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Hydrogeologic Conditions Controlling Contaminant Migration from Storage Tanks Overlying Mississippi River Alluvium

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HYDROGEOLOGIC CONDITIONS CONTROLLING CONTAMINANT MIGRATION FROM STORAGE TANKS OVERLYING MISSISSIPPI RIVER ALLUVIUM: A CASE STUDY

By

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Delta Store #3033 in Indianola, MS is suspected of having had a release of petroleum, which may have contaminated the underlying soil and shallow groundwater. Exploratory boring/monitoring wells were drilled on-site noting all soil formations and groundwater encountered. The soil facies encountered show a fining upward sequence, representative of a fluvial depositional environment.

Soil contamination is mostly confined to the surficial soil; however, evaluation of lab data, boring logs, and cross sections suggests it is likely the contamination migrated through the surficial confining layer into the underlying strata. The hydraulic conductivity of 1.2×10^{-5} cm/sec, surficial geology consisting mostly of low and some high plasticity clays (CL and CH), a hydraulic gradient of 0.01 to 0.02 ft/ft, and the presence of an overlying concrete pavement suggests that any recent release of hydrocarbons should be confined to the immediate vicinity under the site.

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INTRODUCTION

General

This is a site-specific subsurface investigation located in the Mississippi River Alluvium which determined if there had been any contamination from the release of petroleum products from Underground Storage Tanks (UST) at the Delta Store #3033 located in Indianola, Mississippi (see Figure 1). A UST system is defined by both the Federal Code of Regulations Subpart F and the Mississippi Department of Environmental Quality Office of Pollution Control Underground Storage Tank Regulations Subpart F as, "any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which is 10 percent beneath the ground surface". This assessment is done in cooperation with and authorization by the Mississippi Department of Environmental Quality (MDEQ), W. L. Burle Engineers P.A., and Scott Petroleum Corporation of Itta Bena, Mississippi. The assessment work is based on the Code of Federal Regulations on Protection of the Environment and MDEQ's Underground Storage Tank Regulations. Procedures used in the investigation were done in accordance with the regulations established by, MDEQ's Quality Assurance / Quality Control (QA/QC) manual, Annual Book of American Society for Testing and Materials (ASTM) Standards, and the American Association of

Figure 1 Arial map of Delta Store #3033

State Highway and Transportation Officials (AASHTO) Manual on Subsurface Investigation.

Description and History

Delta Store #3033 was developed and constructed by Scott Petroleum with three UST's in 1974. The UST's consisted of one (1) 8,000 gallon gasoline UST, one (1) 10,000 gallon gasoline UST, and one (1) 8,000 gallon diesel. These UST's are still the active tanks on the site today and are still operated by Scott Petroleum Corporation. No major improvements have been conducted on the site since construction.

Detection wells were installed during the installation of the UST's. Soil and water samples were taken and analyzed to develop a baseline for the site. The baseline analyses are readings maintained at MDEQ. The wells continued to be monitored by the storeowner. When the readings reached an unacceptable limit, MDEQ was notified. Typical regulatory levels of BTEX (Benzene, Toluene, Ethyl benzene, and Xylenes) in soil are around 100 ppm (parts per million), and 18 ppm in water (www.deq.state.us). Once the readings continued to exceed those levels, MDEQ requested an underground investigation in the area of the UST's.

On December 18, 2003 Scott Petroleum detected a fuel release at the station. The fuel release was of an unknown quantity. Scott Petroleum notified MDEQ of the release, and who in return instructed Scott Petroleum that an underground investigation would be required.

Site Topography

The site is located in Sunflower County Section 32 Township 19 North Range 4 West (USGS, 1965, 7.5 Minute Quadrangle Map, Indianola, MS) in the Mississippi River Delta. The area known as the delta in Mississippi covers over 7,000 square miles in northwestern Mississippi (Sumner and Wasson, 1984). The site consists of relatively level terrain with an elevation of approximately 120 ft. Mean Sea Level (MSL) (Martin, 1959). The surface water is drained within the highway right-of-way south of the site. The drainage system within the right-of-way conveys the storm drainage to the south to Short Bayou which discharges farther south to Indian Bayou. Indian Bayou travels southerly through Indianola for approximately four miles before discharging to the Big Sunflower River. The Big Sunflower River travels in a southerly direction for approximately 50 miles before discharging into the Yazoo River. The Yazoo River discharges into the Mississippi River, which empties into the Gulf of Mexico.

Hydrogeological Setting

The site's surficial geology is the Mississippi River Alluvial Formation, and is the only formation encountered during drilling activities. The alluvial formation is of the Quaternary System/Cenozoic Era (Arthur, 1994, Arthur and Strom, 1997, Dalsin, 1978 and Jennings, 2001, see Figure 2 and Figure 3). The formation consists of basically one stratigraphic unit comprised of an upper member of fine-grained silts and clays underlain by a lower member of coarse-grained sands and gravels. The formation is approximately 150 ft. thick (see Figure 4) in the vicinity of the site (Arthur and Strom, 1997). The

formation is a high-yielding, unconfined aquifer, and receives most of its recharge from precipitation and the Mississippi River (Dalsin, 1978). The aquifer is mostly used for commercial purposes and rarely used as a public water supply (Brown, 1947).

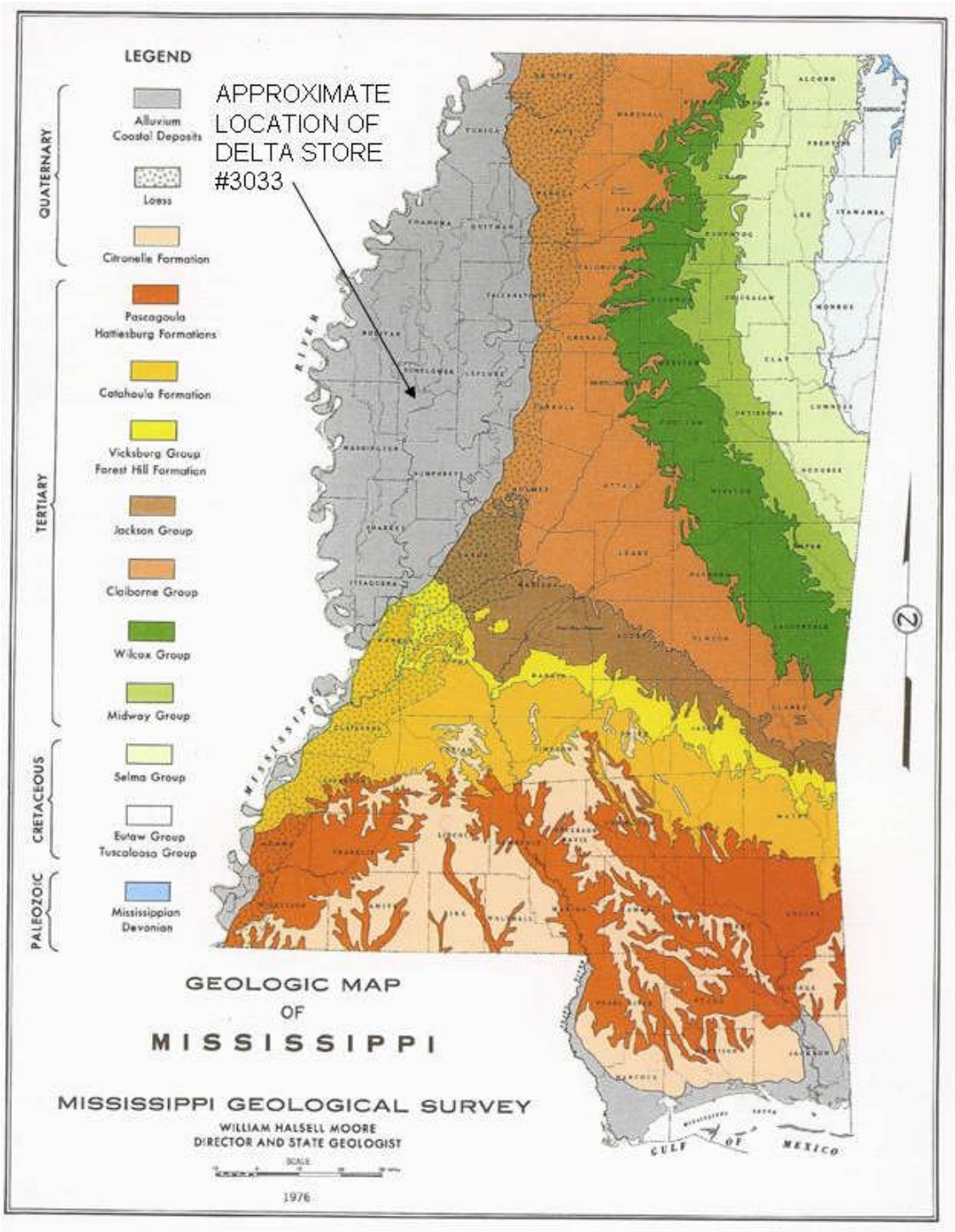


Figure 2 Geological Map of Mississippi

Era	Period	Epoch	Group	Stratigraphic Unit		Water Bearing Character
Cenozoic	Quaternary	Holocene		Flood-Plain Deposits		Non-Aquifer
				Mississippi River Valley Alluvium		Aquifer used for irrigation, capable of high yields.
		Pleistocene		Loess		Non-Aquifer
				Terrace Deposits		Not a significant aquifer.
	Tertiary	Eocene	Jackson	Yazoo Clay		Non-Aquifer
				Moodys Branch Formation		Not a significant aquifer.
			Claiborne	Cockfield Formation		Aquifer with moderate yields.
				Cook Mountain/ Wautubbee Formation		Non-Aquifer
				Sparta Sand/ Kosciusko Sand		Principal source of water for Bolivar and Sunflower Counties.
				Zilpha Clay		Non-Aquifer
				Winona Sand		Winona and Neshoba Sand Member are small supplies of water.
				Tallahatta Formation	Neshoba Sand	
					Basic City	Discontinous sand beds provide domestic and stock supplies.
					Meridian Sand	Meridian-upper Wilcox aquifer is a pricipal source of water.
			Wilcox	Upper Wilcox		
		Paleocene		Middle Wilcox		Principal aquifer in Carroll County.
				Lower Wilcox		Principal aquifer in Tallahatchie County.

(Dalsin, 1978)

Figure 3 Geologic Time Scale showing age relationships of the subsurface stratigraphy of the Alluvium formation

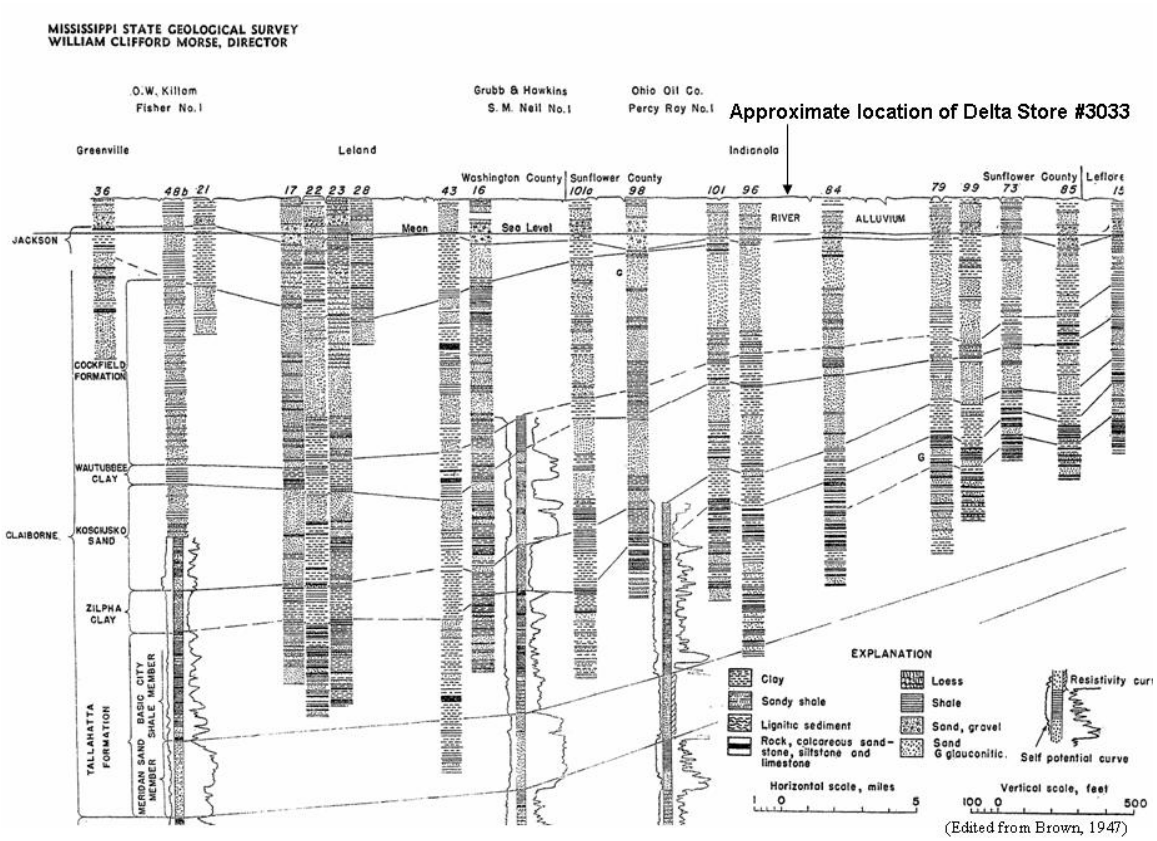


Figure 4 Cross section showing stratiographic units underlying Delta Store #3033

The Yazoo Clay Formation of the Jackson Group uncomfortably underlies the alluvial formation. The Yazoo Clay is of the Eocene/Tertiary System. The formation is a clay deposit of marine origin and is not an aquifer. It is a confining layer which separates the Mississippi River Alluvium formation from the underlying Cockfield sands Formation. The Yazoo Clay outcrops in a band stretching from southern Yazoo County to the southeast to northern Wayne County and then crosses the state line into Alabama. It is approximately 20 ft. thick in the vicinity of the site (Brown, 1947).

Sands of the Cockfield Formation of the Claiborne Group underlies the Yazoo Clay Formation, which is of the Eocene Epoch/Tertiary System (see Figure 3, Figure 4 and Figure 5). The formation consists of a non-marine sand and clay. It is a high-yielding aquifer (>1000 gpm). The formation outcrops in a band stretching in an arc from central Holmes County to the southeast to Eastern Clarke County and then crosses the state line into Alabama. The Cockfield is overlain by the Mississippi River Alluvium in Sunflower County (Dalsin, 1978), on which Delta Store #3033 is located. The formation is approximately 400 ft. thick in the vicinity of the site (Brown, 1947).

The Cook Mountain Formation, also known as the Wautubbee Clay Formation, of the Claiborne Group underlies the Cockfield (see Figure 3, Figure 4 and Figure 5). It acts as a confining layer which separates the Cockfield from the underlying Sparta Sand Formation, also known as the Kosciusko Sand. The formation outcrops a band stretching in an arc from southern Carroll County to the southeast to east central Clarke County and then crosses the state line into Alabama. The formation is approximately 80 ft. thick in the vicinity of the site (Brown, 1947).

The Sparta/Kosciusko Sand Formation underlies the Cook Mountain Formation. The formation consist of a non-marine, heterogeneous sand, and in some places is hydraulically connected to the Mississippi River Alluvium (Dalsin, 1978) (see Figure 4 and Figure 5). The formation is a high-yielding aquifer used by municipalities and industries in the area. The formation outcrops in a band bordering the Bluff Hills and stretching in an arc from Tennessee, crossing the state line in northern Marshall County, MS, then meandering to the south-southeast to the northeastern corner of Clarke County, MS, where it crosses the state line into Alabama. The formation is approximately 30 ft. thick in the vicinity of the site (Brown, 1947).

The Zilpha Clay Formation underlies the Sparta/Kosciusko Sand (see Figure 3 and Figure 4). This formation consists of mostly dark brown clay and is not considered an aquifer. The unit serves as a confining layer which separates the overlying Sparta Sands from the underlying Basic City Shale member of the Tallahatta Formation. The formation outcrops in a band paralleling the Sparta Sand and stretching in an arc from eastern Yalobusha County to the southeast to northern Clarke County and then crosses the state line into Alabama. The formation is approximately 100 ft. thick in the vicinity of the site (Brown, 1947).

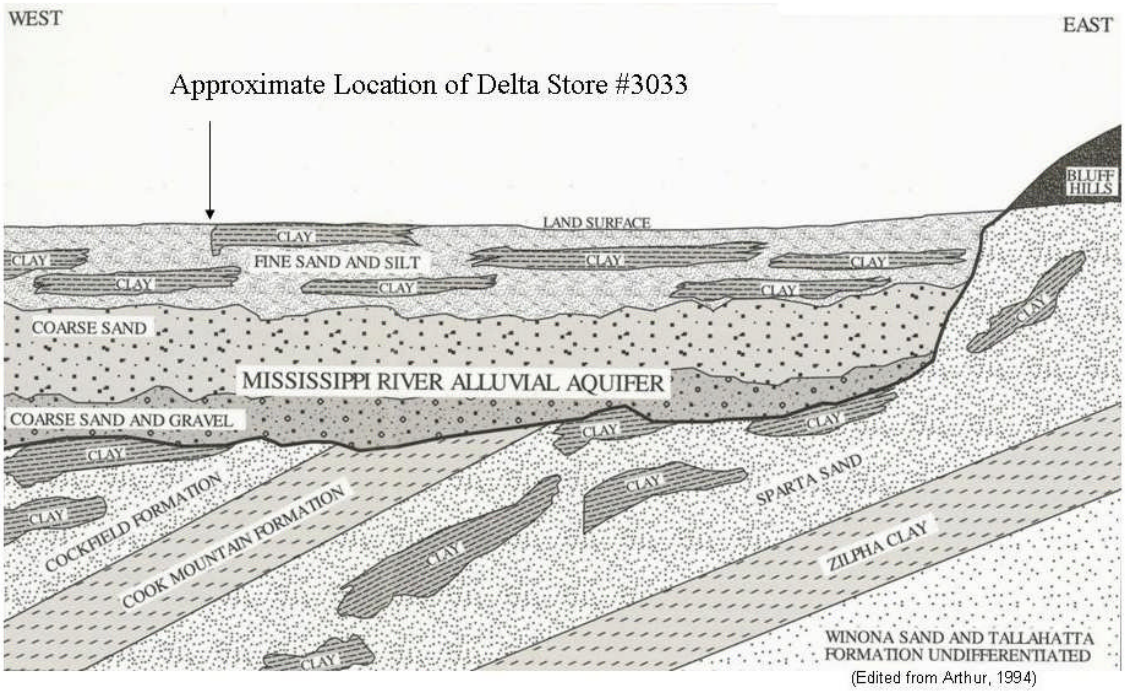


Figure 5 Cross Sectional Map illustrating Mississippi's aquifers

CHAPTER II

PREVIOUS WORK

Sites similar to Delta Store #3033 exist all over the Mississippi River Alluvial Deposit, as well as the rest of the state. Despite to the large volume of related sites and findings, only three similar locations within the Mississippi River Alluvial Deposit have been provided. These three sites used the same subsurface investigative techniques which were used to assess the Delta Store. These techniques are not limited to showing were contamination is found, but also show where it is not located, gives detailed cross sections of the subsurface, which will help in understanding any possible flow of hydrocarbons. The subsurface investigations, both for Delta Store #3033 and the three similar sites discussed below, followed ASTM standards (ASTM D 1452, D 1586, D 2487, D 2488, D 4700;1999 and ASTM D 4448, D 5092, D 5254, D 5434; 1994) , ASHTO standards (AASTHO R 24-99, 1988), and MDEQ's QA/QC manual (MDEQ, 2003). These standards are discussed in more detail in the methodology section of this paper.

The first site exists in Greenwood, MS at the Scott Car Care Center located at 900 Highway 82 West. The site assessment was conducted in March 2004 (W.L. Burle, Engineers, P.A., 2004). The purpose of this assessment was to determine if there was a release of fuel from the UST system located on site. The subsurface was determined by drilling test borings with a DPT (direct push technology) system, logging the formations

encountered, and obtaining representative soil samples to test for contaminants. Within the immediate vicinity of the UST system and pump island stations, a network of one inch diameter Polyvinyl Chloride (P.V.C.) monitoring wells were emplaced. With a network of wells and existing detection wells, water samples were taken and the hydrogeological setting was determined. The soil samples from the test borings all showed moderate levels of contamination, with one exceeding a Flame ionization Device (FID) reading of 1000 ppm (W. L. Burle, Engineers, P.A., Preliminary Subsurface Investigation Report, 2004). The analytical tests for BTEX (Benzene, Toluene, Ethyl benzene, and Xylenes) from laboratory analyses show only one soil sample exceeding MDEQ's maximum allowable limit of 100 mg/kg in soil, at 199 mg/kg in SB-3. With the exception of one detection well having 0.08 inches of free product, the analytical lab results for the water samples all were below MDEQ's maximum allowable limits of 18 mg/l in water (see Figure 6). Once the assessment for this site was complete, it could be determined from the investigative procedures that there was no release of petroleum products from the UST system on site. The contamination that was present on site may have been contributed through localized spillage during filling and transporting of fuel.

The second site is located in Redwood, MS at Walton's 3-61, which an abandoned self service gasoline station. The site investigation at Walton's 3-61 was conducted in June 2003 (W.L. Burle, Engineers, P.A., 2003). The same procedures were used as described above, with the exception that a truck mounted hollow stem drill rig system was used in the subsurface investigation and well installation. An unacceptable

amount of contamination was encountered during the subsurface investigation. Groundwater was encountered in all soil borings with no noticeable free product, however the FID readings were above 1,000 ppm on all soil borings and above 10,000 ppm in three. The analytical lab data for the soil indicated that six of the ten soil borings returned samples above MDEQ's maximum allowable limit of 100 mg/kg in soil from 188 to 1350 mg/kg respectively. Five of the ten borings had 4 inch monitoring wells installed into their locations. With the network of wells and existing detection wells, water samples were taken and the hydrogeological setting was determined (see Figure 7). All five wells returned analytical lab data results above MDEQ's maximum allowable limits of 18 mg/l in water ranging from 20 to 91 mg/l respectively (W.L. Burle, Engineers, P.A., Preliminary Subsurface Investigation Report, 2003) (see Figure 8). It was concluded that the site was contaminated by petroleum which was released from the UST system on site.

