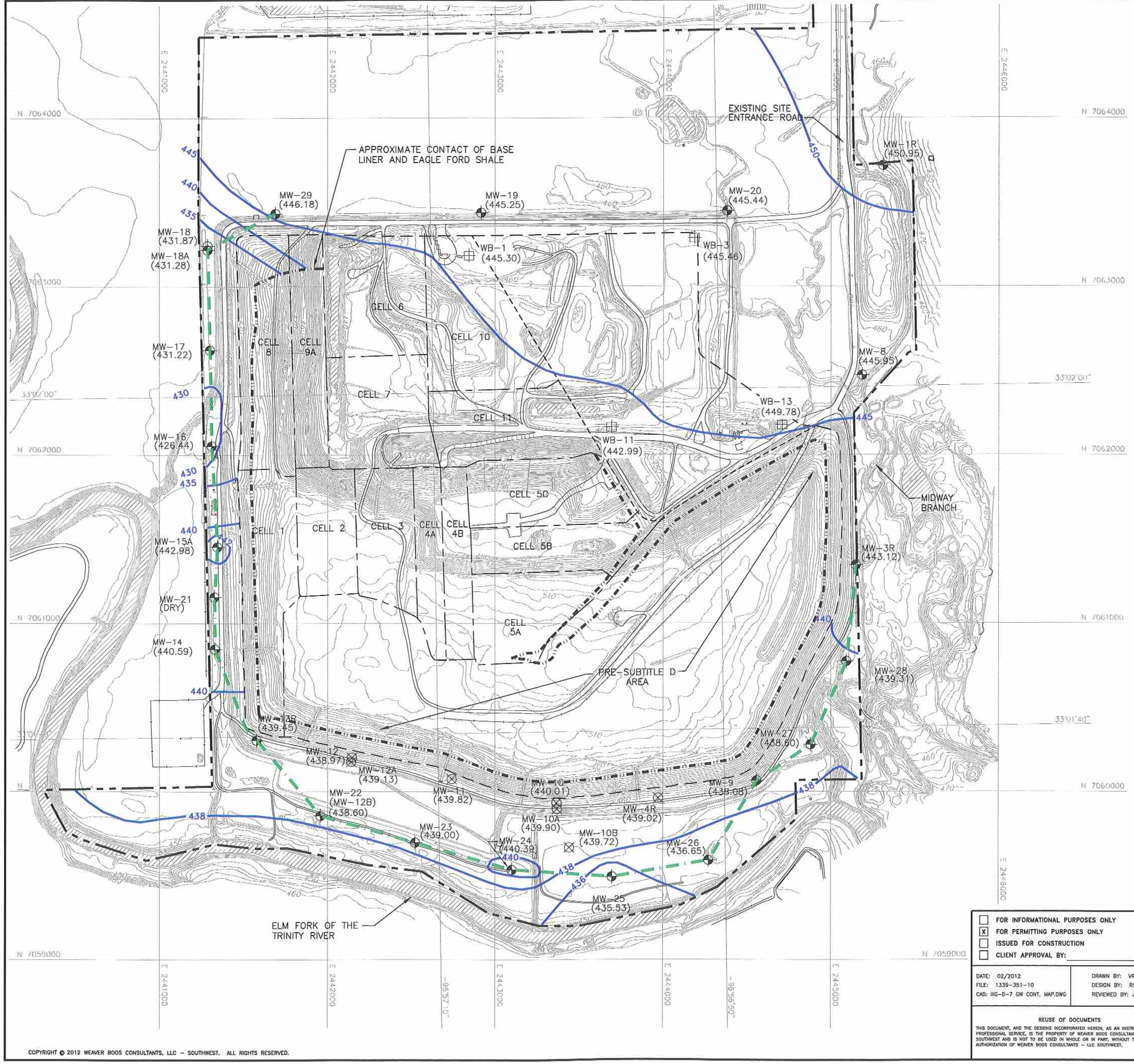
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-6

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-D-6 GW DEC 2008.dwg, 2/21/2012 4:43:22 PM, rsellers



N

0 300 600

SCALE IN FEET

LEGEND

- —— – – —— PERMIT BOUNDARY (SEE NOTE 2)
- - - - - - - - AUTHORIZED LIMITS OF WASTE
- — — — — PROPOSED LIMITS OF WASTE
- N 7064000 STATE PLANE COORDINATE SYSTEM
- ═ EXISTING ROAD
- ~~500~~ EXISTING TOPOGRAPHIC CONTOUR
- —430— GROUNDWATER ELEVATION CONTOUR (FT-MSL)
- 🟩 · 🟩 · 🟩 EXISTING PERMITTED POINT OF COMPLIANCE (TCEQ PERMIT NO. MSW-1312A)
- ▬ ·· ▬ ·· ▬ APPROXIMATE CONTACT WITH EAGLE FORD SHALE
- ⊕ MW-3R (443.12) EXISTING MONITORING WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- ⊗ MW-10 (440.01) OBSERVATION WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- ⊕ MW-18 (431.87) EXISTING MONITORING WELL TO BE REMOVED FOLLOWING BACKGROUND DATA EVALUATION REPORT SUBMITTAL FOR MONITORING WELL MW-18A.
- ⊞ PWB-1 (445.30) EXISTING EXPANSION AREA PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. WATER LEVEL MEASUREMENTS COLLECTED BY WBC ON DECEMBER 5, 2010. POTENTIOMETRIC CONTOURS INTERPRETED BY WBC.

Robert S. Ferbend

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-7 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT POTENTIOMETRIC SURFACE MAP DECEMBER 2010

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

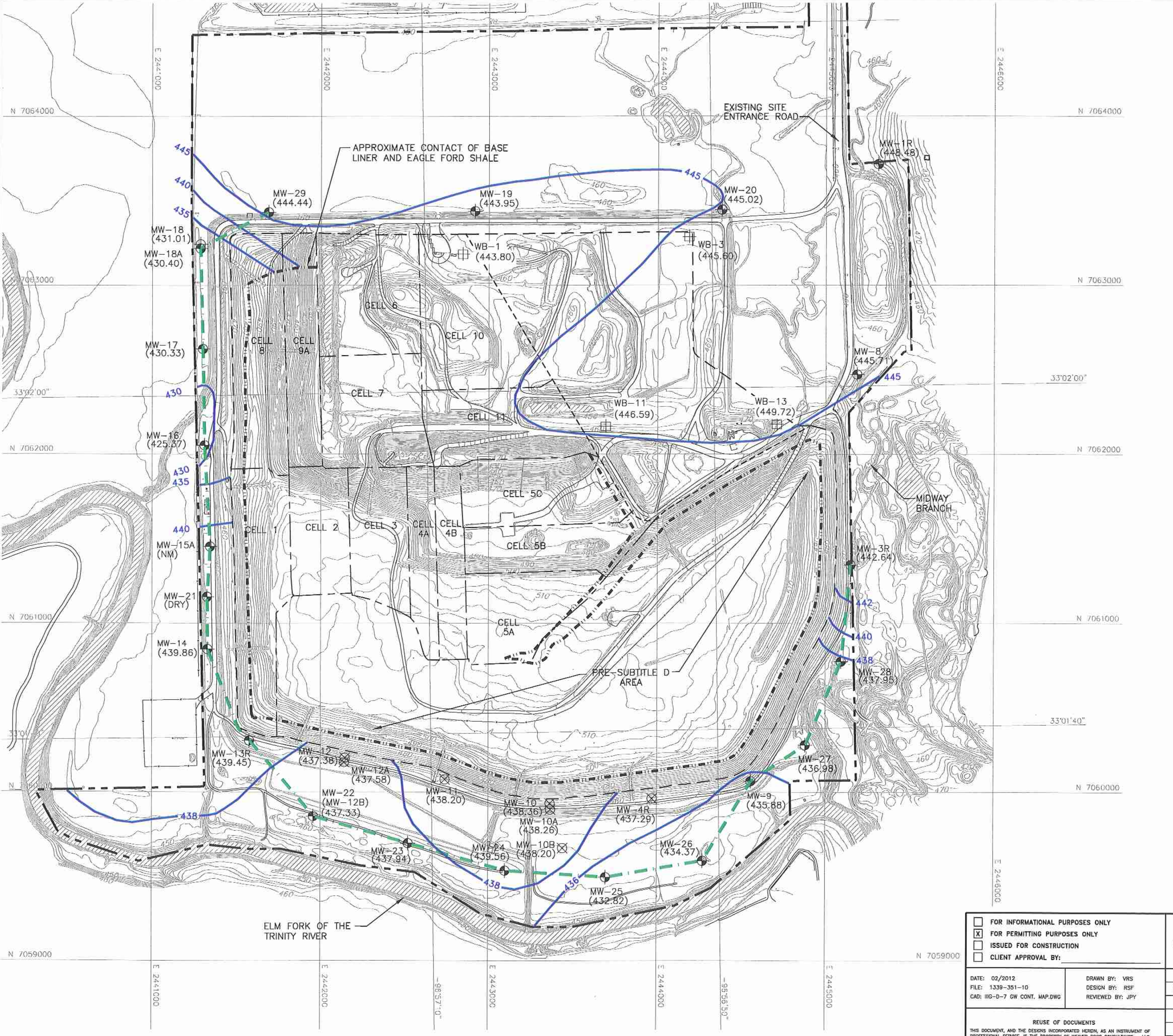
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-7

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-D-7 GW DEC 2010.dwg, 2/21/2012 4:44:12 PM, rsellers



N

0 300 600

SCALE IN FEET

LEGEND

— - — - —	PERMIT BOUNDARY (SEE NOTE 2)
- - - - - - -	AUTHORIZED LIMITS OF WASTE
— — — —	PROPOSED LIMITS OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
∼	EXISTING ROAD
500	EXISTING TOPOGRAPHIC CONTOUR
—430—	GROUNDWATER ELEVATION CONTOUR (FT-MSL)
— · — · —	EXISTING PERMITTED POINT OF COMPLIANCE (TCEQ PERMIT NO. MSW-1312A)
—··—··—	APPROXIMATE CONTACT WITH EAGLE FORD SHALE
MW-3R (442.64)	EXISTING MONITORING WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
MW-10 (438.36)	OBSERVATION WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
MW-18 (431.01)	EXISTING MONITORING WELL TO BE REMOVED FOLLOWING BACKGROUND DATA EVALUATION REPORT SUBMITTAL FOR MONITORING WELL MW-18A.
WB-1 (443.80)	EXISTING EXPANSION AREA PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. WATER LEVEL MEASUREMENTS COLLECTED BY WBC ON DECEMBER 21, 2011. POTENTIOMETRIC CONTOURS INTERPRETED BY WBC.
4. NM – NOT MEASURED DUE TO TOP OF PUMP ABOVE WATER TABLE.

ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend

2-27-12

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ______

DATE: 02/2012
FILE: 1339-351-10
CAD: IIIG-D-7 GW CONT. MAP.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS – LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT POTENTIOMETRIC SURFACE MAP DECEMBER 2011

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F-3727

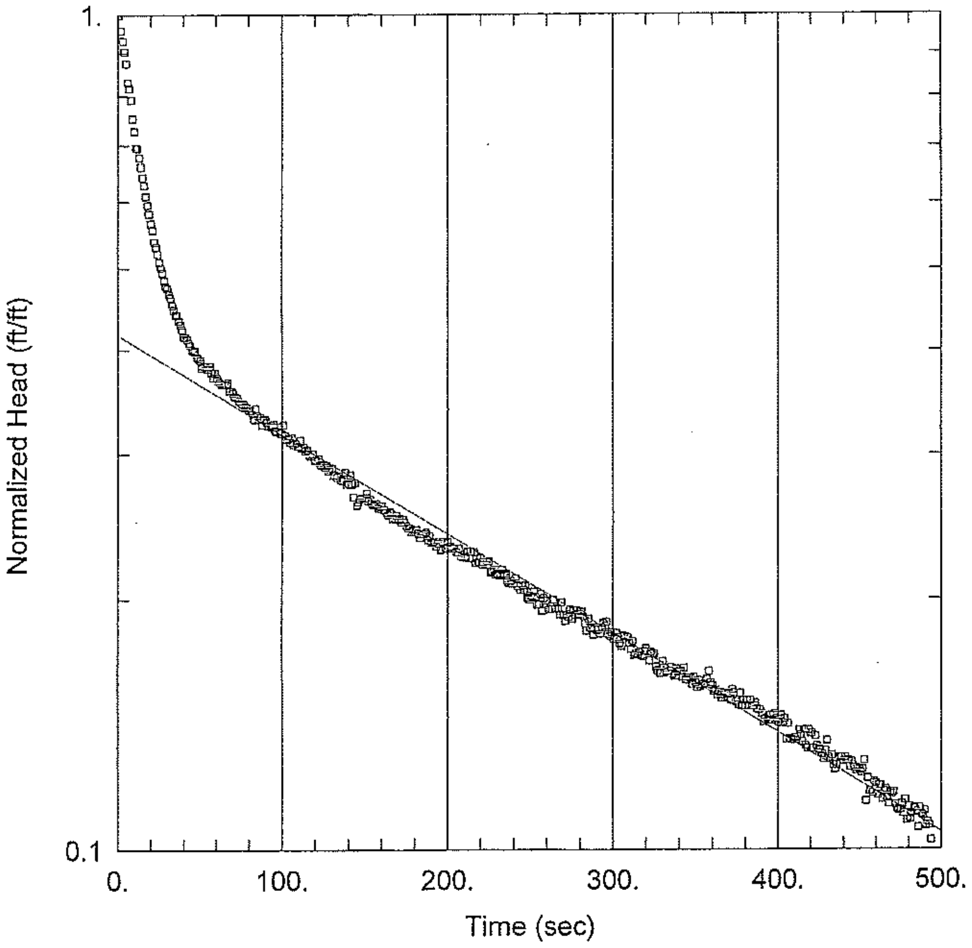
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIG-D-7A

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIG\IIIG-D-7A GW DEC 2011.dwg, 2/24/2012 1:48:26 PM, rsellers



WELL TEST ANALYSIS

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\PWB-1.aqt
Date: 04/14/11 Time: 11:41:32

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: PWB-1

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PWB-1)

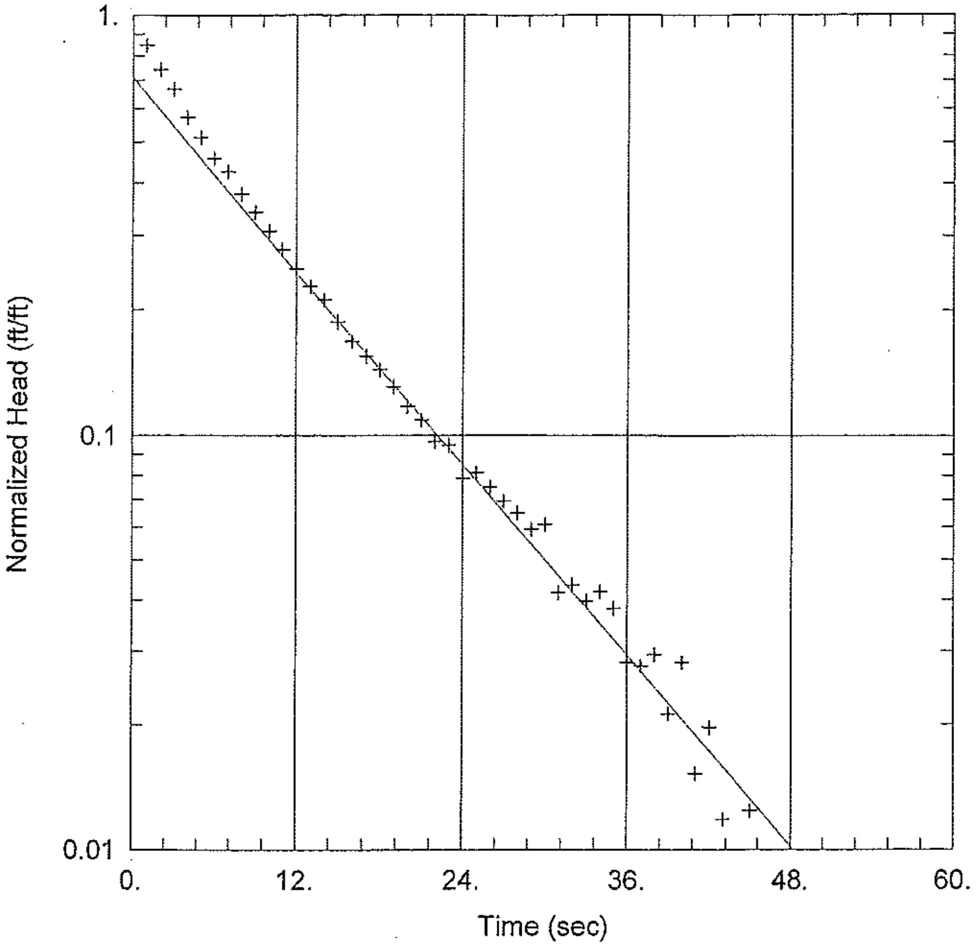
Initial Displacement: 2.274 ft
Total Well Penetration Depth: 8.5 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 10.7 ft
Screen Length: 8.5 ft
Well Radius: 0.354 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 8.167E-5 cm/sec
y0 = 0.9485 ft



PWB-3 RISING HEAD SLUG TEST

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\PWB-3.aqt
Date: 04/14/11 Time: 11:41:11

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: PWB-3

AQUIFER DATA

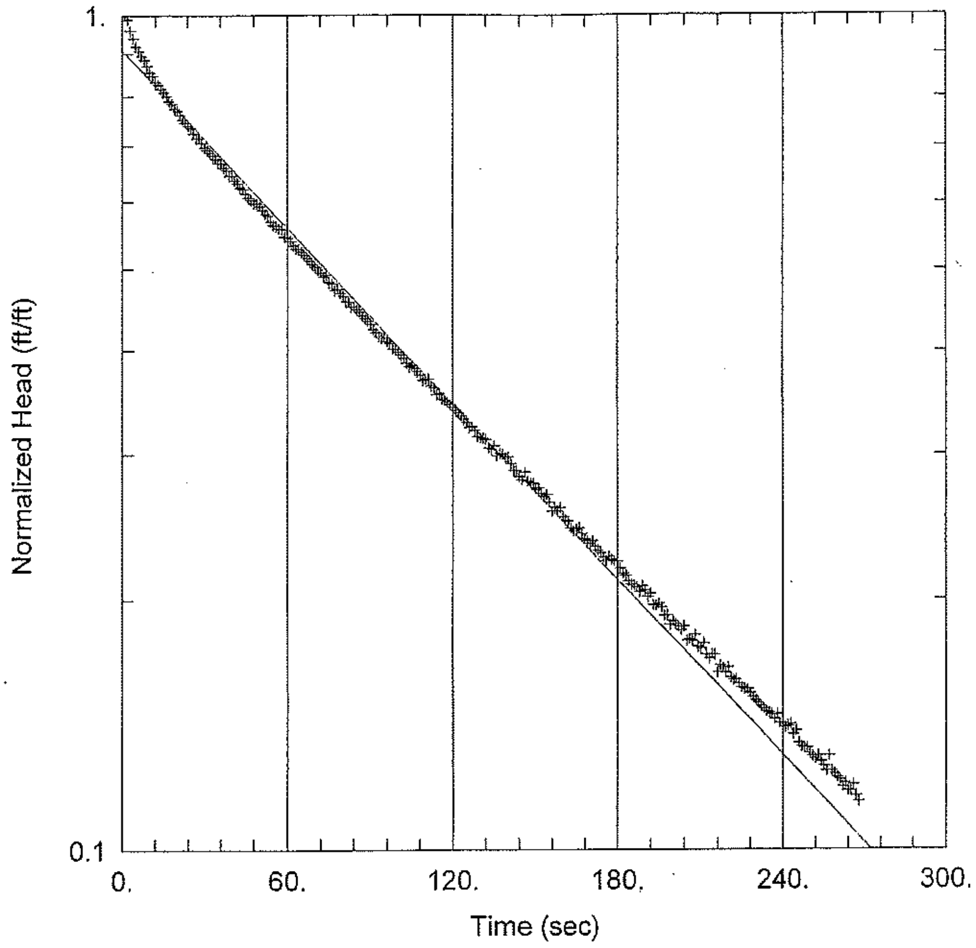
Saturated Thickness: 6.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PWB-3)

Initial Displacement: 1.41 ft
Total Well Penetration Depth: 6.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 7.7 ft
Screen Length: 6.7 ft
Well Radius: 0.3542 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.003033 cm/sec
y0 = 1.001 ft



PWB-13 RISING HEAD SLUG TEST

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\PWB-13.aqt
Date: 04/14/11 Time: 11:40:51

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: PWB-13

AQUIFER DATA

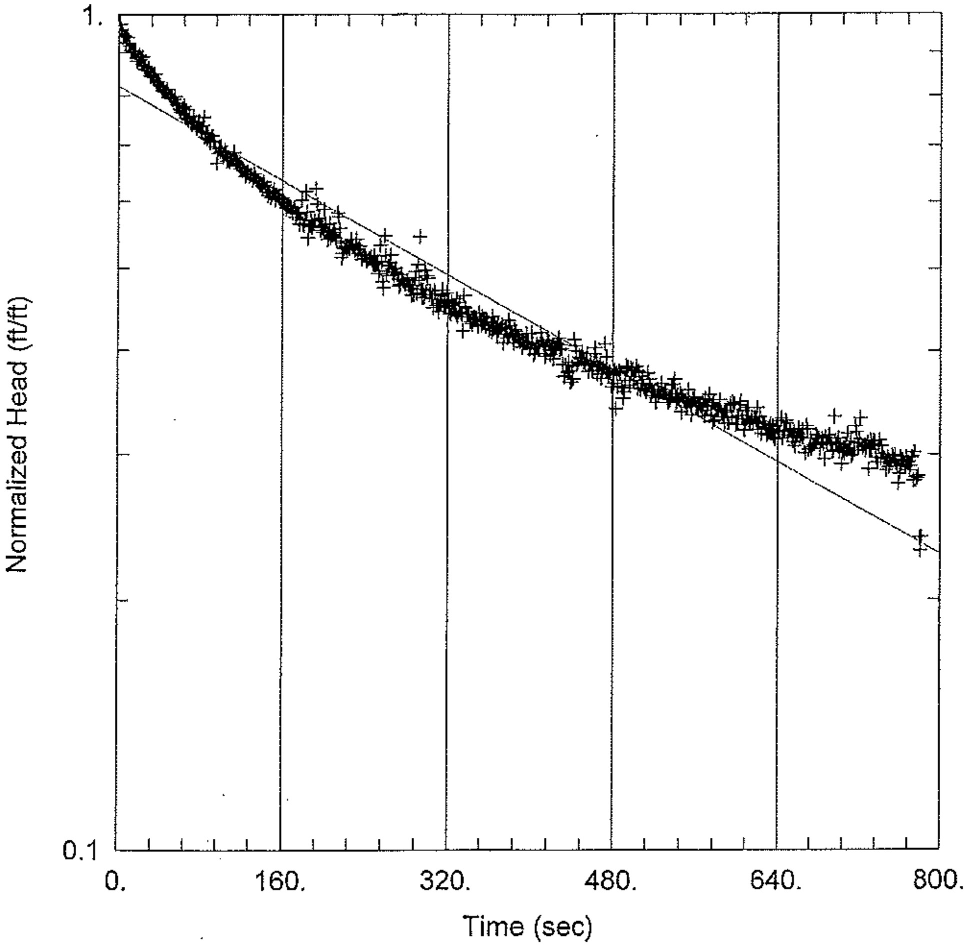
Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PWB-13)

Initial Displacement: 2.779 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 13.9 ft
Screen Length: 10. ft
Well Radius: 0.3542 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.0001893 cm/sec
y0 = 2.529 ft



MW-16 RISING HEAD SLUG TEST

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\MW-16.aqt
Date: 04/14/11 Time: 11:40:32

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: MW-16

AQUIFER DATA

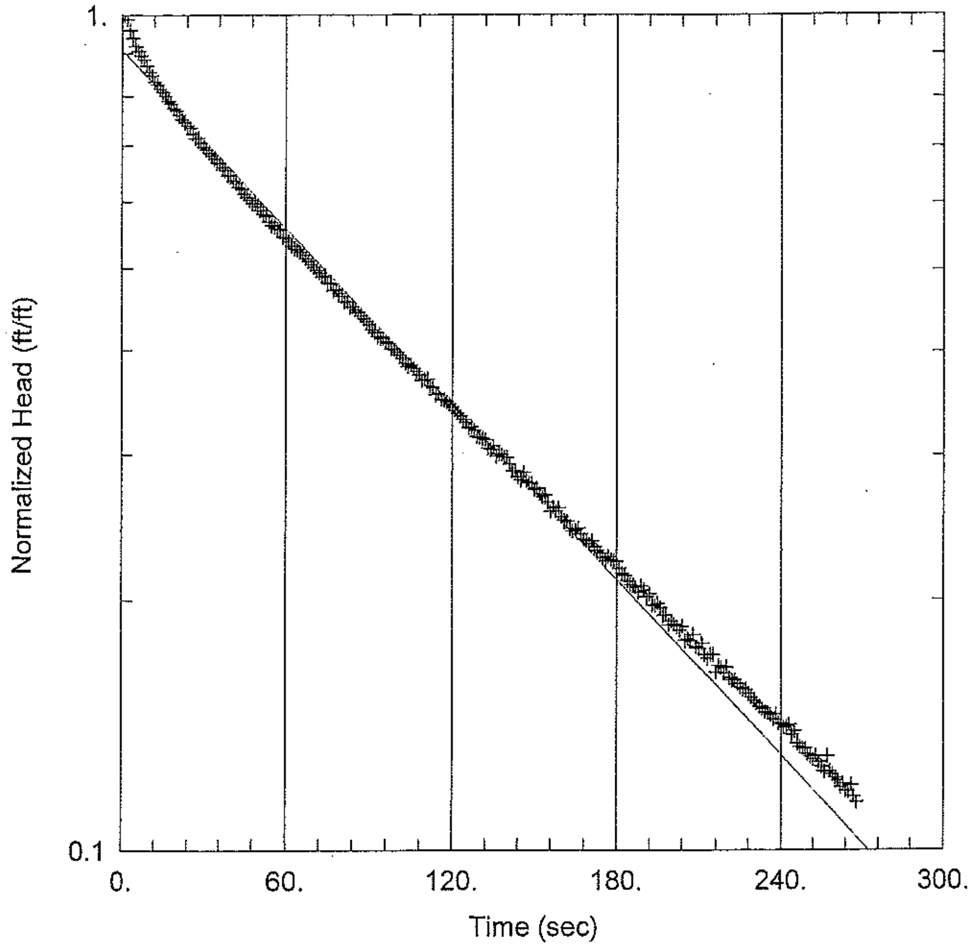
Saturated Thickness: 4. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16)

Initial Displacement: 1.07 ft
Total Well Penetration Depth: 4. ft
Casing Radius: 0.167 ft
Static Water Column Height: 4. ft
Screen Length: 4. ft
Well Radius: 0.4375 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0007458 cm/sec
y0 = 0.8801 ft



MW-23 RISING HEAD SLUG TEST

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\MW-23.aqt
Date: 04/14/11 Time: 11:40:12

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: MW-23

AQUIFER DATA

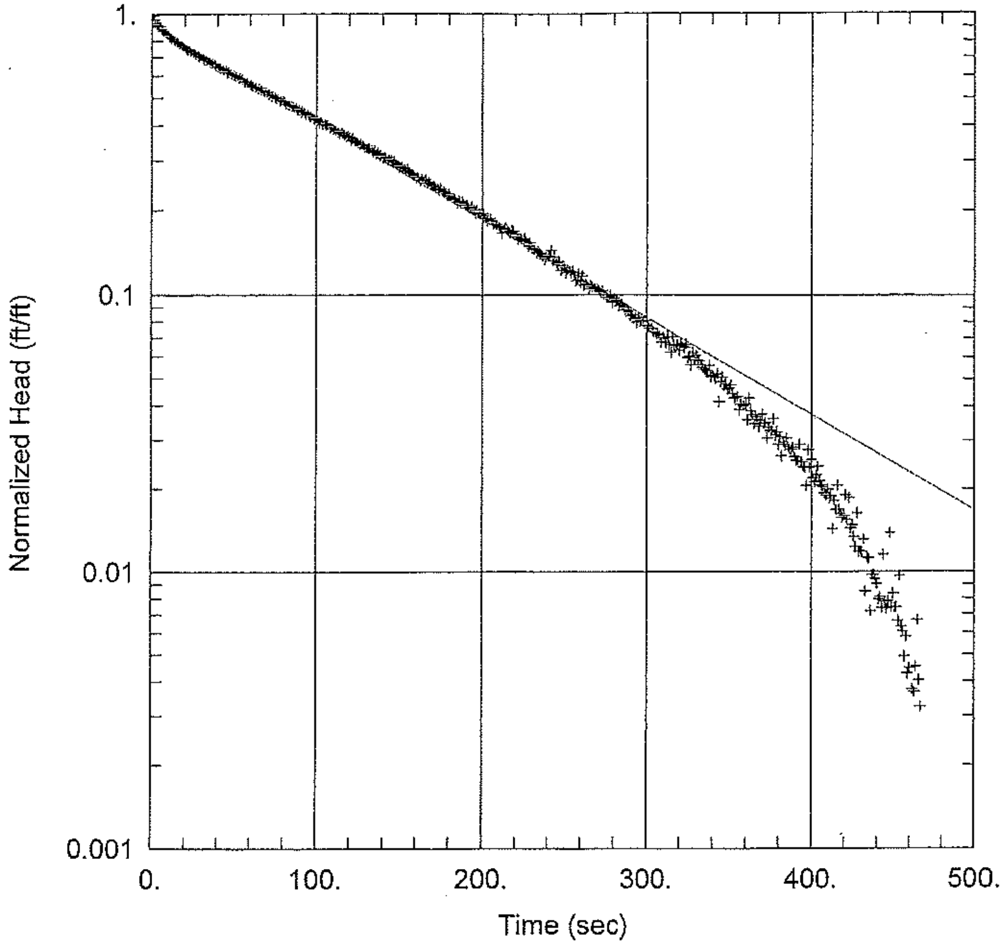
Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-23)

Initial Displacement: 2.779 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.47 ft
Screen Length: 3.5 ft
Well Radius: 0.3542 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.0004019 cm/sec
y0 = 2.529 ft



MW-28 RISING HEAD SLUG TEST

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\MW-28.aqt
Date: 04/14/11 Time: 11:39:52

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: MW-28

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-28)

Initial Displacement: 3.096 ft
Total Well Penetration Depth: 7.5 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.53 ft
Screen Length: 7.5 ft
Well Radius: 0.354 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.0002406 cm/sec
y0 = 2.836 ft

AQTESOLV for Windows

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\PWB-1.aqt
Date: 04/14/11
Time: 11:41:39

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: PWB-1

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PWB-1

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.274 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.354 ft
Well Skin Radius: 0.355 ft
Screen Length: 8.5 ft
Total Well Penetration Depth: 8.5 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.0833 ft
Gravel Pack Porosity: 0.3

No. of Observations: 494

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	2.274	248.	0.4571
2.	2.178	249.	0.4547
3.	2.118	250.	0.4599
4.	2.055	251.	0.4574
5.	1.992	252.	0.4651
6.	1.89	253.	0.4586
7.	1.86	254.	0.4483
8.	1.801	255.	0.4483
9.	1.713	256.	0.4619
10.	1.654	257.	0.4408
11.	1.583	258.	0.4568
12.	1.58	259.	0.4526
13.	1.541	260.	0.454
14.	1.502	261.	0.442
15.	1.459	262.	0.4434
16.	1.429	263.	0.443
17.	1.386	264.	0.4545
18.	1.353	265.	0.4437

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
19.	1.321	266.	0.4443
20.	1.286	267.	0.4427
21.	1.264	268.	0.4364
22.	1.223	269.	0.4512
23.	1.207	270.	0.4351
24.	1.185	271.	0.4285
25.	1.159	272.	0.4367
26.	1.142	273.	0.4326
27.	1.125	274.	0.4427
28.	1.1	275.	0.4306
29.	1.084	276.	0.441
30.	1.077	277.	0.4356
31.	1.061	278.	0.441
32.	1.051	279.	0.4373
33.	1.029	280.	0.4361
34.	1.017	281.	0.4397
35.	1.003	282.	0.4341
36.	1.001	283.	0.4254
37.	0.9855	284.	0.4169
38.	0.9751	285.	0.4308
39.	0.9634	286.	0.4203
40.	0.9433	287.	0.4189
41.	0.9425	288.	0.4121
42.	0.9369	289.	0.4207
43.	0.9286	290.	0.4175
44.	0.922	291.	0.4181
45.	0.9104	292.	0.4133
46.	0.9062	293.	0.4204
47.	0.9086	294.	0.4255
48.	0.8927	295.	0.4226
49.	0.8889	296.	0.4276
50.	0.8845	297.	0.4131
51.	0.8668	298.	0.4108
52.	0.8717	299.	0.4149
53.	0.8693	300.	0.4074
54.	0.8629	301.	0.4067
55.	0.8628	302.	0.4144
56.	0.8703	303.	0.4096
57.	0.8549	304.	0.4023
58.	0.843	305.	0.3993
59.	0.8541	306.	0.412
60.	0.8424	307.	0.411
61.	0.8366	308.	0.4108
62.	0.8314	309.	0.4096
63.	0.8281	310.	0.4028
64.	0.8281	311.	0.3961
65.	0.8283	312.	0.4051
66.	0.8265	313.	0.3895
67.	0.8308	314.	0.3916
68.	0.8135	315.	0.3892
69.	0.8137	316.	0.3931
70.	0.8084	317.	0.389
71.	0.8013	318.	0.3876

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
72.	0.7998	319.	0.394
73.	0.797	320.	0.3968
74.	0.7908	321.	0.3931
75.	0.7864	322.	0.3838
76.	0.7857	323.	0.3931
77.	0.7834	324.	0.3909
78.	0.778	325.	0.3914
79.	0.7766	326.	0.3773
80.	0.7705	327.	0.3732
81.	0.7708	328.	0.3708
82.	0.7633	329.	0.37
83.	0.7516	330.	0.3829
84.	0.7749	331.	0.3707
85.	0.7601	332.	0.3732
86.	0.7512	333.	0.3731
87.	0.7561	334.	0.3722
88.	0.7399	335.	0.3768
89.	0.7511	336.	0.3693
90.	0.752	337.	0.3674
91.	0.7456	338.	0.3751
92.	0.7378	339.	0.3714
93.	0.7404	340.	0.3723
94.	0.7356	341.	0.3721
95.	0.7417	342.	0.3666
96.	0.7284	343.	0.376
97.	0.7264	344.	0.3634
98.	0.737	345.	0.3635
99.	0.7232	346.	0.3661
100.	0.7232	347.	0.3652
101.	0.7397	348.	0.3595
102.	0.7195	349.	0.3669
103.	0.7113	350.	0.361
104.	0.7136	351.	0.3561
105.	0.7054	352.	0.363
106.	0.7154	353.	0.3576
107.	0.7012	354.	0.359
108.	0.7041	355.	0.3601
109.	0.6984	356.	0.3588
110.	0.6974	357.	0.3643
111.	0.709	358.	0.3723
112.	0.6936	359.	0.361
113.	0.6965	360.	0.3584
114.	0.6884	361.	0.3525
115.	0.6907	362.	0.3536
116.	0.6827	363.	0.3487
117.	0.6792	364.	0.3515
118.	0.684	365.	0.3459
119.	0.6836	366.	0.3459
120.	0.6717	367.	0.3509
121.	0.6707	368.	0.3503
122.	0.6746	369.	0.3489
123.	0.6627	370.	0.3497
124.	0.6611	371.	0.3435

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
125.	0.6638	372.	0.3538
126.	0.6582	373.	0.351
127.	0.662	374.	0.342
128.	0.6511	375.	0.3433
129.	0.6547	376.	0.3389
130.	0.6574	377.	0.3503
131.	0.644	378.	0.3379
132.	0.6447	379.	0.3433
133.	0.6402	380.	0.3386
134.	0.6428	381.	0.3433
135.	0.6356	382.	0.3379
136.	0.6338	383.	0.3437
137.	0.6377	384.	0.338
138.	0.6486	385.	0.3381
139.	0.627	386.	0.3407
140.	0.6286	387.	0.3354
141.	0.6447	388.	0.3343
142.	0.6274	389.	0.3347
143.	0.6056	390.	0.3312
144.	0.6297	391.	0.3233
145.	0.5921	392.	0.3258
146.	0.5974	393.	0.3271
147.	0.6022	394.	0.3245
148.	0.6052	395.	0.3296
149.	0.6033	396.	0.3246
150.	0.6044	397.	0.3291
151.	0.6121	398.	0.331
152.	0.5989	399.	0.3263
153.	0.6014	400.	0.3228
154.	0.5951	401.	0.3253
155.	0.5924	402.	0.3294
156.	0.5909	403.	0.3225
157.	0.5944	404.	0.3263
158.	0.5869	405.	0.3081
159.	0.5894	406.	0.3218
160.	0.5912	407.	0.3089
161.	0.5846	408.	0.3078
162.	0.5849	409.	0.3075
163.	0.5792	410.	0.3096
164.	0.576	411.	0.3076
165.	0.5811	412.	0.3097
166.	0.5793	413.	0.3165
167.	0.5696	414.	0.312
168.	0.5703	415.	0.3064
169.	0.575	416.	0.3166
170.	0.568	417.	0.3028
171.	0.5707	418.	0.3008
172.	0.5643	419.	0.3163
173.	0.569	420.	0.3133
174.	0.5641	421.	0.3134
175.	0.5589	422.	0.3006
176.	0.5552	423.	0.311
177.	0.5555	424.	0.3024

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
178.	0.5498	425.	0.2992
179.	0.5522	426.	0.2997
180.	0.5522	427.	0.2961
181.	0.5533	428.	0.292
182.	0.5472	429.	0.2986
183.	0.5402	430.	0.3071
184.	0.5458	431.	0.293
185.	0.5465	432.	0.2913
186.	0.5469	433.	0.295
187.	0.5488	434.	0.2872
188.	0.5364	435.	0.2837
189.	0.5432	436.	0.2869
190.	0.5332	437.	0.2931
191.	0.5348	438.	0.294
192.	0.5348	439.	0.2928
193.	0.5276	440.	0.2903
194.	0.5318	441.	0.2933
195.	0.5317	442.	0.2906
196.	0.5227	443.	0.2908
197.	0.5345	444.	0.2852
198.	0.535	445.	0.2898
199.	0.5242	446.	0.2867
200.	0.5337	447.	0.2848
201.	0.5266	448.	0.2827
202.	0.5275	449.	0.2845
203.	0.5249	450.	0.2832
204.	0.5246	451.	0.2814
205.	0.5195	452.	0.2839
206.	0.518	453.	0.2906
207.	0.5247	454.	0.26
208.	0.5134	455.	0.2769
209.	0.5126	456.	0.2668
210.	0.511	457.	0.2674
211.	0.5131	458.	0.2655
212.	0.5193	459.	0.274
213.	0.5096	460.	0.2727
214.	0.5199	461.	0.2642
215.	0.5102	462.	0.2717
216.	0.5189	463.	0.271
217.	0.5035	464.	0.2609
218.	0.5098	465.	0.2669
219.	0.5044	466.	0.2685
220.	0.511	467.	0.262
221.	0.5016	468.	0.2579
222.	0.5049	469.	0.2661
223.	0.5018	470.	0.2651
224.	0.5008	471.	0.2664
225.	0.5059	472.	0.2574
226.	0.4906	473.	0.2543
227.	0.4924	474.	0.2531
228.	0.4942	475.	0.2538
229.	0.4876	476.	0.2576
230.	0.4889	477.	0.2512

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
231.	0.4865	478.	0.2606
232.	0.4887	479.	0.2462
233.	0.4939	480.	0.2557
234.	0.4888	481.	0.2474
235.	0.4864	482.	0.251
236.	0.4796	483.	0.2544
237.	0.4764	484.	0.2552
238.	0.4796	485.	0.2521
239.	0.475	486.	0.2413
240.	0.476	487.	0.2551
241.	0.4823	488.	0.2507
242.	0.472	489.	0.25
243.	0.4717	490.	0.2526
244.	0.4675	491.	0.2429
245.	0.4734	492.	0.2452
246.	0.4674	493.	0.2432
247.	0.4726	494.	0.2333

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.379

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	8.167E-5	cm/sec
y0	0.9485	ft

T = K*b = 0.02116 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0001213	2.842E-6	+/- 5.584E-6	42.69	cm/sec
y0	1.275	0.01863	+/- 0.0366	68.46	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.03143 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.74

```
y0   0.74      1.00
```

Residual Statistics

for weighted residuals

```
Sum of Squares . . . . . . . 9.087 ft^2
Variance. . . . . . . . . . . . . 0.01847 ft^2
Std. Deviation. . . . . . . . . 0.1359 ft
Mean . . . . . . . . . . . . . . . 0.01103 ft
No. of Residuals. . . . . . . 494
No. of Estimates. . . . . . . 2
```

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\PWB-3.aqt
Title: PWB-3 Rising Head Slug Test
Date: 04/14/11
Time: 11:41:19

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: PWB-3

AQUIFER DATA

Saturated Thickness: 6.7 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PWB-3

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.41 ft
Static Water Column Height: 7.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3542 ft
Well Skin Radius: 0.3543 ft
Screen Length: 6.7 ft
Total Well Penetration Depth: 6.7 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.0833 ft
Gravel Pack Porosity: 0.3

No. of Observations: 51

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	1.196	27.	0.09775
2.	1.046	28.	0.09148
3.	0.94	29.	0.08357
4.	0.8059	30.	0.08581
5.	0.7225	31.	0.05876
6.	0.6455	32.	0.06123
7.	0.5993	33.	0.05603
8.	0.5308	34.	0.0591
9.	0.4799	35.	0.05378
10.	0.4335	36.	0.03983
11.	0.392	37.	0.03901
12.	0.3528	38.	0.04161
13.	0.3203	39.	0.0299
14.	0.2978	40.	0.03983
15.	0.2641	41.	0.02151
16.	0.237	42.	0.02778
17.	0.2186	43.	0.01667

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	0.2033	44.	0.01241
19.	0.1844	45.	0.0175
20.	0.1657	46.	0.006741
21.	0.1535	47.	0.005676
22.	0.1361	48.	0.006032
23.	0.1335	49.	0.006265
24.	0.111	50.	0.005676
25.	0.1144	51.	0.
26.	0.1058		

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.173

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.003033	cm/sec
y0	1.001	ft

T = K*b = 0.6194 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.003565	4.697E-5	+/- 9.442E-5	75.89	cm/sec
y0	1.266	0.01234	+/- 0.0248	102.6	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.728 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.75
y0	0.75	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . 0.01437 ft^2
Variance. . . . . 0.0002932 ft^2

```
Std. Deviation. . . . . . . . . 0.01712 ft
Mean . . . . . . . . . . . . . . . 0.004867 ft
No. of Residuals. . . . . . . 51
No. of Estimates. . . . . . . 2
```

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\PWB-13.aqt
Title: PWB-13 Rising Head Slug Test
Date: 04/14/11
Time: 11:40:58

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: PWB-13

AQUIFER DATA

Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PWB-13

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.779 ft
Static Water Column Height: 13.9 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3542 ft
Well Skin Radius: 0.3542 ft
Screen Length: 10. ft
Total Well Penetration Depth: 10. ft
Corrected Casing Radius (Bouwer-Rice Method): 0.0833 ft
Gravel Pack Porosity: 0.3

No. of Observations: 268

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	2.779	135.	0.8539
2.	2.747	136.	0.8308
3.	2.665	137.	0.8352
4.	2.608	138.	0.834
5.	2.55	139.	0.8266
6.	2.52	140.	0.8278
7.	2.488	141.	0.8112
8.	2.46	142.	0.7963
9.	2.42	143.	0.7965
10.	2.378	144.	0.7839
11.	2.354	145.	0.7765
12.	2.316	146.	0.793
13.	2.297	147.	0.7736
14.	2.272	148.	0.7704
15.	2.25	149.	0.7691
16.	2.227	150.	0.7563
17.	2.197	151.	0.7593

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	2.183	152.	0.7477
19.	2.154	153.	0.7409
20.	2.143	154.	0.745
21.	2.117	155.	0.7295
22.	2.091	156.	0.7117
23.	2.073	157.	0.7203
24.	2.056	158.	0.7124
25.	2.044	159.	0.7182
26.	2.011	160.	0.7002
27.	1.986	161.	0.6943
28.	1.988	162.	0.6919
29.	1.962	163.	0.6785
30.	1.939	164.	0.6734
31.	1.926	165.	0.6761
32.	1.909	166.	0.6788
33.	1.895	167.	0.6682
34.	1.878	168.	0.6581
35.	1.858	169.	0.6553
36.	1.852	170.	0.6503
37.	1.834	171.	0.655
38.	1.82	172.	0.6438
39.	1.793	173.	0.6377
40.	1.794	174.	0.6334
41.	1.77	175.	0.625
42.	1.758	176.	0.6191
43.	1.736	177.	0.6266
44.	1.729	178.	0.6222
45.	1.708	179.	0.6193
46.	1.69	180.	0.6183
47.	1.678	181.	0.6068
48.	1.663	182.	0.598
49.	1.662	183.	0.5951
50.	1.65	184.	0.5857
51.	1.631	185.	0.58
52.	1.615	186.	0.5792
53.	1.608	187.	0.5756
54.	1.583	188.	0.5676
55.	1.568	189.	0.5775
56.	1.564	190.	0.5714
57.	1.554	191.	0.5605
58.	1.548	192.	0.5654
59.	1.518	193.	0.548
60.	1.514	194.	0.5472
61.	1.501	195.	0.5502
62.	1.482	196.	0.5439
63.	1.47	197.	0.532
64.	1.466	198.	0.5324
65.	1.456	199.	0.5182
66.	1.445	200.	0.5234
67.	1.432	201.	0.519
68.	1.421	202.	0.5159
69.	1.409	203.	0.5107
70.	1.398	204.	0.5159

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
71.	1.388	205.	0.4961
72.	1.378	206.	0.4982
73.	1.36	207.	0.4952
74.	1.368	208.	0.5041
75.	1.341	209.	0.4878
76.	1.336	210.	0.4854
77.	1.312	211.	0.4925
78.	1.317	212.	0.4773
79.	1.302	213.	0.4723
80.	1.292	214.	0.4776
81.	1.272	215.	0.477
82.	1.271	216.	0.4543
83.	1.252	217.	0.4625
84.	1.255	218.	0.4599
85.	1.245	219.	0.4534
86.	1.236	220.	0.4601
87.	1.223	221.	0.4475
88.	1.213	222.	0.4444
89.	1.204	223.	0.4447
90.	1.194	224.	0.4401
91.	1.178	225.	0.4353
92.	1.168	226.	0.4332
93.	1.157	227.	0.4329
94.	1.15	228.	0.4286
95.	1.15	229.	0.4237
96.	1.14	230.	0.4197
97.	1.134	231.	0.4171
98.	1.117	232.	0.4129
99.	1.114	233.	0.4106
100.	1.107	234.	0.4069
101.	1.098	235.	0.4062
102.	1.088	236.	0.4037
103.	1.073	237.	0.399
104.	1.064	238.	0.4045
105.	1.068	239.	0.3944
106.	1.059	240.	0.3938
107.	1.049	241.	0.3899
108.	1.039	242.	0.391
109.	1.023	243.	0.3931
110.	1.027	244.	0.3822
111.	1.027	245.	0.3861
112.	1.008	246.	0.3731
113.	1.002	247.	0.3694
114.	0.9837	248.	0.368
115.	0.9883	249.	0.3683
116.	0.9718	250.	0.3622
117.	0.9702	251.	0.3596
118.	0.9652	252.	0.3571
119.	0.9578	253.	0.3605
120.	0.9503	254.	0.3544
121.	0.9422	255.	0.3502
122.	0.935	256.	0.3453
123.	0.9277	257.	0.3603

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
124.	0.9189	258.	0.3454
125.	0.9111	259.	0.3426
126.	0.8976	260.	0.3393
127.	0.9004	261.	0.337
128.	0.8913	262.	0.3307
129.	0.8756	263.	0.3341
130.	0.8738	264.	0.3272
131.	0.873	265.	0.3268
132.	0.8686	266.	0.3327
133.	0.8481	267.	0.3225
134.	0.8455	268.	0.3174

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.209

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0006529	cm/sec
y0	2.529	ft

T = K*b = 0.3184 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0001893	9.264E-7	+/- 1.824E-6	204.4	cm/sec
y0	2.529	0.007911	+/- 0.01558	319.8	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.09233 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.74
y0	0.74	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . 0.4535 ft^2
Variance. . . . . 0.001705 ft^2
Std. Deviation. . . . . 0.04129 ft
Mean . . . . 0.004536 ft
No. of Residuals. 268
No. of Estimates. 2

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\MW-16.aqt
Title: MW-16 Rising Head Slug Test
Date: 04/14/11
Time: 11:40:22

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: MW-16

AQUIFER DATA

Saturated Thickness: 4. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-16

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.07 ft
Static Water Column Height: 4. ft
Casing Radius: 0.167 ft
Well Radius: 0.4375 ft
Well Skin Radius: 0.4376 ft
Screen Length: 4. ft
Total Well Penetration Depth: 4. ft
Corrected Casing Radius (Bouwer-Rice Method): 0.2774 ft
Gravel Pack Porosity: 0.3

No. of Observations: 782

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	1.07	392.	0.4315
2.	1.042	393.	0.439
3.	1.027	394.	0.436
4.	1.017	395.	0.4372
5.	1.013	396.	0.4478
6.	1.009	397.	0.4375
7.	0.9906	398.	0.4376
8.	1.004	399.	0.4285
9.	0.9879	400.	0.4305
10.	0.9901	401.	0.4478
11.	0.9817	402.	0.4373
12.	0.9702	403.	0.4226
13.	0.9637	404.	0.4242
14.	0.9688	405.	0.432
15.	0.9692	406.	0.4352
16.	0.967	407.	0.4337
17.	0.95	408.	0.4318

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	0.9417	409.	0.4362
19.	0.9525	410.	0.4491
20.	0.9587	411.	0.4397
21.	0.9465	412.	0.4352
22.	0.9342	413.	0.4341
23.	0.9536	414.	0.4203
24.	0.9282	415.	0.4239
25.	0.9219	416.	0.4404
26.	0.9305	417.	0.4379
27.	0.9186	418.	0.4383
28.	0.922	419.	0.4223
29.	0.9257	420.	0.4331
30.	0.9041	421.	0.4286
31.	0.9124	422.	0.4177
32.	0.9048	423.	0.427
33.	0.9023	424.	0.4315
34.	0.8989	425.	0.4357
35.	0.9101	426.	0.4345
36.	0.8874	427.	0.4421
37.	0.8877	428.	0.4281
38.	0.8913	429.	0.4345
39.	0.8813	430.	0.4296
40.	0.8838	431.	0.4112
41.	0.8777	432.	0.3978
42.	0.8677	433.	0.398
43.	0.8695	434.	0.4104
44.	0.865	435.	0.4025
45.	0.8679	436.	0.4019
46.	0.8643	437.	0.4136
47.	0.8733	438.	0.4039
48.	0.8639	439.	0.3919
49.	0.8583	440.	0.4087
50.	0.857	441.	0.3947
51.	0.8511	442.	0.4404
52.	0.8561	443.	0.4328
53.	0.848	444.	0.4269
54.	0.8492	445.	0.4111
55.	0.8553	446.	0.4127
56.	0.837	447.	0.4193
57.	0.8412	448.	0.4172
58.	0.8343	449.	0.4172
59.	0.8276	450.	0.4255
60.	0.8238	451.	0.4132
61.	0.8193	452.	0.4152
62.	0.8287	453.	0.4105
63.	0.8167	454.	0.416
64.	0.8334	455.	0.4237
65.	0.8077	456.	0.4032
66.	0.826	457.	0.4101
67.	0.8036	458.	0.412
68.	0.802	459.	0.4112
69.	0.8113	460.	0.4047
70.	0.798	461.	0.4031

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
71.	0.794	462.	0.4235
72.	0.7928	463.	0.4305
73.	0.8123	464.	0.4141
74.	0.7984	465.	0.4005
75.	0.7974	466.	0.4083
76.	0.7864	467.	0.4114
77.	0.7899	468.	0.4117
78.	0.7998	469.	0.3958
79.	0.7891	470.	0.4053
80.	0.7775	471.	0.4074
81.	0.7803	472.	0.4354
82.	0.7914	473.	0.4051
83.	0.8087	474.	0.42
84.	0.7665	475.	0.4024
85.	0.7761	476.	0.3999
86.	0.7627	477.	0.4033
87.	0.7731	478.	0.4016
88.	0.7598	479.	0.3864
89.	0.7548	480.	0.3997
90.	0.7564	481.	0.3903
91.	0.7693	482.	0.4049
92.	0.7685	483.	0.3642
93.	0.7584	484.	0.4031
94.	0.758	485.	0.387
95.	0.7456	486.	0.4039
96.	0.7132	487.	0.4017
97.	0.7335	488.	0.3865
98.	0.742	489.	0.3858
99.	0.7362	490.	0.3748
100.	0.7463	491.	0.3815
101.	0.7384	492.	0.3937
102.	0.734	493.	0.4102
103.	0.7296	494.	0.4067
104.	0.7379	495.	0.4087
105.	0.7352	496.	0.3886
106.	0.7184	497.	0.4077
107.	0.7218	498.	0.4043
108.	0.7174	499.	0.4059
109.	0.7171	500.	0.3939
110.	0.7214	501.	0.3983
111.	0.7203	502.	0.4043
112.	0.7242	503.	0.4094
113.	0.7345	504.	0.385
114.	0.7187	505.	0.4044
115.	0.7167	506.	0.4026
116.	0.7139	507.	0.3846
117.	0.7105	508.	0.3904
118.	0.7082	509.	0.3986
119.	0.7028	510.	0.3865
120.	0.7076	511.	0.3838
121.	0.6992	512.	0.3821
122.	0.7015	513.	0.3847
123.	0.6987	514.	0.4023

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
124.	0.6886	515.	0.395
125.	0.6913	516.	0.3884
126.	0.6966	517.	0.3777
127.	0.6968	518.	0.3845
128.	0.6896	519.	0.3811
129.	0.6918	520.	0.384
130.	0.6915	521.	0.3753
131.	0.6816	522.	0.3705
132.	0.6831	523.	0.3846
133.	0.6934	524.	0.3793
134.	0.687	525.	0.381
135.	0.6846	526.	0.3812
136.	0.679	527.	0.3906
137.	0.6774	528.	0.3806
138.	0.6751	529.	0.3799
139.	0.6759	530.	0.3841
140.	0.671	531.	0.3815
141.	0.6689	532.	0.3745
142.	0.6781	533.	0.3705
143.	0.6727	534.	0.3768
144.	0.6602	535.	0.3729
145.	0.6685	536.	0.3892
146.	0.6534	537.	0.3799
147.	0.6598	538.	0.3902
148.	0.6577	539.	0.3951
149.	0.6504	540.	0.3799
150.	0.6542	541.	0.371
151.	0.6585	542.	0.3789
152.	0.6634	543.	0.3737
153.	0.6464	544.	0.3749
154.	0.6553	545.	0.3803
155.	0.6529	546.	0.361
156.	0.6521	547.	0.3768
157.	0.6526	548.	0.3732
158.	0.6428	549.	0.3709
159.	0.6452	550.	0.3723
160.	0.6494	551.	0.3657
161.	0.6453	552.	0.3703
162.	0.6386	553.	0.3839
163.	0.6367	554.	0.371
164.	0.6298	555.	0.3702
165.	0.6349	556.	0.3583
166.	0.6367	557.	0.375
167.	0.6346	558.	0.3741
168.	0.6345	559.	0.3768
169.	0.6298	560.	0.3665
170.	0.6229	561.	0.3666
171.	0.6315	562.	0.366
172.	0.6323	563.	0.3687
173.	0.6157	564.	0.3669
174.	0.6207	565.	0.3675
175.	0.6218	566.	0.3624
176.	0.6221	567.	0.3702

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
177.	0.6041	568.	0.3569
178.	0.6136	569.	0.3748
179.	0.6453	570.	0.363
180.	0.6057	571.	0.3678
181.	0.6023	572.	0.3738
182.	0.6115	573.	0.3789
183.	0.6609	574.	0.3585
184.	0.6244	575.	0.3662
185.	0.5818	576.	0.3512
186.	0.6004	577.	0.3707
187.	0.6004	578.	0.3527
188.	0.6096	579.	0.363
189.	0.5992	580.	0.3639
190.	0.6032	581.	0.3639
191.	0.6084	582.	0.3646
192.	0.6103	583.	0.3736
193.	0.6659	584.	0.362
194.	0.6382	585.	0.3604
195.	0.6125	586.	0.356
196.	0.6148	587.	0.3603
197.	0.5946	588.	0.3498
198.	0.6002	589.	0.3628
199.	0.5978	590.	0.3604
200.	0.5909	591.	0.3502
201.	0.6292	592.	0.3502
202.	0.604	593.	0.3671
203.	0.5931	594.	0.3694
204.	0.5799	595.	0.3552
205.	0.5861	596.	0.3712
206.	0.6057	597.	0.3679
207.	0.5831	598.	0.3699
208.	0.588	599.	0.3487
209.	0.5849	600.	0.3569
210.	0.5953	601.	0.3489
211.	0.5907	602.	0.3577
212.	0.5818	603.	0.3678
213.	0.5774	604.	0.372
214.	0.6228	605.	0.3541
215.	0.6166	606.	0.3544
216.	0.5977	607.	0.344
217.	0.5738	608.	0.3431
218.	0.5518	609.	0.3622
219.	0.5581	610.	0.3537
220.	0.566	611.	0.3655
221.	0.5692	612.	0.3519
222.	0.567	613.	0.35
223.	0.5648	614.	0.3537
224.	0.5695	615.	0.3562
225.	0.5649	616.	0.3493
226.	0.5716	617.	0.3553
227.	0.5801	618.	0.3568
228.	0.5694	619.	0.3519
229.	0.5677	620.	0.3656

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
230.	0.563	621.	0.3438
231.	0.571	622.	0.3519
232.	0.5805	623.	0.3568
233.	0.5583	624.	0.3401
234.	0.566	625.	0.3519
235.	0.5693	626.	0.3495
236.	0.5545	627.	0.3488
237.	0.5494	628.	0.3461
238.	0.5562	629.	0.3386
239.	0.5539	630.	0.3391
240.	0.5548	631.	0.3445
241.	0.5507	632.	0.3469
242.	0.5466	633.	0.3496
243.	0.5494	634.	0.3398
244.	0.5509	635.	0.348
245.	0.5492	636.	0.3368
246.	0.5532	637.	0.3353
247.	0.5465	638.	0.3347
248.	0.5433	639.	0.3472
249.	0.5555	640.	0.3417
250.	0.5413	641.	0.343
251.	0.5435	642.	0.3418
252.	0.5463	643.	0.3518
253.	0.5282	644.	0.3551
254.	0.5313	645.	0.3357
255.	0.5707	646.	0.3423
256.	0.5447	647.	0.3422
257.	0.5158	648.	0.3527
258.	0.5076	649.	0.3501
259.	0.5855	650.	0.3385
260.	0.5541	651.	0.3443
261.	0.5253	652.	0.3434
262.	0.5403	653.	0.3421
263.	0.5385	654.	0.3364
264.	0.5439	655.	0.3323
265.	0.5559	656.	0.3413
266.	0.5339	657.	0.3287
267.	0.5292	658.	0.3377
268.	0.5252	659.	0.3368
269.	0.5306	660.	0.3402
270.	0.5358	661.	0.3453
271.	0.5261	662.	0.3368
272.	0.52	663.	0.3396
273.	0.5103	664.	0.3366
274.	0.5123	665.	0.3439
275.	0.5273	666.	0.3361
276.	0.5185	667.	0.3226
277.	0.5199	668.	0.3224
278.	0.5138	669.	0.3474
279.	0.5128	670.	0.3444
280.	0.518	671.	0.3254
281.	0.5188	672.	0.3278
282.	0.5111	673.	0.3358

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
283.	0.5083	674.	0.3259
284.	0.505	675.	0.3295
285.	0.4979	676.	0.3297
286.	0.511	677.	0.3298
287.	0.4984	678.	0.3391
288.	0.5223	679.	0.3381
289.	0.5309	680.	0.3351
290.	0.5004	681.	0.3364
291.	0.5413	682.	0.3263
292.	0.5187	683.	0.3322
293.	0.5838	684.	0.3354
294.	0.5066	685.	0.3307
295.	0.4946	686.	0.3169
296.	0.5049	687.	0.3365
297.	0.4943	688.	0.3312
298.	0.5327	689.	0.3322
299.	0.5035	690.	0.3385
300.	0.5247	691.	0.3391
301.	0.5212	692.	0.3294
302.	0.4984	693.	0.3302
303.	0.5034	694.	0.323
304.	0.4922	695.	0.3245
305.	0.4984	696.	0.357
306.	0.4809	697.	0.3313
307.	0.5032	698.	0.3295
308.	0.4985	699.	0.3316
309.	0.4836	700.	0.336
310.	0.4921	701.	0.3235
311.	0.4757	702.	0.3293
312.	0.4909	703.	0.3125
313.	0.4864	704.	0.3236
314.	0.4978	705.	0.3276
315.	0.5042	706.	0.322
316.	0.4807	707.	0.3302
317.	0.489	708.	0.3242
318.	0.4823	709.	0.3404
319.	0.5002	710.	0.3251
320.	0.4864	711.	0.3251
321.	0.4907	712.	0.3326
322.	0.4744	713.	0.3195
323.	0.4721	714.	0.3208
324.	0.4884	715.	0.3244
325.	0.4844	716.	0.3242
326.	0.4827	717.	0.3473
327.	0.4758	718.	0.3422
328.	0.4715	719.	0.331
329.	0.4922	720.	0.3271
330.	0.469	721.	0.3352
331.	0.4759	722.	0.3551
332.	0.4872	723.	0.3307
333.	0.4734	724.	0.3276
334.	0.4718	725.	0.3287
335.	0.4509	726.	0.3301

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
336.	0.4969	727.	0.3251
337.	0.4825	728.	0.327
338.	0.4798	729.	0.3317
339.	0.4718	730.	0.3079
340.	0.4723	731.	0.3253
341.	0.4721	732.	0.3341
342.	0.4618	733.	0.325
343.	0.4682	734.	0.3306
344.	0.4595	735.	0.3336
345.	0.4689	736.	0.3325
346.	0.4685	737.	0.318
347.	0.4689	738.	0.3137
348.	0.4673	739.	0.3137
349.	0.4679	740.	0.3281
350.	0.4569	741.	0.3341
351.	0.4739	742.	0.3171
352.	0.4659	743.	0.3289
353.	0.4582	744.	0.3216
354.	0.4691	745.	0.3174
355.	0.4632	746.	0.3179
356.	0.4678	747.	0.3072
357.	0.4573	748.	0.3159
358.	0.4669	749.	0.3181
359.	0.462	750.	0.3098
360.	0.4523	751.	0.3122
361.	0.4534	752.	0.3154
362.	0.4595	753.	0.3201
363.	0.4507	754.	0.3193
364.	0.4694	755.	0.3158
365.	0.4533	756.	0.3206
366.	0.4602	757.	0.313
367.	0.456	758.	0.3102
368.	0.4468	759.	0.2958
369.	0.4607	760.	0.3041
370.	0.4511	761.	0.3186
371.	0.4546	762.	0.3118
372.	0.4555	763.	0.3165
373.	0.4584	764.	0.3154
374.	0.4364	765.	0.3146
375.	0.4469	766.	0.3096
376.	0.4538	767.	0.3186
377.	0.4541	768.	0.3137
378.	0.442	769.	0.3147
379.	0.464	770.	0.3069
380.	0.4448	771.	0.3109
381.	0.458	772.	0.3182
382.	0.4486	773.	0.3189
383.	0.4425	774.	0.2986
384.	0.4361	775.	0.3231
385.	0.4527	776.	0.2984
386.	0.4504	777.	0.3016
387.	0.4454	778.	0.3001
388.	0.4426	779.	0.3026

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
389.	0.441	780.	0.2544
390.	0.4372	781.	0.2452
391.	0.4397	782.	0.2549

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.583

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0009473	cm/sec
y0	0.8801	ft

T = K*b = 0.1155 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0007458	6.581E-6	+/- 1.292E-5	113.3	cm/sec
y0	0.8801	0.003873	+/- 0.007603	227.2	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.09092 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.78
y0	0.78	1.00

Residual Statistics

for weighted residuals

Sum of Squares	1.31 ft^2
Variance.............	0.001679 ft^2
Std. Deviation.........	0.04098 ft
Mean	0.002098 ft
No. of Residuals.......	782
No. of Estimates.......	2

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\MW-23.aqt
Title: MW-23 Rising Head Slug Test
Date: 04/14/11
Time: 11:40:06

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: MW-23

AQUIFER DATA

Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-23

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.779 ft
Static Water Column Height: 10.47 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3542 ft
Well Skin Radius: 0.3543 ft
Screen Length: 3.5 ft
Total Well Penetration Depth: 3.5 ft
Corrected Casing Radius (Butler Method): 0.0833 ft
Expected Initial Displacement: 2.4 ft

No. of Observations: 268

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	2.779	135.	0.8539
2.	2.747	136.	0.8308
3.	2.665	137.	0.8352
4.	2.608	138.	0.834
5.	2.55	139.	0.8266
6.	2.52	140.	0.8278
7.	2.488	141.	0.8112
8.	2.46	142.	0.7963
9.	2.42	143.	0.7965
10.	2.378	144.	0.7839
11.	2.354	145.	0.7765
12.	2.316	146.	0.793
13.	2.297	147.	0.7736
14.	2.272	148.	0.7704
15.	2.25	149.	0.7691
16.	2.227	150.	0.7563
17.	2.197	151.	0.7593

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	2.183	152.	0.7477
19.	2.154	153.	0.7409
20.	2.143	154.	0.745
21.	2.117	155.	0.7295
22.	2.091	156.	0.7117
23.	2.073	157.	0.7203
24.	2.056	158.	0.7124
25.	2.044	159.	0.7182
26.	2.011	160.	0.7002
27.	1.986	161.	0.6943
28.	1.988	162.	0.6919
29.	1.962	163.	0.6785
30.	1.939	164.	0.6734
31.	1.926	165.	0.6761
32.	1.909	166.	0.6788
33.	1.895	167.	0.6682
34.	1.878	168.	0.6581
35.	1.858	169.	0.6553
36.	1.852	170.	0.6503
37.	1.834	171.	0.655
38.	1.82	172.	0.6438
39.	1.793	173.	0.6377
40.	1.794	174.	0.6334
41.	1.77	175.	0.625
42.	1.758	176.	0.6191
43.	1.736	177.	0.6266
44.	1.729	178.	0.6222
45.	1.708	179.	0.6193
46.	1.69	180.	0.6183
47.	1.678	181.	0.6068
48.	1.663	182.	0.598
49.	1.662	183.	0.5951
50.	1.65	184.	0.5857
51.	1.631	185.	0.58
52.	1.615	186.	0.5792
53.	1.608	187.	0.5756
54.	1.583	188.	0.5676
55.	1.568	189.	0.5775
56.	1.564	190.	0.5714
57.	1.554	191.	0.5605
58.	1.548	192.	0.5654
59.	1.518	193.	0.548
60.	1.514	194.	0.5472
61.	1.501	195.	0.5502
62.	1.482	196.	0.5439
63.	1.47	197.	0.532
64.	1.466	198.	0.5324
65.	1.456	199.	0.5182
66.	1.445	200.	0.5234
67.	1.432	201.	0.519
68.	1.421	202.	0.5159
69.	1.409	203.	0.5107
70.	1.398	204.	0.5159

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
71.	1.388	205.	0.4961
72.	1.378	206.	0.4982
73.	1.36	207.	0.4952
74.	1.368	208.	0.5041
75.	1.341	209.	0.4878
76.	1.336	210.	0.4854
77.	1.312	211.	0.4925
78.	1.317	212.	0.4773
79.	1.302	213.	0.4723
80.	1.292	214.	0.4776
81.	1.272	215.	0.477
82.	1.271	216.	0.4543
83.	1.252	217.	0.4625
84.	1.255	218.	0.4599
85.	1.245	219.	0.4534
86.	1.236	220.	0.4601
87.	1.223	221.	0.4475
88.	1.213	222.	0.4444
89.	1.204	223.	0.4447
90.	1.194	224.	0.4401
91.	1.178	225.	0.4353
92.	1.168	226.	0.4332
93.	1.157	227.	0.4329
94.	1.15	228.	0.4286
95.	1.15	229.	0.4237
96.	1.14	230.	0.4197
97.	1.134	231.	0.4171
98.	1.117	232.	0.4129
99.	1.114	233.	0.4106
100.	1.107	234.	0.4069
101.	1.098	235.	0.4062
102.	1.088	236.	0.4037
103.	1.073	237.	0.399
104.	1.064	238.	0.4045
105.	1.068	239.	0.3944
106.	1.059	240.	0.3938
107.	1.049	241.	0.3899
108.	1.039	242.	0.391
109.	1.023	243.	0.3931
110.	1.027	244.	0.3822
111.	1.027	245.	0.3861
112.	1.008	246.	0.3731
113.	1.002	247.	0.3694
114.	0.9837	248.	0.368
115.	0.9883	249.	0.3683
116.	0.9718	250.	0.3622
117.	0.9702	251.	0.3596
118.	0.9652	252.	0.3571
119.	0.9578	253.	0.3605
120.	0.9503	254.	0.3544
121.	0.9422	255.	0.3502
122.	0.935	256.	0.3453
123.	0.9277	257.	0.3603

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
124.	0.9189	258.	0.3454
125.	0.9111	259.	0.3426
126.	0.8976	260.	0.3393
127.	0.9004	261.	0.337
128.	0.8913	262.	0.3307
129.	0.8756	263.	0.3341
130.	0.8738	264.	0.3272
131.	0.873	265.	0.3268
132.	0.8686	266.	0.3327
133.	0.8481	267.	0.3225
134.	0.8455	268.	0.3174

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.641

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0004019	cm/sec
y0	2.529	ft

T = K*b = 0.04288 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0004019	1.967E-6	+/- 3.873E-6	204.4	cm/sec
y0	2.529	0.00791	+/- 0.01558	319.8	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.04288 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.74
y0	0.74	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . 0.4535 ft^2
Variance. . . . . 0.001705 ft^2
Std. Deviation. . . . . 0.04129 ft
Mean . . . . 0.004528 ft
No. of Residuals. 268
No. of Estimates. 2

Data Set: P:\Groundwater\Allied\Camelot\Expansion 09\Slugs2\MW-28.aqt
Title: MW-28 Rising Head Slug Test
Date: 04/14/11
Time: 11:39:41

PROJECT INFORMATION

Company: WBC
Client: Camelot Landfill
Test Well: MW-28

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-28

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.096 ft
Static Water Column Height: 10.53 ft
Casing Radius: 0.0833 ft
Well Radius: 0.354 ft
Well Skin Radius: 0.355 ft
Screen Length: 7.5 ft
Total Well Penetration Depth: 7.5 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.0833 ft
Gravel Pack Porosity: 0.3

No. of Observations: 469

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	3.096	235.	0.4366
1.	3.057	236.	0.4323
2.	2.96	237.	0.4244
3.	2.874	238.	0.4149
4.	2.831	239.	0.4217
5.	2.795	240.	0.4222
6.	2.731	241.	0.4239
7.	2.689	242.	0.4445
8.	2.653	243.	0.4102
9.	2.631	244.	0.4225
10.	2.597	245.	0.401
11.	2.558	246.	0.3958
12.	2.534	247.	0.4055
13.	2.512	248.	0.3778
14.	2.483	249.	0.3947
15.	2.459	250.	0.3855
16.	2.442	251.	0.3713

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
17.	2.418	252.	0.3791
18.	2.398	253.	0.3763
19.	2.375	254.	0.3685
20.	2.352	255.	0.3734
21.	2.323	256.	0.3647
22.	2.306	257.	0.3468
23.	2.296	258.	0.3496
24.	2.278	259.	0.3693
25.	2.265	260.	0.3436
26.	2.242	261.	0.3603
27.	2.224	262.	0.3352
28.	2.197	263.	0.3386
29.	2.186	264.	0.3345
30.	2.172	265.	0.3249
31.	2.154	266.	0.3342
32.	2.13	267.	0.33
33.	2.126	268.	0.3292
34.	2.099	269.	0.3257
35.	2.091	270.	0.3238
36.	2.068	271.	0.3216
37.	2.06	272.	0.3164
38.	2.047	273.	0.32
39.	2.023	274.	0.3093
40.	2.005	275.	0.3028
41.	1.993	276.	0.3023
42.	1.985	277.	0.3034
43.	1.967	278.	0.3079
44.	1.958	279.	0.2911
45.	1.953	280.	0.2996
46.	1.918	281.	0.2928
47.	1.915	282.	0.295
48.	1.897	283.	0.2818
49.	1.887	284.	0.288
50.	1.877	285.	0.2867
51.	1.865	286.	0.2785
52.	1.849	287.	0.2728
53.	1.824	288.	0.2721
54.	1.829	289.	0.2688
55.	1.809	290.	0.2592
56.	1.786	291.	0.2618
57.	1.776	292.	0.253
58.	1.771	293.	0.2566
59.	1.755	294.	0.2465
60.	1.736	295.	0.2561
61.	1.715	296.	0.2488
62.	1.709	297.	0.2496
63.	1.695	298.	0.2488
64.	1.692	299.	0.2507
65.	1.679	300.	0.2409
66.	1.682	301.	0.2391
67.	1.657	302.	0.2353
68.	1.645	303.	0.2345
69.	1.633	304.	0.2283

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
70.	1.621	305.	0.2263
71.	1.6	306.	0.2235
72.	1.595	307.	0.2246
73.	1.577	308.	0.2209
74.	1.576	309.	0.2094
75.	1.564	310.	0.218
76.	1.551	311.	0.2163
77.	1.541	312.	0.2088
78.	1.518	313.	0.2199
79.	1.517	314.	0.2048
80.	1.512	315.	0.193
81.	1.498	316.	0.2187
82.	1.476	317.	0.2053
83.	1.466	318.	0.2034
84.	1.46	319.	0.2053
85.	1.457	320.	0.1959
86.	1.446	321.	0.2082
87.	1.437	322.	0.2027
88.	1.429	323.	0.2007
89.	1.405	324.	0.2057
90.	1.404	325.	0.1842
91.	1.382	326.	0.1866
92.	1.383	327.	0.1741
93.	1.374	328.	0.1924
94.	1.359	329.	0.1816
95.	1.349	330.	0.1881
96.	1.329	331.	0.1812
97.	1.329	332.	0.1799
98.	1.309	333.	0.1744
99.	1.301	334.	0.1703
100.	1.31	335.	0.1676
101.	1.288	336.	0.1655
102.	1.27	337.	0.1633
103.	1.272	338.	0.173
104.	1.251	339.	0.1578
105.	1.254	340.	0.1595
106.	1.242	341.	0.1582
107.	1.244	342.	0.1563
108.	1.215	343.	0.1615
109.	1.214	344.	0.1283
110.	1.199	345.	0.1513
111.	1.195	346.	0.1568
112.	1.188	347.	0.1463
113.	1.17	348.	0.1485
114.	1.16	349.	0.1423
115.	1.165	350.	0.144
116.	1.159	351.	0.1477
117.	1.147	352.	0.1375
118.	1.13	353.	0.1324
119.	1.131	354.	0.1329
120.	1.124	355.	0.1338
121.	1.101	356.	0.1199
122.	1.112	357.	0.1257

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
123.	1.093	358.	0.1241
124.	1.084	359.	0.1245
125.	1.074	360.	0.1255
126.	1.061	361.	0.1103
127.	1.062	362.	0.1322
128.	1.052	363.	0.1187
129.	1.041	364.	0.1152
130.	1.029	365.	0.107
131.	1.024	366.	0.1132
132.	1.026	367.	0.1106
133.	1.014	368.	0.1041
134.	0.9957	369.	0.1097
135.	1.005	370.	0.1158
136.	0.9796	371.	0.1071
137.	0.986	372.	0.1078
138.	0.9709	373.	0.09492
139.	0.9766	374.	0.1035
140.	0.9476	375.	0.101
141.	0.9561	376.	0.1008
142.	0.9494	377.	0.1114
143.	0.9348	378.	0.097
144.	0.9326	379.	0.0996
145.	0.9343	380.	0.08983
146.	0.9154	381.	0.09582
147.	0.9208	382.	0.08154
148.	0.9049	383.	0.09144
149.	0.8962	384.	0.0893
150.	0.8779	385.	0.09475
151.	0.8826	386.	0.08837
152.	0.8775	387.	0.08647
153.	0.8686	388.	0.08635
154.	0.8533	389.	0.08778
155.	0.8632	390.	0.08091
156.	0.8466	391.	0.07855
157.	0.8391	392.	0.07866
158.	0.8306	393.	0.08998
159.	0.8234	394.	0.07759
160.	0.8089	395.	0.07452
161.	0.8118	396.	0.07392
162.	0.8078	397.	0.06367
163.	0.7892	398.	0.08584
164.	0.7957	399.	0.07404
165.	0.7868	400.	0.07933
166.	0.7951	401.	0.06789
167.	0.7731	402.	0.06553
168.	0.7793	403.	0.06967
169.	0.7641	404.	0.07471
170.	0.7558	405.	0.06624
171.	0.7548	406.	0.06376
172.	0.7471	407.	0.06292
173.	0.7383	408.	0.05973
174.	0.7305	409.	0.05878
175.	0.7379	410.	0.06163

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
176.	0.7252	411.	0.05736
177.	0.7198	412.	0.0583
178.	0.7073	413.	0.04426
179.	0.6954	414.	0.05606
180.	0.7067	415.	0.05203
181.	0.694	416.	0.06372
182.	0.6848	417.	0.05216
183.	0.6794	418.	0.05015
184.	0.6762	419.	0.04861
185.	0.6611	420.	0.04944
186.	0.6677	421.	0.05875
187.	0.6607	422.	0.04789
188.	0.6643	423.	0.05756
189.	0.6544	424.	0.04458
190.	0.6447	425.	0.04577
191.	0.6464	426.	0.04139
192.	0.6326	427.	0.03808
193.	0.6301	428.	0.05059
194.	0.6356	429.	0.03666
195.	0.621	430.	0.03677
196.	0.6058	431.	0.03666
197.	0.6207	432.	0.04053
198.	0.6044	433.	0.02627
199.	0.602	434.	0.03488
200.	0.5934	435.	0.03465
201.	0.6032	436.	0.02224
202.	0.5783	437.	0.03015
203.	0.5688	438.	0.03015
204.	0.5761	439.	0.02909
205.	0.5792	440.	0.02801
206.	0.5664	441.	0.02458
207.	0.5527	442.	0.02506
208.	0.5495	443.	0.02293
209.	0.55	444.	0.03567
210.	0.5431	445.	0.02412
211.	0.5376	446.	0.02269
212.	0.5141	447.	0.02422
213.	0.5298	448.	0.0429
214.	0.535	449.	0.02305
215.	0.5293	450.	0.02577
216.	0.5217	451.	0.02293
217.	0.5145	452.	0.02305
218.	0.5233	453.	0.02056
219.	0.5212	454.	0.02989
220.	0.509	455.	0.0195
221.	0.4974	456.	0.01878
222.	0.488	457.	0.01523
223.	0.4908	458.	0.01796
224.	0.487	459.	0.01323
225.	0.4837	460.	0.01382
226.	0.4905	461.	0.000832
227.	0.4806	462.	0.01157
228.	0.4614	463.	0.01133

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
229.	0.4745	464.	0.01394
230.	0.4533	465.	0.02065
231.	0.4478	466.	0.01252
232.	0.4464	467.	0.01003
233.	0.4369	468.	0.
234.	0.4429		

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.133

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0004054	cm/sec
y0	2.836	ft

T = K*b = 0.09886 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0002406	8.598E-7	+/- 1.69E-6	279.8	cm/sec
y0	2.836	0.007017	+/- 0.01379	404.2	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.05867 cm²/sec

Parameter Correlations

	K	y0
K	1.00	0.71
y0	0.71	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . 0.7179 ft^2
Variance. . . . . 0.001537 ft^2
Std. Deviation. . . . . 0.03921 ft
Mean . . . . -0.00933 ft
No. of Residuals. 469

No. of Estimates. 2

APPENDIX IIIG-E

2010 SOIL BORING PLAN EXCERPTS
AND
TCEQ SOIL BORING PLAN APPROVAL LETTER

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CONTENTS

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CAMELOT LANDFILL
DENTON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1312B

SOIL BORING PLAN

Prepared for

The City of Farmers Branch

March 2010

Revised June 2010

Prepared by

Weaver Boos Consultants, LLC–Southwest
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 1339-351-11-02-6B.7

CONTENTS

CONTENTS (Continued)

1 INTRODUCTION

1.1 Purpose

The Camelot Landfill (TCEQ Permit No. MSW-1312A) is in the process of developing a major permit amendment application for the Camelot Landfill to allow the following improvements.

