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August 16, 2007

Mr. Don Moore
North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Reference: Preliminary Site Assessment
Jai Uck Kim Property (Parcel #009)
1100 N. Main Street
Roxboro, Person County, North Carolina
NCDOT Project R-2241A
WBS Element 34406.1.1
Earth Tech Project No. 100407

Dear Mr. Moore:

Earth Tech of North Carolina, Inc., (Earth Tech) has completed the Preliminary Site Assessment conducted at the above-referenced property. The work was performed in accordance with the Technical and Cost proposal dated June 6, 2007, and the North Carolina Department of Transportation's (NCDOT's) Notice to Proceed dated June 6, 2007. Activities associated with the assessment consisted of conducting a geophysical investigation, collecting soil samples for laboratory analysis, and reviewing applicable North Carolina Department of Environment and Natural Resources (NCDENR) records. The purpose of this report is to document the field activities, present the laboratory analyses, and provide recommendations regarding the property.

Location and Description

The Jai Uck Kim Property (Parcel #009) is located at 1100 N. Main Street in Roxboro, North Carolina. The property is situated on the northeast quadrant of the intersection of N. Main Street (US 501) and Virgilina Road (NC 49) (Figure 1). Based on information supplied by the NCDOT and the site visit, Earth Tech understands that the site is an active gas station/convenience store (Boulevard Kwik Pik) where one multicompartment underground storage tank (UST) is registered and three USTs reportedly have been removed from the property in 1994. According to available information, the USTs consisted of three 8,000-gallon gasoline tanks. The structure on the property is a single-story block building with an asphalt parking area. The currently registered UST is located between the pump island and Main Street. Earth Tech was advised that the proposed right-of-way will affect the building and the UST area. As a result, the NCDOT requested a Preliminary Site Assessment.

Earth Tech reviewed the North Carolina Department of Environment and Natural Resources (NCDENR) Incident Management database and incident number 16068 was assigned to the site. According to the Report of UST Closure prepared by ENSCI dated December 20, 1994, three USTs were removed from the site in November 1994. Following the UST closure, six soil samples were collected from the site and analyzed for gasoline total petroleum hydrocarbons. Three of the six soil samples contained petroleum concentrations above 10 mg/kg; one from the tank pit and two from below the pump island. One water sample (groundwater in the pit) was collected and analyzed using EPA Methods 601 and 602. The analytical results indicated the presence of benzene (25.2 µg/l) at a concentration above the groundwater quality standards. A total of 411.80 tons of contaminated soil was excavated and disposed off-site. Consequently, ENSCI prepared a Release Response Report, dated February 10, 1995, which included the Initial Abatement Measures and Site Check, and Initial Site Characterization. Two groundwater monitoring wells were installed to evaluate the presence of free-phase gasoline at the site and to collect groundwater samples for analysis. No measurable free product was noted and the groundwater sample analysis indicated the presence of several gasoline constituents above the groundwater quality standards. Although no free product was noted in the initial well installation, subsequent sampling events observed a layer of free product in one of the wells. Piedmont Geologic prepared a Free Product Removal Report, dated September 12, 1995, in which product was hand-bailed from the well. According to the report, a total of 700 ml of gasoline was recovered from the well. A passive skimming bailer was installed to collect the free product.

Piedmont Geologic conducted a Comprehensive Site Assessment (CSA) dated June 17, 1996. The CSA was performed by installing six additional shallow monitoring wells and one deep monitoring well, with soil samples collected from the well borehole. The CSA findings indicated a Soil Sensitivity Evaluation (SSE) cleanup concentration of 180 mg/kg. Based on this evaluation, soil contamination requiring cleanup exists near the pump islands and former UST area. The groundwater monitoring wells at the site indicate a groundwater depth of about 1.0 to 1.8 meters (3 to 6 feet) below ground surface and a groundwater flow direction to the northeast. Contaminants detected above the groundwater quality standards in samples from the wells include benzene, ethylbenzene, toluene, xylenes, and MTBE. A benzene isoconcentration map suggests that groundwater contamination is largely contained within the site boundaries, but may have migrated slightly off-site toward the northeast.

Following the NCDENR's review of the CSA, Environmental Answers, LLC, and ENCOM Associates, inc., developed a Corrective Action Plan (CAP) dated February 1999. As part of the CAP, additional soil and groundwater samples were collected and analyzed for the risk-based parameters. One soil sample contained volatile petroleum hydrocarbons (VPH) at a concentration above the residential Maximum Soil Contaminant Concentration (MSCC), and five of the soil samples contained several compounds above the soil-to-groundwater MSCC. Dissolved benzene was detected in one well at a concentration (5,800 µg/l) above the Gross Contamination Level (GCL). As a result, an active remediation system consisting of three air sparging wells and 55 feet of horizontal soil vapor extraction screen was proposed. In addition, groundwater monitoring was proposed. Site activities during the Earth Tech Preliminary Site Assessment did not indicate the presence of an air sparging or SVE system. However, correspondence from Environmental

Answers, LLC, and ENCOM Associates, Inc., dated March 25, 1998, indicated that, up to that time, periodic groundwater sampling of well MW-1 was conducted. The analytical results of a February 18, 1998 and March 6, 1998 sampling events confirm the presence of benzene above the CGL. A hand-written note on the correspondence confirms an intermediate-risk classification for the site. Copies of selected portions of the reports are presented in Attachment A.

Earth Tech also reviewed the UST registration database to obtain UST ownership/responsible party information. According to the database, the USTs on the property were operated under two Facility Numbers; 0-018870 and 0-218870. Facility Number 0-018870 was in place when the three USTs were removed. Facility Number 0-218870 is the current number. However, the landowner is also the convenience store owner and he indicated to earth Tech that the UST permit is in the process of changing to reflect his ownership. As such, Earth Tech was not able to verify UST owner and operator status.

Geophysical Survey

Prior to Earth Tech's mobilization to the site, Pyramid Environmental conducted a geophysical survey as part of this project to evaluate if additional USTs, other than the ones identified or removed, were present on the proposed right-of-way. The geophysical survey consisted of an electromagnetic survey using a Geonics EM61 time-domain electromagnetic induction meter to locate buried metallic objects, specifically USTs. A survey grid was laid out at the property with the X-axis oriented approximately parallel to Virgilina Road and the Y-axis oriented approximately parallel to Main Street. The grid was located to cover the accessible portions of the proposed right-of-way. The survey lines were spaced 1.5 meters (5 feet) apart. Magnetic data was collected continuously along each survey line with a data logger. After collection, the data was reviewed in the field with graphical computer software. Following the electromagnetic survey, a ground penetrating radar (GPR) survey was conducted to further evaluate any significant metallic anomalies if necessary.

Several anomalies were detected in the geophysical survey. However, these anomalies were generally attributed to buried utility lines, conduits, or parked vehicles. The survey concluded that no metallic USTs, other than those identified as currently registered, were present on the proposed right-of-way or easement. A detailed report of findings and interpretations is presented in Attachment B.

Site Assessment Activities

On July 9, 2007, Earth Tech mobilized to the site to conduct a Geoprobe® direct push investigation to evaluate soil conditions within the proposed right-of-way and easement. Continuous sampling using direct push technology (Regional Probing of Wake Forest, North Carolina) resulted in generally good recovery of soil samples from the direct-push holes. Soil samples were collected and contained in 1.2-meter (4-foot) long acetate sleeves inside the direct push sampler. Each of these sleeves was divided in half for soil sample screening. Each 0.6-meter (2-foot) interval was placed in

a resealable plastic bag and the bag was set aside for a sufficient amount of time to allow volatilization of organic compounds from the soil to the bag headspace. The probe of a flame ionization detector/photo ionization detector (FID/PID) was inserted into the bag and the reading was recorded. After terminating the sample hole, the soil sample from the depth interval with the highest FID/PID reading was submitted to Prism Laboratories, Inc., in Charlotte, North Carolina, using standard chain-of-custody procedures. The laboratory analyzed the soil samples for total petroleum hydrocarbons (TPH) in the diesel range organics (DRO) and gasoline range organics (GRO).

Nine direct-push holes (KM-1 through KM-9) were advanced within the proposed right-of-way to a depth of 2.4 to 3.6 meters (8 to 12 feet) as shown in Figure 2 and Attachment C. The borings were located to evaluate the area adjacent to the UST pit and the proposed easement (Attachment D). Borings KM-1 and KM-5 were located to evaluate the soil conditions at each end of the pump island; borings KM-2, KM-3, and KM-4 were placed to assess the area surrounding the USTs within and along the right-of-way and easement line; borings KM-6 and KM-7 were placed to assess the horizontal extent of potential contamination; and borings KM-8 and KM-9 were placed to evaluate soil conditions at two proposed drop inlets on the site. The lithology encountered by the direct-push samples generally was consistent throughout the site. The ground surface was covered with about 10 to 15 centimeters (4 to 6 inches) of asphalt, concrete, gravel, or topsoil. Below the surface treatment to a depth of about 1.8 meters (6 feet) was a medium brown clay that likely represents fill material. Below this fill was a mottled medium brown, reddish brown, and yellow silt/clay. All the borings were terminated at a depth of 3.6 meters (12 feet) or groundwater, whichever was shallower, except for borings KM-8 and KM-9 that were terminated at 2.4 meters (8 feet) at the drop inlet locations. All of the other borings except KM-2 were terminated at 3.6 meters (12 feet). Boring KM-2 was terminated after encountering groundwater at a depth of about 2.3 meters (7.5 feet) below ground surface. Although previous assessments indicated groundwater at a depth of less than 1.5 meters (5 feet), groundwater in two of the borings was encountered at depths of 2.3 meters (7.5 feet in KM-2) and 3.6 meters (12 feet) in boring KM-3. Based on field screening, soil samples were submitted for laboratory analysis, which are summarized in Table 1.

Analytical Results

Based on the laboratory reports, summarized in Table 1 and presented in Attachment E, petroleum hydrocarbon compounds identified as DRO and/or GRO were detected in seven of the nine soil samples collected from the site (Figure 3). According to the North Carolina Underground Storage Tank Section's Underground Storage Tank Closure Policy dated August 24, 1998, the action level for TPH analyses is 10 milligrams per kilogram (mg/kg) for both gasoline and diesel fuel. However, that agency's "Guidelines for Assessment and Corrective Action," dated April 2001, does not allow for use of TPH analyses for confirmation of the extent of petroleum contamination or its cleanup. As a result, while TPH concentrations are no longer applicable in determining if soil contamination is present, this analysis is a legitimate screening tool. Based on the TPH action level for UST closures, the assumed action level for this report is 10 mg/kg. Soil samples collected from borings KM-1 (50 mg/kg), KM-2 (85 mg/kg), KM-3 (180 mg/kg), KM-4 (11 mg/kg), KM-5 (430 mg/kg), KM-7 (35

mg/kg), and KM-9 (45 mg/kg) contained a DRO concentration above the 10 mg/kg assumed action level. Soil samples collected from borings KM-1 (1,300 mg/kg), KM-2 (1,300 mg/kg), KM-3 (2,000 mg/kg), KM-5 (500 mg/kg), and KM-9 (15 mg/kg) contained a GRO concentration above the assumed action level.

Conclusions and Recommendations

A Preliminary Site Assessment was conducted to evaluate the Jai Uck Kim Property (Parcel #009) located at 1100 N. Main Street in Roxboro, Person County, North Carolina. Nine soil borings were advanced to evaluate the soil conditions with respect to the areas adjacent to the existing USTs/pump islands and within the proposed right-of-way. The laboratory reports of the soil samples from these borings suggest that DRO and/or GRO concentrations were present above the assumed action level in seven of the nine soil samples analyzed.

To evaluate the volume of soil requiring possible remediation, the soil samples with TPH concentrations above 10 mg/kg were considered. The analytical results of the soil samples suggest that the soil from borings KM-1 KM-2, KM-3, KM-4, KM-5, KM-7, and KM-9 contained TPH concentrations identified as DRO and/or GRO above the assumed action level. Field screening and observations suggest that contamination in boring KM-5 is at a thickness of about 3 meters (10 feet). The thickness of potentially contaminated soil at borings KM-1, KM-3, and KM-7 is about 1.8 meters (6 feet), and at borings KM-2 and KM-9 the thickness is about 0.6 meters (2 feet). In order to assess the varying thicknesses with respect to volumetric calculations, a contaminant thickness map was constructed and a planimeter was used to obtain a total square meter (square foot) measurement for each thickness interval. This measurement was then multiplied by the potential contaminant thickness for a total volumetric calculation. These measurements are summarized in Table 2. Based on the planimetric measurements and contaminated soil thickness, Earth Tech estimates a total contaminated soil volume for the site to be approximately 823 cubic meters (1076 cubic yards). However, this volume includes the potentially contaminated soil on both the Kim property and the existing right-of-way. The volume of potentially contaminated soil on the Kim Property only is estimated to be approximately 579 cubic meters (757 cubic yards). The volume of potentially affected soil was estimated based on the 10 mg/kg isoconcentration contour shown on Figure 3 and the planimetric measurements within that boundary. This volume is estimated from TPH analytical data, which are no longer valid for remediation of sites reported after January 2, 1998. After this date, MADEP EPH/VPH and EPA Method 8260/8270 analyses will likely be required to confirm cleanup. However, these analyses do not correlate exactly with TPH data and, as a result, the actual volume of contaminated soil may be higher or lower.

Earth Tech appreciates the opportunity to work with the NCDOT on this project. Because compounds were detected above the applicable action levels in the soil samples, Earth Tech recommends that a copy of this report be submitted to the Division of Waste Management, UST Section, in the Raleigh Regional Office. If you have any questions, please contact me at (919)854-6238.

Sincerely,

Michael W. Branson, P.G.
Project Manager

Attachments

c: Project File

TABLE 1

SOIL FIELD SCREENING AND ANALYTICAL RESULTS
JAI UCK KIM PROPERTY (PARCEL #9)
ROXBORO, PERSON COUNTY, NORTH CAROLINA
NCDOT PROJECT NO. R-2241A
WBS ELEMENT 34406.1.1
EARTH TECH PROJECT NO. 100407

LOCATION	DEPTH (m)	FID READING (ppm)	SAMPLE ID	ANALYTICAL RESULTS (mg/kg)	ASSUMED ACTION LEVEL (mg/kg)
KM-1	0 - 0.6	3.68			
	0.6 - 1.2	10.97			
	1.2 - 1.8	16.85			
	1.8 - 2.4	1,021			
	2.4 - 3.0	19,500	KM-1	**DRO (50)** **GRO (1300)**	10 10
	3.0 - 3.6	95			
KM-2	0 - 0.6	1.15			
	0.6 - 1.2	1.18			
	1.2 - 1.8	8.46			
	1.8 - 2.4	1,459	KM-2	**DRO (85)** **GRO (1300)**	10 10
KM-3	0 - 0.6	1.03			
	0.6 - 1.2	1.06			
	1.2 - 1.8	12.08			
	1.8 - 2.4	223			
	2.4 - 3.0	4,952	KM-3	**DRO (180)** **GRO (2000)**	10 10
	3.0 - 3.6	4,623			
KM-4	0 - 0.6	3.14			
	0.6 - 1.2	4.29	KM-4	**DRO (11)** GRO (BQL)	10 10
	1.2 - 1.8	0.91			
	1.8 - 2.4	1.21			
	2.4 - 3.0	0.92			
	3.0 - 3.6	0.7			
KM-5	0 - 0.6	41			
	0.6 - 1.2	549			
	1.2 - 1.8	13,100	KM-5	**DRO (430)** **GRO (500)**	10 10
	1.8 - 2.4	7,471			
	2.4 - 3.0	741			
	3.0 - 3.6	131			
KM-6	0 - 0.6	0.12			
	0.6 - 1.2	0.08			
	1.2 - 1.8	0.06			
	1.8 - 2.4	0.17	KM-6	DRO (BQL) GRO (BQL)	10 10
	2.4 - 3.0	0.01			
	3.0 - 3.6	0.07			
KM-7	0 - 0.6	8.65			
	0.6 - 1.2	102			
	1.2 - 1.8	205	KM-7	**DRO (35)** GRO (9.7)	10 10
	1.8 - 2.4	132			
	2.4 - 3.0	10.02			
	3.0 - 3.6	28			
KM-8	0 - 0.6	2.68	KM-8	DRO (BQL) GRO (BQL)	10 10
	0.6 - 1.2	1.39			
	1.2 - 1.8	0.51			
	1.8 - 2.4	0.91			
KM-9	0 - 0.6	85			
	0.6 - 1.2	211	KM-9	**DRO (45)** **GRO (15)**	10 10
	1.2 - 1.8	97			
	1.8 - 2.4	45			

Soil samples were collected on July 9, 2007.

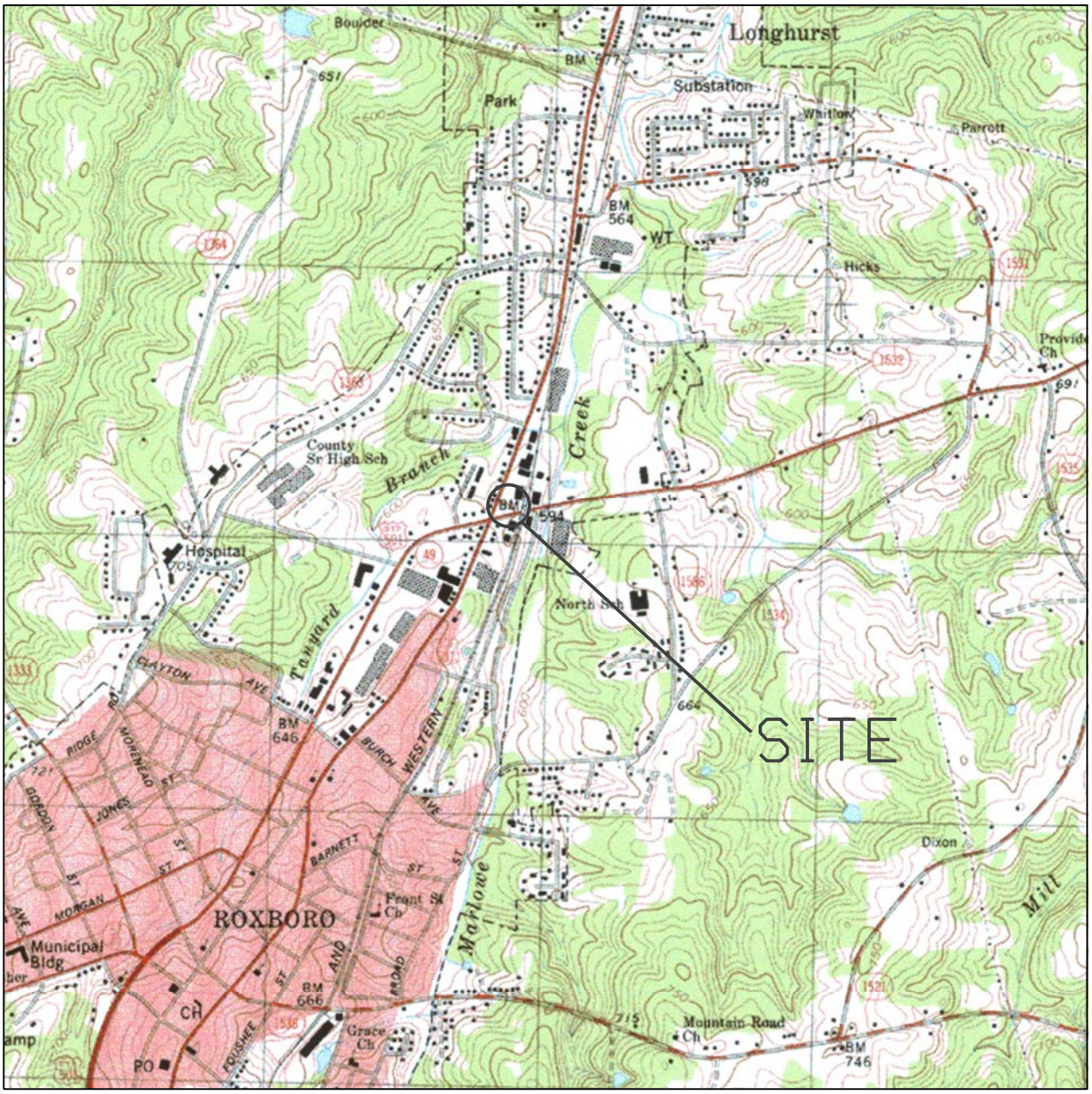
DRO - Diesel range organics.
GRO - Gasoline range organics.
BQL - Below quantitation limit.
ppm - parts per million.
mg/kg - milligrams per kilogram.
BOLD values are above the assumed action level.

TABLE 2

CONTAMINATED SOIL VOLUME CALCULATION
JAI UCK KIM PROPERTY (PARCEL #009)
ROXBORO, PERSON COUNTY, NORTH CAROLINA
NCDOT PROJECT NO. R-2241A
WBS ELEMENT 34406.1.1
EARTH TECH PROJECT NO. 100407

CONTAMINATED SOIL THICKNESS (meters)	TOTAL AREA $meters^2$	TOTAL VOLUME $meters^3$	KIM AREA $meters^2$	KIM VOLUME $meters^3$
3	18	54	18	54
2.4	55	132	55	132
1.8	159	286.2	123	221.4
1.2	148	177.6	83	99.6
0.6	290	174	120	72
TOTAL		823.8		579

FIGURES



SCALE 1:24,000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

SOURCE: U.S. GEOLOGICAL SURVEY 7.5 MIN QUADRANGLE: ROXBORO, NC (1982)

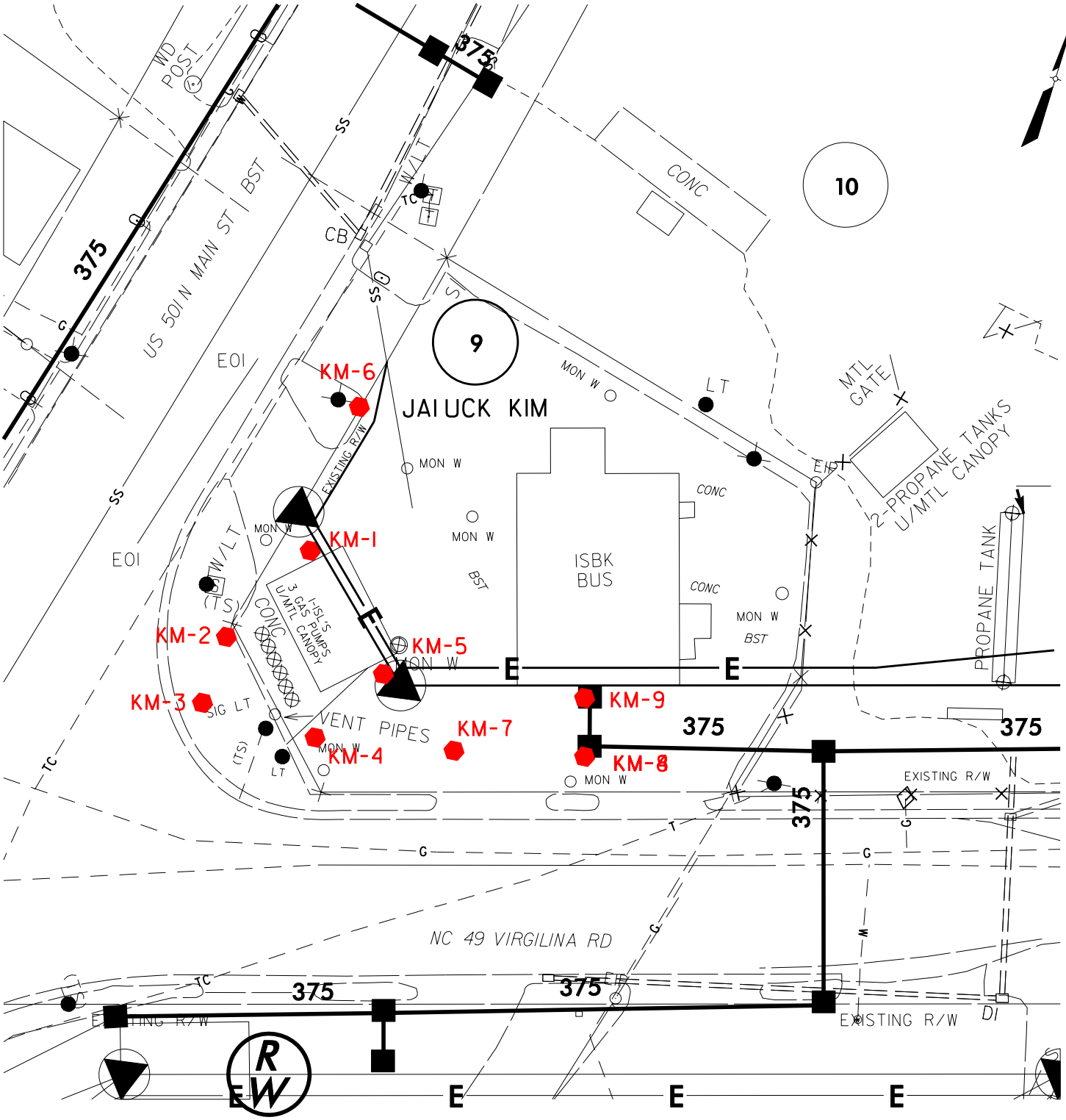
EARTH TECH

FIGURE 1
VICINITY MAP
JAI UCK KIM PROPERTY (PARCEL #009)
ROXBORO, PERSON COUNTY, NORTH CAROLINA

JULY 2007

100407

usgsbord.dgn 8/16/2007 9:43:49 AM



LEGEND

KM-4 SOIL BORING LOCATION AND IDENTIFICATION

0 10 20

GRAPHIC SCALE (meters)