The third site is in Belzoni, MS at Hardin's Chevron located at 102 Hayden Street. This site assessment was initiated in March of 1999 (W. L. Burle Engineers, P.A., 1999). The purpose of this assessment was to determine the extent of contamination, which had supposedly occurred from the UST system located at Hardin's Chevron. The same procedures were used at Hardin's Chevron as in Walton's 3-61 in Redwood, MS. Two of the soil samples taken from the ten different borings returned values exceeding MDEQ's maximum allowable limit of 100 mg/kg of Total BTEX (Benzene, Toluene, Ethel Benzene, Xylenes) in soil. These samples were measured at 110 and 751 mg/kg respectively (see Figure 9). Polynuclear aromatic hydrocarbons (PAH) readings for the

two samples returned values of 1.79 and 6.45 mg/kg respectively. With the network of wells and existing detection wells, water samples were taken and the hydrogeological setting was determined (see Figure 10). There was no free product encountered in the investigation, however two wells returned water samples above MDEQ's maximum allowable limit in water of 18 mg/l. The returned values were 18.5 and 122 mg/l respectively. These values are significant, because there is a public drinking water well only about 1,000 feet down gradient of the site. The limits of the contamination were not determined during the original subsurface investigation. Due to the nearby water well, the limits of the contamination needed to be defined to ensure the protection of the water well. A second investigation was issued, and it was found that the contamination found at Hardin's Chevron did not originate from the UST system on Hardin's Chevron site. It did determine that the contamination was originating from an abandoned service station across Hayden Street, which was thought to have had its tanks emptied. This investigation found that the tanks had leaked an unknown amount of gasoline, which was retained mostly in the surficial aquifer (W.L. Burle, Engineers, P.A., Phase I Environmental Assessment, 1999). The procedures used, not only found and defined the contamination, but were able to confirm that the original site in question was not the source of contamination.

These subsurface investigations, as well as the subject sites, are very site-specific. Locations in which these investigations take place consist of rural farm lands and small cities. Most published geology data is on a regional scale, which makes the information gathered during drilling activities very crucial to understanding the site-specific geology.

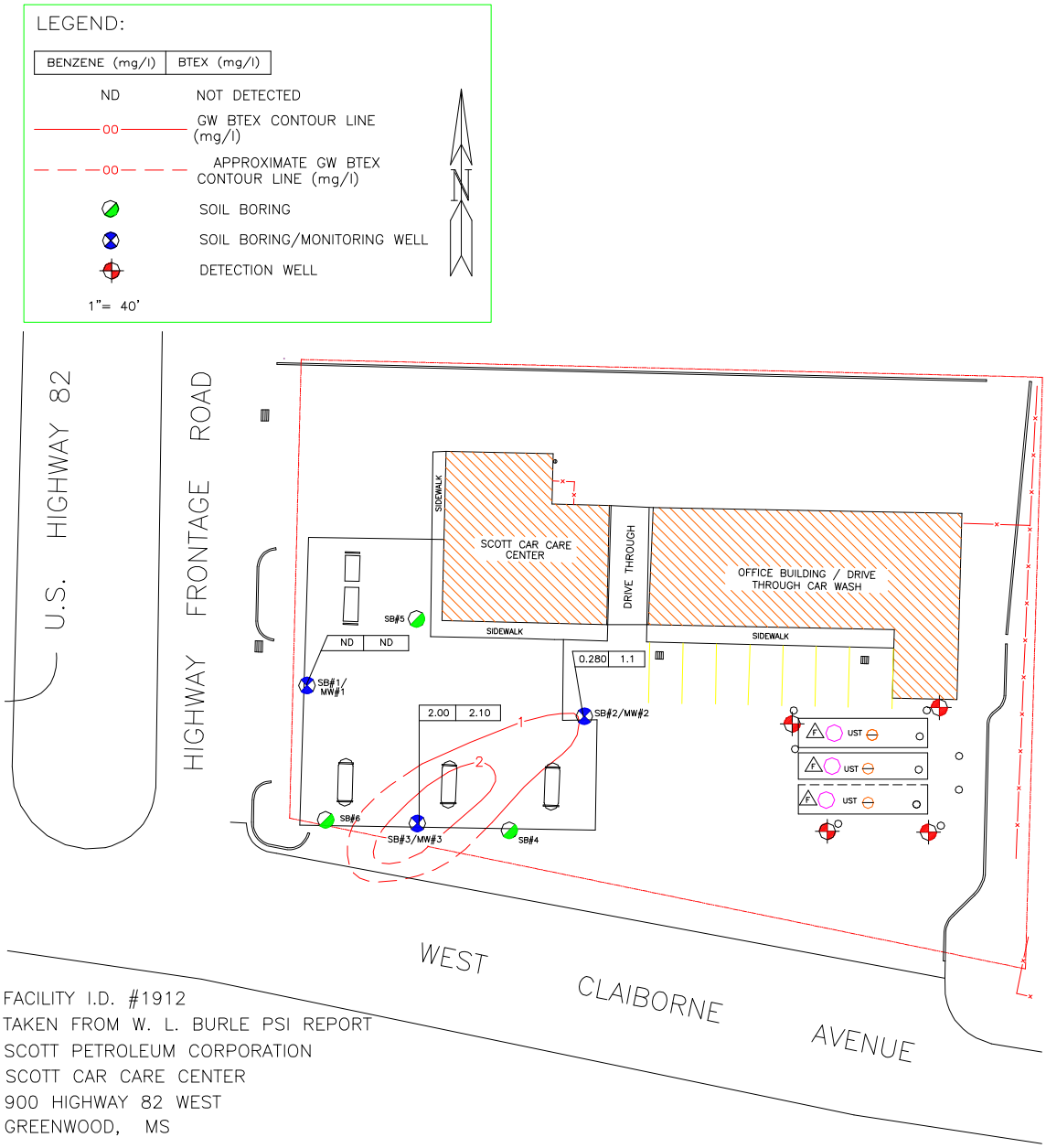


Figure 6 Site map showing contamination levels at Scott Car Care Center in Greenwood, MS

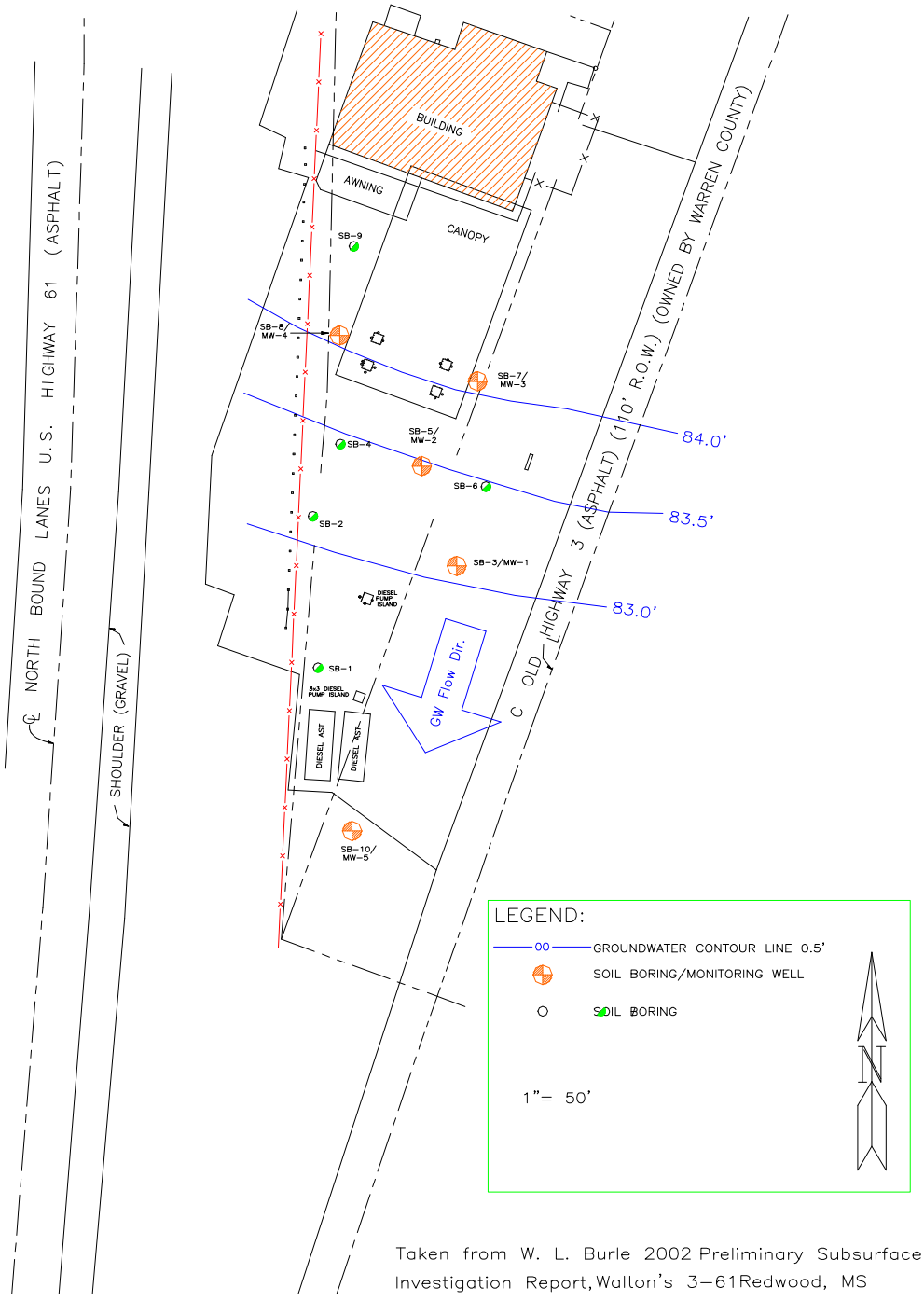
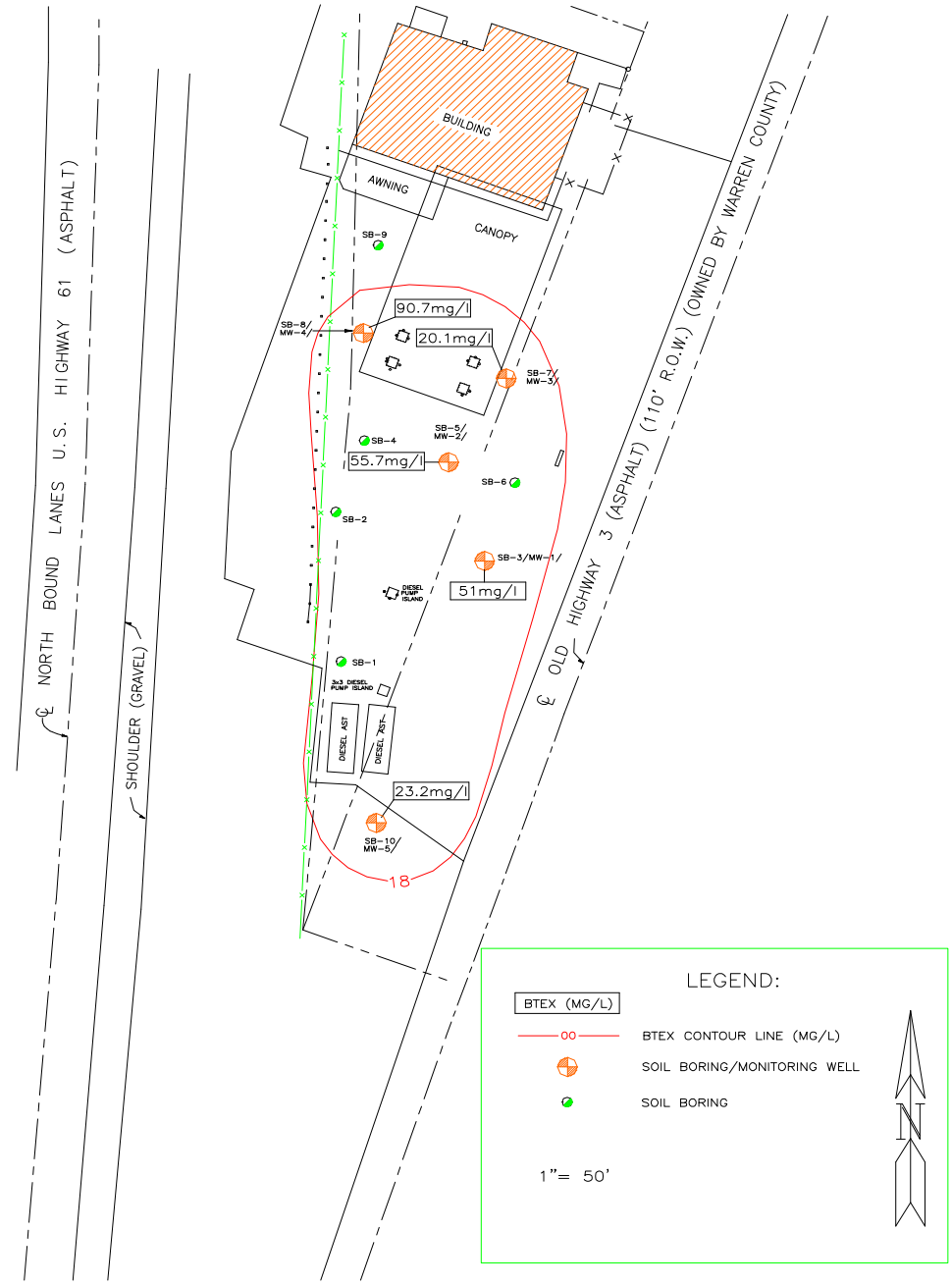


Figure 7 Groundwater flow direction at Walton's 3-61 in Redwood, MS

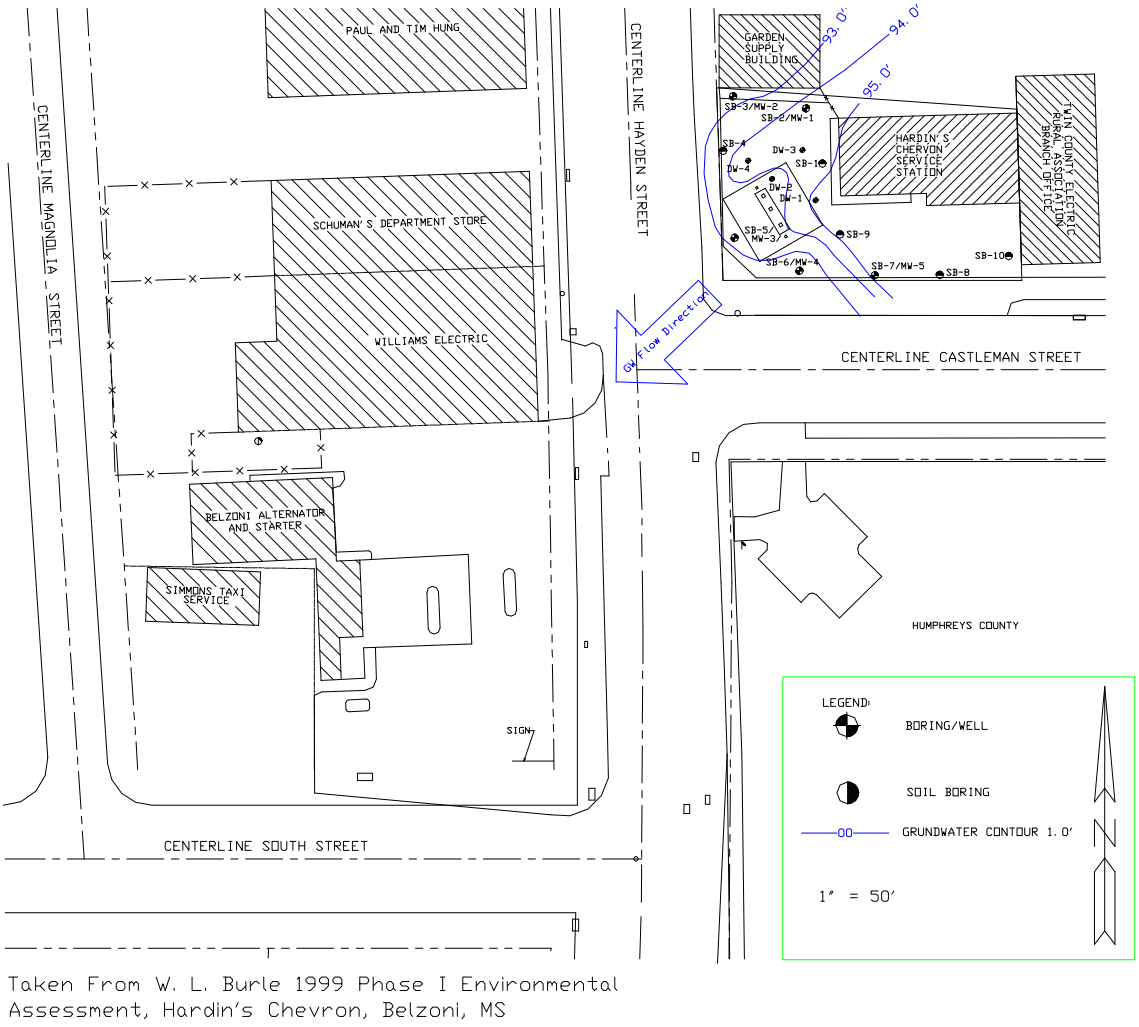


Taken from W. L. Burle, 2002 Preliminary Subsurface Investigation Report, Walton's 3–61, Redwood, MS

Figure 8 Map showing BTEX contamination at Walton's 3-61 in Redwood, MS

Taken From W. L. Burle 1999 Phase I Environmental Assessment, Hardin's Chevron, Belzoni, MS

Figure 9 BTEX contamination at Hardin's Chevron in Belzoni, MS



Taken From W. L. Burle 1999 Phase I Environmental Assessment, Hardin's Chevron, Belzoni, MS

Figure 10 Groundwater flow direction at Hardin's Chevron in Belzoni, MS

CHAPTER III

HYPOTHESIS AND OBJECTIVES

Delta Store #3033 is suspected of having a fuel release from an on-site UST system which contains petroleum products. Any release of petroleum products will have contaminated the subsurface at Delta Store #3033. It is hypothesized that by determining and evaluating the geologic deposition and hydrogeological properties at the site, any petroleum contamination may be mapped and the origin determined. The objective is to collect subsurface data for evaluating and determining if contamination actually exists, determine its approximate origin, and to what extent the contamination has spread.

Specific objectives are as followed:

1. Conduct soil borings and collect soil samples for BTEX and PAH.
2. Insert monitoring wells and collect water samples for BTEX and PAH.
3. Map underlying soil strata using cross sections to depict if the soil may control the movement of the contaminants.
4. Map groundwater flow, direction, and determine gradient.
5. Conduct a slug test to determine the hydraulic conductivity.
6. Map contaminants in soil and water.
7. Determine approximate area of contaminated groundwater on site.
8. Determine the origin of the contaminants.

9. Determine if municipal water wells or adjacent properties were contaminated.

CHAPTER IV

METHODOLOGY

Site Characteristics

Area Water Wells

There are nearly 700 water wells located in Sunflower County, Mississippi (Wasson, 1975). David Burt with the United States Geological Survey (USGS) and Jeff Gregory with the Mississippi Office of Land and Water Resources, were contacted in June 2004 to obtain the location of municipal water wells within a one-mile radius of the site. A field investigation was conducted to identify wells within the one-mile radius. Fifteen were located within the one-mile radius of the site (see Figure 11 and Table 1).

Table 1 Area water wells within one mile radius of Delta Store #3033

Map No.	Well No.	Usage	Depth ft.	Pump HP	Aquifer	Found	Not Found
1	N0003	N/A	N/A	N/A	MRVA		X
2	N0007	N/A	27	N/A	MRVA		X
3	N0017	Irrigation	120	60	MRVA		X
4	N0018	N/A	110	N/A	MRVA		X
5	N0020	N/A	121	N/A	MRVA	X	
6	N0025	N/A	1761	N/A	MUWX		X
7	N0033	N/A	101	N/A	MRVA		X
8	N0059	Irrigation	113	60	MRVA	X	
9	N0093	N/A	1320	N/A	TLLT		X
10	N0094	Industrial	1240	N/A	TLLT	X	
11	N0097	Not in Use	1500	Capped Off	TLLT	X	
12	N0096	N/A	1763	N/A	MUWX		X
13	N0095	N/A	1739	N/A	MUWX	X	
14	N0098	Municipal	1757	N/A	MUWX	X	
15	N0099	Municipal	1778	N/A	MUWX	X	

Aquifer Code:

MRVA = Mississippi River Alluvial Aquifer
TLLT = Tallahatta Formation
MUWX = Meridian-Upper Wilcox Aquifer

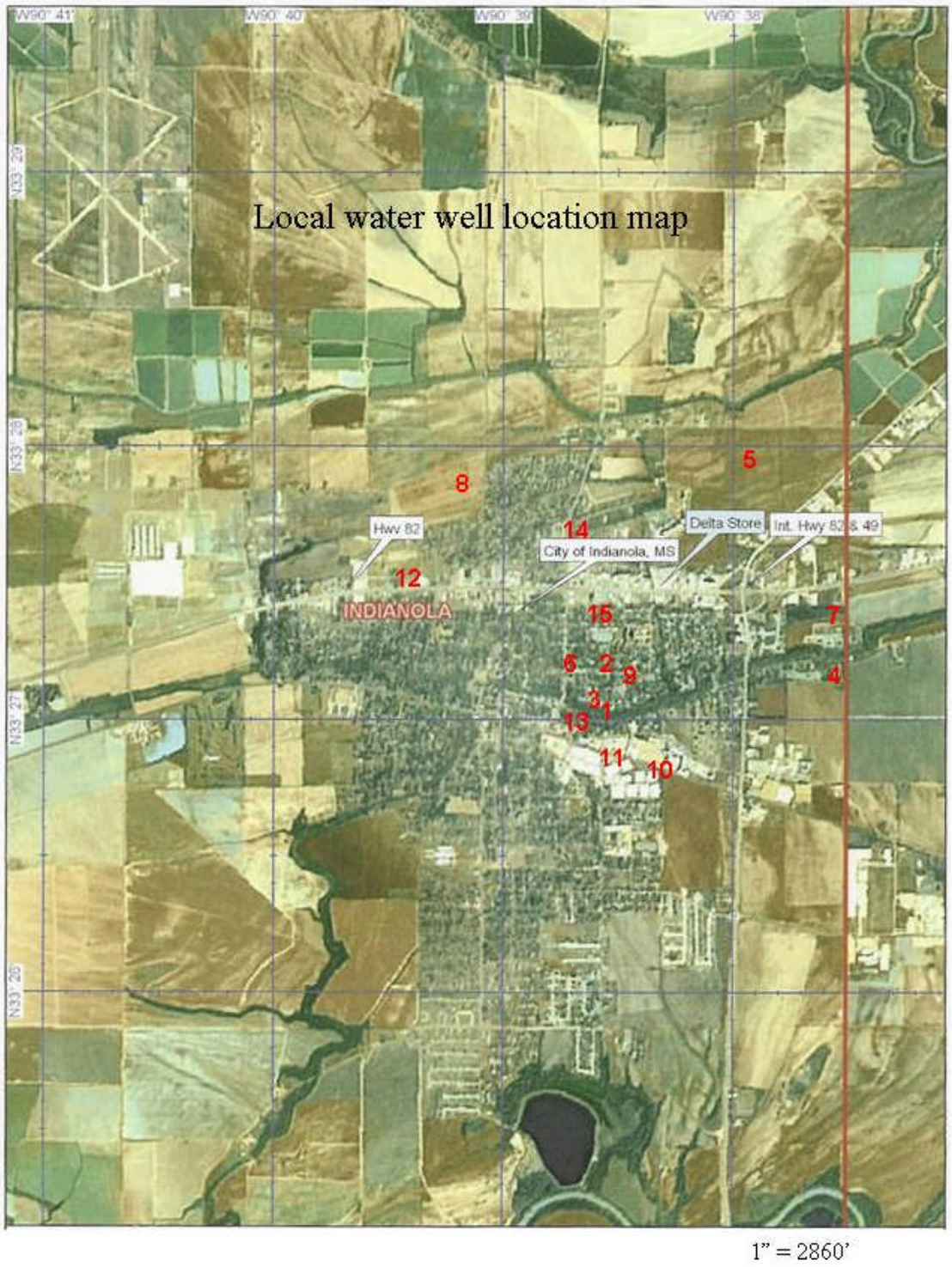


Figure 11 Local water well location map

Only seven of these were physically found to be in existence during the field investigation. Of the 15 wells, seven are established in the Mississippi River Alluvium, with the closest well approximately 3500 ft. away. The remaining wells are established in the Tallahatta and Upper Wilcox Aquifer.