- Laterally expand the existing permitted waste footprint by 37.6 acres. The 207.4-acre permitted waste disposal footprint will be expanded to about 245.0 acres.
- The proposed expansion will increase the depth of the excavation in a 4.2-acre portion of the existing permitted, undeveloped footprint area located adjacent to the proposed 37.6-acre lateral expansion area.
- The EDE in the proposed lateral expansion area is 387 ft-msl.

The following drawings are included in Appendix A to provide an overview of this project.

- Figure A-1 (Site Location Map). This figure provides an overview the landfill area on an aerial photograph.
- Figure A-2 (Expansion Area Plan). The figure shows the lateral expansion area on a detailed site plan.
- Figure A-3 (Permitted Waste Disposal Footprint History). The figure shows the history of the permitted waste footprint of the site. The majority of the proposed lateral expansion area was previously characterized and included in the originally permitted waste disposal footprint area. A minor permit amendment completed in 2001 reduced the footprint of the site from 238.0 acres to the current 207.4-acre permitted footprint. The proposed lateral expansion will reincorporate this previously permitted area.

1.2 Site History

The Camelot Landfill (TCEQ Permit No. MSW-1312A) is an existing Type I municipal solid waste (MSW) landfill facility located in Denton County. The facility was originally permitted in December 1979 (MSW Permit No. 1312) and included a permit boundary of 167 acres. A permit amendment was approved before the site opened in March 1981 (MSW Permit No. 1312-A). The 1981 amendment increased the permit boundary to about 350 acres. The site was upgraded to Subtitle D standards in 1996.

A minor amendment to revise the facility's base grades and final cover configuration was approved by the TCEQ in 2001. As shown on Figure A-3 (Appendix A), the 2001 minor amendment reduced the footprint of the site from 238.0 acres to the current 207.4-acre currently permitted footprint.

2 REGIONAL GEOLOGIC SETTING

2.1 Geologic History

As reported by the Texas Bureau of Economic Geology (1967) on Figure B-1, the geologic formations in the site vicinity are largely Cretaceous-age sediments. These sediments were deposited by northward advancing seas over extensively eroded Paleozoic strata. The landfill is underlain by Cretaceous-age Gulf and Comanche Series sediments, which represent two major Cretaceous sea transgressions. Toward the end of the Cretaceous period, marine deposition ceased after a regional uplift to the west. This resulted in a retreat of the seas gulf ward. Subsequent erosion of the Cretaceous deposits continued from the late Cenozoic Era to present. During the Quaternary period, erosion produced limited areas of Quaternary alluvium and terrace deposits along area stream courses.

2.2 Regional Structural Geology

Figure B-2 – Regional Structural Features Map presents the major Texas structural geologic features. During the formation of Pangea in the late Paleozoic era, tectonic collisions uplifted and deformed the southern margin of the Laurasian paleocontinent. This tectonic event uplifted the Ouachita Mountains, which were source rock areas for the later deposition of the Trinity and Woodbine sediments (Caughey, 1977). With the early Mesozoic breakup of Pangea, continental rifting occurred to the southeast of the Ouachita Fold Belt which created low-lying areas that were subsequently flooded during the Jurassic to form the ancestral Gulf of Mexico (Stearn et al., 1979). During this time, the climate was hot and relatively restricted marine flow in the ancestral Gulf caused the deposition of evaporite deposits.

As the ancestral Gulf widened during the Mesozoic era, drainage patterns in the area shifted to the southeast, and deposition of the Trinity was initiated in the Early Cretaceous. As the Trinity/Woodbine sediments accumulated, the East Texas Basin underwent syndepositional subsidence (Oliver, 1971), which served to foster the formation of the basinward thickening wedge of sediments that characterize the Cretaceous formations in the area.

As noted by Harden et al. (2004), the continued subsidence of the East Texas Basin during the Cretaceous Period and the relative stability of the Texas Craton formed a hinge along the Ouachita Fold Belt. The resulting tensional forces during the Tertiary period and possibly during the Cretaceous contributed to the two main fault systems near the Eastern edge of the study area: the Luling-Mexia-Talco and the Balcones Fault Zones.

The Luling-Mexia-Talco Fault Zone runs parallel to the Ouachita Structural Belt and marks the updip boundary of the East Texas Basin. The Luling-Mexia-Talco fault system consists primarily of normal faults, the growth of which was accelerated by lateral, basinward creep by the underlying evaporite deposits (Jackson, 1982). The Luling-Mexia-Talco Fault Zone has created displacements of more than 700 feet in some areas of Texas. Continued subsidence in the Gulf of Mexico Basin during the Tertiary Period advanced the formation of the Balcones Fault Zone. This zone runs from Austin to north of Waco and consists of a series of high angle normal faults with downthrown blocks toward the Gulf of Mexico.

2.3 Regional Stratigraphy

The regional stratigraphy consists of geologic units of the Cretaceous Comanche and Gulf Series sediments, including the Austin and Eagle Ford groups and the Woodbine Formation. Stratigraphic positions of these groups, along with lithologic characteristics and approximate depths to the formations, are presented in Table 2-1 (modified from Nordstrom, 1982 and Langley, 1999). According to the Texas Bureau of Economic Geology (1967), the site is located upon Quaternary Alluvium that is underlain by low permeability shale of the Eagle Ford Group as shown on the Figure B-1 – Regional Geologic Map and Figure B-3 – Regional Geologic Cross Section (modified from Nordstrom, 1982). Lower portions of the Austin Group crop out and overlie the Eagle Ford Group beginning about 5 miles east of the site. The surface outcrop contact between the Eagle Ford Group and the older underlying Woodbine Formation occurs approximately 3 miles west-southwest of the site at its closest extent.

2.4 Regional Hydrogeology

Regional Cretaceous aquifers beneath the landfill include the Woodbine and Trinity aquifers. These aquifers are separated by approximately 500 feet of low permeability sediments and are not hydraulically connected (Harden, 2004). The Paluxy, Glen Rose, and underlying Twin Mountain formations comprise the Trinity Aquifer. Although not classified as a regional aquifer, the Quaternary Alluvium groundwater is permitted as the uppermost aquifer at the site for groundwater monitoring purposes.

2.4.1 Woodbine Formation

The Woodbine Formation is classified by the Texas Water Development Board (Ashworth and Hopkins, 1995) as a minor Texas aquifer. The Woodbine is composed of fine-grained, cross-stratified, fluvial sand with some gravel that is interbedded with over bank clay and shale (Hopkins, 1996 and Harden, et al., 2004). In the north Texas region, the Woodbine Aquifer is generally confined by the overlying Eagle Ford shale. Based on local water well water level data obtained from the TWDB (Klemt, et al., 1975 and Harden et al., 2004), the potentiometric surface in the landfill area is above the bottom elevation of the confining Eagle Ford Group shale.

Table 2-1
Regional Stratigraphy in the Vicinity of Camelot Landfill[1]

System	Series	Group or Formation	Approximate Formation Depth and (Thickness) in feet	Lithologic Characteristics and Depositional Environment	Estimated Hydraulic Conductivity (cm/sec)
Quaternary	Holocene	Alluvium	Surface (0-50)	Clay, silt, sand, and gravel in current floodplain deposited in fluvial environment.	10^{-1} to 10^{-9} (Fetter, 1988)
	Pleistocene	Terrace	Surface (0-50)	Clay, silt, sand, and gravel above current floodplain deposited in fluvial environment.	10^{-1} to 10^{-9} (Fetter, 1988)
Cretaceous	Gulf	Austin Chalk Group	Outcrops 1 Mile East (0-700)	Chalk, limestone, marl and occasional fine to medium sand deposited in marine environment.	Limestone: 10^{-5} to 10^{-9} Marl/Clay: 10^{-8} to 10^{-11} (Driscoll, 1989)
		Eagle Ford Group	Surface (0-50') (15-35' thick below landfill)	Shale with some thin platy beds of siltstone and sandy limestone deposited in marine environment.	Shale: 10^{-8} to 10^{-12} (Driscoll, 1989)
		Woodbine Formation	65' below landfill (250' thick)	Sand, sandstone, clay, shale, lignite deposited in fluvial and marine deltaic environments.	2 x 10^{-3} (Langley, 1999)
	Comanche	Washita Group	300 feet thick	Limestone, marl, and clay; some sand near top deposited in marine environment.	Limestone: 10^{-5} to 10^{-9} Marl/Clay: 10^{-8} to 10^{-11} (Driscoll, 1989)
		Fredericksburg Group	200 feet thick	Limestone, clay, marl, shale, and shell agglomerates deposited in near shore marine depositional environment.	Limestone: 10^{-5} to 10^{-9} Marl/Clay: 10^{-8} to 10^{-11} Shale: 10^{-8} to 10^{-12} (Driscoll, 1989)
		Trinity Group Aquifer Paluxy Formation	950' below landfill (<100 feet thick)	Fine sand, sandy shale, and shale deposited in fluvial, deltaic, and near shore marine environments.	Paluxy: 1x10^{-3} to 3x10^{-3} (Langley, 1999)

---

[1] Adapted from Nordstrom (1982) and Langley (1999).

The Woodbine Formation is divided, from youngest to oldest, into the ~~older Dexter Member and the overlying Lewisville Member (Sellards, 1990)~~ Templeton, Lewisville, Red Branch, and Dexter members (Dodge, 1968). The formation ranges in thickness from less than 100 feet in south Texas to over 600 feet in northeast Texas down-dip areas (Harden et al., 2004). The Woodbine is composed of sediments eroded from the Ouachita uplift in Oklahoma and Arkansas that were deposited in fluvial, high-destructive deltaic and stand plain depositional systems (Harden et al., 2004). As noted in Figure B-4, the regional Woodbine groundwater flow direction follows the regional dip of the formation to the east-southeast. The average rate of groundwater movement is reported to be about 10 to 20 feet per year (Nordstrom, 1982). The primary source of recharge to the aquifer is precipitation infiltration on the outcrop, which is about three miles to the west of the site.

2.4.2 Paluxy Formation

The Paluxy and underlying Glen Rose, and Twin Mountain formations comprise the Trinity aquifer. The TWDB classifies the Trinity as a major Texas aquifer (Ashworth and Hopkins, 1995). According to the Harden et al. (2004), depth to the top of the Paluxy Formation beneath the permit boundary area is about -500 feet msl and the Paluxy Formation thickness is about 300 feet. The Paluxy potentiometric surface elevation beneath the site in 2000 was less than 100 feet msl, indicating confined aquifer conditions (Harden et al., 2004). According to Nordstrom (1982), the Paluxy hydraulic gradient is about 27 feet per mile with groundwater flowing to the east at less than two feet per year.

The primary source of recharge to the Paluxy aquifer is infiltration of precipitation and surface water on the outcrop. Recharge areas are to the west, with the closest Paluxy outcrop being about 31 miles west of the landfill. The Paluxy formation is comprised of sand, silt, shale, and locally, impure limestone. The sands are fine to very fine grained, and well to very well sorted. The sand units are laminated or massive, and are generally poorly cemented and friable (Fisher and Rodda, 1967). The formation's sediments were derived from the Ouachita and Arbuckle Mountain uplifts in Oklahoma and re-deposited in fluvial, deltaic, and stand plain depositional environments (Harden, 2004).

3 SITE-SPECIFIC GEOLOGY

Reed Engineering submitted the facility's Subtitle D upgrade subsurface characterization in March 1996. The Subtitle D upgrade submittal provides the information in the following site-specific geologic summary section. In addition, the Subtitle D upgrade groundwater characterization is the basis for the design of the TCEQ-approved Subtitle D groundwater monitoring system which has been in place for over 10 years.

3.1 Site-Specific Stratigraphy

3.1.1 Alluvial Stratum

Consistent with the Subtitle D subsurface characterization, the uppermost site-specific stratigraphic unit at the site is the Alluvial Stratum which contains the permitted uppermost groundwater zone. This stratum is largely continuous beneath the landfill, except where it has been removed by soil borrowing or disposal cell development. The stratum has also been affected by sand and gravel mining prior to landfill development. The Alluvial Stratum has been characterized as alluvial sands and clays overlying the weathered and unweathered Eagle Ford Shale. Migration of the river channel resulted in the deposition of channel sands and gravels on top of the Eagle Ford Shale bedrock. These lag deposits were in turn overlain by sandy clays and clays typical of overbank and floodplain deposits. These sediments represent a fining upward strata graphic sequence indication of point bar and later floodplain deposition. According to the existing boring data set, the Alluvial Stratum ranges in thickness from 0 to 52.5 feet with a mean thickness of 25.7 feet.

The Alluvial Stratum consist of upper high plasticity clays and sandy clays that grade downward into moderate to low plasticity sandy clays which in turn grade downward into clayey sands, sands, and gravel. The basal sand and gravel is absent to thin in areas north and east of a central subsurface top of shale high point. Geotechnical laboratory tests indicate the clay and sandy clay sediments have a hydraulic conductivity range of $8.0x10^{-7}$ to $3.5x10^{-9}$ cm/sec and the clayey sands, sands, and gravels have a hydraulic conductivity range of $1.0x10^{-5}$ to $8.0x10^{-6}$ cm/sec. Slug tests of the sandy sediments indicate a hydraulic conductivity of about $1.0x10^{-4}$ cm/sec.

3.1.2 Weathered Shale Stratum

Beneath the Alluvial Stratum, 25 of the 80 existing boring logs describe a clayey weathered shale or residual clay. Eight of these borings fully penetrated the weathered shale indicating thicknesses ranging from 1.0 to 8.0 feet with an average weathered shale thickness of 3.7 feet. Table C-1 in Appendix C indicates the frequency of weathered shale observations may vary by investigation. This Weathered Shale Stratum is a brown

4 PREVIOUS AND PROPOSED SITE EXPLORATIONS

4.1 Previous Site Explorations

Subsurface characterization of the site has been obtained from 13 drilling events at the landfill. Geotechnical and geological subsurface explorations, and monitor well installations were completed by Rone Engineers in 1979, 1980 and 1983, Reed Engineering in 1993, 1994, 1995 and 1996, and the Carel Corporation in 2000, 2003, 2006, 2007, and 2008. These investigations ~~included~~ have provided a total of ~~80~~ 79 exploratory boring logs across the site. These site explorations have previously characterized the entire permit boundary area, including the proposed expansion area. The geologic logs for 5 boreholes known from text descriptions could not be located in TCEQ Central Records, TCEQ Record Archives, or the Site Operating Record. For this reason, this SBP utilizes the 79 existing geologic logs presented in Appendix C of the SBP. The boring specifications are summarized in Table C-1 in Appendix C and in the following text:

- A 1979 subsurface characterization by Rone Engineers included 10 geotechnical borings (B-1 through B-10) that were drilled to evaluate subsurface conditions for a proposed landfill facility. No geologic logs for monitoring wells MW-1, MW-2, or MW-3 could be located in the sources reviewed. These geotechnical borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 1980 subsurface characterization by Rone Engineers included 19 geotechnical borings (B-11 through B-29) that were drilled to evaluate subsurface conditions for a proposed landfill facility. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 1983 subsurface characterization by Rone Engineers included 4 geological borings (B-1 through B-4) that were drilled to install monitoring wells MW-4, MW-5, MW-6 and MW-7. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 1993 subsurface characterization by Reed Engineering included 1 geological boring to install monitor well MW-3R. This boring fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 1994 subsurface characterization at 21 locations by Reed Engineering that included 19 borings (soil borings TB-1 through TB11 and piezometer borings

TW-1 though TW-8), and the geological evaluation of 2 borrow area excavation outcrop descriptions (TC-1 and TC-2). These borings and the excavation descriptions all fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.

- A 1994 to 1995 subsurface characterization by Reed Engineering included 3 deep geological borings (DB-1 through DB-3). These 3 borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 1995 subsurface characterization by Reed Engineering included 7 geological borings to install monitor wells MW-1R, MW-4R, MW-8, MW-9, MW-10, MW-11, and MW-12. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 1996 subsurface characterization by Reed Engineering included 3 geological borings to install monitor wells MW-13, MW-14, and MW-16. The geologic logs for monitor wells MW-15 and later monitor well MW-13R could not be located in the sources reviewed. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 2000 subsurface characterization by the Carel Corporation included 2 geological borings to install monitor wells MW-17 and MW-18. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 2003 subsurface characterization as part of a nature and extent assessment by the Carel Corporation included 5 geological borings to install observation wells B-1 through B-5. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 2006 subsurface characterization by the Carel Corporation included 1 geological boring to install monitor well MW-15R. This boring fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 2007 subsurface characterization by the Carel Corporation included 2 geological borings to install monitor wells MW-10A and MW-12A as part of a VOC nature and extent investigation. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.
- A 2008 subsurface characterization by the Carel Corporation included 2 geological borings to install monitor wells MW-10B and MW-12B as part of a VOC nature and extent investigation. These borings fully penetrated the Alluvial Stratum uppermost saturated zone and encountered the top of the underlying low permeability shale strata.

4.2 Proposed Expansion Area Soil Borings and Piezometers

As stated in Section 1.1, the proposed lateral waste footprint expansion area presented in this SBP is 37.6 acres. Adjacent to the proposed lateral waste fill footprint expansion area is an undeveloped 4.2-acre area within the existing permitted waste fill disposal area where a deeper excavation is proposed (see Figure A-2). This deeper excavation area would provide an excavation grade transition from the shallower permitted disposal area excavations down to the deeper lateral expansion area excavations. For the purpose of determining the number of new soil borings required for the proposed expansion, both areas have been considered as a single 41.8-acre expansion area. The EDE of the proposed 41.8-acre lateral expansion area is 387 ft-msl.

The existing Subtitle D upgrade subsurface characterization is supported by ~~65~~ 62 existing soil borings and 2 measured geologic section descriptions whose locations are shown on Figure B-5 in Appendix B. The majority of these borings are located within the existing permit boundary area. Five of the existing borings are located within the proposed lateral expansion area. To facilitate SBP review, site-specific geologic cross sections have been constructed from the existing boring logs and are presented as Figures B-8 through B-9 in Appendix B. Since 1996, six subsequent site explorations have provided 15 additional soil boring logs for a total of 79 documented soil boring logs from the site. Table C-1 in Appendix C summarizes the existing boring data set and presents the individual boring logs from previous investigations.

Consistent with Title 30 TAC §330.63(e)(4), this SBP proposes to advance 14 new subsurface investigation soil borings and install 4 groundwater piezometers in the lateral waste fill footprint expansion area at the locations indicated on Figure B-6 in Appendix B. The focus of the proposed investigation is to 1) define the top of the Unweathered Shale Stratum beneath the proposed expansion area, 2) demonstrate the heterogeneity and low-permeability characteristics of the shale aquitard beneath the site, 3) characterize the strata and groundwater conditions encountered, and 4) obtain soil/rock samples for geotechnical testing. None of the existing ~~80~~ 79 soil borings will be reused to satisfy the TCEQ number of soil borings required by Title 30 TAC §330.63(e)(4).

In accordance with TCEQ guidelines, all 14 additional borings will be at least 5 feet deeper than the proposed EDE of 387 ft-msl (to 382 ft-msl) and 7 of these 14 borings will be at least 30 feet deeper than the proposed EDE (to 357 ft-msl). The TCEQ boring guidelines and the proposed SBP boring numbers and their depth categories are summarized in the following Table 1. The proposed SBP boring specifications are presented in Table 2.

Table 1
Proposed Expansion Area Boring Summary

Item	TCEQ Recommended Number of Borings for a 41.8-Acre Lateral Expansion Area
Total Borings	14
Number of Borings at least 30-feet below the EDE	7
Number of Borings at least 5-feet below the EDE	7

Table 2
Proposed Boring Specifications

Proposed Boring Name	Surface Elevation (ft-msl)[1]	Boring Depth (ft)	Boring Bottom Elevation (ft-msl)	Depth Below EDE[2] (ft)
WB-1[3]	464	82	382	5
WB-2	460	103	357	30
WB-3[3]	455	73	382	5
WB-4	452	95	357	30
WB-5	454	72	382	5
WB-6	457	75	382	5
WB-7	452	95	357	30
WB-8	456	99	357	30
WB-9	456	74	382	5
WB-10	452	95	357	30
WB-11[3]	460	78	382	5
WB-12	462	105	357	30
WB-13[3]	460	78	382	5
WB-14	446	89	357	30

[1] Surface elevation estimated from 2009 existing topographic contour map provided by Metropolitan Aerial Surveys as compiled from aerial photography flown 03-02-09. This contour map is shown on Figure B-6.

[2] Proposed EDE is 387 ft-msl.

[3] Boring will be completed as a groundwater piezometer.

As noted in Table 2 and shown on Figure B-6 – Proposed Boring Location Map, soil borings WB-1, WB-3, WB-11, and WB-13 will be completed as groundwater piezometers. The piezometers will be screened across the Alluvial/Weathered Shale contact. These four piezometers will be used for groundwater level measurement and characterization purposes.

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

July 16, 2010

Mr. Robert S. Ferbend, P.G.
Weaver Boos Consultants, LLC-Southwest
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109

Re: City of Farmers Branch Camelot Landfill – Denton County
Municipal Solid Waste - Permit No. 1312A
Proposed Site Investigation – Revised Soil Boring Plan (SBP)
Tracking No. 13103189; RN101479038/CN601253628

Dear Mr. Ferbend:

The Texas Commission on Environmental Quality (TCEQ) received your revised SBP on June 16, 2010, for the proposed expansion of the City of Farmers Branch Camelot Landfill. The revised SBP was submitted in response to comments in our letter dated May 19, 2010. Our review of this plan indicates that it complies with the Municipal Solid Waste Regulations and this letter constitutes approval of your plan.

The submittal indicated that the SBP was prepared in support of a proposed expansion of the Camelot Landfill that will include a 37.6 acre lateral expansion of the existing 207.4 acre waste fill footprint. Also, the proposed expansion will increase the depth of a portion of the undeveloped, permitted footprint located adjacent to the lateral expansion area, and this proposed SBP uses a 41.8 acre area (*i.e., 37.6 acre lateral expansion plus a 4.2 acre existing footprint area where the depth will be increased*) to determine the number of soil borings. The SBP identified the elevation of deepest excavation (EDE) as 387 feet Mean Sea Level for the 41.8 acre expansion area. The SBP proposed 14 borings (WB-1 through WB-14), with 7 borings advanced 30 feet below the EDE, and the remainder of the borings advanced 5 feet below the EDE. The SBP also proposed that soil borings WB-1, WB-3, WB-11, and WB-13 will be completed as groundwater piezometers in the lateral waste fill footprint expansion area, screened across the Alluvial/Weathered Shale contact, and used for groundwater level measurements and characterization purposes.

Please be advised that under Title 30 Texas Administrative Code Section 330.63(e)(4)(B), the uppermost aquifer and any hydraulically interconnected aquifers below the site must be identified, as well as the underlying confining unit. It is anticipated that this SBP, when implemented, will accurately characterize the in-situ geologic, hydrologic, and engineering properties of the surface and subsurface strata at this site. Although this plan complies with the Municipal Solid Waste Regulations concerning site investigations, additional soil borings and piezometers could be required by the Commission should the data generated by this SBP prove to be inconclusive.

P.O. Box 13087 Austin, Texas 78711-3087 512-239-1000 Internet address: www.tceq.state.tx.us

If you should find it necessary to modify this approved plan, another plan detailing any proposed modifications must be submitted to the Commission for approval before implementation of the modifications. If you have questions regarding this letter, please contact me at (512) 239-6730. When addressing written correspondence, please use mail code MC 124.

Sincerely,

Gale L. Baker

Gale L. Baker, P.G.
Municipal Solid Waste Permits Section
Waste Permits Division
Texas Commission on Environmental Quality

GLB/fp

cc: Mr. Mark Pavageaux, Director of Public Works, City of Farmers Branch
Mr. Shane Davis, Camelot Landfill Administrator, City of Farmers Branch

and gray, jointed, and highly plastic shale or residual clay formed by the weathering of the underlying Unweathered Shale Stratum. The weathered shale is reportedly not continuous beneath the landfill due to fluvial erosion. The existing characterization incorporates weathered and unweathered shale into one site-specific stratum that slopes in all directions from a high point in the northwestern portion of the permit boundary (see Figure B-10 in Appendix B).

3.1.3 Unweathered Shale Stratum

Beneath the Weathered Shale (or Alluvial Stratum where the Weathered Shale is absent), is the Unweathered Shale Stratum. This unit is considered an aquiclude to the uppermost groundwater zone. The Unweathered Shale Stratum is described as dark gray shale. The Rone soil moisture percent values on the 1980 boring logs indicate the Unweathered Shale is not saturated and has significantly less moisture than either the Weathered Shale or Alluvial strata.

According to Reed (1996), the Weathered and Unweathered Shale strata beneath the landfill have a combined thickness of about 100 feet. These sediments overlie the Woodbine Aquifer, which is considered a minor groundwater aquifer by the Texas Water Development Board. None of the existing borings fully penetrated the Unweathered Shale Stratum and encountered the Woodbine Aquifer.

3.2 Hydrogeologic Interpretation

The uppermost groundwater zone is located on top of the underlying low-permeability shale. The groundwater flow follows the top of shale surface which slopes toward the Elm Fork of the Trinity River (see Figure B-10 in Appendix B). As noted previously, the existing groundwater monitoring system has been in place for over 10 years and the site has collected a substantial amount of groundwater level information. The Carel Corporation has performed Subtitle D groundwater monitoring services for the facility since 1999. A series of groundwater contour maps, prepared by Carel Corporation for the facility's TCEQ approved well spacing permit modification, are included in Appendix D.

3.3 Existing TCEQ-Approved Groundwater Monitoring System

The existing TCEQ-approved Subtitle D groundwater detection monitoring system consists of 14 monitoring wells. The facility has submitted a well spacing permit modification to Permit No. 1312A in response to the §330 rule revisions of 2006. Once the well spacing permit modification is approved by TCEQ, additional monitoring well installations are expected. As some of the existing wells were installed as early as 1995, the facility has over fifteen years of groundwater monitoring data. The existing detection monitoring system monitors both the existing and proposed lateral expansion waste footprint areas. These wells monitor the uppermost groundwater zone that is characterized in the Alluvial Stratum. This groundwater is located on top of the underlying low-permeability shale.

CAMELOT LANDFILL
CITY OF LEWISVILLE, DENTON COUNTY
TCEQ PERMIT NO. MSW-1312B

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIH
GROUNDWATER MONITORING, SAMPLING AND ANALYSIS PLAN

Prepared for

City of Farmers Branch

February 2012

ROBERT S. FERBEND
GEOLOGY
713

Robert S. Ferbend

2-27-12

Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 1339-351-11-02-6B.8

This document is intended for permitting purposes only.

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CONTENTS

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

CONTENTS (Continued)

APPENDICES

Robert S. Ferbend

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

TABLES

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

1 INTRODUCTION

Appendix IIIH addresses §330.63(f)

This groundwater monitoring, sampling and analysis plan (GWSAP) has been prepared for the Camelot Landfill (TCEQ Municipal Solid Waste Permit No. MSW-1312B). This plan incorporates the GWSAP procedures and methodology from the previous permit. The following plan contains the groundwater monitoring system design aspects, system engineering report, and the procedures for collecting representative samples from groundwater monitoring wells and the basic laboratory requirements for obtaining valid, defensible data. The plan also includes monitoring well placement, design and construction, and well development procedures. This GWSAP has been prepared, and will be followed, in accordance with Title 30 TAC §330.401 through §330.415, §330.419 and §330.421. Groundwater monitoring will be conducted at the site through the active life and post-closure care period of the landfill, pursuant to Title 30 TAC §330.401(f).

2 GROUNDWATER MONITORING SYSTEM

2.1 Groundwater Monitoring System

The currently approved groundwater monitoring system design for the Camelot Landfill was completed by The Carel Corporation in 2010 to comply with Title 30 TAC §330.403(a)(2). The groundwater monitoring system is currently comprised of 22 detection monitoring wells. The monitoring system's current point of compliance detection monitoring wells include MW-3R, MW-8, MW-9, MW-12B, MW-13R, MW-14, MW-15A, MW-16, MW-17, MW-18, MW-18A, MW-21, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, and MW-29. The background monitoring wells include MW-1R, MW-19, and MW-20.

In late 2010, the facility installed nine new monitoring wells in response to the TCEQ monitoring well spacing requirement. These wells included MW-18A, MW-21, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, and MW-29. As part of the approved monitoring well system requirements, monitoring well MW-18 will be removed within one year after the background data pool is evaluated by the facility for the nine new monitoring wells.

As part of this permit application, the facility proposes to relocate groundwater monitoring well MW-9 to the monitor well MW-32 location shown on Figure IIIH-A-1 in Appendix IIIH-A. Monitor well MW-13R is proposed to be relocated to the monitor well MW-30 location shown on Figure IIIH-A-1. Monitoring wells MW-9 and MW-13R are to be relocated to facilitate construction of the proposed slurry wall and drainage improvements. In addition, monitor well MW-31 will be added between monitoring wells MW-30 and MW-22 to maintain the 600-foot well spacing requirement. These relocated and additional monitoring wells are designed to monitor the uppermost aquifer at the base of the Alluvial Strata and will be constructed in accordance with the requirements of Title 30 TAC §330.421. A certification of the proposed groundwater monitoring system is provided on page IIIH-A.4 of Appendix IIIH-A.

The existing detection monitoring well layout is shown on Figure IIIH-A.1 – Groundwater Monitoring System. Each monitoring well is constructed in accordance with the requirements of Title 30 TAC §330.421. The detection monitoring system is designed to monitor the uppermost aquifer at the base of the Alluvial Strata.

Table 2-1
Groundwater Monitoring Wells

Well Number	Designation	Status
MW-1R	Background	Installed pre-2010, retained in system.
MW-3R	Point of Compliance	Installed pre-2010, retained in system.
MW-4R	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
MW-8	Point of Compliance	Installed pre-2010, retained in system.
MW-9	Point of Compliance	Installed pre-2010, to be removed and relocated to MW-32.
MW-10	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
MW-10A	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
MW-10B	Observation	Installed pre-2010, observation well.
MW-11	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
MW-12	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
MW-12A	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
MW-22 (MW-12B)	Point of Compliance	Installed pre-2010, retained in system.
MW-13R	Point of Compliance	Installed pre-2010, to be removed and replaced by MW-30 and MW-31.
MW-14	Point of Compliance	Installed pre-2010, retained in system.
MW-15A	Point of Compliance	Installed pre-2010, retained in system.
MW-16	Point of Compliance	Installed pre-2010, retained in system.
MW-17	Point of Compliance	Installed pre-2010, retained in system.
MW-18	Point of Compliance	Installed pre-2010, to be removed for §330.403(a)(2) compliance.
MW-18A	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-19	Background	Installed in 2010 for §330.403(a)(2) compliance.
MW-20	Background	Installed in 2010 for §330.403(a)(2) compliance.
MW-21	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-23	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-24	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-25	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-26	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-27	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-28	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-29	Point of Compliance	Installed in 2010 for §330.403(a)(2) compliance.
MW-30	Point of Compliance	Proposed new monitoring well.
MW-31	Point of Compliance	Proposed new monitoring well.
MW-32	Point of Compliance	Proposed new monitoring well.
B-1	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
B-2	Observation	Installed pre-2010, to be removed prior to slurry wall construction.
B-3	Observation	Installed pre-2010, observation well.

2.2 Monitoring Well Design and Maintenance

The groundwater monitoring well details are shown in Figures IIIH-A.2 and IIIH-A.3 of Appendix IIIH-A. Consistent with Title 30 TAC §330.421, all facility monitoring wells and observation wells were drilled and installed by a qualified driller (Texas licensed water well, monitor well, or master driller). The 2010-installed monitoring wells are constructed of 2-inch diameter Schedule 40 PVC with 2.0 to 10 feet of continuous, factory-slotted PVC screens having 0.010-inch slots. The filter pack consists of 20-40 mesh silica sand placed to approximately 2 feet above the top of the screen. A bentonite seal consisting of approximately 2 feet of hydrated bentonite pellets has been placed on top of the filter sand. The remainder of the borehole is grouted to within approximately 2 feet of ground surface with bentonite grout. Surface completions are 4-foot by 4-foot by 6-inch concrete pads with protective steel bollards as needed. Figure IIIH-A-2 lists the monitoring well details and Figure IIIH-A-3 shows the typical monitoring well construction configuration.

All parts of the groundwater monitoring system will be operated and maintained so that they perform at least to design specifications throughout the life of the monitoring program. Any monitoring well that is damaged to the extent that it is no longer suitable for sampling will be reported to the TCEQ who may make a determination about whether to repair or replace the well. Any monitoring well that is no longer used will be plugged and abandoned by a Texas-licensed monitoring well driller in accordance with TCEQ and other agency requirements. No monitoring or observation well will be plugged and abandoned (removed) without prior TCEQ written authorization. Any replacement monitoring well will be installed in accordance with Title 30 TAC §330.421 by a Texas-licensed monitoring well driller.

After a replacement monitoring well is installed, the well will be developed to remove drilling artifacts. Development will continue until all of the water used or affected during drilling activities has been removed and field measurement of pH, specific conductance (or conductivity), turbidity and temperature have stabilized. In addition, the replacement monitoring well location and all appropriate elevations associated with the top-of-well equipment will be surveyed by a Texas-registered professional surveyor or engineer. The elevations will be surveyed to the nearest 0.01 foot and referenced to mean seal level. The point on the well casing where the top of casing elevation was determined will be permanently marked on the casing. The well location will be given in terms of latitude and longitude (to the nearest 0.1 seconds) or accurately referenced to the landfill's grid system.

Within 60 days of replacement well completion, a monitoring well installation report will be submitted to the TCEQ. The report will include a lithologic log, a site map drawn to scale locating the well, and the relevant point of compliance details regarding the well. For new monitoring well installations, any forms required by any applicable agency will be submitted to that agency and form copies will be provided to the TCEQ as part of the monitoring well installation report.

2.3 Groundwater Monitoring Program

All facility detection monitoring wells are sampled semi-annually for the detection monitoring parameters listed in Table 5-1 of Section 5.1. The observation wells will be gauged and/or sampled as required by the TCEQ. The 2010-installed monitoring wells will begin detection monitoring within six months of background data evaluation by the facility in accordance with Appendix IIIH, Sections 5.3 through 5.5. Monitoring well MW-18 will continue to be used for detection monitoring of total metals until the total metals background data evaluation report for replacement monitoring well MW-18A is submitted. Following that submittal, monitoring well MW-18 will be removed by a Texas-licensed monitor well driller within one year of background data evaluation report submittal. Similarly, monitoring wells MW-9 and MW-13R will continue to be used for total metals detection monitoring until the proposed monitoring wells MW-30, MW-31 and MW-32 total metals background data evaluation report is submitted. Following that submittal, monitoring wells MW-9 and MW-13R will cease groundwater monitoring and will be removed by a Texas-licensed monitor well driller within 90 days of total metals background data evaluation report submittal. Details regarding the proposed sampling, analyses, and statistical comparison procedures to be utilized in groundwater monitoring are detailed in the following sections of Appendix IIIH.

3 GROUNDWATER SAMPLING PROCEDURES

3.1 Health and Safety Plan

A health and safety plan is required for all groundwater sampling events at the landfill. Prior to monitoring well purging and sampling, the sampling contractor's Ground Water Sampling Health and Safety Plan must be in place. Designing the site Ground Water Sampling Health and Safety Plan will be the responsibility of the party performing the actual work.

In addition, each laboratory facility is responsible for their own standard laboratory health and safety plan as required by current OSHA regulations.

3.2 Sample Event Preparation and QA/QC

3.2.1 General Event Preparation

The laboratory performing the groundwater analysis shall supply all necessary coolers, pre-cleaned containers, trip blanks, chemical preservatives, labels, custody seals, chain-of-custody and shipping forms. All field data shall be entered on a Field Data Sheet (see example provided in Appendix IIIH-C) or an equivalent form. Any changes to the monitoring plan and/or procedures need to be given to the laboratory prior to the field sampling personnel arriving on the site. A specific contact person should be established at both the facility and contract laboratory for communication between the two parties.

3.2.2 Sample Container Selection

Each sample container needs to be constructed of materials compatible and non-reactive with the sample it is to contain. Consult Appendix IIIH-D, Containerization and Preservation of Samples, to determine the number, type, and volume of appropriate containers. As noted in Section 3.2.1, the contract laboratory performing the analysis shall supply all the required containers.

3.2.3 Sample Container Preparation

Sample containers will be purchased as a pre-cleaned product or cleaned in the laboratory in a manner consistent with EPA protocol. An example protocol is as follows:

- Bottles, vials, containers, liners and caps hand washed in a laboratory-grade, non-phosphate detergent.
- Rinse three times with distilled water.
- Rinse with a chemically pure or reagent grade 10% nitric acid solution.

- Rinse three times with organic-free water.
- Oven-dried (air-dried for high-density polyethylene containers and caps).

After containers and caps are cool and dry, cap each container and store in a clean and dry environment.

3.2.4 Equipment Preparation Prior to Site Arrival

This section outlines the equipment preparation prior to site arrival for a specific monitoring event. This equipment preparation includes, at a minimum, decontamination procedures for water level indicator(s) and field parameter (temperature, pH, specific conductivity, turbidity) measurement device(s). Operation and calibration of field instruments will be performed per the manufacturers' instructions.

- Water Level Indicator(s) – Water level indicator(s) will be decontaminated prior to initial site arrival by hand washing the sensor probe and entire length of tape in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. While the tape is reeled back onto the carrying spool, the tape and probe will be wiped down with a clean dry paper towel.
- Field Parameter (Temperature, pH, Specific Conductivity, Turbidity) Measuring Device(s) – Field parameter measuring device(s) will be decontaminated by hand washing the sample cells in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. Meters will then be checked for proper calibration and operation as per the manufacturers' instructions. Any malfunctioning meters will be replaced prior to packing.

In the case of equipment failure, it is recommended that back-up instruments be in the sample crew's possession. If a back-up instrument is not available, then sampling should not proceed until proper equipment is made available.

3.2.5 Field QA/QC Samples

Field QA/QC samples consist of two primary areas of quality control. The first area is the quality control designed to prevent sample contamination from occurring in the field and/or shipping procedures. This is monitored in the trip blank(s) and field blank(s). A basic description of each is as follows:

- Trip Blank – These samples will be prepared in the laboratory by filling the appropriate clean sample containers with organic-free water and adding the applicable chemical preservative, if any, as indicated in Appendix IIIH-D. These containers are the be labeled "Trip Blank", in the analyses to be performed on each container indicated, and then shipped in the typical transportation cooler to the field and back to the laboratory along with the other sample set containers for a given event. This blank is tested to detect any contamination that may occur as a result of the containers, sample coolers, cleaning procedures, or chemical preservatives used. Trip blanks will consist of analysis of volatile organics and shall be taken and analyzed at a minimum of one per event.

- Field Blank – Field blank containers will be prepared in the field at a routine sample collection point during a monitoring event by filling the appropriate sample containers from the field supply of organic-free water. This field supply water shall be the same water used for cleaning and decontamination of all field equipment. This blank is tested to detect contamination that may occur as a result of the site ambient air conditions and serves as an additional check for contamination in the containers, sample transport coolers, cleaning procedures, and any chemical preservatives. Field blanks will consist of analysis of volatile organics and shall be taken and analyzed for each sampling event at a frequency of 1 in 20 per monitoring event or at a minimum of 1 per sampling day, whichever is greater.

Other Field QA/QC Samples – A second area of standard field QA/QC samples are field duplicates, matrix spike, and matrix spike duplicates.

- Field Duplicates are an extra set of samples taken at a particular monitoring point, generally from a designated point of compliance monitoring well, and labeled so that the laboratory is unaware that the samples are duplicates. These are independent samples which are collected as close as possible to the same point in space and time. They are 2 separate samples taken from the same source, stored in separate containers, and analyzed independently. Field duplicates are useful in documenting the precision of the sampling and analytical process. Samples shall be collected in proper alternating order for the sample point and field duplicate for each parameter (e.g. VOA – VOA, metals – metals, etc.) Field duplicates shall be taken and analyzed at a batch minimum of 1 in 10 or at a minimum of 1 per sample event for fewer than 20 monitored wells.
- Field samples for matrix spike and matrix spike duplicate analyses are taken in the same manner as field duplicates and allow sufficient volumes of sample to perform matrix spike and matrix spike duplicate analyses. Matrix spike/matrix spike duplicate samples will be collected as required by the laboratory.

Matrix spikes are those samples having a known amount of target analyte added at the lab to the sample prior to sample preparation and analysis. The matrix spike is used to determine the bias of a method in a given sample matrix.

Matrix spike duplicates are intra-laboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs at the lab prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix. Matrix spike and matrix spike duplicates will be analyzed at an appropriate frequency as specified in the method requirements.

Appropriate field QA/QC documentation should be recorded on the Field Data Sheet (e.g. location where field blank was collected).

3.3 Monitor Well Inspection

Visual problems with the monitoring well integrity will be noted in each sampling event on the Field Data Sheet.

3.4 Well Purge

3.4.1 General Well Purge and Potential Methane Monitoring Information

Purging a monitoring well is just as important as the subsequent sampling of the well. Water standing in a monitoring well over a period of time may become unrepresentative of formation water because of chemical and biochemical changes which may cause water quality alterations.

The following monitoring well methane gas measurement procedure has been added in the event a monitoring well methane gas measurement is requested by the TCEQ. Prior to the groundwater purge and immediately after the PVC riser well cap is removed, a combustible gas indicator will be used to check a monitoring well for the presence of any methane gas prior to well purging. The combustible gas indicator used for the measurements will be calibrated prior to methane measurements in accordance with the manufacture's instructions. The gas indicator intake tube will be lowered to a depth of about 2 to 5 feet above the static water table in each monitor well requiring methane measurement. The methane gas measurement will be recorded on the applicable Field Data Sheet(s).

3.4.2 Water Level Measurement

Prior to any purge or sampling activity at each monitoring well, a water level measurement is required. Each well's water level measurement will be recorded on the Field Data Sheet. In addition, the total depth of each monitoring well will be measured at least once every two years and recorded on the Field Data Sheet. Water level indicator equipment will be constructed of chemically inert materials and will be decontaminated at each well with a non-phosphate detergent followed with deionized water rinse. Water levels will be measured with a precision of +/- 0.01 foot.

Each monitoring well has a reference elevation point located at the top of the well casing. This reference point elevation has been measured by a licensed surveyor in relation the Mean Sea Level (MSL). Groundwater elevations in the wells which monitor the same waste management area must be measured over a period of time short enough to avoid temporal variations in groundwater flow which could preclude accurate determination of groundwater flow rate and direction.

3.4.3 Purge Equipment

Groundwater wells will be purged with dedicated bladder pumps. These pumps will remain dedicated to each respective well throughout monitoring unless replacement is necessary due to damage or wear, in which case repairs will be completed or a new pump will be dedicated.

In the event that a dedicated pump is inoperative, the pump and tubing apparatus will be pulled for replacement or repair, and a portable pump or bailer will be used to purge the well until such time the pump is repaired/repaired and reinstalled in the well.

3.4.4 Purge Procedures

This section provides specific instructions for the installation and use of the equipment that will be used for monitoring well purging and/or sample collection.

A dedicated bladder pump will be used for well purging.

Required Equipment:

- Bladder Pump
- Bladder pump controller
- Compressed air source
- New disposable gloves of appropriate material (latex or nitrile)
- Graduated pail
- Field parameter measurement device(s)

Operating Instructions:

- Don a new pair of gloves.
- Connect the compressed air source to the pump fitting at the top of the well.
- Start the air compressor.
- Don a new pair of gloves after handling the gasoline-powered compressor.
- Turn on the pump controller and adjust the discharge and refill cycles to the appropriate settings.
- Press the start button on the controller, which begins the pumping action.
- Adjust the controller to the desired flow rate.

3.4.5 Purge Volume

The purge water will be placed in a graduated container to accurately measure the total volume of purged water.

Low-flow purging will be employed using dedicated bladder pumps. Well purging will be conducted at a rate of approximately 100 milliliters per minute until a minimum of two pump and tubing volumes have been removed and stabilization of field parameters is achieved. Field parameters include temperature, specific conductivity, pH, and turbidity.

Parameter stabilization is defined as:

- Water Levels = less than 0.1 feet between measurements for three (3) consecutive measurements.
- Specific Conductivity = ± 3% for three (3) consecutive measurements.
- pH = ± 0.1 standard pH units for three (3) consecutive measurements.
- Temperature = ± 3% for three (3) consecutive measurements.
- Turbidity = ± ten (10) percent for three (3) consecutive measurements unless the turbidity is below ten (10) NTU. Three (3) consecutive values below ten (10) NTU are considered stable.

Measurements will be recorded on the field data sheet every three to five minutes. Water level measurement will also be taken every three to five minutes and recorded on the field data sheet. An initial decrease in water level may be expected due to pump and tubing evacuation, however, no subsequent continuous drawdown is to be expected. Should a well repeatedly not meet one or more of the above criteria, an alternate criteria may be implemented with TCEQ approval.

3.4.6 Purge Water Management

All purge water (and excess sample water) will initially be collected in appropriate containers or directly into a leachate collection system, contaminated water container, or gas condensate storage tank and not discharged to the ground surface. Contaminated purge water (and excess sample water) is considered contaminated if the concentration of any constituent is greater than the constituent's background concentration. Contaminated Purge water (and excess sample water) will be disposed by methods consistent with the methods and procedures listed in Appendix IIIC and not discharged to the ground surface. Typical options include, but are not limited to, the following:

- Management using the facility leachate collection system via storage tanks, accessible risers, or other access points;
- Management using facility condensate storage tanks;
- Management at the facility working face, which is restricted to purge water and excess sample water only;
- Management at a facility waste solidification system;
- Management using a waste water treatment plant (WWTP) connection.

3.5 Monitoring Well Sample Collection

3.5.1 General Sample Collection Information

Sampling should take place as soon as purging is complete in moderate to high yield wells. For wells purged dry, sampling generally will take place within 24 hours once the well has sufficient recharge, typically the following day. The time interval between the completion of well purge and sample collection normally should not exceed twenty-four hours. However, longer times not exceeding 6 or 7 days may be allowed for slow recharging wells with prior approval from the TCEQ. If after 7 days a slowly recharging well has not recovered sufficiently for a complete set of samples, a partial set of samples will be collected in the order specified in Section 3.5.2, or another order if warranted by conditions and data needs, until no more samples for the set can be collected.

3.5.2 Sample Collection Order

Samples will be collected and containerized according of the volatility of the required analyses. A specific collection order is as follows:

- Field Parameters (temperature, specific conductivity, pH and turbidity)
- Volatile Organic Compounds
- Semi-Volatiles, if collected

- Total Metals
- Inorganics, if collected

3.5.3 Sampling Equipment/Procedures

Groundwater samples will be collected with dedicated bladder pumps. These are the same pumps used in well purge and have the ability to achieve low flow rates at approximately 100 ml/min.

Standard procedures for collecting representative groundwater samples after completion of purge is as follows:

a. Reduce flow from pump to approximately 100 ml/minute.
b. Sample field parameters.
c. Sample for volatile organic compounds.
d. Increase flow to a moderate rate (0.2 to 1.0 liters/minute).
e. Sample metals.
f. Sample general water chemistry parameters.

3.5.4 Sample Preservation

All samples will be containerized and preserved according to Appendix IIIH-D – Sample Containerization and Preservation. Preservation acids may be added to the applicable sample container in the field or pre-preserved by the laboratory prior to sample collection. Methods of preservation are intended to retard biological action, retard hydrolysis of chemical compounds and complexes, and reduce the volatility of constituents.

Samples requiring refrigeration to four degrees Centigrade, according to Appendix IIIH-D will be accomplished by placing the sample containers immediately into coolers containing wet ice or the equivalent and delivering to the analytical laboratory as soon as practical. Groundwater samples for detection or other assessment/corrective action monitoring constituents will not be filtered in the field or the laboratory.

3.5.5 Field Measurements

Required field measurements include water levels, temperature, pH, specific conductivity, and turbidity. Field parameters will be measured using either hand held instruments placed directly into discharged water or an in-line flow through cell. Water level measurement procedures are described in Section 3.4.2. All instruments shall be properly calibrated and checked with standards according to the manufacturer's instructions. Any improperly operating instruments must be replaced prior to continuing sample collection operations.

3.6 Record Keeping

3.6.1 Field Data Sheets

All field notes must be completely and accurately documented. All field information will be entered on a standard Field Data Sheet, an example of which is provided in Appendix IIIH-C. Copies of the field data sheets will be placed in the facility's Site Operating Record as part of the applicable groundwater monitoring reports. All entries should be legible and made in indelible ink. Entry errors will be crossed out with a single line and initialed by the person making the corrections.

3.6.2 Chain-of-Custody/Sample Container Labels

Proper chain of custody records are required to insure the integrity of the samples and the conditions of the samples upon receipt at the laboratory, including the temperature of the samples at the time of log-in. The sample collector will fill in all applicable sections and forward the original, with the respective sample(s), to the laboratory performing the analysis. Upon receipt of the samples at the laboratory, the sample coordinator is to complete the chain of custody, make a copy for his/her files, and make the original documents part of the final analytical report (see Appendix IIIH-E for an example chain-of-custody form). Copies of the chain-of-custody forms will be included in the applicable groundwater monitoring reports.

All sample containers will be labeled to prevent misidentification. The following will be indicated on an adhesive label with waterproof pen:

- Collector's initials, date, and time of sampling.
- Sample Identification number.
- Sample preservatives (if any).
- Test(s) to be performed on the sample.

3.7 Sample Transport

Samples shall be shipped from the field back to the analytical laboratory either by hand delivery or utilizing an overnight courier service. Samples are to be shipped in insulated shipping containers which maintain the samples at approximately 4°C. The sample shipping container will be sealed using a method that will reveal whether the container's security has been violated or otherwise compromised before it is turned over to a common courier or any other person who does not complete the chain-of-custody documentation. Overnight courier shipping containers must be sturdy water-proof design (ice chests are commonly used) equipped with bottle dividers and cushion material to prevent breakage during shipment.

4 LABORATORY PROCEDURES/PERFORMANCE STANDARDS

The facility will submit laboratory data and analyses prepared by a TCEQ-accredited environmental testing laboratory and in accordance with acceptable accreditation standards (e.g. NELAC). The owner or operator will review all analytical data submitted under the requirements of this permit to ensure compliance with data quality objectives, prior to submittal of the data to the commission for review. This data review will include examination of the quality control results and other supporting data, including any data review by the laboratory and will identify any potential impacts such as bias on the quality of the data using qualifiers in the test reports tied to explanations in footnotes and in any laboratory case narrative which is required.

It is the responsibility of the owner or operator to ensure that the laboratory documents and reports all problems and anomalies observed that are associated with the analysis. If the analysis of the data indicates that it failed to meet the quality control goals for the laboratory's analytical data analysis program, it does not necessarily mean that the data is unusable. The owner or operator may still report the analytical data but will report any and all problems and corrective action that the laboratory identified during the analysis.

A Laboratory Case Narrative (LCN) report for all problems and anomalies observed must be submitted by the owner and/or operator. A sample laboratory QC checklist is provided in Appendix IIIH-G. The LCN will report the following information:

1. State the exact number of samples, testing parameters and sample matrix.
2. The name of the laboratory involved in the analysis. If more than one laboratory is used, all laboratories will be identified in the case narrative.
3. State the test objective regarding samples.
4. Explain each failed precision and accuracy measurement determined to be outside of the laboratory and/or method control limits
5. Explain if the effect of the failed precision and accuracy measurements on the results induces a positive or negative bias.
6. Identify and explain problems associated with the sample results, along with the limitations these problems have on data usability.
7. A statement on the estimated uncertainty of analytical results of the samples when appropriate and/or when requested.
8. A statement of compliance and/or noncompliance with the requirements and specifications. Exceedance of holding times and identification of matrix interferences will be identified. Dilutions will be identified and if dilutions are

necessary, they will be done to the smallest dilution possible to effectively minimize matrix interferences and bring the sample into control for analysis.

9. Identify any and all applicable quality assurance and quality control samples that will require special attention by the reviewer.
10. A statement on the quality control of the analytical method of the permit and the analytical recoveries information will be provided when appropriate and/or when requested.

In addition to the LCN, the following information will be submitted for all analytical data:

1. A Table identifying the field sample name with the sample identification in the laboratory report.
2. Chain of custody will be provided.
3. Analytical Report that documents the results and methods for each sample and analyte to be included for every analytical testing event. These test reports will document the reporting limit/method detection limit the laboratory used.
4. A release statement will be submitted from the laboratory. This statement will state "I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist or Laboratory Case Narrative, and no information or data have been knowingly withheld that would affect the quality of the data."
    a. If it is an in-house laboratory, it will have the following statement: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.
5. If the data is from soil and/or sediment samples, it will be reported on a dry weight basis with the percent solids and the percent moisture reported so that any back calculations of the wet analysis may be preformed.
6. A laboratory checklist. The Laboratory Data Package Cover Page, and Laboratory Review Checklist or the laboratory quality assurance and quality control data and laboratory analytical data (which may be submitted in hard-copy or electronic format), will be included with the TCEQ-0312 forms for each groundwater monitoring event. For every response of "No, NA, or NR" that is reported on the checklist, the permittee will ensure the laboratory provides a detailed description of the "exception report" in the summary of the LCN or by adding additional explanations to the checklist. The permittee will require the laboratory to do an

equivalent of an EPA Level 3 review regarding quality control analysis. The facility will explain any problems encountered in the laboratory analysis, either by adding additional explanations to the laboratory checklist or by extending the laboratory case narrative. Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the permittee.

5 CONSTITUENTS, PQLS, AND DETECTION MONITORING

5.1 Analyzed Constituents

The detection monitoring constituents at the facility will be as referenced in Title 30 TAC §330.419 and specified in 40 Code of Federal Regulations (CFR) 258 Appendix I and Table 5-1 below. The laboratory will report the analytic results for each constituent to its respective practical quantitation limit (PQL).

Table 5-1
Detection Monitoring Constituents

15 Metal Constituents (1,2)
Antimony (total)
Arsenic (total)
Barium (total)
Beryllium (total)
Cadmium (total)
Chromium (total)
Cobalt (total)
Copper (total)
Lead (total)
Nickel (total)
Selenium (total)
Silver (total)
Thallium (total)
Vanadium (total)
Zinc (total)

(1) Analyses will be performed using the TCEQ – recommended EPA test methods or alternative methods with equivalent or better performance.

(2) Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

Table 5-1 (Continued)
Detection Monitoring Constituents

47 VOC Constituents [1,2]
Acetone
Acrylonitrile
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform (Tribromomethane)
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane (Ethyl Chloride)
Chloroform (Trichloromethane)
Dibromochloromethane (Chlorodibromomethane)
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene Dibromide or EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans-1,4-Dichloro-2-butene
1,1-Dichloroethane (Ethylidene Chloride)
1,2-Dichloroethane (Ethylene Dichloride)
1,1- Dichloroethylene (Vinylidene Chloride)
Cis-1,2- Dichloroethylene (Cis-1,2- Dichloroethylene)
trans-1,2-Dichloroethylene (trans-1,2-Dichloroethene)
1,2-Dichloropropane (Propylene Dichloride)

(1) Analyses will be performed using the TCEQ – recommended EPA test methods or alternative methods with equivalent or better performance.

(2) Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions there to.

Table 5-1 (Continued)
Detection Monitoring Constituents

47 VOC Constituents (Continued) $^{(1,2)}$
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethyl Benzene
2-Hexanone (Methyl Butyl Ketone or MBK)
Methyl Bromide (Bromomethane)
Methyl Chloride (Chloromethane)
Methylene Bromide (Dibromomethane)
Methylene Chloride (Dichloromethane)
Methyl Ethyl Ketone (2-Butanone or MEK)
Methyl Iodide (Iodomethane)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone or MIBK)
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetracholorethane)
Toluene
1,1,1 Trichloroethane (Methylchloroform)
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene, TCE)
Trichloroflourmethane (CFC-11)
1,2,3-Trichloropropane
Vinyl Acetate
Vinyl Chloride
Xylenes

(1) Analyses will be performed using the TCEQ – recommended EPA test methods or alternative methods with equivalent or better performance.

(2) Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

5.2 Practical Quantitation Limit

The laboratory reporting limits will be the quantitation limits that meet the requirements of Title 30 TAC §330.405(f)(5). Analytical results will be reported to the lowest concentration levels that can be reliably quantified (practical quantitation limits or PQL). The following describes the required PQL:

- The PQL will be below the groundwater protection standard established for each analyte in accordance with Title 30 TAC §330.409(h) unless approved otherwise by the executive director.
- The PQL will be determined as the concentration that corresponds to the following precision and accuracy criteria:

Constituents/Chemicals of Concern	Precision (percent RSD)	Accuracy (percent recovery)
Metals	10	70-130
Volatiles	20	50-150
Semi-Volatiles	30	50-150

- The precision and accuracy of the PQL initially will be determined from the PQLs reported over the course of a minimum of eight ground-water monitoring events. The results obtained from these events will be used to demonstrate that the PQLs meet the specified precision and accuracy limits. The PQL may be updated as more data becomes available.
- The PQL will be supported by analysis of a PQL check sample, consisting of a laboratory reagent grade sample matrix spiked with constituents/chemicals of concern at concentrations equal to or less than the PQL. At a minimum, a PQL check sample will be performed quarterly during the calendar year to demonstrate that the PQL continues to meet the specified limits for precision and accuracy.
- Analytical results for data below the limit of detection ("non-detect" results) will be reported as less than the established PQL limit that meets those precision and accuracy requirements.
- If a PQL cannot be established according to the specified precision and accuracy limits, the owner or operator will ensure that the laboratory provides sufficient documentation to justify the alternate precision and accuracy limits. This information will be reported to the executive director by the owner or operator and will be evaluated on a case-by-case basis.

All samples will be analyzed within the required holding times for the particular analyses to be tested. A list of appropriate sample containers, sample preservation, and recommended holding times is presented in Appendix IIIH-D.

5.3 Background Data Collection

As stated in Title 30 TAC §330.405(b)(3)(A), the number of samples to be collected to establish background groundwater quality data for total metals shall be consistent with the appropriate statistical procedures determined pursuant to Title 30 TAC §330.405(f). Most VOCs are not naturally occurring in groundwater. As a result, a mere detection of a VOC is considered statistically significant and no comparisons to background data are necessary to make this determination. Therefore, there is no need to establish background for VOCs for detection monitoring purposes.

Eight independent samples from each background and each point of compliance monitoring well will be collected in consecutive calendar quarters and analyzed for the total metals constituents referenced in Title 30 TAC §330.419(a) to establish background water quality. The number of background events is necessary due to the seasonal and temporal variations natural in groundwater analytical data and in consideration of potential statistical analyses methodologies and requirements. Groundwater monitoring results from new monitoring wells that are located down gradient from previously placed waste will be reviewed for VOCs after each background sampling event for evidence of a potential release from the facility. Upon completion of a new monitoring well's total metal background data collection, the facility will evaluate the background data to ensure that the data are representative of background groundwater total metals constituent concentrations and unaffected by waste management activities or other sources of contamination. The evaluation shall be documented in a report and submitted to the TCEQ before the next subsequent detection monitoring event following the final total metals background data collection event.

5.4 Updating Background Data

For inter-well total metals statistical comparisons, after completion of the initial eight quarterly background events, analytical data from background monitor wells will be incorporated in to the background data pool after each monitoring event. Data will be evaluated for potential outliers prior to incorporation into the well's background pool.

For total metals intra-well statistical comparisons, after completion of the initial eight quarterly background events, new quarterly or semi-annual data may be incorporated into background at a maximum frequency of once every two years. New data will be evaluated for any significant trends and potential outliers and, if appropriate, incorporated into the well's background pool. Upon completion of the background update data collection, the facility will evaluate the background data to ensure that the data are representative of background groundwater constituent concentrations unaffected by waste management activities or other sources of contamination. The evaluation shall be documented in a report and submitted to the TCEQ before the next detection monitoring event following the updated background period.

5.5 Detection Monitoring Events

Within six months after completion of total metals background, sampling and analysis for both background and point of compliance monitoring wells will be conducted on a semi-annual basis (every six months) for the constituents listed in Table 5-1. New wells and existing wells that are part of the new groundwater monitoring system will be monitored for volatile organic compounds (VOCs) a least semi-annually while collecting background for total metals and subsequent monitoring. New wells and existing wells that are part of the new groundwater monitoring system will be treated under the detection monitoring program for VOCs, even during background monitoring for total metals. Collection of samples for analysis of VOCs will be discontinued in wells not part of the new groundwater monitoring system because detection monitoring for VOCs will be initiated in existing wells carried over to the new system and new wells following installation and initiation of monitoring. The VOC analyses will be discontinued in monitor wells MW-4R, MW-9, MW-13R, and MW-18 because they are not part of the new groundwater monitoring system. Collection of samples and statistical evaluation of former GWSAP metals will continue in wells to be decommissioned during background monitoring for total metals in wells of the new groundwater monitoring system. Any existing piezometers or observation wells will be available for sampling should it be deemed appropriate in the preparation of an Alternative Source Demonstration (ASD) or other investigations. If the facility is in assessment monitoring, it will submit an annual assessment monitoring report within 60 days after the facility's second semiannual groundwater monitoring event in a calendar year.

5.6 Groundwater Analysis Result Submittals

Statistical analyses will be performed in accordance with Section 7 of Appendix IIIH no later than 60 days after each detection monitoring event. In the event that statistical analysis of the groundwater analytical results indicates an initial statistically significant increase (SSI) from background of any tested constituent at any monitoring well, a written notice to the TCEQ (and any other pollution control agency having jurisdiction that requests to be notified) will be submitted within 14 days of the initial SSI determination date.

Three copies of an Annual Report describing groundwater sampling and analyses results will be completed and submitted to the TCEQ within 90 days following the facility's last calendar year monitoring event. If the facility is in assessment monitoring, it will submit an annual assessment monitoring report within 60 days after the facility's second semiannual groundwater monitoring event in a calendar year. The results of groundwater monitoring, testing, and analytical work (as provided on TCEQ Form-0312) and any other information required in accordance with Title 30 TAC §330.407(c) and as outlined in this section will be included in the Annual Report. The annual report will include the following information, determined since the previously submitted annual report:

1. The Annual Report will include all the landfill's groundwater sample and field quality control sample analytical data collected during the reporting year in hard-copy format on TCEQ Form-0312 (Groundwater Sampling Report) and in any format requested by the TCEQ (e.g., electronic format). All information required by Title 30 TAC §330.407(c)(1 through 6) will be included (as pertinent) in the Annual Report.
2. With each monitoring event's laboratory report(s), the landfill will submit a laboratory case narrative (as summarized in Section 4) and either:
    a) A completed laboratory checklist equivalent to the example checklist presented in Appendix IIIH-G, or
    b) The laboratory quality assurance and quality control data and laboratory analytical data (which may be submitted in hard-copy or electronic format).
3. The landfill will explain any problems encountered in the laboratory analysis, either by adding additional explanations to the laboratory checklist or by extending the laboratory case narrative. Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the landfill;
4. A statement regarding SSI(s) in any well and the status of the SSI event(s);
5. The results of all groundwater monitoring, testing, and analytical work, including a summary of background groundwater quality values, groundwater monitoring analyses, statistical calculations, graphs and drawings;
6. The groundwater flow rate and direction in the uppermost aquifer, using the preceding calendar year's data. The report shall include all documentation used to determine the groundwater flow rate and direction;
7. A contour map of piezometric water levels in the uppermost aquifer based on concurrent measurements in all monitoring wells. The report shall include all data or documentation used to establish the contour map;
8. Recommendation for any changes; and
9. Any other items requested by the executive director.

In addition to the Annual Report, detection monitoring information (electronic data deliverables or EDDs) will be submitted to the TCEQ no later than 45 days after each sampling event. EDD data may be submitted to the TCEQ via email, diskette, or another format – as specified by the TCEQ. The landfill will provide laboratory analytical data as requested by the TCEQ. TCEQ-requested laboratory reports may be submitted in either electronic or hard copy form.

6 STATISTICAL METHODOLOGY – GROUNDWATER DATA ANALYSES

6.1 Statistical Methodology

Groundwater samples are collected and analyzed for constituents listed in Table 5-1. Statistical analyses will be limited to those Table 5-1 constituents listed in Appendix I of 40 CFR 258 in accordance with Title 30 TAC §330.419. Statistical comparisons will be performed using Sanitas™, a commercial software program developed by Sanitas Technologies, Inc. or another comparable computer program. Statistical analyses of groundwater data will be performed in accordance with Title 30 TAC §330.407 and §330.409. A Statistical Analysis Plan has been included as Section 7 of Appendix IIIH, which has been prepared using generally accepted statistical analysis principals and practices. However, it is not possible to predict all of the potential future circumstances. Therefore, alternative methods may be used that are more appropriate for the data distribution of the constituents being evaluated.

6.2 SSI, Resampling, ASD, and Assessment Monitoring

Statistical analysis of total metals constituents referenced in Title 30 TAC §330.419 will commence within six months after completion of the eight quarterly background events. An initial total metals Statistically Significant Increase (SSI) will be based on any compound detected in any on-site monitor well at a concentration above the specific constituent's statistical limit. If an initial SSI of any total metals constituent is indicated at any on-site monitoring well, a notice will be made to the TCEQ (and any other pollution control agency with jurisdiction that has requested to be notified) within 14 days of the initial SSI determination date.

Detection monitoring for the 47 volatile organic compounds listed in Table 5-1 of Section 5.1 and referenced in Title 30 TAC §330.419(a) will commence as described in Sections 5.3 and 5.5. An initial SSI will be based on any VOC compound detected above its statistical limit in any on-site monitoring well. If an initial SSI of any volatile organic compound is indicated at any monitoring well, a notice will be made to the TCEQ (and any other pollution control agency with jurisdiction that has requested to be notified) within 14 days of this determination as indicated in Section 5.6 of this plan.

Verification re-sampling is an integral part of the statistical methodology that is required to verify if an SSI has occurred. In the event of an initial SSI for constituents listed in Table 5-1, verification re-sampling will be completed and results submitted within 60 days of the initial SSI determination date. If an initial SSI occurs in a monitoring well and verification resampling is not conducted, then the initial SSI will be treated as a verified SSI. In the event that one or more constituents listed in Table 5-1 of Section 5.1 are verified as an SSI through re-sampling in any groundwater monitoring well, then the facility will either:

1. Notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the initial SSI within 14 days of the initial SSI determination date and begin assessment monitoring within 90 days of the written notice (Title 30 TAC §330.407(b)(1), or
2. Within 14 days of the initial SSI determination date, notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the facility's intent to submit an alternative source demonstration (ASD) report, and
3. Within 90 days of the initial SSI determination, submit an ASD report to the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) that demonstrates that a source other than the facility caused the contamination or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Title 30 TAC §330.407(b)(3)(B)). The report must be prepared and certified by a qualified groundwater scientist. If the report does not sufficiently demonstrate an alternative contamination source to the TCEQ, then the facility must begin assessment monitoring with 90 days of the written ASD intent notification.

In the event that assessment monitoring is required, the facility will comply with the TCEQ assessment monitoring requirements listed in Title 30 TAC §330.409. In accordance with Title 30 TAC §330.409, the landfill will sample and analyze the groundwater monitoring system for the full set of constituents listed in Appendix II to 40 Code of Federal Regulations (CFR) Part 258. The assessment monitoring requirements include sampling and analyses for 40 CFR 258 Appendix II constituents at the SSI well(s) and at the wells on each side of the well(s) exhibiting the SSI(s), unless an alternative subset of wells for sampling and analyses is designated by the TCEQ. Appendix II constituents shall be sampled annually following the initial Appendix II assessment monitoring sampling event unless an alternate sampling frequency is approved by the TCEQ. For any new constituent(s) detected in the point of compliance wells as a result of the complete Appendix II analysis, a minimum of four statistically independent samples from each background well shall be collected and analyzed to establish background levels for the additional constituent(s), unless an alternative subset of Appendix II background constituent analyses is designated by the TCEQ. In the event assessment monitoring is initiated, assessment monitoring will continue until the assessment constituents are statistically below the constituent's background concentration for two consecutive events using TCEQ-approved statistical procedures.

The facility will initiate an assessment of corrective measures within 90 days of finding that any of the assessment constituents have been detected at a statistically significant level exceeding the constituent's groundwater protection standard. In the event that an assessment of corrective measures is necessary, the assessment will include an analysis of the effectiveness of the potential corrective measures in meeting the requirements and objectives of the remedy as described under Title 30 TAC §330.413. In the event that an assessment of corrective measures is necessary, all interested and affected parties will be notified in accordance with the provisions of Title 30 TAC §305.107(c). In the event that an assessment of corrective measures is necessary, the facility will select a remedy and submit a report describing the remedy and how it will meet the required standards.

7 STATISTICAL ANALYSIS PLAN

7.1 Detection Monitoring Statistical Analyses

7.1.1 Statistical Analyses for Volatile Organic Constituents

An apparent Statistically Significant Increase over background (SSI) will be based on any organic compound detected in any monitor well at a concentration above its statistical limit. For a volatile organic compound, the statistical limit would ordinarily be a non-parametric prediction limit corresponding to the practical quantitation limit used to report analytical results. If an apparent SSI of any organic volatile compound is indicated during any detection monitoring event at any monitoring well, a notice will be made to the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) within 14 days of the initial SSI determination date as referenced in Section 6.2 of this plan. In the event that one or more Table 5-1 volatile organic compounds is confirmed through verification resampling as an SSI, and no source other than the landfill, error, or natural variation is demonstrated per Title 30 TAC §330.407(b)(4), then within 90 days of the initial SSI notice to the TCEQ date assessment monitoring will be initiated in accordance with Section 6.2.

7.1.2 Statistical Analyses for Metals

Metals will be statistically evaluated using either a control chart or non-parametric prediction limit approach. Comparisons will typically be made on an intra-well basis. These methods can be used to determine whether a single observation is statistically representative of a group of observations. These methods calculate statistical limits which include one or more observations from the same population with a specified confidence. In groundwater monitoring, these methods' approaches may be used to make comparisons between background and compliance data.

Statistical analysis for the 15 total metals compounds in Table 5-1 will commence within six months after completion of the eight quarterly background events as referenced in Section 5.4 of this plan. If an apparent SSI of any total metals constituent is indicated during any detection monitoring event at any monitoring well, a notice will be made to the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) within 14 days of SSI determination as referenced in Section 6.2 of this plan. In the event an initial SSI for any total metal constituent listed in Table 5-1 is confirmed through verification resampling as an SSI and no source other than the landfill, error, or natural variation is demonstrated per Title 30 TAC §330.407(b)(4), then within 90 days of the SSI notice to the TCEQ, assessment monitoring will be initiated per Section 6.2.

The control charts are constructed assuming that the background data have a normal or transformed-normal distribution. A minimum of eight background well values should be used in constructing the statistical limits.

7.1.3 Control Chart Procedure

For wells in detection monitoring, metals will be statistically evaluated using combined Shewart-CUSUM control charts. This procedure assumes that the data are independent and normally distributed with a fixed mean and constant variance. The most important assumption is independence, therefore wells should be sampled no more frequently than quarterly (Gibbons, 1994). The assumption of normality is less of a concern and natural log or square root transformations are adequate for most applications. The analysis is only applied to constituents that have greater than 50 percent detections in the background data. For those metals with fewer than 50 percent detections in the background data set, a non-parametric prediction limit analysis will be used. The practical quantitation limit for that analysis will be substituted for "non-detect" results when applying control charts.

Shewart-CUSUM control charts allow detection of both major and gradual releases from the facility independent of spatial variation. This procedure is specifically recommended in the USEPA Unified Guidance document (2009).

Control charts are a form of time-series graph, on which a statistical representation of concentrations of a given constituent are plotted at intervals over time. The statistics are computed and plotted together with an upper and/or lower control limit on a chart where the x-axis represents time.

The Procedure for conducting the intrawell analysis using combined Shewart-CUSUM control charts is provided as follows:

Three parameters are selected prior to plotting:

h - The control limit to which the cumulative sum (CUSUM) values are compared. The EPA recommended value for **h** is 5 units of standard deviation.

k - A reference value that establishes the upper limit for the acceptable displacement of the standardized mean. The EPA recommended value for k is 1.

SCL - The upper Shewart control limit to which the standardized mean will be compared. The EPA recommended value for **SCL** is 4.5.

For each time period, T_i, take n_i independent samples (n_i may be one), and calculate the mean, $\bar{x}_i$. Compute the standardized mean Z_i of the measured concentrations where only a single new measurement is obtained for each constituent at each event as:

$$Z_i = (x_i - \bar{x})/s$$

Where:

x_i = value obtained for a constituent during monitoring event i.

s = The standard deviation obtained from prior monitoring data from the same well.

When applicable, for each time period, T_i, compute the cumulative sum, S_i, as:

$$S_i = \max\{0,(Z_i - k) + S_{i-1}\}$$

Where max {A,B} is the maximum of A and B, and $S_o = 0$.

Plot Z_i and S_i against T_i on the control chart. The results may be plotted in standardized units or converted to the concentration units of the constituents being evaluated. An "out-of-control" situation (potential contamination) occurs whenever $Z_i \geq$ SCL or $S_i \geq h$. Two different types of situation are controlled by the limits. Too large a standardized mean will occur if there is a rapid increase in concentration in the well. Too large a cumulative sum may also occur for a more gradual trend. A verified statistically significant increase over background (SSI) will occur if both the initial result *and* a verification sample result consecutively exceed one of the above mentioned statistical limits. Upgradient wells will be monitored for informational purposes only and will not be part of the verification resampling program.

7.1.4 Verification Resamples

The Shewart and CUSUM portions of the control chart are affected differently by outliers. The Shewart portion of the control chart compares each individual new measurement to the control limit, therefore the next monitoring event constitutes an independent verification of the original result. However, the CUSUM procedure incorporates all historical values in the computation, therefore, the effect of the outlier will be present in both the initial and verification sample. Hence, the statistical test will be invalid unless the verification sample value replaces the suspected outlier sample value. Therefore, outlier values will be replaced by verification resample results in order to confirm an SSI (Gibbons, 1994).

7.1.5 Updating Control Charts

As monitoring continues, the background mean and variance will be updated periodically to incorporate new data. Every two years all new data that are in control may be pooled with the initial eight background samples and the mean and variance recomputed and used in constructing future control charts. Texas Commission on Environmental Quality (TCEQ) approval will be obtained prior to updating the background data pool.

7.1.6 Non-Parametric Prediction Limits

For those metals with fewer than 50-percent detections a non-parametric upper prediction limit analysis will be used. An upper prediction limit is a statistical limit calculated to include one or more observations from the same population with a specified confidence.

In groundwater monitoring, an upper prediction limit approach may be used to make comparisons between background and compliance well data. The limit is constructed to contain all **k** observations with stated confidence. If any observation exceeds the upper prediction limit, this is statistically significant evidence that the observation is not representative of the background group. The number of observations, **k**, to be compared to the limit must be specified in advance.

7.1.7 Non-Parametric Upper Prediction Limit Procedure

A non-parametric upper prediction limit uses the highest value from background data to set the upper prediction limit Under EPA Standards, the false positive rate is based upon the formula:

$$1 - (n/(n + k))$$

Where:

n = The background sample size, and

k = The number of future values being compared to the limit.

7.2 Assessment Monitoring Statistical Analyses

A 95 percent lower confidence limit analysis will be used to statistically evaluate the groundwater data derived from assessment monitoring wells. Confidence limits are constructed from monitoring data and are designed to contain the mean concentration of a well analyte in groundwater monitoring, with a designated level of confidence. A confidence limit is generally used when point of compliance samples are being compared to a groundwater protection standard (GWPS).

7.2.1 Assumptions

The sample data used to construct the limits must be normally or transformed-normally distributed. In the case of a transformed-normal distribution, the confidence limit must be constructed on the transformed sample concentration values. In addition to the limit construction, the comparison must be made to the transformed GWPS value. When none of the transformed models can be justified, a nonparametric version of each limit may be utilized. Statistically significant evidence that the mean concentration exceeds the GWPS occurs when the lower confidence limit is greater than the GWPS.

7.2.2 Distribution

The distribution of the data is evaluated by applying the Shapiro-Wilk or Shapiro-Francia test for normality to the raw data or, when applicable, to the Ladder of Powers (Helsel & Hirsch, 1992) transformed data. The null hypothesis, $\mathbf{H_O}$, to be tested is:

$\mathbf{H_O}$**:** The population has a normal (or transformed-normal) distribution.

The alternative hypothesis, $\mathbf{H_A}$, is:

$\mathbf{H_A}$: The population does not have a normal (or transformed-normal) distribution.

7.2.3 Censored Data

If less than 15 percent of the observations are non-detects, these will be replaced with the practical quantitation limit prior to running the normality test and constructing the confidence limit.

If more than 15 percent, but less than 50 percent, of the data are less than the detection limit, the data's sample mean and standard deviation are adjusted according to the method of Cohen or Aitchison (U.S. EPA, April 1989). This adjustment is made prior to construction of the confidence limit.

If more than 50 percent of the data are less than the detection limit, these values are replaced with the practical quantitation limit and a nonparametric confidence limit is constructed.

7.2.4 Parametric Confidence Limit Procedures

A minimum of four sample values is required for the construction of the parametric confidence limit. The mean ($\overline{\mathbf{X}}$) and standard deviation (**S**) of the sample concentration values are calculated separately for each compliance well. For each well, the confidence limit is calculated as:

$$\overline{\mathrm{X}} \pm t_{(1-a,\,n-1)} \frac{S}{\sqrt{n}}$$

Where:

S = The compliance point's standard deviation;

n = The number of observations for the compliance point; and

$t_{(1-\alpha,,n-1)}$ is obtained from the Student's t-Distribution (appendix B; U.S. EPA, April 1989) with (n-1) degrees of freedom.