EARTH TECH

FIGURE 2

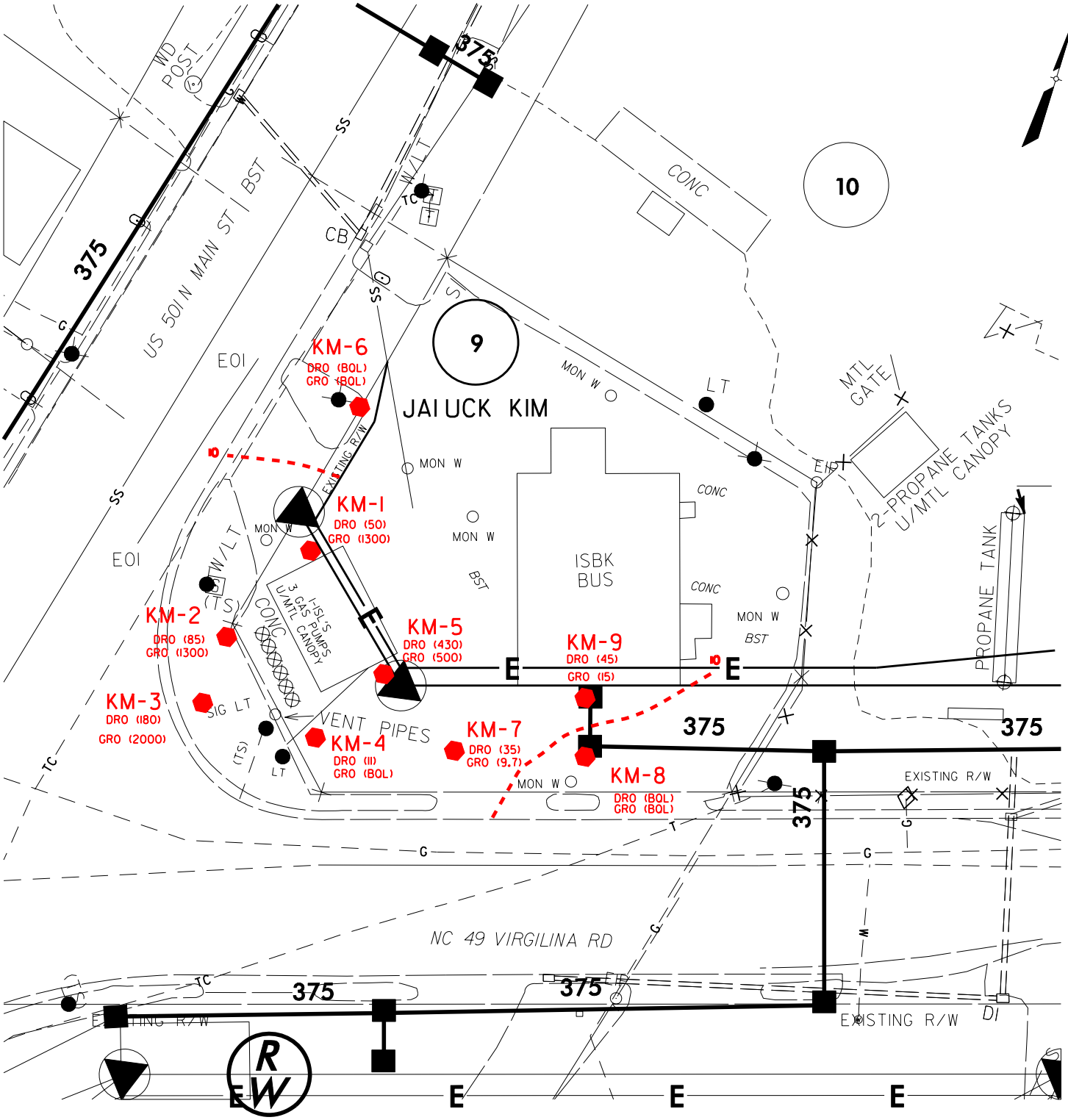
SITE MAP

JAI UCK KIM PROPERTY (PARCEL #009)

ROXBORO, PERSON COUNTY, NORTH CAROLINA

JULY 2007

100407



LEGEND

- SOIL SAMPLE LOCATION
- TPH ISOCONCENTRATION CONTOUR
- DRO (123) — TPH AS DIESEL FUEL IN MG/KG
- GRO (123) — TPH AS GASOLINE IN MG/KG
- BOL — BELOW QUANTITATION LIMIT

0 10 20

GRAPHIC SCALE (meters)

EARTH TECH

FIGURE 3

ANALYTICAL RESULTS MAP

JAI UCK KIM PROPERTY (PARCEL #009)

ROXBORO, PERSON COUNTY, NORTH CAROLINA

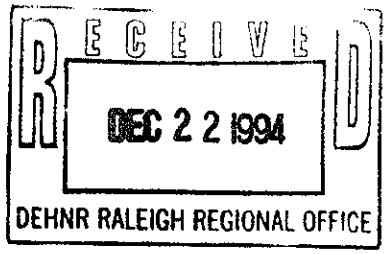
JULY 2007 100407

ATTACHMENT A

GW HIT
BENZENE
25.2 ppb

ENSCI®
ENGINEERING GROUP, P.A.

December 20, 1994



Mr. Jay Zimmerman
North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Raleigh Regional Office
3800 Barrett Dr.
Raleigh, North Carolina 27609

Re: UST Closure Report
Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County
ENSCI Project No. R005131

Dear Mr. Zimmerman:

Please find attached information pertaining to an underground storage tank closure assessment conducted at the above referenced site (**Figure 1**).

Site Activities

On November 2 through 4, 1994, three gasoline underground storage tanks (USTs) continuously placed side to side in one tank pit were unearthed and removed from the ground for permanent closure. Due to the unavailability of space to stockpile soils on site, all soils suspected of being impacted by petroleum were removed from the tank pit sampled, and loaded onto tandem dump trucks for transport to Cherokee Environmental Group for recycling during the removal of the tanks. An estimated 300 cubic yards of soils were removed from the excavation at this time. The tank pit was subsequently backfilled with clean soil.

Ground water was encountered during the tank removal process at a depth approximating eight feet from grade. The tank pit was excavated to a depth of ten feet so that the USTs could be removed. Ground water samples (Pit 1) were procured from the floor of the excavation in lieu of soil sampling. Laboratory results from ground water sampling revealed dissolved Benzene in ground water from the pit in excess of NCAC 2L .0200 standards. No free product was recognized.

Post Office Box 60275
Raleigh, North Carolina 27623-0275
T (919) 787-8209
F (919) 881-8205

1108 Old Thomasville Road
High Point, North Carolina 27260
T (919) 883-7505
F (919) 882-7956

Soil samples were taken from the side walls of the excavation and beneath the dispenser island at the site. Side wall samples were taken at a depth approximating 6.5 feet from grade along the side walls of the excavation. These soils samples (SW1 through SW4) revealed a TPH content(s) ranging from BDL to 54.8 mg\kg. Dispenser island samples D1 and D2 taken by hand auger beneath the fixtures at a depth approximating 6.5 feet from grade revealed a TPH content of 1,789 mg\kg and 7,677 mg\kg respectively by utilizing a California GC/FID Method TPH laboratory analysis of the EPA Method 5030 extraction. **Figure 2** depicts the sample locations.

Stockpile soil samples (SP200 and SP400) taken during soil removal revealed a TPH content of 459 mg/kg and 370 mg/kg respectively.

Field Sampling Protocol

Due to the depth of the excavation and OSHA shoring regulations, soil samples for analyses were obtained by hand from the excavator bucket. Samples were collected from beneath the UST systems in positions indicated by the NCDEHNR Ground Water Section guidelines (June 1993). Soils were placed in resealable plastic bags when sampled; split portions were then placed in appropriate sample containers stored on ice, and transported to a NC certified organic laboratory under chain of custody procedures. Laboratory analyses targeting TPH by preparation method 5030, and the California GC/FID Method analysis, were ordered.

Field samples remaining in the resealable plastic bags were allowed to volatilize for 10 to 15 minutes before the air collected in the headspace was screened with an organic vapor analyzer (OVA). Excavation procedures were guided by OVA readings. Generally, all soils exhibiting detectable levels of 10 ppm organic vapors while utilizing the OVA were removed from excavations for stockpiling and disposal.

Stockpile soil samples (SP200 and SP400) were taken by hand from the excavator bucket at various intervals during soil removal, composited to ensure that a representative sample was taken, and were analyzed for TPH by the California GC/FID analysis of the 5030 extractions, TOX, BTEX, and Total Lead.

Ground water samples were taken from the tank pit utilizing a single sample bailer lowered into the pit. EPA 601 and EPA 602 + MTBE analyses were ordered.

General Observations/Information

1) Ground water was encountered at a depth approximating eight feet from grade during the removal and closure of the USTs. There are no known adjacent or abutting water supply wells within 750 feet of the site. A small creek is located approximately 500 feet east of the site. The area is supplied by a municipal water supply.

2) All impacted soils (411.88 tons) have been removed from the site for remediation by a NC permitted facility, CEG, Inc. Soil certificate of disposal documentation is contained in **Appendix A.**

3) The three removed USTs were disposed of by Safeway Tank Disposal of Colfax, NC. Certificate of Disposal documentation will be provided during subsequent reporting for the site.

4) Data pertaining to the closure of the USTs (measurements, dimensions, OVA screening sampling information) is contained in **Appendix A.**

5) GW/UST-2 and GW/UST-3 forms are contained in **Appendix B.**

6) Laboratory Reports are contained in **Appendix C** for reference.

Results

In-situ soils containing petroleum hydrocarbon compounds in excess of clean-up guidelines established by the NCDEHNR-DEM remain at the site. In addition, ground water has been found to be impacted at levels above NCAC 2L .0200 ground water standards by the release. Further reporting and investigation in accordance with NCAC 2N UST regulations are recommended at the site.

Sincerely,

ENSCI ENVIRONMENTAL, INC.

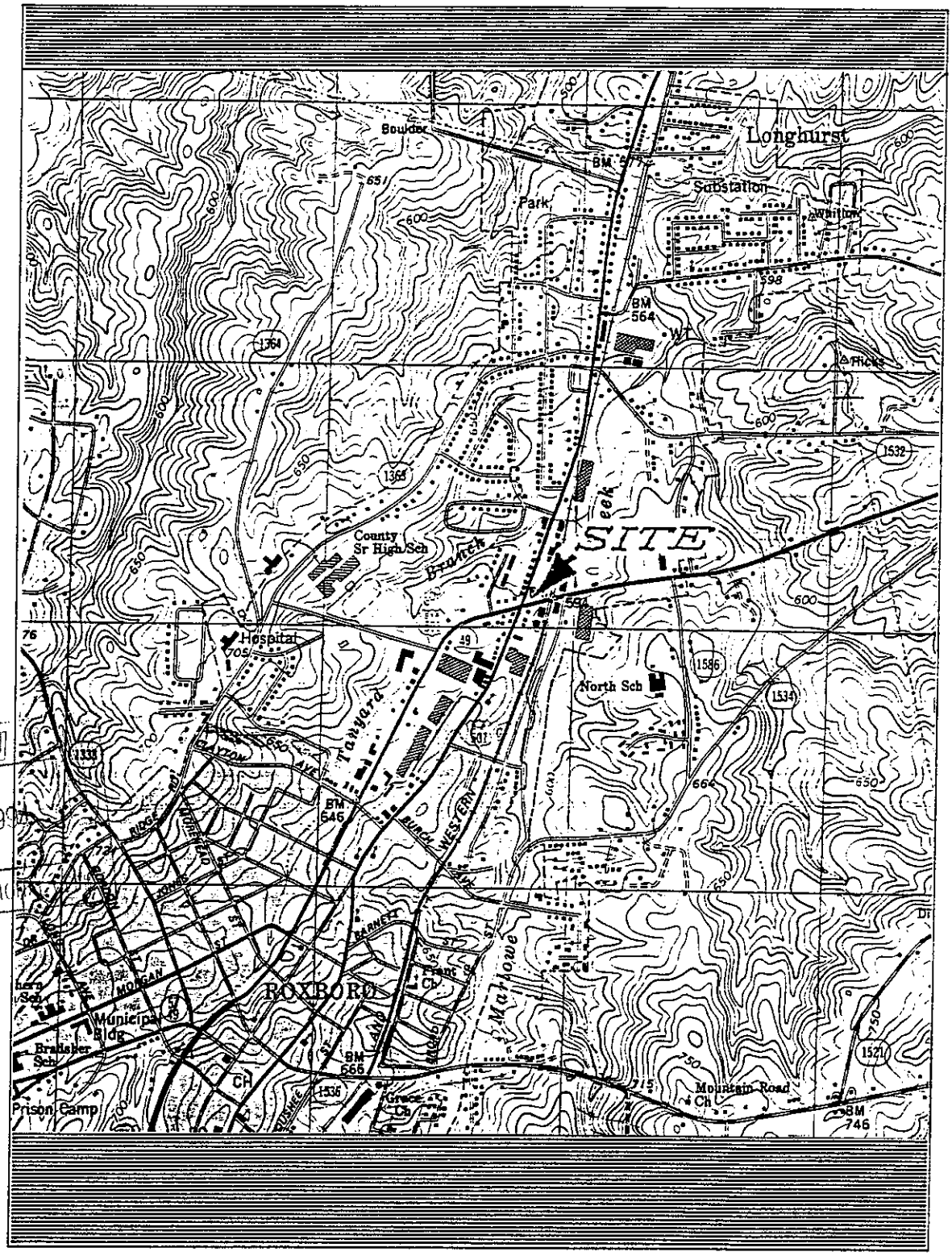
Scott O. Driscoll
Geologist/Project Team Leader

Brian A. Ball, L.G.
Project Manager/Geologist

NORTH CAROLINA LICENSED SEAL GEOLOGIST BRIAN ANTHONY BALL

cc: Erin Shubert
Kenan Oil Company, Inc.

FIGURES

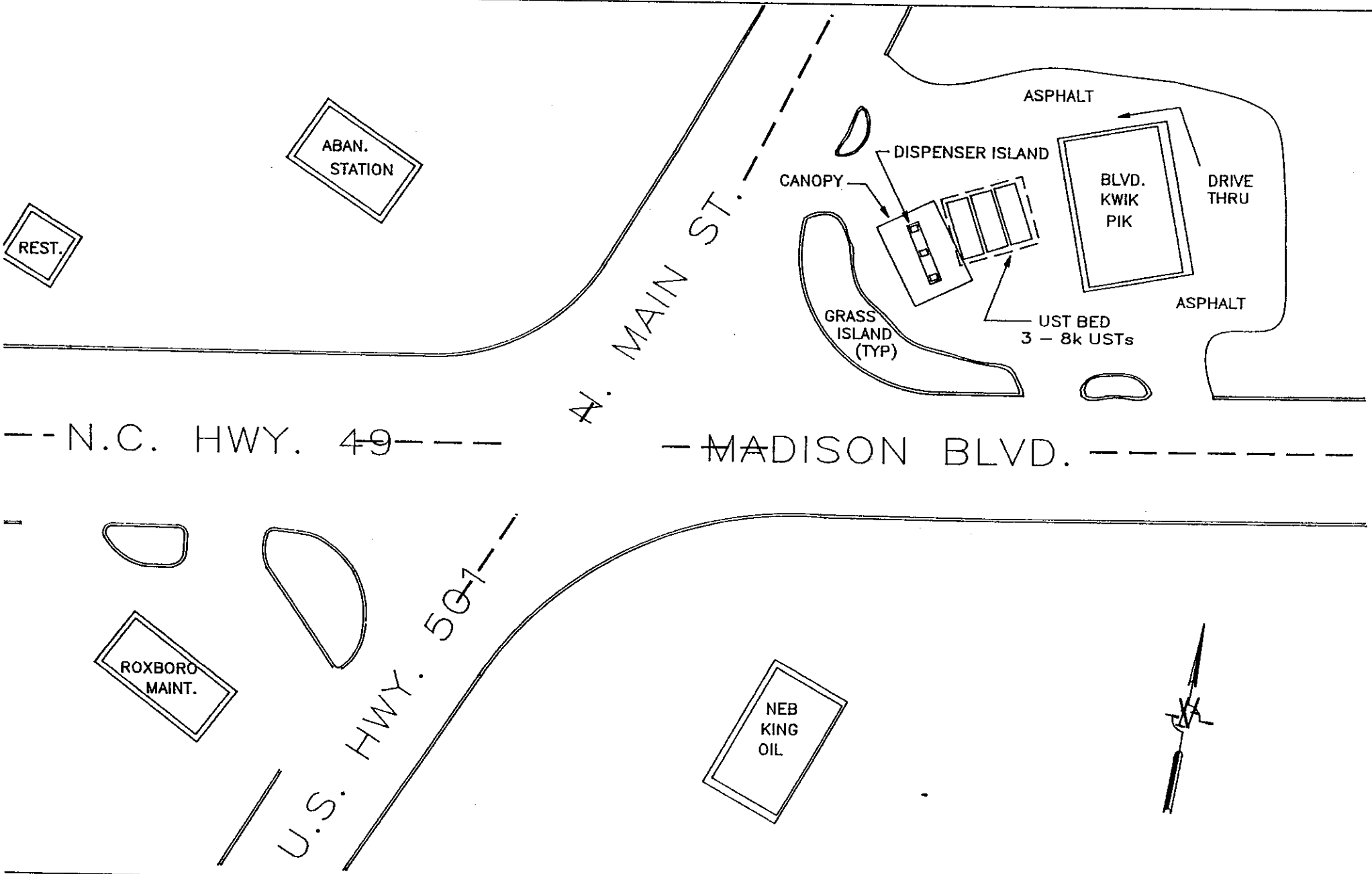


– TAKEN FROM USGS ROXBORO 7.5 ' SERIES TOPOGRAPHIC QUAD MAP –
CONTOUR INTERVAL – 10 FEET

SITE LOCATION MAP
BOULEVARD KWIK PIK
ROXBORO, PERSON COUNTY

ENSCI ENVIRONMENTAL, INC.

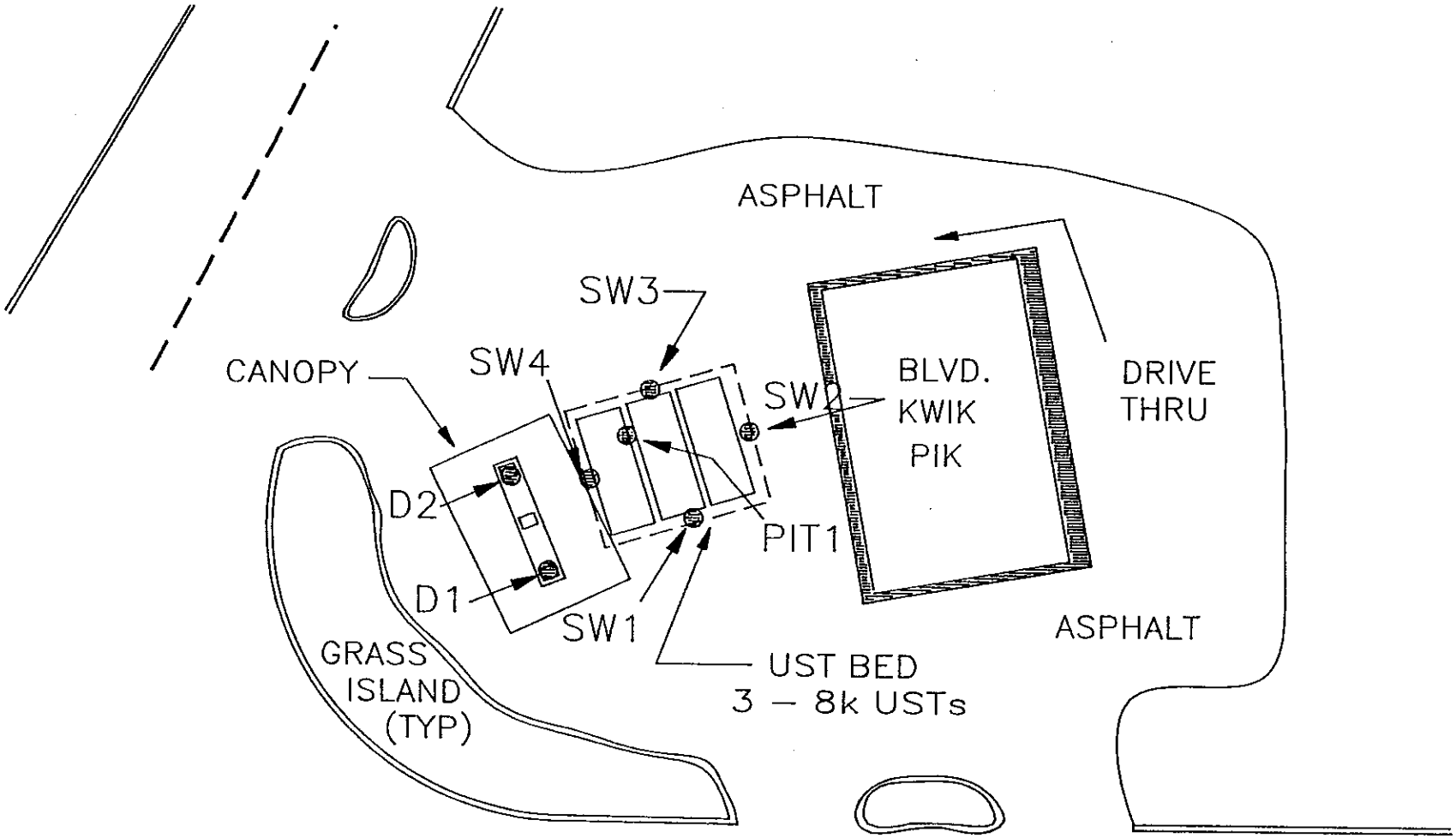
SCALE: 1" = 2000 FEET
PROJECT No.: R005131
FIGURE No.: 1



ENSCI® ENGINEERING GROUP P.A.

SITE PLAN MAP
KENAN OIL COMPANY, INC.
BOULEVARD KWIK PIK ROXBORO

SCALE: 1" = 50 FEET	PROJECT NO.: R005131	DRAWING NO.: 2



ENSCI®
ENGINEERING GROUP P.A.

SAMPLE LOCATION MAP
KENAN OIL COMPANY, INC.
BOULEVARD KWIK PIK ROXBORO

SCALE: 1" = 30 FEET	PROJECT NO.: R005131	DRAWING NO.: 3

APPENDIX A

Closure Report

UST CLOSURE REPORT

1. Ownership of Tank(s)

Kenan Oil Company
Owner Name (Corporation, Individual, Public Agency or Other Entity)

100 Europa Drive, Suite 450
Street Address

Orange
County

Chapel Hill NC 27514
City State Zip Code

919 929-9979
Area Code Telephone Number

2. Location of Tank(s)

Boulevard Kwik Pik
Facility Name or Company

0-018870
Facility ID # (if available)

1100 North Main Street
Street Address or State Road

Person Roxboro 27573
County City Zip Code

910-599-2222
Area Code Telephone Number

3. **Date of Closure** 11/02/94 through 11/04/94

4. **Name(s) of EEG Personnel on site** Gordon Williford/Scott Driscoll

5. **Name(s) of excavation/other contractor personnel** Earl J. Latta Company

6. **Owner Contact Name:** Kenan Oil Company, Contact Erin Shubert

Address: 100 Europa Drive, Suite 450, Chapel Hill, NC 27514

Phone No.: 919-929-9979

7. UST Information

8. Excavation Condition

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	8,000	8' x 22'	Gasoline	X			X	X	
2	8,000	8' x 22'	Gasoline	X			X	X	
3	8,000	8' x 22'	Gasoline	X			X	X	

9. **UST Burial Depth (Base of UST)**

Tank No.	Burial Depth (ft.)
1	9'6"
2	9'6"
3	9'6"

10. **UST Condition**

Tank No.	Uncorroded	Mild Corrosion	Mildly Pitted	Perforated
1			X	
2			X	
3			X	

11a. Sampling UST Pit

Sample No.	Soil (S) or Water (W)	Depth Obtained (ft)	PID Reading (ppm)	Submitted for Lab Analysis (Indicate Methods)	Lab Results
PIT 1	W	8'	N/A	EPA 601	BDL
PIT 1	W	8'	N/A	EPA 602/MTBE	B=25.2 ug/l T=3.93 ug/l E=19.3 ug/l X=31.7 ug/l M=21.3 ug/l
SW1	S	6.5'	66.1 ppm	TPH 5030	9.3 mg/kg
SW2	S	6.5'	47.4 ppm	TPH 5030	BDL
SW3	S	6.5'	427.3 ppm	TPH 5030	2.6 mg/kg
SW4	S	6.5'	828.8 ppm	TPH 5030	54.8 mg/kg

11b. Product Lines/Dispenser Sampling

Sample No.	Soil (S) or Water (W)	Depth Obtained (ft)	PID Reading (ppm)	Submitted for Lab Analysis (Indicate Methods)	Lab Results
D1	S	6.5'	1954 ppm	TPH 5030	1,789 mg/kg
D2	S	6.5'	1920 ppm	TPH 5030	7,671 mg/kg

11c. Stock Pile Soil Sampling

Sample No.	Soil (S) or Water (W)	Depth Obtained (ft)	PID Reading (ppm)	Submitted for Lab Analysis (Indicate Methods)	Lab Results
SP200	S	Composite	400 +	TPH 5030, BTEX, TOX, Total Lead	TPH=459 mg/kg Tox=39 mg/kg Total Lead=14 mg/kg BTEX=9.01 mg/kg Xylenes
SP400	S	Composite	400+	TPH 5030	370 mg/kg
Note: Composite sample taken during excavation/loading activities					

12. Summarize Laboratory Results

Section 11a - Tank Closure - Soil

SW1 - 9.3 mg/kg TPH 5030
SW2 - BDL TPH 5030
SW3 - 2.6 mg/kg TPH 5030
SW4 - 54.8 mg/kg TPH 5030

These samples were collected at a depth approximating 6.5 feet from grade along the side walls of the excavation.