Visual Inspection

The initial visual inspection is a general overview of the site. The inspection concluded that the utilities present on site consisted of underground phone lines, natural gas lines, water and sewer lines, power lines and overhead power lines (see Figure 12). To ensure that all utilities were located and not damaged on site or on adjacent properties, the following companies were contacted (MDEQ QA/QC, 2003):

1. Mississippi One Call System, Inc. (601-362-4374) or (1-800-227-6477).
2. City Water and Sewer Departments
3. Mississippi Valley Gas Corporation
4. Bell South Telephone Company

During the visual site inspection, the UST's were found to be on the north side of the store. Three utility openings were discovered within a 200 ft. radius of the site, two storm sewer inlets and one sanitary sewer manhole.

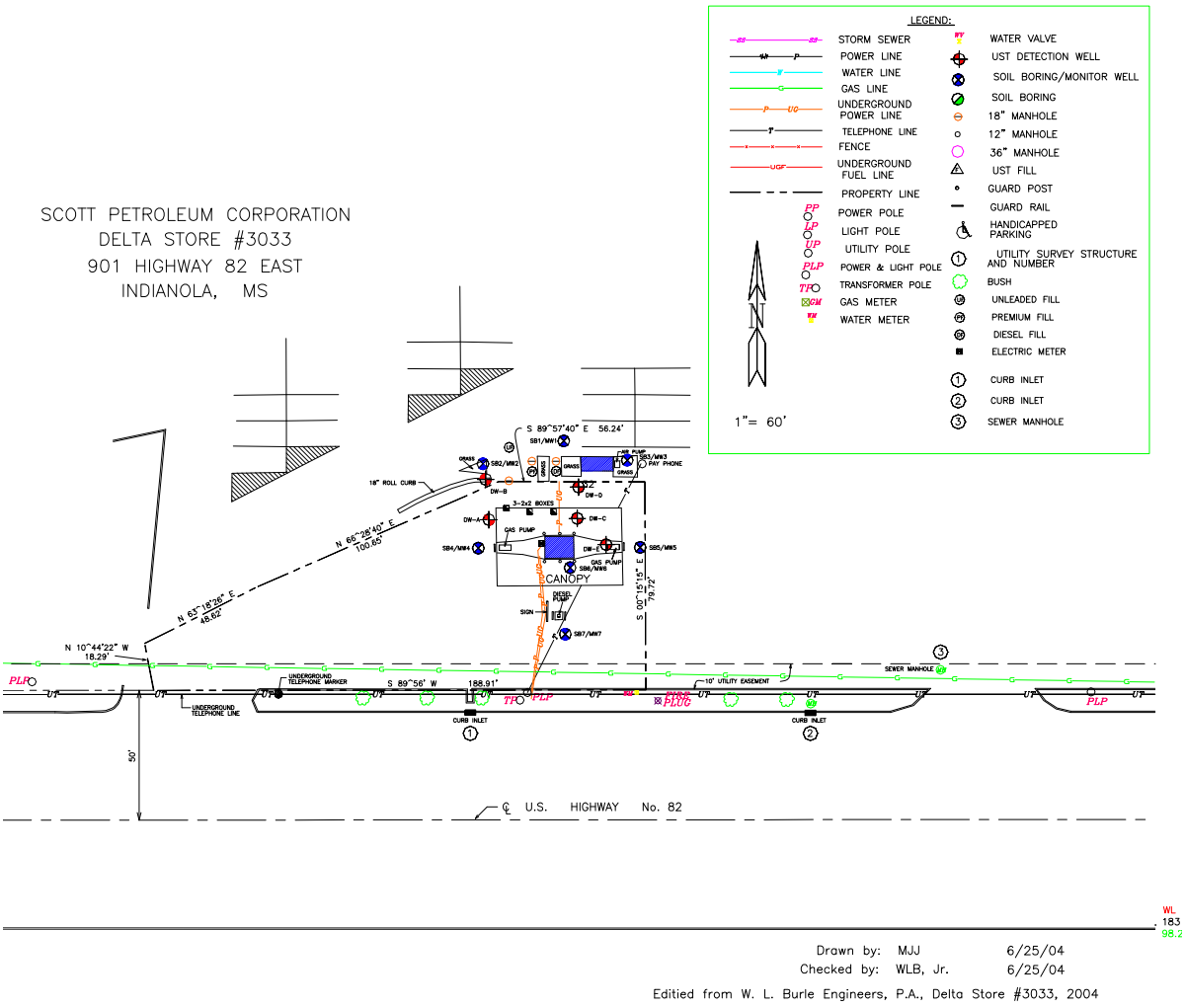


Figure 12 Delta Store #3033 utility layout map

Soil Assessment

Soil Exploration, Sampling, and Field Testing

The ASTM foundation was organized in 1898 and has grown into one of the largest voluntary standards development systems in the world. With that said, it is confident that the techniques used generated accurate results. Field logging of the subsurface was accomplished with the use of a B53 drill-rig mounted on a 4800 series International truck, and an AMS 9600 Power Probe mounted on an 855 John Deere tractor (ASTM D 5434, 1994). Seven test borings were strategically placed around the UST system to obtain as much subsurface information as possible. Monitoring wells were then placed into the same borehole locations to collect water samples.

Exploratory borings were performed using the truck-mounted, hollow-stem auger drill rig for six of the seven borings. Due to the inability to maneuver the truck mounted rig beneath the canopy of the store, the power probe was used to conduct the last boring. Each boring was strategically placed to obtain as much subsurface environmental information as possible. The exploratory borings performed with the B53 drill-rig were conducted using a $3^{1/4}$ inch inside diameter by $6^{5/8}$ inch outside diameter hollow stem auger, which is in accordance with ASTM D 4700, 1999 standard, that states that hollow stem augers may be used to drill borings that are less than $6^{1/2}$ inches inside diameter and greater than $2^{1/4}$ inches. The power probe uses a direct push technology system, which provides continuous sampling throughout the borehole.

During the advancement of the borehole with the B53, soil samples were taken using the Standard Penetration Test (SPT) method described in ASTM 1999 standard D

1586. Test intervals were taken every five feet. Once the desired depth was reached, the split-barrel sampler was attached to a sampling rod and lowered into the borehole. The split-barrel sampler was constructed as indicated in Figure 13 (ASTM D 1586, 1999, pg 143).

The driving shoe was constructed of hardened steel, and had a constant inside diameter of $1^{3/8}$ inches. The use of a retaining basket was used and is permitted by ASTM D 1586, 1999 standards. The hammer was attached to the sampling rod. The dead weight of the sampler, rods, anvil, and drive weight rested on the bottom of the boring and a seating blow was applied. The drill rods were marked in three consecutive six-inch increments in a manor so that the advancement of the sampler was easily observed. The number of blows between each six-inch increment was counted as the sampler was driven with the hammer until one of the following occurred (ASTM D 1586, 1999):

1. A total of 50 blows are counted in any of the three increments.
2. A total of 100 blows are applied.
3. The sampler is not advancing in ten consecutive blows.
4. The sampler advances the entire eighteen inches.

During the soil sampling, the split barrel sampler advanced the entire 18 inches. The number of blows were counted and the sum of the second and third six-inch interval is called the N-value and is considered the standard penetration resistance (see Appendix A). The hammer weighed 140 lbs ± 2 lbs and was a solid, rigid, metallic mass. The hammer was dropped 30 inches ± 1 inch and made steel on steel contact when it was dropped (ASTM D 1586, 1999).

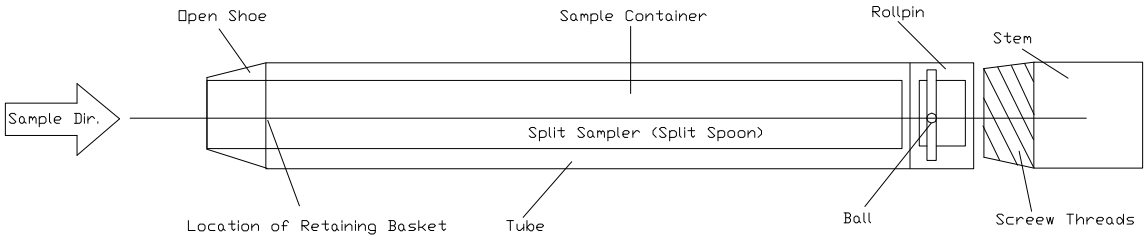


Figure 13 Illustration of the components of a split barrel sampler

After the sampler was driven, it was returned to the surface, and the soil was removed and a description was given including the composition, color, stratification, and condition (see Appendix A), which well also aided in the development of creating cross sections. Handling of the samples followed the procedures described in MDEQ's QA/QC 2003 manual. Each sample interval was split into three separate representative samples that were retained for testing. Handling of the samples required wearing a new pair of latex disposable gloves with each sample interval. The first two samples were placed into two 4 oz. glass jars by hand, in a manor to avoid any air pockets if possible. The jars were labeled clearly to avoid any confusion with other samples. The jars were then placed into a zip-lock bag and again properly labeled. The third sample was placed into a zip-lock bag to volatilize any hydrocarbons which may be present in the soil. This volatilization created a headspace, which determined which sample was retained for testing by the following procedure.

In accordance to MDEQ's QA/QC 2003 manual a portion of each sample was placed into a zip-lock bag for headspace analysis. The FID was used to determine the headspace value. The instrument was calibrated daily before any readings were taken. The samples that are retained in the zip-lock bags were shaken for fifteen seconds, allowed to set between fifteen minutes and sixty minutes, and shaken again before the measurement were taken. The ambient temperature was greater than 60°F, so the samples were placed in direct sunlight to achieve volatilization. The FID probe was inserted quickly into the zip-lock bag, avoiding any direct contact with any soil or water, and the peak measurement was recorded on the boring log in the FID box next to the

corresponding depth (see Appendix A). For each individual boring increment which had an FID reading less than or equal to 250 ppm, the deepest sample taken or the sample nearest to the soil/water interface was retained from that particular boring for laboratory analysis. For FID readings higher than 250 ppm, the sample with the highest reading for an individual boring was retained for lab analysis.

The termination of the borings were performed in accordance with MDEQ's QA/QC 2003 manual. The manual states that if groundwater is encountered before or at twenty feet, then the boring shall be terminated at ten feet into the water table no matter the FID readings. If the groundwater is deeper than twenty feet, two guidelines are used to determine the termination depth. One, if the FID readings are less than 250 ppm, terminate the boring. Two, if the FID readings are greater than 250 ppm, continue the boring until the readings are less than 250 ppm or until water is encountered. Then continue an additional ten feet into the water before terminating the boring. Water levels were taken 24 hours after the soil borings were completed to help aid in evaluating the groundwater flow patterns (ASTM D 1452, 1999).

Between sample intervals, all sampling equipment was cleaned. The following procedures are those that MDEQ's QA/QC 2003 manual state should be used and are those that were implemented on site. Cleaning solutions consisted of tap water, distilled water, isopropyl alcohol, and phosphate free laboratory detergent (alconox). To prevent cross contamination or re-contamination, sampling equipment was cleaned according to the following:

1. All equipment was cleaned with tap water and alconox using a brush to remove any soil particles.
2. The equipment was then be rinsed thoroughly with tap water.
3. Rinsed thoroughly with isopropyl alcohol.
4. Rinsed the equipment with distilled water.
5. Between bore holes, the drill rig and augers were also cleaned in accordance with MDEQ's QA/QC manual procedures described as follows.

When the same drilling devices were used, the devices were washed before the next soil boring was initiated. These devices included all of the augers, sampling stems, the hammer, bolts, and any tools used during the process that came into contact with any possibly contaminated materials. The cleaning process used is described as followed (MDEQ QA/QC, 2003):

1. Any material not removable by steam cleaning with alconox and a wire brush (paint) was sand blasted off.
2. Hollow-stem augers were washed inside and out with clean tap water.
3. Once all foreign matter was removed, the equipment was rinsed with clean tap water.

During the drilling, QA/AC (Quality Assurance / Quality Control) samples were taken. An equipment blank was taken by pouring distilled water over the show of the split barrel sampler and allowed to flow into three 40 ml vials. Three 40 ml vials containing distilled water were labeled Trip Blank. These vials were labeled and shipped with the soil samples to the analytical lab. These QA/QC samples will ensure that no cross

contamination occurred from sampling techniques, and that no contamination occurred during transport.

Groundwater Study

Monitoring Well Installation and Development

After each boring was completed, a monitoring well was installed into the borehole. The monitoring wells were installed in such a manor that the wells provided high quality samples, and did not allow the contaminant to migrate from one aquifer into another leading to further contamination of the underground water systems. The groundwater monitoring wells were installed in accordance with both the MDEQ 2003 QA/QC manual and ASTM D 5092 1994 standard. The minimum set of data elements to identify the groundwater at the site were done in accordance with ASTM D 5254, 1994 standard. A groundwater site is defined as, "any source, location, or sampling station capable of producing water or hydrologic data from a natural stratum from below the surface of the earth" (ASTM D 5254, 1994, pg. 234).

One well, MW-6, was installed using the Power Probe and dual tube system. The remaining monitoring wells were installed with the B53 using a $4^{1/4}$ inch inside diameter hollow-stem augers, which prevented the borehole from caving during advancement of the boring. A disposable wooden plug was inserted into the auger bit to prevent the native material from intruding into the auger. The auger was drilled to the desired depth, and the well was inserted into the auger and used to dislodge the wooden plug. A minimum of two inches was allowed between the casing and the auger wall (MDEQ

QA/QC, 2003). This two-inch space allowed the filter material to be poured down the hollow-stem auger as it was retrieved from the bore hole. The filter material was placed to a minimum of one foot above the screened section and a bentonite seal was placed a minimum of two feet vertical thickness on top of the filter material (MDEQ QA/QC, 2003). The bentonite was saturated with water from a municipal source (ASTM D 5092, 1994) and allowed to swell before the grout seal was emplaced. The grout seal was poured to land surface with a mixture of 95% Portland cement and 5% bentonite (MDEQ QA/QC, 2003). The Portland and bentonite mixture was used for flexibility of the grout due to freeze-thaw conditions (ASTM D 5092, 1994). A surface casing with manhole was placed around the well-head for later access before the grout was poured. The fresh grout had a barrier placed around it for 24 hours to help aid in preventing any damage while the grout dried.

The well material used did not alter the chemical quality of the sample when contact with the aquifer was made (ASTM D 5092, 1994). The well screen and riser was new and wrapped in protective plastic until the well was inserted to ensure cleanliness. The screen was machine made to have 0.010 inch slots, and the bottom of the well was plugged. The length of the screened sections were installed at depths to ensure the top of the water table was always encountered.

With the exception of MW-6, which was constructed with 1 inch well material, the remaining wells were constructed with a two-inch P.V.C. schedule 40 (ASTM D 5092, 1994) body with threaded, flush joints. The filter material was a 20/40 clean medium to coarse grain sand (MDEQ QA/QC, 2003). Threaded P.V.C. plugs were used

to prevent any filter intrusion at the bottom of each well. A rubber-sealed cap was placed on the top of each of the wells to prevent any intrusion of surface water or rain water.

Each of the wells were surveyed to record the vertical and horizontal position (ASTM D 5092, 1994), which are shown on the well completion records in Appendix D and on Figure 14. Each of the wells were surveyed to a reference point on the well, which was a permanent mark at the highest point on top of the wells (ASTM D 5092, 1994). Teflon bailers with new nylon string were used for the purpose of manually purging the wells to accomplish the development of the wells. The water in the monitoring wells was not considered representative of the surrounding static water quality, so the wells were purged removing three times the well volume to ensure a representative sample was acquired (ASTM D 4448, 1994). The monitoring wells were sampled seven days after they were developed. With the use of an oil/water interface probe, no free-product was detected in any of the wells.

The probe was cleaned between sampling each well by the following steps to prevent any cross-contamination:

1. The probe was cleaned with tap water and alconox using a brush.
2. The probe was then rinsed thoroughly with tap water.
3. Rinsed thoroughly with isopropyl alcohol.
4. Rinsed with distilled water.

After the groundwater level was determined, the volume of the water column was determined with the following equation (ASTM D 5299, 1997):

$V = \pi r^2 h$

h = depth of water in feet
r = radius of well in inches
V = volume of water in gallons

The wells were sampled after each well recharged to 75% of its original volume (MDEQ QA/QC, 2003).

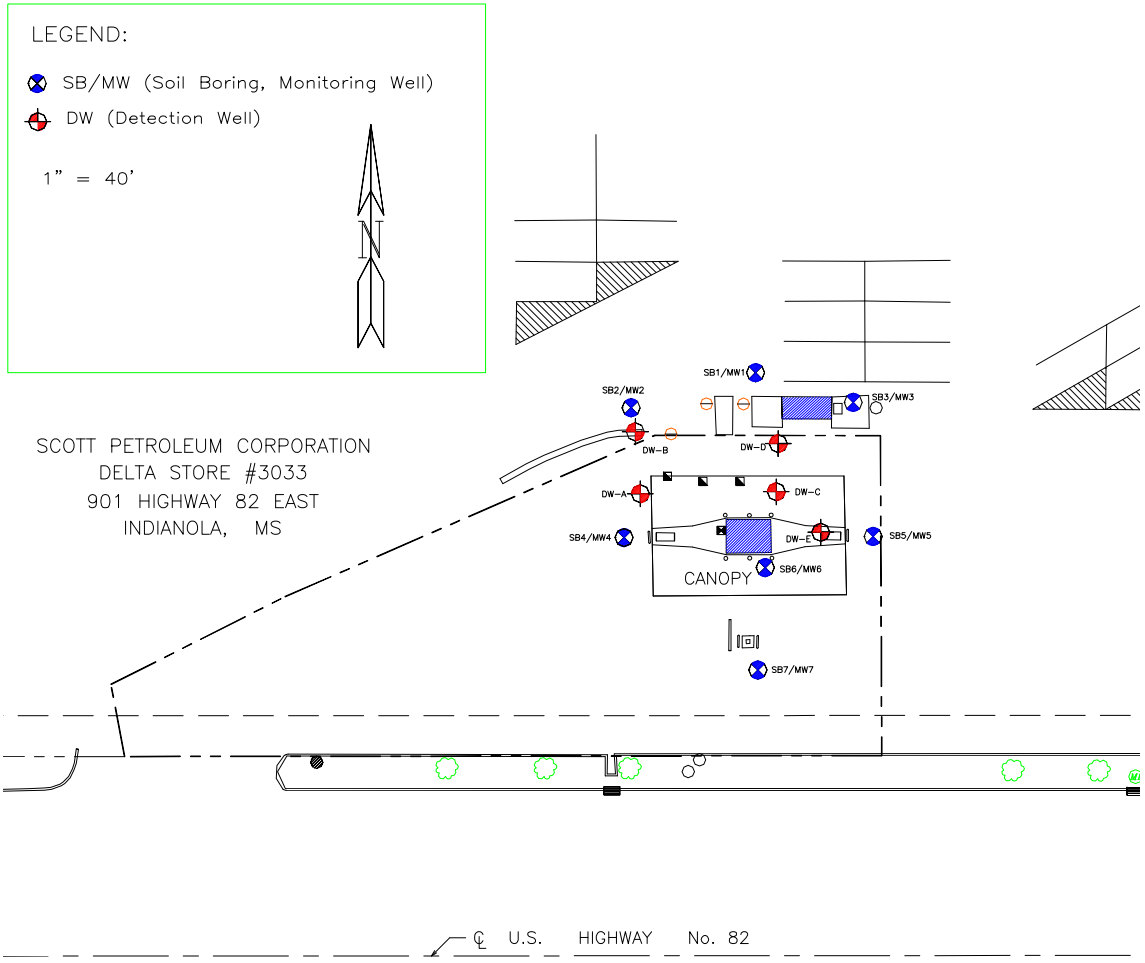


Figure 14 Site map of monitoring wells at Delta Store #3033

The following was the procedure used for sampling BTEX and PAH for groundwater (MDEQ QA/QC, 2003):

1. Three 40 ml vials were labeled clearly so that there was no confusion between samples for BTEX, and a one liter jar for PAH.
2. A new disposable bailer were used for each well.
3. The bailer was lowered slowly into the well. After it was filled, it was retrieved from the well.
4. The water sample was then distributed evenly into the sample containers minimizing turbidity and not allowing any air pockets (headspace) in the containers.
5. The containers were placed into zip-lock bags and placed on ice.

Two QA/QC samples were used in the groundwater sampling. A Trip Blank was used and a duplicate sample was taken in accordance with the MDEQ QA/QC 2003 manual. The trip blank, which consisted of distilled water, was developed in the lab and transported with the water samples to ensure contamination did not occur during the handling and transportation of the samples. The trip blank consisted of distilled water. A duplicate sample was collected at the same time from MW-7 at the same time MW-7 ws sampled and was labeled as "MW-8". The duplicate will act as a check on lab testing and findings.

A chain of custody was used to have a record of the people who were in possession of the samples and as documentation on the samples for evidence. The chain

of custody contained the following information required by the 1988 AASHTO manual standard 24-99:

1. The ID number of the facility.
2. The name of the site in question.
3. The names of all persons sampling or maintaining the samples.
4. The date, time of sample, a description of the sample, and the total number of samples transported.
5. The type of analysis that was done on each of the different samples.
6. All signatures of persons relinquishing the samples and receiving the samples.
7. The temperature of the samples were recorded on the document when the lab received the samples.

The samples were shipped to the lab in accordance with AASHTO R 24-99. This standard required the handler of the samples to place each of the samples into separate compartments or in a manor in which the sample containers were not touching one another. The samples were iced down to maintain the samples close to frozen conditions so that no headspace developed.

CHAPTER V

RESULTS

Field Screening of Utility Openings

Utility openings within a 200 ft. radius of the site were screened to show if any contamination is in the public sewer systems (MDEQ QA/QC, 2003). These openings included two storm sewers along U.S. Hwy 82 and a sanitary sewer manhole within U.S. Hwy 82 R.O.W. (right of way). These openings were measured with a Foxboro OVA-128 FID (Flame Ionization Detector). The locations of the openings can be found in Figure 12**,** and the readings from these utility openings are Table 2. The detector was calibrated using isobutylene in air (concentrated = 98 ppm). The FID was used to measure volatile organic compounds (VOCs) at the utility openings.