The use of the 95th percentile of the t-Distribution is consistent with the 5 percent α -level of individual well comparisons. If the lower limit is above the compliance limit, there is statistically significant evidence that the constituent exceeds a GWPS.

7.2.5 Nonparametric Confidence Limit Procedure

The nonparametric confidence limit procedure requires at least seven observations in order to obtain a one-sided significance level of 1 percent. The observations are ordered from smallest to largest and ranks are assigned separately within each well. Average ranks are assigned to tied values. The critical values of the order statistics are determined as follows.

If the minimum seven observations are used, the critical values are the first and seventh values.

Otherwise, the smallest integer, **M**, is found such that the cumulative binomial distribution with parameters **n** (sample size) and probability of success, p=0.5, is at least 0.99.

The exact confidence coefficient for sample sizes from 4 to 11 are given by the EPA (Table 6-3; U.S. EPA, April 1989). For larger samples, take as an approximation the nearest integer value to:

$$\mathbf{M} = \frac{n}{2} + 1 + \mathbf{Z}_{(1-\alpha)} \sqrt{\frac{n}{4}}$$

Where:

$\mathbf{Z}_{(1-\alpha)}$ = The 1-α percentile from the normal distribution found in Table 4 (appendix B; U.S. EPA, April 1989); and

n = The number of observations in the sample.

Once **M** has been determined, **(n+1-M)** is computed and the confidence limits are taken as the order statistics, **X(M)** and **X(n+1-M)**. These confidence limits are compared to the compliance limit. If the lower limit, **X(M)**, exceeds the compliance limit, there is statistically significant evidence that the constituent exceeds a GWPS.

8 GROUNDWATER ANALYTICAL RESULTS AND POTENTIAL RESPONSE ACTIONS

8.1 Groundwater Quality

The Carel Corporation has completed groundwater monitoring and statistical analyses for the facility since 1998. Except for the VOC, barium, and arsenic detections noted in this section, all unverified analyte detection monitoring SSIs at the site have been resolved through The Carel Corporation's verification resampling. According to The Carel Corporation, all detection monitoring wells were in detection or background status (except monitoring wells MW-1R, MW-4R, MW-9, MW-26, MW-27, and MW-28) as of March 2011.

TCEQ rules (Title 30 TAC §330.63(f)(5-7)) require comparison of the facility's groundwater analytical data to the specific constituents referenced in Title 30 TAC §330.419(a) and listed in 40 Code of Federal Regulations (CFR) Part 258, Appendix I. As shown in Table IIIH-B-1, the specific inorganic constituents detected in the facility's Subtitle D groundwater monitoring events include total arsenic, total barium, total cadmium, total chromium, total cobalt, total copper, total nickel, total thallium, and total zinc. These constituents are naturally occurring metals. Total barium has been detected in all monitor wells in most total metals sampling events. Except for arsenic and barium, these constituents were largely detected sporadically. Other than some arsenic detections, these total metals were detected in facility monitor wells at concentrations below their respective Groundwater Protection Standard (GWPS) concentrations. As such, total barium, total cadmium, total chromium, total cobalt, total copper, total nickel, total thallium, and total zinc are not constituents of concern at the facility.

Arsenic was detected in 13 of 26 existing and former detection monitoring wells during detection and corrective action monitoring events. The GWPS for arsenic in drinking water is 10 µg/l. Since 2009, the arsenic GWPS has been exceeded in former monitoring wells MW-10, MW-11, and MW-12. For this reason, arsenic is a constituent of concern in the facility's corrective action program. As stated in the facility's corrective action plan (The Carel Corporation, Assessment of Corrective Measures, 2009), the arsenic detections are due to mobilization of naturally occurring arsenic due to groundwater chemical changes caused by landfill gas migration.

As shown in Table IIIH-B-2, the volatile organic compound (VOC) constituents detected in the facility's existing and former detection monitoring wells during detection and corrective action monitoring events since 2008 include acetone, benzene, 1,1-dichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, methyl ethyl ketone, trichloroethylene, and vinyl chloride. The acetone, benzene, and methyl ethyl ketone detections were isolated and not verified by subsequent verification resampling during the following year. As stated in the facility's corrective action plan, the other verified

VOC detections are due to landfill gas migration. The detections of VOCs in monitoring wells MW-1R, MW-4R, MW-9, MW-15A, MW-26, MW-27, and MW-28 resulted in these wells being placed in assessment monitoring status as discussed in Section 8.2. As the groundwater VOC concentrations statistically exceeded the GWPS for cis-1,2-dichloroethylene and trichloroethylene, observation wells MW-10, MW-11, and MW-12 are in corrective action status as discussed in Section 8.3.

8.2 Assessment Monitoring Status

Title 30 TAC §330.63(f)(6) requires the establishment of an assessment monitoring program if the presence of hazardous constituents referenced in Title 30 TAC §330.419 have been detected in the groundwater at the time of the permit application. In accordance with Title 30 TAC §330.409(a), the following facility monitoring wells have assessment monitoring status at this time.

- MW-1R – due to verified 1,1-dichloroethane and cis-1,2-dichloroethylene detections with maximum reported 2011 concentrations of 13 µg/L and 4 µg/L, respectively. The GWPS for 1,1-dichloroethane is 4,900 µg/L and the GWPS for cis-1,2-dichloroethylene is 70 µg/L.
- MW-4R – due to verified cis-1,2-dichloroethylene detections with a maximum reported 2011 concentration of 2.6 µg/L.
- MW-9 – due to verified 1,1-dichloroethane and cis-1,2-dichloroethylene detections with maximum reported 2011 concentrations of 1.3 µg/L and 5.8 µg/L, respectively.
- MW-26 – due to verified 1,1-dichloroethane and cis-1,2-dichloroethylene detections with maximum reported 2011 concentrations of 3.3 µg/L and 6.6 µg/L, respectively.
- MW-27 – due to verified 1,1-dichloroethane detections with a maximum reported 2011 concentration of 1.8 µg/L.
- MW-28 – due to verified 1,1-dichloroethane and cis-1,2-dichloroethylene detections with maximum reported 2011 concentrations of 1.3 µg/L and 12 µg/L, respectively.

In the fall of 2010, the facility installed new point of compliance monitor wells to the south of monitor wells MW-10, MW-11 and MW-12 as required by the monitor well spacing permit modification. During the first background monitoring event for the new wells in December 2010, VOCs were detected at concentrations below groundwater protection standards in monitor wells MW-26, MW-27, and MW-28. These new monitor well VOC detections were confirmed in the March 2011 monitoring event. The detected VOC constituents and the measurements of landfill gas in the well headspaces confirm landfill gas migration is the source of the contamination.

8.3 Corrective Action Program

Due to the detections of volatile organic compounds (VOCs) and arsenic in concentrations exceeding applicable GWPSs in observation wells MW-10, MW-11 and MW-12, the facility submitted an Assessment of Corrective Measures (ACM, The Carel Corporation, 2009). This submittal contains the corrective action program required by Title 30 TAC §330.63(f)(7) and is included in Appendix IIIH-H. As listed in the groundwater laboratory results in Tables IIIH-B-1 and IIIH-B-2, the following maximum groundwater VOC and arsenic concentrations have been reported which exceeded the respective GWPSs during the last three years (from 2009 through 2011).

Table 8-1
Recent GWPS Exceedances

Well ID	Constituent	Concentration (µg/L)	GWPS (µg/L)
MW-10	Arsenic	59	10
MW-10	Cis-1,2-dichloroethylene	71	70
MW-11	Arsenic	10	10
MW-11	Cis-1,2-dichloroethylene	150	70
MW-11	Trichloroethylene	14	5
MW-12	Cis-1,2-dichloroethylene	160	70

As stated in the ACM in Appendix IIIH-H, the groundwater GWPS exceedances were caused by landfill gas migration. The ACM also contains the selected remedy and a Corrective Action Plan. The TCEQ accepted this submittal as shown by the correspondence contained in Appendix IIIH-I. The ACM's selected remedies include:

- Continued operation and optimization of the landfill gas collection and control system (GCCS) to mitigate landfill gas and related VOC migration.
- Monitored natural attenuation (MNA) to periodically assess the effectiveness of the GCCS and natural attenuation in mitigating VOC concentrations.

8.4 Implementation of Corrective Action and Monitoring Status

Following a public meeting to discuss the selected remedy, the facility implemented the corrective action plan in 2010. The plan has been fully implemented at this time. In response to the VOCs detections, the facility installed an active gas collection and control system (GCCS) in several phases between 2005 and 2010. Optimization of the gas extraction system is performed on a frequent basis. The effectiveness of the source targeted system is monitored in the approved point of compliance detection monitoring system and the designated MNA observation wells including MW-4R, MW-9, MW-10, MW-10A, MW-10B, MW-11, MW-12, and MW-12A. The MNA observation wells are monitored on an annual basis.

In addition to the selected remedy requirements, the facility has initiated a pilot study to evaluate the potential to reduce VOC and arsenic concentrations at the observation well MW-10 location. The pilot study seeks to determine the effectiveness of enhanced bioremediation to reduce the constituents of concern using an injected Metals Reducing Compound (MRC), which is also known to be effective at remediating VOCs.

8.5 Proposed Revisions to MNA Well Network

The facility proposes to install a slurry wall around the perimeter of the pre-Subtitle D area, as discussed in Appendix IIIA. Construction of the slurry wall will begin within three years after the issuance of TCEQ Permit No. MSW-1312B. To facilitate the slurry wall construction and related heavy equipment access, monitor/observation wells MW-4R, MW-9, MW-10, MW-10A, MW-11, MW-12, MW-12A, B-1 and B-2, and three temporary pilot test landfill gas probes (TGP-1, TGP-2 and TGP-3) must be removed. Annual MNA monitoring in these observation wells/probes will continue until no more than six months prior to the initiation of slurry wall construction. Existing MNA observation wells B-3 and MW-10B will remain operational until their removal is authorized by the TCEQ. As approved by the monitor well spacing permit modification to TCEQ Permit No. MSW-1312A, the observation wells B-3 and MW-10B will be eligible for removal after two years of groundwater VOC results that are below the PQL concentrations. Following these well removals, the point of compliance monitoring wells will be used to evaluate MNA. All wells authorized by the TCEQ for removal will be plugged and abandoned by a Texas-licensed monitor well driller.

9 CONTAMINANT PATHWAY ANALYSIS

The majority of the bottom of the landfill is founded in the unweathered shale which, as described in Appendix IIIB, prevents the downward migration of leachate.

The northwest corner of the site is founded in the Alluvial Strata. While a leachate release from the containment system is unlikely, if one did occur in the northwest corner of the site, leachate would flow downward through the alluvial material. From there the contaminants would flow to the southwest toward the point of compliance monitoring system following the groundwater gradient and top of shale strata surface, as shown on Figure IIIH-A-1 and in Appendix IIIG, Section 3.0 (Figures 3-3 and IIIG-C-11).

As discussed in Appendix IIIB, any potential release from the vertical expansion area in the southern portion of the facility would have to occur through the composite overliner system, pre-Subtitle D sidewall liner, and slurry wall (or soil bentonite cutoff wall). A complete assessment of this potential pathway is provided in Appendix IIIB.

10 REFERENCES

American Society of Testing and Materials (ASTM), 2005. Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs. D 6312

Martin, W.F., Lippirr, J.M., and Protherd, T.G. 1987. Hazardous Waste Handbook for Health and Safety, Butterworth Publishers, Stoneham, Massachusetts, pp. 28-30.

Sanitas Technologies, Inc., 2009, Sanitas® Users Manual, Version 9, Shawnee, Kansas.

Texas Commission on Environmental Quality (TCEQ), "Texas Administrative Code, Title 30, Chapter 330, Municipal Solid Waste", March 27, 2006 (effective date).

The Carel Corporation, 2004, Investigation of the Nature and Extent of Volatile Organic Compound Detections in MW-11, Camelot Landfill, MSW Permit No. 1312A, Denton County, Texas.

The Carel Corporation, 2009, Assessment of Corrective Measures, Camelot Landfill, MSW Permit No. 1312A, Denton County, Texas.

The Carel Corporation, 2010, Camelot Landfill Groundwater Monitor Well Installation Report and Permit Modification – Site Development Plan Attachment 5 (Groundwater Characterization Report).

The Carel Corporation, 2011, Pilot Study Report, Camelot Landfill, MSW Permit No. 1312A, Denton County, Texas.

U.S. Environmental Protection Agency, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: United Guidance. Office of Solid Waste and Emergency Response, Washington D.C.

U.S. Environmental Protection Agency, 1991b. Handbook – Ground Water, Volume II: Methodology. EPA/625/6-90/0166.

U.S. Environmental Protection Agency, November 1986. Test Methods for Evaluating Solid Waste – Physical/Chemical Methods, Third Edition (revised), SW-846. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, November 1993. Solid Waste Disposal Facility Criteria Technical Manual. EPA/530-R-93-017, NTIC #PB94-100-450, Office of Solid Waste and Emergency Response, Washington, D.C.

APPENDIX IIIH-A

GROUNDWATER MONITORING SYSTEM

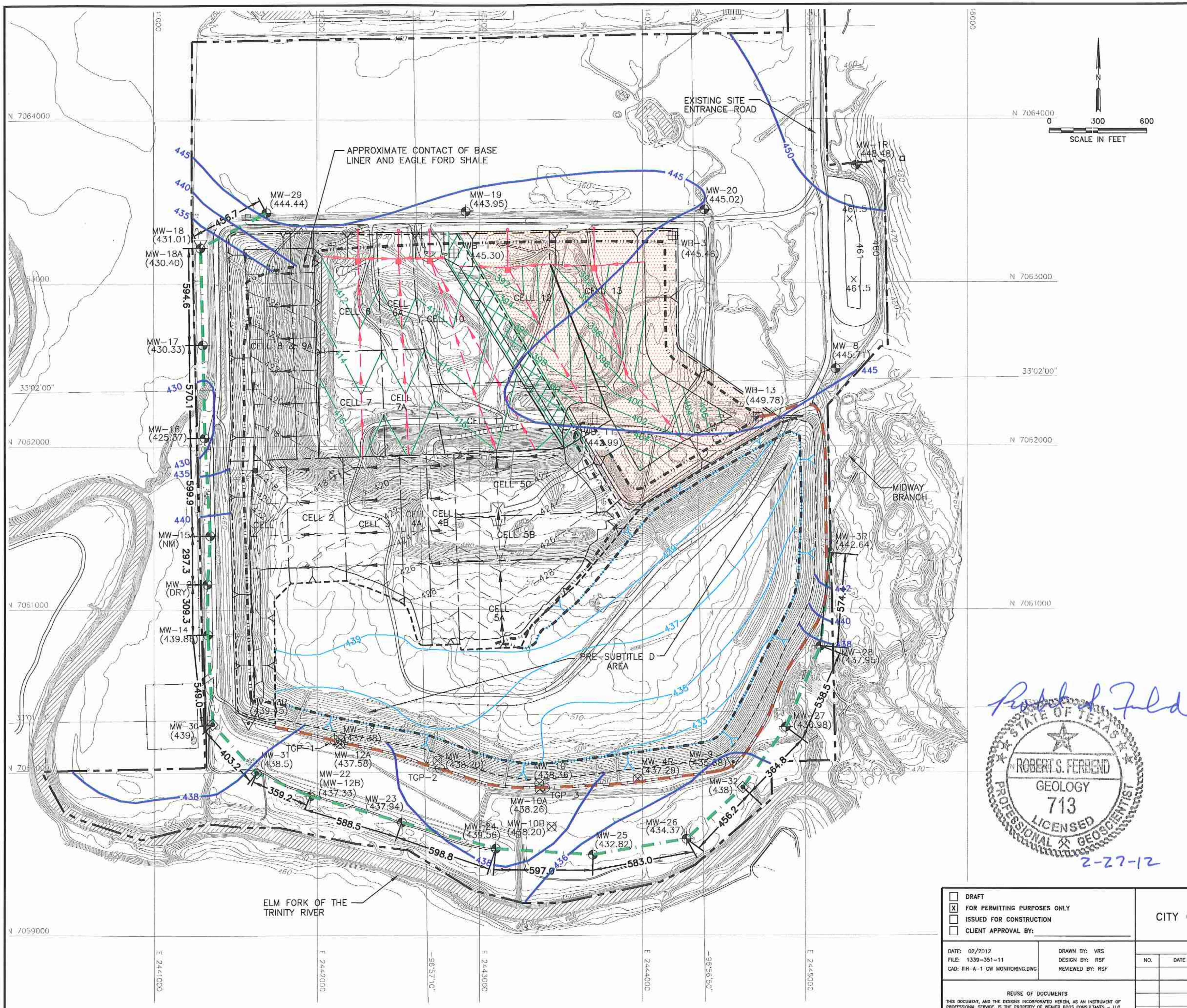
STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

TABLE OF CONTENTS

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12



LEGEND

— - - —	PERMIT BOUNDARY (SEE NOTE 2)
- - - - -	AUTHORIZED LIMITS OF WASTE
— — —	PROPOSED LIMITS OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
	EXISTING ROAD
500	EXISTING TOPOGRAPHIC CONTOUR
430	GROUNDWATER ELEVATION CONTOUR (FT-MSL)
394	PROPOSED EXCAVATION
600	REGRADED BUFFER ZONE AREA
	PROPOSED LEACHATE COLLECTION PIPE
■	PROPOSED LEACHATE COLLECTION SUMP
422	AS-BUILT TOP OF SUBTITLE D GEOMEMBRANE LINER (SEE NOTE 4)
433	APPROXIMATE BOTTOM OF WASTE CONTOUR IN PRE-SUBTITLE D AREA (SEE NOTE 5)
	EXISTING LEACHATE LINE
	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
▨	PROPOSED DEEPER EXCAVATION AREA
▨	PROPOSED WASTE FOOTPRINT LATERAL EXPANSION AREA
	APPROXIMATE CONTACT WITH EAGLE FORD SHALE
	PROPOSED POINT OF COMPLIANCE
MW-3R (442.64)	EXISTING MONITORING WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
MW-10 (438.36)	OBSERVATION WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
WB-1 (443.80)	EXISTING EXPANSION AREA PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
MW-30 (439)	PROPOSED MONITORING WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
MW-9 (435.88)	EXISTING MONITORING WELL PROPOSED FOR REMOVAL AFTER REPLACEMENT WELL BACKGROUND CONCENTRATIONS ESTABLISHED (WITH GROUNDWATER ELEVATION POSTED IN FT-MSL)
TGP-1	EXISTING TEMPORARY GAS PROBE TO BE REMOVED PRIOR TO SLURRY WALL CONSTRUCTION

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY PIESER SURVEYING CO. DATED NOVEMBER 2010.
3. WATER LEVEL MEASUREMENTS COLLECTED BY WBC ON DECEMBER 21, 2011. POTENTIOMETRIC CONTOURS INTERPRETED BY WBC.
4. AS-BUILT TOP OF GEOMEMBRANE LINER CONTOURS WERE DEVELOPED FROM HISTORICAL SLERS MAINTAINED IN THE SITE OPERATING RECORD.
5. APPROXIMATE BOTTOM OF WASTE CONTOURS IN THE PRE-SUBTITLE D AREA WERE DEVELOPED FROM HISTORICAL SLER INFORMATION.

ROBERT S. FERBEND
GEOLOGY
713

2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIH-A-1 GW MONITORING.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: RSF

PREPARED FOR
CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT GROUNDWATER MONITORING SYSTEM

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIH-A-1

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIH\IIIH-A-1 GROUNDWATER MONITORING.dwg, 2/24/2012 2:08:04 PM, rsellers

WELL NUMBER	NORTHING	EASTING	INSTALL DATE	CASING INSIDE DIAMETER[3]	GROUND ELEVATION	TOP OF CASING ELEVATION	TOTAL BOREHOLE DEPTH	FILTER PACK ELEVATION		WELL SCREEN ELEVATION		FILTER PACK DEPTH		WELL SCREEN DEPTH		GROUNDWATER ELEVATION[3]	DEPTH TO GROUNDWATER[3]
								TOP	BOTTOM	TOP	BOTTOM	TOP	BOTTOM	TOP	BOTTOM		
EXISTING GROUNDWATER MONITORING WELLS[1]																	
MW-1R[B]	7063716	2445309	09/19/95	4.0	461.8	464.74	28.0	443.2	433.8	441.6	437.0	18.6	28.0	20.2	24.8	453.81	8.0
MW-3R[P]	7061345	2445148	08/30/93	4.0	456.9	459.92	30.0	439.4	426.9	436.9	426.9	17.5	30.0	20.0	30.0	443.43	13.5
MW-4R[O]	7059961	2443971	11/28/95	4.0	457.7	461.21	30.0	435.2	427.7	434.5	429.9	22.5	30.0	23.2	27.8	438.74	19.0
MW-8[B]	7062472	2445185	09/20/95	4.0	456.5	459.95	28.6	437.5	427.9	435.8	431.2	19.0	28.6	20.7	25.3	447.52	9.0
MW-9[P,8]	7060064	2444557	11/27/95	4.0	455.5	458.98	29.2	437.5	426.3	436.7	429.5	18.0	29.2	18.8	26.0	437.80	17.7
MW-10[O]	7059934	2443367	12/01/95	4.0	464.3	467.79	35.0	440.3	429.3	439.1	434.5	24.0	35.0	25.2	29.8	439.37	24.9
MW-10A[O]	7059897	2443371	08/23/07	2.0	461.1	464.42	30.0	435.1	431.1	434.2	431.2	26.0	30.0	26.8	29.8	439.26	21.8
MW-10B[O]	7059668	2443442	08/26/08	2.0	455.2	458.65	25.0	437.2	430.2	435.2	430.2	18.0	25.0	20.0	25.0	439.20	16.0
MW-11[O]	7060075	2442742	12/05/95	4.0	460.5	463.95	30.0	439.3	430.5	438.1	433.7	21.2	30.0	22.4	26.8	439.08	21.4
MW-12[O]	7060202	2442146	12/06/95	4.0	460.5	463.96	30.4	438.5	430.1	437.9	433.3	22.0	30.4	22.6	27.2	438.24	22.3
MW-12A[O]	7060177	2442141	08/23/07	2.0	460.2	463.85	29.0	435.2	431.2	434.4	431.4	25.0	29.0	25.8	28.8	438.39	21.8
MW-13R[P,8]	7060305	2441577	01/17/96	4.0	458.9	462.60	30.0	437.9	428.9	436.8	431.8	21.0	30.0	22.1	27.1	438.98	19.9
MW-14[P]	7060846	2441328	01/25/96	4.0	462.0	465.50	25.5	445.5	436.5	444.2	439.5	16.5	25.5	17.8	22.5	440.48	21.5
MW-15A[P]	7061454	2441344	06/06/06	2.0	462.4	466.77	26.0	446.4	436.4	444.4	439.4	16.0	26.0	18.0	23.0	BTOP[7]	BTOP[7]
MW-16[P]	7062052	2441310	01/22/96	4.0	458.0	461.02	39.0	433.0	419.0	430.2	423.0	25.0	39.0	27.8	35.0	426.92	31.1
MW-17[P]	7062623	2441300	05/02/00	2.0	457.4	459.90	48.5	428.3	408.9	425.3	410.3	29.1	48.5	32.1	47.1	432.40	25.0
MW-18[8,P]	7063242	2441286	05/01/00	2.0	457.5	459.71	50.0	421.8	407.5	417.9	407.9	35.7	50.0	39.6	49.6	433.03	24.5
MW-18A[P]	7063217	2441286	08/24/10	2.0	457.0	459.93	50.0	421.0	407.0	419.0	409.0	36.0	50.0	38.0	48.0	432.47	24.5
MW-19[B]	7063439	2442917	08/23/10	2.0	457.5	460.63	20.0	445.5	437.5	443.5	438.5	12.0	20.0	14.0	19.0	446.29	11.2
MW-20[B]	7063446	2444379	08/23/10	2.0	453.9	456.99	21.0	440.9	432.9	438.9	433.9	13.0	21.0	15.0	20.0	447.16	6.7
MW-21[P]	7061156	2441326	08/25/10	2.0	462.0	464.89	23.0	443.0	439.0	442.0	439.5	19.0	23.0	20.0	22.5	BTOP[7]	BTOP[7]
MW-22[P]	7059856	2441957	08/26/08	2.0	459.7	463.22	32.0	435.7	427.7	432.7	427.7	24.0	32.0	27.0	32.0	437.99	21.7
MW-23[P]	7059696	2442524	08/25/10	2.0	458.9	462.05	32.0	434.9	426.9	432.9	427.9	24.0	32.0	26.0	31.0	438.73	20.2
MW-24[P]	7059534	2443100	08/25/10	2.0	456.5	459.56	30.0	434.5	426.5	432.5	427.5	22.0	30.0	24.0	29.0	440.01	16.5
MW-25[P]	7059495	2443696	08/30/10	2.0	455.1	457.97	29.0	431.6	426.1	429.6	427.1	23.5	29.0	25.5	28.0	435.75	19.4
MW-26[P]	7059591	2444271	08/31/10	2.0	455.3	457.94	29.0	439.3	426.3	437.3	427.3	16.0	29.0	18.0	28.0	436.71	18.6
MW-27[P]	7060278	2444880	08/30/10	2.0	453.0	456.10	25.0	432.5	428.0	431.5	429.0	20.5	25.0	21.5	24.0	438.38	14.6
MW-28[P]	7060773	2445092	08/30/10	2.0	453.8	456.71	29.0	435.3	424.8	433.3	425.8	18.5	29.0	20.5	28.0	439.17	14.6
MW-29[P]	7063432	2441689	08/23/10	2.0	456.3	459.58	51.0	419.3	405.3	416.3	406.3	37.0	51.0	40.0	50.0	447.10	9.2
PROPOSED GROUNDWATER MONITORING WELLS[2,10]																	
MW-30[9]	7060252	2441389	NEW	2.0	456	NEW	24	440	432	438	433	16	24	18	23	439.0	17.0
MW-31[9]	7059998	2441627	NEW	2.0	458	NEW	27	439	431	437	432	19	27	21	26	438.5	19.5
MW-32[9]	7059908	2444616	NEW	2.0	458	NEW	31	435	427	433	428	23	31	25	30	438.0	20.0

NOTES:

1. ELEVATIONS LISTED ABOVE IN FEET ABOVE MEAN SEA LEVEL, ALL DEPTHS LISTED IN FEET BELOW GROUND SURFACE.
2. PROPOSED MONITORING WELL GROUND ELEVATIONS ESTIMATED FROM SITE TOPOGRAPHIC MAP.
3. GROUNDWATER MEASUREMENTS TAKEN BY WBC ON APRIL 1, 2011.
4. MONITORING WELL CASING INSIDE DIAMETERS LISTED ABOVE IN INCHES.
5. POINT OF COMPLIANCE (P) OR BACKGROUND (B) MONITORING WELL.
6. MONITORING WELL MW-18 TO BE REMOVED FOLLOWING BACKGROUND DATA EVALUATION REPORT SUBMITTAL FOR REPLACEMENT WELL MW-18A.
7. BTOP – WATER LEVEL BELOW TOP OF DEDICATED PUMP; WATER LEVEL NOT MEASURED.
8. EXISTING GROUNDWATER MONITORING WELL TO BE REMOVED FOLLOWING BACKGROUND DATA EVALUATION REPORT SUBMITTAL FOR REPLACEMENT MONITORING WELLS.
9. PROPOSED POINT OF COMPLIANCE GROUNDWATER MONITORING WELL.
10. PROPOSED GROUNDWATER MONITORING WELL DETAILS ARE ESTIMATED FROM EXISTING BORING LOGS. ACTUAL DEPTHS AND ELEVATIONS OF DETAILS TO BE DETERMINED IN FIELD.
11. ALL OBSERVATION WELLS (O) TO BE REMOVED WITHIN 6 MONTHS OF SLURRY WALL CONSTRUCTION INITIATION AS THESE WELLS ARE NOT LOCATED ON THE POINT OF COMPLIANCE.

ROBERT S. FERBEND
713

2-27-12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIH-A-2 MW DETAIL.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
MONITORING WELL DETAILS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

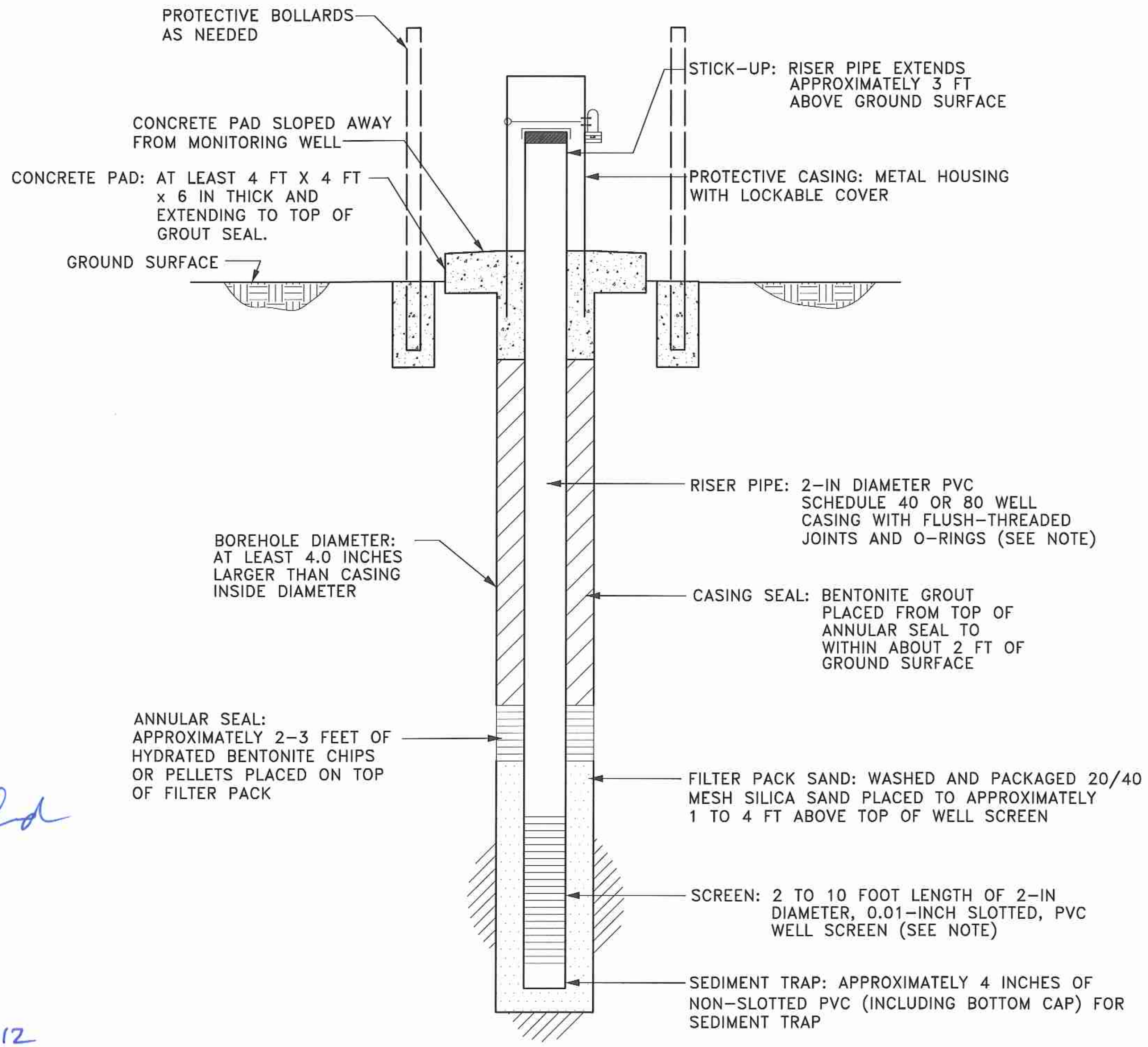
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIH-A-2



ROBERT S. FERBEND
GEOLOGY
713

2-27-12

NOTE:

MONITORING WELLS INSTALLED BEFORE 2010 ARE 4.0-INCH INSIDE DIAMETER AND WELLS INSTALLED IN 2010 OR LATER ARE 2.0-INCH INSIDE DIAMETER.

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIH\IIIH-A-3 MW DETAILS.dwg, 2/21/2012 4:47:16 PM, rsellers

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____

DATE: 02/2012
FILE: 1339-351-11
CAD: IIIH-A-3 MW DETAIL.DWG

DRAWN BY: VRS
DESIGN BY: RSF
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS - LLC SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS - LLC SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
MORE MONITORING WELL DETAILS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE IIIH-A-3

GROUNDWATER MONITORING SYSTEM CERTIFICATION

General Site Information

Site: Camelot Landfill

Site Location: Denton County

MSW Permit No.: 1312B

Qualified Groundwater Scientist Statement

I, Robert S. Ferbend, am a registered professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have reviewed the groundwater monitoring system and supporting details contained herein. In my professional opinion, the groundwater monitoring system design and construction details are in compliance with the groundwater monitoring requirements specified in Title 30 TAC §§330.401, 330.403, 330.405, 330.407, 330.409, 330.419, and 330.421. This system has been designed for the Camelot Landfill. The only warranty made by me in connection with this document is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm/Address:
Weaver Boos Consultants, LLC–Southwest
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76019

ROBERT S. FERBEND
GEOLOGY
713

Signature:
Robert S. Ferbend, P.G., Texas License No. 713

Date: 2-27-12

APPENDIX IIIH-B
GROUNDWATER MONITORING DATA

PROFESSIONAL GEOSCIENTIST
ROBERT S. FERBEND
GEOLOGY
713
LICENSED

Robert S. Ferbend

2-27-12

TABLE OF CONTENTS

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

Robert S. Ferbend

2-27-12

Table IIIH-B-1
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-1R	1/31/1996	n/a	<5	203	<3	<0.1	<20	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	58
	5/13/1996	n/a	<5	182	<3	<0.1	<20	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	103
	9/25/1996	n/a	<5	160	n/a	<0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	158	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	167	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	127	n/a	<0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	135	n/a	0.1	<100	n/a	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	135	n/a	0.2	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/2/1998	n/a	<10	120	<3	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	21
	6/29/1998	n/a	<5	110	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<50
	12/20/1998	n/a	<5	125	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	109	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	105	n/a	3	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	96	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	96	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	91	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	94	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	80	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/2002	n/a	<10	100	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	<10	100	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2003	n/a	<10	87	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	86	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	98	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	93	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/15/2005	n/a	<10	120	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	100	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	<10	93	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	<10	78	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/27/2007	n/a	<10	91	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/14/2007	n/a	<10	110	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/18/2007	n/a	<10	120	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	120	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2008	n/a	<10	100	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	<5	95	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2009	<1	<10	110	<1	<2	<8	<6	<10	<10	<9	<15	<3	<0.5	<6	<30
	3/29/2010	<5	<5	100	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/1/2010	<5	<5	110	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	100	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/6/2010	<5	<5	98	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	97	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/6/2011	<5	<5	96	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/12/2011	<5	<5	92	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/21/2011	<5	<5	97	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All other constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required for this event.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-3R	1/31/1996	n/a	<5	20	<3	0.1	n/a	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<30
	5/13/1996	n/a	<5	29	<3	0.2	<20	n/a	6	n/a	n/a	n/a	n/a	n/a	n/a	210
	9/25/1996	n/a	<5	28	n/a	0.5	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	25	n/a	1.5	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	44	n/a	0.4	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	22	n/a	0.6	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	17	n/a	0.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	n/a	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/29/1998	n/a	<5	16	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/1998	n/a	<5	19	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	14	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	16	n/a	4	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	11	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	20	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	19	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	13	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	15	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	21	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/3/2003	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	21	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/13/2006	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	<20	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/25/2007	n/a	<10	<20	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	n/a	<10	20	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/17/2007	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/1/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2009	n/a	<5	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	<10	20	<1	<2	<8	7.4	<10	<10	19	<15	<3	0.7	<6	<30
	3/29/2010	<5	<5	20	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/2/2010	<5	<5	20	<4	<2	<20	9.8	<10	<15	31	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	17	<4	<2	<20	9.6	<10	<15	37	<50	<10	1.2	<10	<100
	12/6/2010	<5	8	16	<4	<2	<20	14	<10	<15	50	<50	<10	1.5	<10	<100
	3/15/2011	<5	<5	14	<4	<2	<20	<5	<10	<15	47	<50	<10	1.3	<10	<100
	6/8/2011	<5	5	16	<4	<2	<20	18	<10	<15	52	<50	<10	1.4	<10	<100
	9/12/2011	<5	10	17	<4	<2	<20	17	<10	<15	59	<50	<10	1.6	<10	<100
	12/19/2011	<5	8.6	16	<4	<2	<20	16	<10	<15	62	<50	<10	1.8	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-4R	1/31/1996	n/a	<5	37	<3	0.2	n/a	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<30
	5/13/1996	n/a	<5	49	<3	0.2	<20	n/a	6	n/a	n/a	n/a	n/a	n/a	n/a	210
	9/25/1996	n/a	<5	51	n/a	0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	39	n/a	1.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	71	n/a	0.8	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	35	n/a	1.6	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	31	n/a	0.2	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	32	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/2/1998	n/a	<10	34	<3	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	210
	6/29/1998	n/a	<5	29	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<50
	12/20/1998	n/a	<5	32	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	21	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	26	n/a	5	8	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	12	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	25	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	23	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	20	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	18	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/2002	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	<10	29	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2003	n/a	<10	29	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	27	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/15/2005	n/a	<10	29	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/27/2006	n/a	<10	27	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/13/2006	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	<10	23	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	3	<50	<100
	6/27/2007	n/a	<10	21	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/18/2007	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2008	n/a	<10	22	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/1/2008	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2009	n/a	<5	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	<10	19	<1	<2	<8	<6	<10	<10	35	<15	<3	2.5	<6	<30
	3/29/2010	<5	<5	14	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/2/2010	<5	<5	23	<4	<2	<20	<5	<10	<15	<20	<50	<10	2.4	<10	<100
	12/7/2010	<5	<5	23	<4	<2	<20	5.4	<10	<15	34	<50	<10	3.8	<10	<100
	6/6/2011	n/a	<5	22	n/a	<2	<20	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	23	<4	<2	<20	7.3	11	<15	26	<50	<10	2.5	<10	<100

Notes: All constituents listed in micrograms per liter (μg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-8	1/31/1996	n/a	<5	61	<3	0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	93
	5/13/1996	n/a	<5	31	<3	<0.2	n/a	n/a	8	n/a	n/a	n/a	n/a	n/a	n/a	193
	9/25/1996	n/a	<5	49	n/a	0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	25	n/a	0.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	49	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	20	n/a	0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	19	n/a	<0.1	<10	n/a	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	12	n/a	0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/29/1998	n/a	<5	<10	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/1998	n/a	<5	19	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	15	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	19	n/a	n/a	6	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	<100	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	16	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	16	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/26/2001	n/a	<5	16	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	14	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	21	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/3/2003	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/13/2006	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	<20	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/25/2007	n/a	<10	<20	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	n/a	<10	<20	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/17/2007	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/1/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2009	n/a	<5	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	<10	17	<1	<2	<8	<6	<10	<10	<9	<15	<3	<0.5	<6	<30
	3/29/2010	<5	<5	15	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/1/2010	<5	<5	18	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	18	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/6/2010	<5	<5	16	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	15	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/6/2011	<5	<5	14	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/12/2011	<5	<5	16	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/19/2011	<5	<5	13	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (μg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-9	1/31/1996	n/a	<5	46	<3	<0.2	125	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<30
	5/13/1996	n/a	<5	54	<3	0.2	<20	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	200
	9/25/1996	n/a	<5	46	n/a	0.7	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	33	n/a	0.5	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	47	n/a	0.4	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	34	n/a	0.5	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	26	n/a	0.2	<100	n/a	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	40	n/a	0.1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/2/1998	n/a	<10	25	<3	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	230
	6/29/1998	n/a	<5	29	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<50
	12/20/1998	n/a	<5	30	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	18	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	6	37	n/a	4	9	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	20	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	29	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	28	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	32	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/2002	n/a	<5	19	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/2002	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2003	n/a	<10	27	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	22	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	29	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	22	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/15/2005	n/a	<10	28	n/a	<1	<20	n/a	290	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/27/2006	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/13/2006	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	<10	20	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/27/2007	n/a	<10	20	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	n/a	<10	<20	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/18/2007	n/a	<10	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/1/2008	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2009	n/a	<5	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	<10	18	<1	<2	<8	<6	<10	<10	10	<15	<3	<0.5	<6	<30
	3/29/2010	<5	<5	10	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/1/2010	<5	<5	14	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	20	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	19	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	13	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/8/2011	<5	<5	14	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/13/2011	<5	<5	17	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	17	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-10	1/31/1996	n/a	<5	80	<3	<0.1	<20	n/a	130	n/a	n/a	n/a	n/a	n/a	n/a	<20
	5/13/1996	n/a	<5	55	<20	<20	<5	n/a	228	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/1996	n/a	<5	44	n/a	0.5	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	38	n/a	0.7	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	39	n/a	0.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	35	n/a	<0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	6	33	<1	<0.1	<2	n/a	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	20	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/2/1998	n/a	12	11	<3	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	29
	6/29/1998	n/a	5	23	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<50
	12/20/1998	n/a	14	25	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	16	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	12	41	n/a	2	30	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	18	17	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	21	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	23	18	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	22	18	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	11	16	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/2002	n/a	24	22	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	40	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2003	n/a	32	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	39	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	39	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	23	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/15/2005	n/a	25	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/27/2006	n/a	39	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	30	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	26	28	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/27/2007	n/a	21	27	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	<5	23	24	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/18/2007	n/a	25	34	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2008	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/1/2008	n/a	14	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2009	n/a	11	27	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	16	21	<1	<2	<8	24	<10	<10	57	<15	<3	3.3	<6	<30
	3/30/2010	<5	17	21	<4	<2	<20	25	<10	<15	63	<50	<10	3.3	<10	<100
	6/2/2010	<5	14	26	<4	<2	<20	32	<10	<15	43	<50	<10	2	<10	<100
	9/21/2010	n/a	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	10/27/2010	n/a	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/2010	n/a	13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/8/2010	<5	14	22	<4	<2	<20	27	<10	<15	34	<50	<10	1.8	<10	<100
	3/17/2011	n/a	18	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2011	n/a	59	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/15/2011	n/a	13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2011	n/a	25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-11	1/31/1996	n/a	<5	57	<3	<0.1	<20	n/a	8.2	n/a	n/a	n/a	n/a	n/a	n/a	115
	5/13/1996	n/a	<5	51	<3	<0.1	<20	n/a	7	n/a	n/a	n/a	n/a	n/a	n/a	213
	9/25/1996	n/a	<5	30	n/a	<0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	24	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	49	n/a	0.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	26	n/a	0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	22	n/a	<0.1	<100	n/a	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	17	n/a	0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/2/1998	n/a	<10	15	<3	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	24
	6/29/1998	n/a	<5	19	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<50
	12/20/1998	n/a	<5	22	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	20	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	22	n/a	3	8	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	18	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	23	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	7	23	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	17	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/2002	n/a	14	19	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/2002	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2003	n/a	<10	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	22	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2005	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/15/2005	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	<10	22	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/27/2007	n/a	<10	25	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	n/a	<10	23	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/19/2007	n/a	<10	21	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/9/2008	n/a	<10	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/2/2008	n/a	14	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	7	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	<10	22	<1	<2	<8	6.1	<10	<10	22	<15	<3	1.1	<6	<30
	3/30/2010	<5	12	22	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/2/2010	<5	<5	24	<4	<2	<20	6.6	11	<15	26	<50	<10	<1	<10	<100
	8/18/2010	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/8/2010	<5	10	23	<4	<2	<20	8.2	<10	<15	30	<50	<10	1.2	<10	<100
	3/17/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2011	n/a	5.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2011	n/a	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-12	1/31/1996	n/a	<5	83	<3	<0.1	<20	n/a	14.5	n/a	n/a	n/a	n/a	n/a	n/a	99
	5/13/1996	n/a	<5	61	<3	<0.1	<20	n/a	8	n/a	n/a	n/a	n/a	n/a	n/a	173
	9/25/1996	n/a	<5	88	n/a	0.2	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	7	51	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	74	n/a	0.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	37	n/a	<0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	33	n/a	<0.1	<.002	n/a	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	29	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/2/1998	n/a	<10	24	<3	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	22
	6/29/1998	n/a	<5	28	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	<50
	12/20/1998	n/a	<5	32	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	21	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	32	n/a	2	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	6	23	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	37	n/a	1	<5	n/a	7.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	37	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	29	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/2002	n/a	<5	27	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/2002	n/a	<10	37	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	12	34	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2003	n/a	<10	33	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	29	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2005	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	32	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/27/2006	n/a	21	32	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	<10	35	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/27/2007	n/a	<10	33	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	n/a	<10	30	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/19/2007	n/a	15	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/2/2008	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	5	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2009	<1	14	31	<1	<2	<8	18	12	<10	29	<15	<3	<0.5	<6	<30
	3/30/2010	<5	10	26	<4	<2	<20	8	<10	<15	<20	<50	<10	<1	<10	<100
	6/2/2010	<5	<5	30	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	8/18/2010	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/8/2010	<5	6	29	<4	<2	<20	5.7	<10	<15	<20	<50	<10	<1	<10	<100
	3/17/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2011	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2011	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-12B (MW-22)	8/28/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2009	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/2010	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/3/2010	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/2010	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/23/2010	<5	<5	22	<4	<2	<20	<5	11	<15	<20	<50	<10	<1	<10	<100
	12/8/2010	<5	<5	21	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/16/2011	<5	<5	23	<4	<2	<20	<5	10	<15	<20	<50	<10	<1	<10	<100
	6/10/2011	<5	<5	21	<4	<2	<20	<5	10	<15	<20	<50	<10	<1	<10	<100
	9/13/2011	<5	<5	21	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/21/2011	<5	<5	21	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.
wr = well removed prior to this event

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-13R	6/25/1997	n/a	<5	24	n/a	<0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	22	n/a	<0.1	<100	n/a	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	17	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/27/1998	n/a	<100	20	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/29/1998	n/a	<5	20	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/1998	n/a	<5	21	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	22	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	20	n/a	4	8	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	14	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	22	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	28	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	18	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	22	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	n/a	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2003	n/a	n/a	29	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/3/2003	n/a	<10	35	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/4/2003	n/a	n/a	29	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	33	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	37	<3	<1	<20	n/a	<20	<10	n/a	<20	n/a	n/a	n/a	<50
	6/23/2005	n/a	<10	27	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/27/2006	n/a	<10	32	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	25	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/25/2007	n/a	<10	35	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/13/2007	n/a	<10	33	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/19/2007	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/2/2008	n/a	<10	27	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	<5	37	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/2009	<1	<10	30	<1	<2	<8	<6	<10	<10	25	<15	<3	<0.5	<6	<30
	3/30/2010	<5	<5	30	<4	<2	<20	5.2	<10	<15	21	<50	<10	<1	<10	<100
	6/3/2010	<5	<5	30	<4	<2	<20	23	<10	<15	55	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	32	<4	<2	<20	17	<10	<15	38	<50	<10	<1	<10	<100
	12/7/2010	<5	6	24	<4	<2	<20	18	<10	<15	58	<50	<10	<1	<10	<100
	3/16/2011	<5	8.6	23	<4	<2	<20	20	<10	<15	60	<50	<10	<1	<10	<100
	6/7/2011	<5	<5	23	<4	<2	<20	12	<10	<15	38	<50	<10	<1	<10	<100
	9/14/2011	<5	7.3	26	<4	<2	<20	16	<10	<15	31	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	21	<4	<2	<20	<5	10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (μg/L).
n/a = Constituent analysis not required at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-14	1/31/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	5/13/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	9/25/1996	n/a	5	89	n/a	<0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	47	n/a	0.2	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	67	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	25	n/a	0.2	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	23	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	20	n/a	0.3	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/27/1998	n/a	<100	22	n/a	0.2	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/29/1998	n/a	<5	27	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/1998	n/a	<5	23	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	22	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	19	n/a	<1	5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	n/a	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	19	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	21	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	16	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	17	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/3/2003	n/a	<10	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	31	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	36	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	60	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	51	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	30	<4	<1	<20	n/a	<20	<10	n/a	<20	n/a	n/a	n/a	<50
	12/14/2006	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	26	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/25/2007	n/a	<10	26	<2	<1	<20	n/a	21	n/a	n/a	n/a	n/a	n/a	n/a	1200
	9/14/2007	n/a	<10	22	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/19/2007	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/4/2008	<5	<10	29	<4	1.8	<20	<70	<20	<5	80	<20	<50	20	<80	n/a
	12/2/2008	<5	<10	28	<4	<1	<20	<70	<20	<10	<50	<20	<50	<2	<80	<50
	6/23/2009	n/a	<5	25	n/a	1.2	<20	n/a	37	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/2009	<1	<10	24	<1	<2	<8	8.6	<10	<10	48	<15	<3	8.6	<6	51
	3/30/2010	<5	<5	20	<4	<2	<20	7.9	11	<15	41	<50	<10	6.5	<10	<100
	6/3/2010	<5	<5	26	<4	<2	<20	<5	12	<15	26	<50	<10	3.4	<10	<100
	9/20/2010	<5	<5	27	<4	<2	<20	<5	21	<15	29	<50	<10	2.9	<10	<100
	12/7/2010	<5	<5	25	<4	<2	<20	<5	16	<15	20	<50	<10	3.5	<10	<100
	3/16/2011	<5	<5	22	<4	<2	<20	<5	22	<15	<20	<50	<10	2.9	<10	140
	6/7/2011	<5	<5	22	<4	<2	<20	<5	34	<15	<20	<50	<10	3.1	<10	150
	9/14/2011	<5	<5	22	<4	<2	<20	<5	40	<15	<20	<50	<10	3.3	<10	180
	12/19/2011	<5	<5	25	<4	<2	<20	10	33	<15	25	<50	<10	2.8	<10	120

Notes: All constituents listed in micrograms per liter (μg/L).
n/a = Constituent analysis not required at this time.
ni = well not installed at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-15A	1/31/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	5/13/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	9/25/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/27/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	3/30/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/25/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	9/16/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/23/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/20/1998	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/28/1999	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/17/1999	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	7/5/2000	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/22/2000	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/11/2001	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/4/2001	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/24/2002	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/16/2002	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/3/2003	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/3/2003	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/16/2004	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/20/2004	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/22/2005	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/14/2005	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/28/2006	n/a	65	120	n/a	<1	240	n/a	26	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/7/2006	n/a	22	57	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	21	52	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/6/2007	<5	28	200	<2	<1	<20	<50	40	n/a	<50	n/a	<50	<2	<50	<100
	6/26/2007	n/a	14	75	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/14/2007	n/a	24	125	<2	<2	<35	n/a	<35	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/18/2007	n/a	22	52	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/28/2008	n/a	20	44	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	19	49	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/4/2008	<5	18	40	<4	<1	<20	<70	<20	<5	<50	<20	<50	<2	<80	n/a
	12/2/2008	n/a	11	42	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	10	47	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/2009	<1	<10	28	<1	<2	<8	10	<10	<10	19	<15	<3	2	<6	<30
	3/29/2010	<5	<5	31	<4	<2	<20	9.1	11	<15	<20	<50	<10	1.7	<10	<100
	6/3/2010	<5	10	41	<4	<2	<20	16	16	<15	26	<50	<10	1.8	<10	<100
	9/20/2010	<5	<5	32	<4	<2	<20	5.7	<10	<15	<20	<50	<10	1.6	<10	<100
	12/7/2010	<5	<5	39	<4	<2	<20	22	<10	<15	<20	<50	<10	<1	<10	<100
	3/17/2011	<5	<5	37	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/7/2011	<5	<5	31	<4	<2	<20	20	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.
ni = well not installed at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-16	1/31/1996	n/a	<5	108	<3	<0.1	<20	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	49
	5/13/1996	n/a	<5	101	<3	<0.1	<20	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	87
	9/25/1996	n/a	<5	76	n/a	<0.1	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/1996	n/a	<5	55	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/30/1997	n/a	<5	95	n/a	<0.1	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/1997	n/a	<5	53	n/a	<0.1	<200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/16/1997	n/a	<5	53	n/a	<0.1	<100	n/a	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/1997	n/a	<5	42	n/a	<0.1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/29/1998	n/a	<5	44	n/a	<1	<5	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/1998	n/a	<5	44	n/a	<1	<5	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/28/1999	n/a	<5	43	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/17/1999	n/a	<5	40	n/a	2	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/5/2000	n/a	<5	34	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	49	n/a	<1	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	24	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	19	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2002	n/a	<5	28	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	43	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/3/2003	n/a	<10	46	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	39	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	59	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	44	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	29	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	44	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	62	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/13/2006	n/a	<10	60	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	50	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/25/2007	n/a	<10	34	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/14/2007	n/a	<10	32	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/17/2007	n/a	<10	31	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/4/2008	<5	<10	43	<4	<1	<20	<70	<20	<5	<50	<20	<50	<2	<80	n/a
	12/2/2008	n/a	<10	42	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	<5	39	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/23/2009	<1	<10	14	<1	<2	<8	<6	<10	<10	10	<15	<3	<0.5	<6	<30
	3/29/2010	<5	<5	33	<4	<2	<20	20	<10	<15	<20	<50	<10	<1	<10	<100
	6/3/2010	<5	<5	16	<4	<2	<20	6.5	<10	<15	<20	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	30	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/6/2010	<5	<5	62	<4	<2	<20	22	<10	<15	<20	<50	<10	<1	<10	<100
	3/16/2011	<5	<5	28	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/7/2011	<5	<5	36	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/14/2011	<5	<5	34	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	52	<4	<2	<20	11	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (μg/L).
n/a = Constituent analysis not required at this time.
ni = well not installed at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-17	1/31/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	5/13/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	9/25/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/27/1996	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	3/30/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/25/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	9/16/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/23/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	4/2/1998	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/20/1998	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/28/1999	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/17/1999	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	7/5/2000	n/a	<5	22	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	24	n/a	<1	<5	n/a	18	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	27	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/7/2001	n/a	<50	22	n/a	<5	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	23	n/a	<1	n/a	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/28/2002	n/a	<5	24	n/a	<1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/2002	n/a	<5	23	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	30	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	<10	31	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	31	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	28	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	25	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	<10	23	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	24	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/26/2007	n/a	<10	22	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/14/2007	n/a	<10	23	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/17/2007	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2008	n/a	<10	22	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	<5	24	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2009	<1	<10	23	<1	<2	<8	<6	<10	<10	<9	<15	<3	<0.5	<6	<30
	3/29/2010	<5	<5	24	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/3/2010	<5	<5	24	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/20/2010	<5	<5	20	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/6/2010	<5	<5	21	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	25	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/7/2011	<5	<5	26	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/14/2011	<5	<5	22	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/19/2011	<5	<5	16	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (μg/L).
n/a = Constituent analysis not required at this time.
ni = well not installed at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-18	3/30/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/25/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	9/16/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/23/1997	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	4/2/1998	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/20/1998	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	6/28/1999	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	12/17/1999	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
	7/5/2000	n/a	<5	23	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/22/2000	n/a	<5	50	n/a	<1	10	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/22/2000	n/a	<5	18	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/11/2001	n/a	<5	20	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/7/2001	n/a	<50	14	n/a	<5	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/4/2001	n/a	<5	27	n/a	<1	n/a	n/a	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/28/2002	n/a	<5	21	n/a	<1	<5	n/a	<5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/25/2002	n/a	<5	17	n/a	<1	<5	n/a	<100	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/16/2002	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/4/2003	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2003	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/16/2004	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2004	n/a	<10	20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/22/2005	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2005	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/26/2006	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/14/2006	n/a	<10	26	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/5/2007	<5	<10	<20	<2	<3	<50	<50	<50	n/a	<50	n/a	<50	<2	<50	<100
	6/27/2007	n/a	<10	38	<2	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	<100
	9/14/2007	n/a	<10	<20	<2	<3	<50	n/a	<50	n/a	n/a	n/a	n/a	n/a	n/a	<100
	12/18/2007	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/10/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2008	n/a	<10	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2009	n/a	<5	<20	n/a	<1	<20	n/a	<20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2009	<1	<10	15	<1	<2	<8	<6	<10	<10	<9	<15	<3	<0.5	<6	<30
	3/29/2010	<5	<5	17	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/29/2010	<5	<5	17	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/2/2010	<5	<5	16	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/6/2010	<5	<5	19	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/6/2011	n/a	<5	22	n/a	<2	<20	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	22	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
n/a = Constituent analysis not required at this time.
ni = well not installed at this time.

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-18A	9/16/2010	<5	13	40	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	48	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	41	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/6/2011	<5	<5	36	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/14/2011	<5	<5	34	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/19/2011	<5	<5	33	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
MW-19	9/16/2010	<5	<5	51	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	60	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/16/2011	<5	<5	35	<4	<2	<20	8	<10	<15	37	<50	<10	6	<10	<100
	6/6/2011	<5	<5	48	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/14/2011	<5	<5	46	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	39	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
MW-20	9/21/2010	<5	<5	30	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	27	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/16/2011	<5	<5	45	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/6/2011	<5	<5	30	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/14/2011	<5	<5	39	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	30	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
MW-21	9/23/2010	<5	<5	69	<4	<2	<20	9.3	10	<15	44	<50	<10	3.1	<10	<100
	12/7/2010	<5	9	49	<4	<2	<20	8.7	10	<15	42	<50	<10	4.3	<10	<100
	3/16/2011	<5	<5	76	<4	<2	<20	5.6	<10	<15	<20	<50	<10	<1	<10	<100
MW-23	9/21/2010	<5	<5	22	<4	<2	<20	5	<10	<15	22	<50	<10	<1	<10	<100
	12/7/2010	<5	7	38	<4	<2	<20	6.3	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	8.1	40	<4	<2	<20	7.4	<10	<15	22	<50	<10	<1	<10	<100
	6/7/2011	<5	6.3	33	<4	<2	<20	6.7	<10	<15	<20	<50	<10	<1	<10	<100
	9/13/2011	<5	6.4	32	<4	<2	<20	7.7	<10	<15	<20	<50	<10	<1	<10	<100
	12/19/2011	<5	<5	28	<4	<2	<20	5.7	<10	<15	<20	<50	<10	<1	<10	<100
MW-24	9/22/2010	<5	<5	61	<4	<2	<20	6.2	13	<15	42	<50	<10	1.5	<10	<100
	12/7/2010	<5	7	43	<4	<2	<20	6.1	<10	<15	45	<50	<10	1.1	<10	<100
	3/15/2011	<5	5.9	36	<4	<2	<20	5.7	<10	<15	44	<50	<10	<1	<10	<100
	6/7/2011	<5	<5	32	<4	<2	<20	<5	12	<15	41	<50	<10	<1	<10	<100
	9/13/2011	<5	<5	32	<4	<2	<20	7.6	11	<15	43	<50	<10	<1	<10	<100
	12/19/2011	<5	<5	28	<4	<2	<20	6	10	<15	37	<50	<10	<1	<10	<100
MW-25	9/17/2010	<5	<5	45	<4	<2	<20	<5	120	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	44	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	41	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/10/2011	<5	<5	38	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/13/2011	<5	<5	37	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/19/2011	<5	<5	35	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).

Table IIIH-B-1 (continued)
Total Metals Analytical Data from Subtitle D Monitoring Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-26	9/23/2010	<5	<5	96	<4	<2	<20	8	140	<15	23	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	45	<4	<2	<20	6.2	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	44	<4	<2	<20	6	10	<15	<20	<50	<10	<1	<10	<100
	6/8/2011	<5	<5	40	<4	<2	<20	5.7	<10	<15	<20	<50	<10	<1	<10	<100
	9/13/2011	<5	<5	39	<4	<2	<20	6.9	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	35	<4	<2	<20	5.1	<10	<15	<20	<50	<10	<1	<10	<100
MW-27	9/23/2010	<5	<5	37	<4	<2	<20	<5	10	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	<5	36	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	<5	29	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/8/2011	<5	<5	26	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/12/2011	<5	<5	27	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	24	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
MW-28	9/16/2010	<5	<5	25	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/7/2010	<5	5	37	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/15/2011	<5	6.1	38	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/8/2011	<5	<5	39	<4	<2	<20	<5	10	<15	<20	<50	<10	<1	<10	<100
	9/13/2011	<5	12	50	<4	<2	<20	7.9	14	<15	22	<50	<10	<1	<10	<100
	12/20/2011	<5	9.9	33	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
MW-29	12/7/2010	<5	5	23	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/22/2010	<5	<5	22	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	3/16/2011	<5	<5	21	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	6/6/2011	<5	<5	19	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	9/14/2011	<5	<5	22	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	12/20/2011	<5	<5	20	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).

Table IIIH-B-2
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-1R	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	4/2/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	12	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	11	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/15/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/18/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/1/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/6/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-1R	1/31/1996	<0.3	<5	6.6	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	9.6	<0.6	<1.2	5.4	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	7.6	<0.6	<1.2	4.6	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	14	<0.6	<1.2	8.4	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	4.1	<0.6	<1.2	2.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	4/2/1998	<2	<20	3	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	22
	12/22/2000	<2	<20	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	11	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	6/24/2002	<2	<20	<2	<2	9	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	2
	12/17/2002	<5	<10	12	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	9.5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/4/2003	<5	<10	11	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	7.6	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	9.2	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	7.7	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/15/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	7.4	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	9.4	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	7.2	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/18/2007	<5	<10	14	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	12	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2008	<5	<10	13	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	11	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/21/2009	<1	<20	15	<1	<2	5.8	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/1/2010	<2	<100	12	<1	<1	3.9	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/6/2010	<2	<100	14	<1	<1	4.1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	13	<1	<1	4	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2011	<2	<100	13	<1	<1	3.9	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-1R	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	4/2/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/17/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/15/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/18/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/21/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/1/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/6/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-3R	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	4/2/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	0.22	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	19	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/13/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/25/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/17/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/9/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/1/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/6/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/8/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-3R	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	4/2/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	50
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	6
	6/24/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/13/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/25/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/17/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/9/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/1/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/22/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/6/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/8/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-3R	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	4/2/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/13/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/25/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/17/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/9/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/1/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/6/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/8/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-4R	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	7.5	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	4/2/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	15	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/15/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/13/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/18/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/9/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/1/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/14/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-4R	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	4.7	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	11.6	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	9.8	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	3.7	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	2.7	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	4/2/1998	<2	<20	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	<2	<2	<2	4	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<5	<5	<2	47
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	6/24/2002	<2	<20	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<5	<5	3
	12/17/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/4/2003	<5	<10	<5	<5	<5	8.6	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	11	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	10	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	10	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/15/2005	<5	<10	<5	<5	<5	6.3	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2006	<5	<10	<5	<5	<5	5.3	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/13/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/18/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/9/2008	<5	<10	<5	<5	<5	6.8	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/1/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/14/2009	<1	<20	<1	<1	<2	3.8	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	12/22/2009	<1	<20	<1	<1	<2	3.9	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	<1	<1	<1	2.7	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/7/2010	<2	<100	<1	<1	<1	3.6	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	<1	<1	<1	2.6	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/20/2011	<2	<100	<1	<1	<1	2	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-4R	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	4/2/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/17/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/15/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/13/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/18/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/9/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/1/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	8/14/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-8	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	11/26/2001	13	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/13/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/25/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/17/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/9/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/1/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/1/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/6/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-8	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	12	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	22
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	11/26/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	6/24/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/13/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/25/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/17/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/9/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/1/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/22/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/1/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/6/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-8	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	11/26/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/13/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/25/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/17/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/9/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/1/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/1/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/6/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-9	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	4/2/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	14	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	3	<2
	6/25/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	16	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/15/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/13/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/18/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/9/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/1/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/1/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/8/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-9	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	2.8	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	4/2/1998	<2	<20	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	6/29/1998	<2	<20	<2	<2	<2	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	52
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	6	<2	<2	15	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	14	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	6/25/2002	<2	<20	<2	<2	<2	7	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/17/2002	<5	<10	<5	<5	<5	5.2	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/4/2003	<5	<10	<5	<5	<5	6.2	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	6	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	13	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	11	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/15/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2006	<5	<10	<5	<5	<5	7.1	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/13/2006	<5	<10	<5	<5	<5	6.1	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	<5	<5	<5	6.4	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/18/2007	<5	<10	<5	<5	<5	12	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/9/2008	<5	<10	<5	<5	<5	15	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/1/2008	<5	<10	<5	<5	<5	7.3	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2009	<5	<10	<5	<5	<5	7	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/22/2009	<1	<20	1.9	<1	<2	8.2	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/1/2010	<2	<100	<1	<1	<1	5.9	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/7/2010	<2	<100	1.2	<1	<1	6.3	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/8/2011	<2	<100	1.3	<1	<1	5.8	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	1.2	<1	<1	4.9	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-9	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	4/2/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/25/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/17/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/15/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/13/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/18/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/9/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/1/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/1/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/8/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-10	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	1.6	<0.4	<0.8	<1.2	<5	<2.1	1.9	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	2.7	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	4/2/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	3	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	12	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	4	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	20	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	13	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/15/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	9/13/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	10/31/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/18/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/9/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/28/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/1/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-10	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
continued	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/21/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/27/2010	<20	<50	1.9	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	11/16/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/8/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/9/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/15/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	6.75(D)	<2	<5	<1	<2
	12/27/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-10A	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/21/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/27/2010	52	<50	1.8	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	11/16/2010	82	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/9/2011	790	<500	<10	<10	<10	<50	<50	<50	<10	<50	<10	<20	<50	<10	<20
	9/15/2011	1000	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/27/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-10B	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/21/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/27/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	11/16/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/15/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/21/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-10	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	21.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<5	<0.4	<0.6	<1.2	46.3	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3	<50
	9/25/1996	<0.3	<5	11.7	<0.6	<1.2	47.4	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	5.4	<0.6	<1.2	22.7	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	6.1	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	40.5	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	7.1	<0.6	<1.2	43.3	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	8.2	<0.6	<1.2	49.6	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	4/2/1998	<2	<20	<2	<2	<2	12	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	4	<2	<2	38	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	3	<2	<2	34	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	17	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	6	<2	<2	148	<2	<2	<2	<2	<2	<2	<5	<5	<2	46
	12/22/2000	<2	<20	<2	<2	<2	31	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	3	<2	<2	66	<2	<2	<2	<2	9	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	46	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	6/24/2002	<2	<20	<2	<2	<2	23	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	12/17/2002	<5	<10	<5	<5	<5	70	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	<5	<5	<5	92	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/4/2003	<5	<10	<5	<5	<5	83	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	88	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	84	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	99	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/15/2005	<5	<10	<5	<5	<5	92	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2006	<5	<10	<5	<5	<5	99	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	<5	<5	<5	99	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	<5	<5	<5	37	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	9/13/2007	<5	<10	<5	<5	<5	38	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	10/31/2007	<5	<10	<5	<5	<5	34	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/18/2007	<5	<10	<5	<5	<5	43	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/9/2008	<5	<10	<5	<5	<5	56	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/28/2008	<5	<10	<5	<5	<5	60	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/1/2008	<5	<10	<5	<5	<5	71	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2009	<5	<10	<5	<5	<5	71	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexanone	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-10 continued	12/22/2009	<1	<20	<1	<1	<2	41	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	1	<1	<1	41	1.3	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	1.2	<1	<1	46	1.4	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/21/2010	<2	<100	1.4	<1	<1	50	1.6	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/27/2010	<2	<100	1.4	<1	<1	46	1.4	<1	<2	<5	<2	<5	<10	<5	<1	<5
	11/16/2010	<2	<100	1.3	<1	<1	50	1.6	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/8/2010	<2	<100	1.3	<1	<1	49	1.6	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/9/2011	<2	<100	<1	<1	<1	42	1.7	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/15/2011	<2	<100	<1	<1	<1	35	1.5	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/27/2011	<2	<100	<1	<1	<1	26	1.1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexanone	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-10A	12/22/2009	<1	<20	2.5	<1	<2	94	2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	1	<1	<1	32	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	2.7	<1	<1	80	2	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/21/2010	<2	<100	2.6	<1	<1	85	1.9	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/27/2010	<2	<100	2.9	<1	<1	76	2.3	<1	<2	<5	<2	<5	<10	<5	<1	<5
	11/16/2010	<2	<100	2.6	<1	<1	86	2.2	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/9/2011	<20	<1000	<10	<10	<10	30	<10	<10	<20	<50	<20	<50	<100	<50	<10	<50
	9/15/2011	<2	<100	<1	<1	<1	6.1	<1	<1	<2	<5	<2	9.5	<10	<5	<1	<5
	12/27/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexanone	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-10B	12/21/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/21/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/27/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	11/16/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/15/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/21/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-10	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	4.6	<0.8	<3.2	<50	2.8	<1.3
	5/13/1996	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	13.2	<0.8	<3.2	<50	10.4	<1.3	n/a
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	14.4	<0.8	<3.2	<50	4.4	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	7.2	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	8.5	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	7.5	<0.8	<3.2	<50	2.5	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	4	<1.1	<0.8	<1	13	<0.8	<3.2	<50	2.7	<1.3
	4/2/1998	<10	<2	<2	<2	<2	<2	4.4	<2	<2	<2	<2	<2	<2	<10	<2	<2
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	3	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	14	<2	<2	<10	2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	11	<2	<2	<2	38	<2	<2	<10	4	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	3	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/17/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/15/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	9/13/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	10/31/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/18/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/9/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	8/28/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/1/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10

Notes: All the constituents are listed in micrograms per liter (µg/L).
n/a = constituent not analyzed.

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-10 continued	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	1.1	<5	<5	<1	<1	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/21/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/27/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	11/16/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/8/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/9/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/15/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/27/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-10A	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	4.9	<5	<5	<1	<1	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/21/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/27/2010	490	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	11/16/2010	2500	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/9/2011	4300	<50	<50	<20	<20	<10	<50	<10	<10	<10	<50	<100	<10	<1000	<20	<100
	9/15/2011	4300	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	16	<10
	12/27/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	2.2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-10B	12/21/2009	<10	<2	11	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/21/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/27/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	11/16/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/10/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/15/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/21/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-11	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	15.6	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	1.9	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	4/2/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	11	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/25/2002	<10	<10	6	<2	<2	<2	<2	<2	<2	9	<2	<2	<2	<2	<2
	12/17/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	14	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/15/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/19/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/9/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/2/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/8/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/27/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-11	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	16.8	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	7.9	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	17.8	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	10.7	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	113.6	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	4/2/1998	<2	<20	9	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	8	<2	<2	3	<2	<2	<2	<2	<2	<2	<5	<5	<2	48
	12/22/2000	<2	<20	8	<2	<2	9	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	8	<2	<2	14	<2	<2	<2	<2	<2	<2	<2	<5	<5	3
	12/4/2001	<2	<20	12	<2	<2	28	<2	<2	<2	<2	<2	<2	<2	<5	<5	13
	6/25/2002	<2	<20	<2	<2	22	60	2	<2	<2	<2	<2	<2	<2	<5	<5	2
	12/17/2002	<5	<10	9.3	<5	<5	27	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	8.2	<5	<5	22	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/4/2003	<5	<10	11	<5	<5	34	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	11	<5	<5	67	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	12	<5	<5	93	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2005	<5	<10	9.1	<5	<5	120	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/15/2005	<5	<10	8.3	<5	<5	110	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	7	<5	<5	99	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	7.2	<5	<5	96	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	5.6	<5	<5	100	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/19/2007	<5	<10	5.4	<5	<5	110	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/9/2008	<5	<10	5	<5	<5	110	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/2/2008	<5	<10	<5	<5	<5	110	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	150	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/22/2009	<1	<20	3.5	<1	<2	120	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	2.7	<1	<1	100	1.5	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	3.1	<1	<1	100	1.9	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/8/2010	<2	<100	3.3	<1	<1	150	2.4	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	3.5	<1	<1	160	2.6	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/27/2011	<2	<100	2.4	<1	<1	100	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-11	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	6.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	4.4	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	3.9	8.2	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	4/2/1998	<10	<2	<2	<2	<2	<2	2.6	<2	<2	<2	<2	<2	<2	<10	<2	<2
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	11	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	7	<2	<2	<2	14	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	15	<2	<2	<2	31	<2	<2	<10	<2	<6
	6/25/2002	<10	<2	<2	<2	<2	<2	68	<2	<2	<2	46	<2	<2	<10	<2	<6
	12/17/2002	<10	<5	<10	<5	<5	<5	7.4	<5	<5	<5	5.6	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	6	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	13	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	13	<5	<5	<5	25	<10	<5	<10	<2	<10
	6/23/2005	<10	<5	<10	<5	<5	<5	11	<5	<5	<5	25	<10	<5	<10	<2	<10
	12/15/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	17	<10	<5	<10	3.6	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	22	<10	<5	<10	2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	20	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	21	<10	<5	<10	<2	<10
	12/19/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	21	<10	<5	<10	<2	<10
	6/9/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	22	<10	<5	<10	<2	<10
	12/2/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	16	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	14	<10	<5	<10	<2	<10
	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	9.9	<5	<5	<1	1.6	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	6	<10	<1	<100	<2	<10
	8/18/2010	11	<5	<5	<2	<2	<1	<5	<1	<1	<1	7.4	<10	<1	<100	<2	<10
	12/8/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	7.3	<10	<1	<100	<2	<10
	6/10/2011	8.6	<5	<5	<2	<2	<1	<5	<1	<1	<1	9.5	<10	<1	<100	<2	<10
	12/27/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	8	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-12	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	7.8	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	10.6	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	8.6	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	12.4	<0.3	<0.5	<2.6	<0.6	<0.3
	3/27/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	20	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	17	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	21	<2	2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	16	<2	<2	<2	<2	<2
	12/22/2000	11	<10	<2	<2	<2	<2	<2	<2	<2	14	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	23	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	14	<2	<2	<2	<2	<2
	6/25/2002	<10	<10	3	<2	<2	<2	<2	<2	<2	18	<2	<2	<2	<2	<2
	12/17/2002	<10	<25	5.2	<5	<5	<5	<5	<5	<5	20	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	13	<5	<5	<5	<5	<5
	12/4/2003	<10	<25	8	<5	<5	<5	<5	<5	<5	16	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	11	<5	<5	<5	<5	<5	<5	13	<5	<5	<5	<5	<5
	12/20/2004	13	<25	8.4	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	9/13/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	10/31/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/19/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/28/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/2/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-12 continued	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/8/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/27/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-12A	12/22/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/27/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-22 (MW-12B)	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/8/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-12	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	15.6	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	24.9	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/27/1998	<2	<20	27	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	39	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	40	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	34	<2	<2	3	<2	<2	<2	<2	<2	<2	<5	<5	<2	28
	12/22/2000	<2	<20	25	<2	<2	7	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	32	<2	<2	15	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	31	<2	<2	27	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	6/25/2002	<2	<20	31	<2	<2	38	<2	<2	<2	<2	<2	<2	<2	<5	<5	3
	12/17/2002	<5	<10	46	<5	<5	66	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	31	<5	<5	55	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/4/2003	<5	<10	33	<5	<5	77	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	26	<5	<5	100	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	18	<5	<5	88	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2005	<5	<10	16	<5	<5	100	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	14	<5	<5	110	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2006	<5	<10	10	<5	<5	100	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	10	<5	<5	110	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	5.7	<5	<5	68	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	9/13/2007	<5	<10	10	<5	<5	92	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	10/31/2007	<5	<10	7.5	<5	<5	100	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/19/2007	<5	<10	8.8	<5	<5	99	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	9.1	<5	<5	100	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/28/2008	<5	<10	9.2	<5	<5	120	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/2/2008	<5	<10	9	<5	<5	120	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	50	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexanone	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-12 continued	12/22/2009	<1	<20	5.4	<1	<2	100	2.9	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	4.8	<1	<1	98	2.6	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	5.3	<1	<1	110	2.8	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/8/2010	<2	<100	5.8	<1	<1	130	3.9	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	5.5	<1	<1	160	3.9	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/27/2011	<2	<100	3.8	<1	<1	150	3.8	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexanone	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-12A	12/22/2009	<1	<20	7.5	<1	<2	84	2.4	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	8.6	<1	<1	100	3.2	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	8.2	<1	<1	90	2.6	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	8.8	<1	<1	130	3.7	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/27/2011	<2	<100	5	<1	<1	81	3.9	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexanone	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-22 (MW-12B)	12/21/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/8/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-12	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/27/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	4	<2	<2	<10	<2	<6
	6/25/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	4	<2	<2	<10	<2	<6
	12/17/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	3.5	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	3.8	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	3.9	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	9.5	<10	<5	<10	2.4	<10
	6/23/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	12	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	4.5	<10
	6/27/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	12	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	7.9	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	9/13/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	10/31/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/19/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	2.1	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	7.6	<10	<5	<10	2.8	<10
	8/28/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	7	<10	<5	<10	<2	<10
	12/2/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	5.8	<10	<5	<10	3	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-12 continued	12/22/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	2.5	<5	<5	<1	1.2	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/8/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/10/2011	8.2	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/27/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-12A	12/22/2009	<10	<2	<10	<5	<1	<2	1.3	<1	<5	<1	27	<5	<5	<1	2.7	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	34	<10	<1	<100	4	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	29	<10	<1	<100	2.7	<10
	6/10/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	27	<10	<1	<100	2.2	<10
	12/27/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	23	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-22 (MW-12B)	12/21/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/8/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/10/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/21/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-13R	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	16	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	17	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/25/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/19/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	13	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/2/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/23/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-13R	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	47
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	6/24/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	7
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/25/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/19/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/2/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/23/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-13R	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/25/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/19/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/2/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/23/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-14	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	17	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/25/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/19/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/4/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/2/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/23/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-14	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	15
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	6/24/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	6
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/25/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/19/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/4/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/2/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/23/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-14	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/29/1998	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/25/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/19/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	8/4/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/2/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/23/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-15A	6/28/2006	86	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	9/7/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	3/6/2007	24	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	9/14/2007	22	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/18/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	3/28/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/4/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/2/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/23/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-15A	6/28/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	9/7/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	3/6/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	9/14/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/18/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	3/28/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/4/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/2/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/23/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-15A	6/28/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	9/7/2006	<10	<5	<10	<5	n/a	<5	<5	<5	n/a	<5	<5	<10	<5	<10	2.9	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	3/6/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	9/14/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/18/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	2.5	<10
	3/28/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	2.6	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	6.1	<10
	8/4/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/2/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	5.5	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	2.1	<10
	12/23/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All the constituents are listed in micrograms per liter (µg/L).
n/a = constituent not analyzed.

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-16	1/31/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	5/13/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/25/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/27/1996	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	3/30/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/25/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	9/16/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	12/23/1997	<100	<10	<0.4	<0.4	<0.8	<1.2	<5	<2.1	<0.4	<1	<0.3	<0.5	<2.6	<0.6	<0.3
	6/29/1998	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/20/1998	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/28/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/17/1999	<25	<25	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/24/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/13/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/25/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	9/14/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/17/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/4/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/2/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/23/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/6/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-16	1/31/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	5/13/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/25/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/27/1996	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	3/30/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/25/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	9/16/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	12/23/1997	<0.3	<5	<0.4	<0.6	<1.2	<1.2	<0.6	<0.4	<5	<5	<0.6	<50	<1.1	<1.3	<2.4	<0.3
	6/29/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/20/1998	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	6/28/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	12/17/1999	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5
	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	12
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	6/24/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/13/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/25/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	9/14/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/17/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/4/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	n/a	<5
	12/2/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/23/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/6/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (μg/L).
n/a = constituent not analyzed.