Section 11a - Tank Closure - Water

Pit 1
EPA 601 all analytes BDL.
EPA 602/MTBE - B = 25.2 ug/l, T = 3.93 ug/l, E = 19.3 ug/l, X = 31.7 ug/l, MTBE = 21.3 ug/l.

Section 11b - Product Line/Dispenser Island

Product Line sampling not necessary (<20 feet of Line).

Dispenser island samples @ depth approximating 6.5 feet by hand auger:
D1 - 1,789 mg/kg TPH 5030
D2 - 7,677 mg/kg TPH 5030

Section 11c - Stockpile sampling revealed the following results:

SP200 (First 200 yards of material, est.) - Reported TPH (5030) level of 459 mg/kg.
BTEX = 9.01 mg/kg for total Xylenes.
Total Lead = 14 mg/kg
TOX = 39 mg/kg

SP400 (Second 200 yards of material, est.) - Reported TPH (5030) level of 370 mg/kg.

13. Stockpiled Soil

Amount 411.88 tons.

Final Disposition (if known) Shipped to CEG, Inc. for remediation in brick kiln process to consume volatile contaminants.

APPENDIX B

GW/UST-2
GW/UST-3

Site Investigation Report For Permanent Closure of U.S.T.

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE MAP ON REVERSE SIDE OF OWNER'S COPY (BLUE) FOR REGIONAL OFFICE ADDRESS].

Sate Use Only
I.D. Number _____
Date Received _____

INSTRUCTIONS

Please complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Kenan Oil Company, Inc.
Owner Name (Corporation, Individual, Public Agency, or Other Entity)
100 Europa Drive, Suite 400
Street Address
Wake
County
Chapel Hill, NC 27514
City State Zip Code
(919)929-9979
Area Code Telephone Number

II. Location of Tank(s)

Boulevard Kwik Pik
Facility Name or Company
0-018870
Facility ID # (if available)
1100 North Main Street
Street Address or State Road
Person, Roxboro 27573
County City Zip Code
(910)599-2222
Area Code Telephone Number

III. Contact Person

Name: Erin Shubert
Job Title: Environmental Coordinator
Telephone Number: (919) 929-9979

Closure Contractor (Name) Ensci Environmental/P. O. Box 80275/Raleigh, NC 27623 (Address)

Lab (Name) Hydrologic, Inc./2500 Gateway Centre, Suite 900/Morrisville, NC 27560 (Address)

IV. U.S.T. Information / V. Excavation Condition

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation Yes	Water in Excavation No	Free Product Yes	Free Product No	Notable Odor or Visible Soil Contamination Yes	Notable Odor or Visible Soil Contamination No
1	8,000	8'x22'	Gasoline	x			x	x	
2	8,000	8'x22'	Gasoline	x			x	x	
3	8,000	8'x22'	Gasoline	x			x	x	

VI. Additional Information Required

See reverse side of blue copy (owner's copy) for additional information required by N.C. - DEM in the written report and sketch.

VII. Check List

Check the activities completed.

- [ ] Contact local fire marshall
- [x] Notify DEM Regional Office before abandonment
- [x] Drain & flush piping into tank
- [x] Remove all product and residuals from tank
- [x] Excavate down to tank
- [x] Clean and inspect tank
- [x] Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- [x] Cap or plug all lines except the vent and fill lines.
- [x] Purge tank of all product & flammable vapors.
- [ ] Cut one or more large holes in the tanks.
- [x] Backfill the area.

Date Tank Permanently closed: 11/4/94

ABANDONMENT IN PLACE

- [ ] Fill tank until material overflows tank opening:
- [ ] Plug or cap all openings:
- [ ] Disconnect and cap or remove vent line
- [ ] Solid inert material used - please specify: _____

REMOVAL

- [x] Create vent hole
- [x] Label tank
- [x] Dispose of tank in approved manner

Final tank destination: Safeway Tank Disposal, Inc.

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative | Signature | Date Signed

(GW/UST-3) Notice of Intent: UST Permanent Closure or Change-In-Service

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I. D. Number _____
Date Received _____

INSTRUCTIONS
Complete and return thirty (30) days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Kenan Oil Co
(Corporate, Individual, Public Agency, or Other Entity)
Street Address: 100 Europa Dr #450
County: Orange
City: Chapel Hill State: NC Zip Code: 27514
Tele. No. (Area Code): (919) 929-9979

II. LOCATION OF TANK(S)

Facility Name or Company: Blvd. Kwik Pik
Facility ID # (if available): 0-018870
Street Address or State Road: North Main St
County: Person City: Roxboro Zip Code: 27573
Tele. No. (Area Code): (919) 599-2222

III. CONTACT PERSON

Name: Erin Shubert Job Title: Env. Claims Telephone Number: (919) 929-9979

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications. 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. Keep records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Kenan Oil
Address: Same State: Zip Code:
Contact: Erin Shubert Phone:

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY: CLOSURE – Removal	CLOSURE – Abandonment In Place	CHANGE-IN-SERVICE – New Contents Stored
1	8000 gal	gasoline	X		
2	8000 "	gasoline	X		
3	8000 "	gasoline	X		

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title: Edward Holmes Jr Vice President

*Scheduled Removal Date: ASAP will call

Signature: _____

Date Submitted: 12/20/94

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

Cherokee Environmental Group
A Division of Cherokee Sanford Group, Inc.

CERTIFICATION OF REMEDIATION AND RECYCLING OF NON-HAZARDOUS HYDROCARBON CONTAMINATED MATERIAL

ORIGINATING AT: HWY. 15-501, ROXBORO, NORTH CAROLINA .

FROM THE "GENERATOR": KENAN OIL

Cherokee Environmental Group ("CEG") received 411.88 tons of material from the Generator on 11/04---11/07/94 at its GULF facility. Receipt of this shipment of NON-HAZARDOUS hydrocarbon contaminated material is evidenced by CEG's manifests with control numbers 9050 thru 9062, 9087, 9088.

This NON-HAZARDOUS hydrocarbon contaminated material has been accepted by CEG, and this material will be remediated in one of CEG's fully permitted remediation/recycling processes. In the brick manufacturing process, the subject material is mixed with raw materials, crushed, ground, compacted, and extruded into brick. The brick are preheated and then fired in tunnel kilns at temperatures exceeding 1700 degrees Fahrenheit for a period of approximately 12 hours. This process drives off and/or consumes any organic constituents contained in the material, leaving the finished brick product free of any hydrocarbon contamination. Material that is more suitable for bio-remediation will be segregated, cleaned, remediated, and beneficially re-used in CEG's permitted bio-remediation operations. CEG guarantees complete remediation: should CEG's bio-remediation processes not reduce the Total Petroleum Hydrocarbons in the subject material to state defined "clean" soil levels, CEG will thermally remediate the material in one of its sixteen (16) brick kilns.

It must be stressed that these processes are permitted by the State of Maryland's Department of the Environment, the State of North Carolina's Department of Environment, Health, and Natural Resources, the State of South Carolina's Department of Health and Environmental Control, and the Commonwealth of Virginia's Department of Environmental Quality, only for the remediation and recycling of NON-HAZARDOUS material.

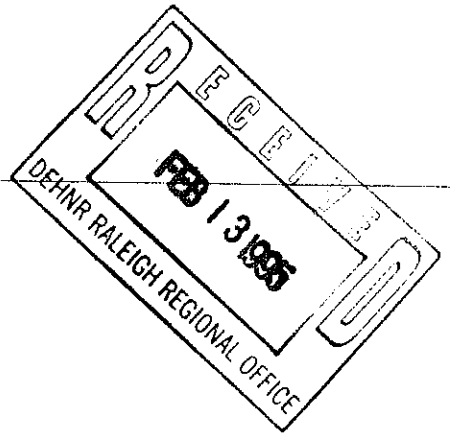
This certification does not change or modify the terms and conditions of any existing contract(s), agreement(s), or certification(s) between CEG and the Generator (or the Generator's authorized agent) relating to the referenced material.

This particular job is filed as WM# 12072.

Joyce Carroll
CHEROKEE ENVIRONMENTAL GROUP

NOVEMBER 23, 1994
DATE

ENSCI®
ENVIRONMENTAL, INC.



February 10, 1995

Mr. Jay Zimmerman
North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Raleigh Regional Office
3800 Barrett Dr.
Raleigh, North Carolina 27609

Re: Release Response Report
Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County
ENSCI Project No. S005132

Dear Mr. Zimmerman:

Please find enclosed information pertaining to Release Response and Corrective Action for UST Systems outlined in Title 15A, NCAC, 2N, .0703, .0704, and .0705. This document will serve to satisfy the above referenced reporting requirements for the Boulevard Kwik Pik facility located at 1100 North Main Street in Roxboro, Person County (**Figure 1**). ENSCI Environmental, Inc. (ENSCI) has been contracted to provide these reporting services on behalf of Kenan Oil Company, Inc. of Chapel Hill, North Carolina.

On January 10, 1995, an ENSCI geologist was dispatched to the facility to gather the information contained in this report. The initial abatement (.0703), site characterization (.0704), and free product investigation (.0705) information is provided in an outline format for ease of communication.

1108 Old Thomasville Road
High Point, North Carolina 27260
T (919) 883-7505
F (919) 882-7958

Post Office Box 80275
Raleigh, North Carolina 27623-0275
T (919) 787-8209
F (919) 881-8205

15A NCAC 2N .0703 - Initial Abatement Measures and Site Check

(a)(1) Three gasoline underground storage tanks (USTs) previously existed and were removed from the ground at the site. According to the UST closure report prepared by ENSCI (dated December 20, 1994), the USTs were permanently closed on November 4, 1994.

No further release of a regulated substance is occurring to the environment from the subject UST system(s) due to their removal from the ground. Site specific information depicting the layout of the site and UST locations can be referenced in **Figure 2**. A new UST system has been installed by Eames Oil Company on the property southwest of the removed UST system.

(a)(2) Visual evidence of an above ground release associated with the subject USTs was not detected during a site inspection conducted by ENSCI on January 10, 1995.

Visual inspection for an exposed below ground release was conducted at this time. Evidence of an exposed below ground release was not detected. During closure activities, soils were excavated surrounding and beneath the UST systems to a depth approximating ten feet from the ground surface to facilitate extraction of the USTs. All excavations which were undertaken at the site to remove the subject USTs have been backfilled with clean backfill soil. No exposure or health hazards by vapors or human contact are thought to exist.

(a)(3) Subsurface utilities and structures at the site consist of water lines, storm and sanitary sewer pipes, and electric and telephone utilities. All accessible openings associated with these structures (valve boxes, inlets, and grate openings) were inspected with a photo ionization detector (PID) to determine if volatile organic vapors associated with the gasoline release exist in the structures. No accumulations of organic vapors were detected above background levels in the structures, and no sheen which would be associated with petroleum impact were noted in the structures accessed.

(a)(4) A total of 411.80 tons of petroleum impacted soils was removed from the excavation and shipped directly to Cherokee Environmental Group (CEG) for recycling in a brick making process. Certificate of Disposal documents and weight manifests are contained in the closure report issued previously.

(a)(5) Two soil borings were advanced at the site to determine the presence/absence of free product gasoline during the site visit on January 10, 1995. The soil borings were converted into permanent ground water monitoring wells to investigate for

the presence of free product in the vicinity of the UST systems. The borings were advanced in the vicinity of the dispenser island (MW1) and former UST bed (MW2). **Figure 3** depicts the location of the borings.

Soils from each borehole were screened utilizing a photo ionization detector (PID) in order to characterize soil conditions in the field. Upon procurement, soil samples were placed in airtight ziplock baggies and allowed to equilibrate for a period of 3 to 5 minutes prior to the screening. The organic vapors which collected in the head space of each baggie were screened utilizing the PID. The PID is a qualitative field instrument which utilizes flame ionization as a means of quantifying concentrations of volatile organic compounds (VOCs) being emitted from a unit sample. The intensity at which the flame burns when exposed to the sample of VOCs is proportional to the concentration of VOCs within a sample. Thus, field interpolation of the presence or levels of a suspected contaminant may be relatively interpreted. These vapor concentrations may be used as an indicator of the presence and level of soil impact by petroleum products. A odor characteristic of gasoline was noted upon installation of the drilled boreholes. The soil sample exhibiting the highest organic vapor concentration from the vadose zone was placed into laboratory supplied containers properly labeled, chilled on ice, and delivered to a certified laboratory for chemical analysis targeting total petroleum hydrocarbons (TPH). Chain of Custody protocol was followed.

Subsequent to ground water monitor well construction each well was developed (purged) of a minimum of three (3) well volumes of ground water prior to sampling. Well development is performed to ensure that a representative sample of ground water is procured. The well development and sampling was performed by utilizing a factory sealed disposable single sample bailer per each well. Vinyl protective gloves were used during development/sampling to avoid cross-contamination. Ground water samples were procured and stored in their appropriate zero head space 40 ml laboratory vials, properly labeled, chilled on ice, and delivered to a certified laboratory for chemical analysis targeting dissolved gasoline constituents per EPA Method 602 + MTBE, EDB, and IPE and EPA Method 601. Chain of Custody protocol was followed.

(a)(6) No measurable amounts of free product have been detected during UST closure activities or subsequent drilling activities conducted at the site.

15A NCAC 2N .0704 - Initial Site Characterization

(a)(1) Three USTs existed and associated appurtenances were owned by Kenan Oil Company, Inc. in the past at the site. **Table 1** summarizes the size and product type for each UST.

Table 1 - UST Specifications

Tank #	Capacity (gal)	Size (ft)	Product
T1	8,000	8' x 22'	Unl. gasoline
T2	8,000	8' x 22'	Unl. gasoline
T3	8,000	8' x 22'	Unl. gasoline

Volatile organic vapors detected during field activities had a characteristic gasoline odor. An estimate of the quantity of the release is not known at this time.

(a)(2) The Boulevard Kwik Pik facility is located at 1100 North Main with its intersection with Madison Boulevard in Roxboro Person County.

The population of Person County is 30,180. The population of Roxboro is (1994).

Municipal water is supplied to the site and its surrounding properties. No private potable wells were recognized during a reconnaissance within a 1500 foot radius of the site. One municipal water tower exists about 4,000 feet north of the site. This tower is apparently a municipal water supply well location.

Subsurface lithologies recognized at the site are characterized as a tan, orange and green slightly sandy (<10%) clayey silt to silty CLAY. Ground water was encountered at a depth approximating 8 feet from grade.

Subsurface utilities and structures at the site consisted of water lines, telephone cables, and sanitary and storm sewer pipes. Most if not all electrical service appeared to be overhead.

Land usage in the site area is mainly light commercial to residential.

Climate in the site vicinity is characterized as wet temperate with an average annual rainfall of 56 inches and a mean temperature of 58°F.

(a)(3) Results of the site check and initial characterization indicate that a release of petroleum products as gasoline has impacted soils and ground water at the site. This conclusion is based upon analytical results from the UST closure and subsequent field observations and drilling made by ENSCI personnel.

Previous sampling activities during closure indicated the following results contained in **Table 2**. Analytical reports are contained in the previously issued UST closure report. Refer to **Figure 3** for sample locations.

Table 2 - UST Closure Results - Boulevard Kwik Pik - NCDEM I.D. 0-018870

Sample I.D.	Soil (S) H20 (W)	Depth (ft)	PID (ppm)	Result
PIT 1	W	8'	N/A	EPA 601 = BDL EPA 602/MTBE B = 25.2 ug/l T = 3.93 ug/l E = 19.3 ug/l X = 31.7 ug/l M = 21.3 ug/l
SW1	S	6.5'	66.1 ppm	9.3 mg/kg
SW2	S	6.5'	47.4 ppm	BDL
SW3	S	6.5'	427.3 ppm	2.6 mg/kg
SW4	S	6.5'	828.8 ppm	54.8 mg/kg
D1	S	6.5'	1954 ppm	1,789 mg/kg
D2	S	6.5'	1920 ppm	7,677 mg/kg
SP200	S	Comp	400+	TPH 459 mg/kg. BTEX = 9.01 mg/kg Xyl Total Pb = 14 mg/kg TOX = 39 mg/kg
SP400	S	Comp	400+	370 mg/kg

Drilling activities initiated to determine the presence of free product at the MW1 and MW2 locations, and further characterize soil and ground water conditions at the site, are summarized in **Table 3**. Refer to **Figure 3** for sample locations. Analytical reports are attached.

Table 3 - Ground water Analytical Results - Boulevard Kwik Pik - NCDEM I.D. 0-018870

Sample Date	January 10, 1995	
Analyte/Well I.D.	**MW1**	**MW2**
Benzene	**1,600**	BDL
Chlorobenzene	BDL	BDL
1,2 Dichlorobenzene	BDL	BDL
1,3 Dichlorobenzene	BDL	BDL
1,4 Dichlorobenzene	BDL	BDL
Ethylbenzene	**1,000**	BDL
Toluene	**2,100**	BDL
Xylenes	**4,600**	BDL
MTBE	**1,080**	**1,840**
EDB	BDL	BDL
IPE	BDL	BDL
TPH	221	4.2

NOTE: All results reported in ug/L
BDL = Below Laboratory Detection Limit
Bold denotes concentration in excess of NCAC 2L ground water standards

(a)(4) No measurable amount of free product was detected on ground water recognized during UST closure activities or subsequent drilling activities at the MW1 and MW2 locations.

Soil and ground water investigation is proceeding at the site so that NCAC 2N rules concerning UST systems are addressed. If you have any questions or concerns, please contact the undersigned at 919-787-8209.

Sincerely,

ENSCI ENVIRONMENTAL, INC.

Scott O. Driscoll
Geologist/Project Team Leader

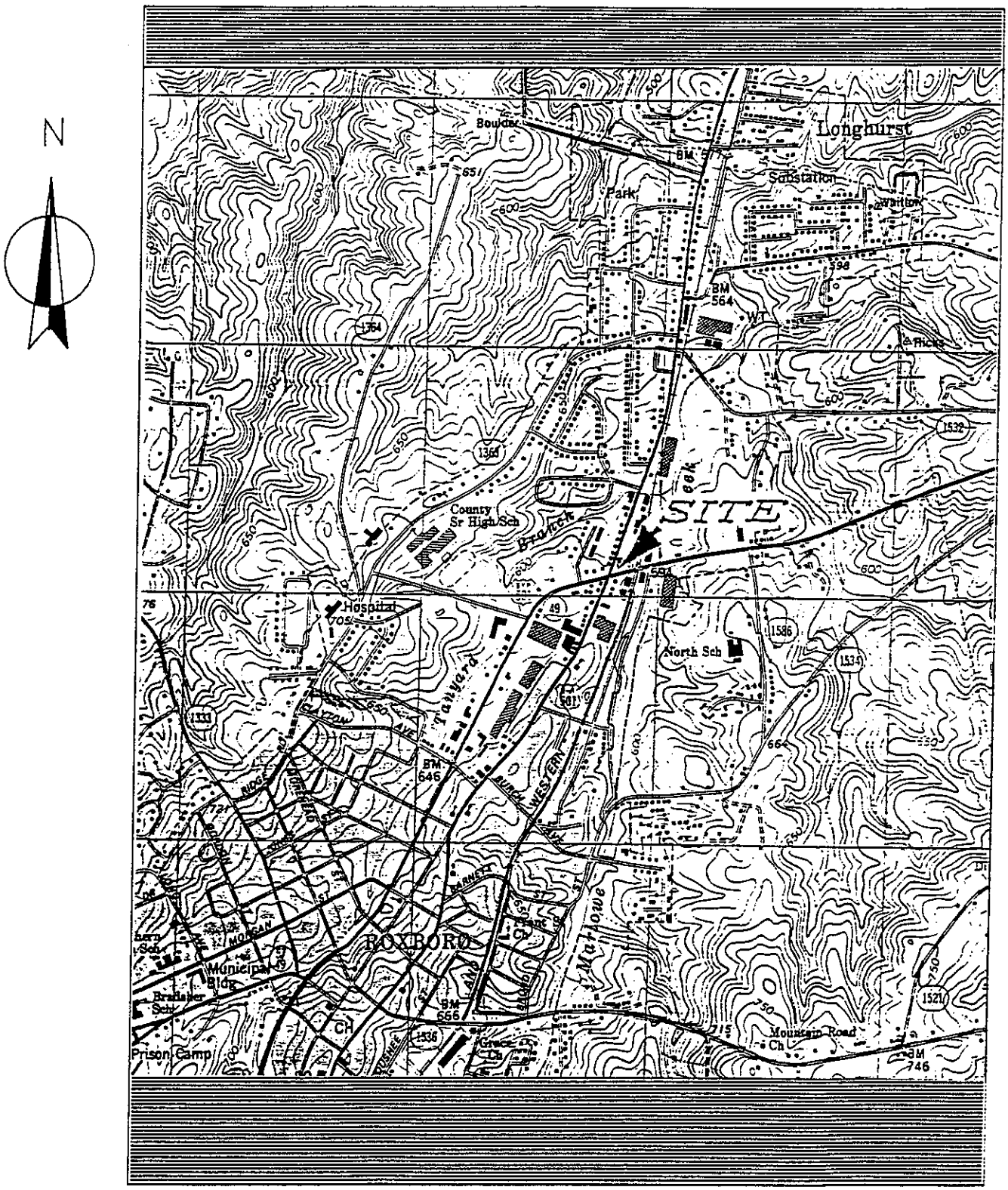
ENSCI ENVIRONMENTAL, INC.

Brian A. Ball, L.G.
Project Manager/Geologist

NORTH CAROLINA LICENSED SEAL 1210 GEOLOGIST BRIAN ANTHONY BALL

cc: Erin Shubert
Kenan Oil Company, Inc.