Table 2 List of utility openings screened at Delta Store #3033

OPENING NO.	OPENING DESCRIPTION	FID READING (PPM)
1	Storm sewer Inlet along U.S. Hwy 82.	0
2	Storm sewer Inlet along U.S. Hwy 82.	0
3	Sanitary Sewer Manhole SE of site within utility easement located north of and along the U.S. Hwy 82 R.O.W.	300

With the results of the FID readings, it was concluded that there were no vapors present in the storm sewers adjacent to the site. The reading observed in the sanitary sewer can be credited to sewer gas.

Soil Assessment Findings

Site Geology

The site geology is based on the information obtained from the boreholes. All strata encountered during the subsurface investigation are included in the boring logs found in Appendix A. The surficial deposit is a fine-grained clay (CL or CH) deposit (ASTM D 2488, 1999). This deposit is encountered in all the borings from the ground surface to below ground surface (bgs) of approximately 8 to 15 ft. Boring SB-3 encountered a silt lens (ML) (ASTM D 2488, 1999) above the previously described clay deposit from 0 to 5 ft. bgs. The SPT N values ranged from 7 to 13 indicating that the consistency of the soil ranges from medium to stiff (West, 1995). The second stratum is a fine-grained silt (ML). It is encountered below the clay deposit and extends to a depth of 25 ft. bgs. SPT N values for this soil's consistency ranges from 6 to 13 indicating a soil density of medium to stiff (West, 1995). The third stratum encountered is a coarse-grained sand (SM or SP) deposit. With the exception of SB-6 which was terminated at a depth of 20 ft. bgs, this deposit was encountered in all other soil borings beneath the silt deposit and extends to the boring terminations depths of 35 ft. bgs. The capillary fringe was encountered in this deposit from depths of 30 ft. to 32 ft. bgs. The SPT N values for this deposit ranged from 7 to 24 indicating the soils relative density of approximately

loose to medium (West, 1995). Due to high FID readings (see Table 3) during the soil assessment, SB-6 was terminated before reaching groundwater. With the exception of SB-6, all other borings were drilled to a depth of 35 feet below ground surface. SB-6 was grouted to a depth of ten feet below ground surface to ensure no conduit was created to promote any transferal of contamination. During drilling operations, a gas odor was detected in SB-4, SB-5, and SB-6.

Table 3 FID readings of soil samples from test borings

SAMPLING DATE	BOREHOLE/MW	SAMPLING INTERVAL (ft)	FID READING (ppm)
6/10/2004	SB-1/MW-1	0-1	56
		4-5	2
		9-20	0
		24-25	0*
		29-35	0
6/9/2004	SB-2/MW-2	0-1	5
		4-5	0
		9-25	0
		29-30	0*
		34-35	0
6/9/2004	SB-3/MW-3	0-1	8
		4-10	0
		14-15	36
		19-25	0
		29-30	0*
		34-35	0
6/8/2004	SB-4/MW-4	0-1	470*
		4-5	0
		9-10	37
		14-20	0
		24-25	2
		29-35	0
6/8/2004	SB-5.MW-5	0-1	280*
		4-15	0
		19-20	4
		24-25	36
		29-30	21
		34-35	0
6/11/2004	SB-6/MW-6	0-1	1250*
		4-5	380
		9-10	60
		14-15	25
		19-20	4
6/10/2004	SB-7/MW-7	0-1	110
		4-10	0
		14-15	16
		19-20	1
		24-25	0
		29-30	0*
		34-35	0

*Sample retained for testing

Figure 15 through Figure 18 are cross sections which illustrate the underlying geologic units encountered during the drilling process. It is clearly shown that there is a fining upward sequence, which demonstrates that the site specific geology was deposited by a fluvial process (Prothero and Schwab, 1996). SB-2, SB-4, SB-5, and SB-6 did not encounter the brown clayey silt to silty clay (CL-ML) as did the rest of the soil borings. As shown on Figure 15 and Figure 17, the cross sections illustrate that the soil strata directly beneath SB-2, SB-4, SB-5, and SB-6 changes from a high plasticity clay (CH) to a sandy silt (ML). Figure 19 illustrates the cross section lines represented in Figures 15, 16, 17, and 18. Other than the sandy silt (ML) from 0 to 5 feet located in the vicinity of SB-3, which may be contributed to a different type engineering fill, the cross sections depict that the top layer is fairly uniform in thickness with virtually no dip. However, the top confining layer appears to be thinner in the vicinity of SB-6. This could be considered the path of least resistance for fluids to travel directly under the site.

Soil Contamination

The analytical lab results for the soil tests are included in Appendix B for BTEX and PAH. Testing for BTEX samples was conducted in accordance with the Environmental Protection Agency's test method 8260B (www.epa.gov, 8/20/03). This method was used to determine the volatile compounds in the soil, regardless of the moisture content. Soil Borings SB-4, SB-5, and SB-6 were the only soil borings to return results that show evidence of contamination. These borings are proximal to the pump islands.

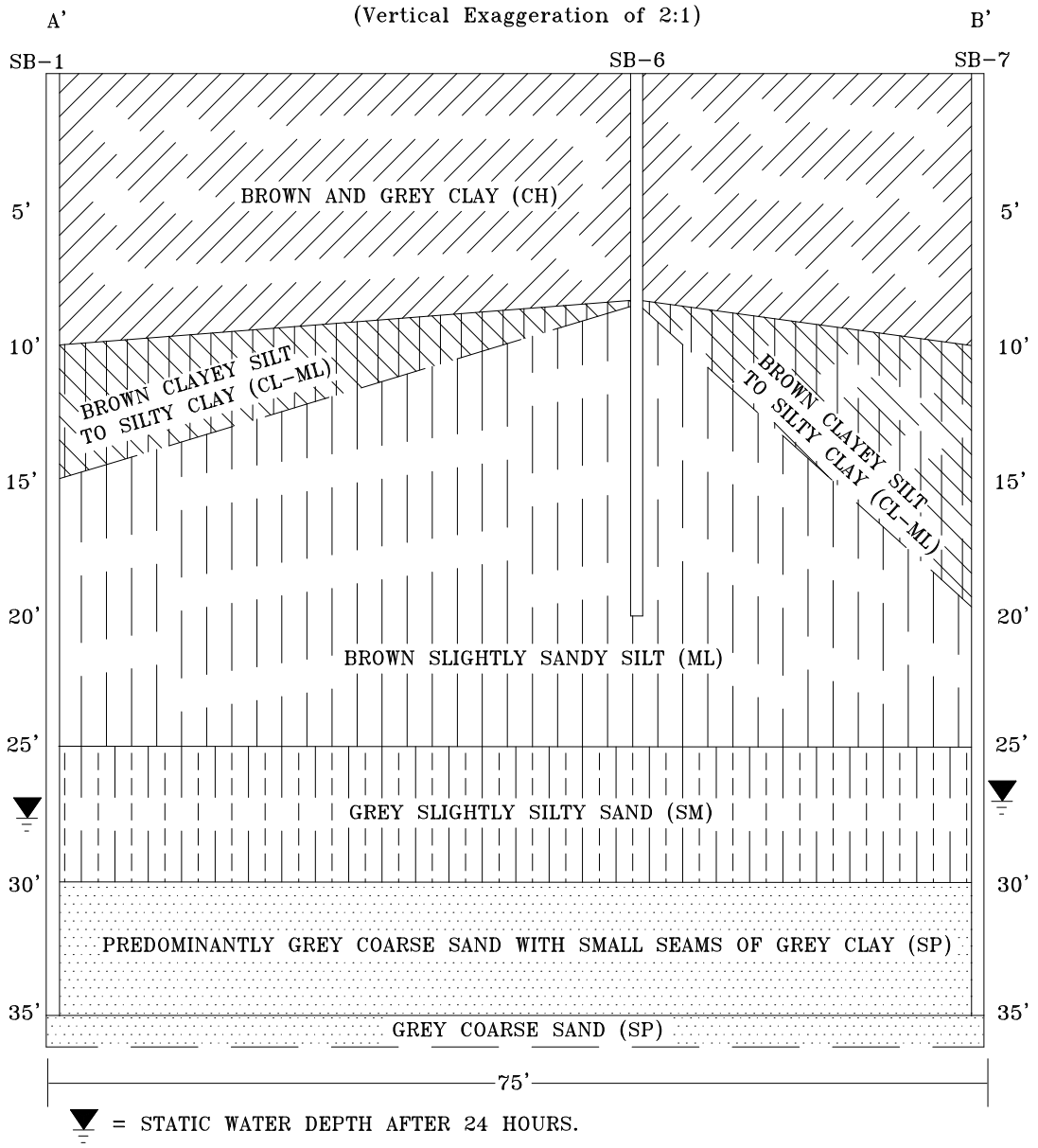


Figure 15 Cross section between SB-1 and SB-7

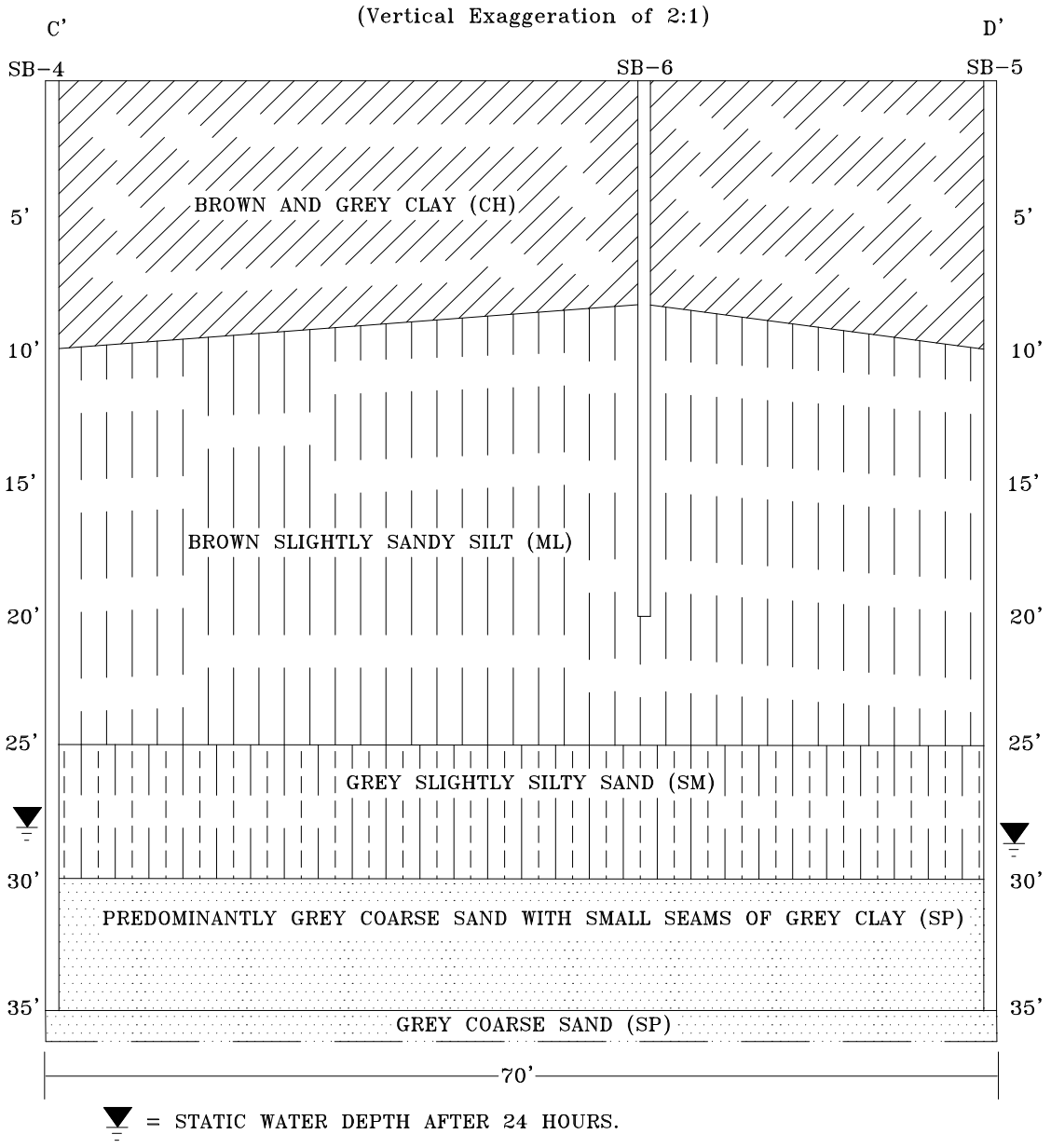


Figure 16 Cross section between SB-4 and SB-5

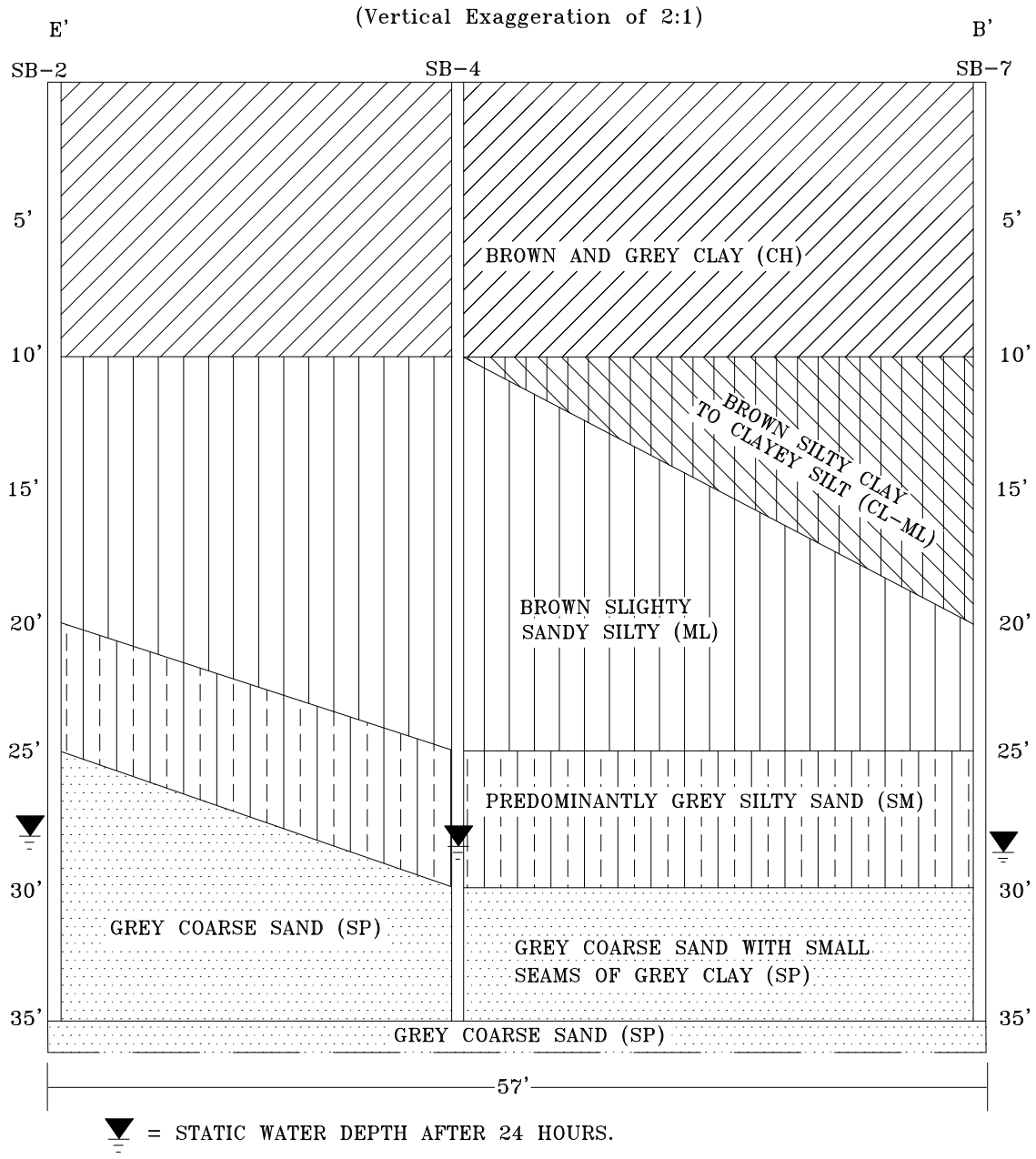


Figure 17 Cross section between SB-2 and SB-7

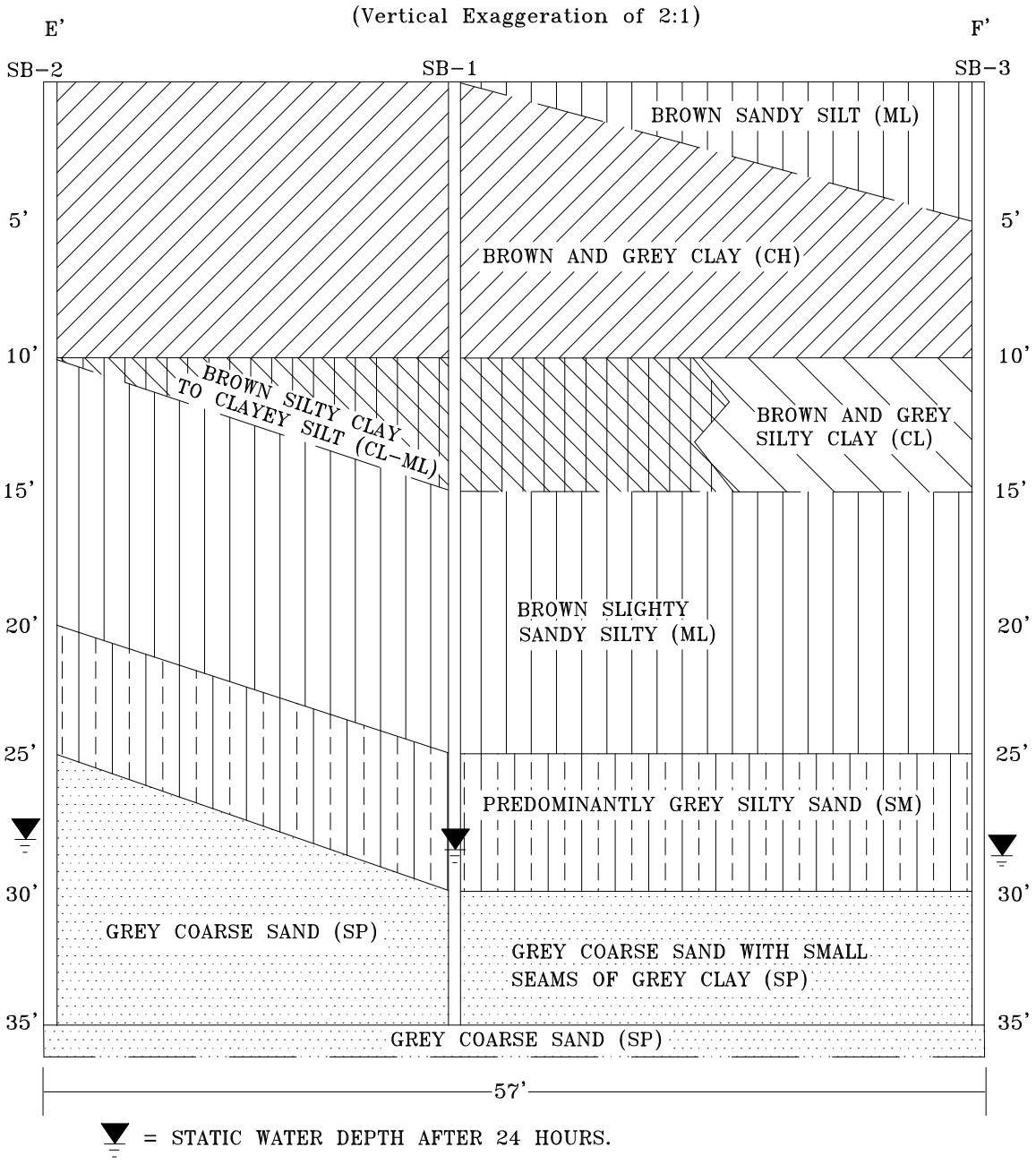


Figure 18 Cross section between SB-2 and SB-3

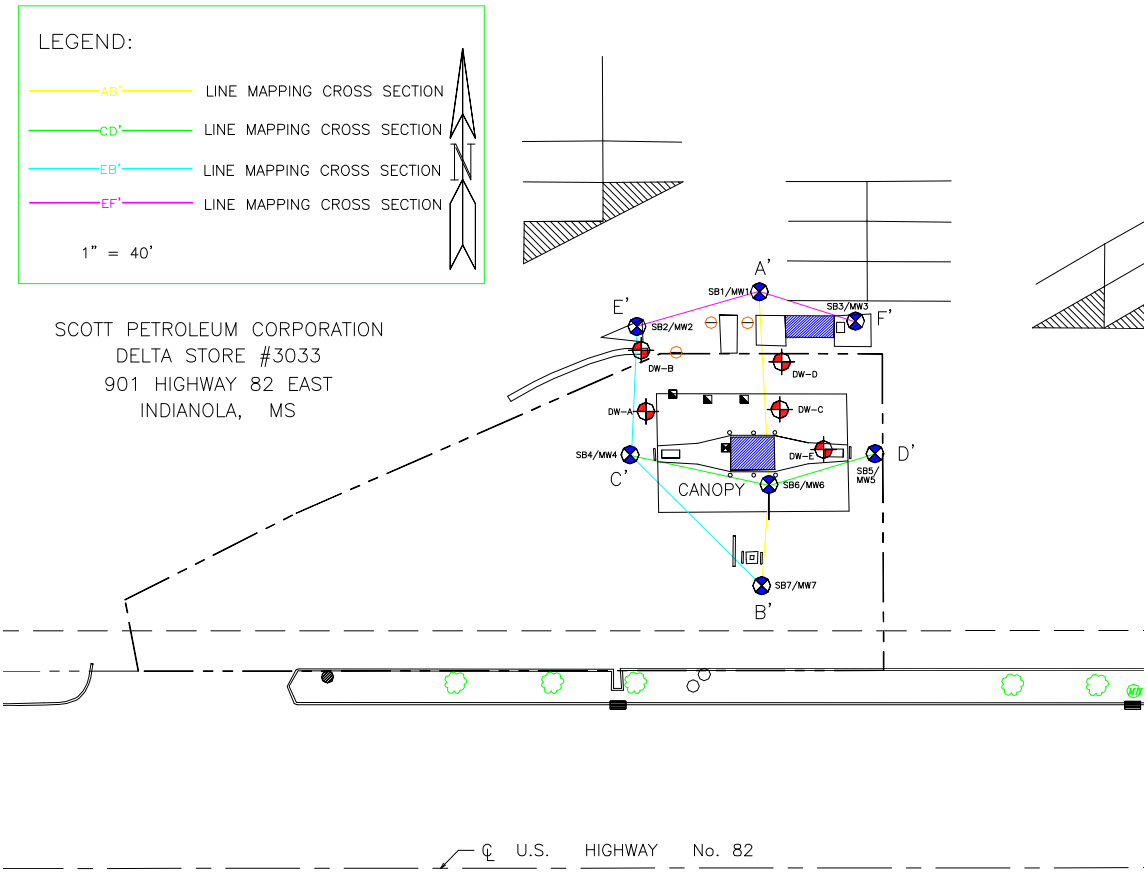


Figure 19 Map illustrating cross section lines at Delta Store #3033

The test results are summarized in Table 4. The QA/QC samples returned a non-detect measurement for both the Trip Blank and the Equipment. These QA/QC test samples help ensure that the samples were not contaminated during transport and that no cross-contamination occurred between soil boring locations.