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-16	1/31/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	5/13/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/25/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/27/1996	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	3/30/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/25/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	9/16/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	12/23/1997	<50	<10	<50	<0.4	<0.5	<0.4	<1.4	<1.1	<0.8	<1	<1.9	<0.8	<3.2	<50	<1.7	<1.3
	6/29/1998	<10	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<10	<2	<2
	12/20/1998	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	6/28/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<5	<6
	12/17/1999	<10	<2	<5	<2	<2	<5	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/24/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	2.7	<10
	12/13/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/25/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	7.9	<10
	9/14/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/17/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	8/4/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/2/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/23/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/6/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-17	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	9/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	9/7/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	2/28/2002	19	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/25/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	26	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/17/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/6/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-17	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	13
	9/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	9/7/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	2/28/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	5
	6/25/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/17/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/21/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/6/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-17	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	9/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	9/7/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	2/28/2002	12	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/25/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/17/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/21/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/6/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-18	7/5/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	9/22/2000	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/22/2000	10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/11/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	9/7/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/4/2001	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	2/28/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	6/25/2002	<10	<10	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2
	12/16/2002	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/4/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/3/2003	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/16/2004	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/20/2004	52	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/22/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2005	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/26/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/14/2006	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/27/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/18/2007	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/10/2008	16	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	8/28/2008	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2008	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	6/23/2009	<10	<25	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/6/2010	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/6/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All the constituents are listed in micrograms per liter (µg/L).
n/a = constituent not analyzed.

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-18	7/5/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	13
	9/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	12/22/2000	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2	<2
	6/11/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	9/7/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	12/4/2001	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	4
	2/28/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<2
	6/25/2002	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	3
	12/16/2002	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/4/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/3/2003	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/16/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/20/2004	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/22/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2005	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/26/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/14/2006	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/27/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/18/2007	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/10/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	8/28/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2008	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	6/23/2009	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	12/21/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/6/2010	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/6/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All the constituents are listed in micrograms per liter (µg/L).
n/a = constituent not analyzed.

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-18	7/5/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	9/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<10	<2	<6
	12/22/2000	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/11/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	9/7/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/4/2001	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	2/28/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	6/25/2002	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<2	<6
	12/16/2002	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/4/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/3/2003	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/16/2004	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/20/2004	13	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/22/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2005	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/26/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/14/2006	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/27/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/18/2007	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/10/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	8/28/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/3/2008	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	6/23/2009	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<2	<10
	12/21/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/6/2010	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/6/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: All the constituents are listed in micrograms per liter (µg/L).
n/a = constituent not analyzed.

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-18A	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-19	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-20	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-21	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/9/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW-23	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-24	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/7/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-25	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-26	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/8/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-27	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/8/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (μg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-28	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/8/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-29	12/7/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/6/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-18A	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-19	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-20	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-21	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/9/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW-23	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-24	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/7/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-25	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-26	12/7/2010	<2	<100	3.9	<1	<1	11	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/8/2011	<2	<100	3.2	<1	<1	6.6	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	3.3	<1	<1	5.4	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-27	12/7/2010	<2	<100	1.6	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/8/2011	<2	<100	1.8	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	1.5	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-28	12/7/2010	<2	<100	1.1	<1	<1	9.5	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/8/2011	<2	<100	1.3	<1	<1	12	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	<1	<1	<1	4.7	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-29	12/7/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/6/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-18A	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-19	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-20	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-21	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/9/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW-23	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-24	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/7/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-25	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/10/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/19/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-26	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/8/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-27	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/8/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/12/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-28	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/8/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	6.5	<10	<1	<100	<2	<10
	9/13/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-29	12/7/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/6/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	9/14/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/20/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All the constituents are listed in micrograms per liter (µg/L).

Table IIIH-B-2 (continued)
VOC Analytical Data from Existing Groundwater Monitoring and Observation Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
B-2	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/2/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/27/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
B-3	12/21/2009	<25	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<1	<2	<2	<1
	6/3/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	8/18/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	6/10/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	12/21/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
B-2	12/21/2009	<1	<20	<1	<1	<2	33	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/2/2010	<2	<100	<1	<1	<1	11	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	<1	<1	<1	5.2	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	<1	<1	<1	2.9	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/27/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
B-3	12/21/2009	<1	<20	<1	<1	<2	<1	<2	<1	<1	<5	<5	<10	<5	<2	<1	<5
	6/3/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	8/18/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	6/10/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	12/21/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Note: All the constituents are listed in micrograms per liter (µg/L).

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
B-2	12/21/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	2	<5	<5	<1	<1	<10
	6/2/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/10/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/27/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
B-3	12/21/2009	<10	<2	<10	<5	<1	<2	<1	<1	<5	<1	<1	<5	<5	<1	<1	<10
	6/3/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	8/18/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	6/10/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	12/21/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Note: All the constituents are listed in micrograms per liter (µg/L).

APPENDIX IIIH-C
SAMPLE FIELD DATA SHEET

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

Robert S. Ferbend

2-27-12

SAMPLE

GROUNDWATER SAMPLING FIELD DATA SHEET

Well Number: ________

Project No.: ________

Project: ______________________ Date: ________ Time: ________

Personnel: ______________________ Weather Conditions: ________ Air Temp.: ____°F

Calibration: pH Meter Model: ______________ Meter S/N: ______ Time: ______

Conductivity Meter Model: ________ Meter S/N: ______ Time: ______

WELL DATA:

Casing Diameter: ____ (in.) ☐ PVC ☐ Other: ____________________

DEPTH TO : Static Water: __________ ft. Well Bottom: ________ ft.

DATUM: ☐ Top of Protective Casing ☐ Top of Well Casing ☐ Other: ______

CONDITION: Is Well clearly labeled? ☐ Yes ☐ No

Is Prot. Casing in Good Cond.? (not bent or corroded) ☐ Yes ☐ No

Is Concrete Pad Intact? (not cracked or frost heaved) ☐ Yes ☐ No

Is Padlock Functional? ☐ Yes ☐ No Is Inner Casing Intact? ☐ Yes ☐ No

Is Inner Casing Properly Capped and Vented? ☐ Yes ☐ No

VOLUME OF WATER: $(d/24)^2$ (23.5)(TD-WL) = One Well Volume (2"=0.163; 4"=0.653)

Standing in well: ______ gal. To be purged: ______ gal.

PURGE DATA:

METHOD: ☐ Bladder Pump ☐ Submersible Pump ☐ Bailer ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Other: ____________

MATERIALS: Pump/Bailer: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________

Tubing/Rope: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________

PURGING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

TIME SERIES DATA:

Time:							
Cum. Volume (gal):	Start						
Temp. (°C):							
pH (Std. Units):							
Spec. Cond. (µmhos/cm)							
Turbidity (NTU):							
Other:							

Pumping Rate: _____ gal/min. Elapsed Time: __________ Volume Pumped: __________ gal.

SAMPLING DATA:

Sample Collection Time: ______________ Date: ______________

Water Level at Time of Sample Collection: ______________ ft.

METHOD: ☐ Bladder Pump ☐ Submersible Pump ☐ Bailer ☐ Other: ____________

MATERIALS: Pump/Bailer: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________

Tubing/Rope: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________

SAMPLING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

APPEARANCE: ☐ Clear ☐ Turbidity (NTU)______ ☐ Color: ________

FIELD DETERMINATIONS: Temp. (°C): _____ pH (SU): _____ Spec. Cond. (µmhos/cm): _____

☐ Background ☐ Detection ☐ Assessment ☐ Quarterly ☐ Other

REMARKS:

I certify that this sample was collected and handled in accordance with applicable regulatory and project protocols.

Signature: ______________________________ Date: ______________

APPENDIX IIIH-D

CONTAINERIZATION AND PRESERVATION OF SAMPLES

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

RECOMMENDED CONTAINERIZATION AND PRESERVATION OF SAMPLES

Measurement[a]	Volume (mL)	Container[b]	Preservative	Holding Times	Reference
Physical Properties					
Specific Cond. (Field)	100	P,G	Cool, 4 °C	Det. on Site	1
Specific Cond. (Lab)	100	P,G	Cool, 4 °C	28 Days	1
pH (Field)	50	P,G	None	Det. on Site	1,2
pH (Lab)	50	P,G	None	24 Hrs	1,2
Temperature	1000	P,G	None	Det. On Site	1
Turbidity	100	P,G	Cool, 4 °C	Det. On Site	1

Measurement[a]	Volume (mL)	Container[b]	Preservative	Holding Times	Reference
Inorganics, Non-Metallics					
Ammonia as Nitrogen	1000	P,G	Cool, 4 °C H_2SO_4 to pH <2	28 days	2,3
Carbonate/Bicarbonate	200	P,G	Cool, 4 °C	14 days	1
Chemical Oxygen Demand (COD)	50	P,G	H_2SO_4 to pH <2	28 days	1
Chloride	200	P,G	None	28 Days	1,2
Nitrate plus Nitrite	200	P,G	Cool, 4 °C H_2SO_4 to pH <2	28 days	1,2
Sulfate	100	P,G	Cool, 4 °C	28 days	1,2
Total Alkalinity	200	P, G	Cool, 4 °C	14 days	1
Total Dissolved Solids (TDS)	500	P,G	Cool, 4 °C	7 days	2,3
Total Organic Carbon (TOC)	250	P,G	Cool, 4 °C HCL or H_2SO_4 to pH <2	28 days	2,3

RECOMMENDED CONTAINERIZATION AND PRESERVATION OF SAMPLES

Measurement[a]	Volume (mL)	Container[b]	Preservative	Holding Times	Reference
Metals (except mercury)					
Total	500	P,G	HNO_3 to pH <2	6 Mos	1,2
Dissolved	500	P,G	Filt. + HNO_3 to pH <2	6 Mos	1,2
Mercury – Total	500	P,G	HNO_3 to pH <2	28 days	1,2
Mercury – Dissolved	300	P,G	Filt. + HNO_3 to pH <2	28 days	1,2

Measurement[a]	Volume (mL)	Container[b]	Preservative	Holding Times	Reference
Organics					
Volatile Organics by GC/MS	100 (2 vials @ 40ml)	G, Teflon septum cap	Cool, 4 °C HCL to pH <2	14 days	2,3
Herbicides	1000	Glass Only	Cool, 4 °C	7 days[c] 40 days[d]	2,3
Pesticides and PCB's	1000	Glass Only	Cool, 4 °C	7 days[c] 40 days[d]	2,3
Semi-Volatiles Acid and Base/Neutral Compounds	2000	Glass Only	Cool, 4 °C	7 days[c] 40 days[d]	2,3

NOTES:

a Additional measurements not required per the GWSAP are included in the event assessment monitoring is initiated or if the need to sample for additional parameters arises due to unforeseen circumstances.

b Plastic (P) or Glass (G). For metals, polyethylene with an all polypropylene cap is preferred.

c Maximum holding time from sampling to extraction.

d Maximum holding time from extraction to analysis.

REFERENCES:

1 Methods for Chemical Analysis of Water and Wastes, March, 1983, USEPA, 600/4-79-020 and additions thereto.

2 Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

3 "Guidelines Establishing Test Procedures for the Analysis of Pollutant Under the Clean Water Act", Environmental Protection Agency, Code of Federal Regulations (CFR), Title 40, Part 136.

APPENDIX IIIH-E
SAMPLE CHAIN-OF-CUSTODY FORM

STATE OF TEXAS

ROBERT S. FERBEND

GEOLOGY

713

LICENSED

PROFESSIONAL GEOSCIENTIST

TO ENSURE PROPER HANDLING OF SAMPLES PLEASE COMPLETE THE SHADED AREAS OF THIS FORM

HERITAGE ENVIRONMENTAL SERVICES, LLC.
COMMERCIAL LABORATORY OPERATIONS
7901 West Morris Street Indianapolis IN 46231
www.heritage-enviro.com (800)827-4374 Fax: (317) 486-5095

I -

Bill to Customer:

Project Name:

Z Quote No:

PO No. or Project/Activity ID:

PRINT HERITAGE TSR NAME:

CUSTOMER STATUS: New / Existing

If no previous credit has been established with Heritage, **prepayment** (check,VISA,etc) is required at the time of sample submittal to the laboratory.

Sampled By:

Analyses Requested
(Note special detection limits or methods)

SAMPLE

Send Report To:

Co:

Add:

Attn:

Phone:

Fax:

E-mail:

Sample Turn Around Time

Standard:_x Rush Date___/___/___
Mo Day Yr

(Accelerated TAT subject to Additional Charge)
(Date must be Accepted and Approved by Lab)

Date Sampled	Time sampled	Comp	Grab	Sample ID and/or Location where your sample was taken	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Swipe, Other	Number Of Containers											Remarks:	Lab use only Sample No.
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	/	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	/	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	/	

Received for Lab by: (Signature)

Date

Time

Temp. °C

ROI: Yes / No

Distribution: White original and Yellow copies to accompany sample to the laboratory.
Pink copy to be retained by the client.

Laboratory use only	Yes	No
Custody seals present/intact?		
Broken containers?		
COC agree with sample labels?		
Correct containers for testing?		
Headspace issues acceptable?		
Holding time(s) acceptable?		
Preservative pH's acceptable?		
Was pH left unadjusted?		

Comments:

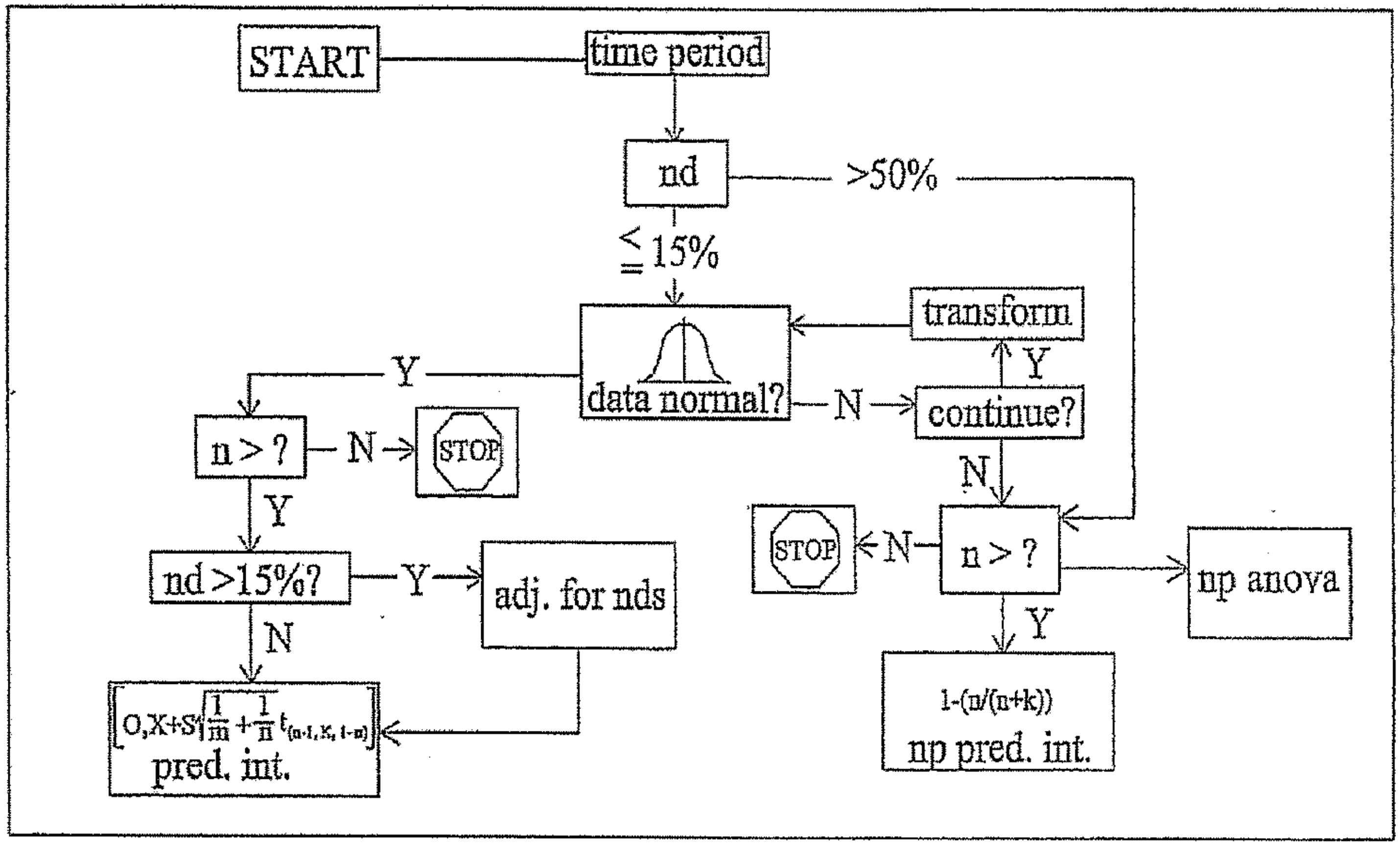
APPENDIX IIIH-F
STATISTICAL ANALYSIS FLOW CHARTS

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

2-27-12

FIGURE 1

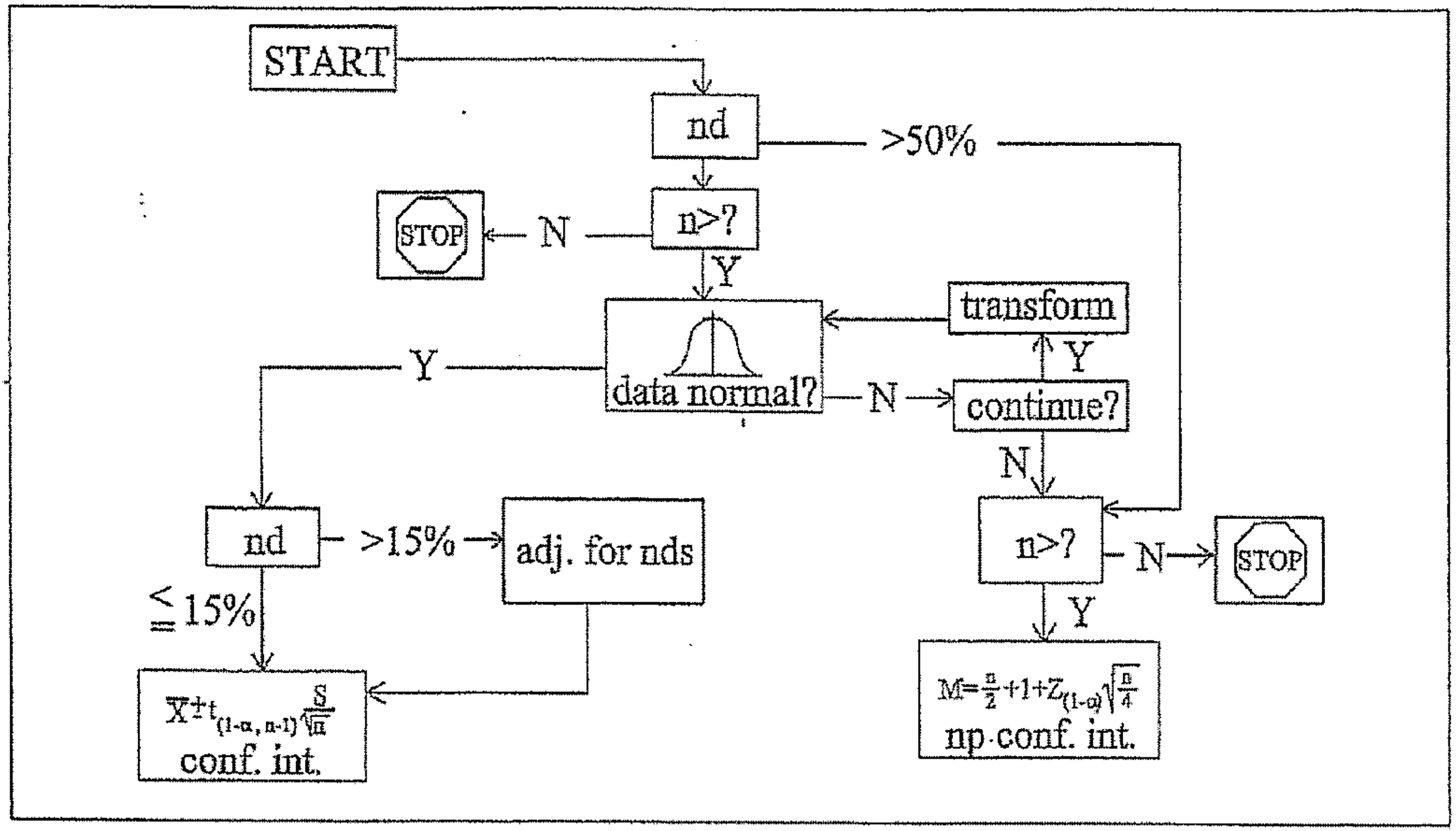
PREDICTION LIMIT FLOWCHART



Source: Sanitas^{TM} version 7.5

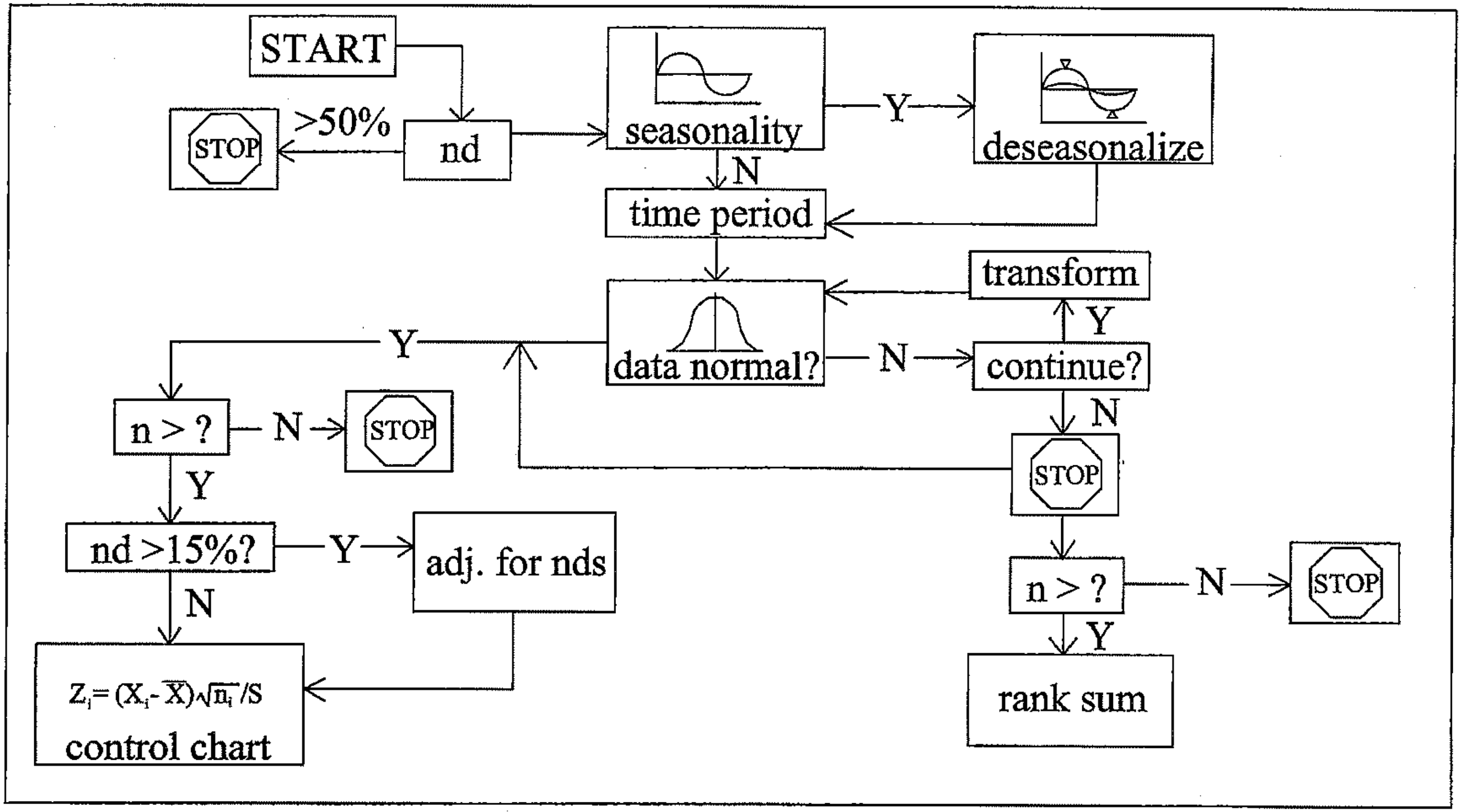
FIGURE 2

95% CONFIDENCE INTERVAL FLOWCHART



Source: Sanitas™ version 8.0

FIGURE 3
CONTROL CHART FLOWCHART



Source: Sanitas™

FIGURE IIIH-F-3

APPENDIX IIIH-G

SAMPLE LABORATORY QC CHECKLIST

STATE OF TEXAS
ROBERT S. FERBEND
GEOLOGY
713
LICENSED
PROFESSIONAL GEOSCIENTIST

Robert S. Ferbend

2-27-12

Laboratory Data Package Cover Page

This data package consists of:

- This signature page, the laboratory review checklist, and the following reportable data:
- R1 Field chain-of-custody documentation;
- R2 Sample identification cross-reference;
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
    a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
    b) dilution factors,
    c) preparation methods,
    d) cleanup methods, and
    e) if required for the project, tentatively identified compounds (TICs).
- R4 Surrogate recovery data including:
    a) Calculated recovery (%R), and
    b) The laboratory's surrogate QC limits.
- R5 Test reports/summary forms for blank samples;
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
    a) LCS spiking amounts,
    b) Calculated %R for each analyte, and
    c) The laboratory's LCS QC limits.
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
    a) Samples associated with the MS/MSD clearly identified,
    b) MS/MSD spiking amounts,
    c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
    d) Calculated %Rs and relative percent differences (RPDs), and
    e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
    a) the amount of analyte measured in the duplicate,
    b) the calculated RPD, and
    c) the laboratory's QC limits for analytical duplicates.
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;
- R10 Other problems or anomalies.

The Exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: **[ ]** This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (printed)	Date

Laboratory Review Checklist: Reportable Data

Laboratory Name:
LRC Date:
Project Name:
Laboratory Job Number:
Reviewer Name:
Prep Batch Number(s):

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
		Chain-of-custody (C-O-C)					
R1	OI	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?					
		Were all departures from standard conditions described in an exception report?					
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?					
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?					
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?					
		Other than those results < MQL, were all other raw values bracketed by calibration standards?					
		Were calculations checked by a peer or supervisor?					
		Were all analyte identifications checked by a peer or supervisor?					
		Were sample quantitation limits reported for all analytes not detected?					
		Were all results for soil and sediment samples reported on a dry weight basis?					
		Were % moisture (or solids) reported for all soil and sediment samples?					
		If required for the project, TICs reported?					
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?					
		Were surrogate percent recoveries in all samples within the laboratory QC limits?					
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?					
		Were blanks analyzed at the appropriate frequency?					
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?					
		Were blank concentrations < MQL?					
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?					
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?					
		Were LCSs analyzed at the required frequency?					
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?					
		Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?					
		Was the LCSD RPD within QC limits?					
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?					
		Were MS/MSD analyzed at the appropriate frequency?					
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?					
		Were MS/MSD RPDs within laboratory QC limits?					
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?					
		Were analytical duplicates analyzed at the appropriate frequency?					
		Were RPDs or relative standard deviations within the laboratory QC limits?					
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?					
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?					
		Are unadjusted MQLs included in the laboratory data package?					
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?					
		Were all necessary corrective actions performed for the reported data?					
		Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?					

Laboratory Review Checklist: Supporting Data

Laboratory Name: | LRC Date:
Project Name: | Laboratory Job Number:
Reviewer Name: | Prep Batch Number(s):

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?					
		Were percent RSDs or correlation coefficient criteria met?					
		Was the number of standards recommended in the method used for all analytes?					
		Were all points generated between the lowest and highest standard used to calculate the curve?					
		Are ICAL data available for all instruments used?					
		Has the initial calibration curve been verified using an appropriate second source standard?					
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank[6] :**					
		Was the CCV analyzed at the method-required frequency?					
		Were percent differences for each analyte within the method-required QC limits?					
		Was the ICAL curve verified for each analyte?					
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?					
S3	O	**Mass spectral tuning:**					
		Was the appropriate compound for the method used for tuning?					
		Were ion abundance data within the method-required QC limits?					
S4	O	**Internal standards (IS):**					
		Were IS area counts and retention times within the method-required QC limits?					
	OI	**Raw data (NELAC section 1 appendix A glossary, and section 5.)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?					
		Were data associated with manual integrations flagged on the raw data?					
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?					
S7	O	**Tentatively identified compounds (TICs):**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?					
S8	I	**Interference Check Sample (ICS) results:**					
		Were percent recoveries within method QC limits?					
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?					
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?					
		Is the MDL either adjusted or supported by the analysis of DCSs?					
S11	OI	**Proficiency test reports:**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?					
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?					
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?					
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5C?					
		Is documentation of the analyst's competency up-to-date and on file?					
S15	OI	**Verification/validation documentation for methods** (NELAC Chap 5n 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?					
S16	OI	**Laboratory standard operating procedures (SOPs):**					
		Are laboratory SOPs current and on file for each method performed?					

Laboratory Review Checklist: Exception Reports	
Laboratory Name:	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name:	Prep Batch Number(s):

ER#[5]	**DESCRIPTION**

1. Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O= organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

6. CCB = Continuing Calibration Blank

APPENDIX IIIH-H

ASSESSMENT OF CORRECTIVE MEASURES (ACM)

ASSESSMENT OF CORRECTIVE MEASURES

CAMELOT LANDFILL

MSW Permit No. 1312A
Denton County, Texas

Project No: 05-08-18

Prepared for:

Camelot Landfill TX, L.P.

and

The City of Farmers Branch, Texas

April 2009

STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST

4-1-09

Prepared by

The CAREL CORPORATION

136 Pecan Street
Keller, Texas 76248
(817) 337-0112

CONTENTS

APPENDICES, TABLES, AND FIGURES

Appendix

Tables

Figures

1 INTRODUCTION

On behalf of the Camelot Landfill, The Carel Corporation has completed an Assessment of Corrective Measures (ACM) for the volatile organic compounds (VOCs) trichloroethene (TCE) in groundwater well MW-11 and cis-1,2 dichloroethene detected in ground water monitor wells MW-10, MW-11, and MW-12. The ACM was also completed for arsenic in MW-10. The ACM has been prepared in accordance with 30 TAC §330.411. The ACM provides an overview of selected remedial technologies applicable to groundwater impacts, specifically in relation to a municipal solid waste (MSW) setting. The ACM summarizes site characteristics, historic analytical data, previous investigations concerning the issues at MW-10, MW-11, and MW-12, and potential remedies.

The goal of the ACM is to propose a future course of action and corrective remedy that fulfills the requirements of 30 TAC §330.413(b):

> *The proposed remedy must:*
>
> *(1) be protective of human health and the environment;*
>
> *(2) attain the groundwater protection standard as specified in accordance with §330.409(h), (i), or (j) of this title (relating to Assessment Monitoring Program);*
>
> *(3) control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of 40 Code of Federal Regulations Part 258, Appendix II constituents into the environment that may pose a threat to human health or the environment; and*
>
> *(4) comply with standards for management of wastes as specified in §330.415(d) of this title (relating to Implementation of the Corrective Action Program).*

An active landfill gas (LFG) extraction system was installed at the Camelot Landfill in July 2005 and expanded in March 2008 to remediate and control landfill gas migration (see Figure 1). Continued operation of the existing LFG extraction system and monitored natural attenuation (MNA) of impacted groundwater are proposed as corrective actions that will fulfill and maintain the requirements of 30 TAC §330.413(b). These remedial choices provide for source removal via landfill gas extraction within the landfill, and documentation of VOC and arsenic attenuation over time. Details regarding the selection of the corrective actions as the most feasible corrective measures fulfilling the requirements of 30 TAC §330.413(b) are provided in Sections 3 and 4 of this report.

2 BACKGROUND

The Camelot Landfill is located south of Business Highway 121, approximately 2 miles east of the intersection of Business Highway 121 and Interstate Highway 35 East. The property is owned by the City of Farmers Branch and is operated by Camelot Landfill TX, L.P.

Trichloroethene in MW-11 was determined to occur at a statistically significant level over its groundwater protection standard (GWPS) of 5 µg/L during the second 2002 semi-annual groundwater monitoring event conducted in December 2002. As a result a nature and extent investigation was performed and an ACM was initiated. The nature and extent report for MW-11 was submitted to the TCEQ under a cover letter dated November 19, 2004. Cis-1,2 dichloroethene in MW-11 also statistically exceeded its GWPS during subsequent groundwater monitoring events conducted in 2006, 2007, and 2008. Cis-1,2 dichloroethene was determined to occur at a statistically significant level over its GWPS of 70 µg/L during the second 2004 semi-annual groundwater monitoring event for MW-10 and the second 2005 semi-annual groundwater monitoring event for MW-12 and, as a result, a separate nature and extent investigation was performed and MW-10 and MW-12 were incorporated into the ACM. The nature and extent report for MW-10 and MW-12 was submitted to the TCEQ under a cover letter dated December 2, 2008. The Nature and Extent investigations were performed in accordance with 30 TAC §330.235(g)[1], to determine the nature and extent of VOC detections in monitor wells MW-10, MW-11, and MW-12 at the Camelot Landfill. Special attention was focused on those VOCs that have historically occurred in MW-10, MW-11, and MW-12. The nature (source) of the VOC detections was initially determined during the first nature and extent investigation conducted for MW-11 (i.e. landfill gas) by The Carel Corporation (Carel Corp, 2004).

The Environmental Protection Agency Maximum Contaminant Level (MCL) for arsenic was lowered from 0.05 mg/L to 0.01 mg/L on January 23, 2006. Arsenic in MW-10 never statistically exceeded the 0.05 mg/L MCL nor was arsenic in MW-10 ever detected above 0.05 mg/L from January 1996 to January 2006. Thus, no further action was ever necessary. However, arsenic was routinely detected above 0.01 mg/L from January 1996 to August 2008. Arsenic was determined to occur at a statistically significant level over the MCL of 0.01 mg/L during the first 2006 semi-annual groundwater monitoring event

---

[1] The VOC exceedences occurred prior to implementation of the March 2006 Municipal Solid Waste Rules went into effect; thus, the work plan was prepared and the nature and extent investigation was conducted in accordance with regulations in effect at that time.

for MW-10. Therefore, arsenic was included in the Nature and Extent Investigation and the ACM.

2.1 Groundwater Monitoring

The groundwater monitoring system consists of a network of wells located around the perimeter of the facility (see Figures 1 and 2). Groundwater monitoring under 30 TAC §330.334 was initiated at MW-10, MW-11, and MW-12 in January 1996. Monitor wells MW-10, MW-11, and MW-12 are located on the southern side of the limits of waste. VOCs have been detected throughout the majority of the monitoring history of MW-10, MW-11, and MW-12, thus groundwater monitoring has proceeded under an assessment monitoring program. Sampling and analysis at the site are being performed in accordance with the approved facility Groundwater Sampling and Analysis Plan (GWSAP)(Carel Corp, 2006). Routine groundwater monitoring occurs semi-annually, typically in June and December. The most recent semi-annual groundwater monitoring event was conducted on December 1-3, 2008.

The monitor wells along the southern disposal boundary, including MW-10, MW-11, and MW-12, are generally located less than 15 feet from the limits of solid waste. The southern property boundary is located along the Elm Fork of the Trinity River channel, approximately 1,000 feet or more from the disposal cell limits. It is noted that the current monitor well locations are well within the 30 TAC 330.3(106) (formerly 30 TAC §330.2) maximum relative point of compliance limit of 500 feet from disposal cells limits.

2.2 Site Geology

The site geology consists of alluvial gravel, sand, silt, and clay soils overlying weathered and unweathered shale of the Cretaceous Eagle Ford Formation. The alluvial deposits are associated with the deposition within the floodplain of the ancestral Elm Fork of the Trinity River and its tributaries. Migration of the ancestral river channel resulted in deposition of channel sands and gravels immediately above the Eagle Ford Shale bedrock. The geology of the site is described more thoroughly in the Groundwater Characterization Report for the facility (Reed, 1995).

The alluvium is the uppermost water-bearing zone under the waste management unit. It consists of interbedded gravel, sand, silt, and clay. The alluvium ranges from approximately a few inches to 18 feet thick and exhibits a fining upward sequence; beginning with a coarse basal gravel, transitioning upward into finer grained sediments. Strata thickness and transitions are not generally uniform or continuous. All monitor wells are completed in the uppermost water-bearing zone. Underlying the alluvium is the Eagle Ford Shale which acts as an aquitard to vertical groundwater movement.

2.2.1 Groundwater Flow Gradient and Rate

A groundwater contour map was prepared for the second 2008 semi-annual groundwater monitoring event and is provided as Figure 2. In general, groundwater at the facility flows towards the Elm Fork of the Trinity River, meandering around the south and west boundary of the property. The eastern portion of the facility is hydraulically upgradient, whereas the southern and western boundaries of the facility are hydraulically downgradient.

Hydraulic gradients were estimated for various parts of the site from the water-level measurements taken during the second 2008 semi-annual groundwater monitoring event. The gradient for a particular part of the site was determined by calculating the difference between the groundwater contours (head difference) and dividing by the horizontal distance between the contours. The values are in ft/ft; multiplied by 5,280 for the gradient in feet per mile. Minimum and maximum rates of groundwater movement were estimated using the groundwater velocity equation (Driscoll, 1986):

$$\nu = 2{,}830Ki/n_e$$

Where:

ν = groundwater velocity (ft/day);
K = hydraulic conductivity (cm/sec);
i = hydraulic gradient (ft/ft);
n_e = effective porosity (percent); and
2,830 converts cm/sec to ft/day.

The hydraulic conductivity for the uppermost water-bearing zone is estimated by Reed (1995) to average about $1.0\text{x}10^{-4}$ cm/sec. Minimum and maximum hydraulic gradients were estimated for the uppermost water-bearing zone from Figure 2. Estimated hydraulic gradients range from a minimum of 0.002 ft/ft in the middle-eastern portion of the site to a maximum of 0.03 ft/ft in the west area of the site, between MW-15A and MW-16 The average effective porosity is estimated to be 30 percent, based on values provided by Freeze and Cherry (1979). Using the equation and the values described above, the estimated minimum and maximum groundwater velocities (with flow directions) for the uppermost water-bearing zone are:

$$v_{min} = \frac{2{,}830 \quad x \quad 1.0E\text{-}04 \quad x \quad 0.00200}{0.30}$$

$$v_{min} = 0.0019 \text{ ft/day (southwesterly)}$$

and

$$v_{max} = \frac{2{,}830 \quad x \quad 1.0E\text{-}04 \quad x \quad 0.03}{0.30}$$

$$v_{max} = 0.0283 \text{ ft/day (westerly)}$$

2.3 Statistical Analysis and Nature and Extent Conclusions

As previously stated, detections of TCE in MW-11 and cis-1,2 dichloroethene in MW-10 and MW-12 triggered the ACM. Cis-1,2 dichloroethene in MW-11 and arsenic in MW-10 later statistically exceeded their GWPS and became constituents of concern (COC). A list of VOCs detected during the two semi-annual monitoring events conducted in the year 2008 for MW-10, MW-11, and MW-12 are provided in the table on the following page. Arsenic detections in MW-10 are also provided in the table.

30 TAC §330.419 constituents exceeding detection monitoring statistical limits and having a groundwater protection standard (GWPS) established by the USEPA or the TCEQ, and/or any VOC detections, are statistically compared to GWPSs using the 95-percent confidence interval analyses. Evaluations are conducted per the GWSAP and Gibbons and Coleman (2001). A 95-percent lower confidence interval (LCL) that is greater than the GWPS provides statistically significant evidence that a constituent occurred at a level greater than the GWPS.

A 95-percent UCL analysis is applicable to assessment parameters for which the 95-percent LCL has previously exceeded a GWPS. A 95-percent UCL that is less than the GWPS provides statistically significant evidence that a constituent occurs at a level less than the GWPS.

The previous two years of data (December 2006 through December 2008) were used to construct the confidence interval in order to better reflect current site conditions. Statistical analysis results are summarized in the following table. The table includes VOCs detected within the LCL timeframe (December 2006 through December 2008) per TCEQ correspondence dated April 17, 2003. A summary of statistical analysis results is provided in the table on the following page.

Well	Constituent	1st 2008 Result (μg/L)	2nd 2008 Result (μg/L)	LCL (μg/L)	UCL (μg/L)	GWPS (μg/L)	LCL Exceeds GWPS?
MW-10	cis-1,2-dichloroethene	56	71	40	70	70[2]	No
	arsenic	<10	14	13	25	10[2]	Yes
MW-11	1,1-dichloroethane	5.0	<5	2.0	7.2	4,900[1]	No
	cis-1,2-dichloroethene	110	110	96	110	70[2]	Yes
	trichloroethene	22	16	18	22	5[2]	Yes
MW-12	1,1-dichloroethane	9.1	9	7.7	9.6	4,900[1]	No
	cis-1,2-dichloroethene	100	120	90	110	70[2]	Yes
	trichloroethene	7.6	5.8	2.5	7.9	5[2]	No
	vinyl chloride	2.8	3	1.0	3.0	2[2]	No

Notes: [1] - 30 TAC 350 Table 3 Groundwater Protection Standard (GWPS)
[2] - EPA Primary Maximum Contaminant Level (MCL)

Trichloroethene in MW-11, cis-1,2 dichloroethene in MW-10, MW-11, and MW-12 and arsenic in MW-10 are the only parameters to have currently statistically exceeded their regulatory GWPS in the past. However, it should be noted that cis-1,2 dichloroethene in MW-10 no longer statistically exceeds its GWPS. Time series plots of detected parameters in the table above are provided in Appendix 1. A noticeable decrease in VOC concentrations, except cis-1,2 dichloroethene in MW-12, is observed in the events following the installation and expansion of LFG extraction system. Cis-1,2 dichloroethene concentrations in MW-12 have remained relatively stable following the installation and expansion of LFG extraction system. The VOC concentration decreases have occurred concurrently with the installation of the landfill gas extraction system. Arsenic concentrations in MW-10 also showed improvement upon the activation of the LFG extraction system; therefore, the continued operation of the current LFG extraction system should maintain lowered VOC and arsenic concentrations.

2.3.1 Nature of VOC Detections in MW-11

The 2004 Nature and Extent Investigation provided for MW-11 and prepared by The Carel Corporation determined landfill gas was determined to be the source of VOCs in MW-11 based on the following information.

- VOC constituents detected in groundwater samples collected from well MW-11 and temporary well B-5 did not coincide with VOC constituents for leachate. Therefore, landfill leachate was determined to not be a probable source of the groundwater VOCs.

- Gas samples were collected from MW-11 and B-5 and analyzed for VOCs using EPA Method TO-14. VOCs detected in groundwater samples from MW-11 and B-1 coincided with VOC constituents in gas samples. Therefore, landfill gas was determined to be the apparent source of the VOC impacts to groundwater samples.

- Carbon dioxide concentrations were elevated in MW-11 and in B-1. Carbon dioxide is a major component of landfill gas and is readily soluble in groundwater. The elevated CO_2 supported the assertion that landfill gas was the source of the groundwater VOCs in MW-11.

- A relationship between total groundwater VOC concentrations and groundwater elevations relative to the screen interval of MW-11 indicated that total groundwater VOC concentrations increased during times when the screen interval was unsaturated. A similar relationship existed between total alkalinity concentrations and groundwater elevations relative to the screen interval. These relationships indicated that groundwater VOC impacts immediately adjacent to the limits of waste exist at low levels. However, accumulations of landfill gas within monitoring wells occurred when the water table dropped below the top of the well screen, resulting in elevated VOC concentrations in groundwater samples from the wells.

2.3.2 Nature of VOC Detections in MW-10 and MW-12 and Arsenic in MW-10

In regards to the nature of the VOC detections in MW-10 and MW-12, the December 2008 Nature and Extent Report concluded that:

- The apparent source of VOC impacts in groundwater collected from monitor wells MW-10 and MW-12 was concluded to be landfill gas rather than leachate based on the following reasons: the VOCs detected in MW-10 and MW-12 did not correlate with landfill leachate but correlated with landfill gas, the source chlorinated hydrocarbons of cis-1,2 DCE (PCE and TCE) were present in the landfill gas but not in the leachate, elevated CO_2 levels were present in MW-10, and portions of the well screens and/or filter packs of both wells were not fully submerged throughout the majority of monitoring history. Further, detected VOCs within groundwater samples collected from MW-10 and MW-12 were common trace components of landfill gas (USEPA, 1998).

In regards to the nature of the arsenic detections in MW-10, the December 2008 Nature and Extent Report concluded that:

- A noticeable decrease in arsenic concentrations was observed in July 2005, coinciding with the installation of the landfill gas extraction system. Arsenic concentrations rebound the following two events followed by an overall decrease in concentrations. The landfill gas extraction system was expanded in March 2008 which also coincided with a non-detection of arsenic in MW-10 in June 2008. The arsenic concentration decreases occurred concurrently with the installation of the landfill gas extraction system; therefore, the source of arsenic was attributed to landfill gas migration.

2.3.3 Extent of VOC Detections in MW-11

In regards to the extent of the VOC detections in MW-11, the November 2004 Nature and Extent Report concluded that:

- The extent of VOC migration downgradient of MW-11 is minimal, extending not more than 35 feet from the existing waste boundary.

2.3.4 Extent of VOC Detections in MW-10 and MW-12 and Arsenic in MW-10

In regards to the extent of the VOC detections in MW-10 and MW-12 and arsenic detections in MW-10, the December 2008 Nature and Extent Report concluded that:

- The extent of the groundwater VOC migration and arsenic migration downgradient of the landfill is minimal and is restricted to the immediate area of the waste boundary. No VOCs were detected in MW-10B or MW-12B and no arsenic was detected in MW-10A or MW-10B. Thus, the VOC area of impact does not extend to temporary monitor wells MW-10B or MW-12B nor does the area of impact extend to the property boundary (see Figure 1). The arsenic impact does not extend to MW-10A or the property boundary.

3 PRELIMINARY ASSESSMENT OF CORRECTIVE MEASURES

Selected corrective measure technologies were reviewed and evaluated to determine corrective measures most appropriate for the conditions encountered at the Camelot facility. Per 30 TAC §330.413(b) remedies must:

> *(1) be protective of human health and the environment;*
>
> *(2) attain the groundwater protection standard as specified in accordance with §330.409(h), (i), or (j) of this title (relating to Assessment Monitoring Program);*
>
> *(3) control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of 40 Code of Federal Regulations Part 258, Appendix II constituents into the environment that may pose a threat to human health or the environment; and*
>
> *(4) comply with standards for management of wastes as specified in §330.415(d) of this title (relating to Implementation of the Corrective Action Program).*

In proposing a corrective measure technology, only methods proven effective for remediation of groundwater in a municipal solid waste landfill or similar setting were considered. General criteria include feasibility, effectiveness, permanence, operations and maintenance (O & M), cost, potential effects, and time frame. Additional site specific considerations include a LFG source with migration, the groundwater flow direction, variable lithology within the saturated zone, and the subsurface area of concern.

3.1 Potential Corrective Measure - Preliminary Screening

The following technologies were identified as warranting further consideration in addressing VOCs and arsenic in groundwater:

- No Action;
- Institutional Controls;
- Monitored Natural Attenuation;
- Containment by Physical Barrier;

- Containment by Hydraulic Barrier;
- In Situ Treatment;
- Groundwater Extraction;
- Upgrading the Landfill Gas Management System; and
- Soil Vapor Extraction (SVE).

It should be noted that only the last two technologies (Landfill Gas Management and SVE) address the source (landfill gas migration that results in VOC detections and facilitates groundwater reduction and subsequent mobilization of arsenic) of elevated VOC and arsenic levels in groundwater. The Landfill Gas Management System directly addresses the source from within the landfill waste; whereas, SVE provides supplemental source control outside the landfill waste footprint within the vadose zone in natural subsurface lithology. Most of the potential remedies may require a modification to the facility permit potentially affecting the implementation schedule. Substantial affects on a potential remedy implementation schedule as a result of institutional requirements are not anticipated.

Potential corrective measure technologies were screened to focus the evaluation on a sub-set of alternatives that deserve serious consideration. In order to be retained at this stage, a remedial technology must be considered to be a viable and proven technique for addressing VOCs and arsenic in groundwater with consideration of site conditions. Technologies that rely on heating, steam, and multiphase extraction, for example, were not considered due to their incompatibility with the chemical properties of arsenic.

3.1.1 No Action

The "No Action" alternative would include no new active or passive measures for addressing COCs in groundwater. Although this alternative is not viable as a complete remedy, it is retained in order to provide a baseline by which the other alternatives will be evaluated.

3.1.2 Institutional Controls

Institutional Controls (IC) are often an effective solution for addressing minor environmental issues at a facility. IC for groundwater most often takes the form of a "deed restriction" whereby the current owner (and any future owners) of the property agree not to extract groundwater from a defined area beneath the site for any purpose. It is anticipated that a deed restriction may be easily obtained for the subject property to prevent potential groundwater use.

In an IC remedy, no active attempt is made to reduce the concentrations of the contaminant in the subsurface. As a stand-alone remedy, IC is not sufficient to address VOC detections or arsenic issues in groundwater at the site. As the source of VOC detections and arsenic mobilization is LFG migration, it is anticipated that this alternative would be used in combination with a more active alternative and has been retained for further evaluation.

3.1.3 Monitored Natural Attenuation

Natural attenuation processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or ground water. These processes include biodegradation; dispersion; dilution; sorption; volatilization; and chemical or biological stabilization, transformation, or destruction of contaminants. The most relevant attenuation processes for VOCs are volatilization, dispersion, and dilution. The most relevant attenuation processes for arsenic are sorption, dispersion, dilution, and transformation (conversion to less mobile arsenic species).

Monitored Natural Attenuation (MNA) can be considered a viable remedy if it can be demonstrated that the concentrations of COC are decreasing and will continue to decrease to below cleanup standards in a reasonable amount of time due to natural causes. Usually, successful MNA demonstrations have to meet the following three criteria, at a minimum:

- There is no on-going source releasing the COC into groundwater;
- Any exceedances of the appropriate groundwater standards are confined to the subject site; and
- Historical data indicate a decreasing dissolved plume and a stable or retreating center-of-mass for the COC within that plume.

To date, only the second and third criteria listed above have been met. The Nature and Extent Investigations proved the COC do not extend beyond the property boundary. Further, the majority of COC have decreased in concentrations or stabilized since the LFG extraction system was activated and expanded in July 2005 and March 2008, respectively (see Appendix A). At this time there may still be an on-going source releasing COC in groundwater although it is difficult to determine precisely since the recent upgrade to the LFGCS has only been operative for one year. It is not known at this time whether or not MNA may be necessary with elimination of the source of constituents of concern (LFG).

As a stand-alone remedy, MNA is not sufficient to address COCs in groundwater at the site. However, MNA could become part of a short-term plan with source control in the form of the LFG extraction system. Therefore, MNA has been retained for further evaluation.

3.1.4 Containment – Slurry Walls/Grout Curtains or Sheet Piles

At sites where groundwater contamination is relatively shallow, one potential alternative for addressing COCs is to construct a slurry wall or grout curtain around the area of concern. Alternatively, it may be more practical and cost effective to drive sheet piles into the subsurface. This evaluation considers both types of containment structures together.

This technology can be particularly effective for relatively small areas of impact, and for COCs that tend to be very mobile in groundwater and may present near-term risks to human health or ecological habitat. These structures are most often constructed by excavating a trench of sufficient width that a low-permeability slurry of cement-bentonite or pure bentonite grout can be placed in the trench without creating voids. If the shallow sediments begin collapsing, one of several pressure grouting techniques can be implemented to keep the trench open and ensure that the grout curtain is continuous. Alternatively, sheet piles can be driven to the desired depth in an overlapping pattern using percussion equipment. Most often, both of these types of structures are "keyed" into a naturally-occurring, low permeability geologic unit.

Containment via a slurry wall or sheet pile was not retained for further analysis for several reasons:

- Arsenic at this site tends to be relatively immobile under most conditions. Containment is typically not the primary concern.
- This option does nothing to reduce the mass or source of VOCs and arsenic.
- The length of the slurry wall/sheet pile system that would be required would be over 1,000 feet and the cost of design and construction would be quite excessive. This type of expenditure could be better used with an alternate technologies focused on VOCs and arsenic.

3.1.5 Containment - Hydraulic

Hydraulic containment was separated from physical containment because it uses an entirely different type of technology to achieve the same goal. Hydraulic containment usually consists of placement of a number of vertical groundwater extraction wells or one or more horizontal wells in such a manner as to restrict the movement of impacted groundwater. In the case of the Camelot site, hydraulic containment would most likely be used to prevent VOCs and arsenic from impacting additional areas of the site and from moving offsite in the future.

Hydraulic containment was not retained as a potential remedial alternative from the preliminary screening because it does nothing to address the source of VOCs or arsenic and is generally not used for the relatively low arsenic concentrations reported in groundwater at the site. Further, hydraulic containment would be impractical given the thin saturated zone in the vicinity of MW-10, MW-11, and MW-12 (approximately five to ten feet thick).

3.1.6 In Situ Treatment

In-situ treatment technologies can take many forms, but the common element to all of them is that the COC is treated in place; no extraction of groundwater is necessary. Several types of in-situ treatments have been used successfully for VOCs and arsenic;

most notably, the use of an oxidant or reductant. Four in-situ technologies were screened:

Oxidant Injection

In-situ bioremediation can be implemented using aerobic bioremediation. Aerobic bioremediation of petroleum hydrocarbons or chlorinated hydrocarbons can be accomplished by the addition of electron acceptor (e.g. oxygen release) compounds. Oxygen can be added to the groundwater by the addition of oxygen release compounds such as magnesium peroxide. Oxygen Release Compound (ORC) is a proprietary formulation of intercalated magnesium peroxide that releases oxygen slowly when hydrated. The release of dissolved oxygen supports a number of biological oxidation pathways that result in the breakdown of petroleum hydrocarbons and chlorinated hydrocarbons such as chlorobenzene, cis-1,2-dichloroethene, and vinyl chloride (Regenesis, 2002a). Lightly chlorinated compounds (e.g., chlorobenzene, cis-1,2-dichloroethene, and vinyl chloride) are typically degradable under aerobic conditions. The more highly chlorinated compounds (e.g., tetrachloroethene and trichloroethene) tend to be more resistant to aerobic degradation, but they can be degraded by dechlorination under anaerobic conditions. Thus, the disadvantage of using oxidant injection in MW-11 and MW-12 is that trichloroethene has been detected in each well.

Furthermore, the application of an oxidant to areas of high arsenic concentration can be successful in immobilizing arsenic by binding the arsenic to oxyhydroxides (primarily iron). These reactions occur very rapidly, and require relatively little iron to bind up a considerable amount of arsenic. The disadvantage of this technology for arsenic attenuation is that the reactions are reversible. If the geochemistry of the aquifer changes at some point in the future, the arsenic can re-solubilize. However, continued operation of the existing LFG extraction system should eliminate the source of reducing conditions (LFG) and maintain lower arsenic concentrations. As previously stated, arsenic concentrations in MW-10 decreased upon installation and activation of the LFG extraction system.

Oxidant injection has been retained as a potentially applicable technology as it addresses currently detected VOCs, excluding trichloroethene, and arsenic.

Reductant Injection

Bioremediation of petroleum hydrocarbons or chlorinated hydrocarbons can be accomplished by the electron donor (e.g. hydrogen remediation or metals remediation) compounds. Hydrogen Release Compound (HRC) is a proprietary polylactate ester that slowly releases lactate when deposited in the subsurface. Lactate is readily metabolized by naturally occurring microorganisms, resulting in the creation of anaerobic conditions and the production of hydrogen. Naturally occurring microorganisms capable of reductive dechlorination then use the hydrogen to progressively remove chlorine atoms from chlorinated hydrocarbon contaminants (i.e. convert trichloroethene to dichloroethene to vinyl chloride to ethene). HRC injection would be used in much the same way as oxidant injection (for hotspots), but has an added advantage of binding the arsenic in a manner that is not easily reversed (e.g. as arsenopyrites). Metals Remediation Compound (MRC) is a non-toxic, slow-release formulation that begins working upon injection into groundwater. The active ingredient is an environmentally benign organosulfur ester compound, which is slowly released when MRC is hydrated and subjected to microbial biodegradation. Contact between the organosulfur compound and metal ions then initiates an irreversible reaction ("complexation") that produces a metal-organosulfur complex. This complex sorbs strongly to soil particles, effectively immobilizing/removing the target metals (e.g., arsenic) from the groundwater environment. After the organic portion of the complex is biodegraded, a metal sulfide precipitate remains fixed to the soil. MRC is designed to render dissolved metals harmless through the manipulation of geochemical processes, such as precipitation, dissolution, oxidation/reduction, and complexation, which control the state and mobility of metals in an aquifer. MRC is formulated to effectively remove metals from groundwater by directly altering geochemical processes. MRC also contains a polylactate ester, which acts as an electron donor and carbon source for naturally-occurring bacteria to create optimal conditions for metals immobilization, while simultaneously providing a substrate for the biodegradation of chlorinated compounds such as tetrachloroethene and trichloroethene. This means sites contaminated with both metals and chlorinated compounds (mixed plumes) can be treated effectively with a single product, MRC, thus eliminating the need and cost for separate processes to treat both metals and chlorinated solvents.

Reductant injection has been retained as a potentially applicable technology as it addresses VOCs and arsenic.

Biologic

Several lines of research are on-going relating to biological treatment of arsenic. At this stage, none of these have been brought to full-scale except the use of the Brake Fern, a hyper-accumulator of arsenic that has been successfully applied to very shallow arsenic plumes in Florida. Because of the depth of the arsenic at the Camelot site, this option is not viable and will not be retained.

Permeable Reactive Barrier

In-situ treatment via construction of a permeable reactive barrier (PRB) has been applied at a number of sites where the primary COCs are organic compounds with relatively high solubility and mobility. The technology involves placement of a "treatment wall" within the aquifer itself, usually in such a manner as to passively or semi-passively "force" impacted groundwater to flow through the wall. The wall is usually of a higher permeability than the surrounding formation, resulting in a natural "sink" that encourages flow toward it. The treatment compounds are often mixed with sand or native soils in such a manner as to provide the appropriate treatment time. PRB was not retained as a potential solution for the Camelot site for the following reasons:

- The technology is most effective for COCs that are mobile and can easily be brought into contact with the treatment wall such as VOCs. However, arsenic is not a particularly mobile COC;
- The costs associated with a PRB this size are extreme relative to the problem.

working upon injection into groundwater. The active ingredient is an environmentally benign organosulfur ester compound, which is slowly released when MRC is hydrated and subjected to microbial biodegradation. Contact between the organosulfur compound and metal ions then initiates an irreversible reaction ("complexation") that produces a metal-organosulfur complex. This complex sorbs strongly to soil particles, effectively immobilizing/removing the target metals (e.g., arsenic) from the groundwater environment. After the organic portion of the complex is biodegraded, a metal sulfide precipitate remains fixed to the soil. MRC is designed to render dissolved metals harmless through the manipulation of geochemical processes, such as precipitation, dissolution, oxidation/reduction, and complexation, which control the state and mobility of metals in an aquifer. MRC is formulated to effectively remove metals from groundwater by directly altering geochemical processes. MRC also contains a polylactate ester, which acts as an electron donor and carbon source for naturally-occurring bacteria to create optimal conditions for metals immobilization, while simultaneously providing a substrate for the biodegradation of chlorinated compounds such as tetrachloroethene and trichloroethene. This means sites contaminated with both metals and chlorinated compounds (mixed plumes) can be treated effectively with a single product, MRC, thus eliminating the need and cost for separate processes to treat both metals and chlorinated solvents.

Reductant injection has been retained as a potentially applicable technology as it addresses VOCs and arsenic.

Biologic

Several lines of research are on-going relating to biological treatment of arsenic. At this stage, none of these have been brought to full-scale except the use of the Brake Fern, a hyper-accumulator of arsenic that has been successfully applied to very shallow arsenic plumes in Florida. Because of the depth of the arsenic at the Camelot site, this option is not viable and will not be retained.

Permeable Reactive Barrier

In-situ treatment via construction of a permeable reactive barrier (PRB) has been applied at a number of sites where the primary COCs are organic compounds with relatively high solubility and mobility. The technology involves placement of a "treatment wall" within the aquifer itself, usually in such a manner as to passively or semi-passively "force" impacted groundwater to flow through the wall. The wall is usually of a higher permeability than the surrounding formation, resulting in a natural "sink" that encourages flow toward it. The treatment compounds are often mixed with sand or native soils in such a manner as to provide the appropriate treatment time. PRB was not retained as a potential solution for the Camelot site for the following reasons:

- The technology is most effective for COCs that are mobile and can easily be brought into contact with the treatment wall such as VOCs. However, arsenic is not a particularly mobile COC;
- The costs associated with a PRB this size are extreme relative to the problem.

3.1.7 Groundwater Extraction

Groundwater extraction is one of the oldest remedial technologies and can be quite effective in the appropriate application. This technology is different from hydraulic containment in that the extraction system would be designed to remove as much VOCs and arsenic from the groundwater as possible, typically from the source area, rather than ensure that all VOC and arsenic-impacted groundwater stays within site boundaries. Usually this involves placement of the wells in locations near the highest concentrations of the COC.

As a stand-alone remedy, groundwater extraction would not normally be considered appropriate for remediation of arsenic in groundwater. This is because arsenic mobility is typically so low in groundwater that recovery of a meaningful amount is unlikely. This is also the case for the Camelot site. Furthermore, the use of this technology without addressing the landfill gas source will provide little to no additional protection. For the reasons listed above, this technology was not retained for further evaluation.

3.1.8 Continued Operation of the Landfill Gas Management System

LFG management is a common operational component for MSW landfills and regulations governing LFG management are in place. Landfill gases can be managed effectively by installing a LFG venting or extraction system. Passive LFG vents are commonly constructed from gas wells drilled into the waste where LFG is allowed to vent into the atmosphere. Flares can be attached to the tops of the vents to burn gases as they are vented. LFG extraction systems are typically comprised of a series of interconnected gas extraction wells installed within the landfill area. A vacuum is induced, and extracted gases are mitigated by combustion via a gas flare system. The Camelot landfill currently maintains a landfill gas collection and control system (LFGCCS) that captures landfill gas generated in the landfill as waste decays.

Landfill gases are composed primarily of methane and carbon dioxide; however, VOCs are a minor component as well. Landfill gas can partition into groundwater where interaction occurs. Thus, in the process of capture and destruction of LFG by a LFGCCS, the source of VOCs and groundwater reduction is mitigated. Landfill gas is generally at a low pressure relative to atmospheric and landfill gas flow rates in the subsurface are typically insufficient to suspend substantial quantities of particulate matter. As such, landfill gas emissions are therefore unlikely to be a significant source of heavy metals with the exception of some rarely detected forms of mercury, arsenic, and antimony. Arsenic may form arsine gas (AsH_3) under certain conditions (Scottish Environment Protection Agency). Thus, in the process of capture and destruction of LFG and arsine gas by the LFGCCS a potential source of VOCs and arsenic would be mitigated as well. Most importantly, in the process of capture of LFG by the LFGCCS, VOC concentrations should continue to decline and the reducing conditions catalyzing arsenic mobilization should be lessened or eliminated. Continued operation of the existing LFGCCS has been retained as a potentially applicable technology as it addresses the source of VOCs and arsenic.

3.1.9 Soil Vapor Extraction (SVE)

SVE systems (SVES) are a widely-used and accepted method for inducing volatilization of aqueous phase volatiles and removing gas-phase volatiles from subsurface strata. SVES have been applied to landfills and leaking UST's since the 1970s (USACE, 1995). The same principals used by a SVES are applied to the LFGCCS. The USEPA provides numerous case studies of successful and ongoing SVE remedial activities (USEPA, 1992; USEPA, 1996; USEPA, 2001c).

An SVES operates by inducing a vacuum within an extraction well (or series of wells) within the vadose zone to create a pressure/concentration gradient, which induces subsurface movement and removal of vapors towards/through an extraction well. The removal of subsurface vapors in contact with groundwater and increased subsurface air-flow towards the extraction wells also facilitates volatilization of VOCs dissolved in groundwater, which are then removed through the SVES. The benefits of a SVES go beyond VOC mitigation to the control of the reducing conditions that cause mobilization of naturally occurring arsenic. The installation and operation of a SVES coupled with the continued operation of the existing LFGCCS provides an implementable technology option that focuses on long-term groundwater management by source control and vadose zone remediation and for this reason this technology has been retained for further evaluation.

3.2 Preliminary Screening Summary

The results of the preliminary technology screening have identified three technologies that may be applicable to address VOCs and arsenic. Institutional controls, monitored natural attenuation, and enhanced bioremediation (e.g., ORC, HRC, and MRC) are all viewed to be potentially applicable technologies to address remnant groundwater COC plumes remaining after the LFG source is controlled. Continued operation of the LFGCCS and SVES implementation were retained as potential source control measures to address the geochemical condition resulting in elevated COC levels in groundwater. These retained technologies are more thoroughly evaluated in the following section.

4 CORRECTIVE MEASURE TECHNOLOGY EVALUATION

Remedial technologies described and retained from Section 3.1 are evaluated in accordance with 30 TAC§330.411(c) in terms of performance, reliability, feasibility, effectiveness, operation and maintenance (O & M), permanence, costs, potential safety impacts, cross media impacts, control of residual contamination, institutional requirements, and time frame. Evaluation of the reviewed remedial technologies is especially attentive to the requirements of 30 TAC §330.413(b).

Performance can be measured by effectiveness and reliability of the proposed technology in the specific remediation. Reliability refers to the ability of a remedial technologic system to perform and maintain its functions in routine circumstances, as well as unexpected circumstances. Feasibility refers to the ability to implement the proposed remedial program and technology. Effectiveness refers to the proposed technology's ability to attain the requirements of 30 TAC §330.413(b) and achieve the goals of the corrective action program. O & M refers to the monitoring, upkeep, repairs, and preventive maintenance to maintain a remedial system. Permanence considers the ability of the system to maintain the goals of the corrective action system when achieved both during operation and following shut down. Cost refers to the monetary resources required to implement, maintain and operate, monitor, and shut down the corrective action technology. Considerations associated with the construction of remedial systems include potential safety impacts, cross-media impacts, and control of exposure to residual contamination. Institutional requirements include state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the proposed remediation. Time frame considers the time required to construct and complete the remedy. Estimated time lines to implement the remedial technologies are provided in Table 2. Evaluation criteria are rated in terms of favorability from 1 to 3. A score of 1 is least favorable, a score of 2 is moderately favorable, and a score of 3 is highly favorable. The score for the technology as a whole is the summation of the scores for each criterion where a total of 33 points is available.

For presentation purposes, the proposed technologies have been segregated based on intended use. The no action, MNA, and enhanced bioremediation technologies are viewed as potentially applicable remedies once the source of LFG is completely addressed. The LFGCCS and SVE technologies are discussed as potentially applicable technologies for addressing gas impacts to groundwater.

4.1 Technologies Used in Conjunction with Source-Control

As anticipated, the lowest score for technologies that may be used after source control measures are implemented is the "no action" technology. By comparison, the overall score for MNA and enhanced bioremediation was higher than institutional controls as the MNA and enhanced bioremediation technologies have more metrics to evaluate the reliability and safety than the institutional controls option. It should be noted that the effectiveness of the MNA remedy is highly dependent on the ability to develop institutional controls to limit potential exposures on the Camelot site property to the south and thus both components are viewed as warranted for inclusion in the final corrective measure design. A detailed evaluation of MNA and enhanced bioremediation is described below.

The total score for a MNA solution is 25 out of a possible 33 total points. A discussion of the scoring is as follows:

Feasibility

Score: 3

Prior to implementation, an additional investigation may be required to determine if subsurface conditions are conducive with source control to remediate VOCs and attenuate arsenic in groundwater. MNA could be implemented with little or no additional construction or disturbance to on-site areas.

Effectiveness

Score: 2

With source control, MNA should be protective of human health and the environment. Elimination of the source should allow geochemical mechanisms besides dispersion (e.g., volatilization, fixation to aquifer solids) to reduce VOC concentrations and soluble arsenic levels with distance.

Reliability

Score: 2

Monitored Natural Attenuation is viewed as moderately reliable since it mainly involves the field sampling of the COC and chemical analysis under laboratory conditions.

Operation and Maintenance

Score: 2

MNA requires little O & M. No mechanical components are required, and remediation occurs by natural processes. Ongoing activity following installation would be limited to periodic monitoring of VOC concentrations and arsenic attenuation from groundwater samples that would include current monitoring parameters and possibly additional natural attenuation indicators such as dissolved oxygen, ferrous and total iron, sulfide, and others. Maintenance of monitor wells would be required as well.

Permanence

Score: 2

The permanence of an MNA remedy will be highly dependent on the ability for source control measures to address further gas impacts to groundwater. Increased or future migration of gas has the potential to result in increased groundwater VOC and arsenic concentrations. Natural attenuation without source control would potentially be a lengthy process, continuing as long as COC continued to be introduced to the system. However, source control (LFG Extraction System) has been implemented at the site and overall has shown improvement as COC concentrations have either decreased or stabilized. Thus natural attenuation with source control may potentially be a short process.

Cost

Score: 3

The cost would be low and include additional laboratory costs and periodic field activities. The estimated cost to implement monitored natural attenuation in conjunction with source control remedial measures is summarized in Table 3. An estimated cost to obtain deed restrictions and other institutional control vehicles is included in the cost estimate.

Potential Safety Impacts

Score: 3

MNA is generally a safe process as there is no required digging or construction nor is their any physical contact with the source of contamination.

Cross-Media Impacts

Score: 3

No potential for cross media impact would be present. Furthermore, MNA is less disruptive to the surrounding area and environment.

Control of Residual Contamination

Score: 2

MNA should moderately control residual contamination since the contaminants are eventually remediated by natural processes. No involvement of forced extraction or movement of contaminants is necessary unless sampling for monitoring purpose.

Institutional Requirements

Score: 3

The institutional requirements are favorable because MNA can be performed within the existing property boundary.

Time Frame

Score: 1

MNA could be implemented at the facility immediately upon approval; although, a pre-project study may also be necessary. The time frame to begin and complete the construction of an MNA monitoring network is relatively short. The length of MNA monitoring will be highly dependent on the ability of source control measures to eliminate the VOC detections and reducing conditions affecting arsenic mobility. Generally, after gas migration has been mitigated, groundwater quality improvement is observed within 6 months to a year with some variability. Even if the proposed source control measures were sufficient to address gas impacts and reduce VOC and arsenic levels, additional monitoring would be required to demonstrate the permanence of the remedy.

The total score for an enhanced bioremediation solution is 22 out of a possible 33 total points. A discussion of the scoring is as follows:

Feasibility

Score: 2

Enhanced bioremediation can be implemented with the installation of bioremediation wells or direct injection of ORC, HRS, or MRC into the groundwater in the area of concern, within the property limits. Access for drilling rigs and avoidance of utilities or other underground structures would be a concern, but can be circumvented with proper prior field scouting and review of facility construction records. An investigation may be necessary to determine if subsurface conditions are amendable to bioremediation processes.

Effectiveness

Score: 3

With source control, based on current literature and case studies, enhanced bioremediation should be protective of human health and the environment, and should obtain a groundwater quality where arsenic and chlorinated hydrocarbons (e.g. chlorinated ethenes) do not exceed a GWPS.

Reliability

Score: 2

Enhanced bioremediation is viewed as moderately reliable since it mainly involves the field sampling of the COC and chemical analysis under laboratory conditions.

Operation and Maintenance

Score: 3

Enhanced bioremediation would require little O & M. The delivery system for addition of catalysts to enhance bioremedial processes would need to be maintained.

Permanence

Score: 1

Permanence of enhanced bioremediation should be good if subsurface conditions are favorable to this process. Even if the system was removed, natural bioremediation would continue, though at decreased efficiency. However, with a constant source, equilibrium may be reached above desired remediation goals. Additionally, increased source output of COC would result in increased groundwater concentrations, especially as the bioremediation process adjusts to greater COC concentrations. System adjustments may be required as conditions change and periodic addition of bioremediation catalysts would be required. Without proper source control, groundwater concentrations would be expected to rebound during system downtime or following removal.

Cost

Score: 1

The cost will be moderate to high and will include temporary bioremediation wells or direct injection into the aquifer, enhancement materials, enhancement mixing and delivery system, and monitoring. Oxidant or reductant injection would need to take place at least once a year further increasing costs. The estimated cost to implement monitored enhanced bioremediation in conjunction with source control remedial measures is summarized in Table 4.

Potential Safety Impacts

Score: 2

Typical safety issues associated with the drilling and installation of enhanced bioremediation wells or injection points may be present. These include but are not limited to slips, trips, falls, lifting of heavy equipment, and head injuries. Necessary caution would need to be taken during any subsurface drilling activities in the vicinity of MW-10, MW-11, and MW-12 to avoid an explosive environment. Furthermore, soil removed during drilling activities may potentially be contaminated causing human exposure and potential cross media impact.

Cross-Media Impacts

Score: 2

Soil removed during drilling and/or injection activities may potentially be contaminated causing human exposure and potential cross media impact if not properly managed.

Control of Residual Contamination

Score: 2

Enhanced bioremediation should moderately control residual contamination since the contaminants are eventually remediated by aerobic and/or anaerobic bioremediation. No involvement of forced extraction or movement of contaminants is necessary unless sampling for monitoring purpose.

Institutional Requirements

Score: 3

The institutional requirements are favorable because enhanced bioremediation can be performed within the existing property boundary.

Time Frame

Score: 1

Time required to begin and complete an enhanced bioremediation system would be moderate to high and include the designing of and construction of an enhanced bioremediation system in the vicinity of MW-10, MW-11, and MW-12.

4.2 Source Control Measures

Potential source control measures include continued operation of the existing LFG management system and installation and operation of an SVE system. As shown in Table 1, continued operation to the existing LFG management system scored higher than the construction and operation of a SVE system. These technologies are further evaluated below.

4.2.1 Landfill Gas Management

The total score for LFG management solution is 30 out of a possible 33 total points. A discussion of the scoring is as follows:

Feasibility

Score: 3

A LFGCCS was activated in July 2005 and expanded in March 2008. Therefore, the necessary infrastructure is already in place at the Camelot landfill. A period of time following the expansion of the LFGCCS in March 2008 is required to achieve steady-state operating conditions. The spacing of the existing LFG extraction wells is currently at 200 foot intervals. The facility owner plans to use the LFGCCS to provide power to a cogeneration power plant.

Effectiveness

Score: 3

Based on current literature and case studies, continued operation of the LFGCCS should provide protection of human health and the environment, and address gas impacts to groundwater quality. Continued operation of the LFGCCS should address the source of groundwater impacts within the landfill disposal boundary. Following source control, vadose zone landfill gases should disperse and decrease.

Reliability

Score: 3

LFGCCS are reportedly highly reliable (Bader, 1994). According to a published report on LFG to energy projects, operators of LFG to energy systems have not encountered serious reliability or maintainability problems in many LFGCCS. Some LFGCCS require a more proactive preventive maintenance program than others, but the systems are reportedly not adversely affected by collection system problems.

Operation and Maintenance

Score: 2

Continued operation of the existing LFGCCS would require minimal O & M. Tasks would include upkeep and maintenance of vacuum blowers/controllers, wells, energy supply (e.g. utility lines), flare system, condensate management, etc.

Permanence

Score: 3

The permanence of the LFGCCS is nominal as the system would serve as a semi-permanent source control feature during the site life and long-term facility post closure operations.

Cost

Score: 1

As previously discussed, the Camelot facility has an active LFGCCS already in place. Therefore, costs will only include continued operations and maintenance of the LFGCCS. Upkeep of the LFGCCS is a committed operating expense of the facility. Table 5 provides an estimated cost for operating this technology.

Potential Safety Impacts

Score: 3

Again, the Camelot facility has an active LFGCCS already in place. The spacing of the existing LFG extraction wells is currently at 200 foot intervals, which is standard spacing for LFG extraction wells. Therefore, no additional wells are expected to be installed at this time and the typical potential safety impacts involved with the installation of additional extraction wells does not apply.

Cross-Media Impacts

Score: 3

Since no additional extraction wells are expected to be installed no potential cross media impacts will occur. The in-situ pressure of the landfill gas would be significantly reduced by an effective LFGCCS. Hence, extent of contaminated groundwater and vadose zone will be reduced.

Control of Residual Contamination

Score: 3

As previously stated, vadose zone landfill gases should disperse and decrease with continued operation of the LFGCCS.

Institutional Requirements

Score: 3

The institutional requirements are favorable because the system has already been installed within the existing property boundary. Permit modifications for the air protection permits have already been submitted and approved. For these reasons, the overall score is 3.

Time Frame

Score: 3

Again, the Camelot facility has an active LFGCCS already in place. It is estimated that the LFGCCS would be run throughout the active life of the facility and through post closure.

4.2.2 Soil Vapor Extraction System (SVES)

A total score for a soil vapor extraction system (SVES) solution is 23 out of a possible 33 total points. A discussion of the scoring is as follows:

Feasibility

Score: 2

Associated equipment with a SVES would include wellhead materials, piping, etc. The system could be tied into the LFGCCS or have dedicated support systems installed. Access for drilling rigs and avoidance of utilities or other underground structures would be a concern, but can be circumvented with proper prior field scouting and review of facility construction records. A period of time following installation would be required to achieve steady-state operating conditions. Additional investigation may be necessary to determine appropriate well spacing and extraction rates.

Effectiveness

Score: 2

Based on current literature and case studies, a SVES should be protective of human health and the environment and should, in combination with other measures, improve groundwater quality. A SVES, while removing vapors outside the landfill footprint, does not provide source control within the landfill proper (the area of LFG generation).

Reliability

Score: 3

The reliability is believed to be favorable because the system has demonstrated ability to continuously service the treatment operation. Combining the SVES with the LFGCCS is also a potentially reliable application.

Operation and Maintenance

Score: 2

A SVES would require O & M, which could be incorporated into routine LFGCCS operations or addressed separately. Upkeep and maintenance, in coordination with the existing LFGCCS would include maintenance of vacuum blowers, controllers, wells, energy supply (e.g. utility lines), flare system, condensate management, etc. Additional costs are associated with monitoring and adjusting the system's performance, both mechanically and as a remediation solution.

Permanence

Score: 2

While operational, the SVES would be an effective and relatively permanent solution to mitigate LFG migration outside the landfill when needed, as the infrastructure for the system would remain in place.

Cost

Score: 2

The cost will be moderate and will include installation, materials (piping, operational equipment), fine-tuning operating parameters, monitoring, maintenance, and repairs. The estimated cost is provided in Table 6 to implement and operate this remedial technology.

Potential Safety Impacts

Score: 2

Typical safety issues associated with the drilling and installation of an SVES may be present. These include but are not limited to slips, trips, falls, lifting of heavy equipment, and head injuries. As previously stated, LFG is mainly composed of carbon dioxide and methane. Necessary caution would need to be taken during any subsurface drilling activities in the vicinity of MW-10, MW-11, and MW-12 to avoid an explosive environment.