FIGURES

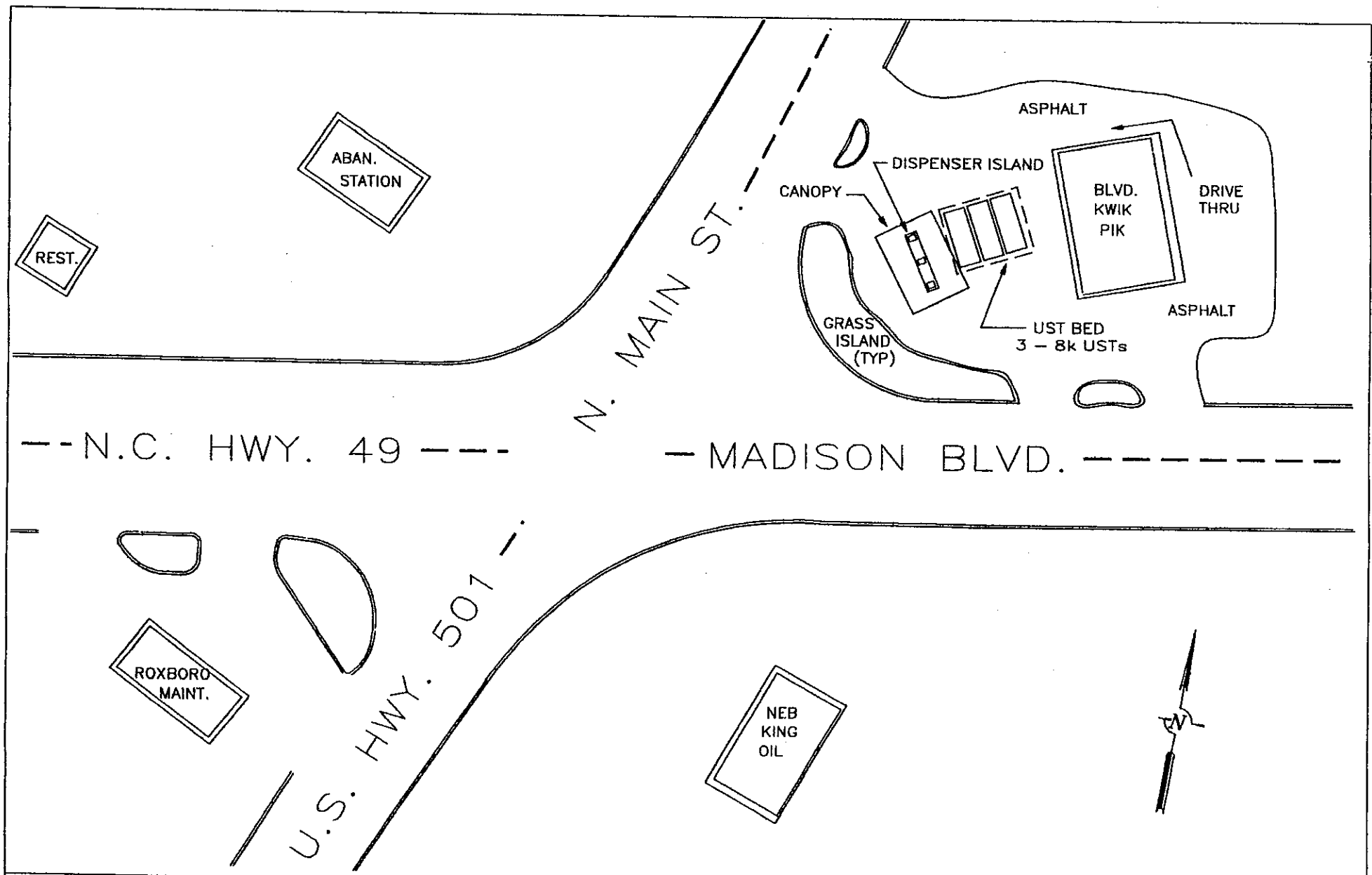


– TAKEN FROM USGS ROXBORO 7.5 ' SERIES TOPOGRAPHIC QUAD MAP –
CONTOUR INTERVAL – 10 FEET

SITE LOCATION MAP
BOULEVARD KWIK PIK
ROXBORO, PERSON COUNTY

ENSCI
ENVIRONMENTAL, INC.

SCALE: 1" = 2000 FEET
PROJECT No.: R005131
FIGURE No.: 1



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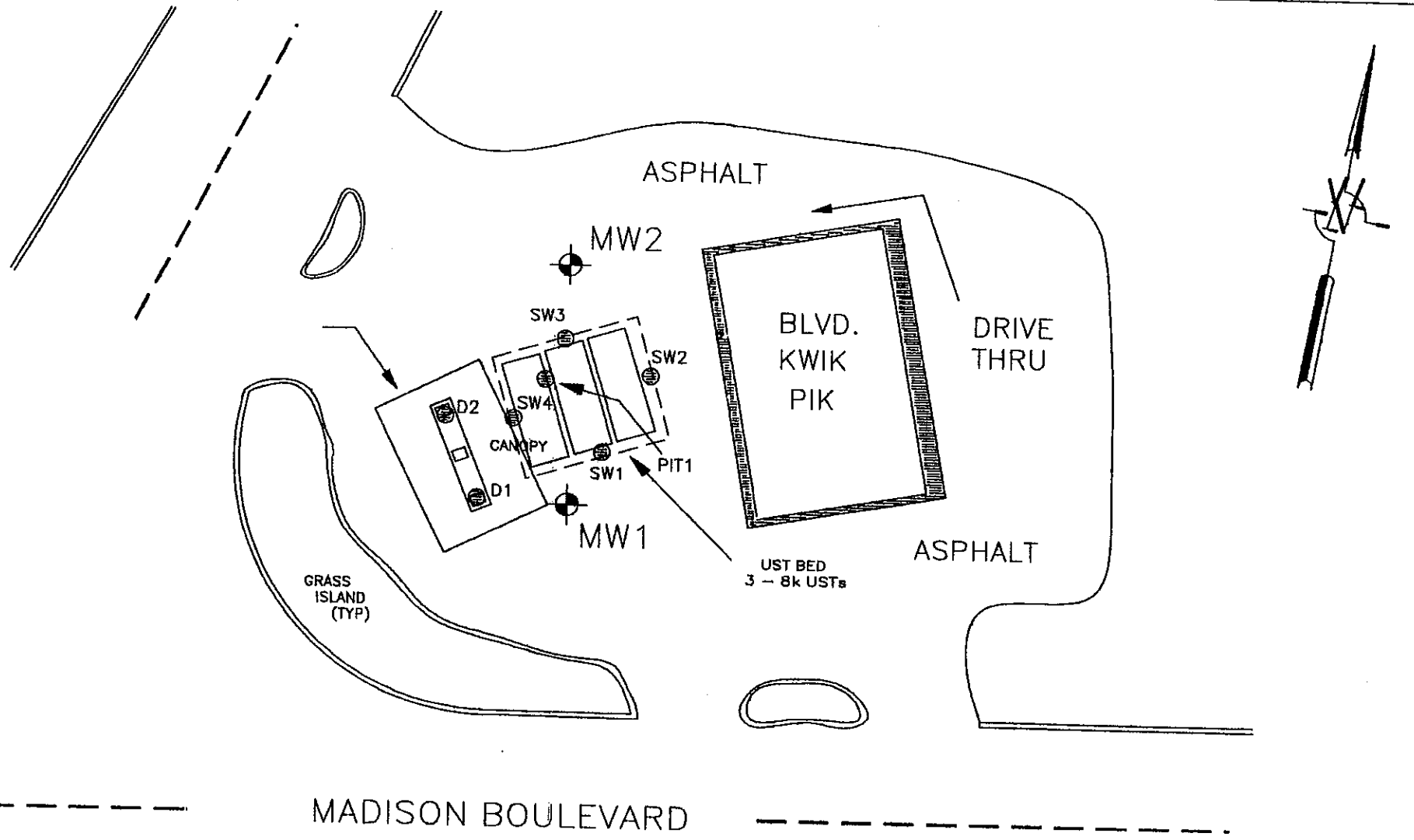
SITE PLAN MAP
KENAN OIL COMPANY, INC.
BOULEVARD KWIK PIK ROXBORO

SCALE: 1" = 50 FEET	PROJECT NO.: S005132	DRAWING NO.: 2



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SAMPLE LOCATION MAP
KENAN OIL COMPANY, INC.
BOULEVARD KWIK PIK ROXBORO

SCALE: 1" = 30 FEET	PROJECT NO.: S005132	DRAWING NO.: 3

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

P. O. Box 459 • Cary, NC 27512-0459 • Tel/Fax: (919) 481-2646

September 12, 1995

Mr. Jay Zimmerman
Division of Environmental Management
North Carolina Department of Environment,
Health, and Natural Resources
3800 Barrett Drive
Raleigh, North Carolina 27609

RE: Free Product Removal Report
Boulevard Kwik Pik, Roxboro, North Carolina
Kenan Oil Company

Dear Mr. Zimmerman:

In accordance with the provisions of 40 CFR 280.64, this letter presents a report of free product removal at the Boulevard Kwik Pik in Roxboro, North Carolina. Kenan Oil Company is presently in the progress of completing a Comprehensive Site Assessment (CSA) for the facility.

A map of the Boulevard Kwik Pik site is presented in Attachment 1. Free product was discovered in monitoring well MW-1 during CSA groundwater-sampling activities on June 21, 1995. MW-1 was installed on January 10, 1995 as part of underground storage tank (UST) closure activities that were initiated in November 1994. Since its discovery on June 21, 1995, free product has been confirmed in MW-1 on subsequent gauging dates. Table 1 lists gauging dates and apparent product thicknesses measured in MW-1.

Table 1
Apparent Product Thicknesses in MW-1

Gauging Date	Depth to Product (ft below top of casing)	Depth to Water (ft below top of casing)	Apparent Product Thickness (ft)
June 21, 1995	3.63	3.79	0.16
June 28, 1995	3.09	3.15	0.06
August 9, 1995	3.44	3.57	0.13

Monitoring-well MW-1 is both downgradient of the product dispensers and adjacent to the upgradient perimeter of the former UST basin. The volume of product released that is associated with the occurrence of free product in MW-1 is unknown.

In response to the discovery of free product in MW-1, free-product recovery activities were implemented on June 21, 1995. On each of the gauging dates listed above, product was removed from MW-1 to the extent practicable (i.e., until only a sheen remained) using a dedicated, polyethylene bailer. Table 2 lists the volume of product recovered on each recovery date.

Table 2
Volumes of Free Product Removed from MW-1

Date	Volume of Free Product Recovered
June 21, 1995	200 milliliters
June 28, 1995	50 milliliters
August 9, 1995	100 milliliters
Total	350 milliliters

Recovered product is currently being stored in an EPA-approved, 2-gallon capacity, metal canister that is secured on site.

A sample of product was collected from MW-1 during the recovery activities on August 9, 1995 and analyzed by Geochem, Inc. for product identification by gas chromatograph (GC). A copy of the laboratory report is provided in Attachment 2. Based on the GC analysis, the product in MW-1 is a slightly weathered gasoline with no other measurable fuels present.

Based on the persistent detection of product in monitoring well MW-1 between June and August 1995, an interim free-product recovery program is being initiated. The purpose of this activity will be to optimize free-product recovery prior to the implementation of future corrective action strategies on site.

Interim product recovery will be conducted through the use of a passive skimming bailer (Keck Model PRC2, or equivalent) that will be installed at the product-groundwater interface in MW-1. The skimming bailer, which has a reservoir capacity of ½ liter, will be checked 2-weeks following the initial installation to observe the volume of product collected. The frequency of subsequent site visits may be adjusted based on the volume collected during the initial 2-week period. It is anticipated that regular site visits to empty the passive bailer will range from once-per two weeks to once-per month.

Product removed from the passive bailer during the regular site visits will be transferred initially to the canister that is secured on site. Once this container is full, a DOT-approved steel drum will be used to store product on site. Full drums will be transported off-site for product recycling in accordance with local, state, and federal regulations.

Excess product observed in MW-1 during the regular site visits will be hand bailed. Product recovered in this manner will be handled as described above. Wastewater generated through this process will be stored on site in a DOT-approved 55-gallon steel drum. Once full, wastewater drums will either be transported

off-site for treatment/disposal or, in the event that a groundwater recovery system is installed as part of the corrective action plan, will be retained on site for treatment/disposal.

We are currently in the process of soliciting bids for the passive skimming bailer, and anticipate placing an order over the next two weeks. Based on this schedule, the interim product recovery activities should begin during the first half of October 1995.

If you have any questions regarding this report, please call.

Sincerely,

Peter J. Dressel

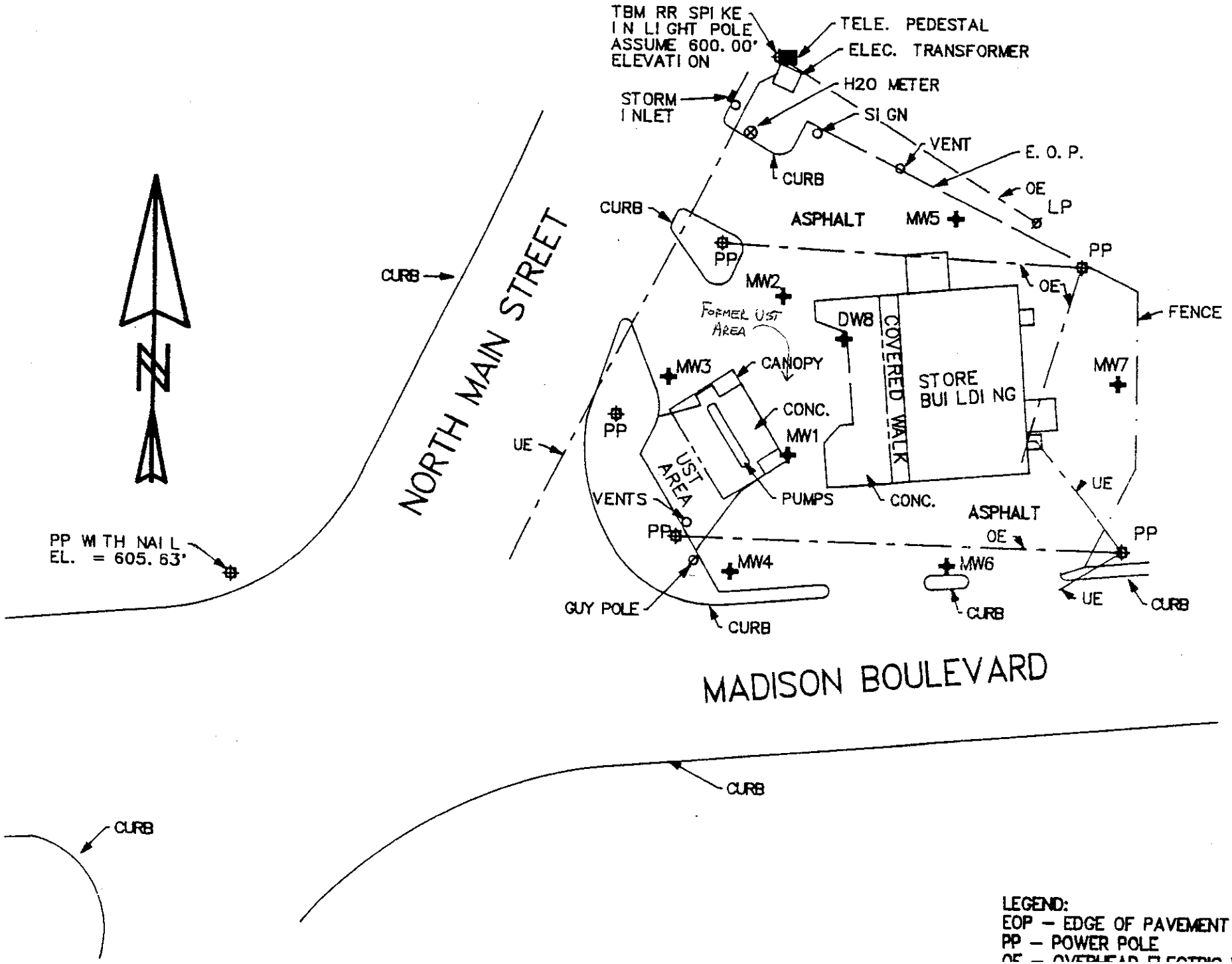
Peter J. Dressel, P.G.
Project Manager
NC Registration No. 1244

cc: Erin Shubert, Kenan Oil

attachments

ATTACHMENT 1

SITE MAP



LEGEND:
EOP – EDGE OF PAVEMENT
PP – POWER POLE
OE – OVERHEAD ELECTRIC LINE

ATTACHMENT 2

LABORATORY REPORT

ATTACHMENT 2

LABORATORY REPORT

GeoChem, Incorporated

Environmental Laboratories

August 21, 1995

Mr. Pete Dressel
Piedmont Geologic, P.C.
PO Box 459
Cary, NC 27512

Reference: **Kenan Oil Boulevard Kwik Pik**
9506
GCI# 9508-028

Dear Mr. Pete Dressel:

This is the analytical report for the above referenced project. On August 9, 1995 we received one product sample for analysis. The analytical and quality control results are presented in separate tables for your convenience. Brief summaries of analytical methods employed are as follows. GeoChem analytical reports contain information based strictly on the analysis requested on the chain of custody (COC) accompanying this report. All soil values are calculated using dry weights. Non-target compounds are not identified or quantified. Our clients must request such additional documentation in writing.

Product Identification

Volatile products are injected using purge and trap technology. Semi-volatile to non-volatile products are dissolved in solvent and injected directly. The hydrocarbon components are detected on a gas chromatograph using a flame ionization detector (FID). Standards made from the fuels of interest are used as reference identification patterns. Copies of the chromatograms have been included with the report.

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem, Incorporated

Environmental Laboratories

Geochem (NC #336/SC # 99008)
Project#9508-028 1 Site Name Kenan Oil Boulevard

LAB ID.	4035
DATE SAMPLED	08/09/95
DATE ANALYZED	08/10/95
FIELD ID.	MW-1 Product

Product Identification

The sample submitted was analyzed on two separate GC systems utilizing Pid/Fid/ELCD detectors. The fuel finger prints were compared to various known fuels. This is a slightly weathered gasoline with no other measurable fuels present.

	soil	water
parts per million =	*mg/kg*	*mg/l*
parts per billion =	*ug/kg*	*ug/l*

pql = practical quantitation limit due to matrix effects.
bdl = below method detection limit.
bql = below quantitation limit.

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

P. O. Box 459 • Cary, NC 27512-0459 • Tel: (919) 481-2646

COMPREHENSIVE SITE ASSESSMENT REPORT

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina

PREPARED FOR:

Kenan Oil Company
100 Europa Drive, Suite 450
Chapel Hill, North Carolina 27514

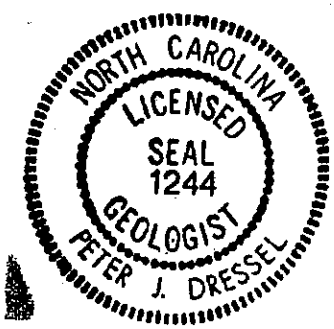
PREPARED BY:

Piedmont Geologic, P.C.
P.O. Box 459
Cary, North Carolina 27512

June 17, 1996

Peter J. Dressel

Peter J. Dressel, P.G.
NC Registration No. 1244



EXECUTIVE SUMMARY

A Comprehensive Site Assessment (CSA) was completed for the Boulevard Kwik Pik facility in Roxboro, North Carolina using data collected during site assessment activities conducted from November 1994 through November 1995. Assessment activities included the installation of eight groundwater monitoring wells, soil sampling and analysis, groundwater sampling and analysis, groundwater level monitoring, monitoring well slug testing, and a potential receptor survey.

The facility is a self-service gasoline station and convenience store. Three 8,000-gallon gasoline underground storage tanks (USTs) are currently at the facility. Three 8,000-gallon gasoline USTs were formerly located at the facility. These USTs were removed in November 1994.

The facility is located within the city limits of Roxboro, North Carolina, and municipal water is available to all properties within at least a ½-mile radius of the facility. No private or public water supply wells, or surface water intakes for water supply, were identified within a ½-mile radius of the facility. The apparent discharge point of groundwater beneath the facility is a perennial stream located approximately 600-feet east of the facility.

In addition to the Boulevard Kwik Pik facility, four other current or previous UST facilities are situated at the intersection of N. Main Street and Madison Boulevard. Three of these facilities have confirmed petroleum releases to groundwater. Based on a topographic evaluation, some of these off-site UST facilities may be hydraulically upgradient of Boulevard Kwik Pik.

Concentrations of total petroleum hydrocarbons (TPH) as gasoline above cleanup levels determined through a *Site Sensitivity Evaluation* (SSE) were detected in three soil samples at the facility collected from adjacent to the product dispenser island and former UST area. Free product has been detected in a monitoring well located adjacent to the dispenser island and former UST area. Concentrations of petroleum hydrocarbons above North Carolina action levels have been detected in five monitoring wells at the facility. Petroleum hydrocarbon isoconcentration contour maps indicate an on-site distribution of dissolved petroleum hydrocarbons in the overburden that is centered at the UST and dispenser island area. Downgradient delineation of dissolved petroleum hydrocarbons has been established through sampling and analysis of groundwater from the facility Type II monitoring wells; however, isoconcentration contour maps indicate that upgradient, off-site, sources may contribute to the dissolved hydrocarbon plume delineated at the Boulevard Kwik Pik facility. Detected concentrations of petroleum hydrocarbons in groundwater samples from a Type III, vertical delineation, monitoring well at the Boulevard Kwik Pik facility may be attributable to an upgradient, off-site, source.

Based on the presence of multiple facilities with confirmed releases of petroleum hydrocarbons to groundwater at the intersection of N. Main Street and Madison Boulevard, it is recommended that a coordinated round of monitoring well surveying, groundwater level measurements, and groundwater sampling/analysis be conducted for all of the UST facilities at the intersection of N. Main Street and

Madison Boulevard to evaluate groundwater flow patterns, dissolved hydrocarbon distributions, and potential source relationships between the UST facilities. In the interim, it is further recommended that the Boulevard Kwik Pik facility be evaluated as a potential candidate for natural remediation under the provisions of 15A NCAC 2L .0106(l).

1.0 INTRODUCTION

This report presents the results of a Comprehensive Site Assessment (CSA) conducted at the Boulevard Kwik Pik convenience store located at 1100 N. Main Street in Roxboro, North Carolina. The report presents information collected during assessment activities conducted from November 1994 to November 1995 and is compiled in a format that is compatible with the CSA outline presented in the North Carolina Division of Environmental Management (NCDEM) guidance document entitled *Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater* (March 1993 with June 1993 revisions).

The information presented in this report was generated during multiple phases of site assessment activities conducted between November 1994 and November 1995. Site assessment activities conducted from June to November 1995 were conducted by Piedmont Geologic, P.C. Site assessment activities conducted prior to June 1995 were conducted by others, under the reported direction of North Carolina licensed geologists. Although the interpretations of site subsurface conditions presented herein rely partially on the results of activities conducted by others; Piedmont Geologic, P.C. assumes no responsibility or liability for the accuracy or completeness of others' activities and/or the results of those activities.

2.0 SITE HISTORY AND SOURCE CHARACTERIZATION

2.1 Site Description

The Boulevard Kwik Pik convenience store is located at 1100 N. Main Street in Roxboro, Person County, North Carolina (Figure 1). The facility comprises approximately 1/3 acre at the northeast corner of N. Main Street and Madison Boulevard and is bounded by a commercial property to the north and east. A one-story building on the property comprises a convenience store (Figure 2). Gasoline is dispensed from a dispenser island located in front of the building. The facility is paved with both asphalt and concrete.

The facility is situated along the flanks of a broad ridge that contains N. Main Street (Figure 1). The ground surface at the facility slopes from the northwest perimeter, along N. Main Street, toward the east-southeast with approximately 4-feet of surficial relief. Beyond the east-southeast property boundary, the ground surface drops sharply approximately 3-feet to grade on the adjacent commercial property. Local drainage features include Marlowe Creek, which is located approximately 600-feet east of the facility and flows toward the north, and a storm ditch, which is located approximately 700-feet northwest of the facility and flows northeast into Marlowe Creek (Figure 1). Surface drainage at the facility is collected into a storm drain system that discharges to both the storm ditch and Marlowe Creek.

2.2 History of Property Ownership and Use

The Boulevard Kwik Pik property has been owned since 1988 by Bernard M. and Shirley A. Fogelman, who currently lease the convenience store operations to others. The property was owned by BGS Associates from 1978 to 1988, and by Kenan Oil Company prior to 1978. With the exception of a period of inactivity during the late 1980s, the property has contained a service station/convenience since 1979.

2.3 Uses of Site and Potential On-Site Sources of Petroleum Hydrocarbons

The facility is a self-service gasoline station and convenience store. Three 8,000-gallon gasoline underground storage tanks (USTs) are currently located adjacent to the dispenser island (Figure 2).

Three, 8,000-gallon, gasoline USTs existed on site prior to the installation of the current USTs (Figure 3). The former USTs, installed in 1978, were located directly northeast of the current USTs and were removed in November 1994.

2.4 Summary of Assessment Activities to Date

The former gasoline USTs were excavated and removed from the facility in November 1994 by ENSCI Engineering Group, P.A. Tank closure activities are documented in the *UST Closure Report* that was submitted to the NCDEM in December 1994 (ENSCI, 1994). Closure procedures included the collection of four soil samples collected from the sidewalls of the UST excavation and two soil samples collected from beneath the dispenser island. The soil samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by Method 8015 modified using EPA Method 5030 for extraction. Concentrations of TPH as gasoline detected in the excavation sidewall soil samples ranged from below detection limits to 54.8 milligrams per kilogram (mg/kg), and concentrations of TPH as gasoline detected in the dispenser island soil samples were 1,789 mg/kg and 7,671 mg/kg, respectively. A total of approximately 412 tons of petroleum contaminated soils excavated from the UST basin were removed from the facility for thermal recycling (ENSCI, 1994).

During the UST removals, groundwater was encountered in the excavation at a depth of approximately 6.5-feet below grade. In response, one groundwater sample was collected from the open UST excavation and analyzed for purgeable aromatics (EPA Method 602 modified) and purgeable halocarbons (EPA Method 601). Benzene was detected in the UST excavation groundwater sample at a concentration of 25.2 micrograms per liter (ug/L), above the North Carolina groundwater action level of 1 ug/L. Toluene, ethylbenzene, xylenes, and methyl tert-butyl ether (MTBE) were also detected in the UST excavation groundwater sample. However, detected concentrations were below the North Carolina groundwater action levels for these constituents. No EPA Method 601 constituents were detected in the UST excavation groundwater sample.

An initial release response assessment was conducted by ENSCI in January 1995. The assessment included the installation of Type II monitoring wells MW-1 and MW-2 (Figure 2) and soil/groundwater sampling and analysis. TPH as gasoline was detected in the soil samples collected from the monitoring well borings at concentrations of 221 mg/kg (MW-1) and 4.2 mg/kg (MW-2). Detected concentrations of benzene, toluene, ethylbenzene, xylenes (BTEX) and MTBE by EPA Method 602 modified, and 1,2-dichloroethane (1,2-DCA) by EPA Method 601, were above the North Carolina action levels for these constituents (ENSCI, 1995).