Table 4 Summary of BTEX and PAH lab results from soil samples

Boring/MW	Depth of Soil Sample (ft.)	Sampling Date	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	2-Methylnaphthalene	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SB1/MW1	25	6/10/2004	ND	ND	ND	ND	ND	ND	ND	ND
SB2/MW2	30	6/9/2004	ND	ND	ND	ND	ND	ND	ND	ND
SB3/MW3	30	6/9/2004	ND	ND	ND	ND	ND	ND	ND	ND
SB4/MW4	1	6/8/2004	0.6	ND	0.4	0.5	1.5	ND	ND	ND
SB5/MW5	1	6/8/2004	0.1	ND	ND	ND	0.1	ND	ND	ND
SB6/MW6	1	6/11/2004	3.6	7.3	4.6	21.8	37.3	2.39	0.713	0.188
SB7/MW7	30	6/10/2004	ND	ND	ND	ND	ND	ND	ND	ND
Equipment		6/8/2004	ND	ND	ND	ND	ND	NT	NT	NT
Trip		6/7/2004	ND	ND	ND	ND	ND	NT	NT	NT
Trip		6/9/2004	ND	ND	ND	ND	ND	NT	NT	NT
Trip		6/11/2004	ND	ND	ND	ND	ND	NT	NT	NT

ND = NON-DETECTABLE
NT = NOT TESTED

Groundwater Findings

The monitoring wells were sampled seven days after they were developed. With the use of an oil/water interface probe, no free-product was detected in any of the wells. The measurement to the groundwater was measured by the oil/water interface probe to

the nearest 0.01 foot (see Table 5). The hydraulic gradient was determined to range from 0.01 to 0.02 ft/ft in the southwesterly direction. After the groundwater level was determined, the volume of the water column was determined with the following equation (ASTM D 5299, 1997):

$$V = \pi r^2 h$$

h = depth of water in feet
r = radius of well in inches
V = volume of water in gallons

All wells with the exception of MW-6, which did not produce water, had three well volumes of water purged from each of them. The wells were sampled after each well recharged to 75% of its original volume (MDEQ QA/QC, 2003).

Table 5 List of monitoring well elevations

Sampling Date	Borehole/ MW	Top of Casing Elevation (ft)	Screened Interval (ft)	Depth to Water (ft)	Depth to Product (ft)	Water Table Elevation (ft)
6/18/2004	SB1/MW1	98.1	63.10-88.1	27.9	None	70.4
6/18/2004	SB2/MW2	97.99	62.99-87.99	27.75	None	70.24
6/18/2004	SB3/MW3	98.66	63.66-88.66	28.4	None	70.26
6/18/2004	SB4/MW4	98.14	63.14-88.14	27.91	None	70.23
6/18/2004	SB5/MW5	98.38	63.38-88.38	27.5	None	70.88
6/18/2004	SB6/MW6	98.38	88.38-93.38	Dry	None	NA
6/18/2004	SB7/MW7	97.58	62.58-87.58	27.4	None	70.18
6/18/2004	DW-A	98.19	Unknown	Dry	None	NA
6/18/2004	DW-B	98.42	Unknown	Dry	None	NA
6/18/2004	DW-C	98.38	Unknown	Dry	None	NA
6/18/2004	DW-D	98.3	Unknown	Dry	None	NA
6/18/2004	DW-E	98.72	Unknown	0.42	Sheen	98.3

NA = Not Available

Groundwater Contamination

The results of the analytical lab results for the groundwater contamination are included in Appendix C for BTEX and PAH. Only one monitoring well, MW-4, returned results showing contamination of 0.011 mg/l for Total BTEX. The lab results are broken down in Table 6**.** Lab results for the duplicate sample, which is referenced as "MW-8" and is a duplicate of MW-7, were evaluated using the Relative Percent Difference (RPD) method (MDEQ QA/QC, 2003). The RPD for BTEX between the two samples is 0%. This demonstrates that the testing protocol used in the laboratory is valid. The trip blank sample returned a non-detect result, indicating that the samples were not contaminated during transport. After completion of all sampling activities, the hydraulic conductivity was determined. Determining the hydraulic conductivity will showed the rate in which the water is moving through the saturated zone at Delta Store #3033 (West, 1995). The rate in which the water moves is directly proportional to the type strata present (Deming, 2002). Therefore by evaluating previous slug tests performed at sites similar to Delta Store #3033, it can be assumed that the subsurface hydrogeology at Delta Store #3033 will be similar to those located within the Mississippi River Alluvium. The hydraulic conductivities calculated from the slug tests at Walton's 3-61 in Redwood, MS and Hardin's Chevron in Belzoni, MS were determined to be 1.91×10^{-5} cm/sec and 1.00×10^{-4} cm/sec with estimated well yields of 17.1 gpd (gallons per day) and 19.2 gpd. With a calculated value in this range, it can be assumed that the low permeability in the subsurface will result in a minimum mobilization of any petroleum released. The

contaminant will mimic the groundwater flow (West, 1995), but the gentle sloping flow gradient present will reduce the potential for the contaminant to move off site.

Table 6 Summary of BTEX and PAH lab results from water samples

Boring/MW	Sampling Date	Benzene (mg/l)	Toluene (mg/l)	Ethylbenzene (mg/l)	Xylenes (mg/l)	Total BTEX (mg/l)	Total PAH (mg/l)
SB1/MW1	6/18/2004	ND	ND	ND	ND	ND	ND
SB2/MW2	6/18/2004	ND	ND	ND	ND	ND	ND
SB3/MW3	6/18/2004	ND	ND	ND	ND	ND	ND
SB4/MW4	6/18/2004	ND	0.001	0.001	0.008	0.011	ND
SB5/MW5	6/18/2004	ND	ND	ND	ND	ND	ND
SB6/MW6	6/18/2004	NT	NT	NT	NT	NT	NT
SB7/MW7	6/18/2004	ND	ND	ND	ND	ND	ND
Trip	6/18/2004	ND	ND	ND	ND	ND	NT
MW-8	6/18/2004	ND	ND	ND	ND	ND	NT

ND = NON-DETECTABLE
NT = NOT TESTED
NA = NOT APPLICABLE

The slug test at Delta Store #3033 was performed on one monitoring well, MW-1. This test method involved the removal of a known quantity (slug) of water from the monitoring well, which was accomplished with the aid of a bailer (ASTM D 4044, 1999). This sudden change in the head was measured with an electronic water level indicator until the water level returned to at least 37% of the initial level. The measurements are plotted in Appendix E as time (logarithmic scale) verses change in depth of water or head

(arithmetic scale) (ASTM D 4104, 1999). Using "Applied Hydrogeology" C. W. Fetter 2nd Edition, 1988, the site specific hydraulic conductivity was determined to be 1.2 x 10^{-5} cm/sec using the following formula:

Hydraulic Conductivity $$K = \frac{r^2 \ln (L/R)}{2 L T_0}$$

where :
K = Hydraulic Conductivity
r = radius of well
R = radius of screen
L = length of screen
T_0= Time for H_2O to reach 37% of static level

Summary of Results

Delta Store #3033 was suspected of having a fuel release and a subsurface investigation was performed to determine, if in fact, a release of petroleum had occurred. The investigative approach which was used is one that is proven to determine the extent of contamination caused by hydrocarbons. The following is a summary of the results at Delta Store #3033.

Seven exploratory borings were drilled on-site and logged noting all soil formations and any groundwater encountered. All soil borings were drilled to depths of 35 ft. bgs, with the exception of SB-6 (20 ft. bgs). The formations encountered suggest that the deposition of the subsurface is a fining upward sequence, which is representative of a fluvial environment. The boring logs and the cross sections show that the surficial soil layer consists of a clay material (CH). This clay was encountered in all boring locations. It appears that the clay layer is thinner in the vicinity of SB/MW-6. SB/MW-4 SB/MW-5, and SB/MW-6 do not encounter the silty clay to clayey silt (CL-ML) layer, which is encountered in the remaining soil borings. Groundwater was encountered around

27.5 ft. bgs on average. Soil samples were taken at five-foot intervals, and scanned with a flame ionization device (FID) to determine if there were any volatilized hydrocarbons present. The samples with the highest FID reading, or the deepest sample interval taken, were saved and sent to an analytical lab for testing. Analytical lab tests returned results showing three borings containing contamination. The levels were 1.5 mg/kg in SB-4, 0.1 mg/kg in SB-5, and 37.3 mg/kg in SB-6 for total BTEX (see Figure 20). SB-6 was the only well to return any values for PAH at 3.291 mg/kg (see Figure 21). The returned values for BTEX in soil are well below the maximum allowable limits of 100 mg/kg, indicating that there is an acceptable limit of contamination in the soil. PAH is broken down into several parameters, which are listed on the analytical lab results in Appendix B. Of these parameters, Napthalene, Phenanthrene, and Pyrene returned results in SB-6 (see Table 4). These values are well below the maximum allowable limits for each respectable constituent. The QA/QC samples returned Non-Detect (ND) lab results, suggested that there was no cross contamination between samples and that no contamination of the samples occurred during transport. All soil borings were converted into monitoring wells for future water quality analytical tests. The monitoring wells were constructed with schedule 40 PVC well casings with 0.010 inch slots for the screen, and a 20/40 sand was used for the filter pack with a bentonite seal placed on top.

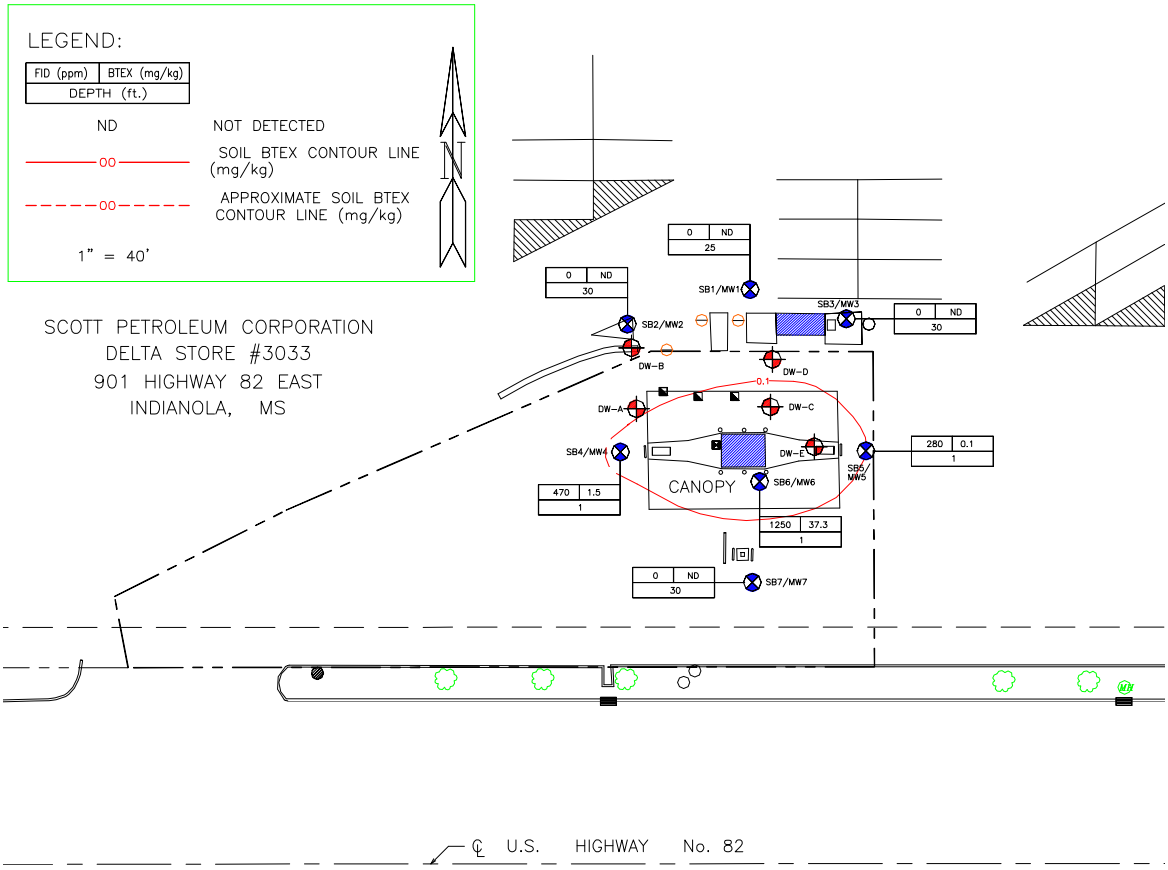


Figure 20 Map illustrating BTEX levels in soil around Delta Store #3033

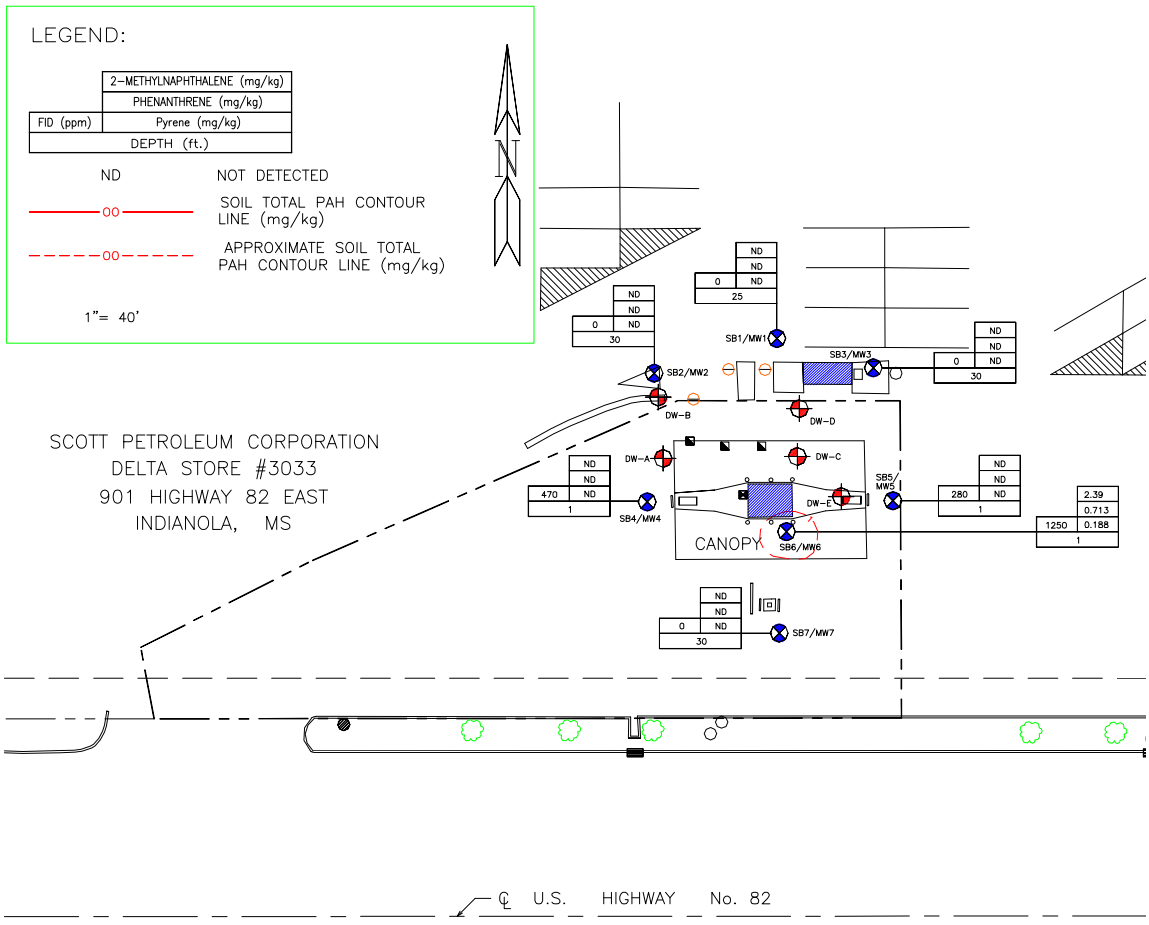


Figure 21 Map illustrating PAH levels in the soil at Delta Store #3033

Hydrogeological information and groundwater samples were collected from the monitoring wells. There were no wells which contained free-product; therefore all monitoring wells were sampled for BTEX and PAH, with the exception of SB-6 which did not produce water. The depth to water was measured and referenced to a known elevation to produce Figure 22, which illustrates the groundwater flow direction. The groundwater flow direction seems to be flowing in a southwesterly direction with a hydraulic gradient from 0.01 to 0.02 ft/ft. The water level is higher in DW-E and MW-5, which may be the result of a water leak at the site. These values were ignored when developing the groundwater contour. MW-4 returned positive results for total BTEX, 0.011 mg/l (see Figure 23). The BTEX hydrocarbon plume in the vicinity of SB/MW-4 is estimated to be approximately 522 ft^2. All water samples returned a ND (non-detect) for PAH. The BTEX value returned for MW-4 was well below the maximum allowable limit of 18 mg/l for BTEX in water. Slug test data show that the site specific hydraulic conductivity at the site is 1.2×10^{-5} cm/sec. The hydraulic conductivity, subsurface geology, and hydraulic gradient at Delta Store #3033 is similar to those sites previously mentioned, which suggests that any recent release of hydrocarbons should be confined to the immediate vicinity under the site.

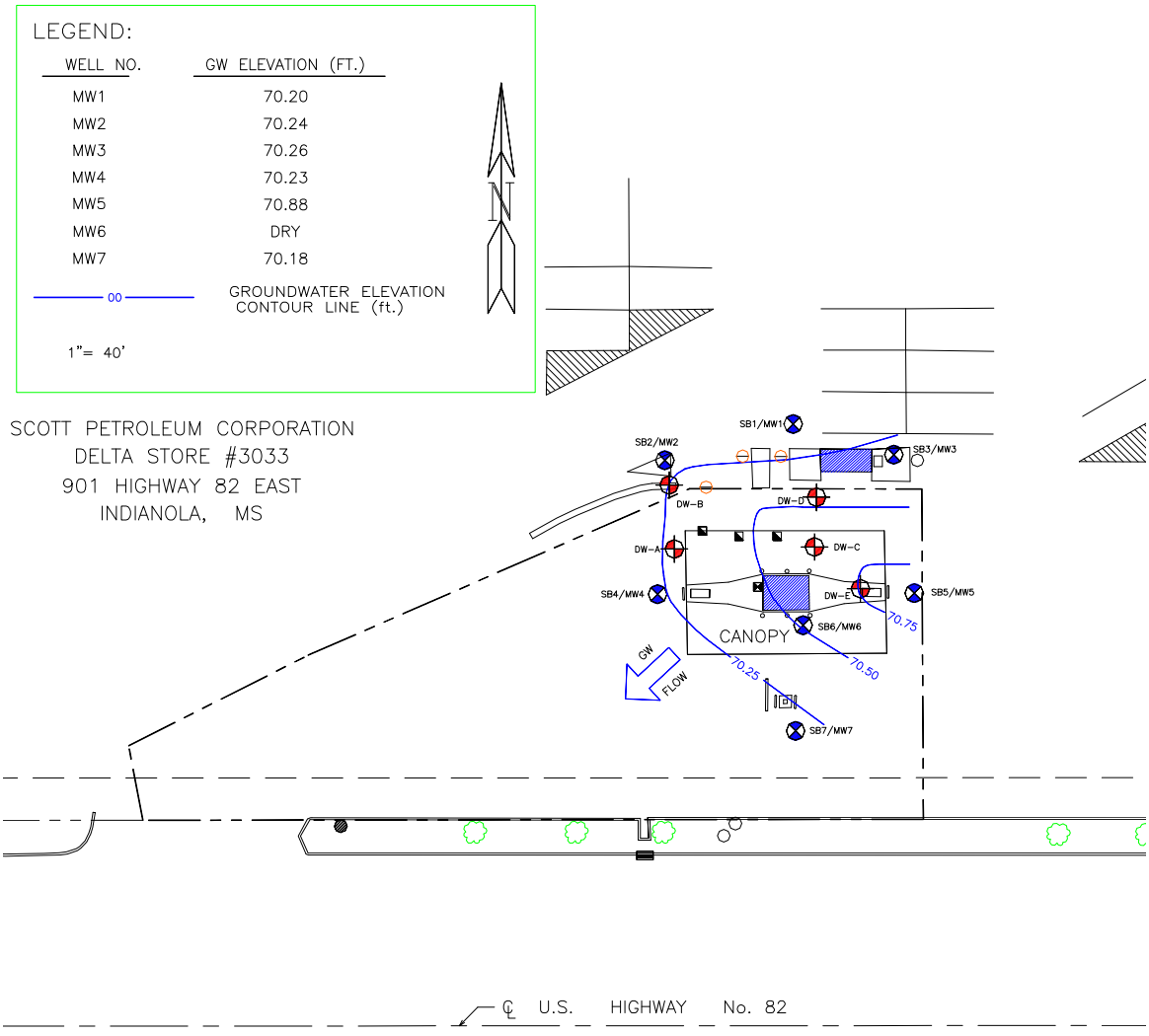


Figure 22 Potentiometric map at Delta Store #3033

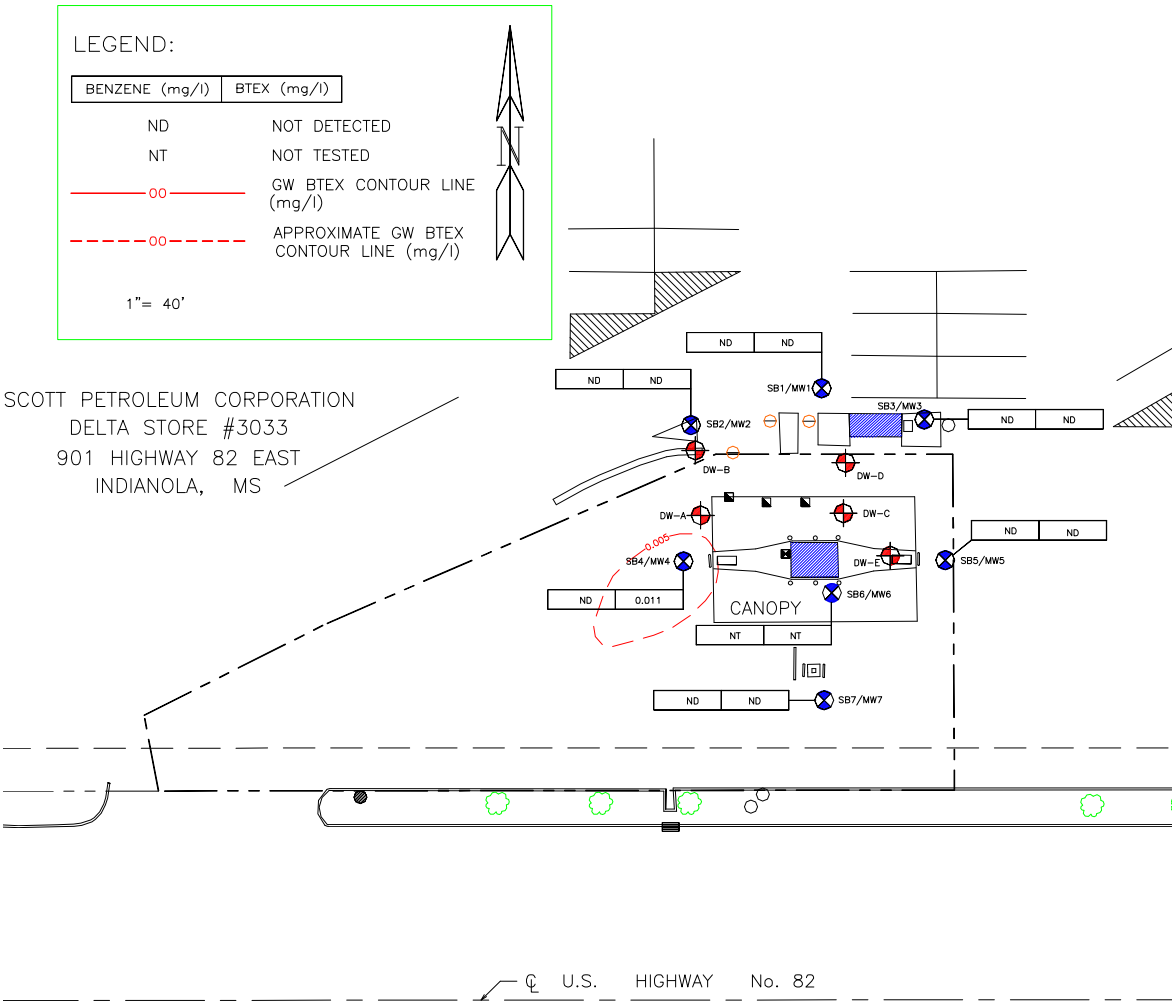


Figure 23 BTEX levels in the groundwater at Delta Store #3033

CHAPTER VI

DISCUSSION

There are several conclusions which can be reached after evaluating the analytical lab data and from the field data collected. Even though the values of the contamination found are well below the maximum allowable limits allowed by MDEQ, there is still evidence of soil and groundwater contamination present at the site. The contamination found is considered low enough that it is apparent no large fuel release from the UST system has occurred. The contamination found may be attributed to localized spills such as customers over pumping their fuel tanks or spilling fuel directly on the ground. While on site, this spillage was witnessed twice in the vicinity of SB/MW4 and SB/MW-6.