Cross-Media Impacts

Score: 2

Soil removed during drilling activities may potentially be contaminated causing human exposure and potential cross media impact if not properly managed.

Control of Residual Contamination

Score: 2

As previously stated, vadose zone landfill gases should disperse and decrease with continued operation of the LFGCCS. Thus, residual contamination would not be affected by a SVES.

Institutional Requirements

Score: 2

Similar to the LFGCCS, the institutional requirements criteria are considered favorable because the system can be installed within the property boundary. However, a permit from the TCEQ will be required to install the SVE wells. Therefore, the overall score is 2.

Time Frame

Score: 2

Time required to begin and complete a SVES would be low to moderate and include the designing of and construction of a SVE system.

5 SELECTION OF PROPOSED REMEDY

After presentation, rating, and review of applicable corrective measures technologies, it is determined that the most viable solution to address the groundwater issues for monitor wells MW-10, MW-11, and MW-12 at the Camelot facility is: i) continued operation of the existing LFGCCS to control the gas source currently causing VOC detections and reducing groundwater outside the landfill; and ii) MNA of groundwater monitoring to document VOC and arsenic attenuation with time and removal of the source (LFG). The proposed remedy fulfills the regulatory requirements and goals of 30 TAC §330.413(b), which are protection of human health and the environment, the ability to obtain GWPSs, and capability to provide source control. The proposed remedy is also favorable for these additional reasons:

- Continued operation of the LFGCCS should remediate not only migrating gas, but also address the groundwater (arsenic and VOCs) issues in the affected wells by control of the source.
- The Camelot facility has already allocated resources to operate and maintain the LFGCCS and is committed to long-term LFG control at the facility.
- A program is already in place to monitor the effectiveness of the LFGCCS on COC concentrations. Improvements to groundwater quality can be monitored at MW-10, MW-10A, MW-10B, MW-11, B-2, B-3, MW-12, MW-12A, and MW-12B by observation of arsenic and VOC concentration changes over time. Arsenic and VOC concentrations below the GWPS and/or laboratory reporting limit are the optimal goals.
- Groundwater in the area of VOC detections and arsenic impact is not currently used as a public or private source. Furthermore, future use of this groundwater can be controlled through proper institutional controls and monitoring to document MNA effectiveness.

Continued operation of the LFGCCS should control LFG migration. Vadose zone LFG and current groundwater COC should be remediated via the LFGCCS, subsurface dispersal and dilution, natural surface emission, fixation, volatilization, and natural degradation. The LFGCCS' effect on VOC concentrations in MW-10, MW-10A, MW-10B, MW-11, B-2, B-3, MW-12, MW-12A, and MW-12B and arsenic concentrations MW-10, MW-10A, and MW-10B will be evaluated on an annual basis. The results of the evaluation will be submitted in Annual Correction Action Progress Reports at the end of each year starting in 2009. In the event COC remain above their respective GWPSs in MW-10, MW-11, and MW-12 through the year 2010, supplemental corrective measures may be warranted.

5.1 Pilot Study

In addition to the proposed selected remedies discussed in the section above, the facility also proposes a pilot study to further evaluate the LFGCCS' effect on LFG migration and COC concentrations in MW-10, MW-11, and MW-12. The pilot study would consist of the following:

- The installation and quarterly monitoring of three temporary gas monitoring probes along the current point of compliance in the vicinity of groundwater wells MW-10, MW-11, and MW-12. Progress towards control and containment of migrating landfill gases outside the landfill footprint can be monitored at the three temporary gas monitoring probes, and
- The implementation of an enhanced bioremediation system in the vicinity of MW-10. Based on conversations and advice from a representative of Regenesis, the proposed bioremediation will involve MRC. As previously stated, MRC is used to remediate concentrations of both metal and chlorinated compounds. A potential pilot test layout diagram for MRC is provided in Appendix 2. A maximum of seven injection points would be installed near MW-10. Routine ground water monitoring of well MW-10 will demonstrate the effectiveness of this treatment.

6 REFERENCES

Bader, Charles D. 1994. Retail Cost-Deferral Landfill Gas Projects. MSW Management - January/February 2004. Santa Barbara, California.

Driscoll, F. G. 1986. Groundwater and Wells. Johnson Division, St. Paul, Minnesota. 1089 p.

Gibbons, Robert D. 1994. Statistical Methods for Groundwater Monitoring. John Wiley and Sons, Inc.

Reed Eng. 1995. Groundwater Characterization Report for the Camelot Sanitary Landfill, Permit Number 1312, Denton County, Texas.

Regenesis, 2002a. Software Help.

Scottish Environment Protection Agency. September 2004. Guidance for Monitoring Trace Components in Landfill Gas.

The Carel Corporation. 2000 (Revised 2006). Groundwater Sampling and Analysis Plan. Camelot Landfill, MSW Permit 1312-A, Denton County.

The Carel Corporation, 2004. Investigation of the Nature and Extent of Volatile Organic Compound Detections in MW-11, Camelot Landfill, MSW Permit No. 1312A, Denton County, Texas.

U. S. Army Corps of Engineers (USACE). 1995. November. Soil Vapor Extraction and Bioventing. Engineering Manual EM 1110-1-4001.

USEPA. 1992. Technology Assessment of Soil Vapor Extraction and Air Sparging. Environmental Protection Agency EPA/600/R-92/173.

USEPA. 1996, April. Engineering Forum Issue Paper: Soil Vapor Extraction Implementation Experiences. Environmental Protection Agency Office of Solid Waste and Emergency Response EPA/540/F-95/030.

USEPA. 1998. Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources.

USEPA, 1998, Guide to Documenting and Managing Cost and Performance Information for Remediation Projects, Revised Version, October 1998, EPA 542-B-98-007

USEPA. 1998. Permeable Reactive Barrier Technologies for Contaminant Remediation. EPA/600/R-98/125. United States Environmental Protection Agency Office of Research and Development Washington DC 20460 EPA/600/R-98/125.

USEPA. 1999. Monitored Natural Attenuation of Chlorinated Solvents U.S. EPA Remedial Technology Fact Sheet. United States Environmental Protection Agency Office of Research and Development Washington DC 20460 EPA/600/F-98/022.

USEPA. 2001a. A Citizen's Guide to Permeable Reactive Barriers. United States Environmental Protection Agency Office of Solid Waste and Emergency Response EPA/542/F/01/005.

USEPA. 2001b. A Citizen's Guide to Monitored Natural Attenuation. United States Environmental Protection Agency Office of Solid Waste and Emergency Response EPA/542-F-01-004.

USEPA. 2001c. A Citizen's Guide Soil Vapor Extraction and Air Sparging. United States Environmental Protection Agency Office of Solid Waste and Emergency Response EPA/542/F-01/006.

USEPA. Technology Innovation Office. 2002. Remediation Technologies Screening Matrix and Reference Guide. 4th Edition. http://www.frtr.gov/matrix2/top_page.html.

Wagner, K. et al. 1986. Remedial Action Technology for Waste Disposal Sites, 2nd Edition, Pollution Technology Review No. 135, Noyes Data Corporation

TABLES

Table 1
Remedial Technologies Scoring Summary
Camelot Landfill

Corrective Measure	Feasibility	Effectiveness	Reliability	Safety	Cross-Media Impact	Control of Residual Contamination	O&M	Permanence	Cost	Time Frame	Institutional Requirement	Total Score
Technology	out of 3	out of 3	out of 3	out of 3	out of 3	out of 3	out of 3	out of 3	out of 3	out of 3	out of 3	out of 33
Monitored Natural Attenuation	3	2	2	3	2	2	2	2	3	1	3	25
Enhanced Bioremediation	2	3	2	2	2	2	3	1	1	1	3	22
Landfill Gas Management System	3	3	3	3	3	3	2	3	1	3	3	30
Soil Vapor Extraction System	2	2	3	2	2	2	2	2	2	2	2	23

Table 2
Estimated Time Frame of Remedial Technologies

Technology	Time Required									
	Pre-Project Study	Demonstration for the Project	Selection of Contractor	System Design	Regulatory Approval or Permitting	Construction of the System	Test and Starting the System	Operation and Maintenance	Analysis and Reporting	Total
Monitored Natural Attenuation	0	0	4	0	6	0	0	360	6	376
Enhanced Bioremediation	3	12	1	3	2	3	0	0	2	26
Landfill Gas Management System	0	0	0	0	0	0	0	360	6	366
Soil Vapor Extraction System	3	3	4	1	4	6	1	360	6	388

Note: Unit in month

Table 3

Estimated Cost for Monitored Natural Attenuation

Item	Unit	Unit Cost	Quantity	Total Cost
Initial Cost:				
Institutional Controls (Deed Restriction)	L.S.	7,500.00	1	$7,500.00
Mobilization	L.S.	1,000.00	1	$1,000.00
Natural Attenuation Demonstration (if needed)	L.S.	15,000.00	1	$15,000.00
Lifecycle O & M:				
Groundwater Sampling	year	2,000.00	5	$10,000.00
Groundwater Analysis	year	2,400.00	5	$12,000.00
Reporting (semi-annual)	year	2,000.00	5	$10,000.00
Field Maintenance	year	1,000.00	5	$5,000.00
Contingencies: (15% of total cost)				$7,950.00
		Total Cost:		**$68,450.00**

Note: Assuming 5 years of monitored natural attenuation groundwater monitoring.

Table 4

Estimated Cost for Enhanced Bioremediation

Item	Unit	Unit Cost	Quantity	Total Cost
Initial Cost:				
Enhanced Bioremediation Injection	each	10,000.00	3	$30,000.00
Lifecycle O & M:				
Yearly Bioremediation Injection	year	30,000.00	5	$150,000.00
Groundwater Sampling	year	2,000.00	5	$10,000.00
Groundwater Analysis	year	2,400.00	5	$12,000.00
Reporting (semi-annual)	year	2,000.00	5	$10,000.00
Contingencies: (15% of total cost)				$31,800.00
		Total Cost:		**$243,800.00**

Note: Assuming 5 years of Enhanced Bioremediation.
Assuming 3 Enhanced Bioremediation systems (MW-10, MW-11, and MW-12).

Table 5
Estimated Cost for Landfill Gas Management System

Item	Unit	Unit Cost	Quantity	Total Cost
Construction Cost:				
LFGCCS Already in Place	each	0.00	0	$0.00
Lifecycle O & M:				
Field Maintenance	year	38,500.00	48	$1,848,000.00
Contingencies: (15% of total cost)				$277,200.00
		Total Cost:		**$2,125,200.00**

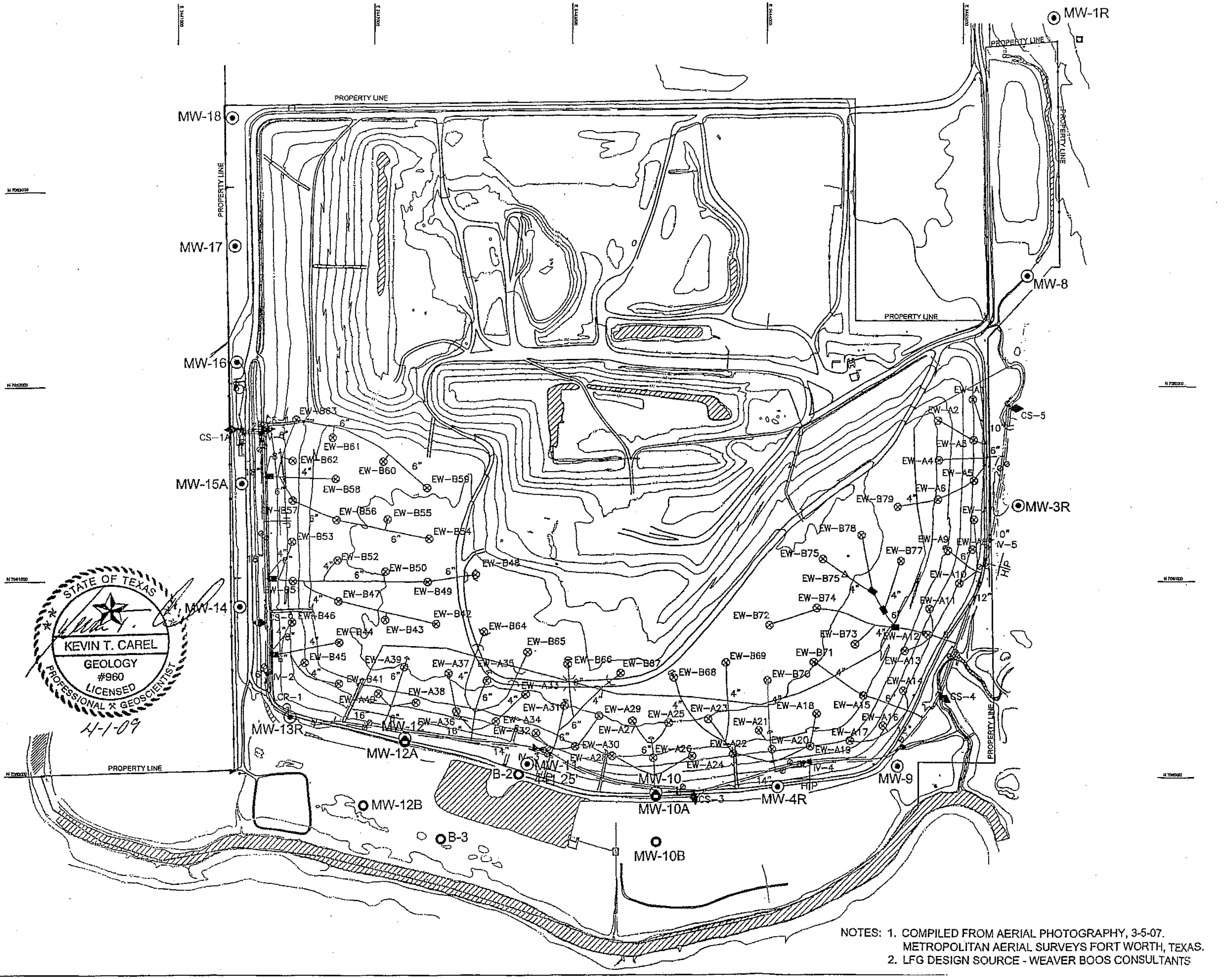
Note: Assuming 18 years of remaining site activities and 30 years of post closure corrective action.
The facility owner plans to use the LFGCCS to provide power to a cogeneration power plant in the future.
As a result, lifecycle O&M costs may need to be reevaluated and revised in the future.

Table 6
Estimated Cost for Soil Vapor Extraction System

Item	Unit	Unit Cost	Quantity	Total Cost
Construction Cost:				
SVE System	each	60,000.00	3	$180,000.00
Lifecycle O & M:				
Field Maintenance	year	5,000.00	5	$25,000.00
Contingencies: (15% of total cost)				$30,750.00
		Total Cost:		**$235,750.00**

Note: Assuming 5 years SVE operation.
Assuming 3 SVE systems (MW-10, MW-11, and MW-12).

FIGURES



NOTES: 1. COMPILED FROM AERIAL PHOTOGRAPHY, 3-5-07. METROPOLITAN AERIAL SURVEYS FORT WORTH, TEXAS.
2. LFG DESIGN SOURCE - WEAVER BOOS CONSULTANTS

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

— — —	APPROXIMATE SITE BOUNDARY
⦿	GROUNDWATER MONITOR WELL
○	TEMPORARY MONITOR WELL
— 360 —	EXISTING SURFACE CONTOUR

N

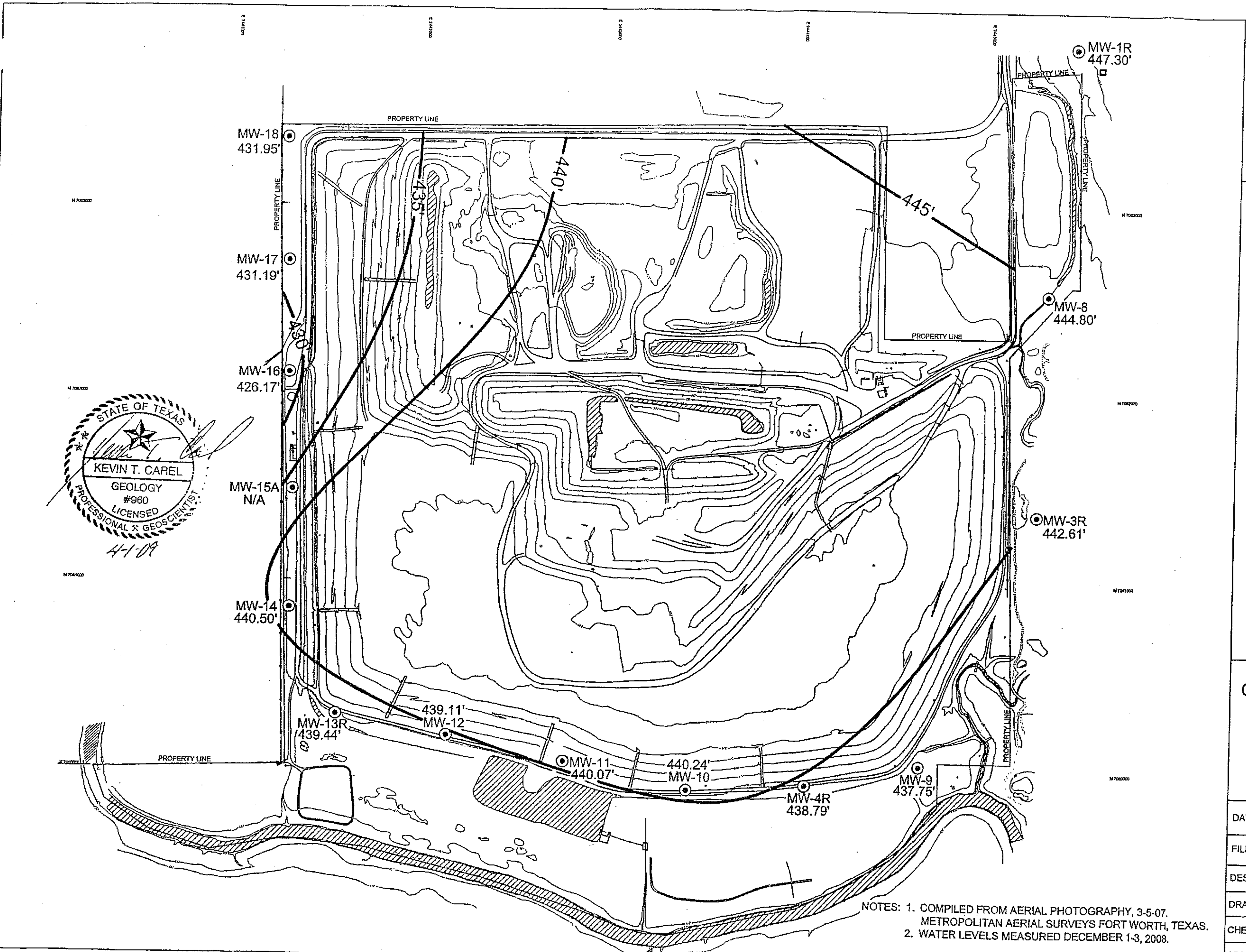
SCALE:

0 250 500
FEET

SITE MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE DRAFTED: November 21, 2008	REV. NO.: 0
FILENAME: J:\Texas\Camelot\2008 LFG Extraction.dwg	
DESIGNED BY:	FIGURE:
DRAFTED BY: TDW	1
CHECKED BY: SJW	
APPROVED BY: KTC	



STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST
4-1-09

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

— — — APPROXIMATE SITE BOUNDARY

⊙ GROUNDWATER MONITOR WELL

—360— EXISTING SURFACE CONTOUR

▬ GROUNDWATER CONTOUR

SCALE:

0 250 500
FEET

GROUNDWATER CONTOUR MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

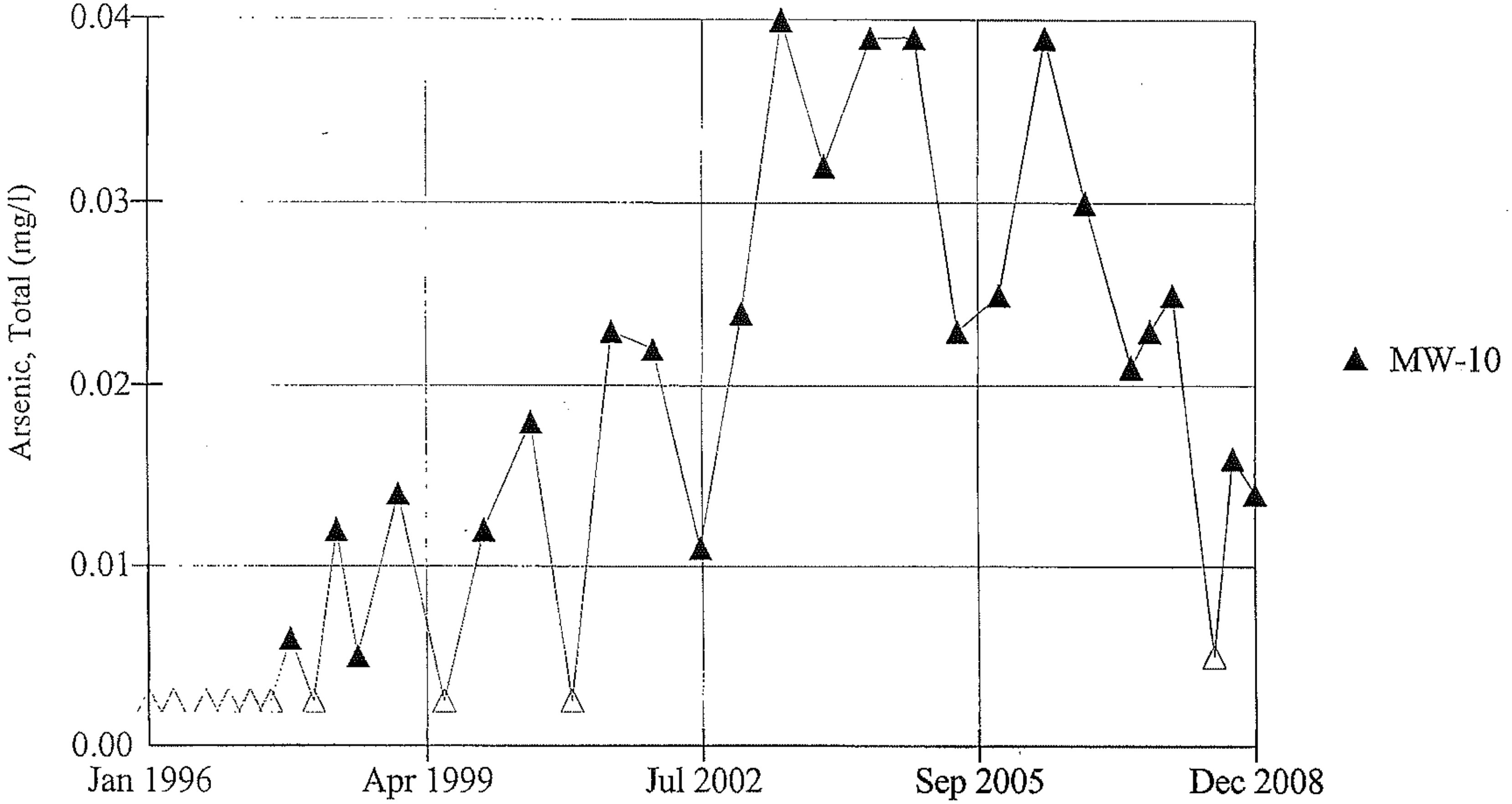
DATE DRAFTED: January 13, 2009	REV. NO.: 0
FILENAME: L:\Texas\Camelot\2007 TOPO\Contour Map.dwg	
DESIGNED BY: ATT	FIGURE:
DRAFTED BY: TDW	2
CHECKED BY: JFZ	
APPROVED BY: KTC	

NOTES: 1. COMPILED FROM AERIAL PHOTOGRAPHY, 3-5-07. METROPOLITAN AERIAL SURVEYS FORT WORTH, TEXAS.
2. WATER LEVELS MEASURED DECEMBER 1-3, 2008.

APPENDIX 1

TIME SERIES PLOTS – CONSTITUENTS OF CONCERN

TIME SERIES



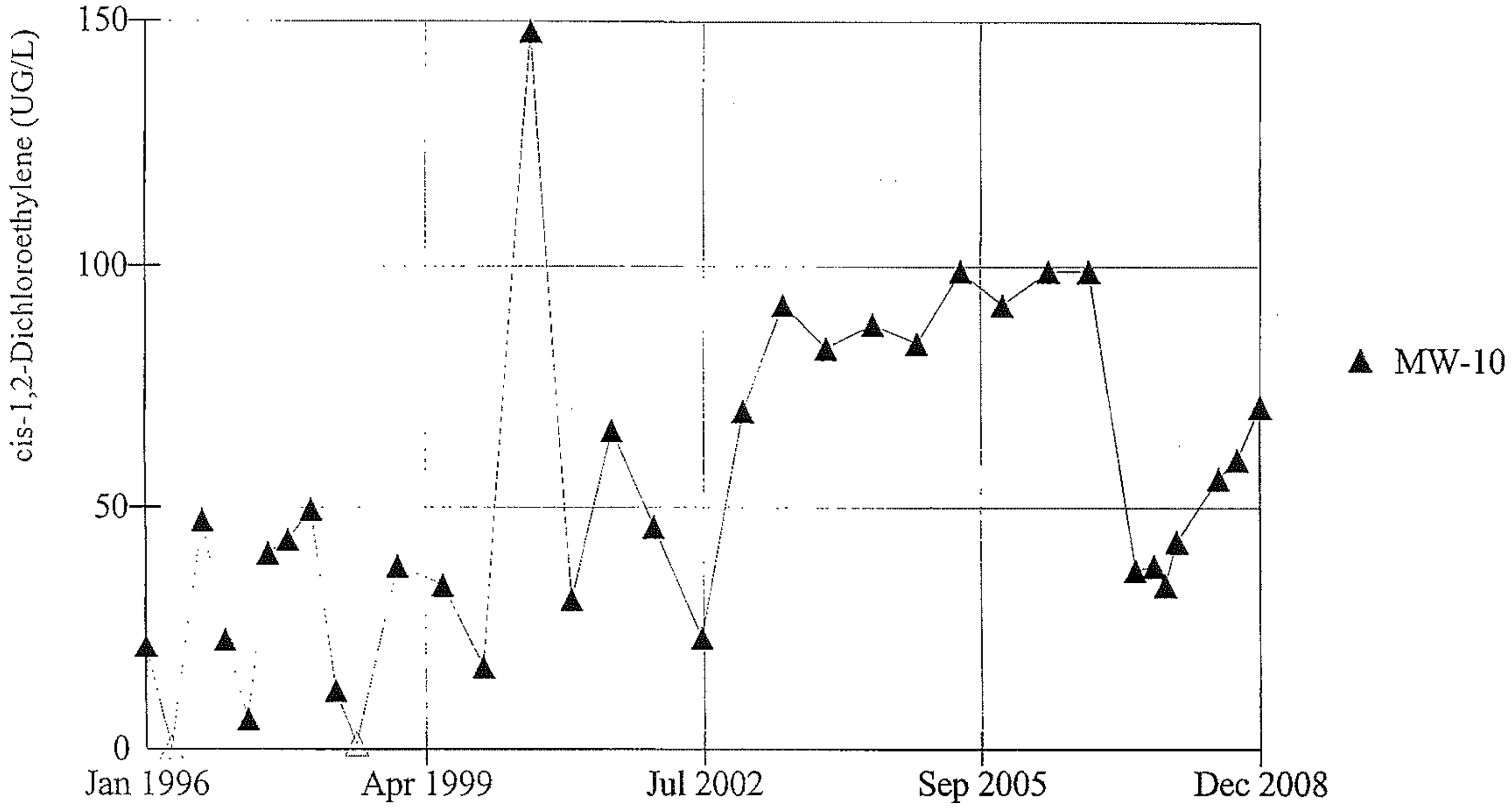
Hollow symbols indicate censored values.

Constituent: Arsenic, Total (mg/l)
Date: 3/16/09, 4:12 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEinorg
View: As

TIME SERIES



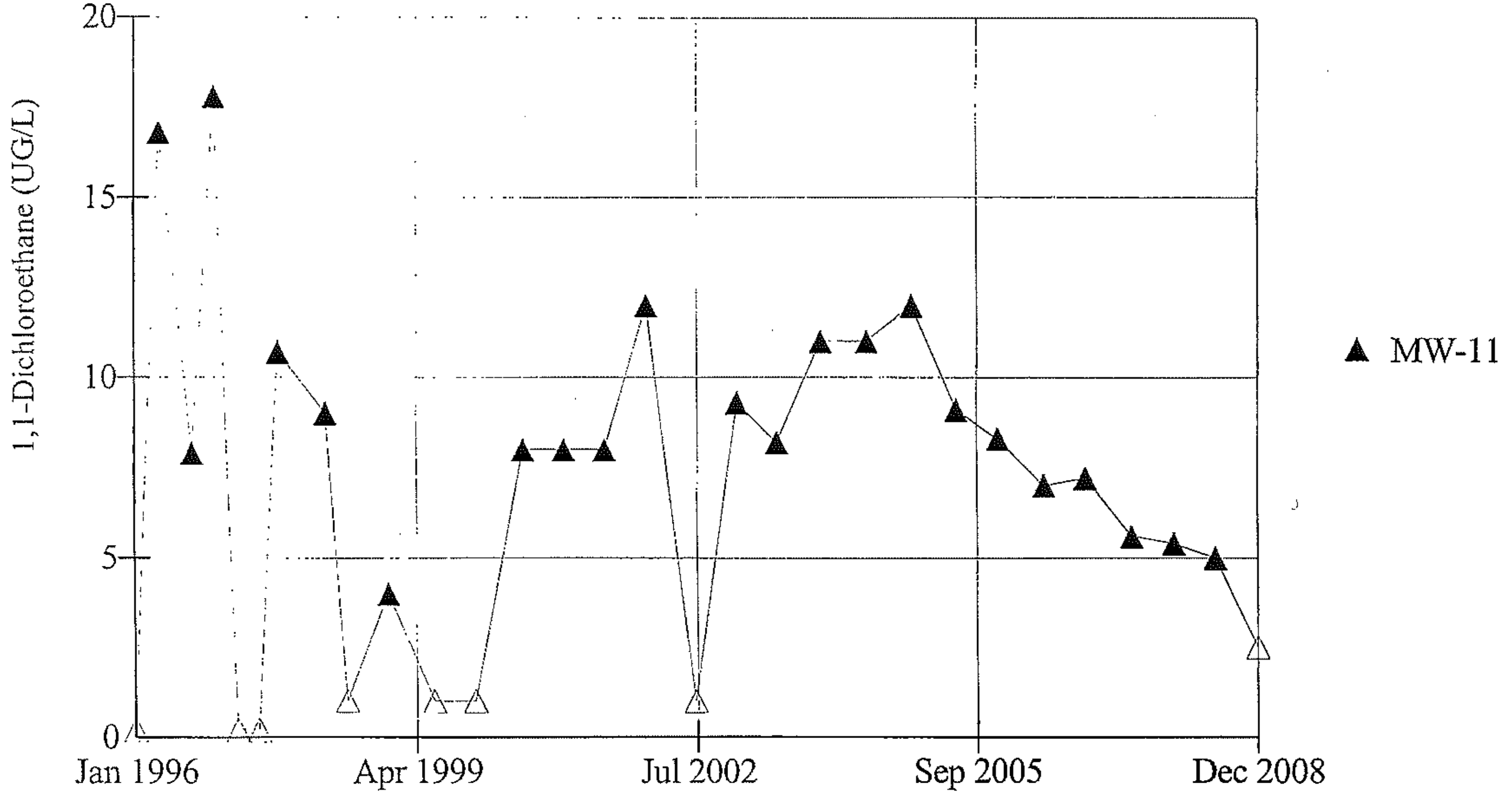
Hollow symbols indicate censored values.

Constituent: cis-1,2-Dichloroethylene (UG/L)
Date: 3/16/09, 4:02 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



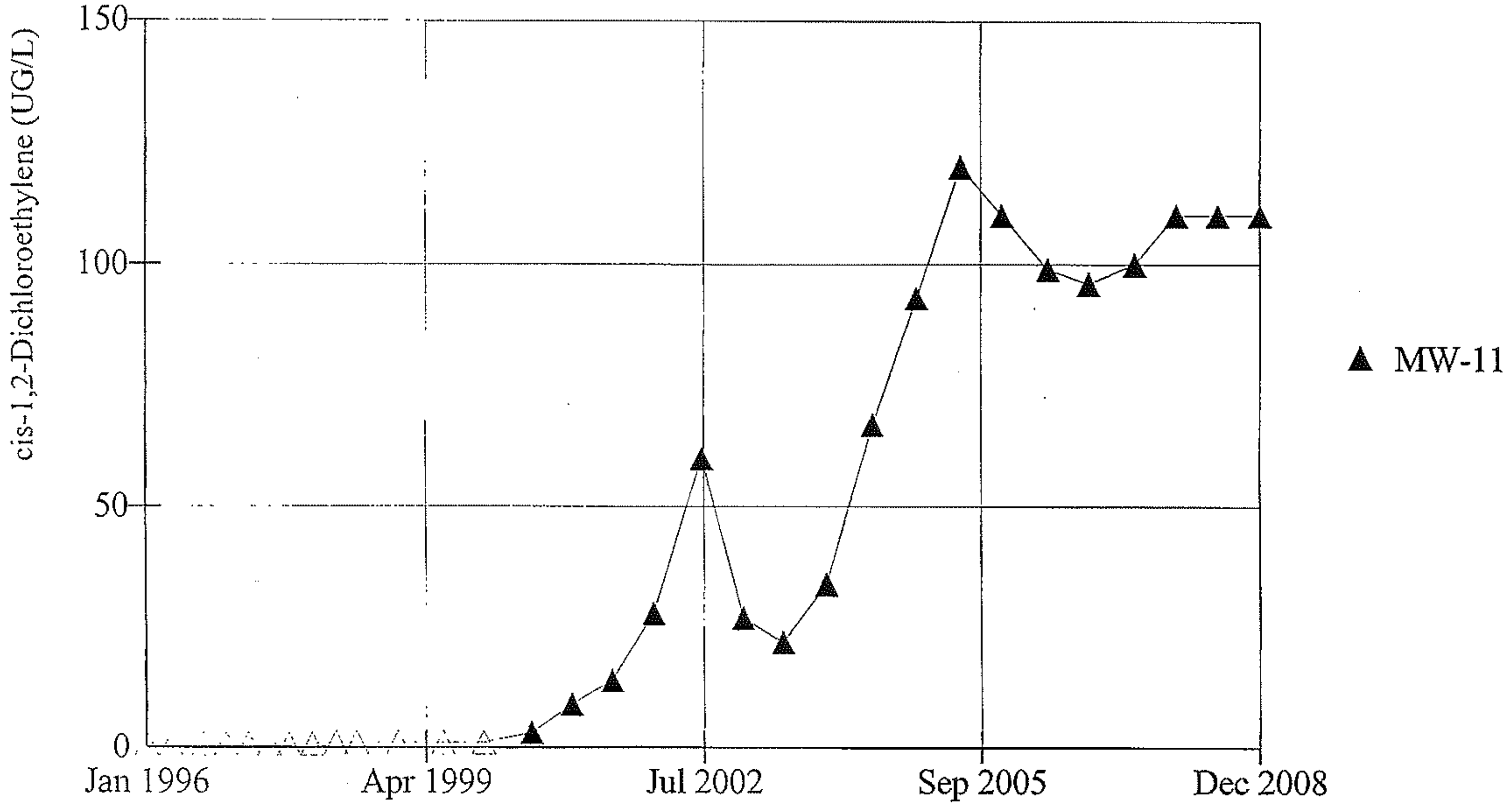
Hollow symbols indicate censored values.

Constituent: 1,1-Dichloroethane (UG/L)
Date: 3/16/09, 4:03 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



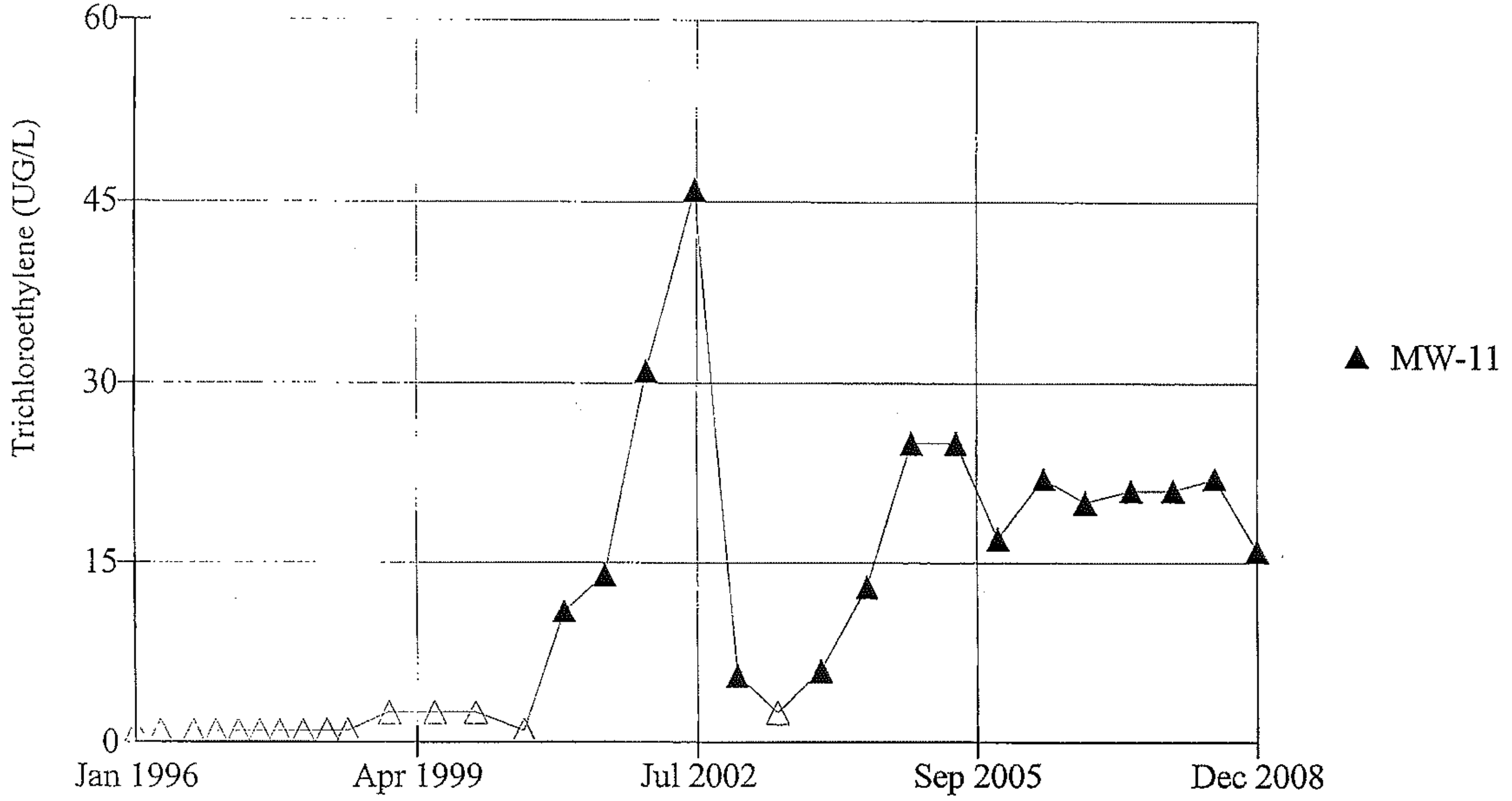
Hollow symbols indicate censored values.

Constituent: cis-1,2-Dichloroethylene (UG/L)
Date: 3/16/09, 4:03 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



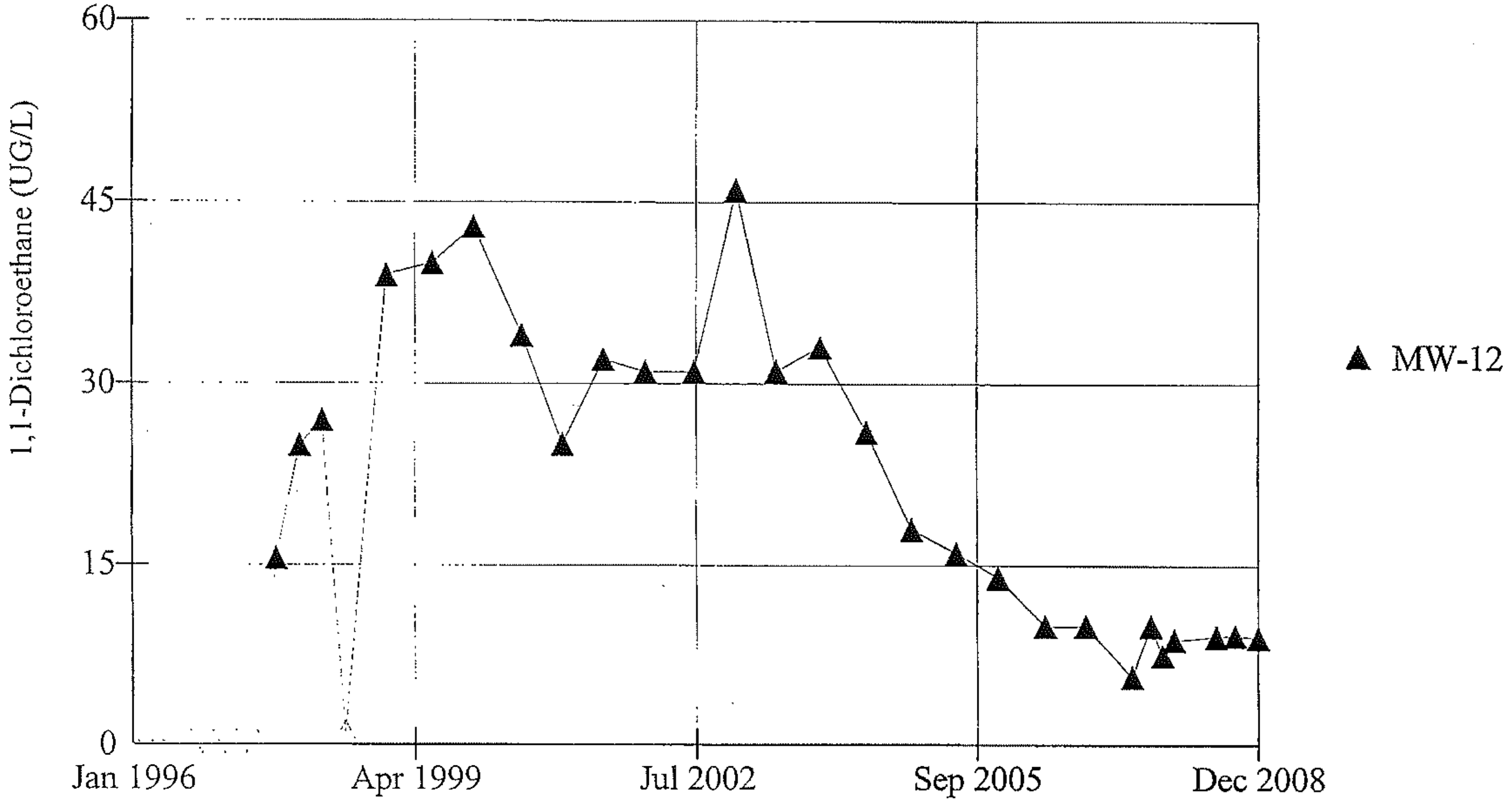
Hollow symbols indicate censored values.

Constituent: Trichloroethylene (UG/L)
Date: 3/16/09, 4:04 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



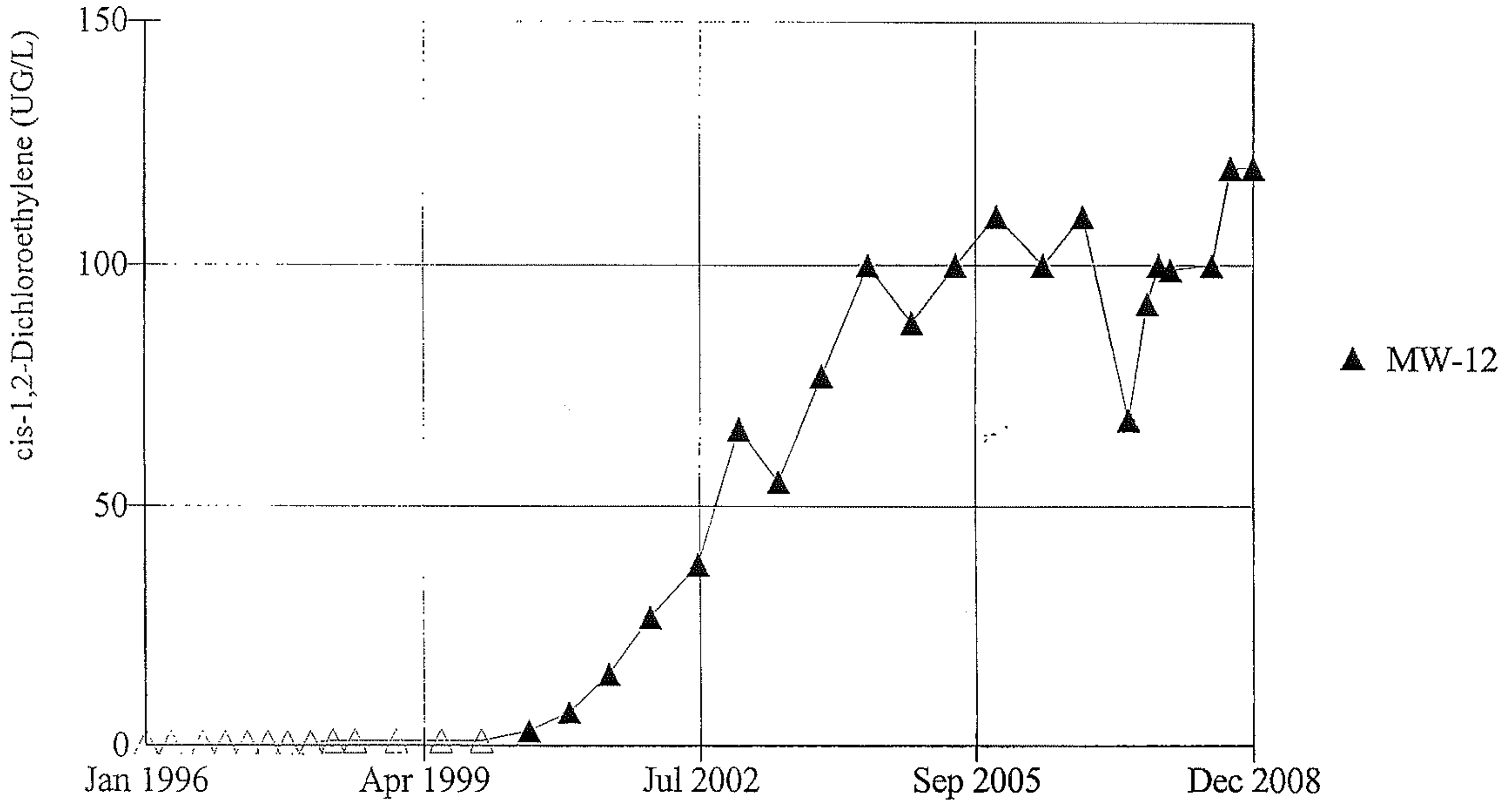
Hollow symbols indicate censored values.

Constituent: 1,1-Dichloroethane (UG/L)
Date: 3/16/09, 4:06 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



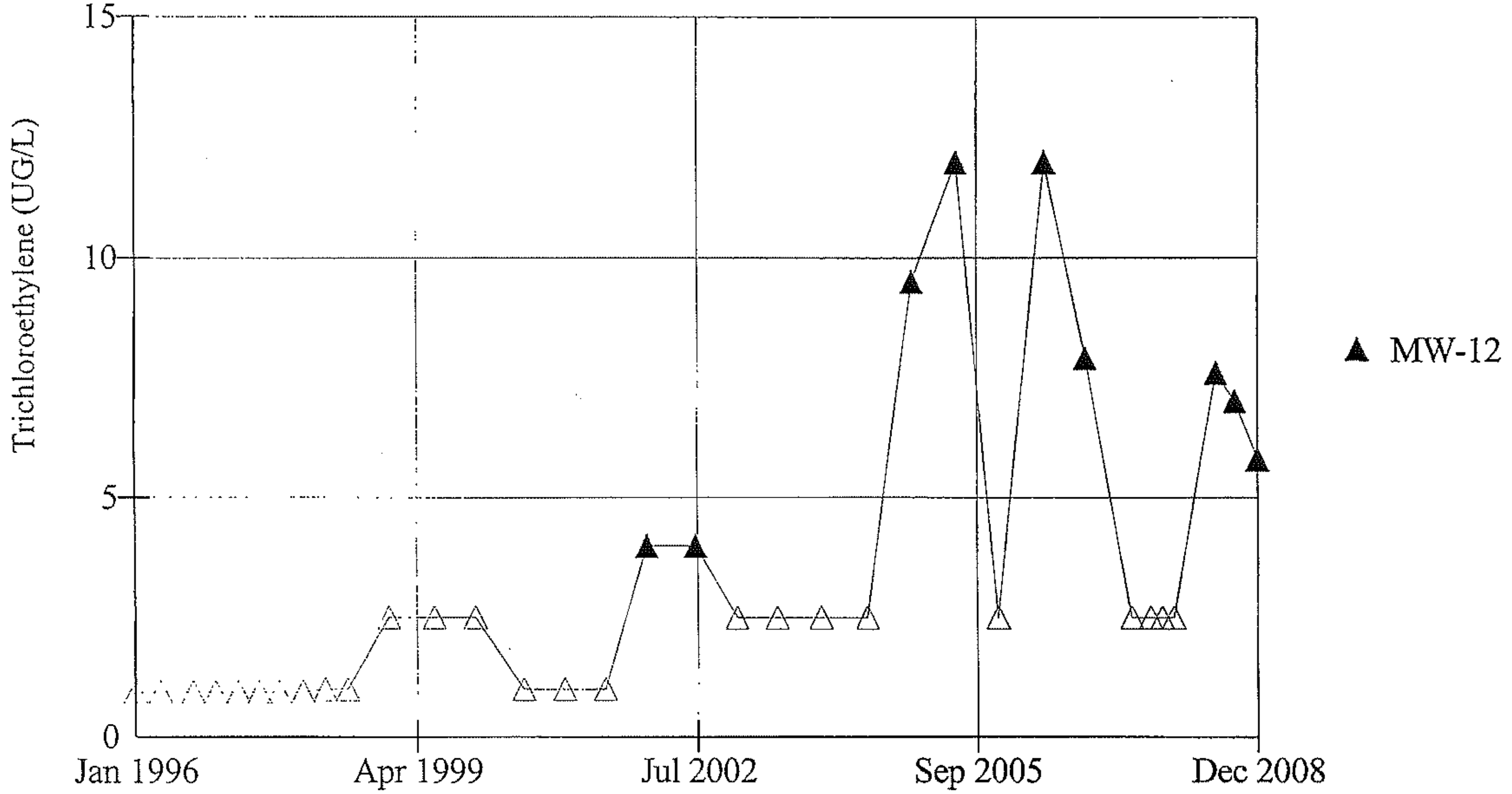
Hollow symbols indicate censored values.

Constituent: cis-1,2-Dichloroethylene (UG/L)
Date: 3/16/09, 4:06 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



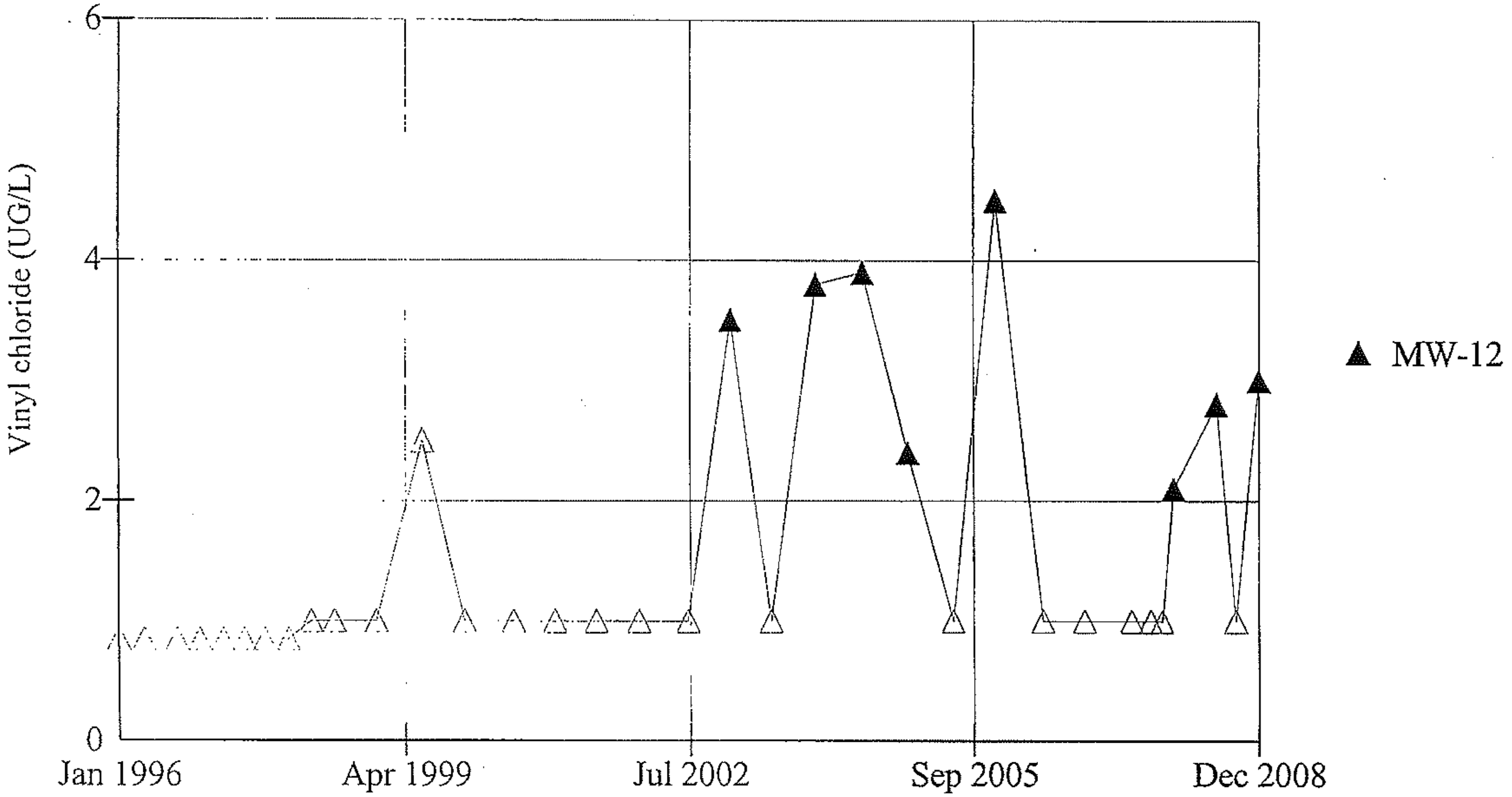
Hollow symbols indicate censored values.

Constituent: Trichloroethylene (UG/L)
Date: 3/16/09, 4:04 PM

Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

TIME SERIES



Hollow symbols indicate censored values.

Constituent: Vinyl chloride (UG/L)
Date: 3/16/09, 4:05 PM

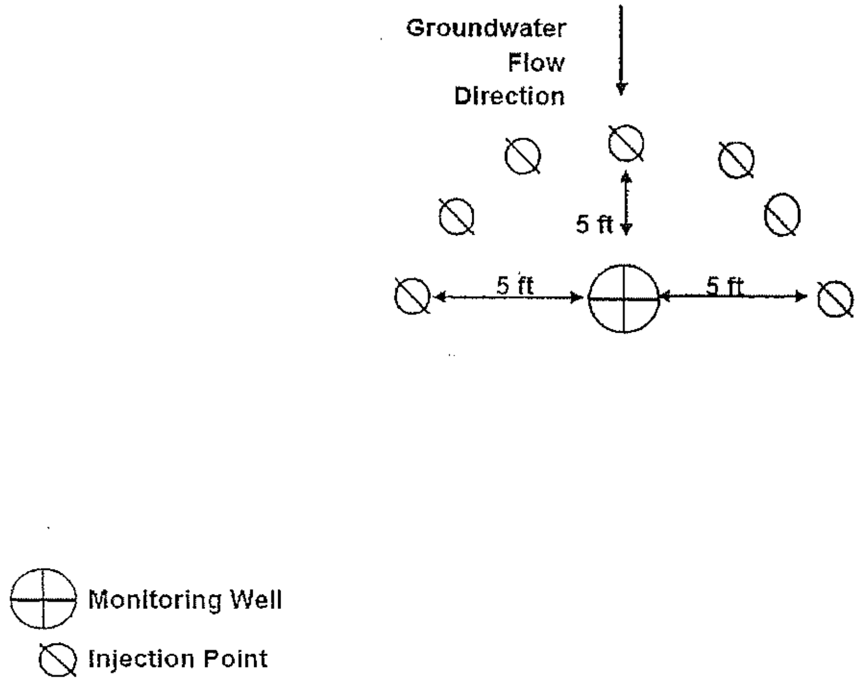
Facility: Camelot LF
Client: AWI

Data File: CAMDBASEorg
View: VOCs

APPENDIX 2

PILOT TEST LAYOUT DIAGRAM

Pilot Test Layout Diagram



KEVIN T. CAREL
GEOLOGY
#960

4-1-09

The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

PILOT TEST LAYOUT DIAGRAM

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

(SOURCE: REGENESIS) IIIH-H-56

APPENDIX

2

The CAREL CORPORATION

January 18, 2010
Project No. 09-12-32

Mr. Arthur Denny
MC 124
Municipal Solid Waste Permits Section
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Re: **Response to a TCEQ Notice of Deficiency Letter Dated December 9, 2009, Assessment of Corrective Measures, Camelot Landfill, MSW Permit No. 1312A, Denton County, Texas; WWC 12544150 & 12647309; RN101479038/CN601253628**

Dear Mr. Denny:

This letter is written to provide a response to the comments in a letter dated December 9, 2009, from the Texas Commission on Environmental Quality (TCEQ). The TCEQ's comment/questions are provided below in italics with our response immediately following.

Comment 1: *Please understand that the 2009 Yearly Groundwater Monitoring Report is expected to discuss the trending for all constituents involved in the facility's assessment monitoring all VOCs, before and after the installation of the active landfill gas collection and control system.*

Response: The comment is duly noted.

Comment 2: *Please include Time-Series Plots for all compounds of concern listed in the Table above.*

Response: The table on the following page lists detected volatile organic compounds (VOCs) and metals that exceeded detection monitoring statistical limits in assessment monitoring wells during the First 2009 semi-annual groundwater monitoring event conducted in June 2009. Arsenic in MW-10 did not exceed its intrawell statistical limit during the June 2009 groundwater monitoring event; however, arsenic in MW-10 has been included due to prior statistical exceedences.

June 2009 Assessment Monitoring Parameters

Well	Constituent	June 2009 Result (μg/L)	GWPS (μg/L)
MW-1R	1,1-dichloroethane	11	4,900[1]
MW-9	cis-1,2-dichloroethene	7.0	70[2]
MW-10	cis-1,2-dichloroethene	71	70[2]
	arsenic	11	10[2]
MW-11	cis-1,2-dichloroethene	150	70[2]
	trichloroethene	14	5[2]
	arsenic	6.8	10[2]
MW-12	cis-1,2-dichloroethene	50	70[2]
MW-13R	barium	37	2,000[2]
MW-15A	vinyl chloride	2.1	2[2]

Notes: [1] - 30 TAC 350 Table 3 Groundwater Protection Standard (GWPS)
[2] - EPA Primary Maximum Contaminant Level (MCL)

Time series plots for each of the constituents in the above table have been included in Attachment 1 of this letter.

Comment 3: *Since when have the carbon dioxide concentration levels been measured in the approximate areas of MW-10, -11, -12?*

Response: Free carbon dioxide levels have been obtained on a semi-annual basis since the December 2004 groundwater sampling event.

Comment 4: *What do the carbon dioxide levels look like for the above mentioned monitor wells and how do they compare with the arsenic concentrations of the MW-10, -11, -12?*

Response: Time series plots for the above requested information are provided in Attachment 2. Carbon dioxide levels noticeably decreased in MW-10 and MW-11 following the activation of the LFG extraction system in July 2005. Arsenic concentrations have an overall direct correlation with carbon dioxide levels in MW-10 and MW-11. Arsenic in MW-10 has steadily decreased in conjunction with carbon dioxide levels. Due to the large decrease in carbon dioxide levels in MW-11 following the activation of the LFG extraction system, the scale is skewed enough to prevent an accurate comparison; therefore, an additional plot without the December 2004 carbon dioxide level is also provided in Attachment 3. The December 2008 and June 2009 arsenic detections in MW-11 do coincide with changes in carbon dioxide levels (i.e. a direct correlation is present). Arsenic concentrations and carbon dioxide levels exhibit similar trends in MW-12. However, spikes of arsenic and carbon dioxide have occurred one semi-annual event apart from one another.

Comment 5: *Please provide the location of or include a map describing the point of compliance wells, the active landfill gas collection and control system, and all temporary wells / piezometers.*

Response:	The requested map is provided as Figure 1. Current point of compliance (POC) monitoring wells includes each illustrated well, except MW-1R and the temporary monitoring wells. A revised, proposed point of compliance adhering to the 600 foot spacing requirements was submitted with the Permit Modification to revise the Groundwater Monitoring System and; subsequently, a June 22, 2009 notice of deficiency (NOD) response letter. The proposed POC map is provided as Figure 2. The proposed revisions to the POC and monitoring wells are being handled separately by responding to a different TCEQ NOD letter dated December 2, 2009.
Comment 6:	*What conclusions does the landfill have concerning the Selection of Remedy and overall remediation efforts in and around the point of compliance areas?*
Response:	Continued operation of the LFG extraction system should control LFG migration within the recently proposed point of compliance (see Figure 2). Vadose zone LFG and constituents of concern should be remediated via the LFG extraction system. The proposed remedy fulfills the regulatory requirements and goals of 30 TAC §330.413(b), which are protection of human health and the environment, the ability to obtain groundwater protection standards, and capability to provide source control.
Comment 7:	*What are the measurable Data Quality Objectives that will be used to assess the remediation efforts at the point of compliance?*
Response:	Semi-annual monitoring of VOCs and arsenic in proposed groundwater monitoring wells listed in the Permit Modification to revise the Groundwater Monitoring System will continue to assess the remediation efforts within the point of compliance. VOCs and arsenic will also be collected from temporary monitoring wells MW-10A, MW-10B, MW-12A, MW-12B, B-2, and B-3 on an annual basis to assess the remediation efforts. Activities associated with the Pilot Study (temporary gas probes and enhanced bioremediation) discussed in the Assessment of Corrective Measures will also be utilized in the assessment.
Comment 8:	*How will the design and re-designing of the remediatory efforts be modified in the future?*
Response:	If needed, potential future changes to the remedial system may include, but not be limited to, the installation of additional LFG extraction wells, more frequent enhanced bioremediation treatments (depending on the results of the pilot study), and/or a risk based evaluation and implementation approach.
Comment 9:	*Please provide complete annotations (Statistical Analysis and Nature and Extent Table) for the December 2006 through December 2008 data file used to produce the table submitted in the Statistical Analysis Report. This table is located under the Sanitas "Options" icon.*
Response:	The requested information is provided as Attachment 3.

Comment 10: *Please provide a new version of the Table located on page 6 of the Statistical Analysis and Nature and Extent Section that includes all of the data (from background to current) for this site.*

Response: The 95 percent confidence interval analyses are conducted in accordance with practices, the statistical analysis plan, and specifically with TCEQ instruction provided in a November 30, 1998 correspondence and as reiterated in a September 16, 2003 correspondence. The November 30, 1998 and September 16, 2003 letters are provided in Attachment 4. The specific TCEQ comments relevant to the statistical analyses are Comment 3.d.i. of the November 30, 1998 letter and Comment 3 of the September 16, 2003 letter. The information specifies that 95 percent confidence analyses will be conducted utilizing data extending back approximately two years from the most recent event as older data are less likely to reflect current conditions than more recent data. The requested methodology is consistent with EPA guidance and published literature.

It is noted that assessment wells are initially screened using detection monitoring statistical methods. Detection monitoring statistical comparisons evaluates the potential of returning an assessment well to detection monitoring and the necessity of additional statistical analyses utilizing the confidence intervals. The detection monitoring statistical evaluation of assessment wells utilizes all of the appropriate data by comparing the current result or series of results to the background. There is no omission of older data. The detection monitoring statistical evaluation looks for statistically significant changes over background. The confidence interval analyses is utilized to determine if a specific constituent occurs at a statistically significant level greater than a set groundwater protection standard in accordance with 30 TAC 330.409(g) or occurs at a statistically significant level less than a GWPS if corrective actions have been implemented in accordance with 30 TAC 330.415. The confidence interval analysis methodology is recommended in EPA guidance documents (e.g. March 2009 Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities—Unified Guidance) and literature (e.g. Gibbons and Coleman, 2001[1] among others). Trend evaluations are an important evaluation tool but are evaluated separately (e.g. Sen's Slope/Mann Kendall Trend Analysis) as necessary. The confidence interval analyses are, by design, set at a specific confidence level (95 percent in this case).

Guidance and literature (e.g. Section 21.3.1 EPA Unified Guidance, NIC Applied Groundwater Statistics Short Course) recommend moving windows of recent data, particularly in the presence of potential trends and/or data "jumps". Long term trends result in wider intervals that do not provide accurate depiction of current conditions. Jumps or changes in data after a long period of relative stability will skew the lower or upper confidence limit

---

[1] Gibbons, Robert D. and Coleman, Davis E. 2001. Statistical Methods for Detection and Quantification of Environmental Contamination. John Wiley & Sons. New York. p. 384.

depending on where the data lie relative to the overall mean. This is clearly illustrated on the comparison of 95 percent confidence interval evaluation results utilizing all the historic data versus the recent data provided on the Confidence Interval Analysis Comparison table. The table below includes the 95% Lower Confidence Limit (LCL) and 95% Upper Confidence Limit (UCL) calculated utilizing all data as requested in the above TCEQ comment. The Sanitas summary table is provided as Attachment 5 along with two selected confidence interval plots providing comparison between analyses conducted utilizing the previous two-year timeframe and all prior data. Review of trichloroethene at MW-11, as an example, utilizing the recent data timeframe produces a LCL of 18 μg/L and UCL of 22 μg/L. The LCL utilizing all data is 1.0 μg/L and the UCL is 16 μg/L. The LCL and UCL are biased low because of five years of non-detections prior to the initial trichloroethene occurrence included in the data set utilized to construct the confidence interval. The result is not representative of current conditions and provides poor information to aid decision needs.

Confidence Interval Analysis Comparison

Well	Constituent	1st 2008 (μg/L)	2nd 2008 (μg/L)	LCL (μg/L)	LCL[3] (μg/L)	UCL (μg/L)	UCL[3] (μg/L)	GWPS (μg/L)
MW-10	cis-1,2-dichloroethene	56	71	40	44	70	63	70[2]
	arsenic	<10	14	13	6.0	25	23	10[2]
MW-11	1,1-dichloroethane	5.0	<5	2.0	5.0	7.2	9.0	4,900[1]
	cis-1,2-dichloroethene	110	110	96	1.0	110	67	70[2]
	trichloroethene	22	16	18	1.0	22	16	5[2]
MW-12	1,1-dichloroethane	9.1	9	7.7	9.1	9.6	25	4,900[1]
	cis-1,2-dichloroethene	100	120	90	3.0	110	77	70[2]
	trichloroethene	7.6	5.8	2.5	1.0	7.9	2.5	5[2]
	vinyl chloride	2.8	3	1.0	1.0	3.0	2.1	2[2]

Notes: [1] - 30 TAC 350 Table 3 Groundwater Protection Standard (GWPS)
[2] - EPA Primary Maximum Contaminant Level (MCL)
3 – LCL and UCL based on all data

As stated in the 2009 EPA Unified Guidance when the population mean increases or decreases (as data tends to do when impacts occur or remediation is implemented) the confidence interval similarly increases or decreases to reflect the change. In practice, confidence intervals are recommended to be constructed for a few or several of the most recent sampling events.

Confidence interval analyses have been conducted for assessment monitoring wells as instructed by the TCEQ in prior correspondences dated November 30, 1998, and September 16, 2003, and in accordance with groundwater statistical analysis guidance documents and literature. Considering the data distribution of the constituents of interest in assessment monitoring wells, the utilization of a moving window of recent measurements is consistent with the TCEQ instructions, EPA guidance, other literature, and standard practice.

Comment 11: *Provide sufficient discussion describing the differences between the two Statistical Analysis tables, describing how the control limits vary between the two different tables in respect to the GWPSs.*

Response: Where data has remained relatively stable within a consistent range, the upper and lower confidence limits are similar between analyses conducted utilizing recent data versus all historic data as is apparent for cis-1,2-dichloroethene in MW-10. However, if a significant increase or decrease in concentration or concentration trend occurs it would not be apparent in the confidence interval analysis utilizing all historic data except by a widening of the interval itself. This is apparent for MW-11. The widening of the intervals for cis 1,2-dichloroethene and trichloroethene in MW-11 produces a biased low LCL and does not exceed its GWPS; whereas, the LCLs calculated from the last two years of monitoring do exceed their respective GWPS.

We trust this information meets your needs, please call Mr. Mark Meadows at (972) 434-2015 or us at (817) 337-0112 if you have any questions.

Sincerely,

THE CAREL CORPORATION

Steven Wim

Steven J. Wimmer
Remedial and Environmental Services Manager

KEVIN T. CAREL
GEOLOGY
#960
LICENSED

Kevin T. Carel, P.G.
President

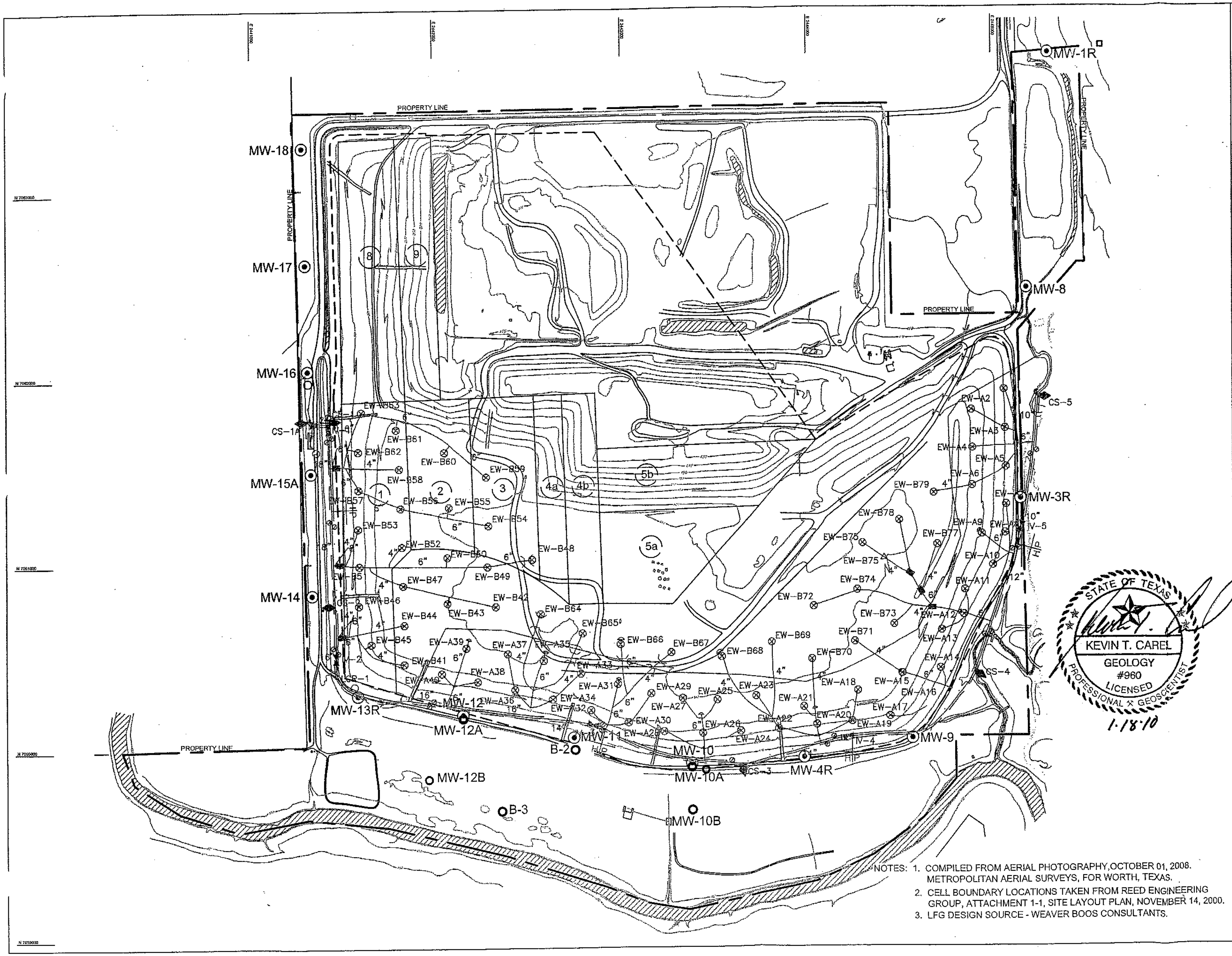
1-18-10

Figure 1: Existing Site Map with Well Locations
Figure 2: Site Map with Proposed Well Locations and POC

Attachment 1: Time Series Plots - Assessment Monitoring Parameters
Attachment 2: Time Series Plots - Arsenic and Free Carbon Dioxide
Attachment 3: Summary Table – 95 Percent Confidence Interval Analysis
Attachment 4: November 30, 1998 and September 16, 2003 TCEQ Letters
Attachment 5: Summary Table and Plots

cc: TCEQ Region 4 Office
Mark Meadows – Camelot Landfill TX, LP
Mark Allendorf – Republic Services, Inc. (e-copy)
Larry Bressman – Camelot Landfill
Shane Davis – City of Farmer's Branch

FIGURES



KEVIN T. CAREL
GEOLOGY
#960
1.18.10

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

— — —	PROPERTY LINE
—360—	EXISTING SURFACE CONTOUR
◉	GROUNDWATER MONITOR WELL
●	TEMPORARY MONITOR WELL
⊗	LANDFILL GAS EXTRACTION WELL
– – – –	LIMITS OF WASTE
——	CELL BOUNDARY
①	CONSTRUCTED CELL
━━	GROUNDWATER CONTOUR
▨	SURFACE WATER BODIES

N

SCALE:

0 250 500
FEET

SITE MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

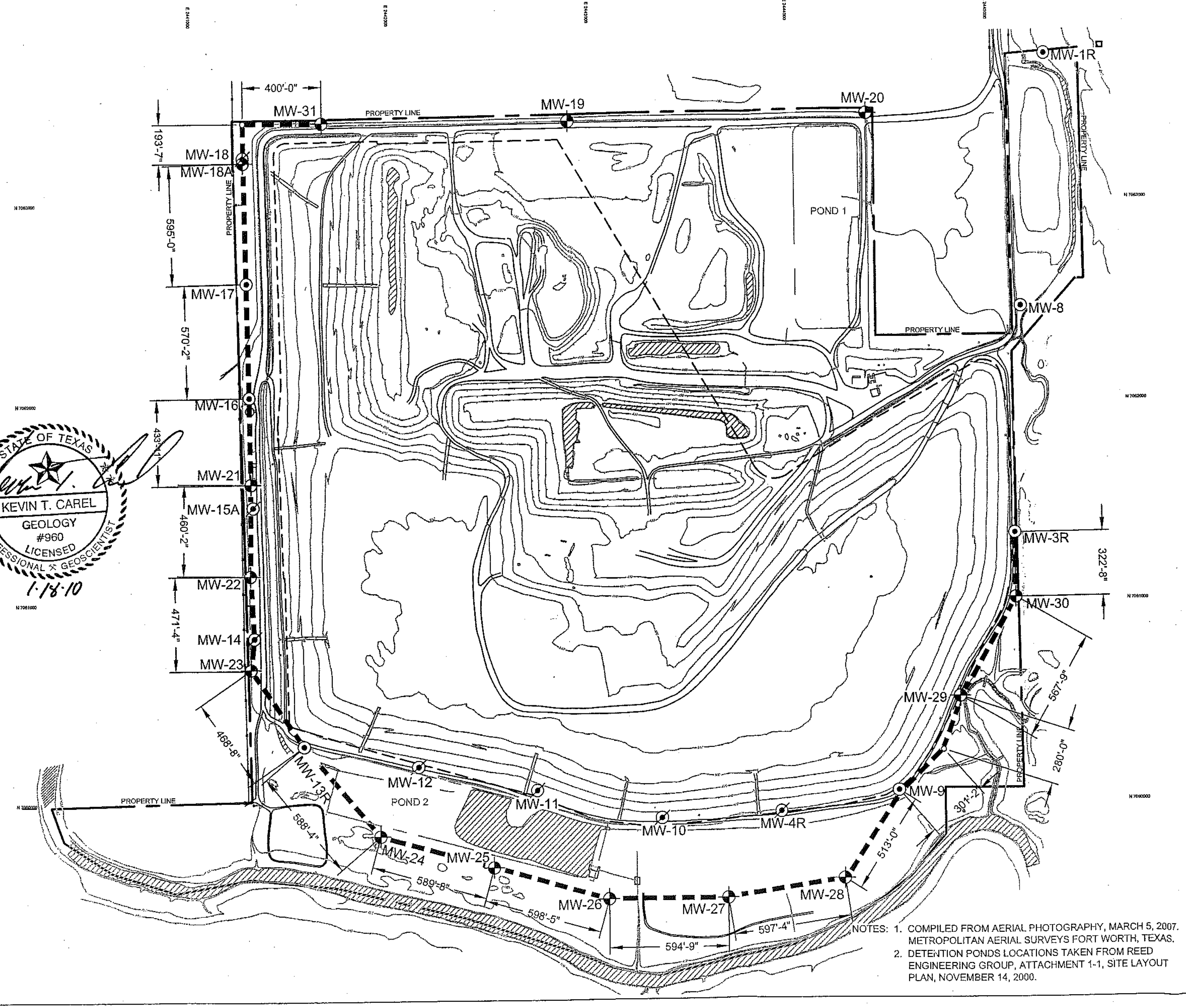
DATE DRAFTED: December 23, 2009 REV. NO.: 1

FILENAME: Y:\TX\Camelot\2008 LFG Extraction System\Camelot Gas System.dwg

DESIGNED BY:
DRAWN BY: TDW
CHECKED BY: KTC
APPROVED BY: KTC

FIGURE:
1

NOTES:
1. COMPILED FROM AERIAL PHOTOGRAPHY, OCTOBER 01, 2008. METROPOLITAN AERIAL SURVEYS, FOR WORTH, TEXAS.
2. CELL BOUNDARY LOCATIONS TAKEN FROM REED ENGINEERING GROUP, ATTACHMENT 1-1, SITE LAYOUT PLAN, NOVEMBER 14, 2000.
3. LFG DESIGN SOURCE - WEAVER BOOS CONSULTANTS.