In June 1995, Piedmont Geologic, P.C. was retained to complete a CSA for the facility. Additional on-site monitoring well installations, groundwater sampling/analysis, and aquifer characterization were conducted in June 1995. Due to apparent off-site migration of dissolved petroleum constituents in groundwater, an access agreement with the adjacent property owner was negotiated between July and October 1995. Installation of an off-site monitoring well, and additional soil/groundwater sampling and analysis was conducted in November 1995.

2.5 Summary of Corrective Actions to Date

Free product was discovered in monitoring well MW-1 during groundwater sampling activities on June 21, 1995. In response, free product recovery activities were implemented. The results of the recovery program are summarized in Table 1. Recovery activities initially consisted of periodic bailing of free product from MW-1. To augment recovery, a passive skimmer bailer was installed in MW-1 on October 3, 1995. Free product has not been detected in MW-1 since installation of the passive skimmer. A total of approximately 0.8 liters of free product was removed from MW-1 during the recovery program. Monitoring well MW-1 is currently gauged on a monthly basis. The progress of free product recovery was reported to the NCDEM via a letter report prepared by Piedmont Geologic, P.C., dated September 12, 1995.

2.6 Potential Off-Site Sources of Petroleum Hydrocarbons

Facilities that currently or previously contained USTs are located at each of the four corners of the intersection of N. Main Street and Madison Boulevard (Figure 4). These facilities are listed as follows.

- Parrott Estate site, 1047 Madison Avenue; GW Inc # 9814
- Neb King Oil Company facility, 1026 N. Main Street; # 10784
- Little Huff Inc., Roxboro maintenance facility, 1035 N. Main Street; #5521
- Southern States Cooperative, Inc. facility, 1112 N. Main Street. PENDING

Each of these sites has been involved in environmental compliance activities due to petroleum USTs. Available files at the Groundwater Section of the Raleigh Regional Office of the NCDEM were reviewed in June 1995. Additional information for the Parrott Estate site was reviewed in February 1996. A summary of the information reviewed is presented as follows.

Parrott Estate Site

Documents reviewed for the Parrott Estate site are listed as follows.

- *Hydrogeologic Investigation Report*, Environmental Investigations, P.A., August 1993.
- *Comprehensive Site Assessment Report*, East Coast Environmental, P.A., January 1996.

Seven USTs were removed from the site in June 1992. A total of 14 monitoring wells (12 Type II and 2 Type III) were installed at the site between February 1993 and November 1995. The locations of the monitoring wells are shown in Figure 4. The most recent groundwater sampling events for the site were conducted in July and December 1995. Summarized results of groundwater analysis (from East Coast Environmental, 1996) are contained in Appendix A. Petroleum hydrocarbons were detected in groundwater samples collected from monitoring wells along the southern and eastern perimeter of the Parrott Estate site, upgradient of the Boulevard Kwik Pik facility. Free product has not been detected in any monitoring wells at the Parrott Estate site.

Neb King Oil Company Facility

Documents reviewed for the Neb King Oil Company facility are listed as follows.

- *Soil Vapor Survey* (letter report), ATEC Environmental Consultants, January 24, 1989;
- Letter from ATEC Associates, Inc. to Neb King Inc., July 6, 1989;
- Letter from ATEC Environmental Consultants to NCDEM, August 21, 1989;
- *Report for Soil Boring Investigation*, Environmental & Regulatory Consultants, Inc., November 16, 1993.

A soil vapor survey was conducted at the facility in January 1989 to evaluate the horizontal and vertical extent of petroleum hydrocarbons in the subsurface at the site. The results of the survey indicated concentrations of petroleum hydrocarbons in soils located northwest of the site building (i.e., between the building and the intersection of N. Main Street and Madison Avenue. Four USTs were removed from the soil vapor survey area in January 1989. Free product was observed in the base of the UST excavation and was removed. Following the UST removals, further excavation was conducted to remove apparent contaminated soils adjacent to the USTs. The final excavation measured 40 feet x 22 feet and was 18 feet deep (i.e., to the top of bedrock). Following removal of the former USTs, new USTs were reportedly installed within the former UST excavation. Based on stained soils observed in the sidewalls of the UST excavation, adjacent to a Centel telephone conduit vault, it was concluded that the free product observed in the UST excavation originated from off site and migrated onto the Neb King Oil Company facility via

the telephone conduit. The telephone conduit (discussed further in Section 3.0) runs east-west (topographically downgradient) from the Little Huff Inc. facility to the Neb King Oil Company facility and north-south (topographically downgradient) from the Neb King Oil Company facility to Boulevard Kwik Pik.

One Type III monitoring well (MW-1) and one Type II monitoring well (MW-2) were installed at the Neb King Oil Company facility in July 1989. Laboratory analysis of a groundwater sample collected from MW-1, located adjacent to the former UST area (Figure 4) indicated concentrations of benzene (129 ug/L), MTBE (13,340 ug/L), and ethylene dibromide (EDB)(28 ug/L) above North Carolina action levels. No petroleum hydrocarbons were detected in Type III monitoring well MW-1, located southeast of the site building (Figure 4) and reportedly screened within bedrock (total depth of 50-feet below grade).

A subsurface release of petroleum product reportedly occurred in the current UST area at the Neb King Oil Company facility during early July 1993. A total of 950 gallons of petroleum were recovered from the facility between July 9 and September 7, 1993. No records indicating the release amount or recovery efforts since September 7, 1993 were found in the NCDEM files.

Little Huff Inc., Roxboro Maintenance Facility

Documents reviewed for the Little Huff Inc., Roxboro maintenance facility are listed as follows.

- *Groundwater Investigation* (report), Groundwater Management Associates, Inc., August 22, 1990;
- Letter from Little Huff Inc. (Neil Humphries) to NCDEM, July 17, 1991;
- *Project Update* (letter), Applied Environmental Services, Inc., December 3, 1991;
- *UST Closure Assessment* (report), Applied Environmental Services, Inc., October 5, 1992;

Six Type II monitoring wells were installed at the Little Huff Inc., Roxboro maintenance facility in 1990 (Figure 4) in response to the discovery of free product in the Centel telephone conduit vault located at the southwest intersection of N. Main Street and Madison Boulevard (i.e., at the Neb King Oil Company facility). Free product was not detected in any of the monitoring wells; however, concentrations of BTEX constituents and MTBE above North Carolina groundwater action levels were detected in groundwater samples collected from five of the six monitoring wells in November 1991. Summarized results of the November 1991 groundwater analysis are contained in Appendix A.

Three gasoline USTs were removed from the Little Huff Inc. facility in August 1992. The USTs were located between the facility building and the intersection of N. Main Street and Madison Boulevard.

Analysis of soil samples collected from the UST excavation indicated concentrations of TPH as gasoline ranging from 4.6 to 430 mg/kg. Free product was not observed within the UST excavation.

A permit to construct a groundwater recovery well system on the Little Huff Inc. facility was granted by the NCDEM on November 7, 1994. No records were found in the NCDEM files concerning the installation and operation of a groundwater recovery system at the site.

Southern States Cooperative Facility

Documents reviewed for the Southern States Cooperative facility are listed as follows.

- Letter from Southern States Cooperative, Inc. (James Lillard) to the NCDEM, July 10, 1990;
- Affidavit of James M. Lillard (Southern States Cooperative, Inc.), August 15, 1990.

Two, 4000-gallon petroleum USTs were removed from the Southern States Cooperative facility on May 25, 1988. Soil samples collected from the UST excavation were screened for volatile organic compound (VOC) vapors using an organic vapor analyzer (OVA). Concentrations of VOC vapors were detected in soil samples collected from the base of the UST excavation. In response, additional soil was removed until OVA readings indicated VOC vapor concentrations "at, or near, 0." The excavated soils were spread on the Southern States Cooperative, Inc. facility and tilled over a 6-day period, following which time no VOC vapors in the soils were detected. The soils were subsequently left in place for incorporation into the parking area of the facility. No records concerning any further action at the Southern States Cooperative, Inc. facility were found.

In order to evaluate potential hydrogeological relationships between the Boulevard Kwik Pik property and the other UST facilities at the intersection of N. Main Street and Madison Boulevard, a surficial watershed area map for the area of the properties was developed (Figure 5). According to LeGrande (1988), surficial watersheds reflect underlying hydrogeologic units with potential groundwater interaction between areas within each unit. The intersection of N. Main Street and Madison Boulevard is located along a surficial watershed divide (drainage basins "A" and "B" on Figure 5). The Boulevard Kwik Pik property, the Neb King Oil facility, and the Southern States Cooperative facility all appear to be located within one drainage basin (basin A), whereas the Little Huff facility and the Parrott Estate site appear to be located along the watershed divide. Based on these topographic relationships, the Neb King Oil facility, Little Huff facility, and Parrott Estate site may be located hydraulically upgradient of the Boulevard Kwik Pik facility.

3.0 POTENTIAL RECEPTORS AND MIGRATION PATHWAYS

Figure 6 presents a composite of Person County tax maps showing properties in the vicinity of the site. Table 2 lists of names and addresses of adjacent property owners. Property usage within a ½-mile radius of the site is primarily residential, commercial, and light industrial.

An automobile reconnaissance of a ½-mile radius of the facility was conducted on August 22, 1995 (Figure 7). No private or public water-supply wells were observed within the search radius. With the exception of the four properties at the intersection of N. Main Street and Madison Boulevard discussed in Section 2.6, no monitoring wells were observed on any properties within the search radius. According to the City of Roxboro Engineering Department, the source of Roxboro's municipal water supply is Water Works Lake, located approximately 2.4-miles north-northeast of the facility. Municipal water is available to all properties within the Roxboro city limits (i.e., within a ½-mile radius of the site).

The locations of subsurface utilities at the facility are shown in Figure 8. Electric and phone service is provided to the site via overhead lines. Sanitary sewer and water mains run beneath N. Main Street, upgradient of the facility. Sanitary sewer and water utility lines to the facility run from the northwest corner of the property (Figure 8). According to the City of Roxboro Engineering Department, the sanitary sewer and water main lines are buried between 4 and 20-feet below grade. The sanitary sewer service line and storm drains at the facility were checked for the presence of VOC vapors using a photo-ionization detector (PID). No VOC vapors were detected.

Storm sewer drains are located adjacent to the northwest and southeast corners of the property. These drains channel storm runoff to the storm ditch east of the property and Marlowe Creek, respectively. The storm drains are approximately 4-feet below grade. Standing water was observed in the storm drain adjacent to the southeast corner of the property during the CSA activities from June to November 1995, indicating that this storm drain is a potential point of groundwater discharge. However, based on facility water table contour maps (discussed in Section 5.3), groundwater at the facility is not flowing toward the storm drains.

A Centel telephone conduit runs beneath the facility perimeter along N. Main Street (Figure 8). This conduit connects to a service vault at the southeast corner of N. Main Street and Madison Boulevard (adjacent to the Neb King Oil facility), from where it runs beneath N. Main Street to the southwest corner of N. Main Street and Madison Boulevard (adjacent to the Little Huff facility). These locations are both topographically upgradient of Boulevard Kwik Pik. The reported depth of the telephone conduit is

approximately 10-feet below grade. As discussed in Section 2.6, free product was observed on standing water in the telephone vault at the southeast corner of N. Main Street and Madison Boulevard in 1990. The presence of free product in the vault was attributed by other investigators to operations at either the Neb King Oil facility or the Little Huff facility. Free product and/or concentrations of dissolved petroleum hydrocarbons detected in monitoring wells at Boulevard Kwik Pik may be related to migration of free product from the off-site sources via the telephone conduit.

The apparent discharge point of groundwater in the area of the facility is Marlowe Creek, located approximately 600-feet east of the facility. No groundwater users have been identified between the facility and Marlowe Creek.

4.0 SOIL ASSESSMENT

4.1 Regional Geology

Boulevard Kwik Pik is located within the Piedmont physiographic province, which is characterized by moderately level interstream areas separated by broad valleys. Bedrock in Roxboro, North Carolina is mapped within the Carolina Slate Belt lithologic division of the Piedmont, which consists of metamorphosed volcanic and sedimentary rocks that are intruded by a number of igneous plutons. According to the *Geologic Map of North Carolina* (North Carolina Geological Survey, 1985), bedrock beneath the facility consists of metamorphosed mudstone that is a member of the Virgilina Formation.

Competent bedrock in the Piedmont province in North Carolina is typically overlain by variable thicknesses of saprolite and soil, collectively referred to as "overburden." Saprolite is bedrock that has decomposed in place due to differential physical/chemical alteration but has retained relict bedrock structures (i.e., fractures, foliations, etc.), which are absent in the more highly weathered overlying soil. Thicknesses of the overburden in the Piedmont in North Carolina typically range from 10 to 75 feet.

4.2 Site Soil Investigation

Soil sampling was conducted at Boulevard Kwik Pik during the UST excavations in November 1994, the initial soil boring activities in January 1995, and the additional soil boring activities in June and November 1995. Soil sample locations are shown in Figure 9. Standard soil sampling procedures are described in Appendix B.

Soil samples SW-1 through SW-4, D-1, and D-2 were collected during the UST excavations on November 2, 1994. Samples SW-1 through SW-4 were collected from the sidewalls of the UST excavation at a depth of 6.5-feet below grade, directly above the level of standing water in the excavation, using a backhoe bucket. Samples D-1 and D-2 were collected at both ends of the dispenser island at a depth of 6.5-feet below grade using a hand auger. Half of each sample was sealed in a plastic bag and allowed to sit at ambient temperature. Following a 10 to 15 minute waiting period, the headspace of each sample bag was screened for VOC vapors using a PID. The remaining sample portions were sealed in laboratory prepared containers and analyzed by a North Carolina certified laboratory for TPH as gasoline by Method 8015 modified using EPA Method 5030 for extraction.

Two subsurface borings (MW-1 and MW-2) were drilled on site as part of the preliminary assessment activities in January 1995, and seven additional borings (MW-3 through MW-9) were drilled as part of the CSA activities in June and November 1995. The locations of the soil borings are shown in Figure 9. Borings MW-1, MW-2, and DW-8 were installed adjacent to the locations of the previous USTs. Borings MW-3 through MW-7 were drilled along the facility perimeter. Based on the apparent direction of groundwater flow delineated following the June 1995 monitoring well installations, boring MW-9 was drilled approximately 50 feet downgradient of the facility on the Southern States Cooperative, Inc. property (Figure 9). All of these soil borings were subsequently converted to monitoring wells (discussed in Section 5.2).

The facility soil borings were drilled using hollow-stem augers. Standard soil sampling procedures are described in Appendix B, and boring logs are provided in Appendix C. Prior to drilling each boring, all downhole pipe and tools were steam cleaned on site.

Soil samples were collected from the soil borings on 2 to 5-foot centers using 2-inch inside diameter (I.D.) split-spoon samplers. Prior to collecting each soil sample, the split-spoon samplers were cleaned using a soap and water wash and distilled water rinse. One half of each sample was sealed in a laboratory prepared container and placed on ice in a cooler. The remaining sample portion was logged, sealed in a plastic bag, and allowed to sit at ambient temperature. Following a minimum waiting period of 10 to 15 minutes, the headspace of each sample bag was screened using a PID. The soil sample from each boring exhibiting the highest VOC concentration through the PID screening was retained for analysis by a North Carolina certified laboratory. In the absence of VOC concentrations above background levels, the sample from above the apparent depth to water was retained for laboratory analysis. The retained soil samples were analyzed for TPH as gasoline (Method 8015 modified using EPA Method 5030 for extraction). In addition, soil samples from borings MW-3 through DW-8 were analyzed for TPH as diesel (Method 8015 modified using EPA Method 3550 for extraction).

4.3 Site Geology and Soils

Geologic cross sections of the facility are presented as Figures 10 through 12. Three generalized lithologic units are recognized beneath the facility, described as follows.

Overburden

Fill Materials: Primarily fine sandy clay and clayey silt: mottled brown, reddish brown, and gray; occasional silty sand/gravel layers.

Saprolite: Clayey silt and sandy silt with relict bedrock structures: brown, grayish brown, whitish gray; some remnant bedrock fragments and iron encrustation; often blocky and friable; generally dry to moist.

Bedrock

Weathered sandy meta-mudstone.

Based on one boring that was drilled into bedrock (DW-8), the overburden at the site is approximately 20-feet thick. The saprolite is typically dense and hard.

4.4 Results of Soil Sampling and Analysis

Results of the field and laboratory analysis of soil samples are summarized in Table 3. TPH as diesel was not detected in any of the soil samples collected from soil borings MW-3 through DW-8. TPH as gasoline was detected in soil samples SW-1, SW-3, SW-4, DW-1, DW-2, collected during the UST excavations, and in the soil samples from borings MW-1, MW-2, and MW-7.

4.5 Site Sensitivity Evaluation/Distribution of Petroleum Hydrocarbons in Soil

A Site Sensitivity Evaluation (SSE) was conducted for Boulevard Kwik Pik using information generated through the CSA activities. Completed SSE forms are provided in Appendix D. Rationale for assignment of each condition in the *Site Characteristics Evaluation* (Appendix D) is provided as follows.

- Grain Size: site soils are described as sandy clay and silt. Based on this description, a score of 50 was assigned.

- Relict structures: saprolite in the Carolina Slate Belt is generally characterized as containing relict bedrock structures, such as fractures and foliations. Relict structures were observed within split-spoon samples collected from soil borings drilled at the facility. In response, a score of 10 was assigned.

- Distance from Deepest Contaminated Soil to Water Table: soil samples submitted for laboratory analysis were collected at or below the observed depths to groundwater in the facility monitoring wells. In response, a score of 20 was assigned.

- Top of Bedrock above Water Table: The observed depth to bedrock beneath the facility is below the observed water table depth. In response, a score of 0 was assigned.

- Artificial Conduits: Potential artificial conduits (i.e., telephone conduit, sanitary sewer) are located in the area of the former UST system. Depths of the conduits may be below the observed water table depth at the facility. Based on this condition, a score of 10 was assigned.

Based on the SSE *Site Category Descriptions* (Appendix D), Boulevard Kwik Pik was assigned Category E based on the following criteria.

- No known water supply wells are contaminated.
- Area is served by accessible public water supply.

According to the SSE, initial and final cleanup levels for TPH as gasoline and TPH as diesel in soil at the facility are listed as follows.

SSE Results	TPH as Gasoline (mg/kg) Method 8015/5030
Initial Cleanup Level	60
Final Cleanup Level	180

TPH as gasoline was detected at concentrations above the final cleanup level in the following soil samples.

TPH as Gasoline Concentrations Above Final Action Level
1,789 mg/kg, D-1 (6.5' below grade)
7,677 mg/kg, D-2 (6.5' below grade)
221 mg/kg, MW-1 (3'-5' below grade)

Detected concentrations of TPH as gasoline are shown with the soil sample locations in Figure 13. Borings D-1 and D-2 were drilled beneath both ends of the dispenser island. Boring MW-1 was drilled adjacent to the dispenser island and the former UST area. These samples were also collected downgradient of the Centel telephone conduit along N. Main Street (Figure 8). Based on the locations of D-1, D-2, and MW-1, product piping associated with the dispenser island, the former USTs, and/or the Centel telephone vault are the apparent sources of adsorbed phase hydrocarbon concentrations above the final cleanup levels for the facility.

5.0 GROUNDWATER ASSESSMENT

5.1 Regional Hydrogeology

Groundwater in the Piedmont province occurs in the overburden under unconfined (i.e., water table) conditions, and in the underlying bedrock under both unconfined and confined conditions. Groundwater in the overburden occurs within pore spaces of the unconsolidated medium, including relict bedrock structures (i.e., fractures, foliations, etc.). Due to the typical fine-grained nature of saprolite, the formation normally possesses a relatively low permeability and is not usually utilized for groundwater production. The overburden is recharged by the infiltration of precipitation where the formation is exposed and acts as a storage medium for groundwater that is slowly released to surface water bodies and the underlying bedrock.

Groundwater in the underlying bedrock occurs along zones of secondary permeability, such as fractures, bedding planes, foliations, solution voids, etc. Most water-supply wells in the Piedmont are completed in bedrock with casings extending through the overburden to at least the bedrock surface. Although the bedrock is recharged by the overlying overburden, leakage (upward) from the bedrock into the overburden also occurs in response to local topographic/geologic influences.

Groundwater in the Piedmont moves from areas of high hydraulic head (recharge areas) to areas of low hydraulic head (discharge areas). Overburden groundwater-flow patterns usually follow surface topographic gradients, and the water-table surface usually mimics the overlying terrain. Groundwater movement in the bedrock is controlled by the distribution and orientation of bedrock structures; however, bulk groundwater-flow patterns in the bedrock usually follow patterns in the overburden. Groundwater-flow velocities in the overburden are typically low (i.e., <30 ft/year) due to the low permeability of the unit. Groundwater-flow velocities in the bedrock are dependent on the number and interconnection of bedrock structures. In zones of sparse or poorly connected structures, groundwater-flow velocities in the bedrock will approximate overburden groundwater-flow velocities. However, where fracture zones occur, groundwater-flow velocities may be much higher, especially in response to local hydrogeologic effects (e.g., pumping wells).

5.2 Site Hydrogeological Assessment

5.2.1 Monitoring-Well Installations

Two Type II groundwater monitoring wells (MW-1 and MW-42) were installed as part of the preliminary assessment activities in January 1995. Five additional Type II monitoring wells (MW-3 through MW-7) and one Type III monitoring well (DW-8) were installed during the CSA activities in June 1995. In order to establish lateral delineation of dissolved petroleum hydrocarbons in groundwater, one additional Type II monitoring well was installed off site (Southern States Cooperative, Inc. property) in November 1995. The locations of the facility monitoring wells are shown in Figure 2. Monitoring well construction details are provided with the drilling logs in Appendix C and summarized in Table 4. Standard monitoring well construction procedures are provided in Appendix B.

Monitoring wells MW-1 and MW-2 were installed adjacent to the former UST area. MW-1 is also adjacent to the dispenser island. MW-3 and MW-4 were installed in the apparent upgradient direction from the current and former UST areas and dispenser island. MW-5 through MW-7 were installed along the facility perimeter in the apparent downgradient direction from the UST area. Based on the apparent groundwater flow direction delineated through monitoring wells MW-1 through MW-7, monitoring well MW-9 was installed approximately 50-feet downgradient of MW-7. Monitoring well DW-8 (Type III) was installed downgradient of the former UST basin to provide vertical delineation of dissolved petroleum hydrocarbons in groundwater.

The Type II monitoring wells were constructed using 2-inch I.D., Schedule 40, PVC well screen and casing, and the Type II monitoring well borings were drilled using 4¼-inch I.D. hollow-stem augers. The depths of the Type II wells range from approximately 18 to 25-feet below grade. The wells were constructed using 15 and 20-foot screen lengths (0.010-inch slots) that were installed to straddle seasonal variations in the water table. A sand pack was installed within each Type II well annulus from the bottom of the boreholes to 1 to 2-feet above the top of the well screen. A 1 to 2-foot thick bentonite seal was placed on top of the sand pack, and the remaining borehole annulus was filled with concrete. The Type II monitoring wells were completed with flush-mounted manholes set in concrete pads, and the tops of the PVC casings were fitted with locking expansion plugs.

Type III monitoring well DW-8 is double cased through the overburden. The outer boring was drilled to the top of bedrock (20-feet below grade) using 8¼-inch I.D. hollow-stem augers. The outer casing (6-inch I.D., Schedule 40 PVC) was installed to the top of bedrock and the casing annulus was pressure grouted

with a cement/bentonite slurry. Following overnight curing of the grout, the inner Type III monitoring well boring was drilled to a depth of 35-feet below grade using rotary drilling (5 7/8-inch diameter tri-cone roller bit). The Type III inner well was installed using 2-inch I.D., Schedule 40, PVC well screen and casing with the screen (0.010-inch slots) interval from approximately 30 to 35-feet below grade. A sand pack was installed within the inner-borehole annulus to a depth of 2-feet above the top of the well screen. A 3-foot thick bentonite seal was placed on top of the sand pack, and the remaining well annulus was pressure grouted with a cement/bentonite slurry. DW-8 was completed with a flush-mounted manhole set in a concrete pad, and the top of the PVC casing was fitted with a locking expansion plug.

Following installation, the Type II and III monitoring wells were developed to remove suspended solids from the water column and to establish hydraulic communication between the monitoring wells and surrounding formations. The monitoring wells were developed using a combination of bailing, mechanical surging, and pumping for a period of approximately 1 to 2-hours each until the discharge water appeared free of suspended solids.

The top-of-casing elevations of the facility monitoring wells were surveyed by a North Carolina licensed surveyor relative to a arbitrary datum that was established on site in June 1995. In addition, a site plan that includes the horizontal positions of the facility monitoring wells was developed.

5.2.2 Groundwater Sampling and Analysis

Standard monitoring well sampling procedures are provided in Appendix B. Copies of sampling forms that were completed during groundwater sampling activities in June, August, and November 1995 are provided in Appendix E.