The soil contamination found is in the vicinity of SB/MW-4, SB/MW-5, and SB/MW-6 and the groundwater contamination is found in the vicinity of SB/MW-4. The soil contamination is mostly confined to the surficial soil; however, after evaluating lab data and construction and evaluation of the boring logs and cross sections, it appears that the contamination has migrated down and through the surficial confining layer into the underlying strata.

The migration of the contamination is believed to have three possibilities. The levels of contamination around SB/MW-6 are much higher than SB/MW-4 and SB/MW5. It may be possible that the contamination originated around SB/MW-6 and radiated out contaminating the areas around SB/MW-4 and SB/MW-5, and then migrating downward

through the soil layers into the groundwater. Once in the groundwater, the contamination migrated with the natural groundwater flow in the southeast direction and is now lingering around SB/MW-4. Another possibility is that the contamination originated around SB/MW-4, SB/MW-5, and SB/MW-6. From these three locations the contamination moved directly downward in the soil layers into the groundwater. Again, once in the groundwater the contamination migrated in the direction of SB/MW-4. The last possibility would be some sort of combination of the first two. Nevertheless, with SB/MW-4 being the only water well to return positive results for BTEX in the groundwater, and the only well which is down gradient from all other monitoring wells; suggests that any contamination in the on-site groundwater would be and was detected in this down gradient well.

The levels of contamination which were encountered are believed to closely resemble the original maximum contamination levels on site. This belief is determined through a number of factors. Natural attenuation of the hydrocarbons is a slow process, and is not believed to have impacted the contamination in the short time frame from which the suspected fuel release occurred to the time the site assessment was conducted. Other factors include that the entire site is paved with concrete, which practically eliminates the risk of rainwater filtering through the soil and mobilizing the contamination. Also, the low hydraulic conductivity and the gentle hydraulic gradient, added in with capillary forces, suggests that any groundwater flow will be at a minimum. This reduces the chance for the contamination migrating off site.

Due to the low levels of contamination, the surficial confining layer, and the hydraulic properties, the local-area-registered municipal water wells or any adjacent properties are not immediately threatened by the contamination present at Delta Store #3033.

CHAPTER VII

CONCLUSION

Though the contamination may not have occurred from any underground piping or other features related to the UST configuration, there were still signs of contamination on site. Therefore, I accept my hypothesis in showing that the methods used were able to determine that the site had soil contamination from a possible origin of localized spillage on the surface, which migrated downward into the groundwater creating a BTEX hydrocarbon plume of approximately 522 ft^2 in the vicinity of SB/MW-4.

Due to the low levels of contamination, it does not appear to be an eminent threat to public safety. It is highly likely that the levels of contamination found should naturally attenuate in the subsurface. Therefore, no further action should be taken towards the assessment of the current conditions at Delta Store #3033.

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APPENDIX A

BORING LOGS

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS — SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS — DATE: 6-10-04
BORING NO.: SB-1 — LOCATION: See Site Map — PROJECT NO.: 08050-2-0304
ELEVATION: 98.45' — DRILLING METHOD: 4-1/4" I.D. HSA — DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0				4" Wire Reinforced Concrete							
				Brown and Grey Clay	56						Time: 9:25
5	CH				2	9					Time: 9:34
10	CL-ML			Brown Silty Clay to Clayey Silt	0	9					Time: 9:42
15				Brown Slightly Sandy Silt	0	8					Time: 9:50
20	ML			Brown Sandy Silt	0	7					Time: 9:58
25	SM			Grey Slightly Silty Sand	0	13					Time: 10:07
30	SP			Grey Sand with some Clay	0	9					Time: 10:15 Sample Retained for Testing
35				Grey Coarse Sand	0	7					Time: 10:24

DEPTH TO WATER: INITIAL ▽ 31' AFTER 24 HOURS ▽ 27.75' BORING TERMINATED AT 35 FT

W. L. BURLE, ENGINEERS, P.A.

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS — SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS — DATE: 6-9-04
BORING NO.: SB-2 — LOCATION: See Site Map — PROJECT NO.: 08050-2-0304
ELEVATION: 98.34' — DRILLING METHOD: 4-1/4" I.D. HSA — DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0				Grass, Grass Roots, Dark Brown Clay	5						Time: 9:10
				Brown and Grey Clay							
5	CH				0	7					Time: 9:40
10				Brown and Grey Slightly Sandy Clayey Silt	0	6					Time: 9:53
15	ML				0	8					Time: 10:04 Moist
20				Brown & Grey Silty Sand	0	7					Time: 10:16 Moist
	SM										
25				Grey Medium Coarse Sand	0	22					Time: 10:20
30	SP				0	20					Time: 10:27 Sample Retained for Testing
35				Grey Coarse Sand	0	11					Time: 10:35

DEPTH TO WATER: INITIAL ▽ 31' AFTER 24 HOURS ▽ 27.61' BORING TERMINATED AT 35 FT

W. L. BURLE, ENGINEERS, P.A.

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS
SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS
DATE: 6-9-04
BORING NO.: SB-3 LOCATION: See Site Map
PROJECT NO.: 08050-2-0304
ELEVATION: 98.92' DRILLING METHOD: 4-1/4" I.D. HSA
DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0	ML			Grass, Grass Roots, Brown Sandy Silt Brown Sandy Silt	8						Time: 12:29
5	CH			Brown and Grey Clay	0	12					Time: 13:25
10	CL			Brown and Grey Silty Clay	0	11					Time: 13:32
15	ML			Light Brown Slightly Sandy Silt	36	11					Time: 13:46
20					0	8					Time: 13:55
25	SM			Fine Grey Silty Sand	0	17					Time: 14:03
30	SP			Grey Medium Coarse Sand with Clay Balls	0	18					Time: 14:18 Sample Retained for Testing
35				Grey and Black Sand	0	7					Time: 14:28

DEPTH TO WATER: INITIAL ▽ 31' AFTER 24 HOURS ▼28.30' BORING TERMINATED AT 35 FT

W. L. BURLE, ENGINEERS, P.A.

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS
SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS
DATE: 6-8-04
BORING NO.: SB-4 LOCATION: See Site Map
PROJECT NO.: 08050-2-0304
ELEVATION: 98.43' DRILLING METHOD: 4-1/4" I.D. HSA
DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0	SM			4" Wire Reinforced Concrete Light Brown Silty Sand Grey Clay	470						Time: 10:15 Sample Retained for Testing
5	CH			Brown and Grey Clay	0	11					Time: 10:40
10				Brown Slightly Sandy Silt	37	9					Time: 10:50
15	ML				0	11					Time: 11:04
20					0	11					Time: 11:10
25	SM			Fine Grey Silty Sand	2	8					Time: 11:22
30	SP			Grey Medium Coarse Sand	0	18					Time: 11:30
35				Grey Coarse Sand	0	24					Time: 11:40

DEPTH TO WATER: INITIAL ▽ 32' AFTER 24 HOURS ▽ 27.81' BORING TERMINATED AT 35 FT

W. L. BURLE, ENGINEERS, P.A.

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS
SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS
DATE: 6-8-04
BORING NO.: SB-5 LOCATION: See Site Map
PROJECT NO.: 08050-2-0304
ELEVATION: 98.71' DRILLING METHOD: 4-1/4" I.D. HSA
DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0				4" Wire Reinforced Concrete							
				Brown and Grey Clay	280						Time: 13:54 Sample Retained for Testing
5	CH			Brown and Grey Clay	0	9					Time: 14:08
10				Brown Slightly Sandy Silt	0	13					Time: 14:14
15	ML				0	8					Time: 14:28
20				Grey Slightly Sandy Silt with Clay Balls	4	9					Time: 14:35
25	SM			Fine Grey Silty Sand with Clay Balls	36	11					Time: 14:42
30	SP			Grey Medium Sand with Clay Balls	21	11					Time: 14:55
35				Grey Coarse Sand	0	15					Time: 15:06

DEPTH TO WATER: INITIAL ▽ 32' AFTER 24 HOURS ▽ 28.10' BORING TERMINATED AT 35 FT

W. L. BURLE, ENGINEERS, P.A.

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS
SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS
DATE: 6-11-04
BORING NO.: SB-6 LOCATION: See Site Map
PROJECT NO.: 08050-2-0304
ELEVATION: 98.61 DRILLING METHOD: 2.375" O.D.
DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0				4" Wire Reinforced Concrete							
	SM			Light Brown Silty Sand	1250						Time: 9:10 Sample Retained for Testing Strong Gas Odor
				Grey Clay							
5	CH			Brown and Grey Clay	380						Time: 9:40 Gas Odor
				Light Slightly Sandy Silt							
10					60						Time: 9:48 Slight Gas Odor
	ML										
15					25						Time: 10:03 Slight Gas Odor
20					4						Time: 10:13
25											
30											
35											

DEPTH TO WATER: INITIAL ▽ N/A AFTER N/A HOURS ▽ N/A BORING TERMINATED AT 20 FT

W. L. BURLE, ENGINEERS, P.A.

TEST BORING RECORD

PROJECT: PSI/Scott Delta Store #3033, Indianola, MS
SHEET 1 OF 1
CLIENT: Scott Petroleum Corporation, Itta Bena, MS
DATE: 6-10-04
BORING NO.: SB-7 LOCATION: See Site Map
PROJECT NO.: 08050-2-0304
ELEVATION: 97.99' DRILLING METHOD: 4-1/4" I.D. HSA
DRILLER: Olivi

DEPTH (FT)	USCS	LEGEND	SAMPLE	DESCRIPTION	FID (PPM)	N Value	W	PL	LL	PI	REMARKS
0				4" Wire Reinforced Concrete							
	CH			Grey and Brown Clay	110						Time: 12:00
5					0	9					Time: 12:18
10				Brown Clayey Silt to Silty Clay	0	13					Time: 12:28
15	CL-ML				16	8					Time: 12:35
20	ML			Brown Slightly Sandy Silt	1	13					Time: 12:47
25	SM			Grey Silty Sand with Clay Balls	0	10					Time: 12:58
30	SP			Grey Coarse Sand with Small Grey Clay Seam	0	21					Time: 13:09 Sample Retained for Testing
35					0	12					Time: 13:19

DEPTH TO WATER: INITIAL ▽ 30' AFTER 24 HOURS ▽ 27.40' BORING TERMINATED AT 35 FT

W. L. BURLE, ENGINEERS, P.A.

KEY TO SYMBOLS

Symbol Description

Strata symbols


Paving


High plasticity clay


Silty low plasticity clay


Silt


Silty sand


Poorly graded sand


Low plasticity clay

Misc. Symbols


Water table during drilling


Water table at boring completion


Water table during drilling


Water table at boring completion

Soil Samplers


Bulk/Grab sample


Standard penetration test

Notes:

1. Boring locations were taped from existing features and elevations extrapolated from the final design schematic pla
2. These logs are subject to the limitations, conclusions, and recommendations in this report.
3. Results of tests conducted on samples recovered are reporte on the logs.

APPENDIX B

ANALYTICAL LAB RESULTS FOR SOIL SAMPLES

ARGUS ANALYTICAL, INC.

235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/14/04
Date Received: 06/09/04
Date/Time Sampled: 06/08/04 10:15
Sampled by: Client

Project ID/Location: Phase I (PSI)
Scott Petroleum

Project Number:

Sample Description: SB-4 @ 1 ft.
Sample Matrix: SOIL

Sample Number: BB69295
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	0.6	0.1	mg/Kg	8021B	JAR	06/10/04	10:58
Toluene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	10:58
Ethylbenzene	0.4	0.1	mg/Kg	8021B	JAR	06/10/04	10:58
Xylene	0.5	0.1	mg/Kg	8021B	JAR	06/10/04	10:58
Methyl-t-butyl ether	0.5	0.2	mg/Kg	8021B	JAR	06/10/04	10:58
-- Prep for Volatile Organics	-			5035	JAR	06/09/04	16:30
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Acenaphthylene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Anthracene	ND	0.085	mg/Kg	8270C	JWH	06/11/04	06:14
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	JWH	06/11/04	06:14
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	JWH	06/11/04	06:14
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Chrysene	ND	0.09	mg/Kg	8270C	JWH	06/11/04	06:14
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	JWH	06/11/04	06:14
Fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Fluorene	ND	0.05	mg/Kg	8270C	JWH	06/11/04	06:14
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
2-Methylnaphthalene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Naphthalene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Phenanthrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14
Pyrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:14

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

rgsmprT

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/14/04
Date Received: 06/09/04
Date/Time Sampled: 06/08/04 13:54
Sampled by: Client

Project ID/Location: Phase I (PSI)
Scott Petroleum

Project Number:

Sample Description: SB-5 @ 1 ft.
Sample Matrix: SOIL

Sample Number: BB69296
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	0.1	0.1	mg/Kg	8021B	JAR	06/10/04	11:24
Toluene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:24
Ethylbenzene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:24
Xylene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:24
Methyl-t-butyl ether	ND	0.2	mg/Kg	8021B	JAR	06/10/04	11:24
-- Prep for Volatile Organics	-			5035	JAR	06/09/04	16:30
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Acenaphthylene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Anthracene	ND	0.085	mg/Kg	8270C	JWH	06/11/04	06:41
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	JWH	06/11/04	06:41
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	JWH	06/11/04	06:41
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Chrysene	ND	0.09	mg/Kg	8270C	JWH	06/11/04	06:41
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	JWH	06/11/04	06:41
Fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Fluorene	ND	0.05	mg/Kg	8270C	JWH	06/11/04	06:41
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
2-Methylnaphthalene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Naphthalene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Phenanthrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41
Pyrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	06:41

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmprT

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/14/04
Date Received: 06/09/04
Date/Time Sampled: 06/08/04 10:27
Sampled by: Client

Project Number:

Project ID/Location: Phase I (PSI)
Scott Petroleum

Sample Number: BB69297

Sample Description: SB-2 @ 30 ft.

Page Number: 1

Sample Matrix: SOIL

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:49
Toluene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:49
Ethylbenzene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:49
Xylene	ND	0.1	mg/Kg	8021B	JAR	06/10/04	11:49
Methyl-t-butyl ether	ND	0.2	mg/Kg	8021B	JAR	06/10/04	11:49
-- Prep for Volatile Organics	-			5035	JAR	06/09/04	16:30
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Acenaphthylene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Anthracene	ND	0.085	mg/Kg	8270C	JWH	06/11/04	07:0
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	JWH	06/11/04	07:0
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	JWH	06/11/04	07:0
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Chrysene	ND	0.09	mg/Kg	8270C	JWH	06/11/04	07:0
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	JWH	06/11/04	07:0
Fluoranthene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Fluorene	ND	0.05	mg/Kg	8270C	JWH	06/11/04	07:0
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
2-Methylnaphthalene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Naphthalene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Phenanthrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0
Pyrene	ND	0.10	mg/Kg	8270C	JWH	06/11/04	07:0

ND = Not Detected

Janet Hunter
Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/11/04

Date Sampled: 06/08/04
Time Sampled: 14:00
Sampled by: Client

Project ID/Location: Phase I (PSI)
Scott Petroleum

Date Received: 06/09/04

Sample Description: Equipment Blank

Sample Number: BB69298

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	JAR	06/10/04
Toluene	ND	1	ug/L	8021B	JAR	06/10/04
Ethylbenzene	ND	1	ug/L	8021B	JAR	06/10/04
Xylene	ND	1	ug/L	8021B	JAR	06/10/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	JAR	06/10/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/11/04

Date Sampled: 06/07/04
Time Sampled: 08:40
Sampled by: Client

Project ID/Location: Phase I (PSI)
Scott Petroleum

Date Received: 06/09/04

Sample Description: Trip Blank

Sample Number: BB69299

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	JAR	06/10/04
Toluene	ND	1	ug/L	8021B	JAR	06/10/04
Ethylbenzene	ND	1	ug/L	8021B	JAR	06/10/04
Xylene	ND	1	ug/L	8021B	JAR	06/10/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	JAR	06/10/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

SAMPLE CHAIN OF CUSTODY RECORD

W. L. BURLE ENGINEERS, P.A.
111 South Walnut Street
GREENVILLE, MS 38701

Client: Scott Petroleum 6/9/04
Tara Bena, MS

Project Description: Phase I (P.S.I.) | ATTN: Argus

Scott Petroleum
Indianola, MS

Sampler (Signature)

NO. OF SAMPLE CONTAINERS

Page 1 of 1

STATION	DATE	TIME (Military)	SAMPLE DESCRIPTION	BTEX	MTBE	PAH	REMARKS
SB-4 @ 1'	6/8/04	10:15	two 4oz jars (soil)	X	X	X	BCL9795
SB-5 @ 1'	6/8/04	13:54	↓	X	X	X	69796
SB-2 @ 30'	6/9/04	10:27	↓	X	X	X	69797
EQUIP. BLANK	6/8/04	14:00	Three 40ml vials (H_2O)	X	X		69798
TRIP BLANK	6/7/04	8:40	↓	X	X		69799

Relinquished by (Signature)	Date	Time (Military)	Received by (Signature)	Date	Time (Military)	Relinquished by (Signature):	Date	Time (Military)	Received by (Signature):	Date	Time (Military)
	6/7/04	12:15		6/9/04	12:15						
Relinquished by (Signature)	Date	Time (Military)	Received by (Signature)	Date	Time (Military)	REMARKS:					
	6/9/04	13:45		6/10	13:43						

ORIGINAL WHITE - REPORT
YELLOW COPY - LABORATORY

Cooler Receipt Check List

Sample Number(s): BB69295-69

Unless otherwise noted, the test results meet all NELAC requirements for the methods listed on Argus' scope of accreditation.

The test results relate only to the items tested or to the sample as received by the laboratory. Reports shall not be reproduced except in full, without the written approval of the laboratory.

Client: WCBurle

Date Opened: 6/9/04

Opened by: cc

Temperature when opened: (4°(ice)) Ambient Measured (1): _____ (1) In < 50% ice, use a thermometer to measure the temperature at the bottom of the cooler.

Type of wrapping material: (None) Peanuts Bubblewrap Paper Other

Cooler **custody seals** intact? (n/a) Y/N Signed & dated? Y/N

Container custody seals intact? (n/a) Y/N

COC papers received? (Y/N) Receipt properly noted on COC? (Y/N)

COC papers properly filled in (signed in ink)? (Y/N) Container labels correspond to the COC? (Y/N)

All **containers** intact (not broken)? (Y/N) Samples received within **holding times**? (Y/N)

Correct containers/preservatives used? (Y/N) Short HT tests: BOD Color Cr6 DissMet DO Fecal MBAS

Container labels filled in? (Y/N) Nitrate or Nitrite OrP pH SS Sulfite TRC Turb

Were Trip Blanks rec'd with VOAs? (Y/N) Lab Notified:

VOA vials - headspace detected? n/a (Y/N) If headspace detected, < 0.25" dia? Y/N

VOA soils - 5035 compliance criteria met? n/a (Y/N) (if met, circle the applicable method, below)

~~High concentration jar (48 hr)~~ Low conc EnCor samplers (48 hr)

~~High concentration pre-weighed vial (methanol - 14 d)~~ Low conc pre-weighed vials (sodium bisulfate - 14 d)

Lab Notified (date, time, initials): CC 6/8/04 13:30

	If checked, refer to the "Sample Receipt - Notification of Deviation" (attached).
	Per previous discussion with the client, thermal preservation not required, and Deviation Notification **not** required.