STATE OF TEXAS
KEVIN T. CAREL
GEOLOGY
#960
LICENSED
PROFESSIONAL GEOSCIENTIST

1-18-10

NOTES:
1. COMPILED FROM AERIAL PHOTOGRAPHY, MARCH 5, 2007. METROPOLITAN AERIAL SURVEYS FORT WORTH, TEXAS.
2. DETENTION PONDS LOCATIONS TAKEN FROM REED ENGINEERING GROUP, ATTACHMENT 1-1, SITE LAYOUT PLAN, NOVEMBER 14, 2000.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

— — —	PROPERTY LINE
— 360 —	EXISTING SURFACE CONTOUR
⊙	EXISTING GROUNDWATER MONITOR WELL
⊘	PROPOSED DEOMMISSIONED GROUNDWATER MONITOR WELL
⊕	PROPOSED GROUNDWATER MONITOR WELL
■ ■ ■ ■	POINT OF COMPLIANCE
○	TURNING POINT
– – –	LIMITS OF WASTE
▨	SURFACE WATER BODIES
▭	DETENTION POND

N

SCALE:

0 250 500 FEET

GROUNDWATER MONITORING SYSTEM PLAN

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

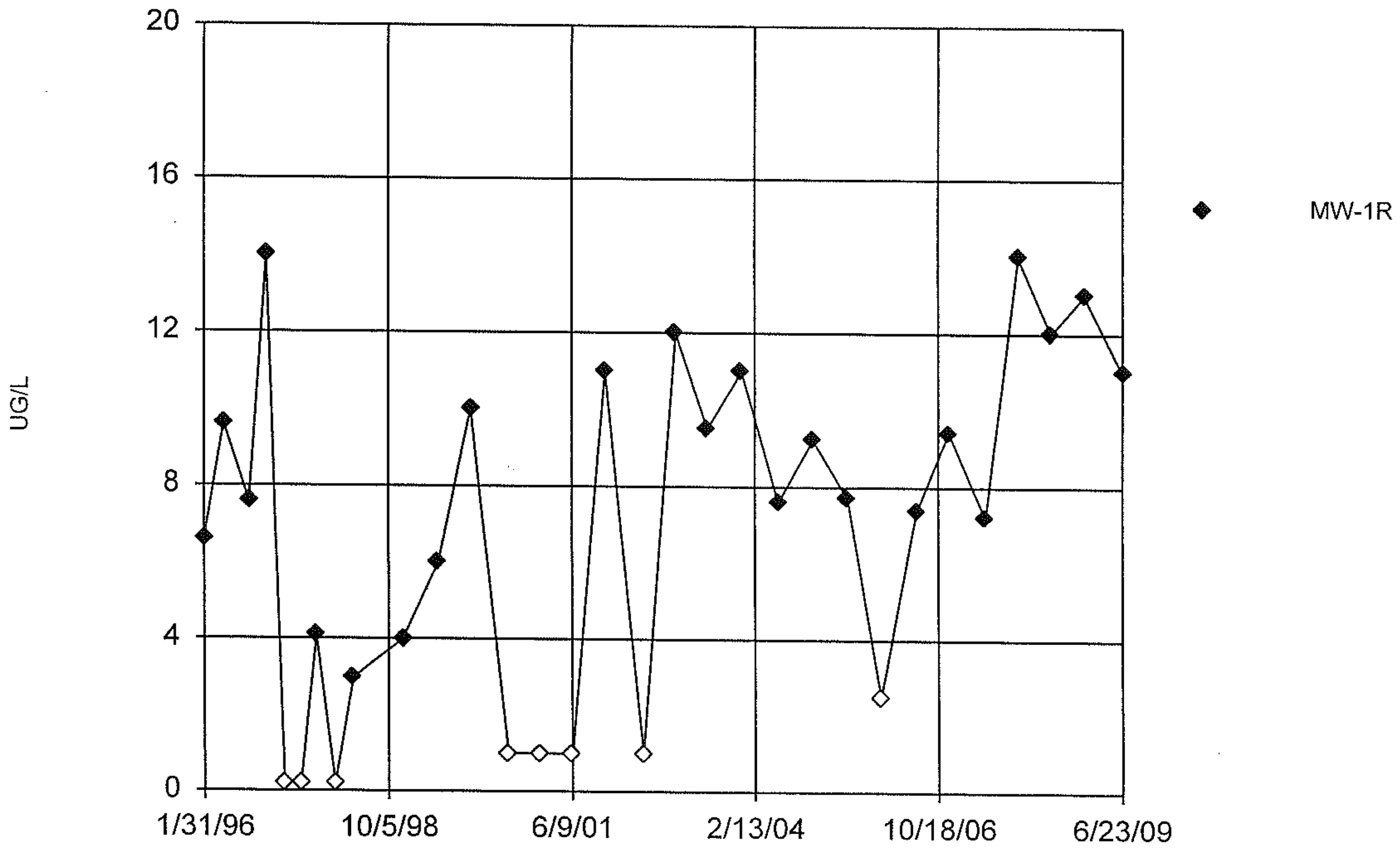
DATE DRAFTED: June 11, 2009	REV. NO.: 1
FILENAME: R:\Texas\Camelot\2006\ACM\ACM2\Fig 2.dwg	
DESIGNED BY: JFZ	FIGURE
DRAWN BY: TDW	2
CHECKED BY: SJW	
APPROVED BY: KTC	IIIH-H-65

ATTACHMENT 1

TIME SERIES PLOTS – ASSESSMENT MONITORING PARAMETERS

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

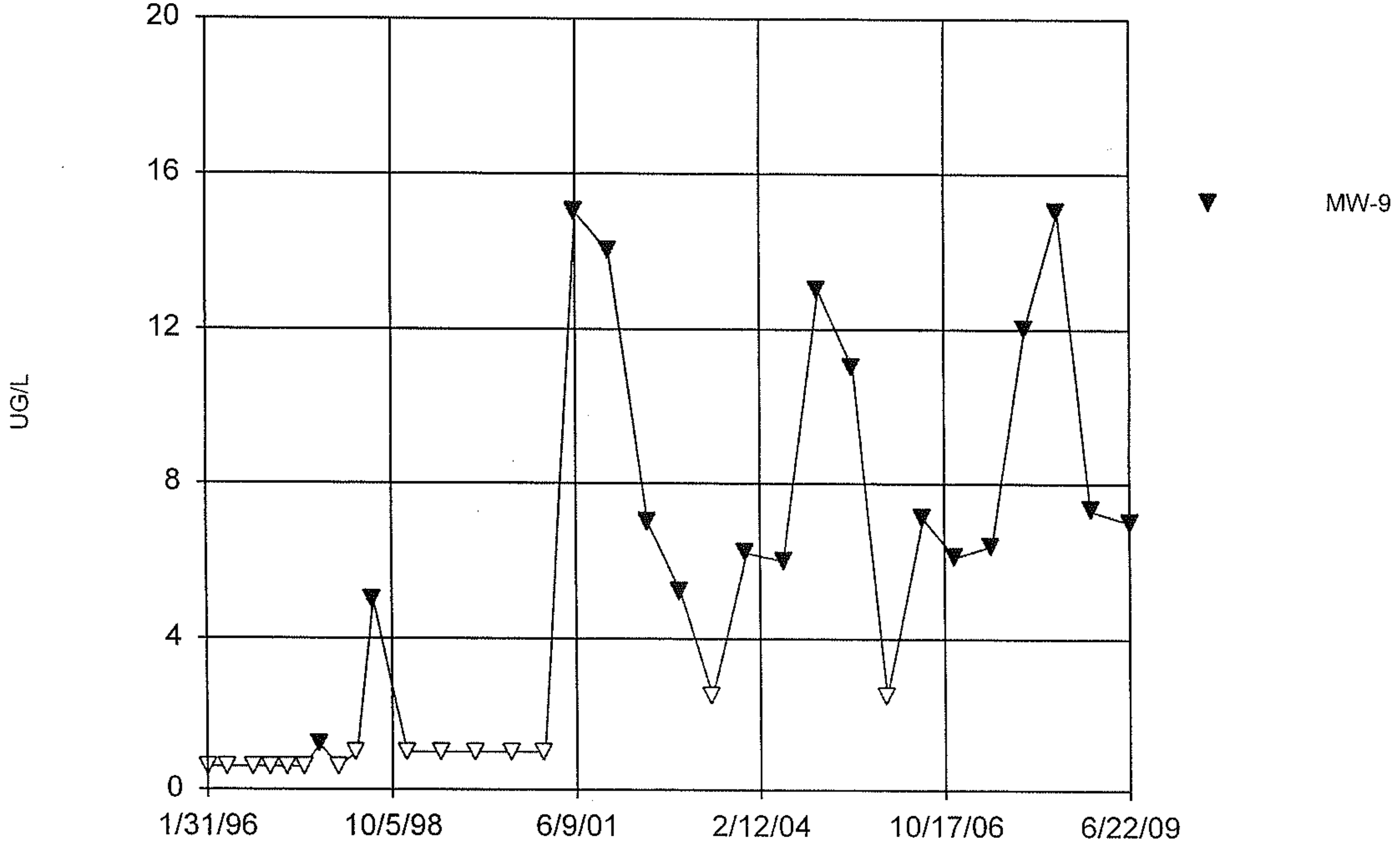
Time Series



Constituent: 1,1-Dichloroethane   Analysis Run 12/23/2009 9:28 AM
Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

Time Series

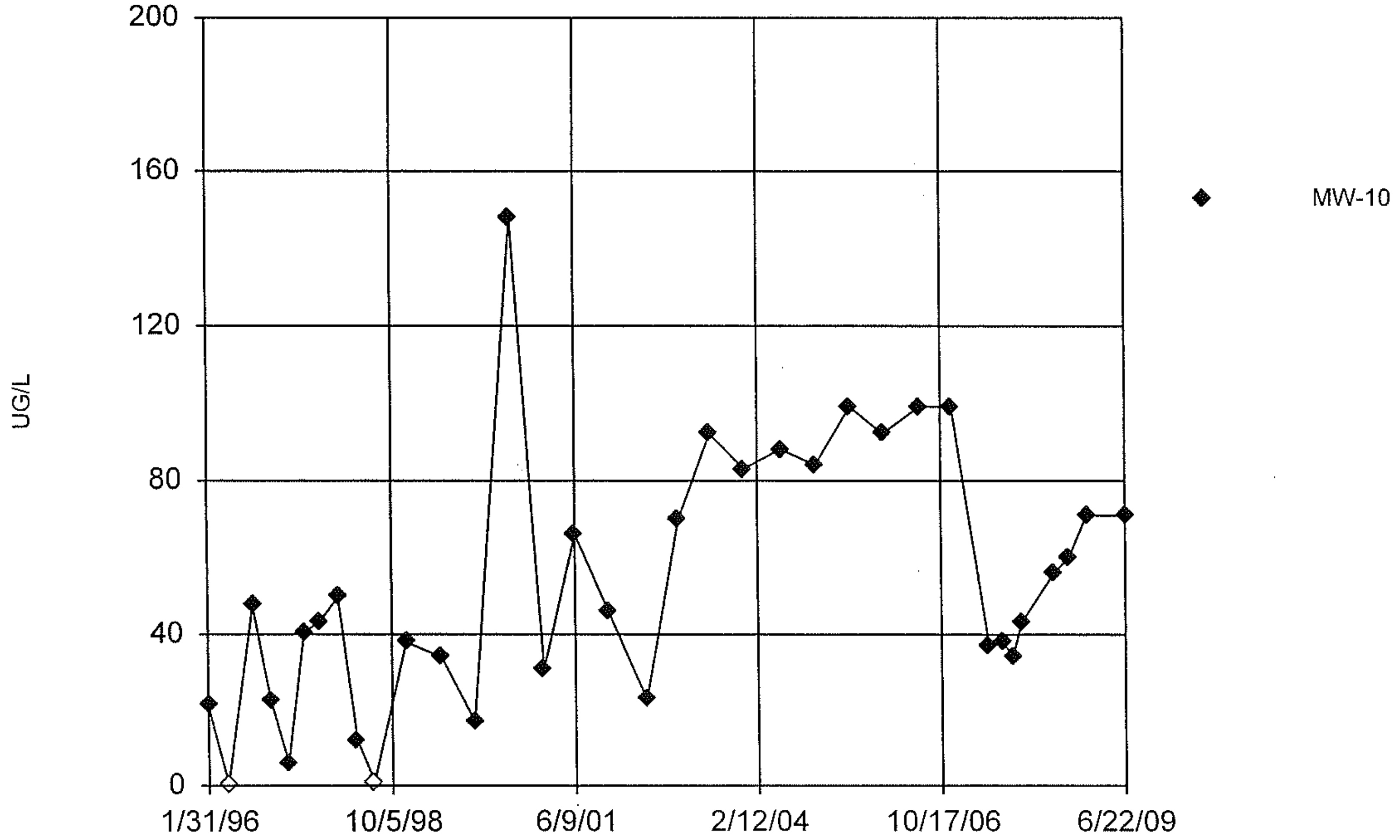


Constituent: cis-1,2-Dichloroethylene Analysis Run 12/23/2009 9:29 AM

Facility: Camelot LF Client: RSI Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

Time Series

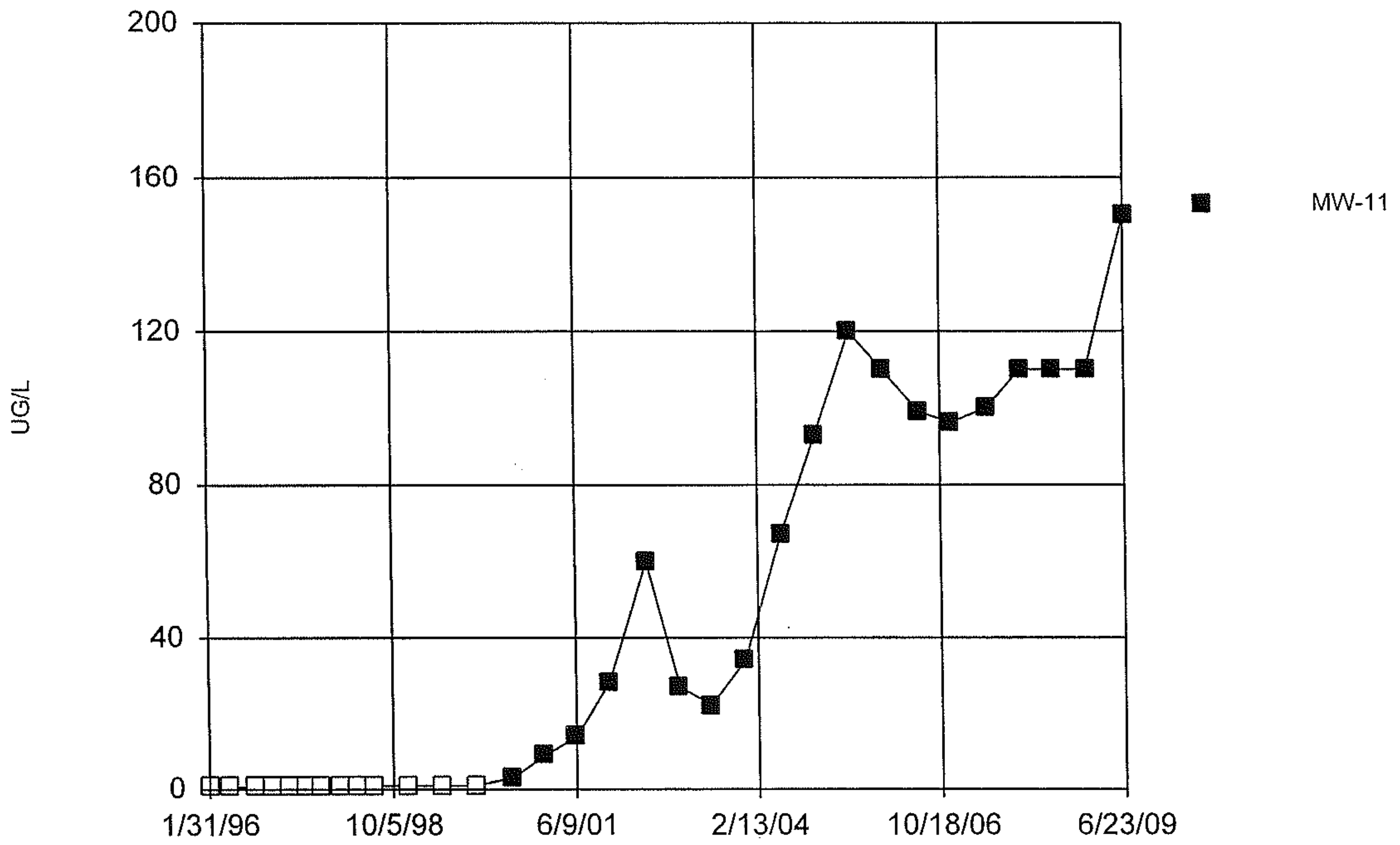


Constituent: cis-1,2-Dichloroethylene   Analysis Run 12/23/2009 9:29 AM

Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

Time Series

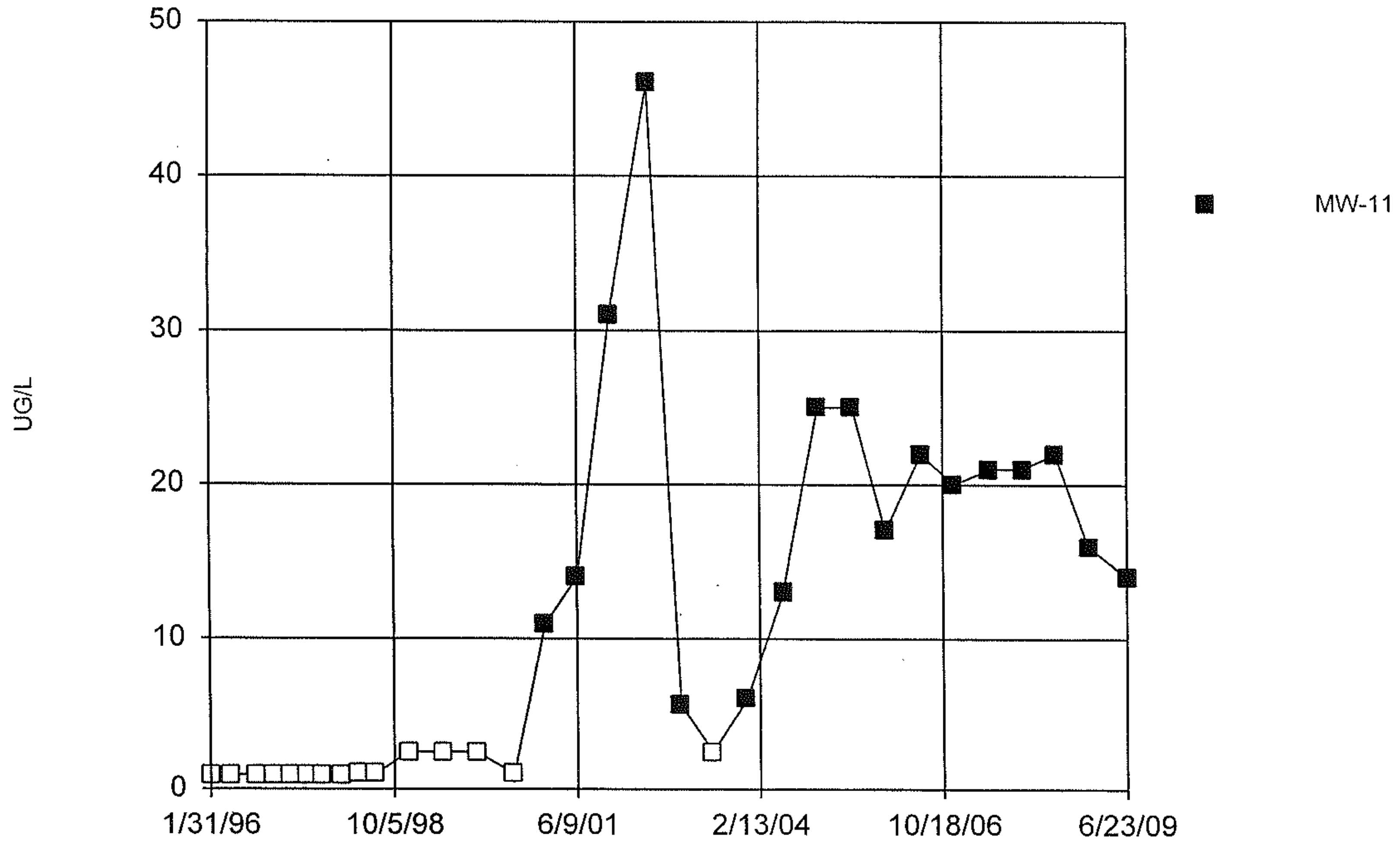


Constituent: cis-1,2-Dichloroethylene   Analysis Run 12/23/2009 9:30 AM

Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

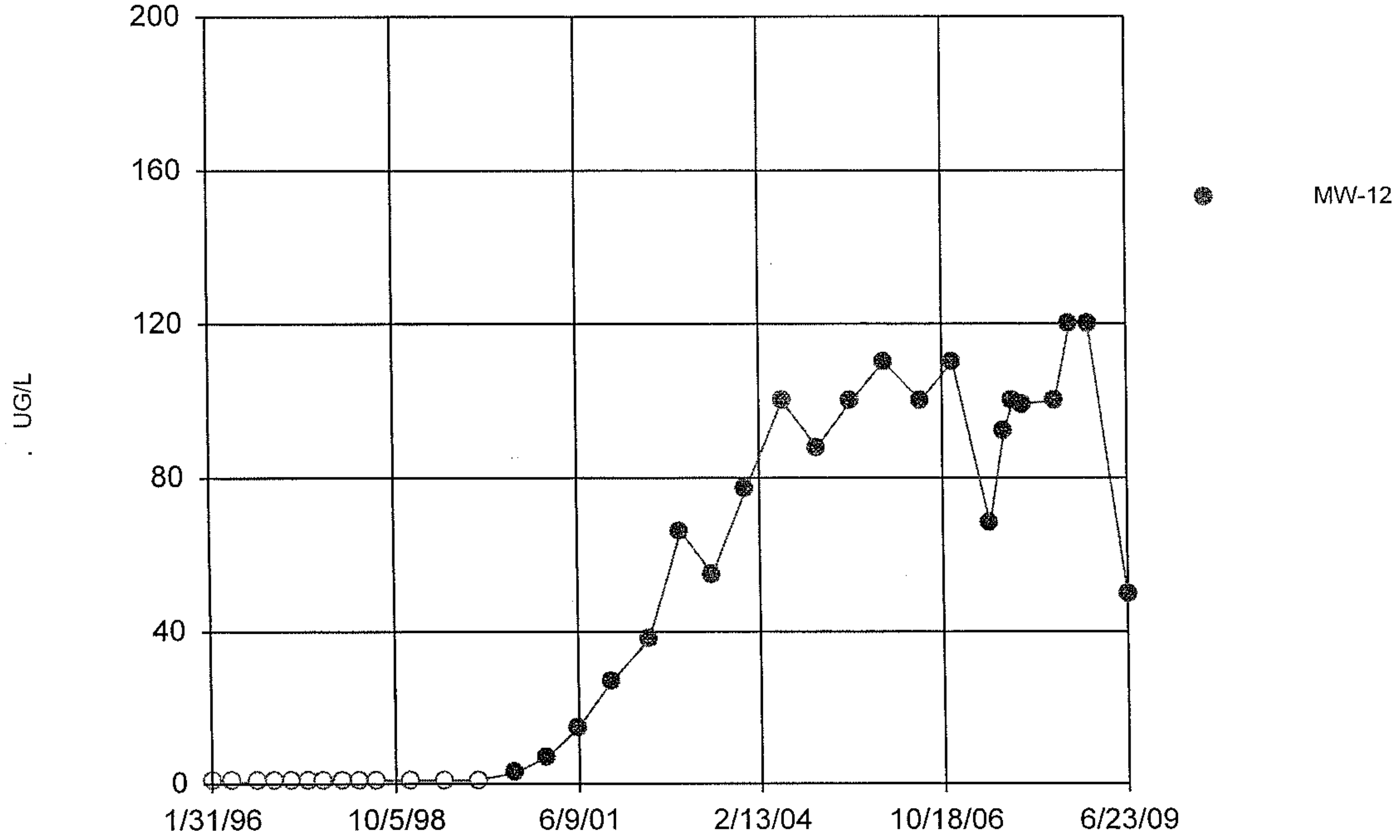
Time Series



Constituent: Trichloroethylene Analysis Run 12/23/2009 9:31 AM
Facility: Camelot LF Client: RSI Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

Time Series

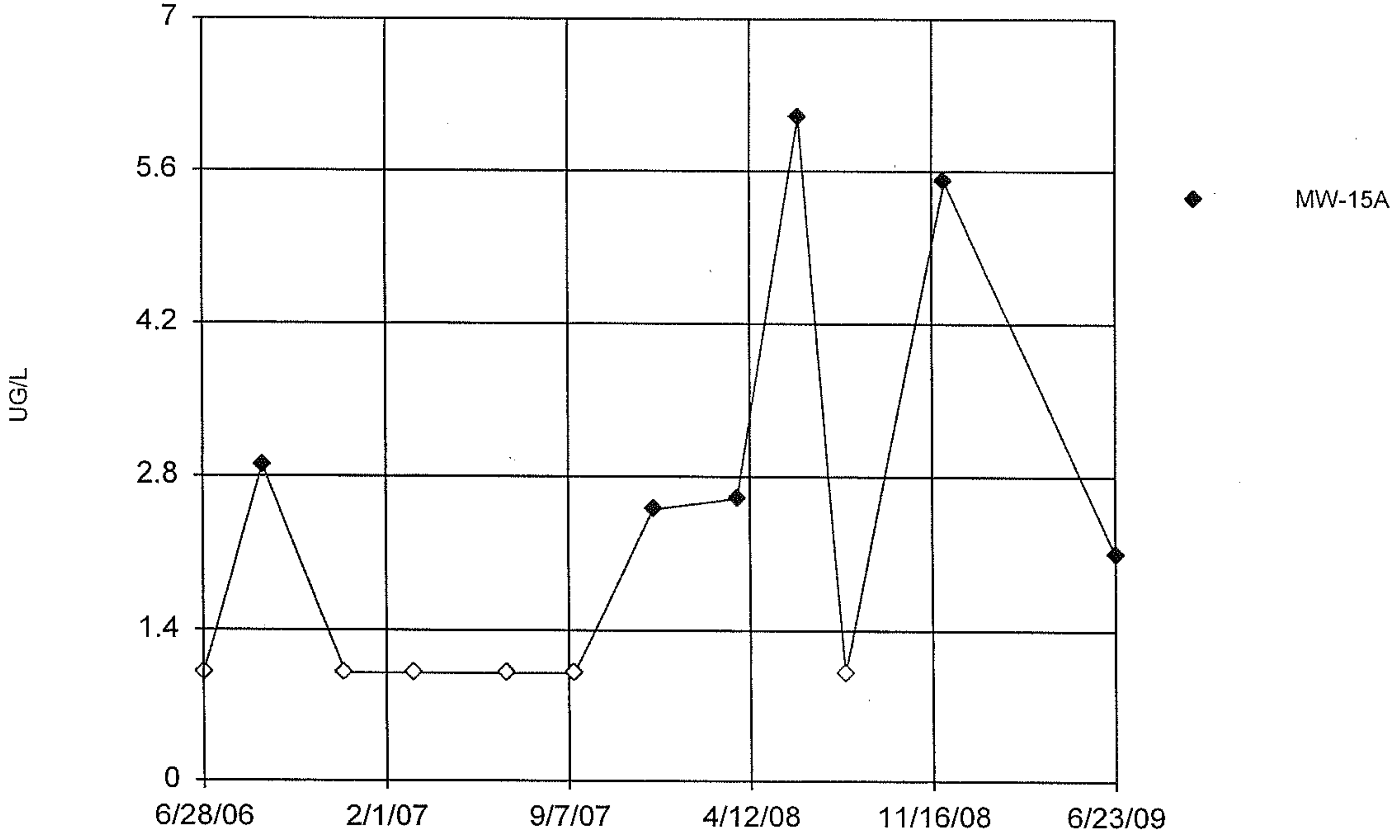


Constituent: cis-1,2-Dichloroethylene   Analysis Run 12/23/2009 9:35 AM

Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

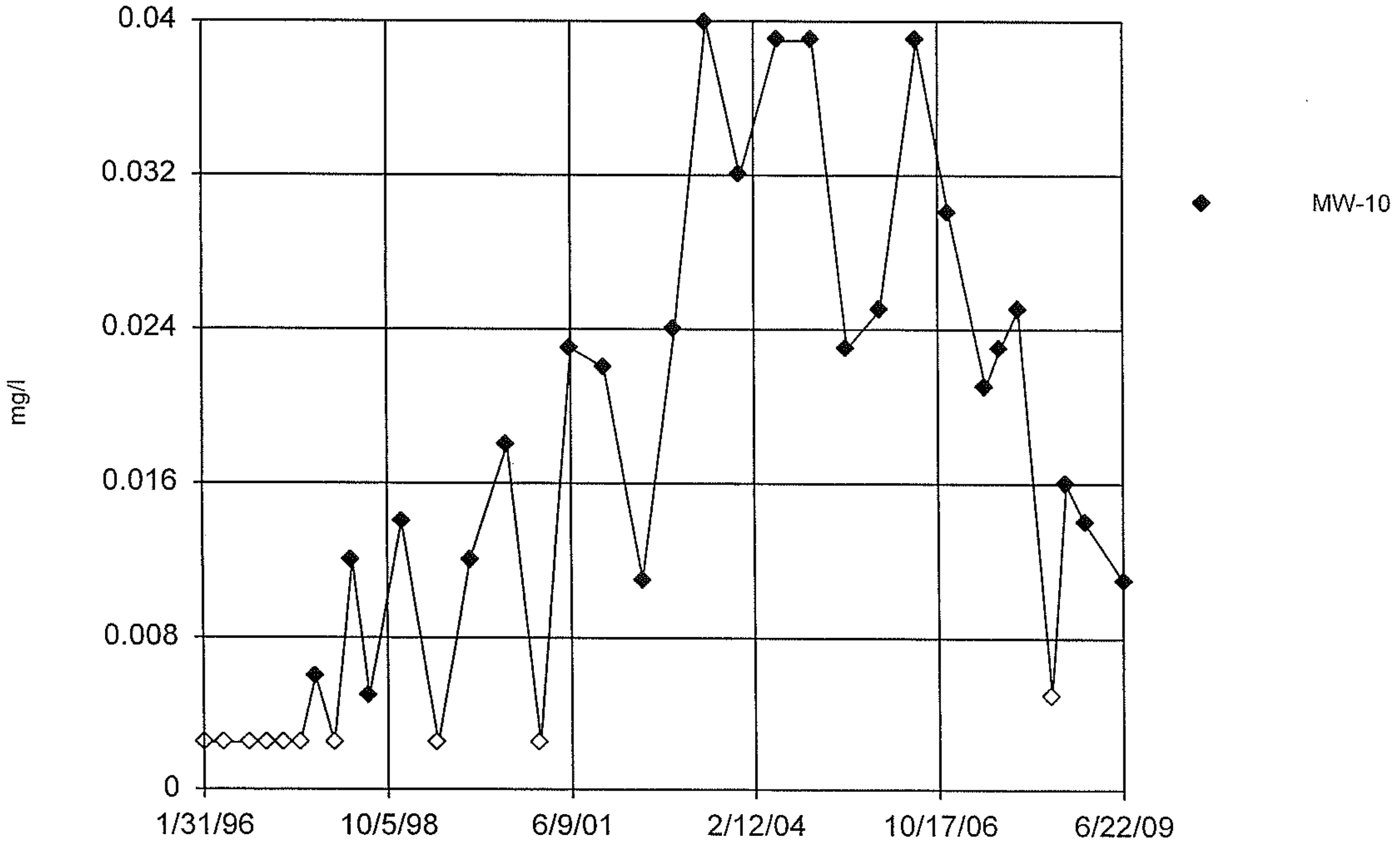
Time Series



Constituent: Vinyl chloride   Analysis Run 12/23/2009 9:32 AM
Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

Time Series

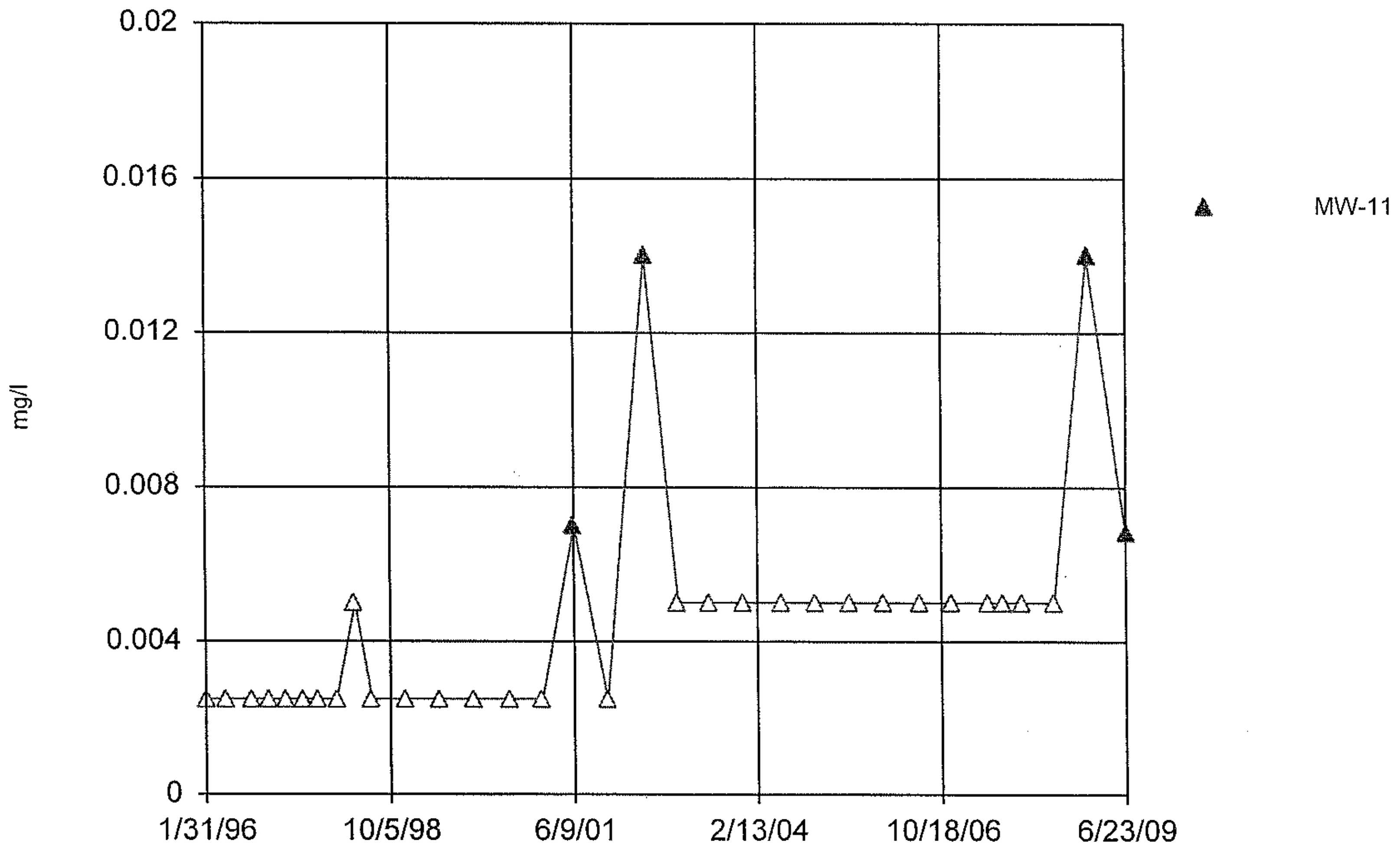


Constituent: Arsenic, Total Analysis Run 12/23/2009 9:46 AM

Facility: Camelot LF Client: RSI Data File: CAMDBASEinorg

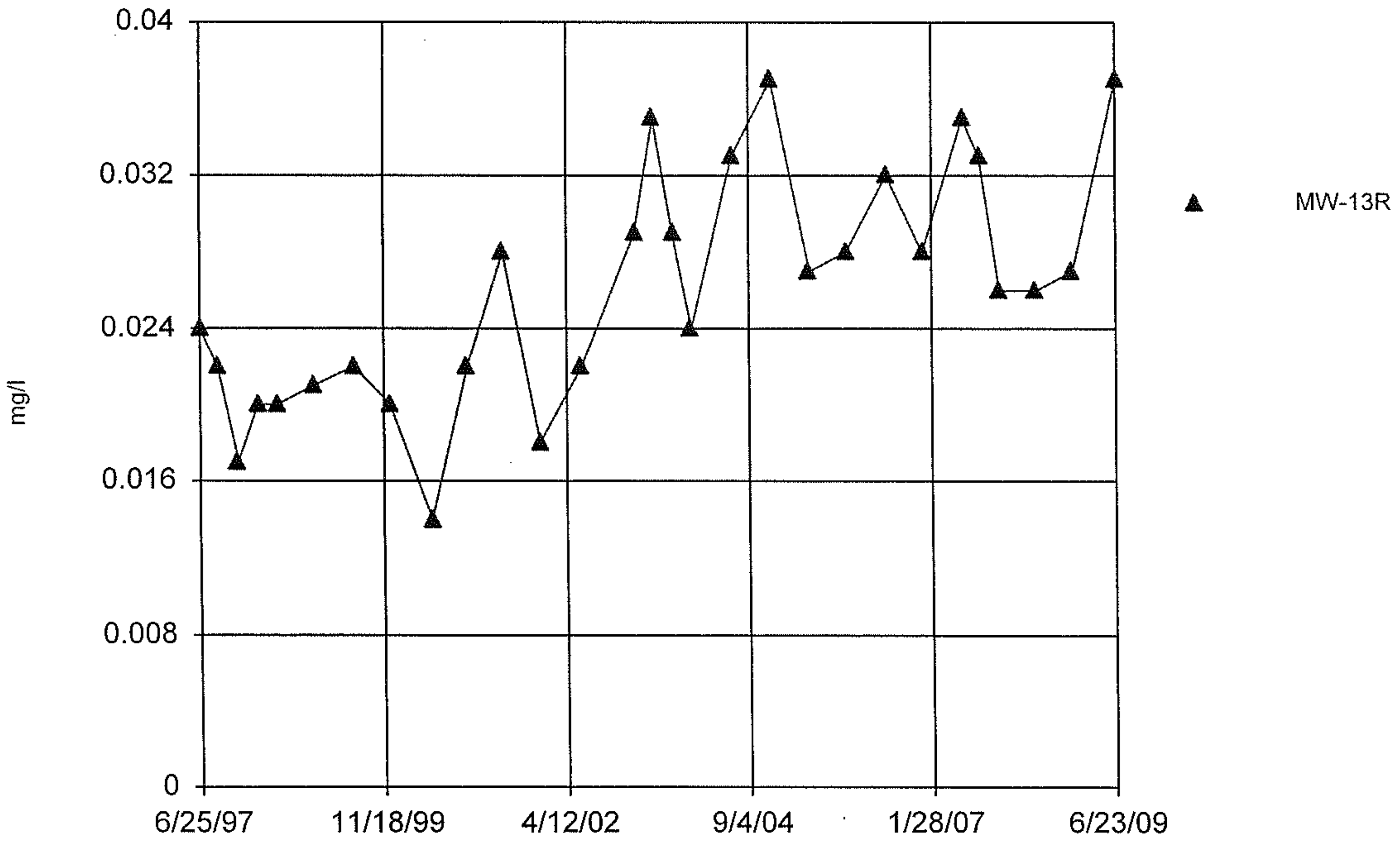
v.9.0.30 For the statistical analyses of ground water by The Carel Corporation only. EPA
Hollow symbols indicate censored values.

Time Series



Constituent: Arsenic, Total   Analysis Run 12/23/2009 9:46 AM
Facility: Camelot LF   Client: RSI   Data File: CAMDBASEinorg

Time Series



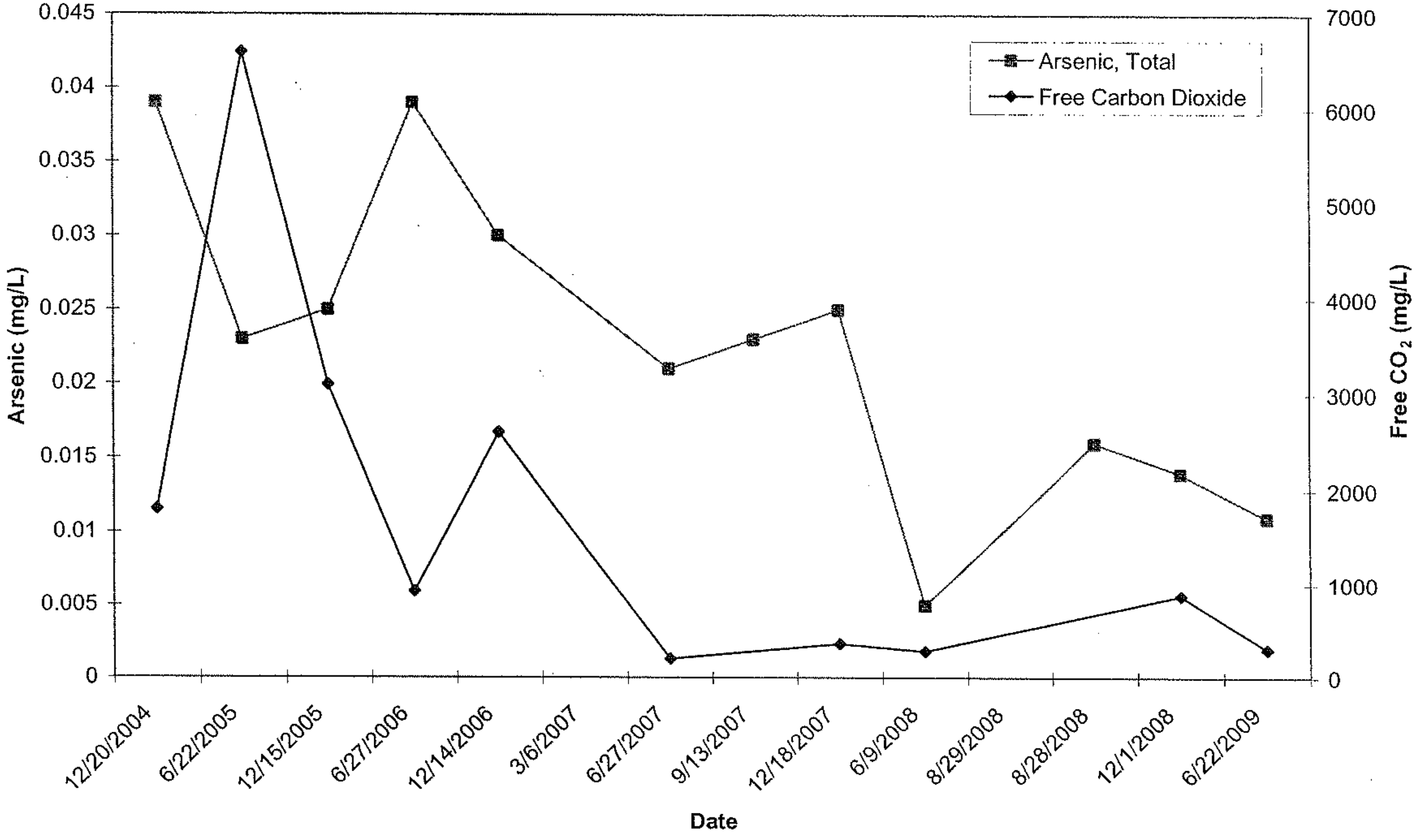
Constituent: Barium, Total   Analysis Run 12/23/2009 9:47 AM

Facility: Camelot LF   Client: RSI   Data File: CAMDBASEinorg

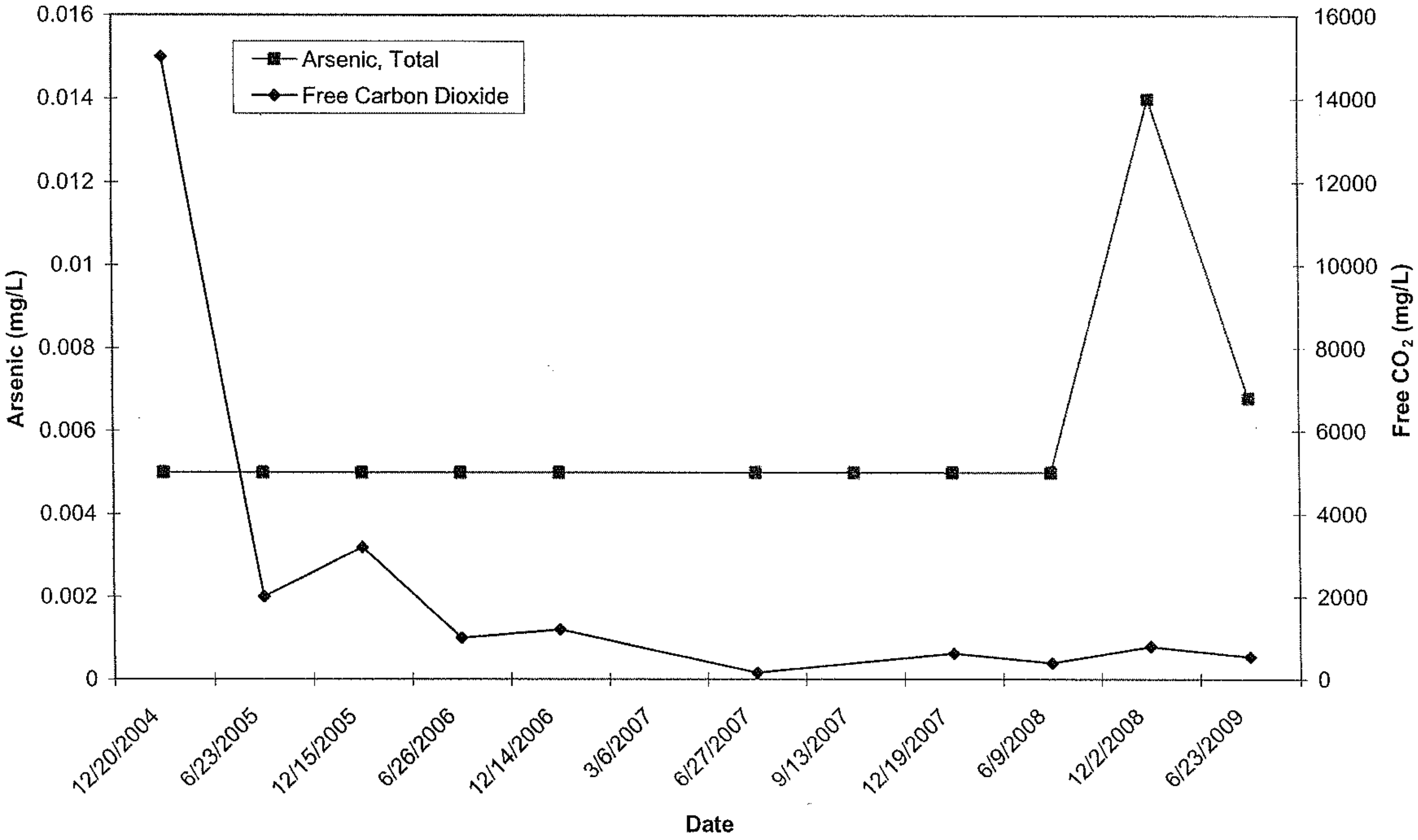
ATTACHMENT 2

TIME SERIES PLOTS - ARSENIC AND FREE CARBON DIOXIDE

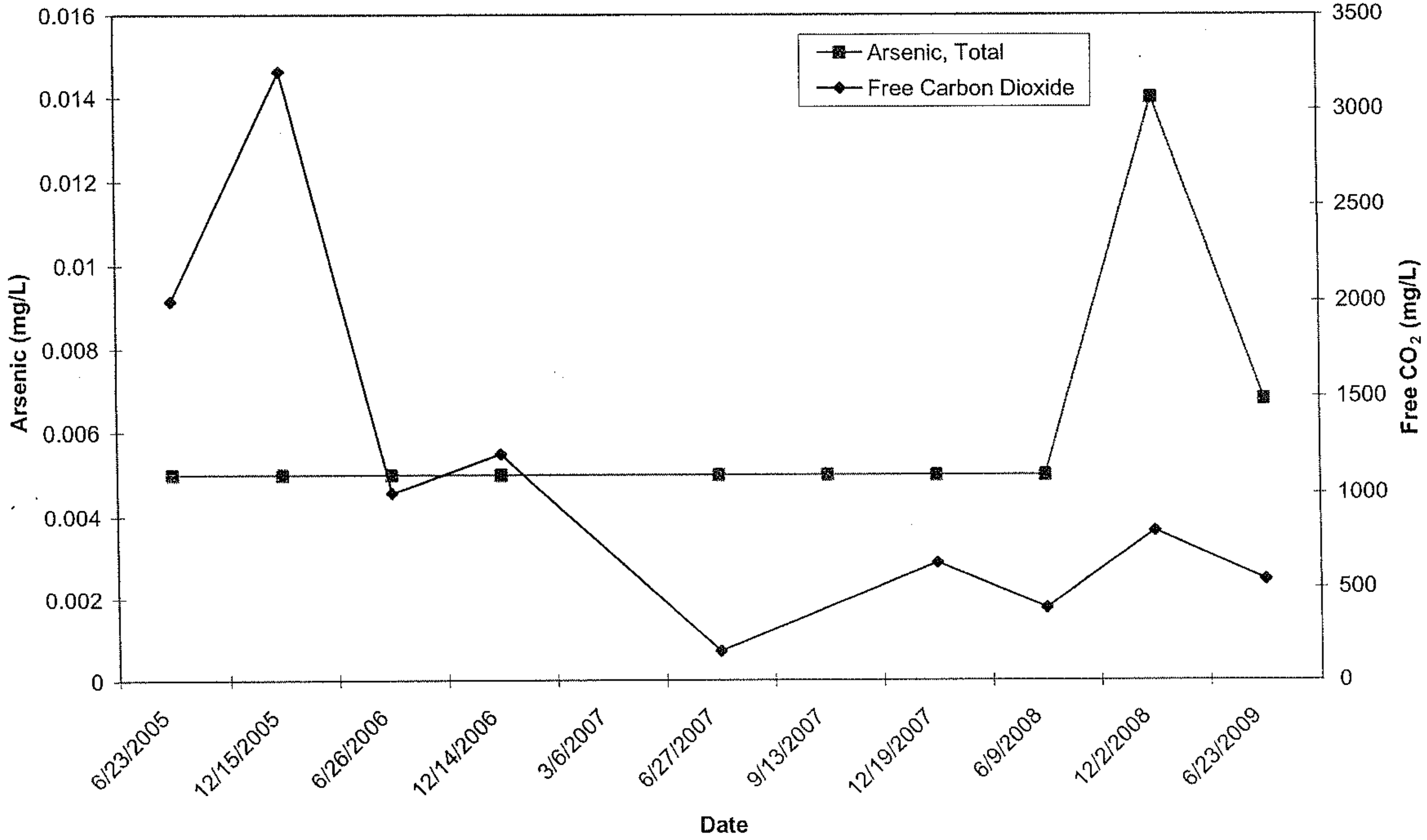
Camelot Landfill
Arsenic and Free CO_2 Vs. Time - MW-10



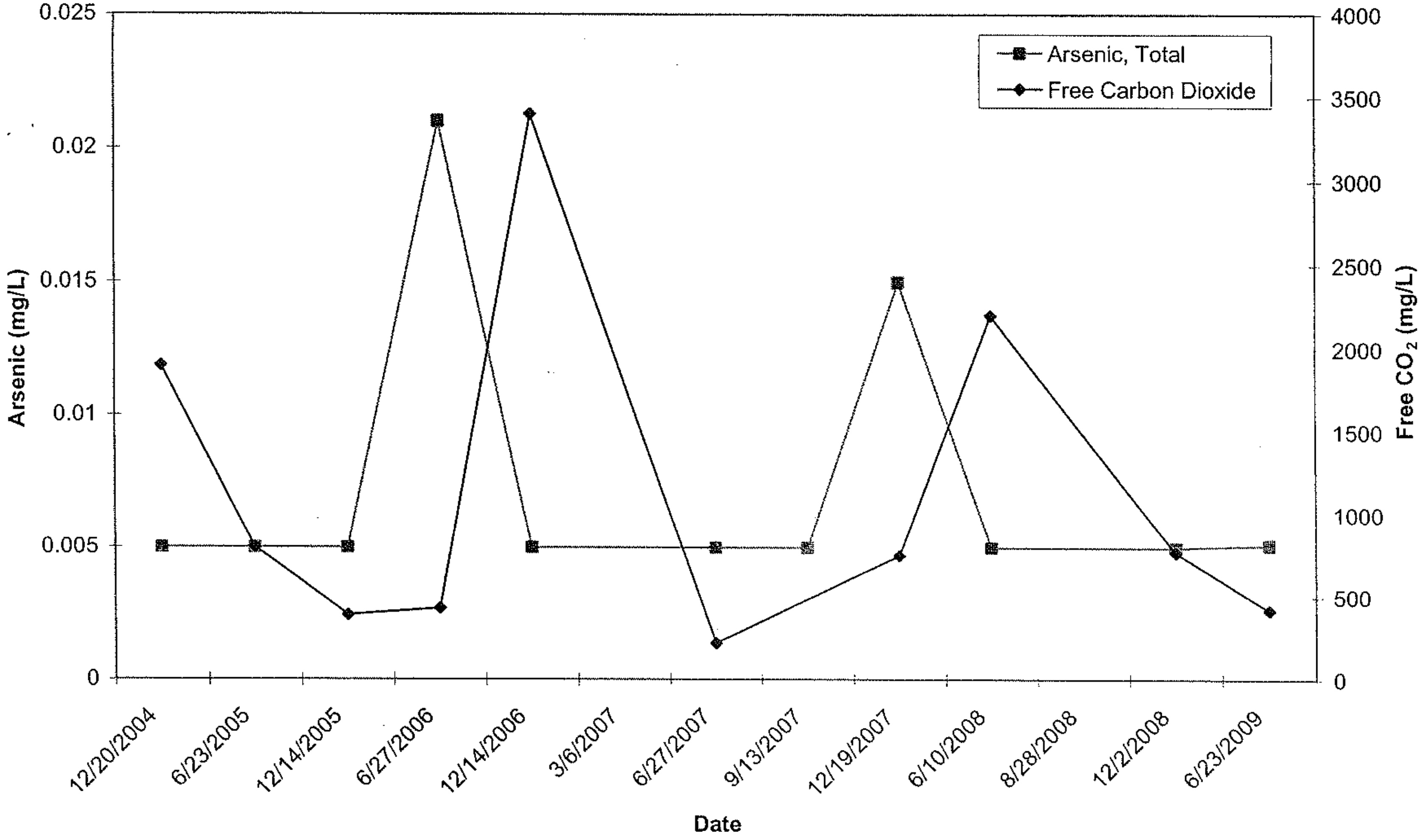
Camelot Landfill
Arsenic and Free CO_2 Vs. Time - MW-11



Camelot Landfill
Arsenic and Free CO_2 Vs. Time - MW-11



Camelot Landfill
Arsenic and Free CO_2 Vs. Time - MW-12



ATTACHMENT 3

SUMMARY TABLE – 95 PERCENT CONFIDENCE INTERVAL ANALYSIS

Confidence Interval Summary

Date: 11/22/09, 8:25 PM   Facility: Camelot LF

Data File: CAMDBA~2 Client: AWI

Constituent Name	Well	Upper Limit	Lower Limit	Compliance Limit	Exceeds	N	Mean	Standard Deviation	% Non-Detects	Adjustment for NDs	Transformation	Alpha	Method
1,1-Dichloroethane (UG/L)	MW-1R	14	8.5	2400	No	5	11.12	2.781	0	No	non-	0.05	Parametric
cis-1,2-Dichloroethylene (	MW-4R	6.8	2.5	70	No	5	n/a	n/a	80	No	n/a	0.031	NP (nds)
cis-1,2-Dichloroethylene (	MW-9	13	5.6	70	No	5	9.38	3.95	0	No	non-	0.05	Parametric
cis-1,2-Dichloroethylene (	MW-10	70	40	70	No	8	54.75	22.09	0	No	non-	0.05	Parametric
cis-1,2-Dichloroethylene (	MW-11	110	96	70	Yes	5	n/a	n/a	0	No	n/a	0.031	NP (normality)
1,1-Dichloroethane (UG/L)	MW-11	7.2	2	2400	No	5	4.64	2.725	20	Aitchison's	non-	0.05	Parametric
Trichloroethylene (UG/L)	MW-11	22	18	5	Yes	5	20	2.345	0	No	non-	0.05	Parametric
Trichloroethylene (UG/L)	MW-12	7.9	2.5	5	No	8	n/a	n/a	50	No	n/a	0.004	NP (normality)
1,1-Dichloroethane (UG/L)	MW-12	9.6	7.7	2400	No	8	8.663	1.43	0	No	non-	0.05	Parametric
cis-1,2-Dichloroethylene (	MW-12	110	80	70	Yes	8	101.1	16.81	0	No	non-	0.05	Parametric
Vinyl chloride (UG/L)	MW-12	3	1	2	No	8	n/a	n/a	62.5	No	n/a	0.004	NP (nds)
Acetone (UG/L)	MW-13R	13	5	22000	No	5	n/a	n/a	80	No	n/a	0.031	NP (nds)
Vinyl chloride (UG/L)	MW-15A	6.1	1	2	No	9	n/a	n/a	55.56	No	n/a	0.002	NP (nds)

v.8.5.09. For the statistical analyses of ground water by The Carel Corporation only.

Confidence Interval Summary

Date: 11/22/09, 8:32 PM Facility: Camelot LF

Data File: CAMDBA~1 Client: AWI

Constituent Name	Well	Upper Limit	Lower Limit	Compliance Limit	Exceeds	N	Mean	Standard Deviation	% Non-Detects	Adjustment for NDs	Transformation	Alpha	Method
Arsenic, Total (mg/l)	MW-10	0.025	0.013	0.01	Yes	7	0.019	0.008235	14.29	No	non-	0.05	Parametric
Arsenic, Total (mg/l)	MW-11	0.014	0.005	0.01	No	6	n/a	n/a	83.33	No	n/a	0.0155	NP (nds)
Barium, Total (mg/l)	MW-13R	0.032	0.026	2	No	6	0.029	0.003869	0	No	non-	0.05	Parametric

ATTACHMENT 4

NOVEMBER 30, 1998 AND SEPTEMBER 16, 2003 TCEQ LETTERS

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 30, 1998

The Honorable Dave Blair
Mayor of Farmers Branch
P.O. Box 819010
Farmers Branch, Texas 75381-9010

Re: Solid Waste – Denton County
City of Farmers Branch Camelot Landfill – MSW Permit No. 1312-A
Groundwater Monitoring Results / Statistical Evaluations

Dear Mayor Blair:

We have reviewed the responses to our letter dated May 26, 1998 (regarding the sixth-, seventh-, and eighth background groundwater monitoring events), as well as analytical results for groundwater samples taken in March 1998, April 1998, and June 1998 at the referenced facility. The monitoring events are summarized below:

Dates of Event	Sample Locations	Monitoring Phase
March 27, 1998	MW-13R	Background [1,2,3,4]
	MW-14	Background (heavy metals only) [1,4,5]
April 1-2, 1998	MW-1R, 4R, 9-12	Assessment (initial) [1,4,6]
June 27-29, 1998	MW-3R, 8, 13R, 14-16	Detection [3,4,7]
	MW-1R, 4R, 9-12	Assessment (subsequent) [3,4,7,8]

[1] Samples analyzed by Intertek (formerly Inchcape) Testing Services, Richardson, Texas, except volatile organic compounds from April 1998 event analyzed by ERMI, Dallas, Texas.
[2] Fourth background sampling event for MW-13R (installed in June 1997 to replace MW-13).
[3] Samples analyzed for constituents listed in Table 2 of Groundwater Sampling and Analysis Plan, and antimony, cobalt, nickel, silver, thallium, and nitrate.
[4] Metals analyzed for dissolved-phase concentrations.
[5] Supplemental background event for MW-14; samples analyzed for heavy metals listed in Table 2 of Groundwater Sampling and Analysis Plan, and antimony, cobalt, nickel, silver, and thallium.
[6] Samples analyzed for assessment monitoring constituents listed in Appendix II to 40 CFR Part 258.
[7] Samples analyzed by Core Environmental Laboratories, Dallas, Texas.
[8] Samples also analyzed for acetophenone, and bis(2 ethylhexyl) phthalate.

The responses to our May 26, 1998, letter were provided in a letter dated June 30, 1998, from Messrs. Paul S. Rodusky, Hydrogeologist, and Elan A. Allen, Project Hydrogeologist, Reed Engineering Group, Inc., and included a report on the statistical evaluation of results from the April 1998 assessment monitoring event. The responses are acceptable. The analytical results for the March 1998, April 1998, and June 1998 events were submitted to the TNRCC under cover letters dated June 12, 1998 (addressed to Mr. Pete Pistole of the City of Farmers Branch), July 8, 1998, and September 11, 1998, respectively.

Please note the following comments:

1. Correction to TNRCC letter dated May 26, 1998, regarding chloroethane

   The summary table provided under comment no. 1 in our letter dated May 26, 1998, incorrectly listed a maximum contaminant level (MCL) of 5 μg/L for chloroethane. Chloroethane does not have an established MCL. The error did not affect the statistical evaluations of assessment monitoring results, which used the chloroethane groundwater protection standard of 730 μg/L, listed in 30 TAC §335.568.

2. Assessment monitoring results and statistical evaluations

   a. April 1998 (initial) assessment monitoring event

      Five assessment monitoring constituents – *tin, zinc, sulfide, acetaphenone,* and *bis(2-ethylhexyl) phthalate* – were detected for the first time during the April 1998 event.

      Statistical comparisons of confidence intervals on mean concentrations for detected volatile organic compounds and heavy metals (determined from as many as nine separate measurements from the January 1996 event through the April 1998 event) to groundwater protection standards (GWPSs) showed that lower confidence limits (LCLs) in each case were less than corresponding GWPSs. As noted in the June 30, 1998, letter from Messrs. Rodusky and Allen, no further action was needed until the next assessment monitoring event.

   b. June 1998 (subsequent) assessment monitoring event

      Of the five assessment monitoring constituents detected for the first time during the April 1998 event, only *tin* was detected again. Because four of the newly detected constituents were below detection (i.e., the results of the previous event were disconfirmed), and because the fifth constituent (tin) does not have a health-based GWPS, it was determined that it would not be necessary to establish background for the newly detected constituents.

      Statistical comparisons of confidence intervals on mean concentrations for detected volatile organic compounds and heavy metals (determined from as many as ten separate measurements from the January 1996 event through the June 1998 event) to GWPSs showed that LCLs were again less than corresponding GWPSs (except for iron in MW-10). The LCL for iron in MW-10 exceeded the iron GWPS of 0.3 mg/L, however, because that standard is based on a secondary maximum contaminant level (secondary constituent level) and not on a health-based concentration, no action is required.

3. Instructions for next groundwater monitoring event

a. The next event should be a combined detection- and assessment monitoring event and should occur approximately six months from the time of the June 1998 event.

b. Wells not under assessment monitoring (MW-3R, 8, 13R, 14-16) should be sampled, and samples analyzed for all detection monitoring constituents. The analytical results should be evaluated for statistically significant changes to determine if any of these wells need to be included under assessment monitoring.

c. Wells under assessment monitoring (MW-1R, 4R, 9, 10, 11, and 12) should be sampled, and samples analyzed for assessment monitoring constituents. Because none of the assessment constituents of Appendix II (to 40 CFR Part 258) beyond the usual detection monitoring subset for this facility were detected during the first two assessment monitoring events (except as noted earlier in this letter), it will be acceptable to sample and analyze for the detection monitoring subset only. Therefore, wells under assessment monitoring may be sampled for the same constituents as wells under detection monitoring. The results from wells under assessment monitoring must continue to be statistically compared to GWPSs.

d. Until instructed otherwise, continue to statistically evaluate assessment monitoring results by comparing lower confidence limits on means to GWPSs. However, please observe the following guidelines:

i. Confidence intervals should be constructed using *valid* data from at least the four most recent observations. More observations may be included to better define variability, however, data older than the two years preceding the most recent event should not be included as they are less likely to reflect current conditions than more recent data.

ii. "Non-detect" results that were reported using limits higher than MCLs, action levels, or other health-based target reporting limits may not be valid and should be excluded from the statistical evaluations, unless a satisfactory explanation of why they should be included is provided to the TNRCC.

e. VOCs results were all below reporting limits during the June 1998 event, in contrast to the April 1998 event during which VOCs were detected in six wells. Differences were most notable for *cis-1,2-dichloroethene* in MW-10 (12 μg/L during April 1998 event,

<2 μg/L during June 1998 event), *1,1-dichloroethane* in MW-11 (9 μg/L in April 1998, <2 μg/L in June 1998), and *1,1-dichloroethane* in MW-12 (27 μg/L in April 1998, <2 μg/L in June 1998). The June 1998 event was the first in which samples from this facility were analyzed by Certes Environmental Laboratories. **Because this change in VOC results coincided with a change in laboratories, we request that duplicate VOC samples be collected from each well under assessment monitoring during the upcoming semiannual event, and that the duplicate samples be independently analyzed by a different laboratory to verify the results from Certes.**

f. Please refer to comment no. 1 in our May 26, 1998, letter for actions that may need to be taken following the upcoming semiannual monitoring event at this facility.

Please call Mr. Arten J. Avakian, Geologist, at (512) 239-4419, if you have any questions about this letter.

Sincerely,

Ada Lichaa

Ada Lichaa, Team Leader
MSW Permit Team I
MSW Permits Section
Office of Waste Management, Permits Division

AAL/AJA

cc: Mr. Sam Barrett, Waste Program Manager, TNRCC Region 4 Field Office
Mr. Pete Pistole, Solid Waste Manager, City of Farmers Branch
Mr. Elan A. Allen, Reed Engineering Group

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Kathleen Hartnett White, *Commissioner*
Margaret Hoffman, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 16, 2003

Ms. Gretchen McDonnell
Environmental Manager
Allied Waste Industries
BFI Lewisville Landfill
801 East College Street
Lewisville, Texas 75057-4077

Re: Solid Waste – Denton County – TCEQ Region 4
Camelot Landfill – Permit No. MSW-1312A
Groundwater Monitoring (MSW Mail Log Nos. 03-2742, 2787, and 2935)

Dear Ms. McDonnell:

This letter acknowledges that the Texas Commission on Environmental Quality (TCEQ), Municipal Solid Waste (MSW) Permits Section has received the analytical results and statistical evaluation report for groundwater samples taken at the referenced facility during the monitoring event summarized below:

Date of Event	Sample Locations	Type of Event
June 3-4, 2003	MW-3R, 8, 13R, 14, 16, 17, 18	Detection monitoring [1,2]
	MW-1R, 4R, 9, 10, 11, 12	Assessment monitoring [1,2]
	MW-15	Assessment monitoring [1,3]

[1] Samples analyzed by Heritage Environmental Services, L.L.C., Indianapolis, Indiana.

[2] Samples analyzed for constituents in Table 2 of Groundwater Sampling and Analysis Plan.

[3] First-time assessment event; samples analyzed for constituents in Table 2 of Groundwater Sampling and Analysis Plan, and for assessment constituents in Appendix II to Title 40 Code of Federal Regulations, Part 258.

The analytical report was submitted on behalf of the facility by The Carel Corporation, Keller, Texas, under a cover letter dated July 17, 2003. The statistical evaluation report was submitted by The Carel Corporation under a cover letter dated August 4, 2003, and included a background update demonstration for MW-4R, and analytical results for leachate samples collected on June 12, 2003. We also received a report from The Carel Corporation dated July 8, 2003, documenting the results of a background update for monitor wells MW-3R, 8, 13R, 14, 15, and 16.

Thank you for the submittals. Please note and/or address the following comments:

1. Monitor well MW-15 in assessment monitoring

   In our letter dated July 25, 2003, we explained that the demonstration regarding statistically significant changes (SSCs) recently observed in MW-15 did not provide satisfactory evidence that the SSCs were caused by natural variation. We also noted that you had already prepared for that possible outcome and had made plans to sample MW-15 for the assessment monitoring constituents identified in Title 30 Texas Administrative Code (30 TAC) Chapter 330, Section (§) 330.235 during the next semiannual groundwater sampling event. The report for the June 2003 semiannual sampling event documented that MW-15 was indeed sampled and analyzed for the assessment constituents. The June 2003 event should be treated as the initial assessment monitoring event for MW-15.

2. Documentation of statistical calculations for assessment constituents

The statistical evaluation report apparently omits the results of statistical calculations for several assessment constituents that were detected during one or more events in 2001 and 2002, but not detected during the June 2003 event. These include: cis-1,2-dichloroethylene (DCE) in MW-4R; 1,1-dichloroethane (DCA) and DCE in MW-9; benzene, DCA, ethylbenzene, tetrachloroethylene (PCE), trichloroethylene (TCE), and vinyl chloride (VC) in MW-10; PCE and TCE in MW-11; and benzene, chloroethane, and VC in MW-12. Even if an assessment constituent was not detected during the most recent event, the confidence limit should be calculated and documented to demonstrate which of the conditions of 30 TAC §330.235(e) (return to detection monitoring), §330.235(f) (continued assessment), and §330.235(g) (assessment with corrective action) have been met.

3. Upper confidence limit after exceedance of groundwater protection standard

When a well enters assessment monitoring, assessment constituents are evaluated to determine if any have been detected at statistically significant levels above a groundwater protection standard (GWPS). The usual statistical test is to compare normal, 95-percent *lower* confidence limits (LCLs) constructed from the four most recent measurements for each assessment constituent (extending back approximately two years from the most recent event) to GWPSs. The statistical evaluation report for the June 2003 event documents that such a test is used at this facility. The data continue to be tested this way until the conditions of 30 TAC §330.235(e) have been met and the well returns to detection monitoring, or until a GWPS is exceeded and corrective action triggered in accordance with 30 TAC §330.235(g).

Please note that if a GWPS *is* exceeded in a well, the groundwater sampled by the well is declared to be contaminated, and from then on it is necessary to compare 95-percent *upper* confidence limits (UCLs) to GWPSs for each assessment constituent to evaluate the effectiveness of corrective action and to determine when the remedy(ies) is(are) complete in accordance with 30 TAC §330.238(e).

4. Evaluate assessment constituents in MW-11 using UCLs

The LCL for tetrachloroethylene in MW-11 during the June 2002 event (8.6 µg/L) exceeded the GWPS (5 µg/L) during the June 2002 groundwater monitoring event. The concentrations of assessment constituents in MW-11 since that event should therefore be tested using *UCLs* (see earlier comment).

The statistical evaluation report for the June 2003 event acknowledged our letter dated July 25, 2003, in which we advised the facility to proceed with the work plan to characterize the nature and extent of groundwater contamination in the vicinity of monitor well MW-11. Please remember that the facility must also initiate an assessment of corrective measures in accordance with 30 TAC §330.236, and then select and implement a remedy as needed, in accordance with 30 TAC §330.237 and §330.238.

5. Background update / Return to detection monitoring for monitor well MW-4R

The statistical evaluation report for the June 2003 event provided an acceptable demonstration in accordance with 30 TAC §330.234(d)(2) that past SSCs for sulfate were due to natural variation in groundwater quality, however, the demonstration for updating the background data set for MW-4R did not identify clearly which data were proposed to be added to background. For example, section 5.2.1 (page 11-12) of the report indicates that data from April 1998 through December 1999 (excluding identified outliers) would be added to the original eight data points from the period January-February 1996 through December 1997, for a total of up to 13 background measurements, whereas several of the tables in Appendix E of the statistical evaluation report for the June 2003 indicate data sets with up to 20 measurements.

Also, several of the data sets for MW-4R have been transformed without establishing that the selected transformations are appropriate. The intermediate statistics and statistical limits expressed in the transformed scale are difficult to understand in terms of the actual measurement scale, and may be biased.

In addition, it was not explained why the June 2001 measurement for iron in MW-4R (4.64 mg/L, almost ten times the median value for the data set) was not identified as an outlier and excluded from the proposed background update.

Please address these issues and submit a revised background update demonstration for MW-4R (the demonstration may be included with a revised background update demonstration for MW-3R, 8, 13R, 14, 15, and 16, discussed in the following comment). Monitor well MW-4R may return to detection monitoring status after the update for MW-4R is in place and the conditions of 30 TAC §330.235(e) have been met.

6. Background update for monitor wells MW-3R, 8, 13R, 14, 15, and 16

   a. Exclude MW-15 from update. Background should not be updated at this time for monitor well MW-15, which has just recently entered assessment monitoring.

   b. Avoid data transformation. Many of the data sets for monitor wells MW-3R, 8, 13R, 14, 15, and 16 have been transformed using natural logarithms and other methods. The intermediate statistics and statistical limits expressed in the transformed scale are difficult to understand in terms of the actual measurement scale. The data plots do not help in the understanding, as they do not show the calculated limits, and use the same symbols for data points whether or not the constituent was detected above the reporting limit. In addition, non-detects are plotted at one-half the value of the reporting limit, which also makes it difficult to understand the data.

      Several statistical references we examined (Gibbons, 1994, p. 77-79; Gilbert, 1987, p. 148-149)[1,2] caution against transforming data, as it can yield limits that are biased high, resulting in elevated false negative rates in the statistical evaluation program. For example, the updated Shewart control limit (SCL) computed for iron in MW-3R after a natural logarithm transform has been applied to the data set is 166.8 mg/L, which is more than 50 times greater than the highest value in the data set (2.96 mg/L, December 2001), indicating that the transformation was not appropriate for the data set.

      Please recalculate statistical limits for control charts assuming normal distributions, unless you can demonstrate clearly that a transformation is appropriate and does not yield biased results. Note that ASTM (1999, p. 11, sec. 6.3.2.1)[3] indicates that the criterion of normality may be relaxed somewhat for Shewart-CUSUM control charts.

7. Leachate chain-of-custody form

   Please note that the copy of the chain-of-custody form for leachate samples included in the statistical evaluation report for the June 2003 event was not legible (copy was too light to show written information).

---

[1] Gibbons, R. D. , 1994, Statistical methods for groundwater monitoring: John Wiley & Sons, Inc., 286 p.

[2] Gilbert, R. O., 1987, Statistical methods for environmental pollution monitoring: Van Nostrand Reinhold, 320 p.

[3] ASTM, 1999, Standard guide for developing appropriate statistical approaches for ground-water detection monitoring programs: American Society for Testing and Materials, D6312-98, 14 p.

Please respond to the comments above with 45 days from the date of this letter. All submittals, including cover letters, should be provided in duplicate (one original and one copy; please include our internal mail code, MC 124, as the first line of the mailing address). A copy should also be sent directly to TCEQ Region 4, 2301 Gravel Drive, Fort Worth, Texas 76118-6951, to the attention of Mr. Sam Barrett, Waste Section Manager.

If you have any questions about this letter, please contact me at (512) 239-4419, or in writing at the address on our letterhead (please specify mail code MC 124 on the first line of our address).

Sincerely,

Arten Avakian, Geologist
MSW Permit Team III
MSW Permits Section, Waste Permits Division
Texas Commission on Environmental Quality

AJA/aja

cc: Mr. Mark Parvageaux, Director of Public Works, City of Farmers Branch
Mr. Brian Handley, Landfill Manager, Camelot Landfill, Lewisville
Mr. Gordon Spradley, Project Manager, Allied Waste Industries
Mr. Kevin T. Carel, The Carel Corporation, Keller
Mr. Sam Barrett, Waste Section Manager – TCEQ Region 4, Fort Worth

ATTACHMENT 5

SUMMARY TABLE AND PLOTS

Confic ce Interval

Facility: Camelot LF Client: RSI Data File: CAMDBASEinorg Printed 12/23/2009, 3:29 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Arsenic, Total (mg/l)	MW-10	0.023	0.006	0.01	No	33	0.01638	0.01262	30.3	None	No	0.05	NP (normality)
Arsenic, Total (mg/l)	MW-11	0.005	0.0025	0.01	No	32	0.004453	0.002841	90.63	None	No	0.05	NP (NDs)

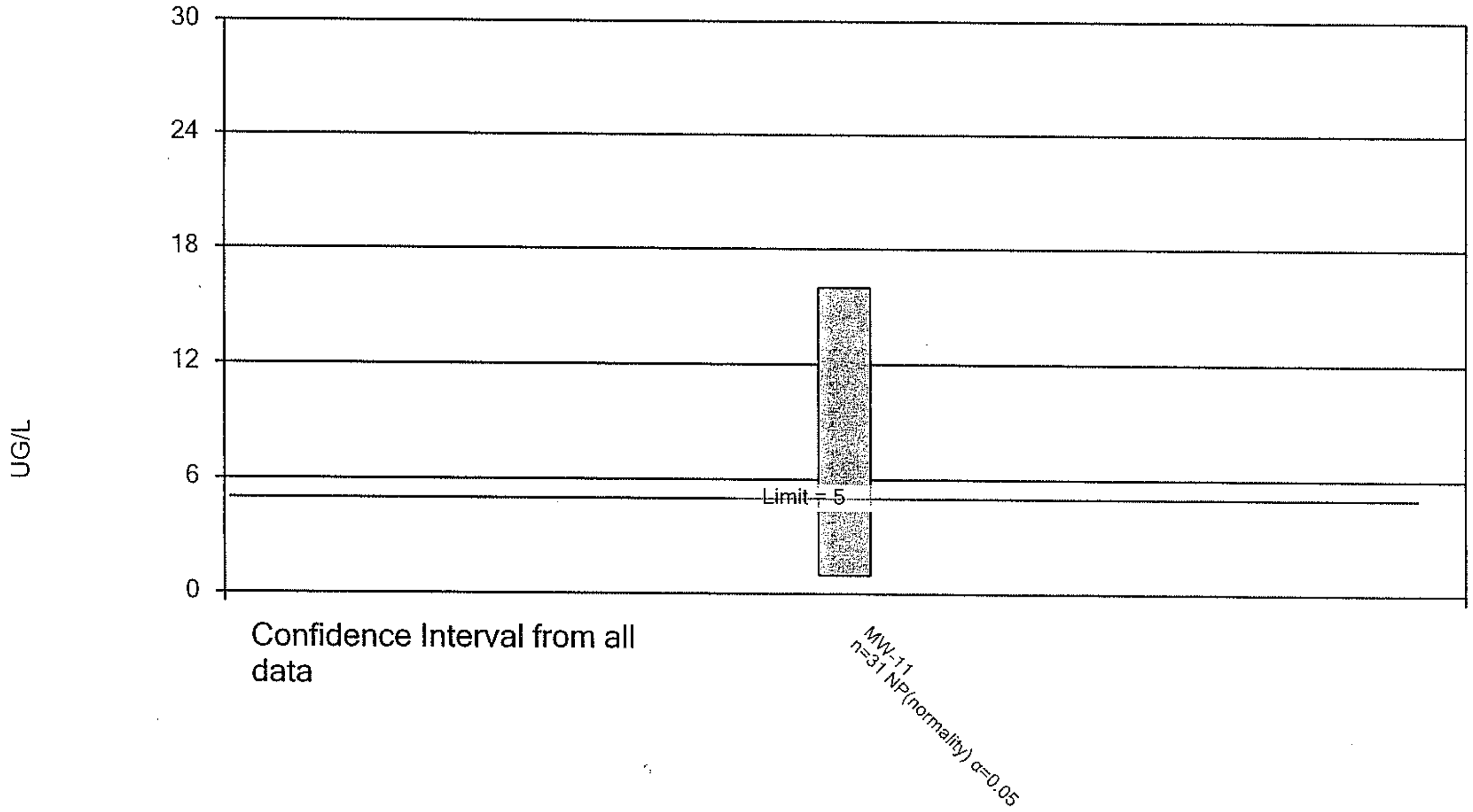
Confidence Interval

Facility: Camelot LF Client: RSI Data File: CAMDBASEorg Printed 12/23/2009, 3:34 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
cis-1,2-Dichloroethyl...	MW-10	62.58	42.84	70	No	34	5.882	No	0.05	Param.
cis-1,2-Dichloroethyl...	MW-11	60	1	70	No	31	41.94	No	0.05	NP (normality)
1,1-Dichloroethane (U...	MW-11	9	5.4	4900	No	31	25.81	No	0.05	NP (normality)
Trichloroethylene (UG/L)	MW-11	16	1	5	No	31	48.39	No	0.05	NP (normality)
Trichloroethylene (UG/L)	MW-12	2.5	1	5	No	34	73.53	No	0.05	NP (NDs)
1,1-Dichloroethane (U...	MW-12	21.99	13.64	4900	No	34	20.59	No	0.05	Param.
cis-1,2-Dichloroethyl...	MW-12	88	1	70	No	34	38.24	No	0.05	NP (normality)
Vinyl chloride (UG/L)	MW-12	2.1	1	2	No	34	76.47	No	0.05	NP (NDs)

Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Normality Test: Shapiro Wilk, alpha based on n.