Groundwater samples were collected from monitoring wells MW-1 and MW-2 during the preliminary assessment activities on January 10, 1995, and groundwater samples were collected from MW-1 through DW-8 during the CSA activities on June 21, 1995. Due to the detection of purgeable halocarbons (EPA Method 601) in groundwater samples collected during the June 1995 groundwater sampling event, and the detected concentration of benzene in the June 1995 groundwater sample from MW-7, confirmatory groundwater samples were collected from monitoring wells MW-3, MW-7, and DW-8 on August 9, 1995. To establish lateral delineation of dissolved petroleum hydrocarbons in groundwater at the facility, a groundwater sample was collected from off-site monitoring well MW-9 on November 14, 1995.

Prior to collecting groundwater samples, groundwater levels and well depths were measured using an electronic interface probe, which distinguishes between groundwater and petroleum product, and standing

water was purged from each well. An attempt was made to purge at least three standing volumes of groundwater from each monitoring well; however, most of the monitoring wells were purged dry prior to extracting three standing volumes.

The January 1995 groundwater samples were collected using dedicated, disposable, polyethylene bailers and disposable nylon rope. The June, August, and November 1995 groundwater samples were collected using a non-dedicated teflon bailer and disposable rope. Prior to collecting each groundwater sample, the bailer was cleaned using a soap and water wash and distilled water rinse.

Upon collection, each groundwater sample was promptly transferred to laboratory prepared containers and placed on ice in a cooler. A summary of laboratory analyses for each round of groundwater samples is listed as follows.

Date	Wells Sampled	Analyses
January 10, 1995	MW-1, MW-2	BTEX, MTBE, IPE, EDB by EPA Method 602; Purgeable halocarbons by EPA Method 601.
June 21, 1995	MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, DW-8	BTEX, MTBE, IPE, EDB by EPA Method 602; Purgeable halocarbons by EPA Method 601; Semi-volatile organic compounds by EPA Method 625; Total lead by Methods 7241/3030C.
August 9, 1995	MW-3, DW-8	Purgeable halocarbons by EPA Method 624.
August 9, 1995	MW-7	BTEX, MTBE, IPE by EPA Method 602.
November 14, 1995	MW-9	BTEX, MTBE, IPE by EPA Method 602; Purgeable halocarbons by EPA Method 601; EDB by EPA Method 504.

BTEX = benzene, toluene, ethylbenzene, and xylenes;
MTBE = methyl tert-butyl ether;
IPE = Isopropyl ether;
EDB = ethylene dibromide.

The August 9, 1995 groundwater samples from monitoring wells MW-3 and DW-8 were analyzed by EPA Method 624 to provide mass spectral confirmation of 1,2-DCA, which was detected through the previous EPA Method 601 analyses.

Groundwater samples were not collected from monitoring well MW-1 during the CSA activities in June through November 1995 due to the detected presence of free product in this well. A sample of free product was collected from MW-1 during the confirmatory groundwater sampling event on August 9, 1995. The product sample was analyzed for product identification by PID/FID and 1,2-DCA and isopropyl ether (IPE) by Method 8240.

5.2.3 Groundwater-Level Measurements and Slug Testing

A full round of groundwater level measurements in the site monitoring wells was collected during the groundwater sampling event on June 21, 1995. An additional full round of groundwater level measurements was collected on June 28, 1995.

Slug tests were conducted using Type II monitoring wells MW-3 through MW-7 on June 28, 1995. Slug test forms are provided in Appendix F. Because the screened sections of monitoring wells MW-3, MW-5, and MW-7 intersected the water table on the day of the testing, rising head slug tests were conducted in these wells by rapidly lowering the water level in each well and measuring the groundwater recovery versus time with an interface probe. To lower the water levels, approximately 1 to 3-gallons of groundwater was rapidly bailed from these wells. The initial drawdown in these wells was assumed to be equal to the column of water bailed. The screened sections of monitoring wells MW-4 and MW-6 were below the water table on the day of the testing. Due to these conditions, falling head slug tests were conducted in MW-4 and MW-6 by injecting distilled water to the tops of the casings and measuring the groundwater recovery versus time with an interface probe. Following slug injection/withdrawal, groundwater level monitoring continued until the monitoring wells achieved at least 95% recovery to static levels.

5.3 Aquifer Characterization

Groundwater level data for June 21 and 28, 1995 are listed in Table 5. Observed depths to groundwater in the site monitoring wells have ranged from approximately 2 to 6-feet below grade. Water-bearing strata were not readily apparent in most of the monitoring well borings, and it is conjectured that the observed depths to groundwater on site are partially reflective of a perched water table within the uppermost fill materials observed on site.

A water table contour map based on the June 21, 1995 groundwater level data is provided as Figure 14. The water table contours indicate a northeasterly apparent direction of groundwater flow in the overburden, which is consistent with the site topography (i.e., toward Marlowe Creek). Based on the potentiometric contours in Figure 14, the water table hydraulic gradient is approximately 0.03.

Hydrogeologic cross-sections A-A' and B-B' are presented as Figures 15 and 16. Based on the groundwater levels observed in Type III monitoring well DW-8 relative to the water table contours (Figure 14), a downward potentiometric gradient exists between the overburden and bedrock at the facility. The downward potentiometric gradient is consistent with the topographic setting of the site.

Data generated from the June 28, 1995 slug tests are contained in Appendix F. The slug test data were analyzed by the Bouwer and Rice (1976) methodology using AQTESOLV™ Version 1.10 software (Geraghty and Miller, 1988) to estimate the hydraulic conductivity (K) of the overburden. Graphical results of the analysis are presented in Appendix F along with the analytical output of the method solutions.

The rising head slug test curves for monitoring wells MW-3, MW-5, and MW-7 show a similar three-segment effect that is typical of rising-head slug tests on wells with screens that straddle the water table (Bouwer, 1989). The first segment is the steepest straight line formed by the earliest test data. The second segment is also straight but less steep than the first segment. The third segment curves in an asymptotic manner from the second straight line segment. The first segment is due to rapid drainage of the gravel pack around the monitoring well after the water level is lowered. As the water level in the gravel pack drains to the level of the water in the well, the flow into the well slows, and the resulting data points form a second, less steep, slope. The third segment deviates asymptotically from the second straight line segment as drawdown of the water table becomes significant relative to the water level in the well. The second line is indicative of flow from the undisturbed aquifer into the well (Bouwer, 1989). In accordance with Bouwer (1989), the second portion of each curve was used in the curve matching function of the Bouwer and Rice (1976) methodology to estimate the hydraulic conductivity of the saturated overburden for the rising head slug tests.

The falling head slug tests were conducted on monitoring wells with screens completely below the water table (MW-4 and MW-6). Because gravel pack drainage does not occur for falling head slug tests conducted in this manner, data curves for these tests are missing the earliest straight line segment described above (Bouwer, 1989), and the initial straight line segment was analyzed.

Based on the Bouwer and Rice (1976) and Bouwer (1989) analysis of the slug test data, the resulting estimates of hydraulic conductivity are listed as follows.

Well I.D.	Type of Slug Test	Hydraulic Conductivity (ft/min)	Hydraulic Conductivity (ft/day)
MW-3	Rising Head	4.2×10^{-5}	0.06
MW-4	Falling Head	3.8×10^{-5}	0.05
MW-5	Rising Head	1.1×10^{-4}	0.15
MW-6	Falling Head	4.6×10^{-5}	0.07
MW-7	Rising Head	9.8×10^{-5}	0.14
median	-----	4.6×10^{-5}	0.07
mean	-----	6.7×10^{-5}	0.10

The estimated values of hydraulic conductivity are consistent with the low values usually derived for saprolitic overburden and the observed low yields of site monitoring wells during development and purging.

The groundwater flow velocity in the overburden at the facility was estimated using the linear flow relationship V = Ki/n, where V is the groundwater flow velocity, K is the hydraulic conductivity, i is the hydraulic gradient, and n is the overburden porosity. A range of groundwater flow velocity was estimated, using the range of hydraulic conductivity values estimated from the slug testing, the hydraulic gradient delineated from the June 21, 1995 water-table contours, and a range of effective overburden porosity of 10% to 30%, as follows.

Low-End Groundwater-Flow Velocity Estimate

K = 0.05 ft/day

i = 0.03 ft/ft

n = 0.3

V = Ki/n = (0.05 ft/day)(0.03 ft/ft)/(0.3) = 0.005 ft/day = 2 ft/year

High-End Groundwater-Flow Velocity Estimate

K = 0.15 ft/day

i = 0.03 ft/ft

n = 0.1

V = Ki/n = (0.15 ft/day)(0.03 ft/ft)/(0.1) = 0.045 ft/day = 16 ft/year

5.4 Results of Groundwater Sampling and Analysis

Results of the laboratory analysis of the January 1995 groundwater samples are summarized in Table 6 and the results of the laboratory analysis of the June and November 1995 groundwater samples are summarized in Table 7. The results of the laboratory analysis of the August 1995 confirmatory groundwater samples are summarized in Table 8. Copies of the laboratory reports for the September, August, and November 1995 groundwater samples are provided in Appendix G. The January 1995 groundwater analysis report was previously provided to the NCDEM under separate cover (ENSCI, 1995).

The following constituents have been detected in the groundwater samples at concentrations above North Carolina action levels (15A NCAC 2L .0202).

- Benzene;
- Toluene;
- Ethylbenzene;
- Xylenes;
- MTBE;
- IPE;
- 1,2-DCA;

The highest concentrations of dissolved petroleum hydrocarbons were detected in the groundwater sample collected from MW-1 in January 1995. Concentrations of benzene above the North Carolina action level have been detected in the groundwater samples from MW-1, MW-3, MW-4, and MW-7. Concentrations of MTBE above the North Carolina action level have been detected in the groundwater samples from MW-1 through MW-4. Concentrations of toluene above North Carolina action levels have been detected only in the January 1995 groundwater sample from MW-1, and concentrations of ethylbenzene and xylenes have been detected only in the groundwater samples from MW-1 and MW-3. Concentrations of IPE above the interim North Carolina action level have been detected in the groundwater samples from MW-2 and MW-3, and concentrations of 1,2-DCA above the North Carolina action level have been detected in the groundwater samples from MW-1, MW-3, MW-4, MW-5, MW-6, and DW-8. Semi-volatile organic compounds were not detected in any of the June through November 1995 groundwater samples, and total lead was not detected above North Carolina groundwater action levels in any of the June 1995 groundwater samples.

The results of the laboratory analysis of the August 9, 1995 free product sample from MW-1 are summarized in Table 9. The product sample was identified as slightly weathered gasoline. Neither 1,2-DCA nor IPE were detected in the product sample; however, due to matrix interference effects, the practical quantitation limits for these compounds by the SW-846 Method 8240 analysis were high (Table 9).

5.5 Distribution of Petroleum Hydrocarbons in Groundwater

Isoconcentration contour maps for dissolved benzene, MTBE, IPE, and 1,2-DCA, based on the results of analysis of the June and November 1995 groundwater samples, are presented as Figures 17 through 20. Isoconcentration cross sections for dissolved benzene, MTBE, IPE, and 1,2-DCA are presented as Figures 21 through 28. The isoconcentration contour maps (Figures 17 through 21) include results of the July

1995 groundwater sampling/analysis for monitoring wells MW-2 and MW-3 on the Parrott Estate site (northwest corner of N. Main Street and Madison Boulevard). Based on the water table contours developed from the June 21, 1995 groundwater level data for the Boulevard Kwik Pik facility (Figure 14), these monitoring wells are upgradient of the UST system at Boulevard Kwik Pik.

The isoconcentration contour maps and cross sections indicate an on-site distribution of dissolved petroleum hydrocarbons that is centered in the former/current UST and product dispenser areas. However, based on the configuration of the isoconcentration contours in Figures 17 through 28, and the concentrations of dissolved petroleum hydrocarbons detected in the groundwater samples from the Parrott Estate site (Figures 17 through 20), the Centel telephone vault (Figure 8), and/or other potential upgradient, off-site, hydrocarbon sources may contribute to the dissolved hydrocarbon plume depicted in Figures 17 through 20.

Based on the results of analysis of the perimeter and downgradient monitoring wells at the Boulevard Kwik Pik facility, adequate downgradient lateral delineation of dissolved petroleum hydrocarbons at the facility has been established.

1,2-DCA was the only constituent detected in the June 1995 groundwater sample from monitoring well DW-8 at a concentration above the North Carolina action levels. Figure 29 presents a graph of detected 1,2-DCA concentrations versus monitoring well depths. The graph illustrates generally increasing 1,2-DCA concentrations with depth in the overburden/bedrock. This condition is confirmed by the cross section isoconcentration contours for 1,2-DCA (Figures 27 and 28), which, unlike the isoconcentration contours for the other dissolved constituents, are not closed around the UST/dispenser island area.

Based on the apparent increases in 1,2-DCA concentration with depth, and the atypical cross section isoconcentration contours, it is suspected that the concentrations of 1,2-DCA detected in the groundwater sample from DW-8 may be indicative of a deeper-seated (i.e., lowermost saprolite/bedrock) dissolved hydrocarbon plume that originates from an upgradient, off site, source. Based on detected concentrations of 1,2-DCA detected in the July 1995 groundwater samples from the Parrott Estate site (Appendix A), the Parrott Estate site does not appear to be a source of the detected 1,2-DCA concentrations in DW-8. No information is available concerning analysis of groundwater samples from the Neb King Oil facility or Little Huff facility for 1,2-DCA.

6.0 RECOMMENDATIONS

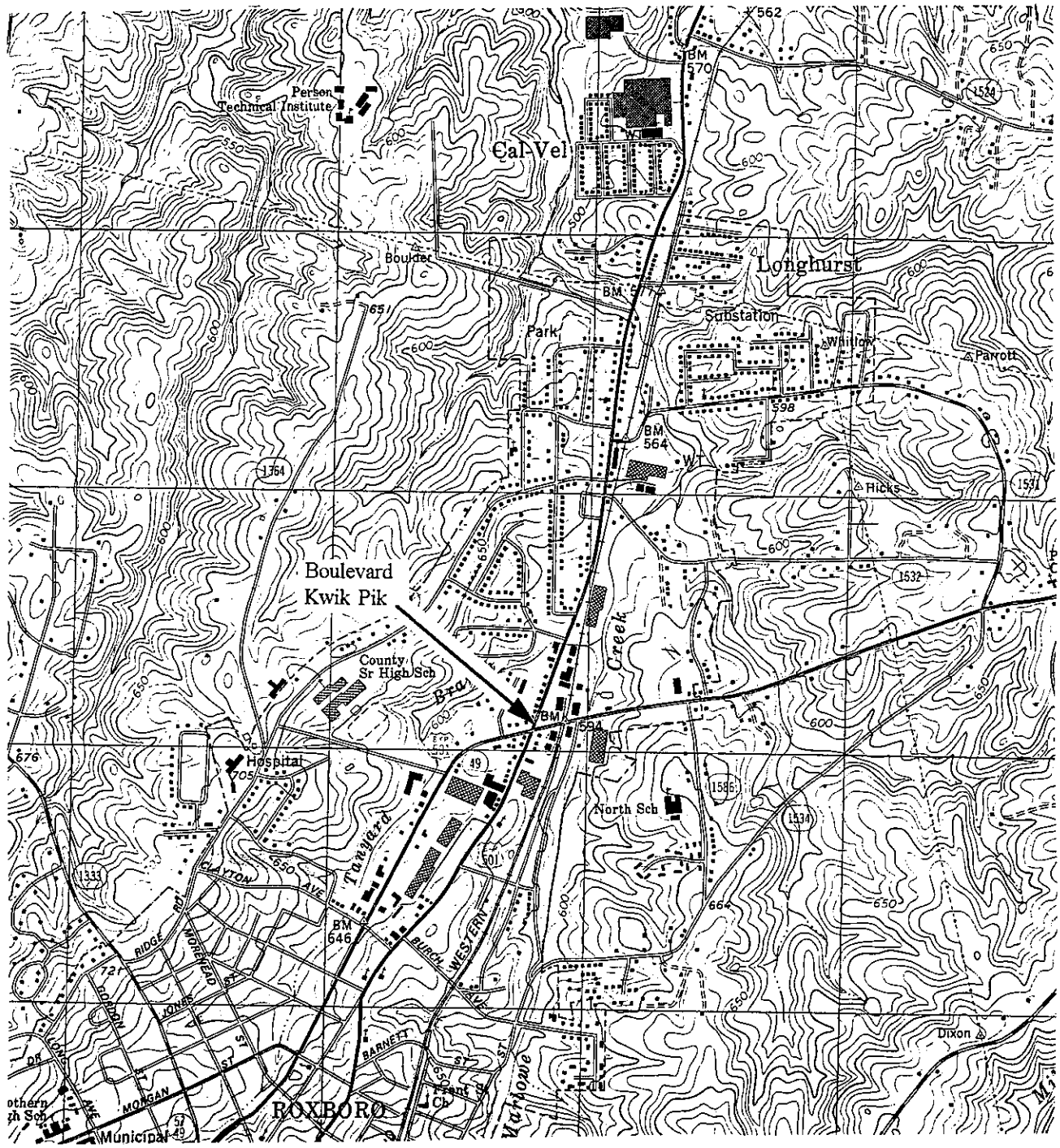
Based on the results of the CSA, the following recommendations are presented for the Boulevard Kwik Pik facility.

1. The top-of-casing elevations of monitoring wells at the Boulevard Kwik Pik facility, the Parrott Estate site, the Neb King Oil facility, and the Little Huff facility should be surveyed relative to a common datum. A full round of groundwater levels should be measured in all of these facility monitoring wells, and a full round of groundwater samples should be collected from the wells for analysis of petroleum constituents. Based on the results of the common activities, potentiometric contour maps (with apparent directions of groundwater flow), and contaminant isoconcentration contour maps, should be developed. The need for additional vertical and/or horizontal delineation at the Boulevard Kwik Pik facility would be based on the common assessment activities. The NCDEM will need to take the lead to establish a program for these activities.

2. The monthly free product gauging activities should continue for monitoring well MW-1 until a 6-month period with no detected free product has elapsed.

3. A quarterly groundwater sampling/analysis program for the facility monitoring wells should be implemented.

4. The facility should be evaluated as a potential candidate for natural remediation under the provisions of 15A NCAC 2L .0106, paragraph (l). Based on the natural remediation evaluation, the common assessment activities conducted as per above, and the monthly free product gauging activities, a corrective action plan (CAP) for the Boulevard Kwik Pik facility will be developed in accordance with 15A NCAC 2L .0106, paragraph l (natural remediation), or paragraph j (best available technology).



N.C.

QUADRANGLE LOCATION

SOURCE: USGS Roxboro, NC
7.5-min Quadrangle, 1982
1 in. = 2000 ft.
Contour interval = 10 ft.

N

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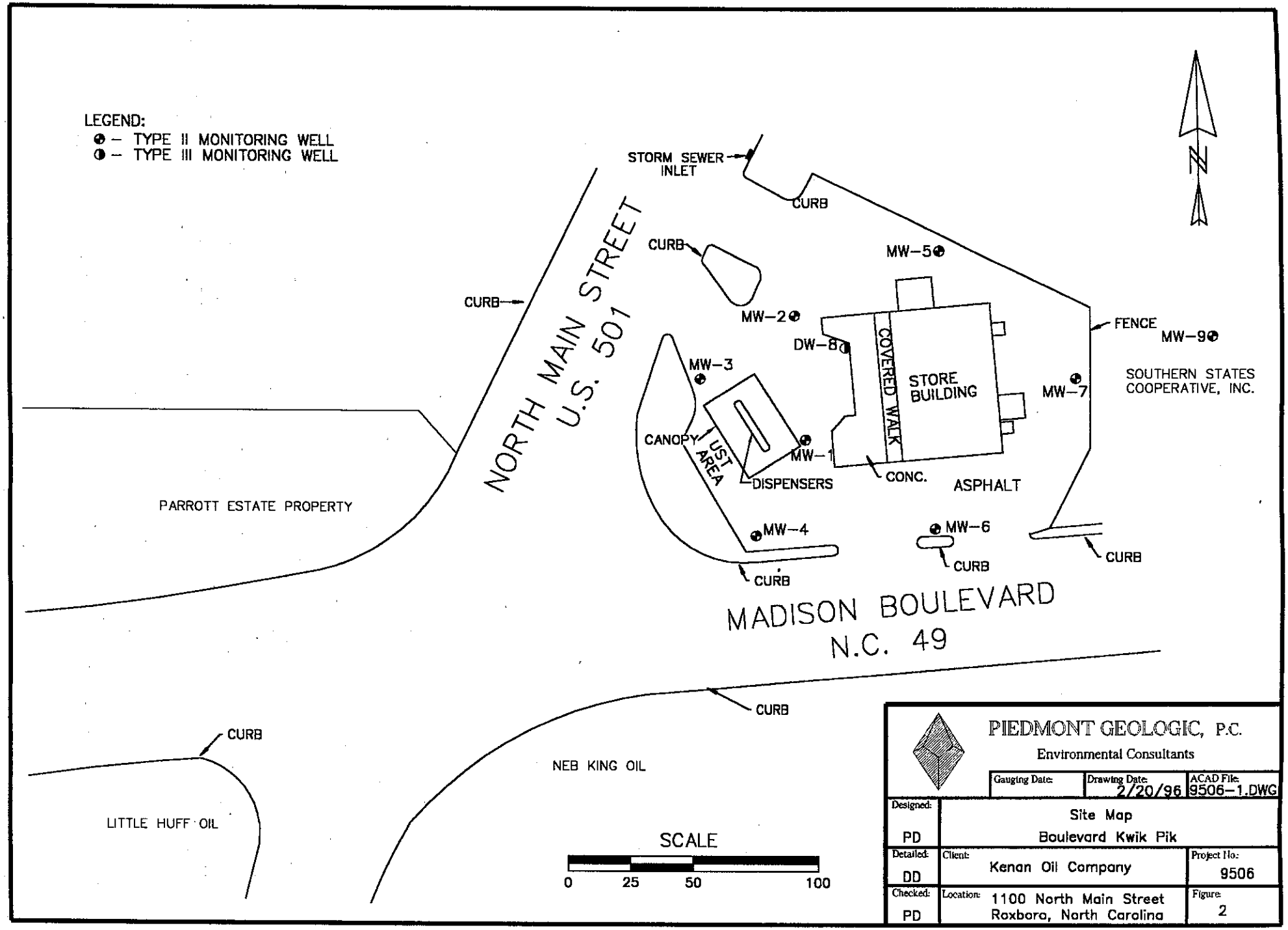
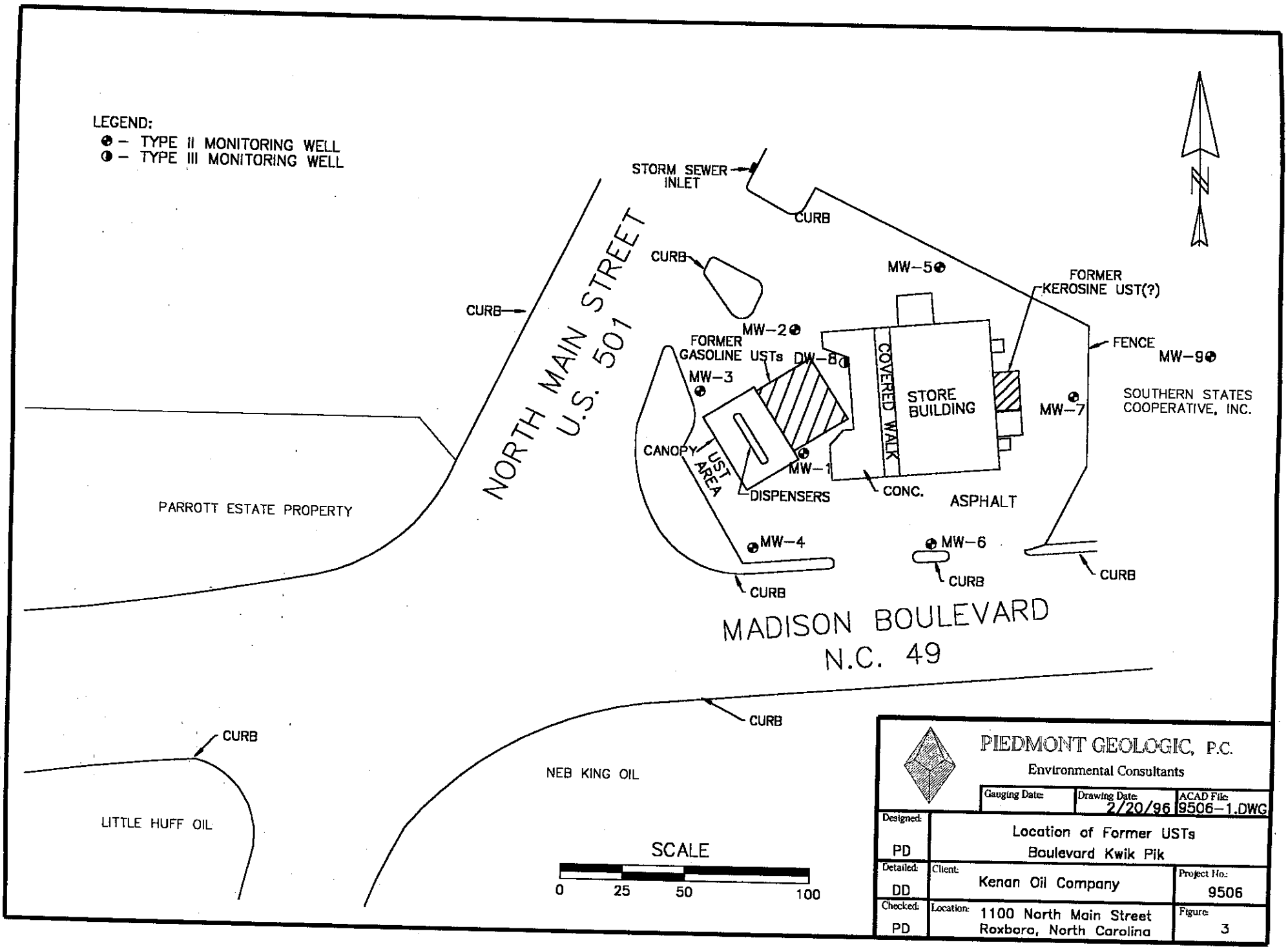
USGS QUADRANGLE MAP EXCERPT
Boulevard Kwik Pik
1100 N. Main St., Roxboro, NC