Login Checked by: JM

			Phone/Fax Numbers	Done: date/initials
Rush	Due: _____			
Call	Contact: _____	#	_____	_____
FAX	Contact: _____	#	_____	_____
E-Mail	Contact: _____	#	_____	_____

Comments: _____

Form Printed 5/19/04 5:06 PM

Composite R10 c:\d\e\f\Cooler Receipt.R07.xls

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/16/04
Date Received: 06/10/04
Date/Time Sampled: 06/09/04 14:18
Sampled by: Client

Project ID/Location: Scott/Delta Store #3033
Scott Petroleum

Project Number:

Sample Description: SB-3 @ 30 ft.
Sample Matrix: SOIL

Sample Number: BB69362
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	08:38
Toluene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	08:38
Ethylbenzene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	08:38
Xylene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	08:38
Methyl-t-butyl ether	ND	0.2	mg/Kg	8021B	JAR	06/14/04	08:38
-- Prep for Volatile Organics	-			5035	JAR	06/11/04	09:45
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Acenaphthylene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Anthracene	ND	0.085	mg/Kg	8270C	KRE	06/15/04	17:37
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	KRE	06/15/04	17:37
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	KRE	06/15/04	17:37
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Chrysene	ND	0.09	mg/Kg	8270C	KRE	06/15/04	17:37
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	17:37
Fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Fluorene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	17:37
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
2-Methylnaphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Naphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Phenanthrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37
Pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	17:37

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmprT

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/16/04
Date Received: 06/10/04
Date/Time Sampled: 06/10/04 10:15
Sampled by: Client

Project ID/Location: Scott/Delta Store #3033
Scott Petroleum

Project Number:

Sample Description: SB-1 @ 30 ft.
Sample Matrix: SOIL

Sample Number: BB69363
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:03
Toluene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:03
Ethylbenzene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:03
Xylene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:03
Methyl-t-butyl ether	ND	0.2	mg/Kg	8021B	JAR	06/14/04	09:03
-- Prep for Volatile Organics	-			5035	JAR	06/11/04	09:45
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Acenaphthylene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Anthracene	ND	0.085	mg/Kg	8270C	KRE	06/15/04	18:04
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	KRE	06/15/04	18:04
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	KRE	06/15/04	18:04
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Chrysene	ND	0.09	mg/Kg	8270C	KRE	06/15/04	18:04
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	18:04
Fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Fluorene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	18:04
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
2-Methylnaphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Naphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Phenanthrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04
Pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmprT

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/16/04
Date Received: 06/10/04
Date/Time Sampled: 06/10/04 13:09
Sampled by: Client

Project ID/Location: Scott/Delta Store #3033
Scott Petroleum

Project Number:

Sample Description: SB-7 @ 30 ft.
Sample Matrix: SOIL

Sample Number: BB69364
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:28
Toluene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:28
Ethylbenzene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:28
Xylene	ND	0.1	mg/Kg	8021B	JAR	06/14/04	09:28
Methyl-t-butyl ether	ND	0.2	mg/Kg	8021B	JAR	06/14/04	09:28
-- Prep for Volatile Organics	-			5035	JAR	06/11/04	09:45
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Acenaphthylene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Anthracene	ND	0.085	mg/Kg	8270C	KRE	06/15/04	18:32
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	KRE	06/15/04	18:32
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	KRE	06/15/04	18:32
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Chrysene	ND	0.09	mg/Kg	8270C	KRE	06/15/04	18:32
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	18:32
Fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Fluorene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	18:32
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
2-Methylnaphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Naphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Phenanthrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32
Pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	18:32

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmprT

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/15/04
Date Sampled: 06/09/04
Time Sampled: 12:00
Sampled by: Client

Project ID/Location: Scott/Delta Store #3033
Scott Petroleum
Sample Description: Trip Blank
Sample Matrix: WATER
Project Number:

Date Received: 06/10/04
Sample Number: BB69365
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	JAR	06/14/04
Toluene	ND	1	ug/L	8021B	JAR	06/14/04
Ethylbenzene	ND	1	ug/L	8021B	JAR	06/14/04
Xylene	ND	1	ug/L	8021B	JAR	06/14/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	JAR	06/14/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

SAMPLE CHAIN OF CUSTODY RECORD

W. L. BURLE ENGINEERS, P.A.
111 South Walnut Street
GREENVILLE, MS 38701

Client: Scott Petroleum
Indianola, MS

Project Description: Scott / Delta Store #3033
Indianola, MS

ATTN: Angus J

Sampler (Signature)

NO. OF SAMPLE CONTAINERS

BTEX and MTBE
P.A.H.

Page 1 of 1

STATION	DATE	TIME (Military)	SAMPLE DESCRIPTION			REMARKS
SB-3 @ 30'	6/9/04	14:18	Two 40z. Jars (Soil)	X	X	BB69362
SB-1 @ 30'	6/10/04	10:15	↓	X	X	69363
SB-7 @ 30'	↓	13:09	↓	X	X	69364
TRIP BLANK	6/9/04	12:00	Three 40ml vials (H2O)	X		69365

Relinquished by (Signature)	Date	Time (Military)	Received by (Signature):	Date	Time (Military)	Relinquished by (Signature):	Date	Time (Military)	Received by (Signature):	Date	Time (Military)
	6/10/04	16:30		6/11/04	16:30						
Relinquished by (Signature)	Date	Time (Military)	Received by (Signature):	Date	Time (Military)	REMARKS:					

ORIGINAL WHITE - REPORT
YELLOW COPY - LABORATORY

Argus Analytical, Inc.

Cooler Receipt Check List

Sample Number(s): B469362 - 69365

Unless otherwise noted, the test results meet all NELAC requirements for the methods listed on Argus' scope of accreditation.

The test results relate only to the items tested or to the sample as received by the laboratory. Reports shall not be reproduced except in full, without the written approval of the laboratory.

Client: WL Burke

Date Opened: 6/10/04

Opened by: CC

Temperature when opened: (4°(ice)) Ambient Measured (1): _____ (1) In < 50% ice, use a thermometer to measure the temperature at the bottom of the cooler.

Type of wrapping material: (None) Peanuts Bubblewrap Paper Other

Cooler **custody seals** intact? (n/a) Y/N Signed & dated? Y/N

Container custody seals intact? (n/a) Y/N

COC papers received? (Y) Receipt properly noted on COC? (Y)

COC papers properly filled in (signed in ink)? (Y) Container labels correspond to the COC? (Y)

All **containers** intact (not broken)? (Y) Samples received within **holding times**? (Y)

Correct containers/preservatives used? (Y) Short HT tests: BOD Color Cr6 DissMet DO Fecal MBAS

Container labels filled in? (Y) Nitrate or Nitrite OrP pH SS Sulfite TRC Turb

Were Trip Blanks rec'd with VOAs? (Y) Lab Notified:

VOA vials - headspace detected? n/a (Y) If headspace detected, < 0.25" dia? Y/N

VOA soils - 5035 compliance criteria met? n/a (Y) (if met, circle the applicable method, below)

(High concentration jar (48 hr)) Low conc EnCor samplers (48 hr)

High concentration pre-weighed vial (methanol - 14 d) Low conc pre-weighed vials (sodium bisulfate - 14 d)

Lab Notified (date, time, initials): 6/10/04 15:00CC CAshley

	If checked, refer to the "Sample Receipt - Notification of Deviation" (attached).
	Per previous discussion with the client, thermal preservation not required, and Deviation Notification **not** required.

Login Checked by:

			Phone/Fax Numbers	Done: date/initials
Rush	Due:			
Call	Contact:	#		
FAX	Contact:	#		
E-Mail	Contact:	#		

Comments:

Composite R10 c:\d\e\f\Cooler Receipt.R07.xls

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/16/04
Date Received: 06/11/04
Date/Time Sampled: 06/11/04 09:10
Sampled by: Client

Project Number:

Project ID/Location: Delta Store #3033
Scott Petroleum

Sample Number: BB69417

Sample Description: SB-6 @ 1 ft.

Page Number: 1

Sample Matrix: SOIL

Parameter	Result	Det Limit	Units	Method	Analysts	Date	Time
BTEX & MTBE							
Benzene	3.6	0.1	mg/Kg	8021B	JAR	06/14/04	09:53
Toluene	7.3	0.1	mg/Kg	8021B	JAR	06/14/04	09:53
Ethylbenzene	4.6	0.1	mg/Kg	8021B	JAR	06/14/04	09:53
Xylene	21.8	0.1	mg/Kg	8021B	JAR	06/14/04	09:53
Methyl-t-butyl ether	3.6	0.2	mg/Kg	8021B	JAR	06/14/04	09:53
-- Prep for Volatile Organics	-			5035	JAR	06/11/04	16:12
PAHs							
Acenaphthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Acenaphthylene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Anthracene	ND	0.085	mg/Kg	8270C	KRE	06/15/04	19:00
Benzo(a)anthracene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Benzo(a)pyrene	ND	0.07	mg/Kg	8270C	KRE	06/15/04	19:00
Benzo(b)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Benzo(g,h,i)perylene	ND	1.00	mg/Kg	8270C	KRE	06/15/04	19:00
Benzo(k)fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Chrysene	ND	0.09	mg/Kg	8270C	KRE	06/15/04	19:00
Dibenzo(a,h)anthracene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	19:00
Fluoranthene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Fluorene	ND	0.05	mg/Kg	8270C	KRE	06/15/04	19:00
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
2-Methylnaphthalene	2.39	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Naphthalene	ND	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Phenanthrene	0.713	0.10	mg/Kg	8270C	KRE	06/15/04	19:00
Pyrene	0.188	0.10	mg/Kg	8270C	KRE	06/15/04	19:00

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Ac
LELAP 04

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/16/04

Date Sampled: 06/11/04
Time Sampled: 08:00
Sampled by: Client

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/11/04

Sample Description: Trip Blank

Sample Matrix: WATER

Sample Number: BB69418

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	JAR	06/15/0
Toluene	ND	1	ug/L	8021B	JAR	06/15/0
Ethylbenzene	ND	1	ug/L	8021B	JAR	06/15/0
Xylene	ND	1	ug/L	8021B	JAR	06/15/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	JAR	06/15/04

ot Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

SAMPLE CHAIN OF CUSTODY RECORD

W. L. BURLE ENGINEERS, P.A.
111 South Walnut Street
GREENVILLE, MS 38701

Client: Scott Petroleum
Itta Bena, MS

Project Description: Delta Store #3033
Indianola, MS

ATTN: Angus

Sampler (Signature)

NO. OF SAMPLE CONTAINERS

Page 1 of 1

STATION	DATE	TIME (Military)	SAMPLE DESCRIPTION	BTEX + MTBE	PAH	REMARKS
SB-6 GT	6/11/04	9:10	Two 4oz jars (soil)	X	X	BB6744.7
TRIP BLANK	6/11/04	8:00	Three 40ml vials (H_2O)	X		BB6744.8

Relinquished by (Signature)	Date	Time (Military)	Received by (Signature):	Date	Time (Military)	Relinquished by (Signature):	Date	Time (Military)	Received by (Signature):	Date	Time (Military)
	6/11/04	15:26	J. Jones	06/11/04	15:27						
Relinquished by (Signature)	Date	Time (Military)	Received by (Signature):	Date	Time (Military)	REMARKS:					

ORIGINAL WHITE - REPORT
YELLOW COPY - LABORATORY

Argus Analytical, Inc.

Cooler Receipt Check List

Sample Number(s): BB69417-418

Unless otherwise noted, the test results meet all NELAC requirements for the methods listed on Argus' scope of accreditation.

The test results relate only to the items tested or to the sample as received by the laboratory. Reports shall not be reproduced except in full, without the written approval of the laboratory.

Client: W. L. Burle

Date Opened: 06/11/04

Opened by: Client

Temperature when opened: (4°(ice)) Ambient Measured (1): _____			(1) In < 50% ice, use a thermometer to measure the temperature at the bottom of the cooler.
Type of wrapping material: (None) Peanuts Bubblewrap Paper Other			
Cooler **custody seals** intact? (n/a)	Y/N	Signed & dated?	Y/N
Container custody seals intact? (n/a)	Y/N		
COC papers received?	(Y)/N	Receipt properly noted on COC?	(Y)/N
COC papers properly filled in (signed in ink)?	(Y)/N	Container labels correspond to the COC?	(Y)/N
All **containers** intact (not broken)?	(Y)/N	Samples received within **holding times**?	(Y)/N
Correct containers/preservatives used?	(Y)/N	Short HT tests: BOD Color Cr6 DissMet DO Fecal MBAS	
Container labels filled in?	(Y)/N	Nitrate or Nitrite OrP pH SS Sulfite TRC Turb	
Were Trip Blanks rec'd with VOAs?	Y/N	Lab Notified:	
VOA vials - headspace detected? (n/a)	Y/N	If headspace detected, < 0.25" dia?	Y/N
VOA soils - 5035 compliance criteria met? n/a	(Y)/N	(if met, circle the applicable method, below)	
(High concentration jar (48 hr))		Low conc EnCor samplers (48 hr)	
High concentration pre-weighed vial (methanol - 14 d)		Low conc pre-weighed vials (sodium bisulfate - 14 d)	
Lab Notified (date, time, initials): 06/11/04 15:30			

	If checked, refer to the "Sample Receipt - Notification of Deviation" (attached).
	Per previous discussion with the client, thermal preservation not required, and Deviation Notification not required.

Login Checked by: JM

Rush	Due: _____		Phone/Fax Numbers	Done: date/initials
Call	Contact: _____	#	_____	_____
FAX	Contact: _____	#	_____	_____
E-Mail	Contact: _____	#	_____	_____

Comments: _____

Form Printed 5/19/04 5:06 PM

Composite R10 c:\d\e\f\Cooler Receipt.R07.xls

APPENDIX C

ANALYTICAL LAB RESULTS FOR WATER SAMPLES

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Date Sampled: 06/18/04
Time Sampled: 11:10
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/18/04

Sample Description: MW #1

Sample Number: BB69698

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	ND	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/22/04
Xylene	ND	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/22/04
PAHs						
Acenaphthene	ND	0.002	mg/L	8270C	JAR	06/22/04
Acenaphthylene	ND	0.002	mg/L	8270C	JAR	06/22/04
Anthracene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(a)anthracene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(a)pyrene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(b)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/22/04
Benzo(g,h,i)perylene	ND	0.005	mg/L	8270C	JAR	06/22/04
Benzo(k)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/22/04
Chrysene	ND	0.002	mg/L	8270C	JAR	06/22/04
Dibenzo(a,h)anthracene	ND	0.005	mg/L	8270C	JAR	06/22/04
Fluoranthene	ND	0.002	mg/L	8270C	JAR	06/22/04
Fluorene	ND	0.002	mg/L	8270C	JAR	06/22/04
Indeno(1,2,3-cd)pyrene	ND	0.005	mg/L	8270C	JAR	06/22/04
2-Methylnaphthalene	ND	0.002	mg/L	8270C	JAR	06/22/04
Naphthalene	ND	0.002	mg/L	8270C	JAR	06/22/04
Phenanthrene	ND	0.002	mg/L	8270C	JAR	06/22/04
Pyrene	ND	0.002	mg/L	8270C	JAR	06/22/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Date Sampled: 06/18/04
Time Sampled: 10:55
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/18/04

Sample Description: MW #2

Sample Number: BB69699

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	ND	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/22/04
Xylene	ND	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/22/04
PAHs						
Acenaphthene	ND	0.002	mg/L	8270C	JAR	06/22/04
Acenaphthylene	ND	0.002	mg/L	8270C	JAR	06/22/04
Anthracene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(a)anthracene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(a)pyrene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(b)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/22/04
Benzo(g,h,i)perylene	ND	0.005	mg/L	8270C	JAR	06/22/04
Benzo(k)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/22/04
Chrysene	ND	0.002	mg/L	8270C	JAR	06/22/04
Dibenzo(a,h)anthracene	ND	0.005	mg/L	8270C	JAR	06/22/04
Fluoranthene	ND	0.002	mg/L	8270C	JAR	06/22/04
Fluorene	ND	0.002	mg/L	8270C	JAR	06/22/04
Indeno(1,2,3-cd)pyrene	ND	0.005	mg/L	8270C	JAR	06/22/04
2-Methylnaphthalene	ND	0.002	mg/L	8270C	JAR	06/22/04
Naphthalene	ND	0.002	mg/L	8270C	JAR	06/22/04
Phenanthrene	ND	0.002	mg/L	8270C	JAR	06/22/04
Pyrene	ND	0.002	mg/L	8270C	JAR	06/22/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04
Date Sampled: 06/18/04
Time Sampled: 11:17
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum
Sample Description: MW #3
Sample Matrix: WATER
Project Number:

Date Received: 06/18/04
Sample Number: BB69700
Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	ND	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/22/04
Xylene	ND	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/22/04
PAHs						
Acenaphthene	ND	0.002	mg/L	8270C	JAR	06/22/04
Acenaphthylene	ND	0.002	mg/L	8270C	JAR	06/22/04
Anthracene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(a)anthracene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(a)pyrene	ND	0.002	mg/L	8270C	JAR	06/22/04
Benzo(b)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/22/04
Benzo(g,h,i)perylene	ND	0.005	mg/L	8270C	JAR	06/22/04
Benzo(k)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/22/04
Chrysene	ND	0.002	mg/L	8270C	JAR	06/22/04
Dibenzo(a,h)anthracene	ND	0.005	mg/L	8270C	JAR	06/22/04
Fluoranthene	ND	0.002	mg/L	8270C	JAR	06/22/04
Fluorene	ND	0.002	mg/L	8270C	JAR	06/22/04
Indeno(1,2,3-cd)pyrene	ND	0.005	mg/L	8270C	JAR	06/22/04
2-Methylnaphthalene	ND	0.002	mg/L	8270C	JAR	06/22/04
Naphthalene	ND	0.002	mg/L	8270C	JAR	06/22/04
Phenanthrene	ND	0.002	mg/L	8270C	JAR	06/22/04
Pyrene	ND	0.002	mg/L	8270C	JAR	06/22/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Date Sampled: 06/18/04
Time Sampled: 11:03
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/18/04

Sample Description: MW #4

Sample Number: BB69701

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	1.3	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	1.4	1	ug/L	8021B	KRE	06/22/04
Xylene	8.4	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/22/04
PAHs						
Acenaphthene	ND	0.002	mg/L	8270C	JAR	06/23/04
Acenaphthylene	ND	0.002	mg/L	8270C	JAR	06/23/04
Anthracene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(a)anthracene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(a)pyrene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(b)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/23/04
Benzo(g,h,i)perylene	ND	0.005	mg/L	8270C	JAR	06/23/04
Benzo(k)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/23/04
Chrysene	ND	0.002	mg/L	8270C	JAR	06/23/04
Dibenzo(a,h)anthracene	ND	0.005	mg/L	8270C	JAR	06/23/04
Fluoranthene	ND	0.002	mg/L	8270C	JAR	06/23/04
Fluorene	ND	0.002	mg/L	8270C	JAR	06/23/04
Indeno(1,2,3-cd)pyrene	ND	0.005	mg/L	8270C	JAR	06/23/04
2-Methylnaphthalene	ND	0.002	mg/L	8270C	JAR	06/23/04
Naphthalene	ND	0.002	mg/L	8270C	JAR	06/23/04
Phenanthrene	ND	0.002	mg/L	8270C	JAR	06/23/04
Pyrene	ND	0.002	mg/L	8270C	JAR	06/23/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Date Sampled: 06/18/04
Time Sampled: 11:22
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/18/04

Sample Description: MW #5

Sample Number: BB69702

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	ND	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/22/04
Xylene	ND	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	3.4	2	ug/L	8021B	KRE	06/22/04
PAHs						
Acenaphthene	ND	0.002	mg/L	8270C	JAR	06/23/04
Acenaphthylene	ND	0.002	mg/L	8270C	JAR	06/23/04
Anthracene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(a)anthracene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(a)pyrene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(b)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/23/04
Benzo(g,h,i)perylene	ND	0.005	mg/L	8270C	JAR	06/23/04
Benzo(k)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/23/04
Chrysene	ND	0.002	mg/L	8270C	JAR	06/23/04
Dibenzo(a,h)anthracene	ND	0.005	mg/L	8270C	JAR	06/23/04
Fluoranthene	ND	0.002	mg/L	8270C	JAR	06/23/04
Fluorene	ND	0.002	mg/L	8270C	JAR	06/23/04
Indeno(1,2,3-cd)pyrene	ND	0.005	mg/L	8270C	JAR	06/23/04
2-Methylnaphthalene	ND	0.002	mg/L	8270C	JAR	06/23/04
Naphthalene	ND	0.002	mg/L	8270C	JAR	06/23/04
Phenanthrene	ND	0.002	mg/L	8270C	JAR	06/23/04
Pyrene	ND	0.002	mg/L	8270C	JAR	06/23/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Date Sampled: 06/18/04
Time Sampled: 11:30
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/18/04

Sample Description: MW #7

Sample Number: BB69703

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	ND	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/22/04
Xylene	ND	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/22/04
PAHs						
Acenaphthene	ND	0.002	mg/L	8270C	JAR	06/23/04
Acenaphthylene	ND	0.002	mg/L	8270C	JAR	06/23/04
Anthracene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(a)anthracene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(a)pyrene	ND	0.002	mg/L	8270C	JAR	06/23/04
Benzo(b)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/23/04
Benzo(g,h,i)perylene	ND	0.005	mg/L	8270C	JAR	06/23/04
Benzo(k)fluoranthene	ND	0.005	mg/L	8270C	JAR	06/23/04
Chrysene	ND	0.002	mg/L	8270C	JAR	06/23/04
Dibenzo(a,h)anthracene	ND	0.005	mg/L	8270C	JAR	06/23/04
Fluoranthene	ND	0.002	mg/L	8270C	JAR	06/23/04
Fluorene	ND	0.002	mg/L	8270C	JAR	06/23/04
Indeno(1,2,3-cd)pyrene	ND	0.005	mg/L	8270C	JAR	06/23/04
2-Methylnaphthalene	ND	0.002	mg/L	8270C	JAR	06/23/04
Naphthalene	ND	0.002	mg/L	8270C	JAR	06/23/04
Phenanthrene	ND	0.002	mg/L	8270C	JAR	06/23/04
Pyrene	ND	0.002	mg/L	8270C	JAR	06/23/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

ARGUS ANALYTICAL, INC.
235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

NELAP Accredited
LELAP 04023

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Date Sampled: 06/18/04
Time Sampled: 10:45
Sampled by: G. Olivi

Project ID/Location: Delta Store #3033
Scott Petroleum

Date Received: 06/18/04

Sample Description: MW #8

Sample Number: BB69704

Sample Matrix: WATER

Project Number:

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	Date
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/22/04
Toluene	ND	1	ug/L	8021B	KRE	06/22/04
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/22/04
Xylene	ND	1	ug/L	8021B	KRE	06/22/04
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/22/04

ND = Not Detected

Quality Assurance/Quality Control

B. G. Giessner, Ph.D.

argsmpr1

235 Highpoint Drive
Ridgeland, Mississippi 39157
Telephone: 601/957-2676 FAX: 601/957-1887

To: W.L. Burle Engineers, P.A.
William Burle, Jr.
111 South Walnut Street
Greenville MS 38701

Date Reported: 06/23/04

Project ID/Location: Delta Store #3033 Scott Petroleum
Sample Description: Trip #1
Sample Matrix: WATER
Project Number:

Date Sampled: 06/18/04
Time Sampled: 08:00
Sampled by: G. Olivi

Date Received: 06/18/04

Sample Number: BB69705

Page Number: 1

Parameter	Result	Det Limit	Units	Method	Analysts	D
BTEX & MTBE						
Benzene	ND	1	ug/L	8021B	KRE	06/
Toluene	ND	1	ug/L	8021B	KRE	06/
Ethylbenzene	ND	1	ug/L	8021B	KRE	06/2
Xylene	ND	1	ug/L	8021B	KRE	06/2
Methyl-t-butyl ether	ND	2	ug/L	8021B	KRE	06/2

ted

Quality Assurance/Quality Control

SAMPLE CHAIN OF CUSTODY RECORD

W. L. BURLE ENGINEERS, P.A.
111 South Walnut Street
GREENVILLE, MS 38701

Client: Scott Petroleum
Itta Bena, MS

Project Description: Delta Store #3033
Water Sampling Event

ATTN: Argus Analytical

Sampler (Signature): Nino V. Oliva

Page 1 of 1

STATION	DATE	TIME (Military)	SAMPLE DESCRIPTION	NO. OF SAMPLE CONTAINERS: 24	6	BTEX & MTBE	PAH	REMARKS:
MW # 1	6/18/04	11:10	1 Liter & (3) 40ml Vials HCl			X	X	BB69698
MW # 2		10:55				X	X	BB69699
MW # 3		11:17				X	X	BB69700
MW # 4		11:03				X	X	BB69701
MW # 5		11:22				X	X	BB69702
MW # 7		11:30				X	X	BB69703
MW # 8		10:45	(3) 40ml Vials HCl H2O			X		BB69704
TRIP # 1		8:00	(3) 40ml Vials HCl H2O			X		BB69705

Relinquished by (Signature)	Date	Time (Military)	Received by (Signature):	Date	Time (Military)	Relinquished by (Signature):	Date	Time (Military)	Received by (Signature):	Date	Time (Military)
	6/18/04	11:52		6/18/04	11:53		6/18	14:28			
Relinquished by (Signature)	Date	Time (Military)	Received by (Signature):	Date	Time (Military)	REMARKS:					

ORIGINAL WHITE - REPORT
YELLOW COPY - LABORATORY

Argus Analytical, Inc.