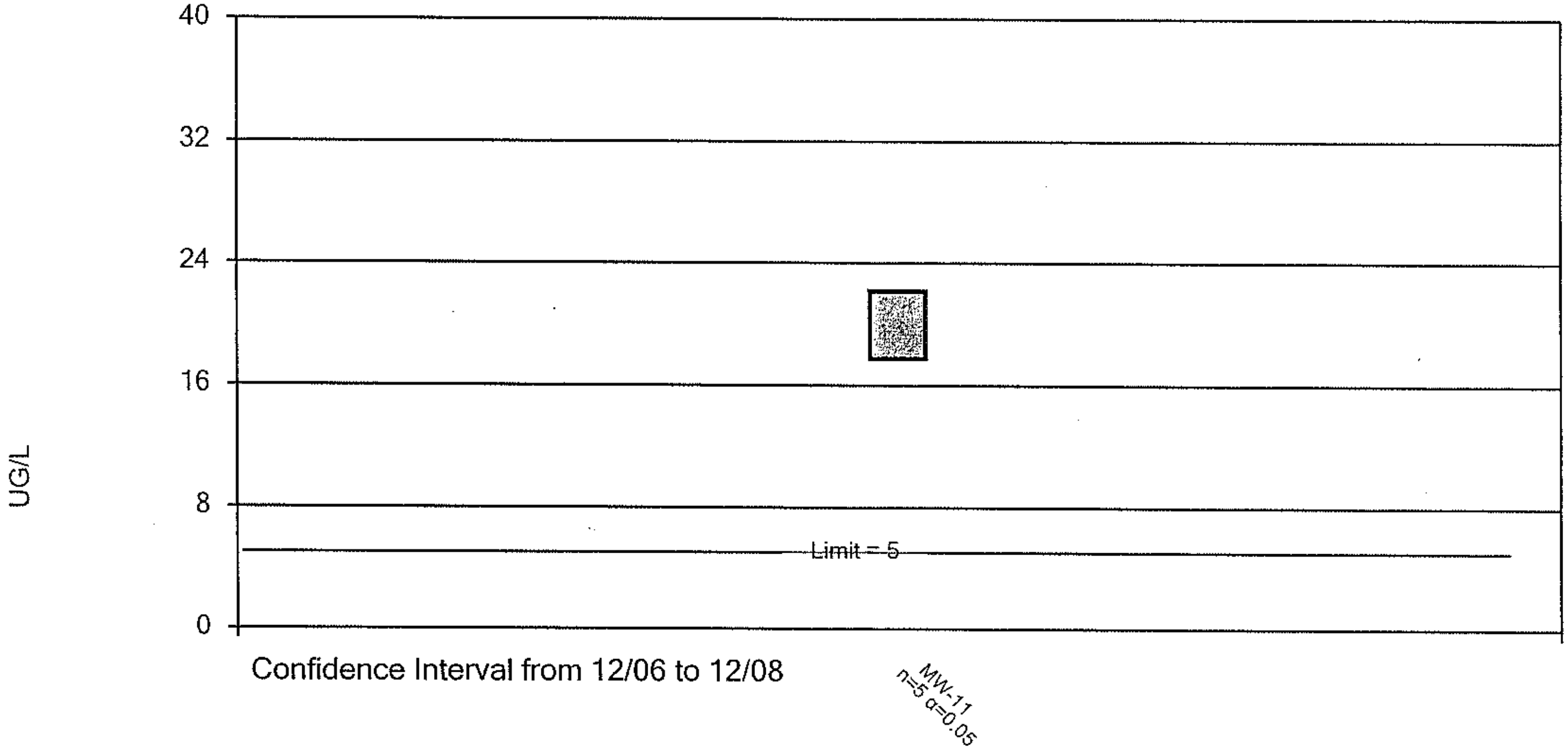


Constituent: Trichloroethylene   Analysis Run 12/23/2009 3:47 PM

Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

Parametric Confidence Interval

Compliance limit is exceeded. Normality Test: Shapiro Wilk, alpha based on n.

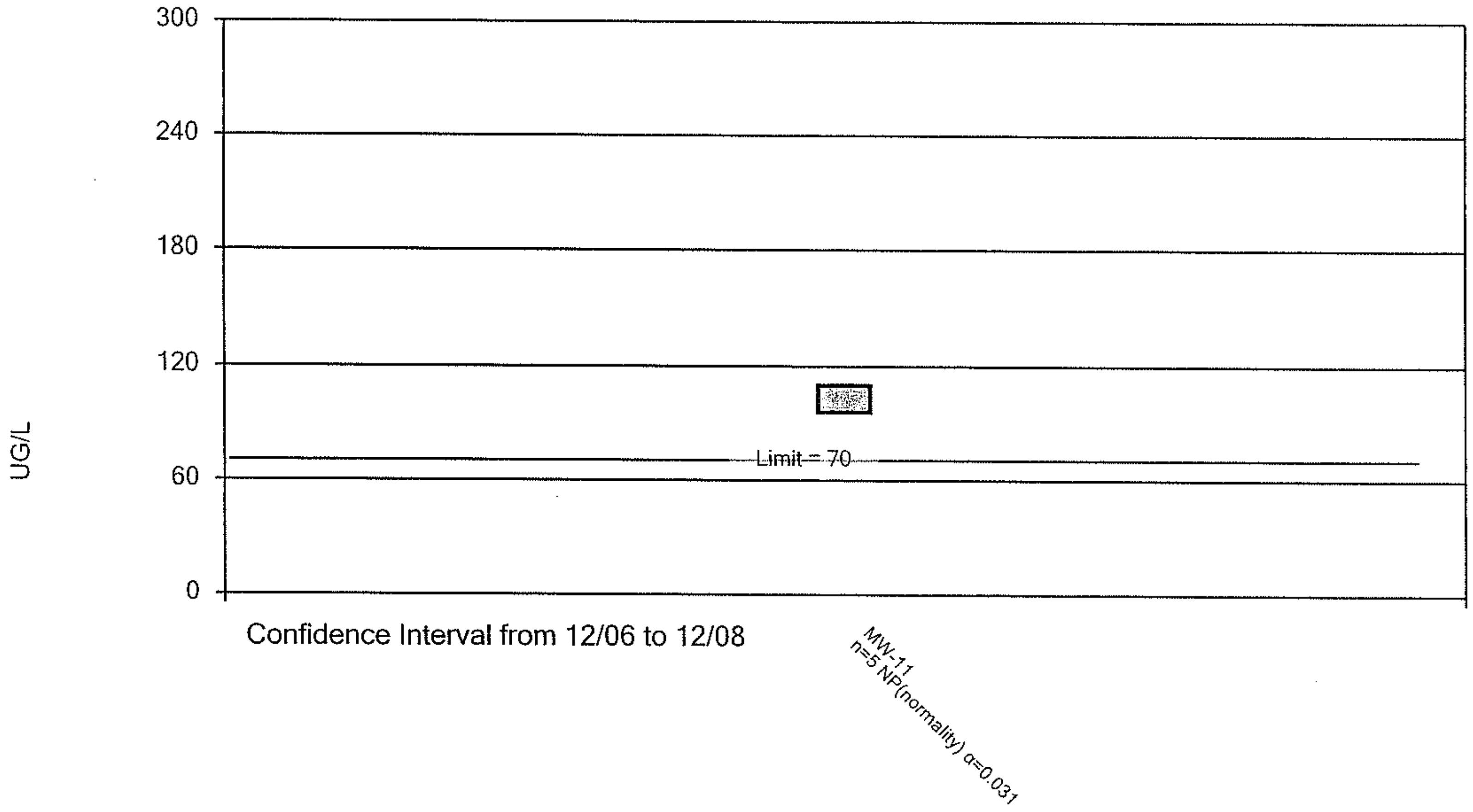


Constituent: Trichloroethylene Analysis Run 12/23/2009 3:40 PM

Facility: Camelot LF Client: RSI Data File: CAMDBASEorg

Non-Parametric Confidence Interval

Compliance limit is exceeded. Normality Test: Shapiro Wilk, alpha based on n.

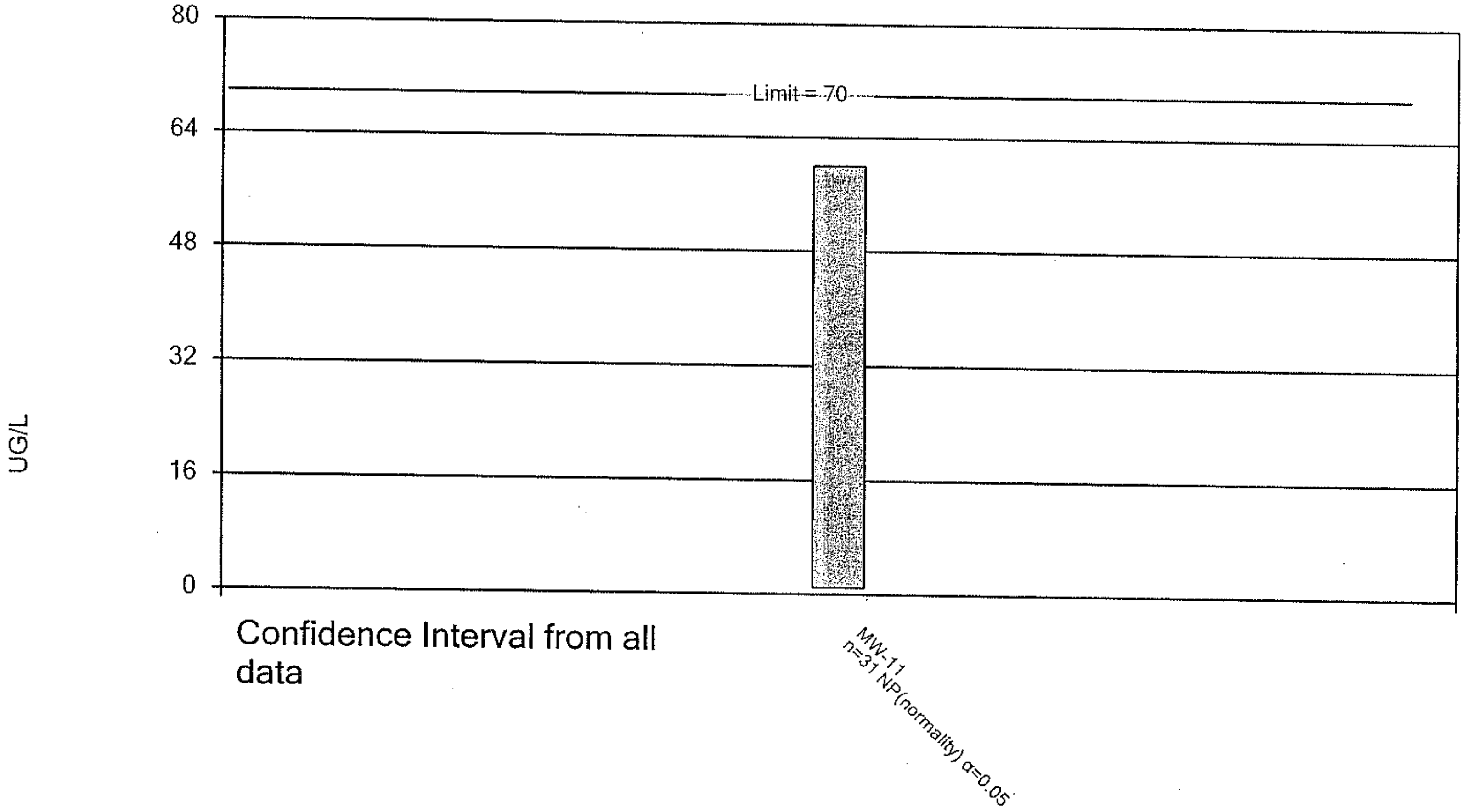


Constituent: cis-1,2-Dichloroethylene   Analysis Run 12/23/2009 3:42 PM

Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: cis-1,2-Dichloroethylene   Analysis Run 12/23/2009 3:45 PM
Facility: Camelot LF   Client: RSI   Data File: CAMDBASEorg

APPENDIX IIIH-I

ACM ACCEPTANCE CORRESPONDENCE

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

received 6/16/10

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 11, 2010

Mr. Mark Pavageaux
Director, Public Works Dept.
City of Farmers Branch
13000 William Dodson Parkway
Farmers Branch, Texas 75234-6253

Re: Camelot Landfill – Denton County
Municipal Solid Waste – Permit No. 1312A
Assessment of Corrective Measure (ACM) – First Notice of Deficiency (NOD) Response
Tracking No. 13077756; RN101479038/CN601253628

Dear Mr. Pavageaux:

This letter acknowledges that we have reviewed the above mentioned ACM groundwater monitoring (GWM) response. The NOD response was submitted on behalf of the above mentioned facility by Mr. William Surratt, and Mr. Kevin P.G., of the Carel Corporation in Keller, Texas. Thank you for your submittal.

The additional discussions concerning the statistical methods currently being used for the evaluation of the above mentioned facility's GWM data were very useful. We also appreciate the added description of how this facility is verifying the data distribution, temporal variability, and spatial homogeneity, involved with the facility GWM program.

It is an ongoing obligation of persons associated with a site to ensure that municipal solid wastes are managed in a manner which does not cause the discharge or imminent threat of discharge of waste into or adjacent to waters in the state, a nuisance, or the endangerment of the public health and welfare, which are prohibited by Title 30 Texas Administrative Code, Chapter 330, Section 330.15(a).

If you have questions regarding this letter, please contact me at (512) 239-6610 or by email at adenny@tceq.state.tx.us. When addressing written correspondence, please use mail code MC 124.

Sincerely,

Arthur Denny, Senior Scientist
Municipal Solid Waste Permits Section
Waste Permits Division

ALD/fp

cc: Mr. William Surratt, P.G., The Carel Corporation, Keller

P.O. Box 13087 Austin, Texas 78711-3087 512-239-1000 Internet address: www.tceq.state.tx.us

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

received
7/28/2010

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

July 21, 2010

Mr. Mark Pavageaux
Director, Public Works Dept.
City of Farmers Branch
13000 William Dodson Parkway
Farmers Branch, Texas 75234-6253

Re: Camelot Landfill – Denton County
Municipal Solid Waste – Permit No. 1312A
Assessment of Corrective Measure (ACM) – Second Notice of Deficiency (NOD) Response
Tracking No. 13077768; RN101479038/CN601253628

Dear Mr. Pavageaux:

This letter acknowledges that we have reviewed the above mentioned ACM groundwater monitoring response. The NOD response was submitted on behalf of the above mentioned facility by the Carel Corporation in Keller, Texas. Thank you for your submittal.

Investigation of the Nature and Extent

The presence of cis-1,2-dichloroethene was statistically determined to be over the groundwater protection standard (GWPS) of 70 µg/L during the second 2004 semi-annual monitoring event in MW-10 and the second 2005 semi-annual monitoring event in MW-12. Arsenic has been routinely detected in MW-10 at concentrations above the 10 µg/L maximum regulatory limit from January 1996 through August 2008. Trichloroethene has exceeded the GWPS of 5 µg/L during the second 2002 semi-annual monitoring event in MW-11.

Data supporting this conclusion includes a previous nature and extent investigation for MW-11, in which the landfill gas was the source of volatile organic compounds (VOCs) in MW-10, MW-11, and MW-12. The above mentioned facility has recently installed an active landfill gas collection and control system. It is noted that the extent of groundwater VOC and arsenic migration does not appear to have migrated to the temporary monitor wells (TW-) 10A, TW-10B or TW-12B.

It is noted that landfill gas is believed to be the source of the VOCs and arsenic in monitor wells (MW)-10, MW-11 and MW-12. The following facts have been submitted in support of the landfill gas being the cause of the above mentioned VOC impacts, as listed in the following table:

- VOCs detected in MW-10 and MW-12 do not correlate with the VOCs detected in the landfill leachate, but do correlate with the landfill gasses;
- Elevated CO_2 levels were present in MW-10;
- Portions of the well screens or filter packs were not fully submerged below the groundwater levels; and
- the detected VOCs are common trace components of landfill gas.

Statistical Analysis Exceedances

Well	COC	1st 2008	2nd 2008	LCL	UCL	GWPS	Exceeded LCL
MW-10	Cis-1,2-dichloroethene	56	71	40	70	70	No
MW-10	Arsenic	<10	14	13	25	10	Yes
MW-11	1,1-dichloroethane	5.0	<5	2.0	7.2	4,900	No
MW-11	Cis-1,2-dichloroethene	110	110	96	110	70	Yes
MW-11	Trichloroethene	22	16	18	22	5	Yes
MW-12	1,1-dichloroethane	9.1	9	7.7	9.6	4,900	No
MW-12	Cis-1,2-dichloroethene	100	120	90	110	70	Yes
MW-12	Trichloroethene	7.6	5.8	2.5	7.9	5	No
MW-12	Vinyl Chloride	2.8	3	1.0	3.0	2	No

The corrective actions to address the VOCs and arsenic include the expansion of the active landfill gas collection and control system with the possible addition of more landfill gas extraction wells and/or soil vapor extraction wells. A Pilot Study has also been referenced in the Assessment of Corrective Measures.

Technical Comments – Assessment of Corrective Measures

The above mentioned detections that are at statistically significant levels above the groundwater protections standards are consistent with recent results for the groundwater monitoring wells surrounded by the active landfill gas collection and control system.

Proposed Selection of Remedy

Continued operation of the landfill gas collection and control system with monitored natural attenuation of the groundwater monitoring to document VOCs and arsenic, are the corrective actions proposed as the selection of remedy. In the event that VOCs remain above their GWPSs, supplemental corrective actions may be warranted.

Pilot Study – Gas Monitoring Probes and Enhanced Bio-Remediation System

In addition to the above mentioned corrective actions, a pilot study consisting of the installation and quarterly monitoring of three temporary gas monitoring probes along the current point of compliance in the vicinity of MW-10, MW-11, and MW-12 has also been proposed.

August or September of 2010 is the proposed implementation date for the pilot study to begin. The pilot study will also include an enhanced bioremediation system in the vicinity of MW-10. The enhanced bioremediation system will consist of a maximum of seven injection points installed in the vicinity of MW-10.

Please include a copy of your response to Texas Commission on Environmental Quality, Region 4, to the attention of Mr. Sam Barrett, Waste Section Manager, 2309 Gravel Drive, Ft. Worth, TX 76118-6951. Also, please include the tracking number referenced above in the subject line of your response.

It is an ongoing obligation of persons associated with a site to ensure that municipal solid wastes are managed in a manner which does not cause the discharge or imminent threat of discharge of waste into or adjacent to waters in the state, a nuisance, or the endangerment of the public health and welfare, which are prohibited by Title 30 Texas Administrative Code, Chapter 330, Section 330.15(a).

If you have questions regarding this letter, please contact me at (512) 239-6610 or by e-mail at adenny@tceq.state.tx.us. When addressing written correspondence, please use mail code MC 124.

Sincerely,

Arthur Denny, Senior Scientist
Municipal Solid Waste Permits Section
Waste Permits Division
Texas Commission on Environmental Quality

ALD/fp

cc: Mr. Steven Wimmer, The Carel Corporation, Keller

CAMELOT LANDFILL
CITY OF LEWISVILLE, DENTON COUNTY
TCEQ PERMIT NO. MSW-1312B

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX III I
LANDFILL GAS MANAGEMENT PLAN

Prepared for

City of Farmers Branch

February 2012

J. HEATH PARKER
94764

J. Heath Parker
2/23/12

Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 1339-351-11-02-5F

This document is intended for permitting purposes only.

J. HEATH PARKER
94764

J. Heath Parker
2/23/12

CONTENTS

CONTENTS (continued)

J. HEATH PARKER
94764

2/23/12

1 INTRODUCTION

1.1 Scope

This appendix addresses §330.371.

This Landfill Gas Management Plan (LGMP) has been developed for the City of Farmers Branch consistent with the requirements set forth in the Texas Commission on Environmental Quality (TCEQ) Municipal Solid Waste regulations 30 Texas Administrative Code (TAC) §330.371 §330.159, and RCRA Subtitle D regulations in 40 CFR §258.23.

In accordance with TCEQ "Guidelines for Preparing a Landfill Gas Management Plan," this LGMP describes the existing landfill gas (LFG) monitoring network and the proposed upgrades to the monitoring network. It also discusses the operation and monitoring of this network, procedures for verification of monitoring data, and notification procedures, and outlines possible remediation activities, if required. In addition, this LGMP includes a description of the existing and proposed expansions to the Landfill Gas Collection and Control System (GCCS).

1.2 Purpose

30 TAC §330.159 requires landfills to develop a LGMP in accordance with §330.371. Compliance with §330.371 requires landfills to implement a routine monitoring program for methane to verify that (1) the concentration of methane gas generated by the facility does not exceed 1.25% by volume in facility structures (excluding LFG control or recovery system components), and (2) the concentration of methane gas does not exceed 5% by volume in monitoring points, probes, subsurface soils, or other matrices at the facility boundary defined by the legal description in the permit or permit by rule.

The purpose of the LGMP is to provide guidelines for management of LFG at the site. These guidelines cover monitoring for LFG migration at the permit boundary and in structures within the permit boundary. This will be conducted by monitoring LFG concentrations in LFG monitoring probes near the facility's permit boundary and within on-site occupied structures. If LFG migration is detected, it may be controlled by various options which are discussed in Section 5.

The LFG monitoring program will continue for a period of 30 years after final closure of the facility or until the owner or operator receives written authorization from TCEQ to revise or discontinue the program.

2 SITE CHARACTERISTICS

2.1 Introduction

A site plan for the Camelot Landfill is included as Figure III I-A-1 in Appendix III I-A. As shown on Figure III I-A-1, under TCEQ Permit No. 1312A, 18 existing landfill gas (LFG) monitoring probes were installed around the perimeter of the current fill area to monitor for potential migration of LFG.

This LGMP addresses the additional monitoring probes required by the proposed expansion of the Camelot Landfill. As a result of the proposed landfill expansion, all 18 existing LFG monitoring probes will be abandoned and 22 new probes will be installed.

The type and frequency of the LFG monitoring for this site was based on the following factors: geologic conditions, hydrogeologic conditions, hydraulic conditions, location of the facility structures, underground utilities, land use, nature and age of waste, climate, and depth of waste. These factors are described in detail in the following subsections.

2.2 Geologic Conditions

The facility is located upon a mapped outcrop of Quaternary-age alluvium (Barnes et al, 1997). The alluvium consists of coarsening downward mixtures of clay, silt, sand, and gravel. The facility's uppermost aquifer occurs in the basal portion of the alluvium sediments. The alluvium was deposited unconformably on top of a thick sequence of low permeability Cretaceous-age Eagle Ford Shale. This shale strata is an aquilude and lower confining unit for the uppermost aquifer. Beneath the Eagle Ford Shale is the confined Cretaceous-age Woodbine Aquifer. The uppermost aquifer and Woodbine aquifer are not hydraulically connected due to the presence of the thick sequence of low permeability Eagle Ford Shale.

2.3 Hydrogeologic Conditions

Although not classified by the Texas Water Development Board as a regional aquifer, groundwater that occurs in the Alluvial Strata comprises the uppermost aquifer for groundwater monitoring purposes. The facility's uppermost aquifer groundwater flows from northeast to west or south around the landfill's waste footprint. The uppermost aquifer is discussed in Sections 2 and 3 of Part III, Appendix IIIG.

2.4 Hydraulic Conditions

The site is located approximately 2 miles south of Lake Lewisville within the watershed of the Elm Fork of the Trinity River. The Elm Fork of the Trinity River forms the southern boundary of the site. Midway Branch, a tributary of the Elm Fork, flows along the east side of the permit boundary.

2.5 Facility Structures Within the Permit Boundary

All on-site structures, including but not limited to, buildings, subsurface vaults, utilities, or any other areas where potential gas buildup would be of concern as well as any future on-site structures, buildings, subsurface vaults, utilities, or any other areas where potential gas buildup would be of concern, installed within the permit boundary (per any future permit amendments or modifications) will be monitored as described in Section 3.2.

2.6 Underground Utilities

Currently the underground sanitary sewer line has test vents. In addition, passive vent pipes will be installed into or directly adjacent to the pipe bedding of underground utilities to monitor for LFG migration and vent potential methane accumulations. The passive vent pipes will be installed near the underground utility where it crosses the permit boundary. Currently, there are two existing underground utilities at the site. The first is a sanitary sewer line easement that crosses the southwest and northwest corners of the existing permit boundary. This existing sanitary sewer line will also cross the northwest and northeast corners of the proposed permit boundary. The second is an electric easement that crosses the eastern permit boundary. Passive trench vent pipes will be installed in or near these underground utilities within 6 months after the approval of this permit amendment as shown on Figure III I-A-1 in Appendix III I-A. All future underground utilities which cross the permit boundary will be vented and monitored as well. Future passive trench vents will be installed within 60 days after utility construction. A construction detail for the passive trench vent pipes is provided on Figure III I-A-2. The vents will be equipped with monitoring ports to facilitate routine methane monitoring.

2.7 Land Use and Offsite Structures

Land use within a 1,000 foot radius of the site's permit boundary consists of residential, recreational, business, and open areas. The nearest residence is approximately 680 feet east of the permit boundary. A surrounding development map showing the structures within 1,000 feet of the permit boundary is presented in Appendix III I-B. Refer to Parts I/II, Section 7 for additional information on surrounding land use. With any future development around the facility, the LFG monitoring system will be reviewed and revised as needed to protect human health and the environment. All proposed changes to the LFG monitoring system will be submitted to the TCEQ for approval.

2.8 Nature and Age of Waste

The Camelot Landfill is currently operated as a Type I municipal solid waste disposal facility. The existing landfill currently serves residences and businesses in Collin, Dallas, Denton, and Tarrant Counties. The site was originally permitted as a landfill under Texas Department of Health (TDH) Permit No. 1312 in December 1979. The permit was amended in March 1981 before the site opened to expand the permit boundary (TCEQ Permit No. MSW-1312A). The facility reported the receipt of approximately 305,478 tons of solid waste in its 2010 Annual Report to the TCEQ.

The major classifications of solid waste to be accepted at the Camelot Landfill include household waste, yard waste, commercial waste, industrial waste (non-hazardous), construction-demolition waste, and some special wastes as authorized by TCEQ. Consistent with §330.15, the facility will not accept regulated hazardous waste, prohibited PCBs, infectious medical wastes, or other wastes prohibited by TCEQ regulations. Refer to Parts I/II, Section 2 for additional information.

2.9 Climate

The climate of the region is characterized as humid subtropical. According to normal mean monthly precipitation data from the National Oceanic & Atmospheric Administration (NOAA) for the region, the average annual precipitation is approximately 34.3 inches. The temperature ranges between an average low of 32°F in January and an average high of 94°F in July.

2.10 Depth of Waste and Liner Description

As discussed in Parts I/II-Section 3.2, the waste fill areas of the existing landfill were lined in accordance with liner construction requirements at the time of initial waste placement. The waste fill areas include approximately 88.4 acres of pre-Subtitle D liner area. The pre-Subtitle D area is underlain by in-situ and compacted clay liners. The existing Subtitle D areas consist of Cells 1 through 5C and Cell 8/9A. Approximately 68.1 acres of the 109.9-acre Subtitle D area has been constructed at the site. The Subtitle D-lined cells have a liner system consisting of 2 feet of compacted clay liner, 60-mil HDPE geomembrane, leachate collection layer, and protective cover.

This application also includes an overliner system that will be installed over the pre-Subtitle D areas. The proposed overliner system design and details are summarized in Appendix IIIA-Landfill Unit Design Information. The overliner will consist of the following layers from bottom to top:

- A geosynthetic clay liner (GCL);
- A 40-mil LLDPE geomembrane liner; and
- A leachate collection and protective soil cover layer.

3 MONITORING

3.1 Perimeter Monitoring

3.1.1 Existing Perimeter Monitoring Network

The site currently has 18 existing LFG monitoring probes that were installed under TCEQ Permit No. 1312A. The locations of the existing approved probes are shown on Figure III I-A-1 in Appendix III I-A. The existing probes were installed with an average interprobe spacing of approximately 1,000 feet.

All of the existing LFG monitoring probes will be abandoned as part of the landfill expansion. The abandonment will include removing the surface completion material, attempting to pull the probe casing materials, and grouting the boreholes with bentonite grout from the total depth to surface. The probes will be abandoned and plugged in accordance with applicable rules in Title 16 TAC Chapter 76.

3.1.2 Proposed Landfill Gas Monitoring Probes

As part of the proposed landfill expansion, 22 new probes will be installed around the perimeter of the permit boundary prior to abandoning the existing probes and within 6-months of the approval of this permit amendment. The proposed probes will be installed in accordance with applicable rules in Title 16 TAC Chapter 76. The interprobe spacing will be less than 1,000 feet with closer spacing in areas with nearby off-site structures. The new probes will be installed as shown on Figure III I-A-2 in Appendix III I-A. The top of the shale is considered the lowest elevation at which gas migration could potentially occur due to the low permeable nature of the unweathered shale formation. As such and to be conservative, each probe will be drilled to a depth 2 feet below the top of the unweathered shale strata. Proposed elevations and depths for the new probes are summarized in Table III I-1. The final depths of the new probes will be dependent on the field conditions at the time of installation.

Table III I-1
Proposed LFG Monitoring Probes Data[1]

Probe I.D.	Probe Ground Surface Elevation[2] (ft. msl)	Top of Shale Strata Elevation[3] (ft msl)	Proposed Probe Bottom Elevation (ft msl)	Proposed Probe Boring Depth (ft bgs)
GMP-1R	455	435	433	22
GMP-2R	458	435	433	25
GMP-3R	458	430	428	30
GMP-4R	453	430	428	25
GMP-5R	456	430	428	28
GMP-6R	454	430	428	26
GMP-7R	456	430	428	28
GMP-8R	458	430	428	30
GMP-9R	458	430	428	30
GMP-10R	458	432	430	28
GMP-11R	461	440	438	23
GMP-12R	462	421	419	43
GMP-13R	458	407	405	53
GMP-14R	458	405	403	55
GMP-15R	458	410	408	50
GMP-16R	459	412	410	49
GMP-17R	458	414	412	46
GMP-18R	456	416	414	42
GMP-19	458	418	416	42
GMP-20	458	422	420	38
GMP-21	471	435	433	38
GMP-22	460	435	433	27

[1] The data given below is approximate. Actual elevations and dimensions will be determined at the time of installation.

[2] Probe ground surface elevations were obtained from August 28, 2010 aerial survey provided by Metropolitan Aerial Surveys.

[3] Top of shale strata elevations were obtained from Figure IIIG-C-11 - Top of Shale Strata Elevation Contour Map included in Appendix IIIG - Geology Report.

3.1.3 Proposed Passive Trench Vents

Passive trench vents will be installed in or near the underground utility trenches as shown on Figure III I-A-1. A typical detail of the future trench vents is shown on Figure III I-A-2. The underground utility locations will be identified and located by representatives of the utility easement owners. The installation of the new trench vents will occur within 6-months of the approval of this permit amendment and approvals from the easement owners.

3.1.4 Monitoring Procedures

Methane concentrations will be measured using a portable gas detection device pre-calibrated against reference methane and oxygen standards. The portable gas detection device will be equipped with a suction sampling line equipped with an air tight fitting. This fitting will match with a corresponding air tight fitting installed at the top of each probe and on each passive trench vent to enable gas samples to be drawn directly into the monitoring instrument without diluting the sample. The instrument is designed to give a direct reading of the methane concentration in two scales, either percent of the LEL or percent methane by volume. A qualified landfill representative or consultant will conduct the monitoring. The monitoring equipment will be maintained and calibrated in accordance with the manufacturer's recommended procedures prior to use.

Monitoring data will be recorded on the Landfill Gas Monitoring Report (LGMR) form shown in Appendix III I-C, or a similar form, and the data maintained in the facility's Site Operating Record. Probe and passive trench vent monitoring procedures will be as recommended by the gas detection device instrument manufacturer. Manufacturers' information on typical monitoring equipment used at the site is provided in Appendix III I-D.

If LFG monitoring determines that methane has been detected in concentrations exceeding a regulatory limit, verification and notification procedures as described in Section 4 will be implemented.

3.1.5 Maintenance Procedures

As part of the overall maintenance program, routine inspection of the probes/trench vents will be conducted. Each time LFG monitoring is conducted, the sampler will inspect the integrity of the monitoring probes/trench vents. The sampler will record pertinent information on the LGMR form (Appendix III I-C) or similar form. Each probe/trench vent will be inspected for the following:

- Verification that the monitoring probe/trench vent is clearly numbered.
- Verification that the protective cover or piping is intact and is not bent or excessively corroded.
- Verification that the concrete pad is intact.

- Verification that the padlock is functional on the probe casing.
- Verification that the visible portion of the PVC riser is intact.

If damage or excessive wear to the monitoring probe/trench vent is observed, it will be reported to the Landfill Manager and the monitoring probe/trench vent repaired. If it is not possible to repair the monitoring probe/trench vent and the damage can potentially affect the accuracy of future monitoring results, the monitoring probe/trench vent will be abandoned and replaced with a new monitoring probe/trench vent in accordance with Sections 3.1.2, 3.1.3, and 3.4.

3.2 Monitoring of Facility Structures

3.2.1 Monitoring Procedures

All on-site enclosed structures, including, but not limited to buildings, subsurface vaults, or any other areas where potential gas buildup would be of concern will be equipped with a continuous monitor/alarm that provides an audible alarm if methane concentrations exceed 1.25% methane by volume. During each quarterly sampling event, the continuous monitors' performance will be checked in accordance with the manufacturer's recommendations. The verification will be documented on the LGMR form. Manufacturer's information regarding the monitors/alarms is in Appendix III I-D.

If methane concentrations exceeding 1.25% by volume are detected within an enclosed structure, the building will be immediately evacuated and ventilated by opening doors and windows. Verification procedures described in Section 4 will be implemented. If verification procedures indicate allowable limits are being exceeded, notification procedures, also described in Section 4, will be implemented. If existing enclosed structures are removed from the site to allow for the continued development of the landfill, the monitors/alarms installed in these structures will be decommissioned.

3.2.2 Maintenance Procedures

The continuous LFG monitor/alarms will be maintained and tested in accordance with the manufacturer's recommendations and specifications. According to the specification sheets in Appendix III I-D, these monitors/alarms do not require maintenance. However, on a quarterly basis the monitors/alarms will be inspected to ensure they are properly installed and connected to power.

3.3 Recordkeeping/Reporting

The recordkeeping and reporting requirements for the Camelot Landfill will be consistent with those outlined by Title 30 TAC §330.159, §330.371, and §330.125. Records will be maintained for the methane monitoring. The records will be kept on site and maintained as part of the Site Operating Record. Field data will be recorded on the LGMR form (or similar form) as shown in Appendix III I-C.

The LFG monitoring probes, trench vents, and any on-site structures will be monitored quarterly and the results will be placed in the Site Operating Record and made available to the TCEQ upon request.

For those quarterly LFG monitoring events when the measured methane levels are either; (1) above 5% methane by volume in monitoring ports, probes, subsurface soils, or other matrices at the facility boundary defined by the legal description in the permit or permit by rule; or (2) above 1.25% methane by volume in air measured in facility structures (excluding gas control or recovery system components), quarterly LFG monitoring reports will be submitted to the TCEQ.

3.4 Contingency Monitoring Plan

In accordance with 30 TAC §330.371(g)(3), the following contingency plan will be used if the main monitoring system breaks down or becomes ineffective.

LFG Monitoring Probes/Trench Vents

1. Within 60 days, when it is noted that an LFG monitoring probe/trench vent has been damaged and is inoperative and needs to be abandoned and replaced, a permit modification will be submitted to the TCEQ. The permit modification will describe the proposed abandonment/replacement and the schedule for implementation.
2. Should a monitoring event occur prior to replacement of a damaged probe/trench vent, a bar-hole will be placed next to the damaged probe, and a portable gas detection device will be used until the probe/trench vent is replaced.
3. Upon completion of the replacement probe/trench vent, an installation report including any boring logs and construction details will be submitted to the TCEQ.

Continuous LFG Monitors/Alarms

1. Damaged or inoperative continuous monitors/alarms will be repaired or replaced within 30 days of the sampling event during which the damage was noted.
2. A portable gas detection device calibrated for 1.25% by volume will be used to monitor weekly until the stationary unit(s) is replaced.

4 EXCEEDANCE ACTION PLAN

4.1 Exceedance Response Measures

This action plan has been prepared for the protection of human health and the environment in the event concentrations of methane exceed allowable limits either within any enclosed structures that may be constructed within the permit boundary or in the LFG monitoring probes. The appropriate emergency response is different for each situation; therefore, the following plan will address the situations for enclosed structures and probes separately.

This plan also recognizes that a single-event exceedance of allowable limits on a combustible gas indicator or alarm does not necessarily mean that the concentration of methane has actually exceeded allowable levels. Therefore, a procedure for verifying the detected levels is described below.

These action plans will be implemented upon the initial exceedance of a perimeter monitoring probe/trench vent or enclosed structure monitor. Once an enclosed structure and/or monitoring probe/trench vent has been verified to have an exceedance, the site will follow the remediation plan in Section 5.

4.1.1 Initial Action

The initial action in the event methane is detected at levels above regulatory limits is to immediately take necessary steps to protect human health. The specific response depends on the circumstances of the situation.

Building/Structures. If a continuous monitoring device installed within an enclosed structure located within the permit boundary is triggered or if LFG monitoring equipment indicates that 1.25% methane by volume has been exceeded, the building is to be immediately evacuated of all personnel and the Landfill Manager will be notified. Personnel (except for qualified monitoring personnel) will not be allowed to reenter the affected structure until additional measures are taken, as described in Section 4.1.2 - Verification Procedures. Notification procedures will be implemented as described in Section 4.2.

Perimeter Monitoring Probes/Trench Vents. If an exceedance of allowable limits of methane is detected at the permit boundary in one of the monitoring probes/trench vents, the Landfill Manager will be notified immediately. The immediate emergency response measure will be for the Landfill Manager to determine if any nearby buildings (including off site structures) are at risk and if evacuation of the buildings should be requested.

Verification procedures as described in Section 4.1.2 will be taken. Notification procedures will be implemented as described in Section 4.2.

4.1.2 Verification Procedures

Once emergency measures have been taken to immediately protect human health, the Landfill Manager will authorize monitoring personnel to immediately begin verification procedures. Such procedures are intended to determine if the detected methane levels are accurate, or if erroneous levels have been detected as a result of equipment malfunction or other reasons.

Buildings/Structures. Verification of detected methane levels in facility structures located within the permit boundary will be accomplished by monitoring personnel using the following procedures:

- Monitor methane and oxygen levels throughout the building using a calibrated portable gas detection device. In particular, readings will be taken in each room and in confined spaces (i.e., closets). If there are natural gas appliances in the building, they should be checked for leaks.
- Determine if continuous monitor/alarm equipment is working properly.

If methane concentrations are not above the regulatory limit and oxygen-deficient conditions (oxygen-deficient conditions exist any time the oxygen concentration is below 19.5 percent by volume) are not detected (i.e., a malfunction or erroneous reading is suspected), personnel may return to the building.

In the event that methane concentrations above the regulatory limit are detected during verification procedures, notification procedures, as described in Section 4.2, and remediation procedures as described in Section 5, will be implemented and followed.

Perimeter Monitoring Probes/Trench Vents. Verification of detected levels of methane in monitoring probes will be accomplished by monitoring personnel using the following procedures:

1. Recalibrate monitoring equipment according to manufacturer's recommended procedures, and immediately recheck the methane concentration in the LFG monitoring probe/trench vent.
2. Recheck the methane concentration in the monitoring probe at least once within 24 hours of the initial detection.
3. If methane concentrations above the regulatory limit are detected during the 24-hour monitoring reading, recheck the methane concentration in the monitoring probe within 7 days after the initial reading. If methane concentrations above the regulatory limit are not detected during this 7 day recheck, quarterly monitoring procedures will resume.

4. If, however, a methane reading above the regulatory limit is detected during the 7 day recheck, then notification and remediation procedures described in Section 4.2 and Section 5, respectively, will be implemented.

4.2 Notification Procedures

When methane levels above the regulatory limit have been detected, sampling personnel will notify the Landfill Manager. If verification procedures described in Section 4.1.2 confirm the presence of elevated methane above the regulatory limit, the landfill manager will immediately notify the Executive Director of the TCEQ or the designated TCEQ staff personnel responsible for LFG monitoring, local and county officials, emergency officials, and the public. The notification will be made initially by telephone or by fax within 48 hours after verification procedures. Follow up written notification will be made to the TCEQ within 7 days following verification.

In addition to notifying the Executive Director, the Landfill personnel will verbally or in writing notify all contiguous property owners located within 1,000 feet of the probe/vent. In addition, the site will notify appropriate local, county, and emergency officials.

Once a methane level has been verified to be above the regulatory limit and the TCEQ notified, the site will take action as described in Section 5. Subsequent notifications during remediation activities will be followed as described in the remediation plan, if deemed necessary.

In addition, once a methane level has been verified to be above the regulatory limit and the TCEQ notified, the TCEQ will be notified again in writing for any additional monitored points that were not part of the original notification which now exhibit methane exceedances above the regulatory limit. If the new monitored points affect property owners which were not originally notified, they will be notified as described above.

4.3 Placement into Operating Record

Records of LFG monitoring including the data and methane gas levels, whether for routine monitoring, verification, or remediation purposes, will be maintained and placed in the Site Operating Record. In the event that levels of methane above the regulatory limit have been detected and verified either in facility structures, in monitoring probes/trench vents, or in other matrices, a description of steps taken to protect human health will also be placed in the Site Operating Record. Notifications made, verbally or in writing, will also be recorded and placed into the Site Operating Record. These placements into the Site Operating Record will occur within 7 days after detection and verification of methane above the regulatory limit.

5 REMEDIATION PLAN

Once verification procedures have confirmed that the methane levels are above regulatory limits in the facility buildings/structures, or in one or more of the LFG monitoring probes/trench vents, or in other matrices, a specific remediation plan will be developed and implemented within 60 days of detection.

The initial remediation plan may include some or all of the following elements, depending on the circumstances:

- Bar-hole probe or hydropunch testing in the vicinity of the impacted monitoring probe/trench vent
- Sampling and laboratory analysis of LFG samples collected from the monitoring probe/trench vent to determine the concentration of methane and trace compounds
- A gas analysis to try to determine the source
- Additional LFG monitoring
- Adjustments to nearby LFG extraction wells

Using accumulated data, an assessment will be made to determine an appropriate course of action to mitigate the LFG migration, if needed. Such actions may vary with the specific incident, but may include (and are not limited to) the expansion of the existing LFG collection and control system (GCCS).

Copies of any specific remediation plan will be placed in the operating record and provided to the Executive Director of the TCEQ along with notification that the plan has been implemented.

6 LFG SYSTEM

6.1 Existing LFG Collection and Control System

Currently, the site has an active LFG collection and control system (GCCS) as shown in Appendix III I-E on Figure III I-E-1. The Camelot Landfill has a design capacity greater than 2.5 million megagrams and 2.5 million cubic meters, but does not currently have a nonmethane organic compound (NMOC) emission rate greater than 50 megagrams per year. As such, the existing GCCS is not required and has been voluntarily installed. In the future should the NMOC emission rate be greater than 50 megagrams per year, the facility will comply with control requirements specified in 40 CFR Part 60, Subpart WWW, New Source Performance Standards for Municipal Solid Waste Landfills (NSPS).

The existing GCCS consists of vertical LFG extraction wells, a piping network, condensate management system, and a blower/flare facility. In addition, the site also has a LFG to energy (LFGTE) facility, which is owned and operated by a third party energy developer. The gas collection piping system conveys the extracted LFG from the collection points (i.e., vertical wells) to the LFGTE facility and/or flare facility.

6.2 Future GCCS Expansions

As the site develops, additional GCCS components will be installed as needed to reduce the buildup of internal gas pressures caused by the increased generation of LFG. The locations of the anticipated proposed vertical extraction wells and piping are shown in Figure III I-E-2. Existing LFG extraction wells in areas receiving additional waste will be extended and/or replaced with a new well as necessary based on the additional waste fill.

Future LFG extraction wells installed outside of or above the overliner system area will be constructed as shown on Figure III I E-3. Extraction wells that penetrate the overliner system will be completed one of two ways. If the wells are in place prior to the installation of the overliner, they will be installed as shown in Detail LFG 4 on Figure III I-E-4. If the wells are installed after the overliner is in place, they will be installed as shown in Detail LFG 5 on Figure III I-E-4.

Each extraction well will be equipped with a control valve and monitoring port as shown in Figure III I-E-3. These control valves and monitoring ports, used in conjunction with controls on the blower, will allow the site to regulate vacuum and LFG levels at each individual extraction well. This will allow the site to make adjustments in order to effectively reduce the potential for subsurface migration and odors, as well as to protect the integrity of the final cover system.

Each LFG extraction well will consist of a perforated pipe within a gravel backfill. The LFG extraction wells will be installed in phases as needed as the landfill develops. The exact number and location of wells, piping, and future LFG components will be determined based on field conditions at the time of installation.

Using the EPA Landfill Gas Emissions Model, it is estimated that the site will generate a maximum of approximately 10,987 standard cubic feet per minute (scfm) of LFG in 2040 (Appendix III I-F). As additional waste is received and LFG generation increases, the site will continue to add additional piping and control equipment as needed to provide the vacuum and capacity necessary to handle the increased flow rate of collected LFG.

6.3 LFG System Operation and Maintenance

The operation and maintenance of the proposed LFG system will be performed consistent with industry guidelines and practices. Wellhead and system monitoring will be performed on a routine basis to monitor overall system performance. As needed, system adjustments will be made to optimize the extraction of LFG from the landfill to control LFG migration, odors, and greenhouse gases. In addition, the system will routinely be visually inspected for any evidence of needed repairs or other maintenance. General maintenance procedure will include the following;

- Each wellhead will be monitored and adjusted as needed to control LFG while limiting oxygen intrusion into the landfill.
- Pressure readings will be taken at various locations along the piping system to evaluate vacuum distribution.
- Condensate sumps will be checked for proper operation.
- Blowers and flares will be inspected for proper operation.

6.4 GCCS Regulatory Applicability

Camelot Landfill is currently authorized by two separate 30 TAC Chapter 116 Air standard permits registration No. 75220 for the landfill issued on March 30, 2005 and registration No. 75222 for the flare issued on March 31, 2005. The site's initial Title V permit (General Operating Permit) authorization to operate No. O-02376 was approved on April 20, 2007. The site will maintain compliance with these air permits at all times.

The site conducted a Tier 2 Nonmethane Organic Compound (NMOC) Emission Rate Test on January 14, 2008 through January 17, 2008 in accordance with the requirements in 40 CFR, Part 60, Subpart WWW, New Source Performance Standards for MSW Landfills (NSPS). The Tier 2 test determined that the site will be below the NSPS compliance threshold of 50 megagrams per year for the next 5 years (i.e., through 2012).

As such, the site is currently not required to install and operate a Landfill Gas Collection and Control System (GCCS) in accordance with 40 CFR, Part 60, Subpart WWW. However, to reduce internal gas pressures to protect the integrity of the final cover and to control greenhouse gases, additional GCCS components will be installed. These additional GCCS components may be installed proactively before final cover placement to recover LFG for energy production and/or to reduce greenhouse gas emissions.

In addition, the site has an independently owned and operated LFGTE facility, which is authorized by registration by rule No. 48028. The LFGTE facility is also authorized by a standard air permit No. 91989 and Title V permit No. O-03390. The air permit and Type IX registration approval letters have been included in Appendix III I-G.

APPENDIX III I-A

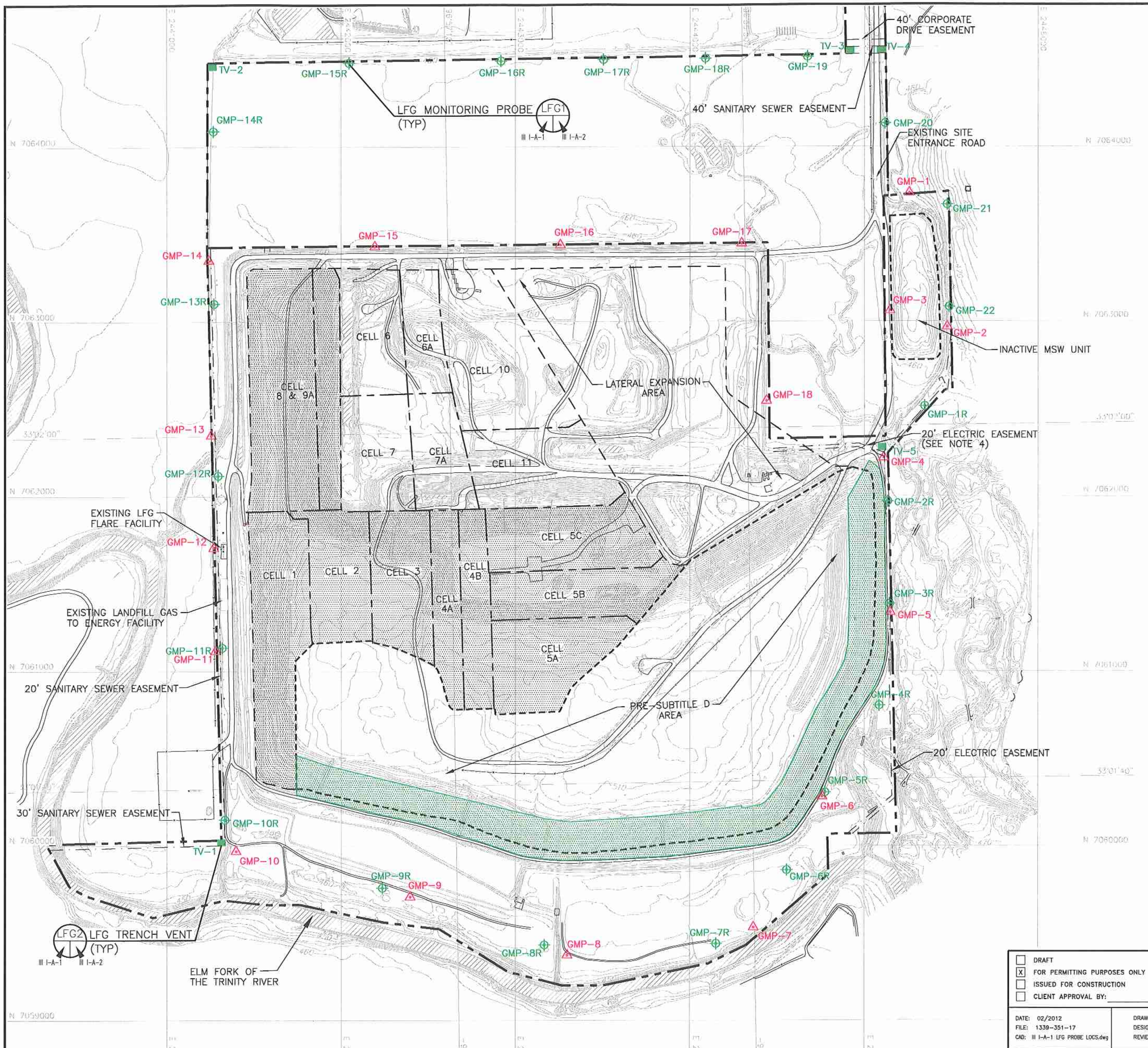
LANDFILL GAS PROBE LOCATIONS

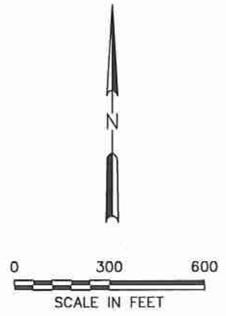
PROPOSED LANDFILL GAS PROBE/TRENCH VENT DETAILS

Includes Figures III I-A-1 and III I-A-2

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER

J. Heath Parker
2/23/12





STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER
J. Heath Parker
2/23/12

LEGEND:

━━ ━ ━━	CURRENT PERMIT BOUNDARY (PERMIT NO. MSW-1312A)
━━ ━ ━ ━━	PROPOSED PERMIT BOUNDARY
- - - - - - -	AUTHORIZED PRE-SUBTITLE D AREA LIMIT OF WASTE (PERMIT NO. MSW-1312A)
— — — — —	AUTHORIZED SUBTITLE D AREA LIMIT OF WASTE (PERMIT NO. MSW-1312A)
— — — — —	PROPOSED LIMITS OF WASTE
430	EXISTING CONTOURS
N 7062000	STATE PLANE COORDINATES
33°02'00"	GEODETIC COORDINATE SYSTEM
— · — · —	EASEMENT
—x—x—	EXISTING FENCE
▨	EXISTING SUBTITLE D COMPOSITE LINER AREA
🟩	CONSTRUCTED FINAL COVER
△ GMP-8	EXISTING LANDFILL GAS MONITORING PROBE (TO BE ABANDONED)
⊕ GMP-20	PROPOSED LANDFILL GAS MONITORING PROBE
■ TV-4	PROPOSED TRENCH VENT

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-10. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. LOCATIONS OF THE PROPOSED LANDFILL GAS MONITORING PROBES AND TRENCH VENTS ARE APPROXIMATE. ACTUAL LOCATIONS MAY VARY DUE TO FIELD CONDITIONS AT THE TIME OF INSTALLATION.
4. THIS 20-FOOT ELECTRICAL EASEMENT PROVIDES ELECTRICITY TO THE TEMPORARY MAINTENANCE AREA. THE EASEMENT WILL BE ABANDONED PRIOR TO DEVELOPMENT IN THIS AREA.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-17
CAD: III I-A-1 LFG PROBE LOCS.dwg

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
LANDFILL GAS PROBE LOCATIONS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

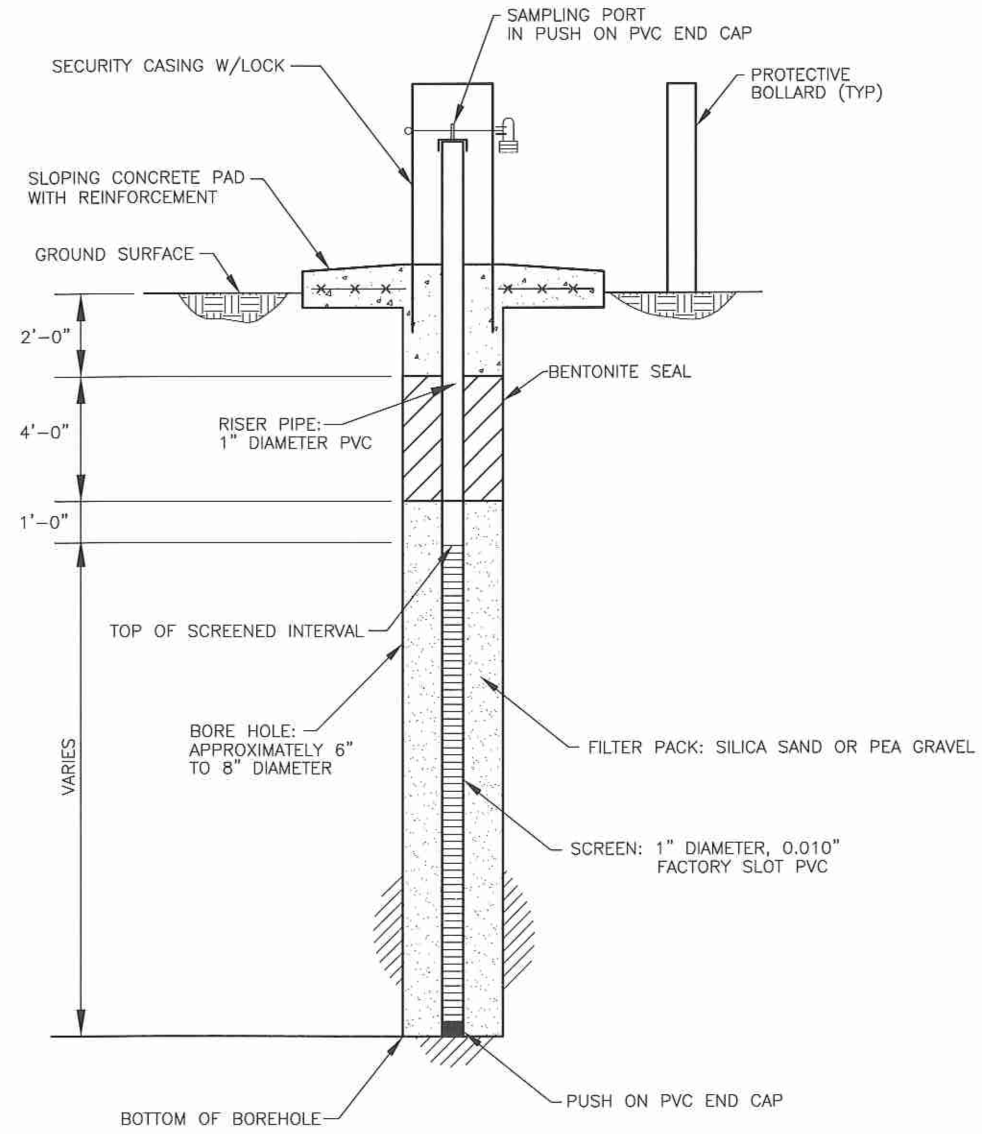
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I-A-1

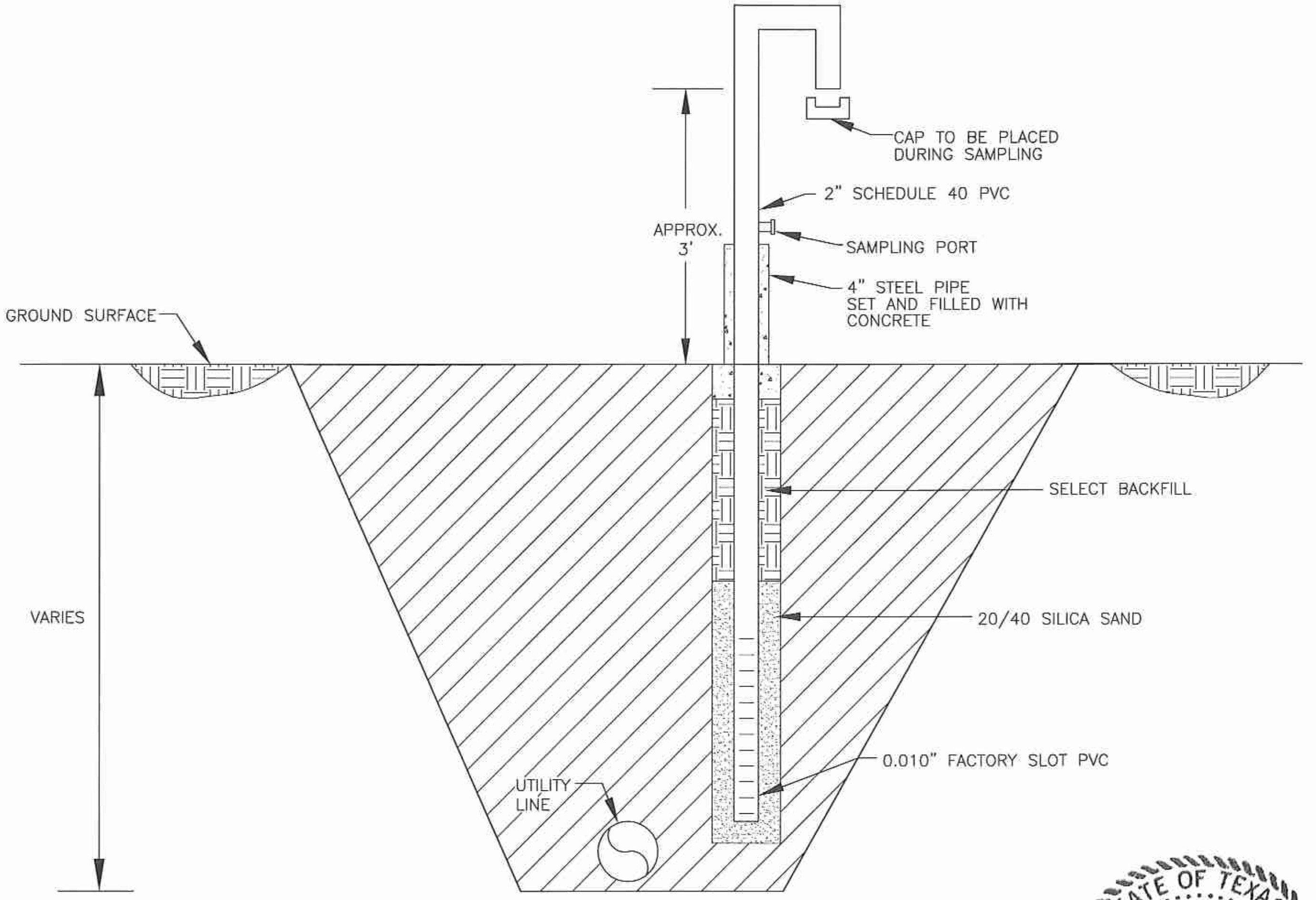
O:\1339\351\EXPANSION 2009\PART III-SDP\III\III I-A-1 LFG PROBES.dwg, jwilson, 1:2



LFG MONITORING PROBE (LFG1)
NTS
III I-A-1 III I-A-2

NOTES:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.
2. ACTUAL LOCATION OF LFG MONITORING PROBE WILL BE DETERMINED BASED ON FIELD CONDITIONS AT THE TIME OF CONSTRUCTION.



LFG TRENCH VENT (LFG2)
NTS
III I-A-1 III I-A-2

NOTE:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.

J. HEATH PARKER
94764

J. Heath Parker
2/23/12

O:\1339\351\EXPANSION 2009\PART III-SDP\III\III I-A-2 PROBE DETAIL.dwg, jwilson, 1:2

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-17
CAD: III I-A-2 PROBE DETS.dwg
DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

REUSE OF DOCUMENTS

PREPARED FOR
CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
PROPOSED LANDFILL GAS
PROBE/TRENCH VENT DETAILS
CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I-A-2

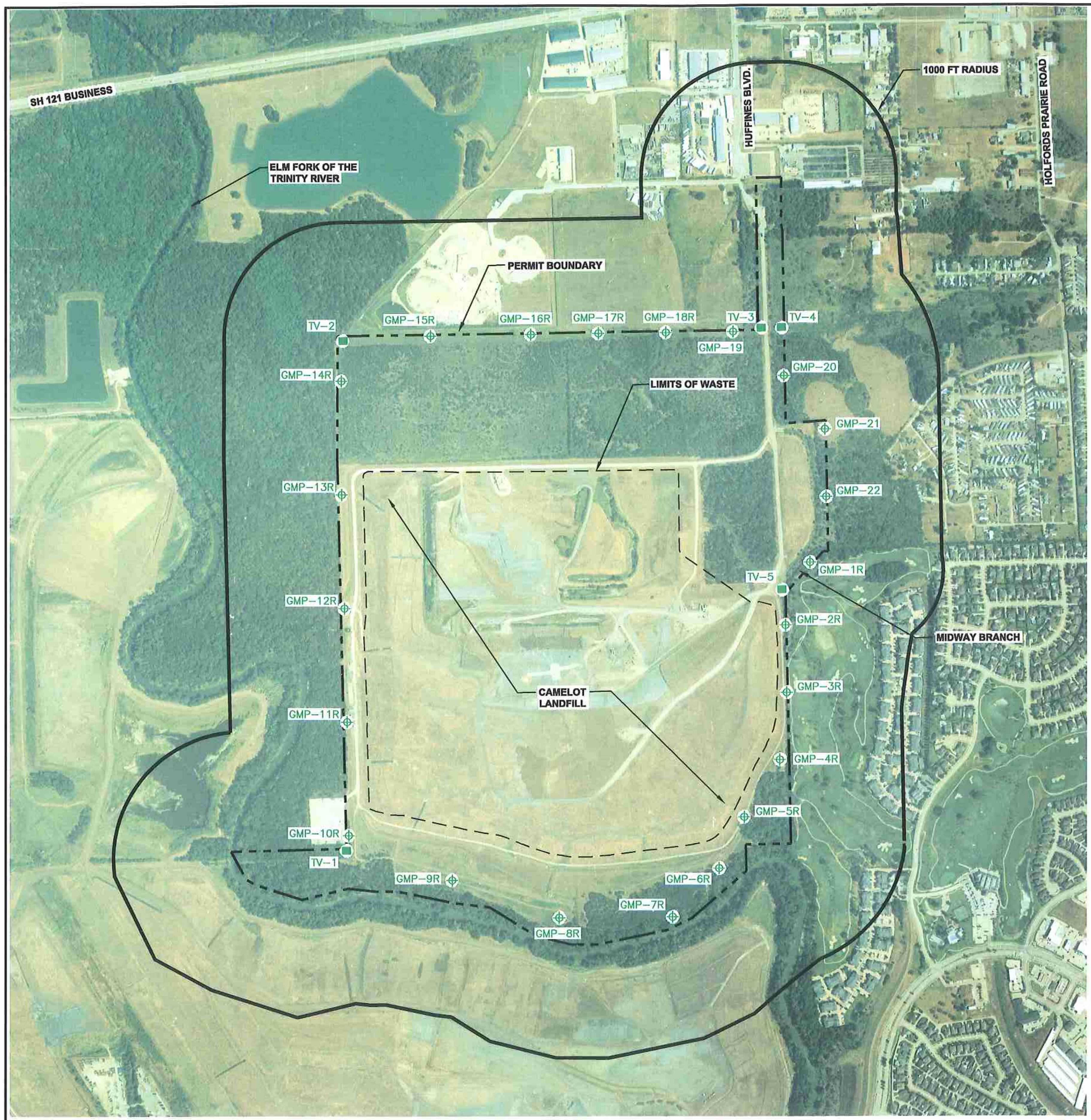
APPENDIX III I-B

SURROUNDING DEVELOPMENT MAP

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER

J. Heath Parker
2/23/12

Includes Figure III I-B-1



N

0 500 1000
SCALE IN FEET

LEGEND:

▬ ▬ · ▬ · ▬	PERMIT BOUNDARY
— — — — —	LIMIT OF WASTE
▬▬▬▬	1,000 FT RADIUS
⌖ GMP-20	PROPOSED LFG MONITORING PROBE
■ TV-4	PROPOSED TRENCH VENT

NOTE:

1. AERIAL PHOTOGRAPH PROVIDED BY METROPOLITAN AERIAL SURVEYS, FROM AERIAL PHOTOGRAPHY FLOWN ON AUGUST 28, 2010.

J. HEATH PARKER
94764

J. Heath Parker
2/23/12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ______

DATE: 02/2012
FILE: 1339-351-17
CAD: III I-B-1 DEVELOPEMNT MAP.dwg

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
SURROUNDING DEVELOPMENT MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I-B-1

O:\1339\351\EXPANSION 2009\PART III-SDP\IIII\III I-B-1 SURROUNDING DEVELOPMENT.dwg, jwilson, 1:2

APPENDIX III I-C

LANDFILL GAS
MONITORING REPORT FORM

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER

J. Heath P

2/23/12

CAMELOT LANDFILL
LANDFILL GAS MONITORING REPORT FORM

Sampled by:______________________________ Date:____________________
Time:________(Start) __________ (Finish) Temperature:__________________
Weather:_______________________ Barometric Pressure (optional):_____________
Monitoring Equipment:_________________ Date of Calibration:______________

PROBE NO.	SURFACE ELEVATION ft-msl	BOTTOM ELEVATION ft-msl	% METHANE 0-100	%[1] LEL 0-100	STATIC PRESSURE "w.c."[2] (Optional)	O_2 % (Optional)	PROBE INTEGRITY VERIFIED Yes/No

ONSITE STRUCTURES	Verify if Continuous LFG Alarm is Operational (Circle One)		Continuous LFG Alarm Activated (LEL>25%) During Previous Quarter (Circle One)	
	YES	NO	YES	NO
	YES	NO	YES	NO
	YES	NO	YES	NO
	YES	NO	YES	NO
	YES	NO	YES	NO

1 % LEL = (20) x (observed % methane) - Note: Record >100% in LEL column if percent methane is over 5%.
2 "w.c. – Inches Water Column

APPENDIX III I-D

TYPICAL MONITORING EQUIPMENT MANUFACTURERS' INFORMATION

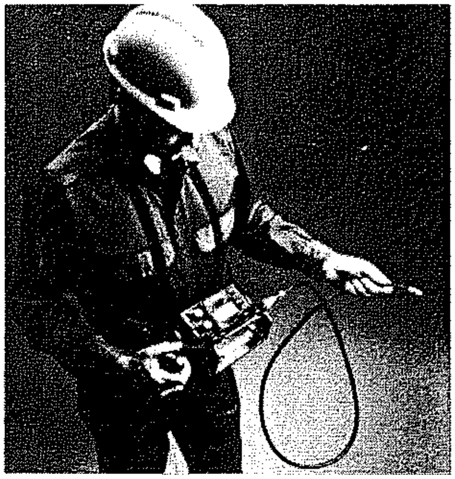
STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER

J. Heath P

2/23/12

GASCOPE® COMBUSTIBLE GAS INDICATORS

08-01-04



FEATURES

- Effective measurement of combustible gases and vapors
- Excellent for pinpointing leaks
- 3 Models to meet differing detection needs
- Impact-resistant, waterproof case
- Equipped with neck and waist straps for hands-free operation

DESCRIPTION

Gascope Combustible Gas Indicators are portable instruments for use in detecting, measuring and pinpointing leaks of combustible gases and vapors. Housed in a high-impact-resistant and waterproof case, Gascope units measure 6 1/2" high by 7 1/4" long by 4" wide. Each unit is easily carried with integral neck and waist straps, leaving hands free for climbing, operating the instrument, or carrying additional equipment.

Meter movement is of core magnet type to prevent errors caused by stray magnetic fields such as those encountered in manholes or electric utility vaults.

The gas flow is cast as an integral part of the case, eliminating internal bing and connections, and the possibility of leaks that could dilute samples. Flow systems incorporate a cylindrical filter chamber; the standard cotton filter prevents dirt from entering the system. A special charcoal filter can be used when necessary to distinguish between natural gas and petroleum vapors. A special line trap assembly is available to prevent water from being drawn into the indicator.

Powered by 8 zinc carbon batteries, Gascope Indicators can operate continuously for over 8 hours.

A panel indicator signals the unit's operational readiness, as well as the strength of the batteries.* Separate adjustment knobs for each measuring circuit are clutch-type to help prevent accidental changing of zero settings. A hinged case lid, with operating instructions affixed to the inside, protects the unit when not in service. When in use, the lid lies flat against the back of the case. The instrument is utomatically turned off when the lid closed.

Three Gascope Combustible Gas Indicator Models

The Model 60 is designed for use by gas utility companies in routine testing for methane-in-air concentrations in manholes, sewers, curb boxes and other street openings. The unit reads 0 to 5% by volume methane-in-air, and 0-100% by volume methane-in-air.

The Model 62S , also suitable for use by gas utility companies, is designed for reading 0-100% LEL methane-in-air and 0-100% by volume methane-in-air.

The Model 62 is designed for general industrial use. The unit provides quick detection of most combustible gases and, therefore, has a number of applications, such as testing tank and vessel interiors; locating pipeline and process system leaks; and checking nfined areas in steel mills, paint ctories, sewage disposal plants, chemical manufacturing facilities and other industrial applications. The unit is factory-calibrated on pentane-in-air to simulate the qualities of petroleum vapors. The Model 62 reads 0-100% LEL pentane-in-air and 0-100% by volume pentane-in-air.

APPROVALS & STANDARDS

Gascope Combustible Gas Indicators have been tested to Factory Mutual Approval standard for Combustible Gas Detector, Class Nos. 6310-6330 (7/1/78). Suitable for use in Class I, Division 1, Groups C and D hazardous locations as defined by the National Electrical Code.

OPERATION

The Gascope Combustible Gas Indicator is prepared for operation by turning the switch to the ON position, and setting the selector switch for high or low scale. A sample is drawn in by squeezing the aspirator bulb. The instrument uses two different types of filaments: a catalytic combustion filament for the low range, and a thermal-conductivity filament for the high range.

Concentrations on the low ranges are measured by the hot-wire, Wheatstone bridge method. The filament is one arm of the bridge. When a gas sample is passed across this filament, combustibles are burned, raising the temperature of the filament. As a result, resistance is increased and the bridge becomes unbalanced.

The imbalance is proportional to the concentration of the combustibles, and is indicated on the low range of the meter.

For measuring in or above the explosive range, a thermal-conductivity filament is used. Combustibles in the sample cool this filament, causing the Wheatstone bridge to go out of balance. The imbalance, proportional to the gas concentration, is measured by the meter and read as percent-by-volume. The filament is field replaceable.

LIMITATIONS

Silanes, silicones, silicates and other compounds containing silicon in the tested atmosphere may seriously impair the response of this instrument. Some of these materials rapidly poison the catalytic combustion filament so that it will not function properly. When there is even a suspicion that such materials are in the atmosphere being tested, the instrument must be checked frequently (at least once every five uses). Calibration kits are available to conduct this test. Leaded gasoline vapors can also poison the catalytic combustion filament. To prevent this, an inhibitor filter (Part No. 47740) should be used to nullify their effect.

ORDERING INFORMATION

Gascope Combustible Gas Indicator: Complete with carrying straps and batteries, less sampling line

Part No.	**Description**
465475	Utility Model 60
465681	Model 62
468410	Utility Model 62S

ACCESSORIES

Sampling Lines: For testing out-of-the-way areas. Available in various lengths on multiples of 5 feet. These nonabsorbent, synthetic rubber sampling lines have couplings for connecting to the instrument and a probe tube or rod, or to another length of sampling line.

Sampling Lines

Part No.	**Description**
11354	5-foot
11955	10-foot
11912	15-foot
11913	25-foot
11957	35-foot
11958	50-foot

---

* U.S. Patent No. 4,127,024 dated Nov.28, 1978 covers battery voltage regulating and condition indicating circuit for measuring instruments.

Hollow Probe Tubes: For sampling from manholes or barholes.

Part No.	Description
73743	3-foot Hollow Dielectric Plastic Probe Tube
11961	3-foot Hollow Brass Probe Tube
486934	20-inch Hollow Dielectric Plastic Probe Tube

Solid 4-foot Probe Rod: For testing tanks or other vessels which may contain liquids. The probe rod prevents liquids from being drawn into the system.

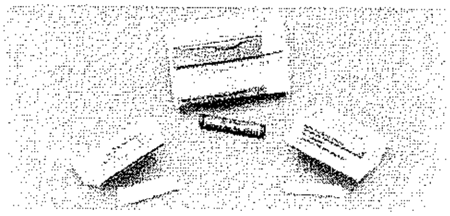
Part No.	Description
11960	4-foot Solid Probe Rod

Charcoal Cartridge: To distinguish between combustible hydrocarbon vapors and natural gas. Used with the External Cartridge Holder, the cartridge absorbs hydrocarbon vapors. The difference in the readings with and without the charcoal cartridge indicates that either vapor, gas or a combination of the two is present in the sample.

Part No.	Description
14318	Charcoal Filters; pkg of six (required for detecting petroleum vapors in natural gas)

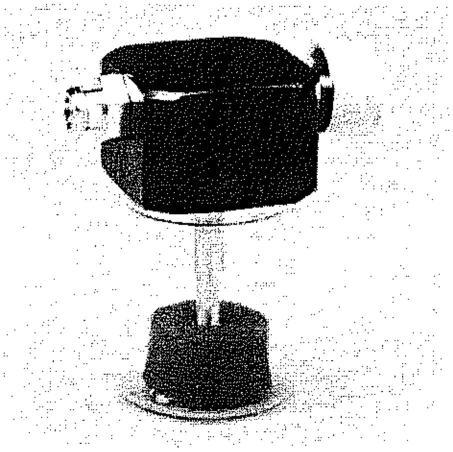
Inhibitor Filters: For testing air contaminated with leaded motor fuels. Used with the External Cartridge Holder, the inhibitor filter can be inserted in the filter chamber of the Gascope Indicator. This device reacts with the tetraethyl-lead compound and presents poisoning of the catalytic platinum filament.

Part No.	Description
47740	Inhibitor Filters, pkg of six (required for measurements in lead-contaminated atmospheres)



Cotton Filters: For general purpose use in environments containing airborne dust and particulates. Used with the External Cartridge Holder.

Part No.	Description
16499	Cotton filters, pkg of six

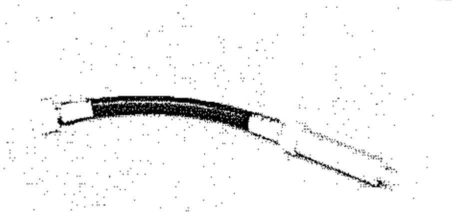


Line Trap Assembly: For trapping liquids in the sample. Has a removable plastic jar. Assembly is easily mounted on the outside of the case.

Part No.	Description
74814	Line Trap Assembly

Water Trap System: Disposable filter with fittings for trapping liquids and dirt in the sample. Assembly is easily mounted to inlet fitting on the outside of the case.