Designed by:	Drawn by:	Reviewed by:	Drawing #: 9506-01	Figure 1
			Drawing Date: 3-8-96	


LEGEND:
◓ – TYPE II MONITORING WELL
◑ – TYPE III MONITORING WELL
STORM SEWER INLET
CURB
CURB
CURB
NORTH MAIN STREET
U.S. 501
MW-5
MW-2
FENCE
MW-9
DW-8
MW-3
COVERED WALK
STORE BUILDING
MW-7
SOUTHERN STATES COOPERATIVE, INC.
CANOPY
UST AREA
MW-1
DISPENSERS
CONC.
ASPHALT
PARROTT ESTATE PROPERTY
MW-4
MW-6
CURB
CURB
CURB
MADISON BOULEVARD
N.C. 49
CURB
CURB
NEB KING OIL
LITTLE HUFF OIL
SCALE
0 25 50 100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date:
Drawing Date: 2/20/96
ACAD File: 9506-1.DWG
Designed: PD
Site Map
Boulevard Kwik Pik
Detailed: DD
Client: Kenan Oil Company
Project No: 9506
Checked: PD
Location: 1100 North Main Street Roxboro, North Carolina
Figure: 2


LEGEND:
TYPE II MONITORING WELL
TYPE III MONITORING WELL
STORM SEWER INLET
CURB
CURB
CURB
NORTH MAIN STREET
U.S. 501
MW-5
FORMER KEROSINE UST(?)
MW-2
FORMER GASOLINE USTs
DW-8
FENCE
MW-9
MW-3
COVERED WALK
STORE BUILDING
MW-7
SOUTHERN STATES COOPERATIVE, INC.
CANOPY
UST AREA
MW-1
DISPENSERS
CONC.
ASPHALT
PARROTT ESTATE PROPERTY
MW-4
MW-6
CURB
CURB
CURB
MADISON BOULEVARD
N.C. 49
CURB
CURB
NEB KING OIL
LITTLE HUFF OIL
SCALE
0
25
50
100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date:
Drawing Date: 2/20/96
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Designed: PD
Location of Former USTs
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Detailed: DD
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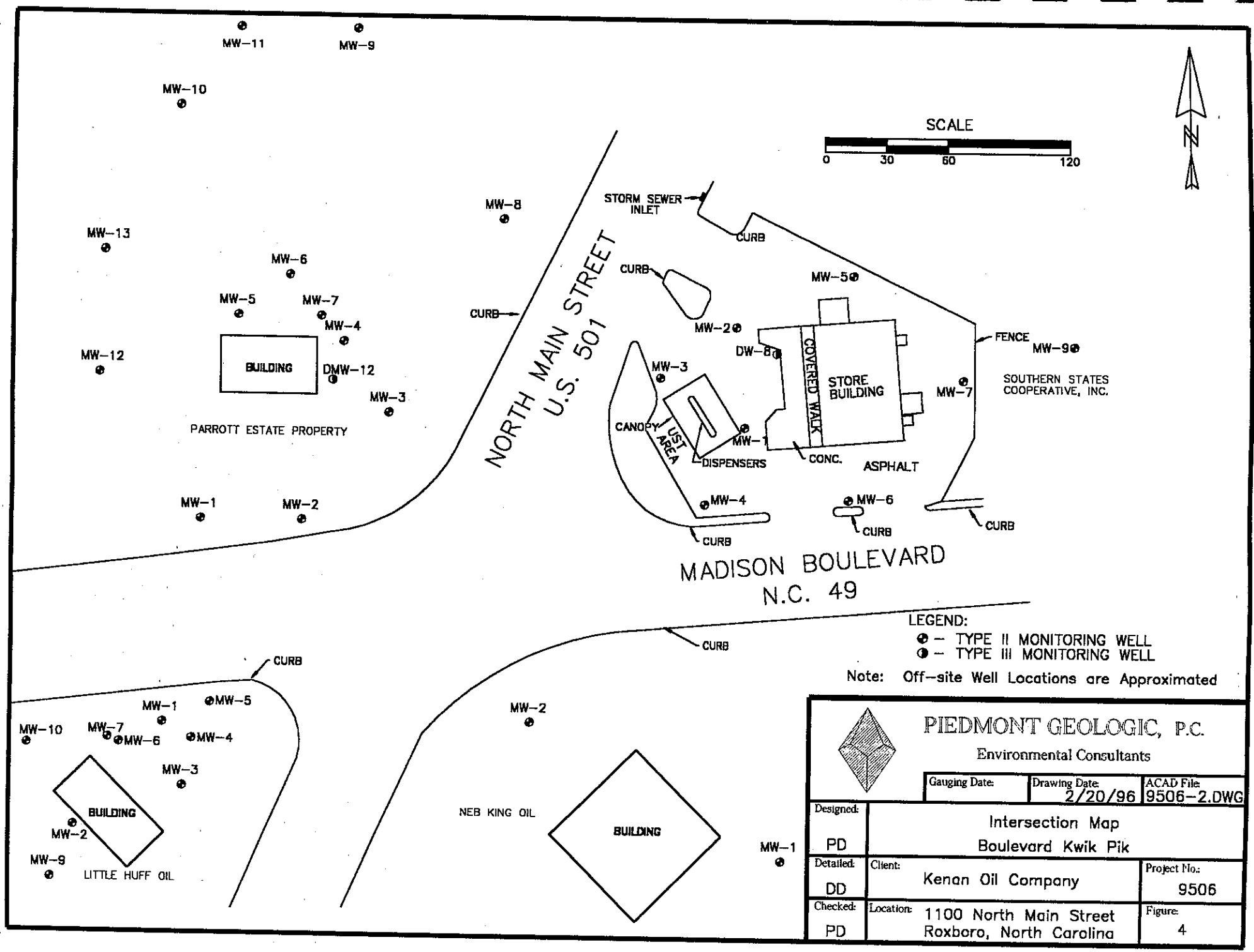
Project No.: 9506
Checked: PD
Location: 1100 North Main Street
Roxboro, North Carolina
Figure: 3



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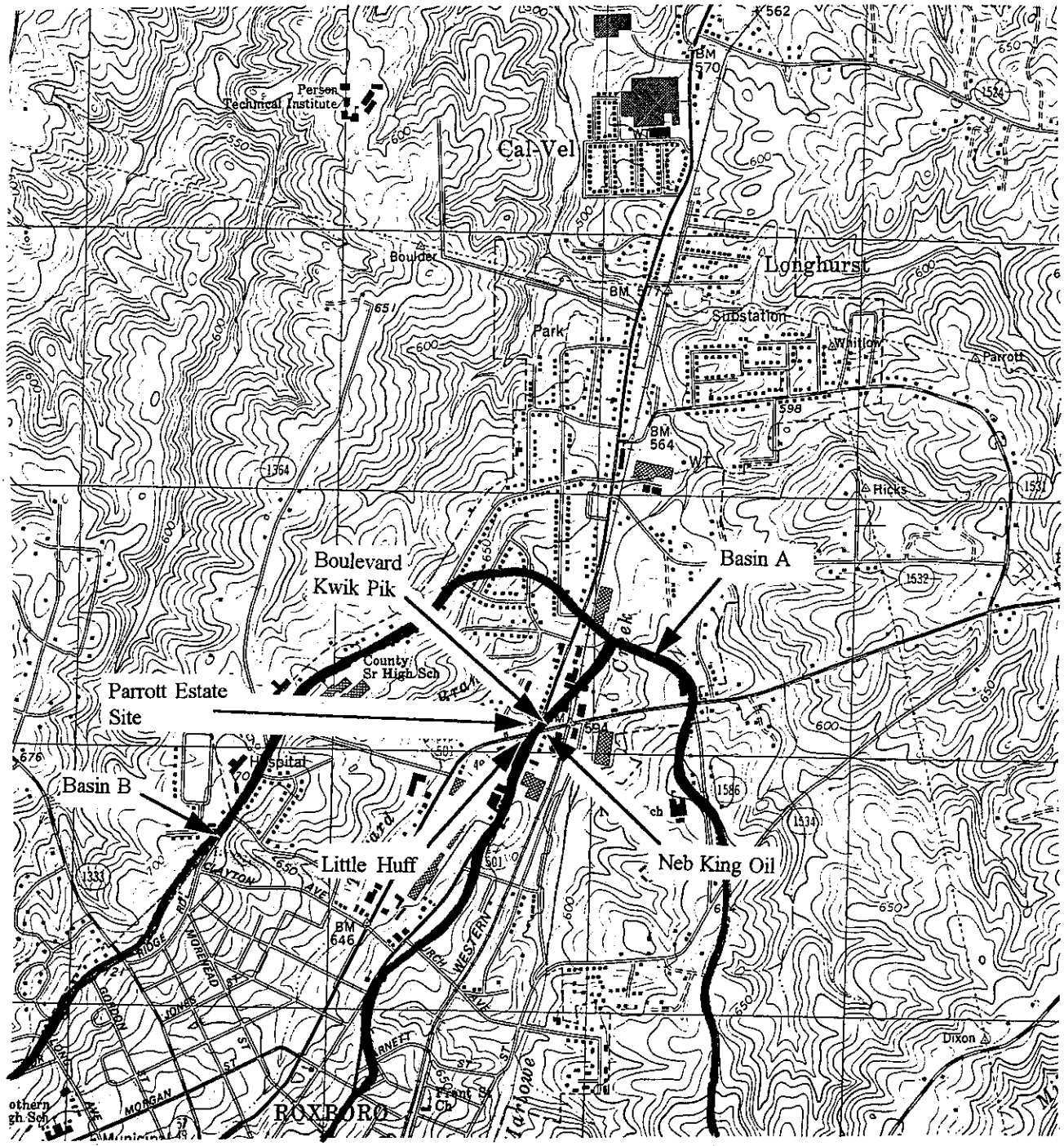
Gauging Date:	Drawing Date: 2/20/96	ACAD File: 9506-2.DWG
Designed: PD	Intersection Map Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 4



QUADRANGLE LOCATION

N

SOURCE: USGS Roxboro, NC
7.5-min Quadrangle, 1982
1 in. = 2000 ft.
Contour interval = 10 ft.

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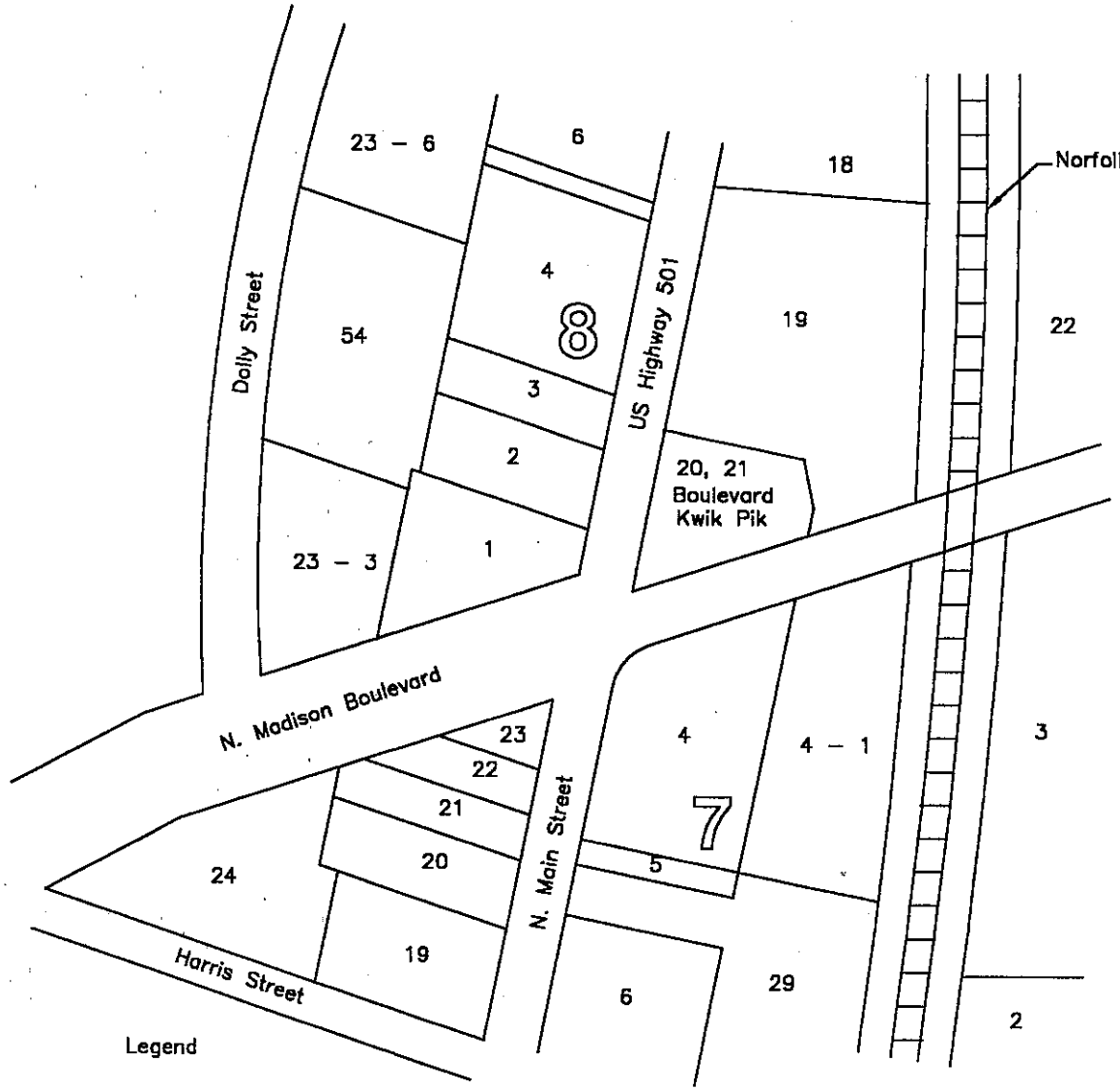
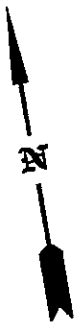
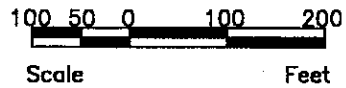
SURFICIAL WATERSHED MAP
Boulevard Kwik Pik
1100 N. Main St., Roxboro, NC

Designed by:	Drawn by:	Reviewed by:	Drawing #: 9506-05	Figure 5
			Drawing Date: 3-8-96	







Note: See Table 2 for listing of property owners by map and lot number.
Source: Person County Tax Map

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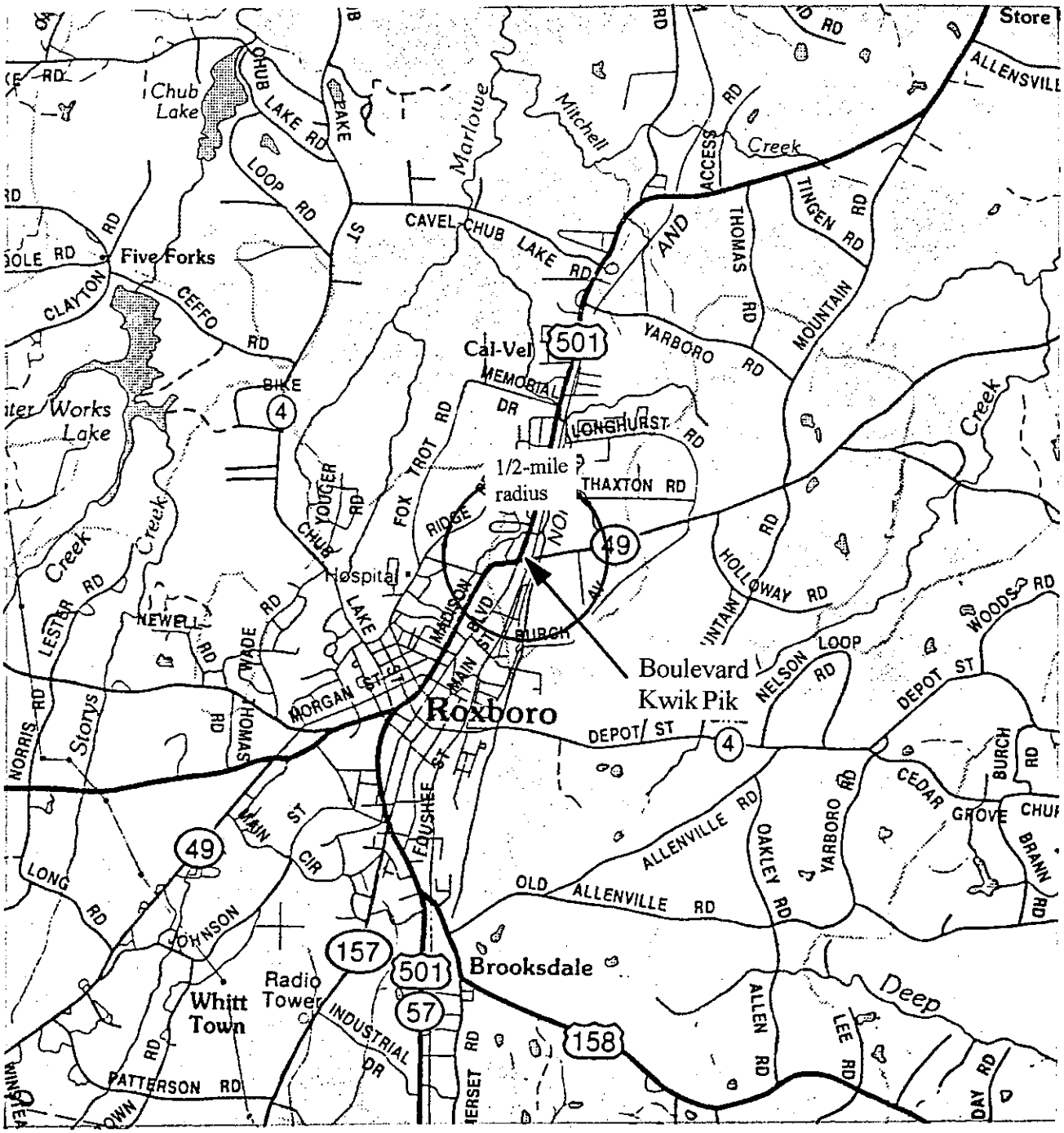
Environmental Consultants

Gauging Date:	Drawing Date: 2/2/96	ACAD File: 9506.DWG

Designed: PD	Tax Map Composite Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 6



N

SOURCE: DeLorme Mapping (1993)
1 in. = 1 mile

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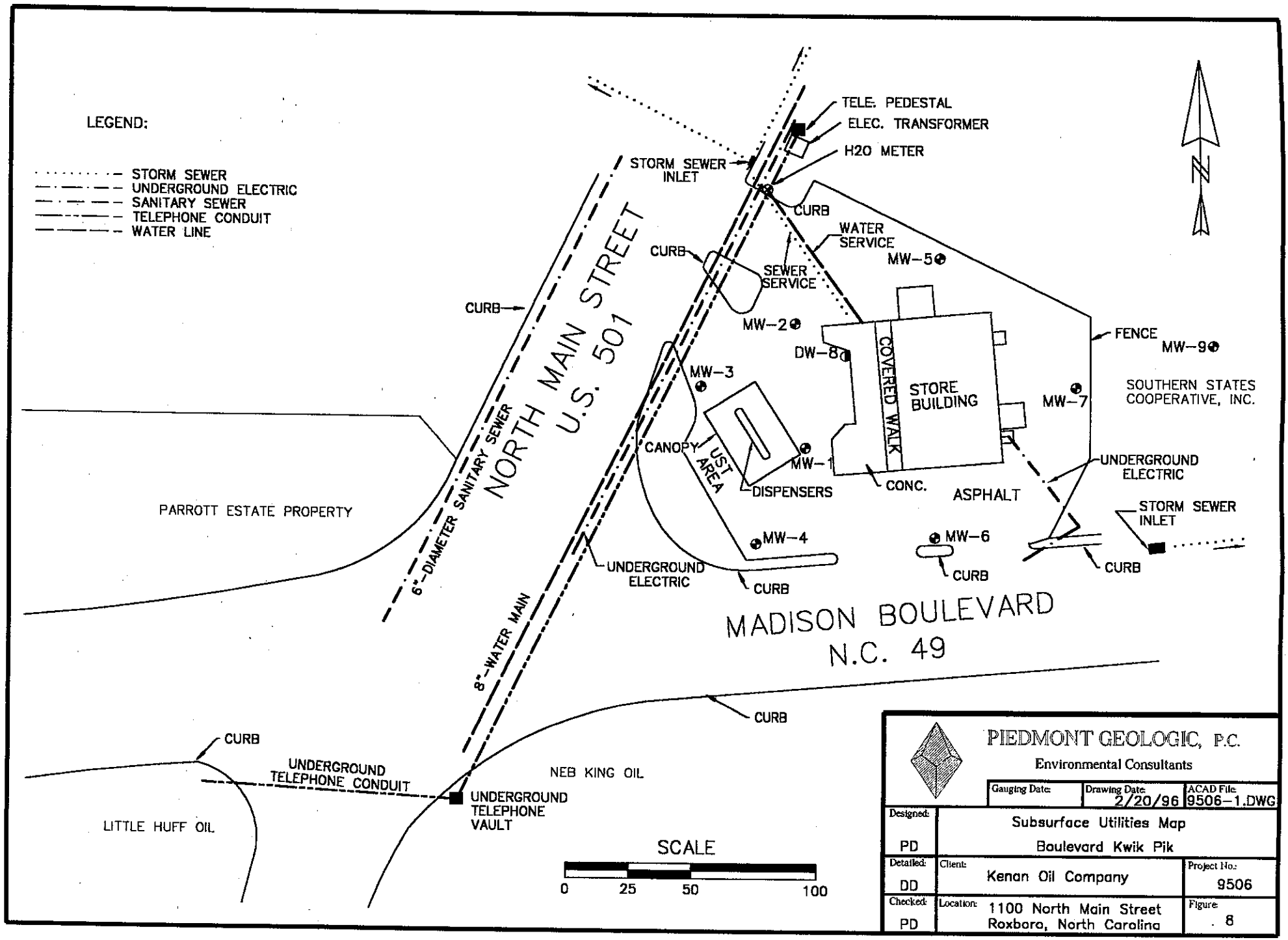
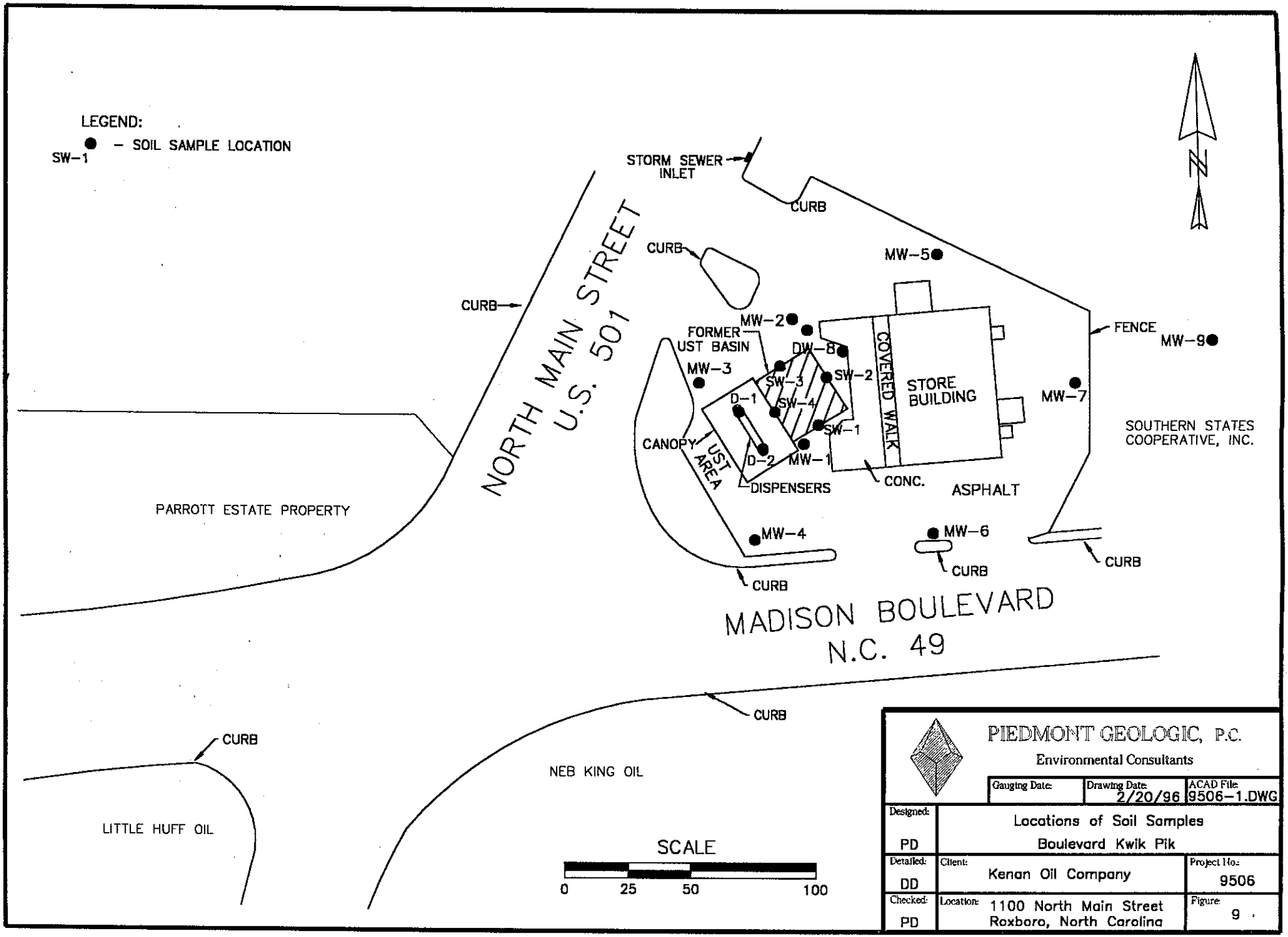
Environmental Consultants