Cooler Receipt Check List

Sample Number(s): BB69698-705

Unless otherwise noted, the test results meet all NELAC requirements for the methods listed on Argus' scope of accreditation.

The test results relate only to the items tested or to the sample as received by the laboratory. Reports shall not be reproduced except in full, without the written approval of the laboratory.

Client: W. L. Burle

Date Opened: 06/18/04

Opened by: R. Lackey

Temperature when opened: (4°(ice)) Ambient Measured (1): _____ (1) In < 50% ice, use a thermometer to measure the temperature at the bottom of the cooler.

Type of wrapping material: (None) Peanuts Bubblewrap Paper Other

Cooler **custody seals** intact? (n/a) Y/N Signed & dated? Y/N

Container custody seals intact? (n/a) Y/N

COC papers received? (Y/N) Receipt properly noted on COC? (Y/N)

COC papers properly filled in (signed in ink)? (Y/N) Container labels correspond to the COC? (Y/N)

All **containers** intact (not broken)? (Y/N) Samples received within **holding times**? (Y/N)

Correct containers/preservatives used? (Y/N) Short HT tests: BOD Color Cr6 DissMet DO Fecal MBAS

Container labels filled in? (Y/N) Nitrate or Nitrite OrP pH SS Sulfite TRC Turb

Were Trip Blanks rec'd with VOAs? (Y/N) Lab Notified:

VOA vials - headspace detected? (n/a) Y/N If headspace detected, < 0.25" dia? Y/N

VOA soils - 5035 compliance criteria met? (n/a) Y/N (if met, circle the applicable method, below)

High concentration jar (48 hr) Low conc EnCor samplers (48 hr)

High concentration pre-weighed vial (methanol - 14 d) Low conc pre-weighed vials (sodium bisulfate - 14 d)

Lab Notified (date, time, initials): _____

	If checked, refer to the "Sample Receipt - Notification of Deviation" (attached).
	Per previous discussion with the client, thermal preservation not required, and Deviation Notification **not** required.

Login Checked by: JM

Rush	Due: _____		Phone/Fax Numbers	Done: date/initials
Call	Contact: _____	#	_____	_____
FAX	Contact: _____	#	_____	6/24/04 8:45 JM
E-Mail	Contact: _____	#	_____	_____

Comments: _____

Form Printed 5/19/04 5:06 PM

Composite R10 c:\dvl\Cooler Receipt R07.xls

APPENDIX D

WELL COMPLETION RECORDS

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-1

CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci

INSTALLATION DATE: 6-10-04
DEVELOPMENT DATE: 6-11-04
DRILLER: Olivi
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Hollow Stem Auger
Size: 4-1/4" I.D.
: 7-5/8" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

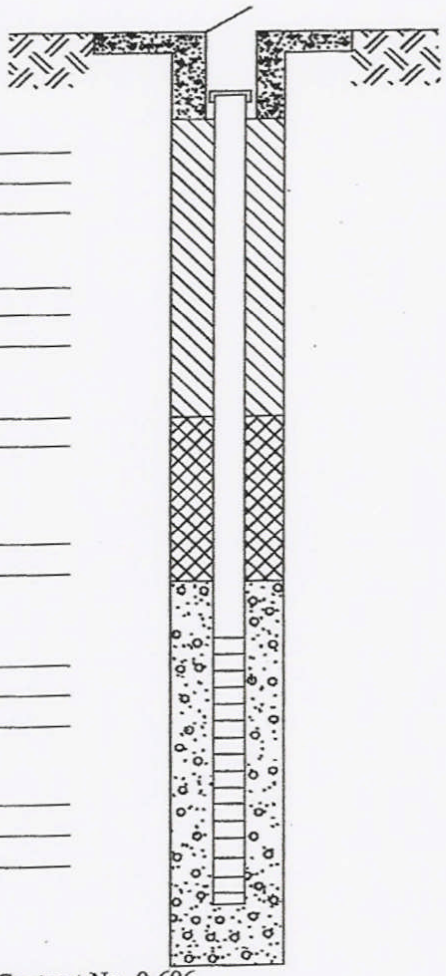
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size: 2" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 2" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



Elev. 98.45
Elev. 98.10
Elev. 92.10
Elev. 90.10
Elev. 88.10
Elev. ▽ 70.35
Elev. 63.10
Elev. 62.10

REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-2

CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci

INSTALLATION DATE: 6-9-04
DRILLER: Olivi

DEVELOPMENT DATE: 6-11-04
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Hollow Stem Auger
Size: 4-1/4" I.D.
: 7-5/8" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

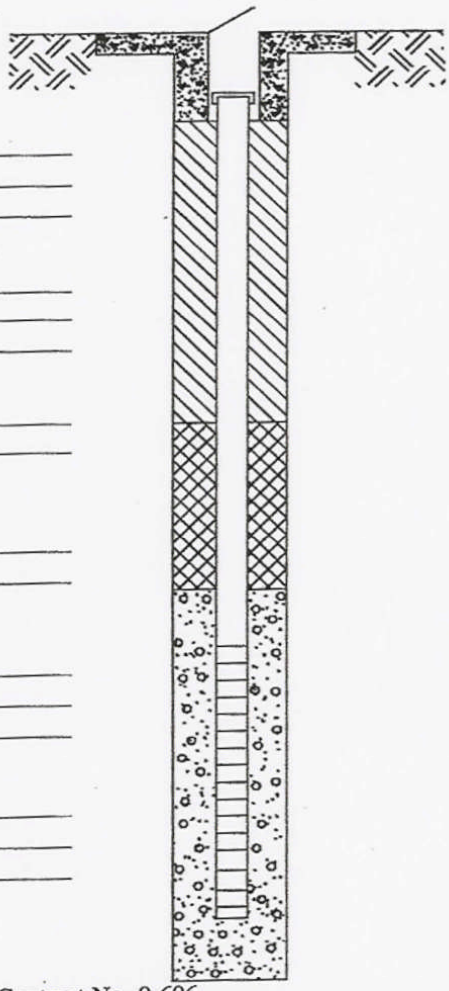
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size:: 2" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 2" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



Elev. 98.28
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Elev. 91.99
Elev. 89.99
Elev. 87.99
Elev. ▼ 70.38
Elev. 62.99
Elev. 61.99

REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

W. L. BURLE ENGINEERS, P. A.

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-3

CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci

INSTALLATION DATE: 6-9-04
DRILLER: Olivi

DEVELOPMENT DATE: 6-11-04
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Hollow Stem Auger
Size: 4-1/4" I.D.
: 7-5/8" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

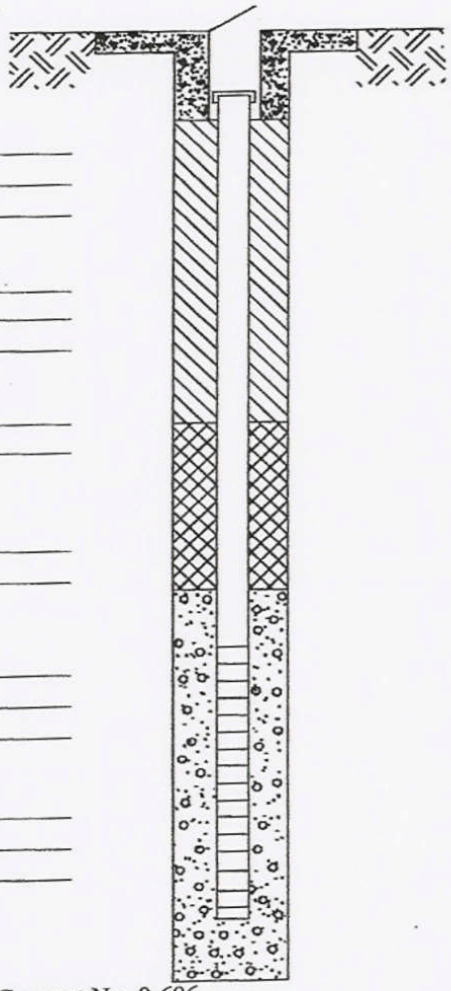
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size: 2" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 2" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



Elev. 98.87
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Elev. 90.66
Elev. 88.66
Elev. ▽ 70.36
Elev. 63.66
Elev. 62.66

REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

W. L. BURLE ENGINEERS, P. A.

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-4
CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci
INSTALLATION DATE: 6-8-04
DRILLER: Olivi
DEVELOPMENT DATE: 6-11-04
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Hollow Stem Auger
Size: 4-1/4" I.D.
: 7-5/8" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

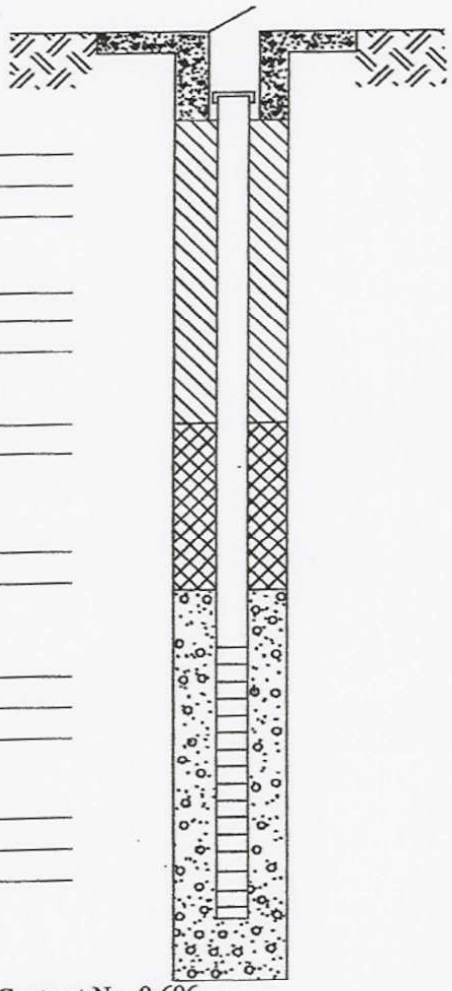
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size: 2" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 2" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



Elev. 98.43
Elev. 98.14
Elev. 92.14
Elev. 90.14
Elev. 88.14
Elev. ▽ 70.33
Elev. 63.14
Elev. 62.14

REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

W. L. BURLE ENGINEERS, P. A.

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-5

CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci

INSTALLATION DATE: 6-8-04
DEVELOPMENT DATE: 6-11-04
DRILLER: Olivi
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Hollow Stem Auger
Size: 4-1/4" I.D.
: 7-5/8" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

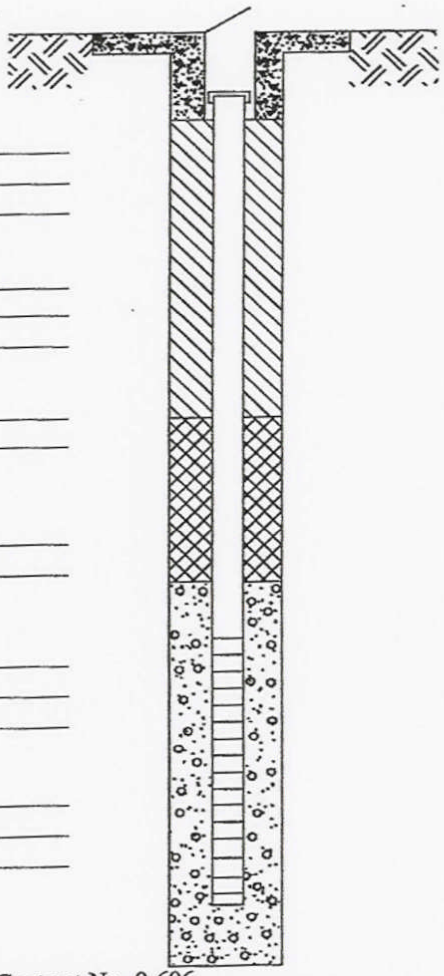
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size: 2" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 2" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



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Elev. 92.38
Elev. 90.38
Elev. 88.38
Elev. ▼ 70.28
Elev. 63.38
Elev. 62.38

REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

W. L. BURLE ENGINEERS, P. A.

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-6
CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci
INSTALLATION DATE: 6-11-04
DRILLER: Olivi
DEVELOPMENT DATE: 6-11-04
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Geoprobe "Dual Tube"
Size: 1.375" I.D.
: 2.375" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

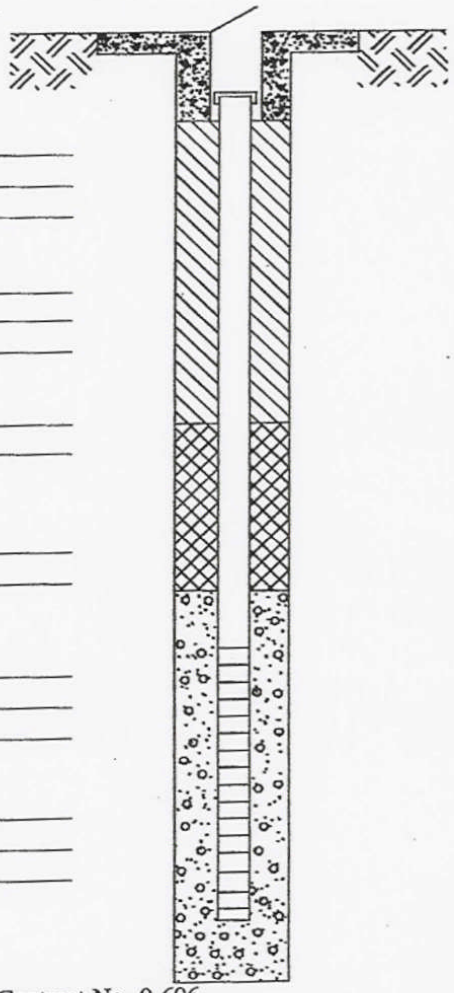
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size:: 1" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 1" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



Elev. 98.61
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Elev. 97.38
Elev. 95.38
Elev. 93.38
Elev. ▽ N/A
Elev. 88.38
Elev. 87.38

REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

W. L. BUBLE ENGINEERS, P. A.

WELL COMPLETION RECORD

PROJECT: PSI Scott Petroleum Corporation
Delta Store #3033, Indianola, MS
PROJECT NO.: 08050-2-0304
WELL NO.: MW-7

CLIENT: Scott Petroleum Corporation
Itta Bena, Mississippi
ENGINEER/GEOLOGIST: Santucci

INSTALLATION DATE: 6-10-04
DEVELOPMENT DATE: 6-11-04
DRILLER: Olivi
ELEV. REFERENCED: Assumed 100.00'

DRILLING METHOD
Type: Hollow Stem Auger
Size: 4-1/4" I.D.
: 7-5/8" O.D.

SURFACE CASING
Type: 8" Manhole
: Cover with Bolt
: On Lid with O-Ring

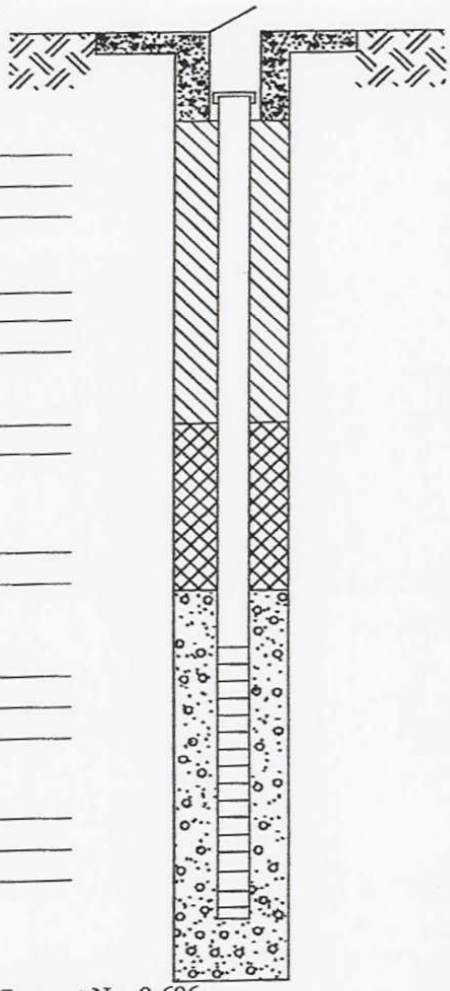
GROUT
Type: 95% Portland
: Cement and
: 5% Bentonite Gel

SEAL
Type: 1/4" Bentonite
: Pellets

WELL CASING
Type: PVC Sch. 40
Size:: 2" I.D.

WELL SCREEN
Type: PVC Sch. 40
Size: 2" I.D.
: 0.010" Slotted Screen

FILTER PACK
Type: 20/40 Sand
: Filter Sand
:



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Elev. 91.58
Elev. 89.58
Elev. 87.58
Elev. ▼ 70.18
Elev. 62.58
Elev. 61.58

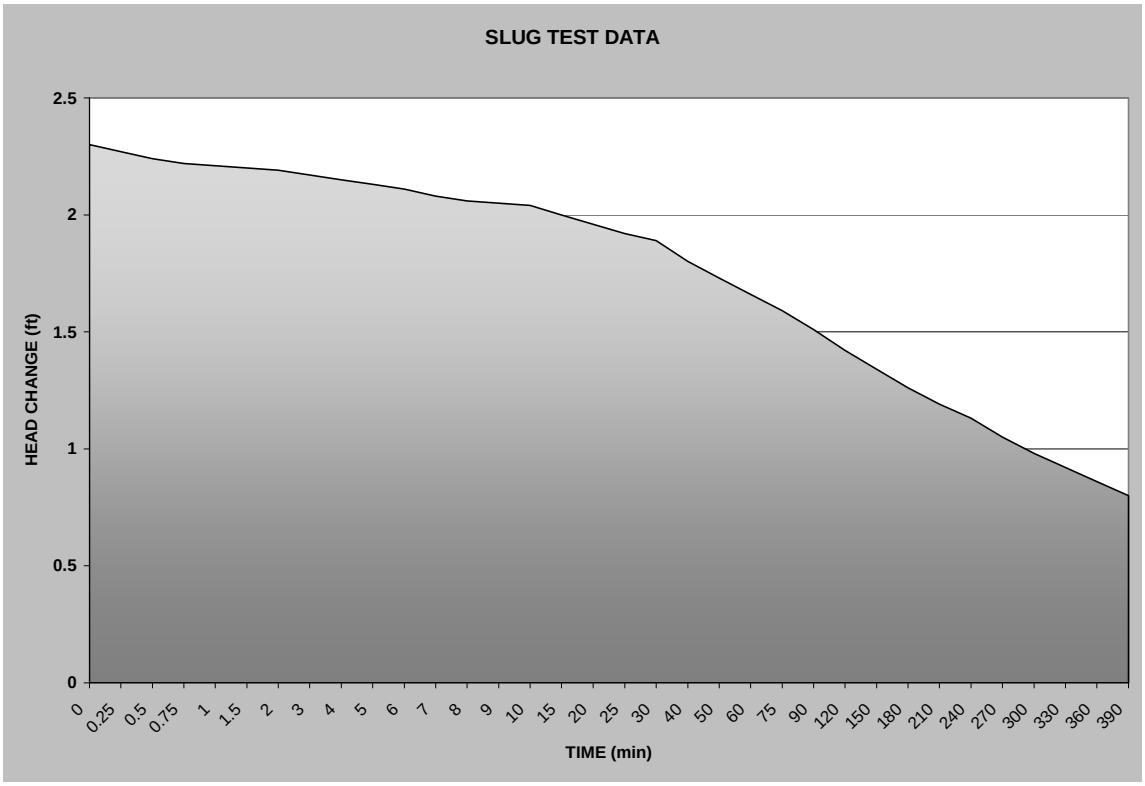
REMARKS Gino Olivi - Water Well Contract No. 0-606
Note - Water readings taken on development date.

W. L. PURLE ENGINEERS, P. A.

APPENDIX E

SLUG TEST DATA

Slug Test Data			
Elapsed Time (min)	Depth to Water (ft)	Change in Water Level (ft)	Percent Recovery
static level	27.9		
0	25.6	2.3	1
0.25	25.63	2.27	0.986956522
0.5	25.66	2.24	0.973913043
0.75	25.68	2.22	0.965217391
1	25.69	2.21	0.960869565
1.5	25.7	2.2	0.956521739
2	25.71	2.19	0.952173913
3	25.73	2.17	0.943478261
4	25.75	2.15	0.934782609
5	25.77	2.13	0.926086957
6	25.79	2.11	0.917391304
7	25.82	2.08	0.904347826
8	25.84	2.06	0.895652174
9	25.85	2.05	0.891304348
10	25.86	2.04	0.886956522
15	25.9	2	0.869565217
20	25.94	1.96	0.852173913
25	25.98	1.92	0.834782609
30	26.01	1.89	0.82173913
40	26.1	1.8	0.782608696
50	26.17	1.73	0.752173913
60	26.24	1.66	0.72173913
75	26.31	1.59	0.691304348
90	26.39	1.51	0.656521739
120	26.48	1.42	0.617391304
150	26.56	1.34	0.582608696
180	26.64	1.26	0.547826087
210	26.71	1.19	0.517391304
240	26.77	1.13	0.491304348
270	26.85	1.05	0.456521739
300	26.92	0.98	0.426086957
330	26.98	0.92	0.4
360	27.04	0.86	0.373913043
390	27.1	0.8	0.352422907


SLUG TEST DATA
HEAD CHANGE (ft)
2.5
2
1.5
1
0.5
0
0
0.25
0.5
0.75
1
1.5
2
3
4
5
6
7
8
9
10
15
20
25
30
40
50
60
75
90
120
150
180
210
240
270
300
330
360
390
TIME (min)