Part No.	Description
497199	Water Trap System
497200	Replacement filters for water trap system, pkg. of 5



External Cartridge Holder: To hold Charcoal Cartridge, Lead Inhibitor and Cotton Filters. Attaches to the sample line connection of the instrument

Part No.	Description
14273	External Cartridge Holder

Part No.	Description
471113	Case, carrying

Calibration Check Kit, Model R

Part No.	Description
476609	Calibration Check Kit, Model R, with 1.5 L/m regulator, complete, (less calibration gas) including: 459948 Regulator (1.5 L/m) 449401 Adapter Hose (with sampling line connection)
459945	Calibration Check Gas Cylinder (2% Methane-in-air)
459942	Calibration Check Gas Cylinder (2.5% Methane-in-air)

REPLACEMENT PARTS

Part No.	Description
11355	Catalytic Filament (black base)
74730	Thermal Conductivity Filament (white base)
30052	Batteries, (eight "D" cells required), Carbon Zinc
16839	Aspirator Bulb (complete with check valves)
466520	Instruction Manual, Model 60
465919	Instruction Manual, Model 62
468453	Instruction Manual, Model 62S

e: This Data Sheet contains only a general description of MSA ope Combustible Gas Indicators. While uses and performance abilities are described, under no circumstances should these products be used until the instructions, labels or other literature accompanying the products have been read and understood and the precautions therein set forth followed. Only they contain the complete and detailed information concerning these products.

MSA
Offices and representatives in principal cities worldwide.
In U.S. call nearest stocking location toll free at 1-800-MSA-2222.
For MSA International, call (412) 967-3249 or Fax (412) 967-3451.

Corporate Headquarters: P.O. Box 426, Pittsburgh, PA 15230 USA.

Printed in U.S.A. 9111(L)

INFRARED GAS ANALYZER

LANDTEC

GEM™2000

PORTABLE GAS ANALYZER INSTRUMENTATION

The GEM™2000 combines the GEM™500 and the GA-90 into one faster, more accurate, intrinsically safe instrument

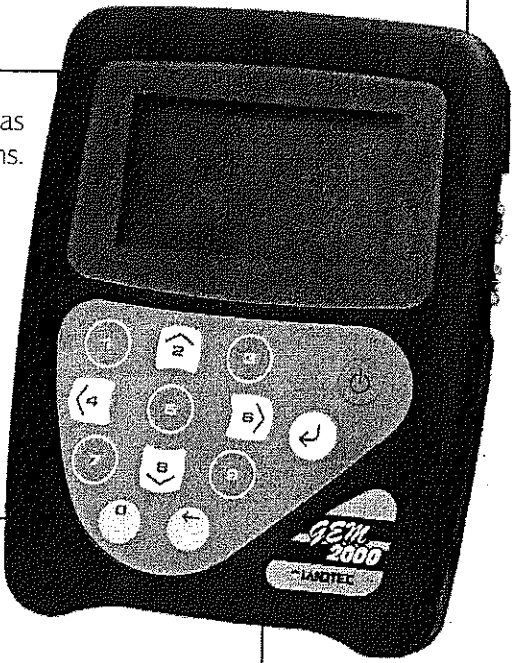
The GEM™2000 design specifically for use on landfills to monitor landfill gas (LFG) extraction systems, flares, and migration control systems. The GEM™2000 samples and analyzes the methane, carbon dioxide and oxygen content of landfill gas.

Features

- Measures % CH_4, CO_2 and O_2 Volume, static pressure and differential pressure
- Calculates balance gas, flow (SCFM) and calorific value (KW or BTU)
- Displays % LEL of CH_4, and user-defined comments
- Records site and well conditions
- Extended operation (10 - 14 hrs use from one charge)
- Certified intrinsically safe for landfill use
- Two instruments in one (GA and GEM mode)

Benefits

- Designed specifically for use on landfills to monitor landfill gas (LFG) extraction systems, flares, and migration control systems.
- No need to take more than one instrument to site
- Can be used for routine sub-surface migration monitoring of landfill site perimeter probes and for measuring gas composition, pressure and flow in gas extraction systems
- The user is able to set up comments and questions to record information at site and at each sample point
- Ensures consistent collection of data for better analysis
- Allows balancing of gas extraction systems



Applications

- Landfills
- Gas Extraction Wells
- Flare Monitoring
- Subsurface Migration Probes

850 South Via Lata, Suite 112 Colton, CA 92324 Phone (800) LANDTEC, (909) 783-3636
Visit our web site at http://www.LANDTECNA.com

Technical Specification

Gases Measured	CH_4, CO_2, by dual wavelength infrared cell with reference channel. O_2 by internal electrochemical cell

CH_4	0-100% Reading		
CO_2	0-100% Reading	O_2	0-25%

Gas Accuracy	CH_4	CO_2	O_2
0-5%	±0.3%	±0.3%	±1.0%
5-15%	±1.0%	±1.0%	±1.0%
15% - Full Scale	±3.0%	±3.0%	±1.0%

Other Parameters	Unit	Resolution	Comments
Energy	BTU/hr	1000 BTU/hr	Calculated from specific parameters.
Static Pressure	in.H_2O	0.1 in.H_2O	Direct Measurement
Differential Pressure	in.H_2O	0.001 in.H_2O	Direct Measurement

Flow	Typically 300 cc/min
Flow with 5.9 in.Hg vacuum	Approximately 250 cc/min
Operating Temperature Range	32°F - 104°F
Operating Pressure	-100 in. H_2O, +100 in. H_2O
Relative Humidity	0-95% non condensing
Barometric Pressure	±5.9 in.Hg from calibration pressure
Barometric Pressure Accuracy	±1% typically
Battery Life	Typical use 10 hours from fully charged
Charge Time	Approximately 2 hours from complete discharge.
Certifications	UL- Certified to Class 1, Zone 1, AEx ib d IIa T1

SWANA MEMBER

The Climate Registry

ISWA International Solid Waste Association

LANDTEC North America
Western Sales Office
(800) 821-0496 • Fax (909) 825-0591
Eastern Sales Office
(800) 390-7745 • Fax (301) 391-6546

LANDTEC South America
+55(11) 5181-6591 • Fax +55(11) 5181-6585
www.LANDTEC.com.br

CERTIFIED ISO 9001

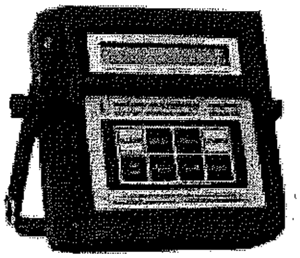
CTS-GEM2000 Rev 4 02-09

AIR VELOCITY/PRESSURE METER

CleanAir

CleanAir Instrument Rental
500 W. Wood Street
Palatine, IL 60067-4975
800-553-5511
www.cleanair.com

Shortridge AirData Multimeter ADM-860C



The ADM-860C Includes:

- Multimeter
- VelGrid
- Standard Pitot (90°angle)
- AirFoil Probe, Two (2) static pressure probes
- TemProbe w/Flexible Extension
- Captive Knob Screw
- Push Handle & Plug
- Extension Rods
- Battery Charger
- WinWedge® Software, RS232 Download Cable
- Instrument Rental Shipping Carton
- Instruction Manual w/Certification Sheet

Specifications:

- Approximate Shipping Weight: 21 lbs.
- Air Velocity: ± 3% of reading ± 7 fpm 50 to 8,000 fpm pitot tube (30,000 fpm FS); 50 to 5,000 fpm AirFoil; 50 to 2500 fpm VelGrid. Pitot tube velocity readings from 8,000 fpm to 30,000 fpm are based on compressible isentropic flow theory and are not certified NIST traceable.
- Differential Pressure: Measured in inches of water column (wc) or Pascals (Pa). ± 2% of reading ± 0.0001 in wc with 4 place resolution from 0.025 to 50.00 in wc. 20 psid maximum safe pressure.
- TemProbe: 0.1° F resolution. Accuracy is ± 0.5° F from 32° F to 158° F. Safe range for
- TemProbe is -100° F to +250° F
- Absolute Pressure: ± 2% of reading ± 0.1 in Hg from 14 to 40 in Hg referenced to vacuum. 60 psia maximum safe pressure.
- Air Density Correction: Local air density correction range is 14 to 40 in Hg and -67° F to 250° F.
- Position Sensitivity: Unaffected by position/motion.
- Memory: 100 readings, sequence labeled, sum, average, maximum and minimum.
- Calibration: certified, NIST traceable standards.
- Readout: 10 digit, , liquid crystal display.
- Output: RS-232
- Meter Housing: 6.0" x 6.4" x 2.7" high impact ABS.
- Connections: 1/4" OD slip-on for 3/16" ID soft tubing.
- Response Time: Five seconds or less at pressures greater than .002 in wc (180fpm), and up to eight seconds at less than .0003 in wc (70 fpm).
- Operational Temperature Limits: The specified accuracy for measurements is maintained over a meter exposure temperature range of 40° F to 140° F
- Air Bleed: Each pressure measurement requires a small volume of air to pass through the meter. The pressure source must be capable of supplying this volume without significant depletion to ensure accurate measurements. Bleed through (typ) 0.0004 cu in/in wc/measurement. Quiescent bleed through (max) 0.0005 cu in/in wc/minute.
- Battery Life: 2000 readings per charge, 500 recharge cycles.
- The battery charger requires 120VAC, 60Hz, 8W. Batteries recharge in a maximum of 10 hours, and may be left on charge for an unlimited time without harm. The temperature of the instrument during charge should be kept between 40°F and 113° F (5° C to 45 ° C). The meter is fully operational during recharge.

CleanAir®

CleanAir Instrument Rental
500 W. Wood Street
Palatine, IL 60067-4975
800-553-5511
www.cleanair.com

Shortridge AirData Multimeter ADM-860C

Rental/Application Notes:

- Air Velocity readings are displayed as local density, true air velocity or flow.
- Internal calibration, temperature compensation, range selection and zeroing are fully automatic with each reading. No external adjustments needed.
- The memory feature of the ADM-860 can store up to 100 readings for individual recall, and can give a reading total and average. This simplifies pitot tube traverses, the averaging of face velocities, temperatures and static pressures, and the recording of outlet readings.
- The ADM-860C can store and download data via an RS-232 connection. The data can be sent to a printer (not included) or to a PC where it can be used with WinWedge® software.
- The maximum recommended length of pneumatic tubing for the measurement of airflow, velocity, or differential pressure is 18 feet. Minimum tubing size is ID 3/16".
- Equipment must be returned in its original packaging

WATER LEVEL INDICATOR

HERON
INSTRUMENTS
Groundwater Monitoring INC.

Heron Water Tape Water Level Indicator

Model: Water Tape (Economy Model)
Length Options: 100ft/30m to 1500ft/450m

The Water Tape

The economical **Water Tape** water level indicator is used for measuring the depth of water in wells, boreholes and standpipes. The **Water Tape** will signal water with a bright LED light and solid tone buzzer allowing the user to make water level measurements accurate to 1/100th ft or to each millimeter. The **Water Tape** signals when contact is made with water, the water shorts the probe tip and body to complete a circuit. There is no on/off switch. The switch is the water.

Water Tape Specifications:

The **Water Tape** uses a high quality polyethylene tape that is indelibly heat stamped with markings in engineering scale in either feet and tenths or meters and centimeters. This rugged tape is reinforced with Kevlar fibers for strength and the stranded stainless steel conductors within the tape are non-corrosive ensuring the long life of the unit. The flexible tape winds smoothly onto the tough Nylon reel, and hangs straight in the well.

Water Tape Electronic Module Specifications:

The **Water Tape** includes a fully potted, fully field removable electronic module. The super bright red LED and buzzer are housed inside this water tight module. The electronic circuit converts the DC battery current to an alternating current; this prevents corrosion and mineral buildup on the probe. The **Water Tape** works on one 9 volt battery in an easy access battery drawer mounted on the front of the module.

Water Tape Probe Specifications:

The **Water Tape** comes with a standard 5/8 inch (16mm) diameter fully submersible, leak proof probe up to 1500ft/450m. The **Water Tape** probe has been especially designed for easy cleaning by removing any holes and recesses that would allow for the buildup of contaminates. The stainless steel probe is 7 inches (30mm) in length and is attached to the tape using a flexible linking device that allows the tape and probe to be protected at this vital junction.

Water Tape Reel Specifications:

The **Water Tape** is a well balanced unit. The stand-alone, sturdy steel frame is coated in Polyurethane for durability. The Vinyl coated carry handle is ergonomically designed for comfort and easier rewinding. The reel flanges and center hub are molded from high strength Nylon turning on a stainless steel axle allowing the smooth running of tape up and down the well or borehole. The third hand well casing hanger and tape guide are standard features on all Heron water level indicators. (Excluding **little dipper**)

Features to remember:

- Economically priced
- High quality polyethylene reinforced with Kevlar fibers
- Submersible pressure/depth rated probe included.
- Tape guide and third hand well casing hanger included.
- Heron Enviro carry bag included.

Options:

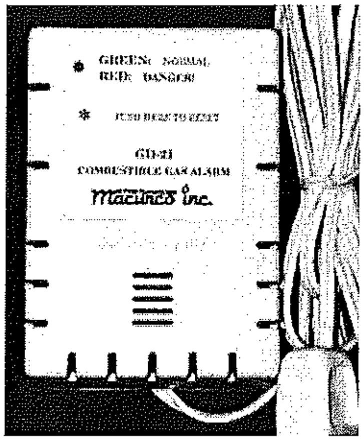
- Well depth indicator probe
- Well casing indicator probe
- Narrow 3/8 probe
- Potable Water Only model

CONTINUOUS COMBUSTIBLE GAS METER/ALARMS

GAS DETECTION
Macurco

COMBUSTIBLE GAS ALARM

Residential landfill buildings commercial



GD-21

- 120 VOLT PLUG IN UNIT
- ATTRACTIVE CASE
- LOUD BUZZER ALARM
- EASY INSTALLATION
- GAS DETECTION IS FIRE PREVENTION

FEATURES:

- Detects many combustible gases: Natural Gas, LP, Propane, Butane, and Gasoline Fumes.
- Standard Calibration setting is 25% of LEL (Lower Explosive Limit) for natural gas.
- Loud Buzzer (similar to a smoke alarm buzzer) wakes even heavy sleepers.
- Stand Alone Unit: Plug into any 120 VAC power outlet.
- Ignition protected: Explosion Proof Design.
- Maintenance free electronic sensor, supervised.
- Small, compact, attractive white case.
- Easy to install: Just hang unit on a screw or nail, and plug it in.
- Special calibrations are available.

SPECIFICATIONS:

POWER: 120 VAC, 60 Hz
CURRENT: Less than 10 watts
SHIPPING WEIGHT: 1 lb
COLOR: White
ALARM SOUND: 88 dB @ 10 ft
ALARM SET POINT: 25% of LEL natural gas
SENSOR MAINTENANCE: none
SENSOR LIFE: 7 – 10 years
SIZE: 4½ x 3¼ x 1¾ inches

DETECTOR LOCATION:

WHERE: Gas detectors should be placed near the source of the potential leak, namely near a gas appliance such as a furnace, water heater, or gas log fireplace. Because of various odors and gases given off in cooking, place the unit near, but not in the kitchen.

MOUNTING HEIGHT: For natural gas and methane which are lighter than air, mount the unit 1 ft below the ceiling. For propane, LP, and other gases that are heavier than air, mount the detector 1 ft above the floor

MANUFACTURER:

Macurco
3946 S. Mariposa Street
Englewood, CO 80110
303-781-4062 Fx: 303-761-6640
www.macurco.com

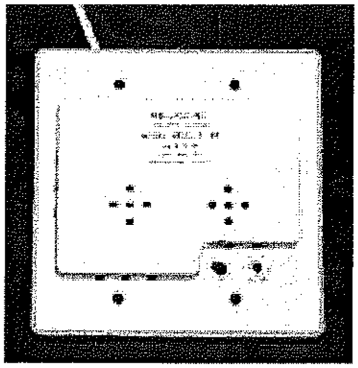
DISTRIBUTED BY:

GAS DETECTION

Macurco inc.

Combustible Gas Detector

Home Furnaces   Telecom Buildings   Landfill Buildings   Commercial Buildings



4S1D-1-BR

Commercial Grade Combustible Gas detector

FEATURES:

- All units individually gas calibrated
- **Detects combustible gases** (Natural Gas, LP, Propane, Butane, and many other hydrocarbons)
- **Standard Calibration** setting is 20% of LEL (Lower Explosive Limit) for natural gas (methane). See list on next page for a partial list of gases that can be detected.
- **Loud Buzzer** (similar to a smoke alarm buzzer) wakes even heavy sleepers.
- **Special Calibrations** are available to meet specific customers needs.
- **Stand Alone Unit.** Powered by 120VAC.
- **Explosion Proof Design.** (Ignition protected)
- **Maintenance free** electronic sensor, supervised
- Mounts on a two gang electrical box and becomes the cover of the box.
- **Gas Detection is Fire Prevention.**

Manufactured By:

Distributed By:

MACURCO INC.
3946 S. Mariposa Street
Englewood, Colorado, USA
303-781-4062 F: 303-761-6640
www.macurco.com

Combustible Gases that the 4S1D-1-BR Can Detect

The following is a partial list of the gases that can be detected. The gases marked with an asterisk (*) can be detected easily with the standard calibration setting of the 4S1D-1-BR. The detector will respond to other gases more slowly or more quickly depending on the hydrocarbon gas present. *Special calibrations are available.*

Acetylene *
Butane *
Ethylene
Hydrogen *
Methane gas *
Natural gas *
Propane *

Alcohol
Ethane
Gasoline fumes *
Kerosene fumes
Methanol
Pentane
Xylenes

Benzene
Ethanol
Jet fuel
Lacquer thinner *
MEK
LP gas *
Jet fuel

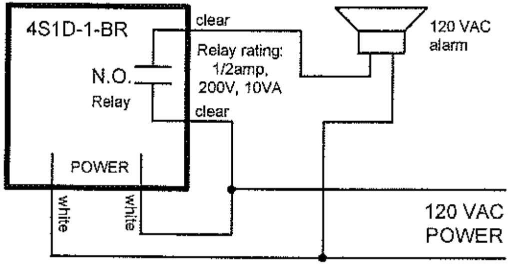
Detector Placement

Where? The 4S1D-1-BR gas detector should be placed near the source of the gas. Typically, units are placed near furnaces, hot water heaters, other gas appliances, gas fireplaces or along the incoming gas lines. Macurco does not recommend placing gas detectors in kitchens or bathrooms, because nuisance alarms can occur. If a detector is required in the kitchen, place the unit as far away from the stove or fryer as possible.

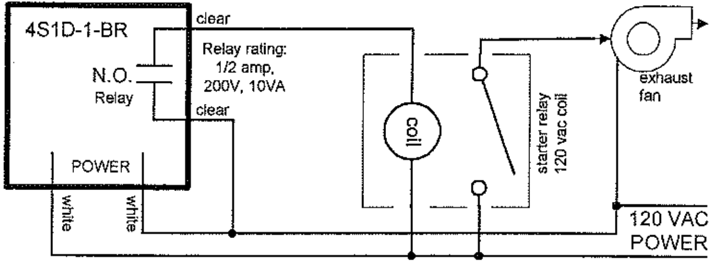
Height? Detectors should be placed close to the ceiling for gases such as natural gas (methane) which are lighter than air. Conversely, with gases like LP/Propane, which are heavier than air, the 4S1D-1-BR should be placed near the floor.

Two Typical Hookups:

Typical connection of 4S1D-1-BR to remote alarm.



Typical connection of 4S1D-1-BR to control exhaust fan



Macurco supplies only the gas detector.

Specifications:

Power	120VAC, 60 Hz
Current:	Less than 10 Watts
Shipping Weight:	Approximately 2 pounds.
Color:	White
Alarm Sound:	85 db at 10 feet
Alarm Relay rating:	0.5 Amps, 200 V, 10 VA
Sensor Maintenance:	Not required
Sensor Life:	7 to 10 years
Size:	4 ½ X 4 ½ X 1 ½ inches

Rev 9/99

APPENDIX III I-E

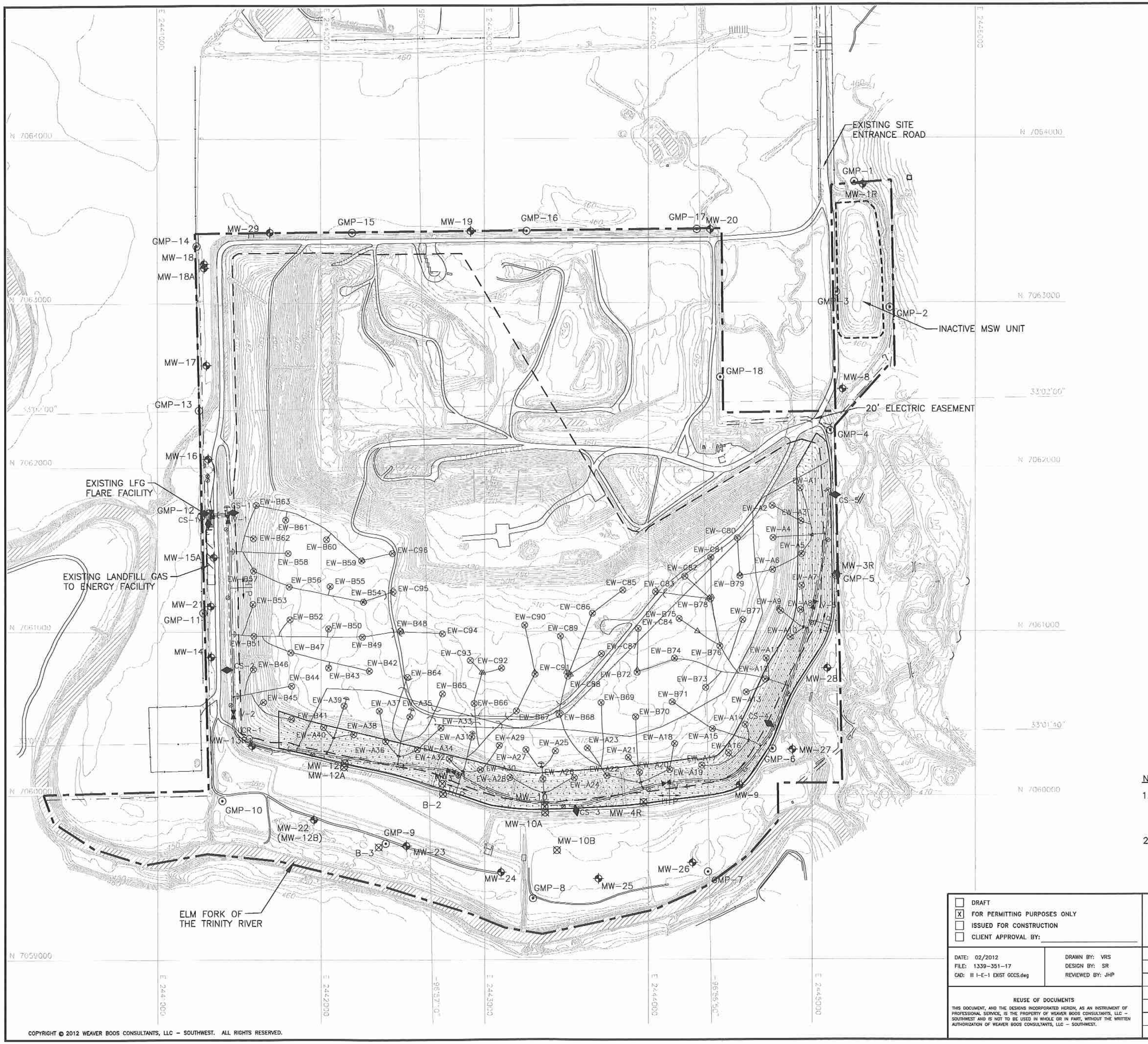
LANDFILL GAS COLLECTION AND CONTROL SYSTEM PLAN

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER

J. Heath P

2/23/12

Includes Figures III I-E-1 Through III I-E-5



O:\1339\351\EXPANSION 2009\PART III-SDP\III\III I-E-1 EXISTING GCCS LAYOUT.dwg, jwilson, 1:2

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED PROFESSIONAL ENGINEER

J Heath Parker
2/23/12

LEGEND:

	CURRENT PERMIT BOUNDARY (PERMIT NO. MSW-1312A)
	AUTHORIZED LIMIT OF WASTE (PERMIT NO. MSW-1312A)
430	EXISTING CONTOURS
N 7062000	STATE PLANE COORDINATES
33°02'00"	GEODETIC COORDINATE SYSTEM
	EASEMENT
	EXISTING FENCE
	CONSTRUCTED FINAL COVER
GMP-15	EXISTING LFG MONITORING PROBE
MW-8	EXISTING GROUNDWATER MONITORING WELL
MW-10	OBSERVATION MONITORING WELL
EW-A15	EXISTING LFG EXTRACTION WELL
△	EXISTING REMOTE WELLHEAD
	EXISTING LFG COLLECTION PIPING
	EXISTING AIR SUPPLY LINE
	EXISTING CONDENSATE FORCEMAIN
CS-2 ◆	EXISTING CONDENSATE SUMP
	EXISTING HDPE CAP
IV-1	EXISTING ISOLATION VALVE
	EXISTING AIR/CONDENSATE ISOLATION VALVE
	EXISTING CONDENSATE BALL CHECK VALVE
LCR-1 ○	EXISTING LEACHATE CLEANOUT RISER CONNECTION
HP	EXISTING HIGH POINT
) (	EXISTING ROAD CROSSING

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-10. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-17
CAD: III I-E-1 EXIST GCCS.dwg

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

REUSE OF DOCUMENTS

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
EXISTING GCCS LAYOUT

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

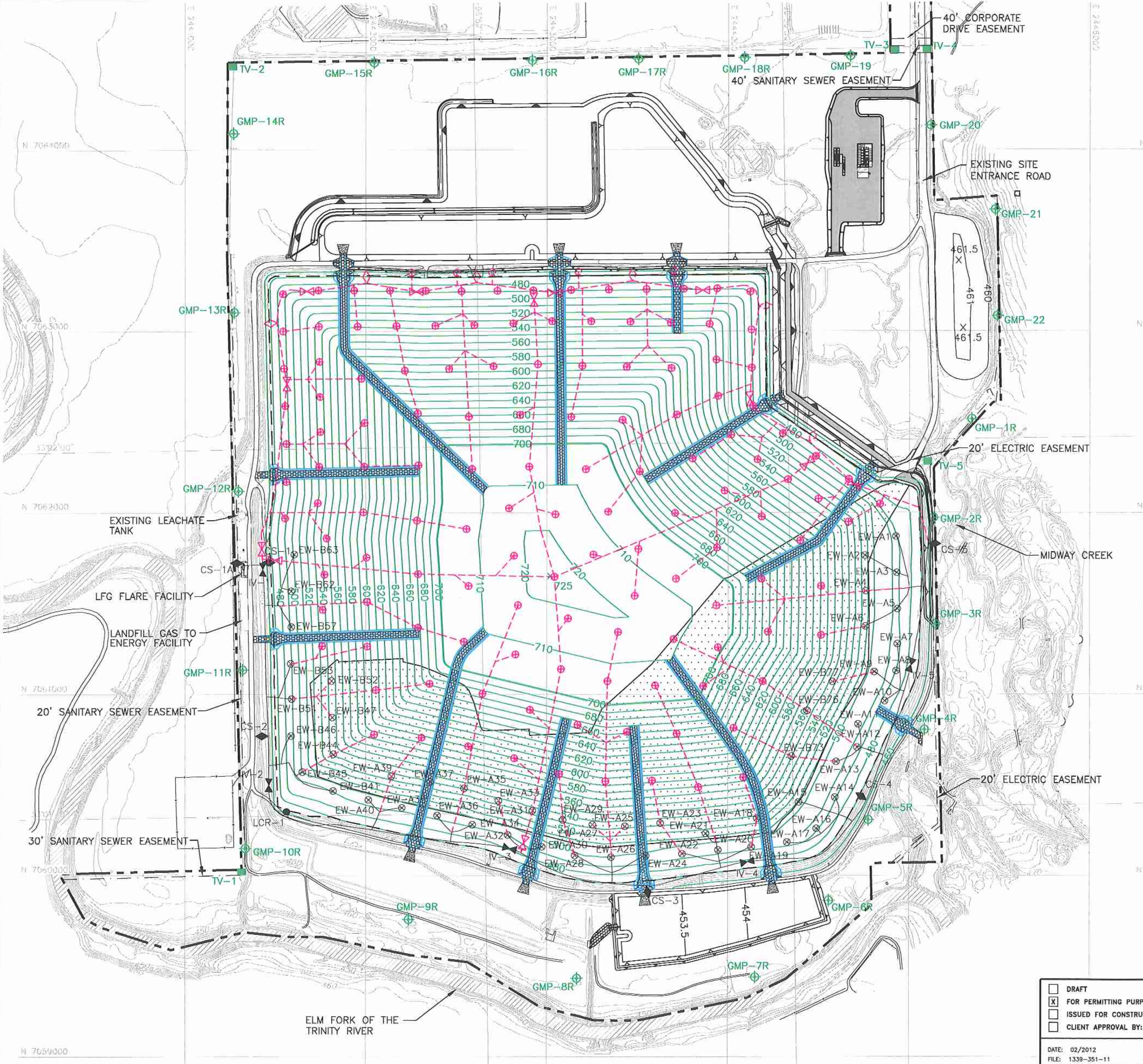
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

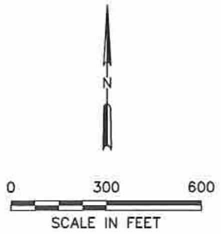
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I-E-1





LEGEND

— · —	PROPOSED PERMIT BOUNDARY
— — —	PROPOSED LIMIT OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
▨	OVERLINER SYSTEM AREA
600	PROPOSED FINAL COVER CONTOUR
600	REGRADED BUFFER ZONE AREA
▨	PROPOSED DRAINAGE LETDOWN
— · — · —	EASEMENT
GMP-20	PROPOSED LANDFILL GAS MONITORING PROBE
TV-4	PROPOSED TRENCH VENT
GMP-8	EXISTING LANDFILL GAS MONITORING PROBE (TO BE ABANDONED)
EW-A7	EXISTING LFG EXTRACTION WELL
——	EXISTING LFG COLLECTION PIPING
CS-2	EXISTING CONDENSATE SUMP
IV-2	EXISTING ISOLATION VALVE
LCR-1	EXISTING LEACHATE CLEANOUT RISER CONNECTION
⊕	PROPOSED LFG EXTRACTION WELL
- - -	PROPOSED LFG COLLECTION PIPING
◇	PROPOSED CONDENSATE SUMP
⋈	PROPOSED ISOLATION VALVE
○	PROPOSED LEACHATE CLEANOUT RISER CONNECTION

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED PROFESSIONAL ENGINEER

J. Heath Parker
2/23/12

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-10. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PREPARED BY PIESER SURVEYING CO. DATED NOVEMBER 2010.
3. THE LOCATION AND NUMBER OF PROPOSED FUTURE EXTRACTION WELLS AND GCCS COMPONENTS ARE APPROXIMATE. EXACT NUMBER AND LOCATION WILL BE DETERMINED BASED ON SITE CONDITIONS AT THE TIME OF INSTALLATION.
4. IN THE OVERLINER AREA WHERE EXTRACTION WELLS HAVE BEEN INSTALLED PRIOR TO THE OVERLINER INSTALLATION, THE EXTRACTION WELLS WILL BE EXTENDED THROUGH THE OVERLINER AS SHOWN IN DETAIL LFG4 OR REDRILLED AS SHOWN IN DETAIL LFG5.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY:

DATE: 02/2012
FILE: 1339-351-11
CAD: III I-E-2-FUTURE GCCS.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT FUTURE GCCS LAYOUT

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

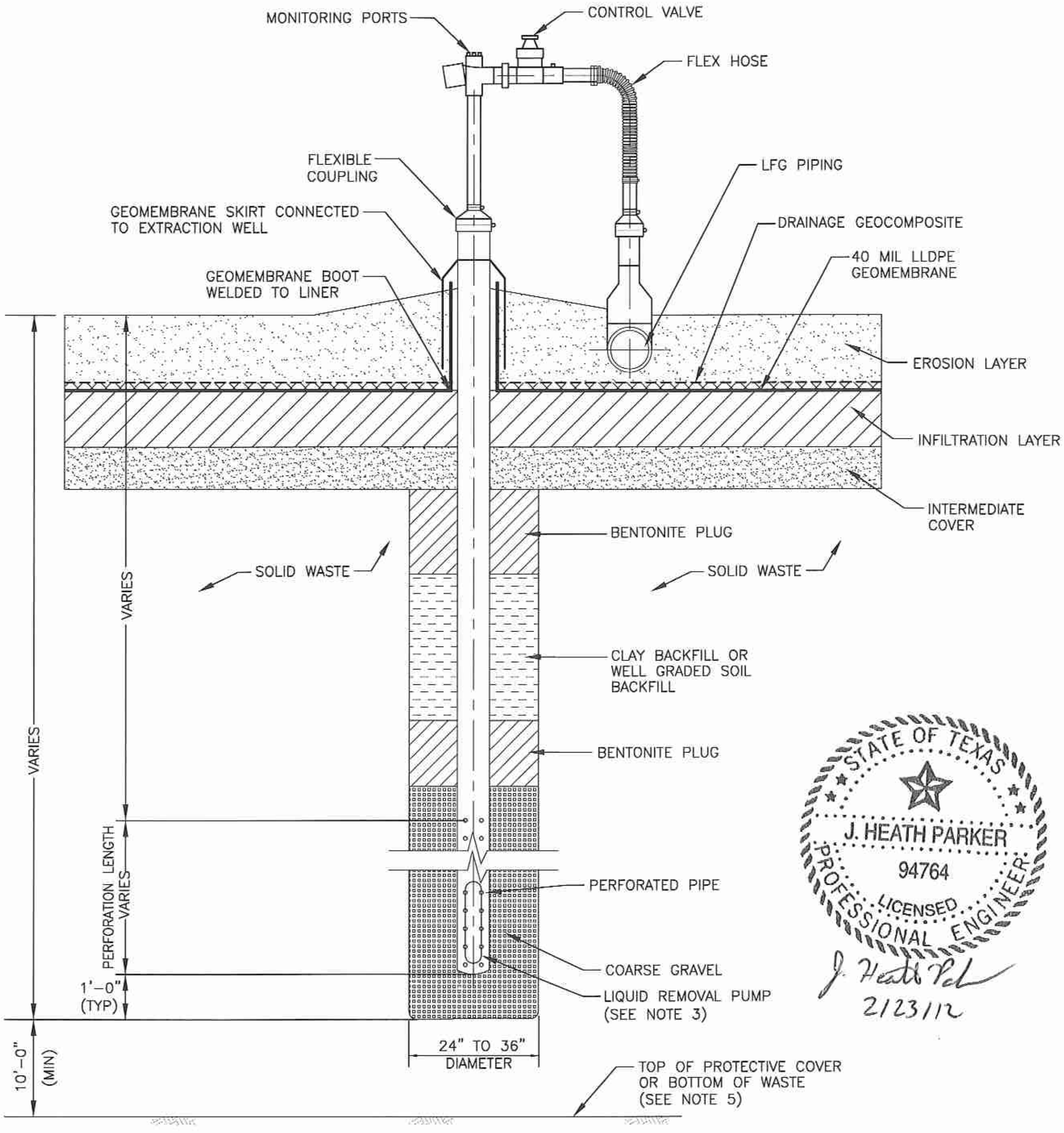
FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I-E-2

REUSE OF DOCUMENTS

O:\1339\351\EXPANSION 2009\PART III-SDP\III\III I-E-2 FUTURE GCCS LAYOUT.dwg, jwilson, 1:2



J. HEATH PARKER
94764

J. Heath Parker
2/23/12

TYPICAL LFG EXTRACTION WELL (LFG3 / III-E-3)

INSTALLED OUTSIDE OR ABOVE THE OVERLINER SYSTEM

NTS

NOTES:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.
2. THE EXACT WELLHEAD CONFIGURATION DEPENDS ON MANUFACTURER.
3. PUMPS WILL BE INSTALLED AS NEEDED.
4. THIS DETAIL IS FOR LFG EXTRACTION WELLS WHICH WILL BE INSTALLED OUTSIDE OR ABOVE THE OVERLINER SYSTEM. SEE DETAILS LFG4 AND LFG5 ON FIGURE III I-E-4 FOR LFG EXTRACTION WELLS WHICH WILL PASS THROUGH THE OVERLINER SYSTEM.
5. THE ELEVATION OF THE OVERLINER SYSTEM OR OTHER EXISTING LINER SYSTEM WILL BE VERIFIED PRIOR TO CONSTRUCTION. THE VERIFICATION PROCESS WILL INCLUDE THE REVIEW OF EXISTING AS-BUILT LINER CERTIFICATION INFORMATION.

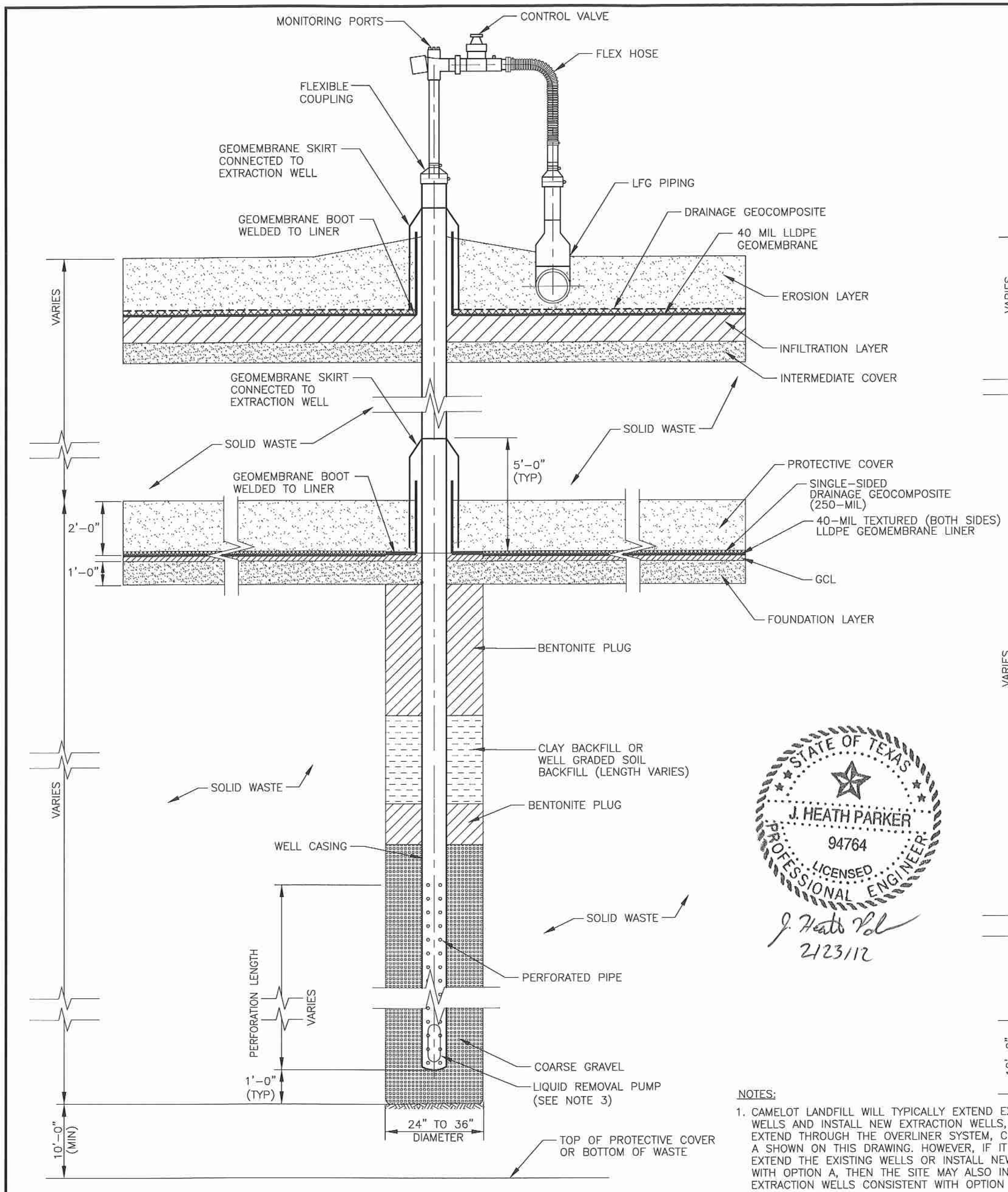
MAJOR PERMIT AMENDMENT
TYPICAL LFG EXTRACTION WELL DETAIL

CITY OF FARMERS BRANCH
CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL DOWNERS GROVE, IL	FORT WORTH, TX (817) 735-9770	GRIFFITH, IN SOUTH BEND, IN SPRINGFIELD, IL
DRAWN BY: VRS	DATE: 02/2012	FILE: 1339-351-11
REVIEWED BY: JPY	CAD: WELL-DETAIL.DWG	FIGURE III I-E-3

O:\1339\351\EXPANSION 2009\PART III-SDP\III\III I-E-3 EXT WELL DETAIL.dwg, jwilson, 1:2



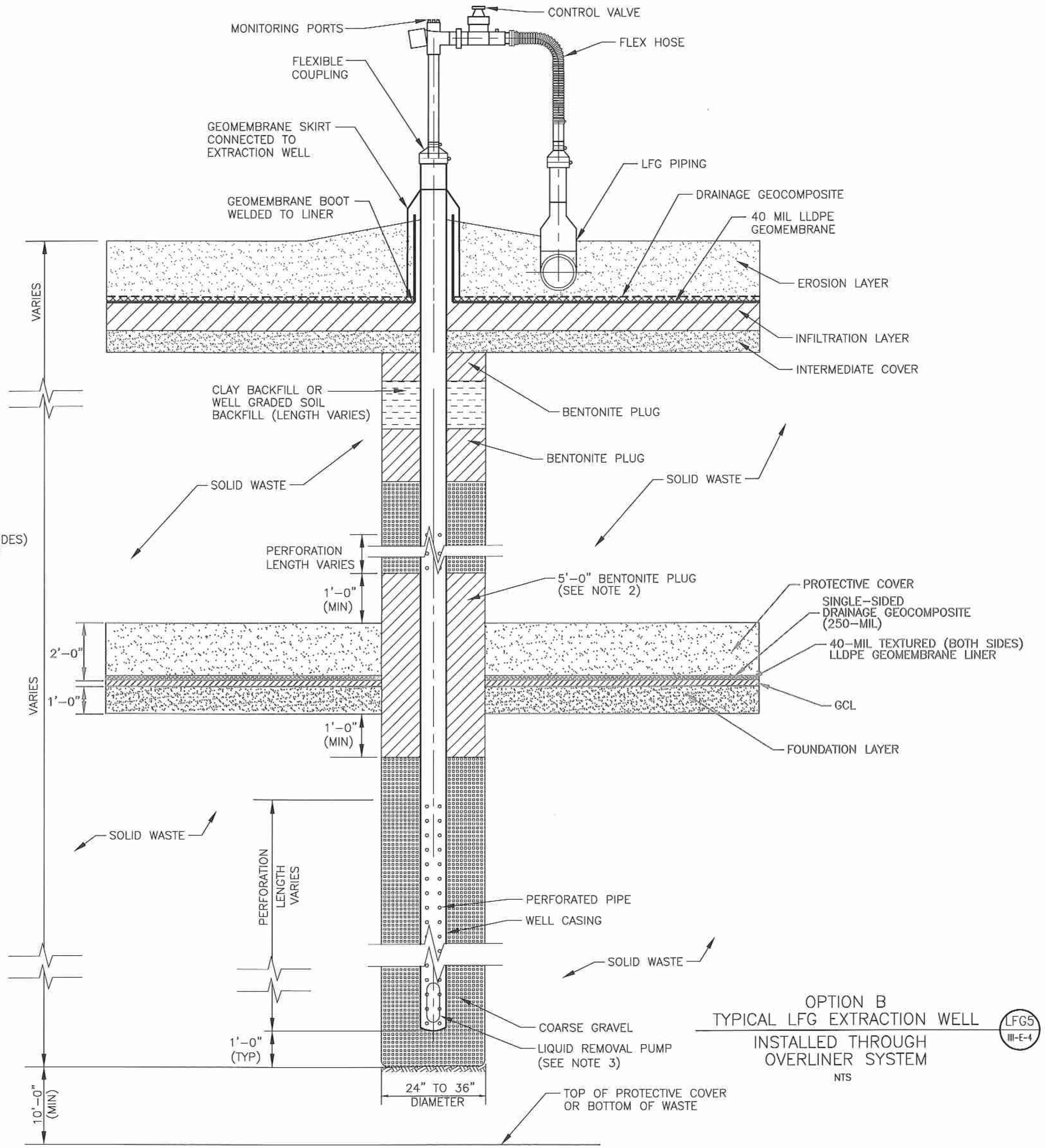
OPTION A

TYPICAL LFG EXTRACTION WELL

INSTALLED WITH OVERLINER SYSTEM

NTS

LFG4
III-E-4



OPTION B

TYPICAL LFG EXTRACTION WELL

INSTALLED THROUGH OVERLINER SYSTEM

NTS

LFG5
III-E-4

J. HEATH PARKER
94764

J. Heath Parker
2/23/12

NOTES:

1. CAMELOT LANDFILL WILL TYPICALLY EXTEND EXISTING LFG EXTRACTION WELLS AND INSTALL NEW EXTRACTION WELLS, WHICH NEED TO EXTEND THROUGH THE OVERLINER SYSTEM, CONSISTENT WITH OPTION A SHOWN ON THIS DRAWING. HOWEVER, IF IT IS NOT FEASIBLE TO EXTEND THE EXISTING WELLS OR INSTALL NEW WELLS CONSISTENT WITH OPTION A, THEN THE SITE MAY ALSO INSTALL THE LFG EXTRACTION WELLS CONSISTENT WITH OPTION B.
2. THE BENTONITE PLUG IS PLACED TO ACT AS A LIQUID TIGHT SEAL. THE MINIMUM THICKNESS OF THE 5'–0" BENTONITE PLUG WILL ALLOW FOR A WATER TIGHT SEAL AROUND THE ANNULUS OF THE WELL CASING SHOULD ANY SETTLEMENT OCCUR.
3. PUMPS WILL BE INSTALLED AS NEEDED.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339–351–17
CAD: III I–E–4 WELL DETAILS.dwg

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
OVERLINER SYSTEM
TYPICAL LFG EXTRACTION WELL DETAILS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F–3727

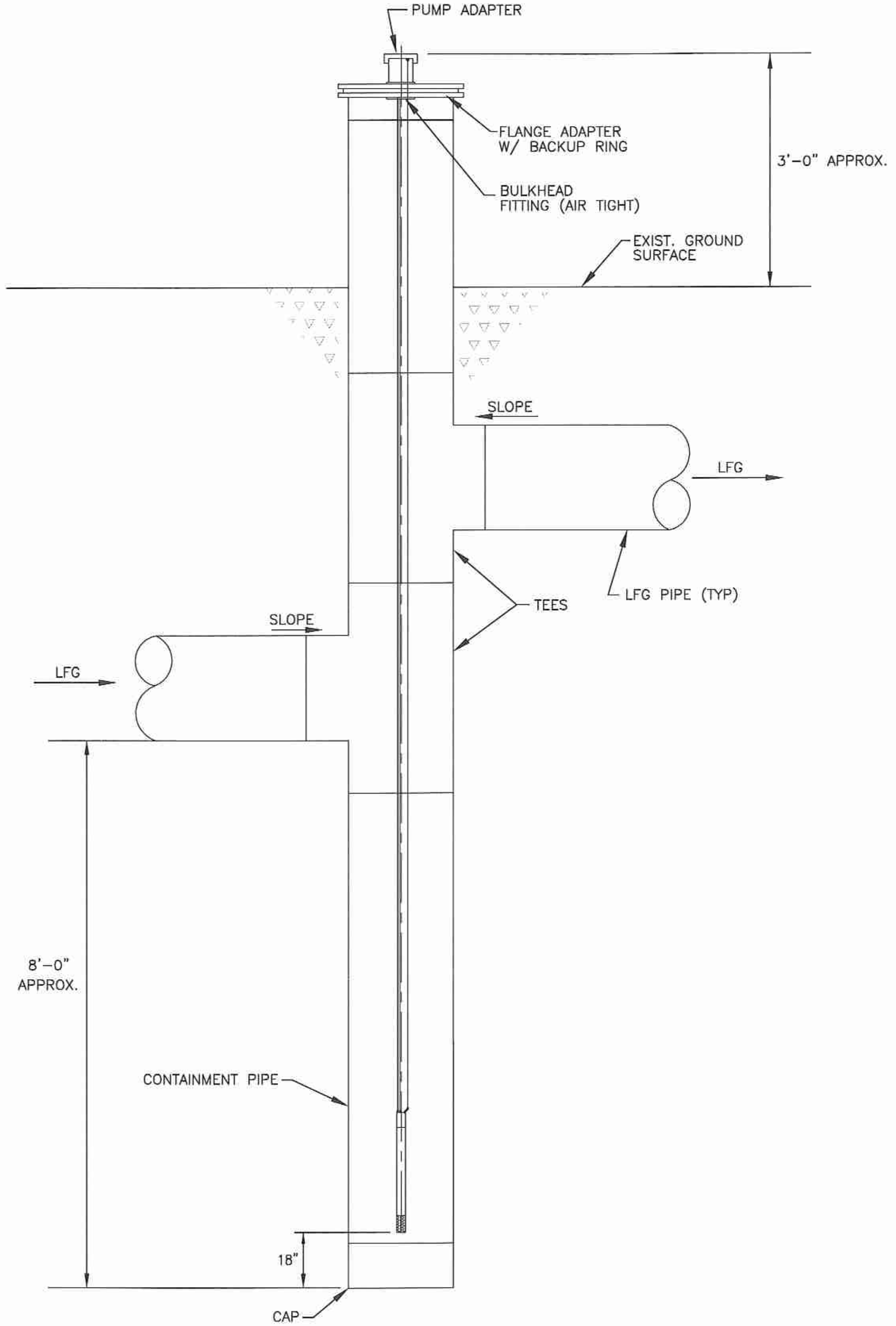
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I–E–4

O:\1339\351\EXPANSION 2009\PART III–SDP\III\III I–E–4 LFG EXTRACTION WELL DETAILS.dwg, jwilson, 1:2

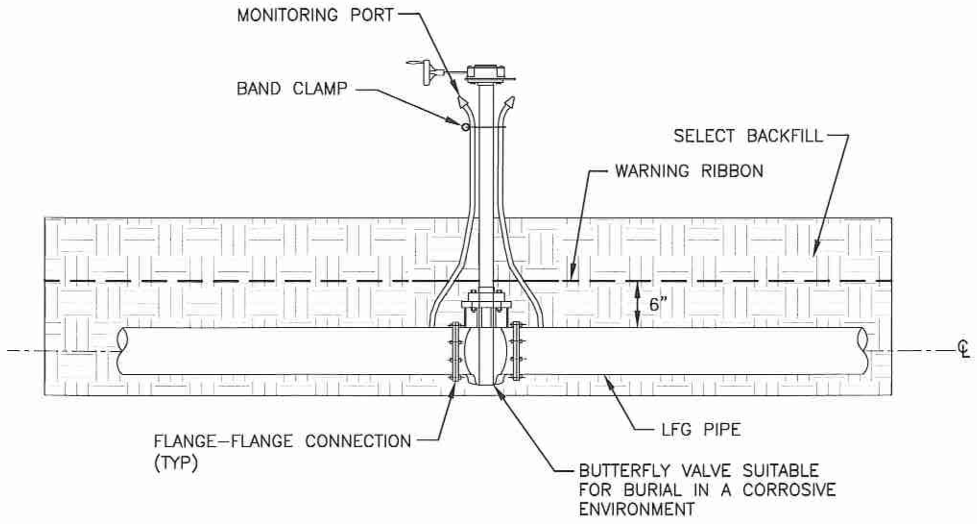


TYPICAL CONDENSATE SUMP LFG6 III-E-5

NTS

NOTES:

1. AIR/FORCEMAIN AND PUMP HOSES ARE NOT SHOWN IN THIS VIEW.
2. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.

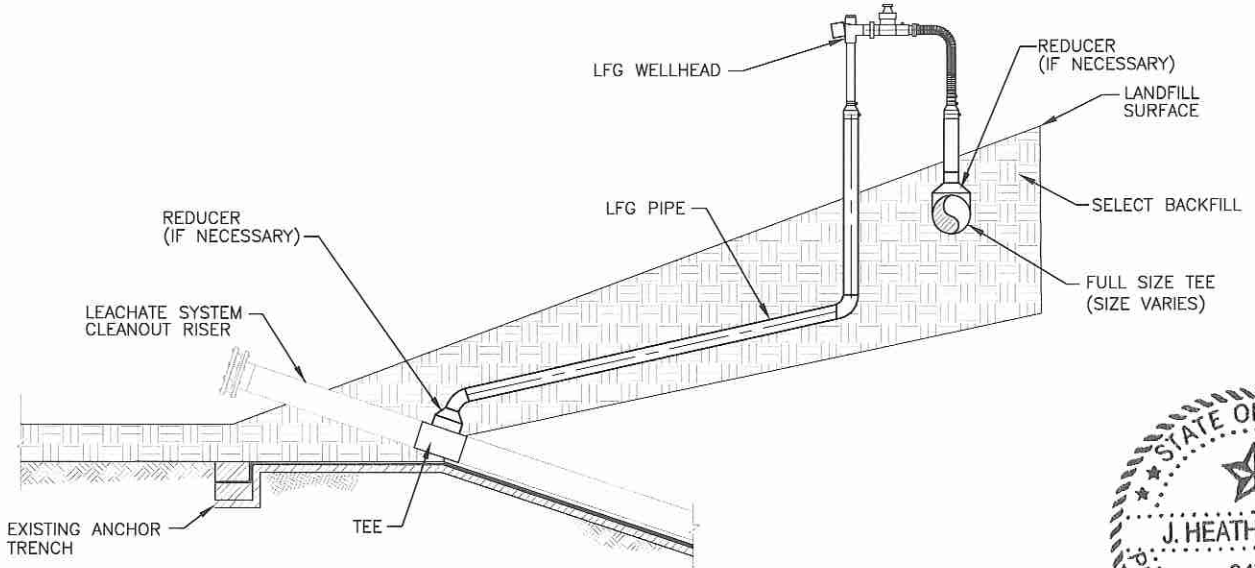


TYPICAL LFG ISOLATION VALVE LFG7 III-E-5

NTS

NOTE:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.



TYPICAL LFG PIPING TO LCR CONNECTION LFG8 III-E-5

NTS

J. HEATH PARKER
94764

J. Heath Park
2/23/12

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 02/2012
FILE: 1339-351-17
CAD: III I-E-5 DETAILS.dwg

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: JHP

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
LFG SYSTEM COMPONENT DETAILS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE III I-E-5

O:\1339\351\EXPANSION 2009\PART III-SDP\III\III I-E-5 LFG DETAILS.dwg, jwilson, 1:2

APPENDIX III I-F

LFG GENERATION MODEL

Includes page III I-F-1 and Table III I-F-1

STATE OF TEXAS
J. HEATH PARKER
94764
LICENSED
PROFESSIONAL ENGINEER

J. Heath Par

2/23/12

LANDFILL GAS GENERATION MODEL

Table III I-F-1 presents the results of a LFG generation estimate prepared for the Camelot Landfill. The estimate was generated using the U.S. Environmental Protection Agency (EPA) Landfill Gas Emission Model (LandGEM), Version 3.02. The modeling results reflect the estimated waste quantities accepted over the operating life of the site, including the proposed landfill expansion.

Gas generation parameters used in the model were those established by the EPA in AP-42, Compilation of Air Pollutant Emission Factors, including a methane generation potential (L_0) of 100 cubic meters per megagram of solid waste, and a methane generation constant (k) of 0.04 year^{-1}. For converting methane to LFG, a methane content of 50 percent was assumed.

The results suggest the LFG generation rate will continue to increase with time as more waste is placed in the landfill. Peak LFG generation is expected to be achieved prior to site closure with a maximum generation rate of approximately 10,987 standard cubic feet per minute in 2040. As noted in Section 6 of Appendix III I, the proposed LFG System will be designed to collect generated gas to protect the integrity of the cover system and control greenhouse gas emissions.

Table III I-F-1
Estimated Landfill Gas Generation Rate
Camelot Landfill

Year	Refuse In Place (Mg)	Landfill Gas Generation	
		m^3/yr	(scfm)
1980	0.000E+00	0	0
1981	1.476E+05	1.160E+06	78
1982	3.052E+05	2.353E+06	158
1983	4.733E+05	3.581E+06	241
1984	6.526E+05	4.850E+06	326
1985	8.440E+05	6.163E+06	414
1986	1.048E+06	7.526E+06	506
1987	1.266E+06	8.943E+06	601
1988	1.498E+06	1.042E+07	700
1989	1.747E+06	1.196E+07	804
1990	2.011E+06	1.357E+07	912
1991	2.294E+06	1.526E+07	1,025
1992	2.589E+06	1.698E+07	1,141
1993	2.899E+06	1.875E+07	1,260
1994	3.223E+06	2.056E+07	1,381
1995	3.562E+06	2.242E+07	1,506
1996	3.918E+06	2.433E+07	1,635
1997	4.290E+06	2.630E+07	1,767
1998	4.679E+06	2.833E+07	1,904
1999	5.087E+06	3.042E+07	2,044
2000	5.514E+06	3.259E+07	2,189
2001	5.945E+06	3.469E+07	2,331
2002	6.367E+06	3.665E+07	2,463
2003	6.718E+06	3.797E+07	2,551
2004	7.086E+06	3.937E+07	2,646
2005	7.448E+06	4.067E+07	2,733
2006	7.907E+06	4.269E+07	2,868
2007	8.242E+06	4.365E+07	2,933
2008	8.546E+06	4.432E+07	2,978
2009	8.831E+06	4.482E+07	3,012
2010	9.095E+06	4.514E+07	3,033
2011	9.372E+06	4.555E+07	3,061
2012	9.761E+06	4.682E+07	3,146
2013	1.016E+07	4.809E+07	3,231
2014	1.056E+07	4.936E+07	3,316
2015	1.097E+07	5.063E+07	3,402
2016	1.138E+07	5.189E+07	3,487
2017	1.180E+07	5.315E+07	3,571
2018	1.222E+07	5.441E+07	3,655
2019	1.265E+07	5.565E+07	3,739
2020	1.309E+07	5.689E+07	3,822
2021	1.418E+07	6.327E+07	4,251
2022	1.530E+07	6.953E+07	4,672
2023	1.642E+07	7.567E+07	5,084
2024	1.757E+07	8.170E+07	5,490
2025	1.873E+07	8.763E+07	5,888

Table III I-F-1
Estimated Landfill Gas Generation Rate
Camelot Landfill

Year	Refuse In Place (Mg)	Landfill Gas Generation	
		m^3/yr	(scfm)
2026	1.991E+07	9.346E+07	6,280
2027	2.110E+07	9.917E+07	6,663
2028	2.231E+07	1.048E+08	7,038
2029	2.353E+07	1.102E+08	7,406
2030	2.476E+07	1.156E+08	7,766
2031	2.601E+07	1.208E+08	8,119
2032	2.727E+07	1.260E+08	8,466
2033	2.854E+07	1.311E+08	8,806
2034	2.983E+07	1.360E+08	9,140
2035	3.113E+07	1.409E+08	9,469
2036	3.244E+07	1.457E+08	9,793
2037	3.377E+07	1.505E+08	10,111
2038	3.512E+07	1.552E+08	10,425
2039	3.648E+07	1.598E+08	10,734
2040	3.776E+07	**1.635E+08**	**10,987**
2041	3.776E+07	1.571E+08	10,557
2042	3.776E+07	1.510E+08	10,143
2043	3.776E+07	1.450E+08	9,745
2044	3.776E+07	1.393E+08	9,363
2045	3.776E+07	1.339E+08	8,996
2046	3.776E+07	1.286E+08	8,643
2047	3.776E+07	1.236E+08	8,304
2048	3.776E+07	1.187E+08	7,979
2049	3.776E+07	1.141E+08	7,666
2050	3.776E+07	1.096E+08	7,365

APPENDIX III I-G

AIR PERMITTING AND REGISTRATION APPROVAL LETTERS

Section 1 - Document

March 30, 2005

Mr. Mark Pavageaux

Director of Public Works

City Of Farmers Branch

13000 William Dodson Parkway

Farmers Branch, Texas 75234

Re: Standard Permit Number: 75220

Camelot Landfill

Farmers Branch, Denton County

Regulated Entity Number: RN101479038

Customer Reference Number: CN600131676

Dear Mr Pavageaux:

This is in response to your registration request, Form PI-1S, received March 8, 2005, regarding the proposed registration of the Camelot MSW Landfill located at 580 Huffines Boulevard, Farmers Branch, Denton County. The emissions represented for this project are included on the attached enclosure "Standard Permit Maximum Emission Rates Table".

After evaluation of the information which you have submitted, we have determined that your proposed project meets the requirements for a Municipal Solid Waste Landfill standard permit if constructed and operated as described in your registration. This standard permit was authorized by the Commissioners pursuant to Title 30 Texas Administrative Code § 116.621. A copy of the standard permit in effect at the time of this registration is enclosed. You must operate in accordance with all requirements of the enclosed standard permit rule.

You are reminded that these facilities must be in compliance with all rules and regulations of the Texas Commission on Environmental Quality and of the U.S. Environmental Protection Agency at all times, including the enclosed standard permit. Please reference the regulated entity number (RN), customer reference number (CN), and permit number noted in this document in all your future correspondence for the referenced facility or site. The RN replaces the former TCEQ account number for the facility (if portable) or site (if permanent). The CN is a unique number assigned to the company or corporation and applies to all facilities and sites owned or operated by this company or corporation.

Mr. Mark Pavageaux

Page 2

March 30, 2005

Re: Standard Permit Number: 75220

Your cooperation in this matter is appreciated. If you have any questions, please contact Mr. Jon Edwards at (512) 239-5863 or write to the Texas Commission on Environmental Quality, Office of Permitting, Remediation, and Registration, Air Permits Division (MC-163), P.O. Box 13087, Austin, Texas 78711-3087.

Sincerely,

Anne M. Inman, Manager

General/Standard/Rule (GSR) Permit Section

Air Permits Division

Texas Commission on Environmental Quality

AMI/JE/alb

Enclosures

cc: Mr. Matt Stutz, LFG/Air Services Manager, Weaver Boos Consultants LLC-Southwest, Fort Worth

Mr. Joe Tilger, Environmental Health Officer, City of Farmers Branch, Farmers Branch

Mr. Tony L. Walker, Air Section Manager, Region 4 - Fort Worth

Project Number: 114083

Standard Permit Maximum Emission Rates Table

Permit Number 75220

III I-G-2

The facilities and emissions included in this table have been represented and reviewed as the maximum emissions authorized by this standard permit registration.

Facility or Source Name	Air Contaminant*	Emission Rates	
		lb/hr	TPY
Landfill Fugitives**	VOC	4.26	18.65
	HAPs	2.074	9.084
Landfill Cell Const/Fill	PM_{10}	14.62	3.34
Tank1D	VOC	0.0003	0.001
Tank2D	VOC	0.00004	0.0002

The maximum operating schedule represented for these facilities is:

hours/day	days/week	weeks/year	hours/year
24	7	52	8760

* VOC - volatile organic compounds

HAPs - hazardous air pollutants

PM_{10} - particulate matter less than 10 microns in size

**Fugitive emissions are an estimate only and should not be considered as a maximum allowable

Air Permits Division MC 163

MR MARK PAVAGEAUX

DIRECTOR OF PUBLIC WORKS

CITY OF FARMERS BRANCH

13000 WILLIAM DODSON PKWY

FARMERS BRANCH TX 75234

Published by GroupWise

Section 1 - Document

March 31, 2005

Mr. Mark Pavageaux

Director of Public Works

City of Farmers Branch

13000 William Dodson Parkway

Farmers Branch, Texas 75234

Re: Standard Permit Number: 75222

Gas Collection and Control System

Lewisville, Denton County

Regulated Entity Number: RN101479038

Customer Reference Number: CN600131676

Dear Mr. Pavageaux:

This is in response to your registration request, Form PI-1S, received March 9, 2005, regarding the proposed installation of a gas collection and control system consisting of a blower and two flares

at the Camelot Landfill located at 580 Huffines Boulevard in Lewisville, Denton County. The emissions represented for this project are included on the attached enclosure "Standard Permit Maximum Emission Rates Table".

After evaluation of the information which you have submitted, we have determined that your proposed project meets the requirements for a Pollution Control Project standard permit if constructed and operated as described in your registration. This standard permit was authorized by the Commissioners pursuant to Title 30 Texas Administrative Code § 116.617. A copy of the standard permit in effect at the time of this registration is enclosed. You must operate in accordance with all requirements of the enclosed standard permit rule.

You are reminded that these facilities must be in compliance with all rules and regulations of the Texas Commission on Environmental Quality and of the U.S. Environmental Protection Agency at all times, including the enclosed standard permit. Please reference the regulated entity number (RN), customer reference number (CN), and permit number noted in this document in all your future correspondence for the referenced facility or site. The RN replaces the former TCEQ account number for the facility (if portable) or site (if permanent). The CN is a unique number assigned to the company or corporation and applies to all facilities and sites owned or operated by this company or corporation.

Your cooperation in this matter is appreciated. If you have any questions, please contact Mr. Monico Banda at (512) 239-1589 or write to the Texas Commission on Environmental Quality, Office of Permitting, Remediation, and Registration, Air Permits Division (MC-163), P.O. Box 13087, Austin, Texas 78711-3087.

Sincerely,

Anne M. Inman, Manager

General/Standard/Rule (GSR) Permit Section

Air Permits Division

Texas Commission on Environmental Quality

AMI/MSB/alb

Enclosures

cc: Mr. Tony L. Walker, Air Section Manager, Region 4 - Fort Worth

Mr. Steven L. Bacchus, Director/Utilities, City of Lewisville, Lewisville

Project Number: 114086

Standard Permit Maximum Emission Rates Table

Permit Number 75222

III I-G-6

The facilities and emissions included in this table have been represented and reviewed as the maximum emissions authorized by this standard permit registration.

Emission Point No.	**Facility or Source Name**	**Air Contaminant***	**Emission Rates**	
			lb/hr	**TPY**
Flare	LFG Flare Facility	VOC	0.09	0.38
		NO_x	8.17	35.77
		CO	44.44	194.63
		PM_{10}	2.20	9.64
		SO_2	1.84	8.08
		HAPs	0.96	4.22
		HCl	0.92	4.04

The maximum operating schedule represented for these facilities is:

hours/day	days/week	weeks/year	hours/year
24	7	52	8760

* VOC - volatile organic compounds

PM - total particulate matter

PM_{10} - particulate matter less than 10 microns in size

NO_x - total oxides of nitrogen

CO - carbon monoxide

SO_2 - sulfur dioxide

HAPs - hazardous air pollutants

HCl - hydrogen chloride

**Fugitive emissions are an estimate only and should not be considered as a maximum allowable.

Air Permits Division MC 163

MR MARK PAVAGEAUX
DIRECTOR OF PUBLIC WORKS
CITY OF FARMERS BRANCH
13000 WILLIAM DODSON PKWY
FARMERS BRANCH TX 75234

Published by GroupWise

Kathleen Hartnett White, *Chairman*
Larry R. Soward, *Commissioner*
H. S. Buddy Garcia, *Commissioner*
Glenn Shankle, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Protecting Texas by Reducing and Preventing Pollution

April 20, 2007

MR MARK PAVAGEAUX
DIRECTOR OF PUBLIC WORKS
CITY OF FARMSERS BRANCH
PO BOX 819010
FARMERS BRANCH TEXAS 75381-9010

Re: General Operating Permit Number: O-2376, Renewal Date: 04/20/2012
Landfill Permit Number: MSW-1312A
Camelot Landfill
Lewisville, Denton County
Regulated Entity Number: RN101479083
Customer Reference Number: CN601253628
Account Number: DF-0541-K

Dear Mr. Pavageaux:

This is in response to your Certification Form received on April 2, 2007, regarding the Camelot Landfill located at 580 Huffines Boulevard in Lewisville, Denton County. After evaluation of your General Operating Permit Application and Certification Form, the initial application received on December 4, 2000, the first revision received on August 15, 2005, and the second revision received on April 2, 2007, we have determined that your site continues to qualify for the Municipal Solid Waste General Operating Permit (GOP) Number 517, if operated as represented in your application. From the date of this letter the site referenced above must continue operating in accordance with the requirements of Title 30 Texas Administrative Code Chapter 122 (30 TAC § 122), including the permit conditions contained in 30 TAC §§ 122.143-122.146. The permit holder must submit an updated application to the executive director for changes according to 30 TAC § 122.504.

If you have any questions, please contact Mr. Marc Olivier (512) 239-5760 or write to the Texas Commission on Environmental Quality, Office of Permitting, Remediation, and Registration, Air Permits Division (MC-163), P.O. Box 13087, Austin, Texas 78711-3087.

This action is taken under authority delegated by the Executive Director of the TCEQ.

Sincerely,

Anne M. Inman, P.E., Manager
General/Standard/Rule (GSR) Permit Section
Air Permits Division
Texas Commission on Environmental Quality

cc: Air Section Manager, Region 4 - Fort Worth

Title V Project Numbers: 2936, 7696, 10183

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 29, 2010

Mr. James Kisiel, P.E.
Waste Management Renewable Energy, LLC
1001 Fannin, Suite 4000
Houston, TX 77002

Re: Camelot Landfill Gas-to-Energy Facility – Denton County
Municipal Solid Waste (MSW) – Registration by Rule No. 48028
Registration By Rule – Type IX Landfill Gas to Energy Facility
Tracking Nos. 13017339 and 13085233; RN105830685 / CN602991515

Dear Mr. Kisiel:

The MSW Permits Section has completed the review of the Type IX registration-by-rule application received March 15, 2010 and the revisions received June 1, 2009. The application was prepared by Mr. Matt K. Stutz, P.E. of Weaver Boos Consultants, LLC-Southwest, and submitted on behalf of Waste Management Renewable Energy, LLC. By your submittals, you have complied with the reporting requirements of Title 30 of the Texas Administrative Code (30 TAC) Section (§)330.9(k). Your facility has been assigned the MSW Registration No. 48028. Please reference this number in all future correspondence to the Texas Commission on Environmental Quality.

Please be aware that it is the continuing obligation of persons associated with a site to assure that the facility remains in compliance with the requirements of 30 TAC §330.9(k)(2) by obtaining all authorizations regarding air emissions. In addition, please ensure the facility complies with the regulations in 30 TAC Chapter 330 Subchapter E (Operational Standards for Municipal Solid Waste Storage and Processing Units), 30 TAC §330.459 (Closure Requirements for Municipal Solid Waste Storage and Processing Units), 30 TAC §330.461 (Certification of Final Facility Closure), 30 TAC §330.505 (Closure Cost Estimates for Storage and Processing Units), and 30 TAC Chapter 37, Subchapter R (Financial Assurance for MSW Facilities). It is the responsibility of all persons associated with the site to ensure that the site is managed in a manner which does not cause a nuisance or endangerment of the public health and welfare.

If you have any questions about this letter, please contact Mr. Charles Brown by phone at (512) 239-6234. When addressing written correspondence, please use mail code MC 124.

This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality.

Sincerely,

Richard C. Carmichael, Ph.D., P.E.
Manager, Municipal Solid Waste Permits Section
Waste Permits Division

RCC/CBB/fp

cc: Mr. Matt K Stutz, P.E., Weaver Boos Consultants, LLC-Southwest, Fort Worth

Enclosure

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

REGISTRATION BY RULE FOR TYPE IX BENEFICIAL REUSE LANDFILL GAS FACILITY

MUNICIPAL SOLID WASTE REGISTRATION NO. 48028

Camelot Landfill Gas-To-Energy Facility

In accordance with Title 30 of the Texas Administrative Code (30 TAC), Chapter 330, Section (§)330.9(k), a Registration by Rule is granted to WM Renewable Energy, LLC for the operation of a landfill gas to energy facility on the Camelot Landfill, owned by Camelot Landfill TX, LP.

Documentation necessary to meet the requirements of 30 TAC §330.9(k) was received on March 15, 2010 with revisions received on June 1, 2010. The documentation prepared and submitted to support the registration by rule application are requirements of the registration by rule.

WM Renewable Energy, LLC is required to acquire all authorizations regarding air emissions and must comply with 30 TAC, Chapter 330, Subchapter E and §§330.459, 330.461, and 330.505.

Financial assurance in the amount of $59,400 (2010 dollars) shall be provided prior to commencing operation.

This registration by rule is granted by authority delegated by the Executive Director of the Texas Commission on Environmental Quality and is subject to the rules and Orders of the Commission and laws of the State of Texas. Nothing in this registration by rule exempts the registrant from compliance with other applicable rules and regulations of the Texas Commission on Environmental Quality. This registration by rule will be valid until canceled, amended, or revoked by the Commission.

APPROVED, ISSUED AND EFFECTIVE in accordance with 30 TAC §330.9(k).

ISSUED DATE:

JUN 29 2010

For the Commission

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Protecting Texas by Reducing and Preventing Pollution

March 23, 2010

MR PAUL PABOR
VICE PRESIDENT
WM RENEWABLE ENERGY LLC
1001 FANNIN ST STE 4000
HOUSTON TX 77002-6711

Standard Permit Registration Number:	91989	Renewal Date: March 23, 2020
Location:	580 Huffines Blvd	
City/County:	Lewisville, Denton County	
Project Description/Unit:	Camelot Landfill Gas To Energy Facility	
Regulated Entity Number:	RN105890685	
Customer Reference Number:	CN602991515	
New or Existing Site:	New	
Affected Permit (if applicable):	None	
Standard Permit Type:	Electric Generator	

WM Renewable Energy, L.L.C., has registered the emissions associated with the installation of 3 Caterpillar internal combustion engine generator sets to convert landfill gas to energy at the Camelot Landfill Facility owned by the City of Farmers Branch and operated by Republic Services, Inc., under the standard permit listed above as authorized by the Commissioners pursuant to Title 30 Texas Administrative Code § 116.602 (30 TAC § 116.602). Emissions are listed on the attached table. For rule information see www.tceq.state.tx.us/permitting/air/nav/standard.html.

No planned maintenance, startup, and shutdown emissions have been represented or reviewed for this registration and none will be authorized.

As of July 1, 2008, all analytical data generated by a mobile or stationary laboratory in support of compliance with air permits must be obtained from a NELAC (National Environmental Laboratory Accreditation Conference) accredited laboratory under the Texas Laboratory Accreditation Program or meet one of several exemptions. Specific information concerning which laboratories must be accredited and which are exempt may be found in 30 TAC § 25.4 and § 25.6.

For additional information regarding the laboratory accreditation program and a list of accredited laboratories and their fields of accreditation, please see the following Web site:

http://www.tceq.state.tx.us/compliance/compliance_support/qa/env_lab_accreditation.html

For questions regarding the accreditation program, you may contact the Texas Laboratory Accreditation Program at (512) 239-3754 or by email at labprgms@tceq.state.tx.us.

Re: Standard Permit Registration Number 91989

The company is also reminded that these facilities may be subject to and must comply with other state and federal air quality requirements. If you have questions, please contact Mr. Emmanuel Ukandu, P.E., at (713) 767-3699. This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality.

Sincerely,

Anne M. Inman, P.E., Manager
Rule Registrations Section
Air Permits Division
Texas Commission on Environmental Quality

cc: Assistant City Manager, City Manager's Office, City of Lewisville, Lewisville
Air Section Manager, Region 4 - Fort Worth

Project Number: 155972

Standard Permit Maximum Emission Rates Table
Permit Number 91989

The facilities and emissions included in this table have been represented and reviewed as the maximum emissions authorized by this standard permit registration.

MAXIMUM EMISSION RATES TABLE															
EPN / Emission Source	**Specific VOC or Other Pollutants**	**VOC**		**NOx**		**CO**		**PM_{10}**		**$PM_{2.5}$**		**SO_2**		**Other**	
		lbs/hr	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**
ENG01/Engine No.1	HAPs	0.92	4.04	2.95	12.94	14.77	64.69	0.68	2.96	0.68	2.96	2.65	11.61	0.05	0.22
ENG02/Engine No. 2		0.92	4.04	2.95	12.94	14.77	64.69	0.68	2.96	0.68	2.96	2.65	11.61	0.05	0.22
ENG03/Engine No. 3		0.92	4.04	2.95	12.94	14.77	64.69	0.68	2.96	0.68	2.96	2.65	11.61	0.05	0.22
TOTAL EMISSIONS		2.76	12.12	8.85	38.82	44.31	194.07	2.04	8.88	2.04	8.88	7.95	34.83	0.15	0.66
TOTAL EMISSIONS (TPY):			12.12		38.82		194.07		8.88		8.88		34.83		0.66
MAXIMUM OPERATING SCHEDULE:		**Hours/Day**				**Days/Week**			**Weeks/Year**				**Hours/Year**		8760

VOC - volatile organic compounds
NO_x - total oxides of nitrogen
CO - carbon monoxide
PM_{10} - particulate matter equal to or less than 10 microns in size
$PM_{2.5}$ particulate matter equal to or less than 2.5 microns in size
SO_2 - sulfur dioxide
HAPs
**Fugitive emissions are an estimate only and should not be considered as a maximum allowable

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Protecting Texas by Reducing and Preventing Pollution

March 22, 2011

MR PAUL PABOR
VICE PRESIDENT
WM RENEWABLE ENERGY, L.L.C.
1001 FANNIN ST STE 4000
HOUSTON TX 77002-6717

Re: General Operating Permit Number: O3390, Renewal Date: March 22, 2016
Camelot Landfill Gas to Energy Facility,
Denton County
Regulated Entity Number: RN105890685
Customer Reference Number: CN602991515

Dear Mr. Pabor:

This is in response to your initial application Certification Form received on September 9, 2010, regarding the Camelot Landfill Gas To Energy Facility located at 580 Huffines Blvd., Lewisville, Denton County, Texas. After evaluation of your General Operating Permit Application and Certification Form, we have determined that your site qualifies for Municipal Solid Waste General Operating Permit (GOP) Number 517, if operated as represented in your application. From the date of this letter the site referenced above must operate in accordance with the requirements of Title 30 Texas Administrative Code Chapter 122 (30 TAC § 122, including the permit conditions contained in 30 TAC §§ 122.143-122.146). The permit holder must submit an updated application to the executive director for changes according to 30 TAC § 122.504.

As of July 1, 2008, all analytical data generated by a mobile or stationary laboratory in support of compliance with air permits must be obtained from a NELAC (National Environmental Laboratory Accreditation Conference) accredited laboratory under the Texas Laboratory Accreditation Program or meet one of several exemptions. Specific information concerning which laboratories must be accredited and which are exempt may be found in 30 TAC §§ 25.4 and 25.6.

For additional information regarding the laboratory accreditation program and a list of accredited laboratories and their fields of accreditation, please see the following Web site:

http://www.tceq.state.tx.us/compliance/compliance_support/qa/env_lab_accreditation.html

For questions regarding the accreditation program, you may contact the Texas Laboratory Accreditation Program at (512) 239-3754 or by email at labprgms@tceq.state.tx.us.

P.O. Box 13087 • Austin, Texas 78711-3087 • 512-239-1000 • Internet address: www.tceq.state.tx.us

Re: General Operation Permit O3390

The company is also reminded that these facilities may be subject to and must comply with other state and federal air quality requirements. If you have questions, please contact Mr. Jon Edwards, P.E. at (512) 239-5863.

This action is taken under authority delegated by the Executive Director of the TCEQ.

Sincerely,

Anne M. Inman, P.E., Manager
Rule Registrations Section
Air Permits Division
Texas Commission on Environmental Quality

AI/JE

cc: Air Section Manager, Region 4 - Fort Worth

Title V Project Number: 15478