AREA ROAD MAP
Boulevard Kwik Pik
1100 N. Main St., Roxboro, NC

Designed by:	Drawn by:	Reviewed by:	Drawing #: 9506-07	Figure 7
			Drawing Date: 3-8-96	

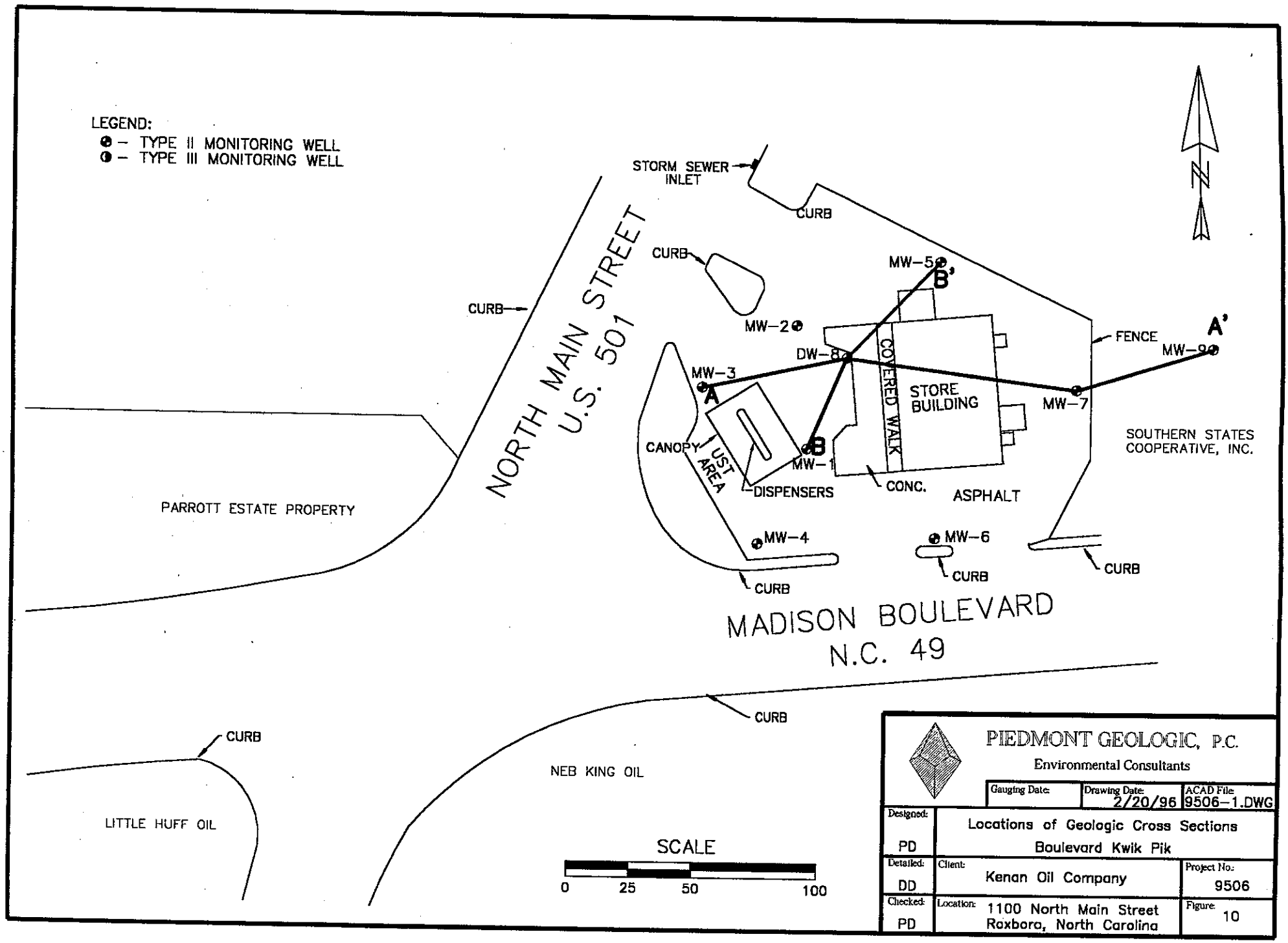

LEGEND:
STORM SEWER
UNDERGROUND ELECTRIC
SANITARY SEWER
TELEPHONE CONDUIT
WATER LINE
TELE. PEDESTAL
ELEC. TRANSFORMER
H2O METER
STORM SEWER INLET
CURB
WATER SERVICE
SEWER SERVICE
MW-5
MW-2
MW-3
DW-8
FENCE
MW-9
COVERED WALK
STORE BUILDING
MW-7
SOUTHERN STATES COOPERATIVE, INC.
CANOPY
UST AREA
MW-1
DISPENSERS
CONC.
ASPHALT
UNDERGROUND ELECTRIC
STORM SEWER INLET
MW-4
MW-6
CURB
NORTH MAIN STREET
U.S. 501
6"-DIAMETER SANITARY SEWER
8"-WATER MAIN
PARROTT ESTATE PROPERTY
MADISON BOULEVARD
N.C. 49
UNDERGROUND TELEPHONE CONDUIT
UNDERGROUND TELEPHONE VAULT
NEB KING OIL
LITTLE HUFF OIL
SCALE
0
25
50
100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date:
Drawing Date: 2/20/96
ACAD File: 9506-1.DWG
Designed: PD
Subsurface Utilities Map
Boulevard Kwik Pik
Detailed: DD
Client: Kenan Oil Company
Project No.: 9506
Checked: PD
Location: 1100 North Main Street Roxboro, North Carolina
Figure: 8



PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

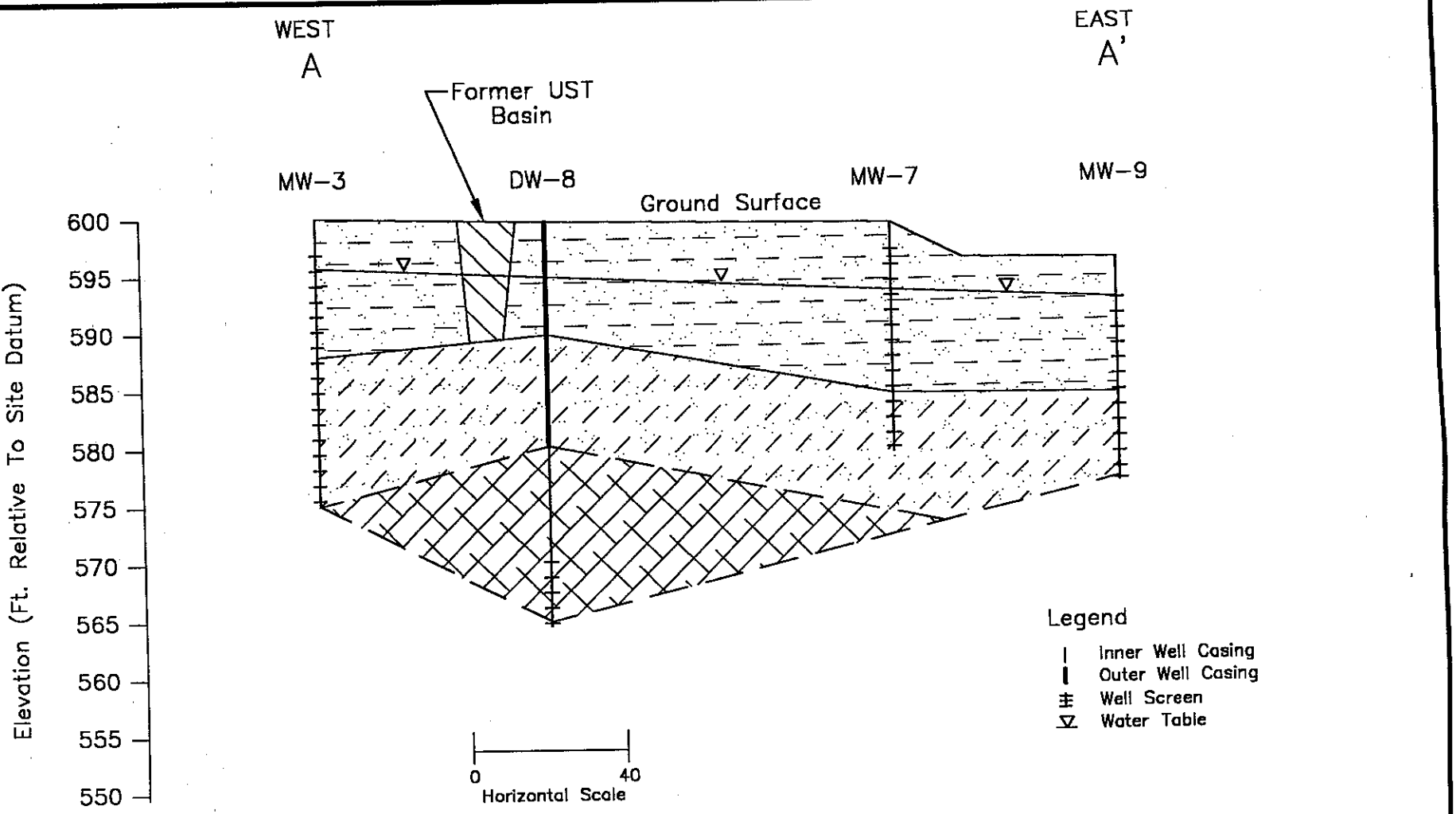
Gauging Date:	Drawing Date: 2/20/96	ACAD File: 9506-1.DWG

Designed: PD	Locations of Soil Samples Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 9



PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

	Gauging Date:	Drawing Date: 2/20/96	ACAD File: 9506-1.DWG
Designed: PD	Locations of Geologic Cross Sections Boulevard Kwik Pik		
Detailed: DD	Client: Kenan Oil Company		Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina		Figure: 10



Fine Sandy Clay and Clayey Silt: Mottled Brown, Reddish Brown, and Gray; Occasional Silty Sand/Gravel Layers. (Fill Materials).

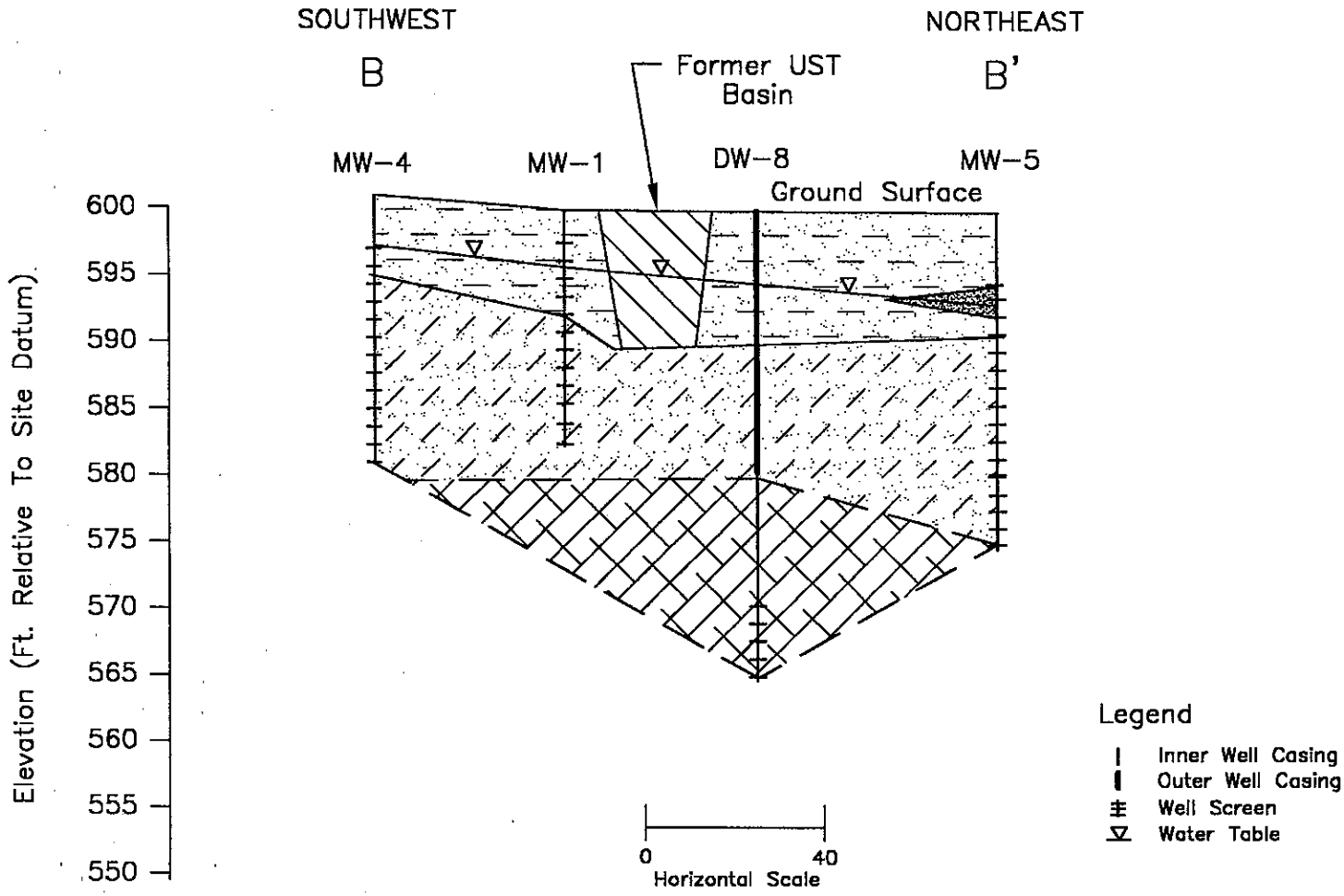
Clayey Silt and Sandy Silt with Relict Bedrock Structures: Brown, Grayish-Brown, and Whitish-Gray; Some Remnant Bedrock Fragments. (Saprolite).

Bedrock: Weathered Sandy Meta-Mudstone.

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date:	Drawing Date: 2/20/96	ACAD File: 9506.DWG

Designed: PD	Geologic Cross Section A-A' Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 11



Fine Sandy Clay and Clayey Silt: Mottled Brown, Reddish Brown, and Gray; Occasional Silty Sand/Gravel Layers. (Fill Materials).

Silty Sand; brown.

Clayey Silt and Sandy Silt with Relict Bedrock Structures: Brown, Grayish-Brown, and Whitish-Gray; Some Remnant Bedrock Fragments. (Saprolite).

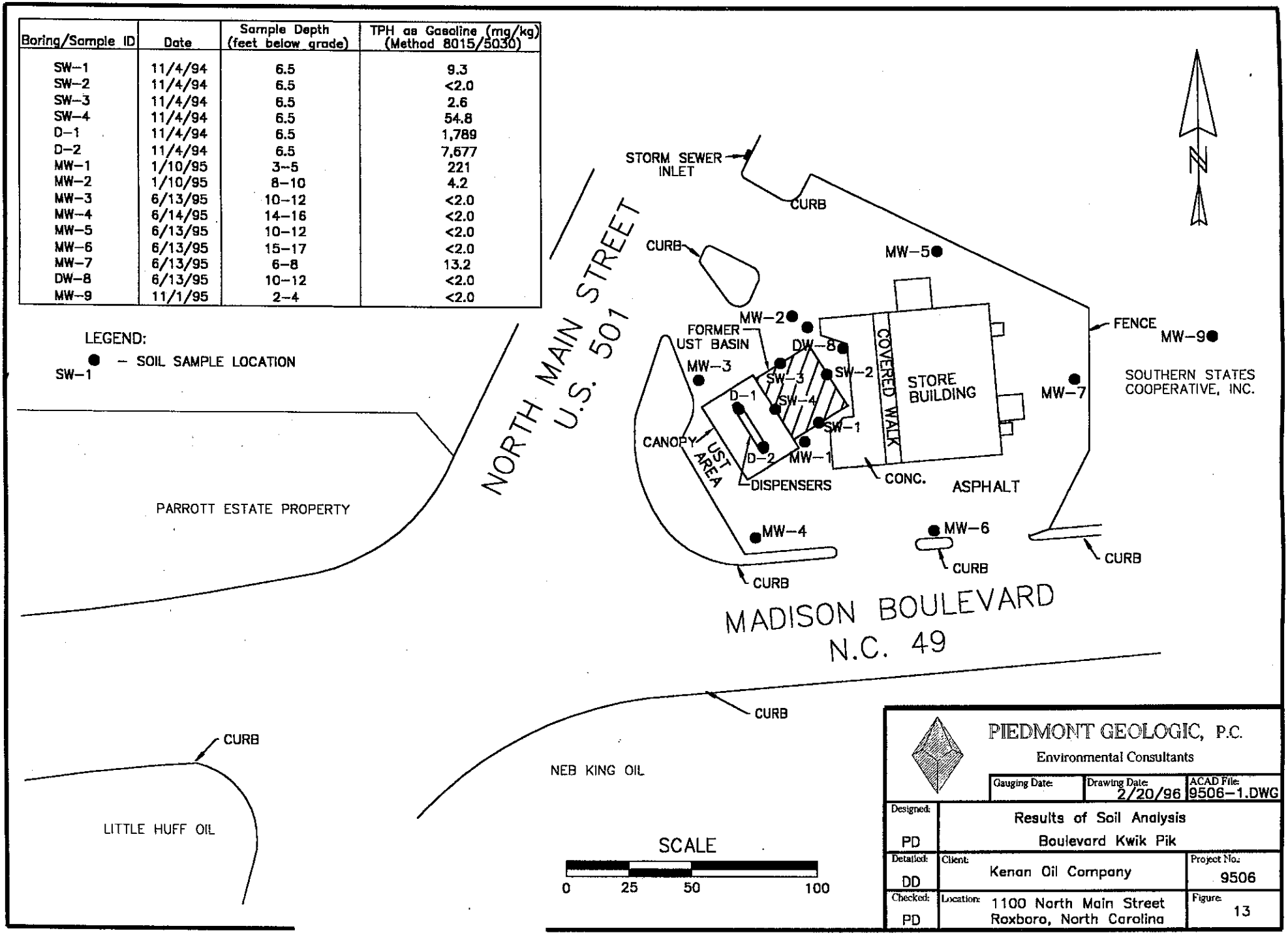
Bedrock: Weathered Sandy Meta-Mudstone.

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date: 6/21/95	Drawing Date: 2/20/96	ACAD File: 9506.DWG

Designed: PD	Geologic Cross Section B – B' Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 12

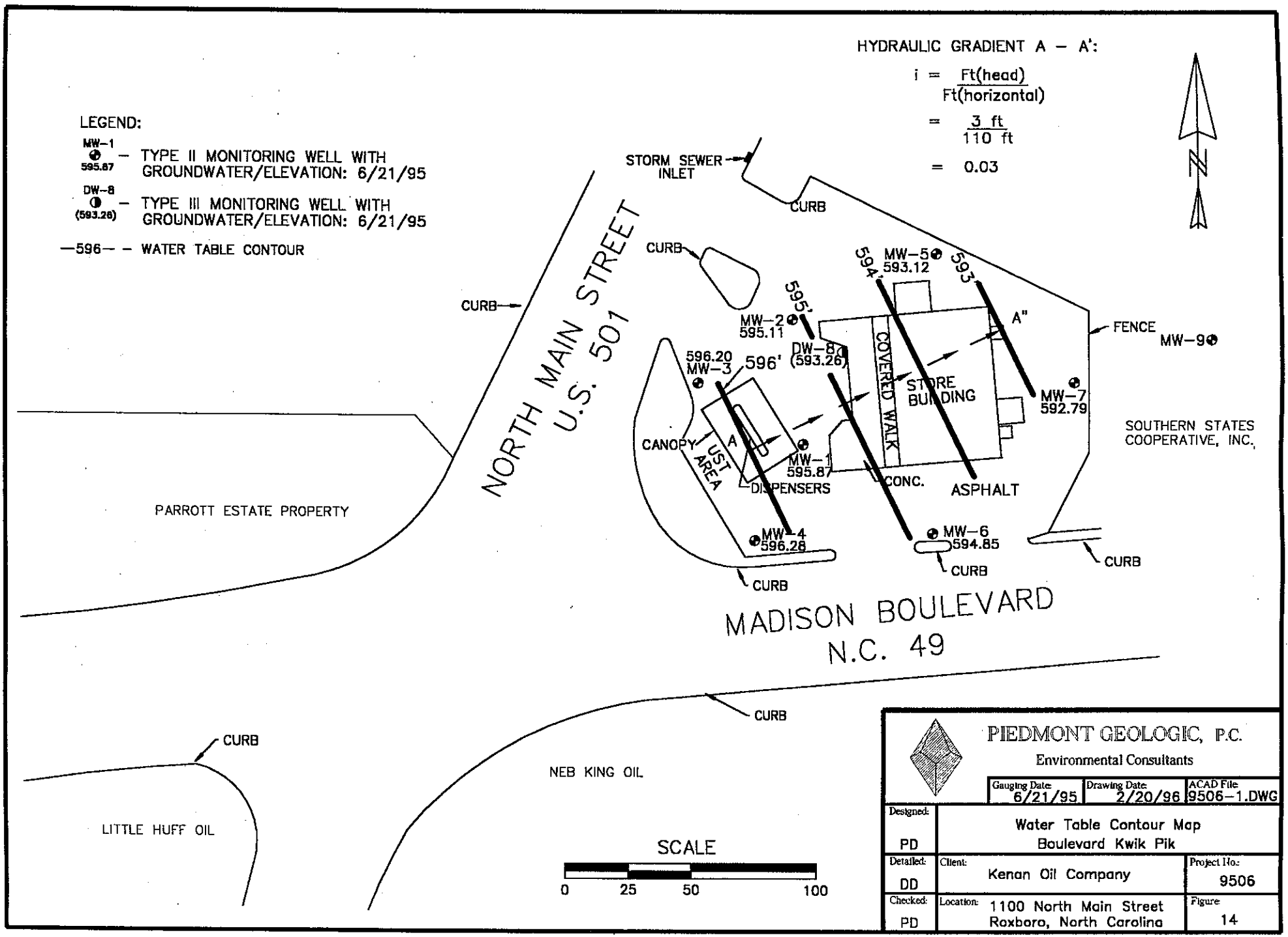
Boring/Sample ID	Date	Sample Depth (feet below grade)	TPH as Gasoline (mg/kg) (Method 8015/5030)
SW-1	11/4/94	6.5	9.3
SW-2	11/4/94	6.5	<2.0
SW-3	11/4/94	6.5	2.6
SW-4	11/4/94	6.5	54.8
D-1	11/4/94	6.5	1,789
D-2	11/4/94	6.5	7,677
MW-1	1/10/95	3-5	221
MW-2	1/10/95	8-10	4.2
MW-3	6/13/95	10-12	<2.0
MW-4	6/14/95	14-16	<2.0
MW-5	6/13/95	10-12	<2.0
MW-6	6/13/95	15-17	<2.0
MW-7	6/13/95	6-8	13.2
DW-8	6/13/95	10-12	<2.0
MW-9	11/1/95	2-4	<2.0

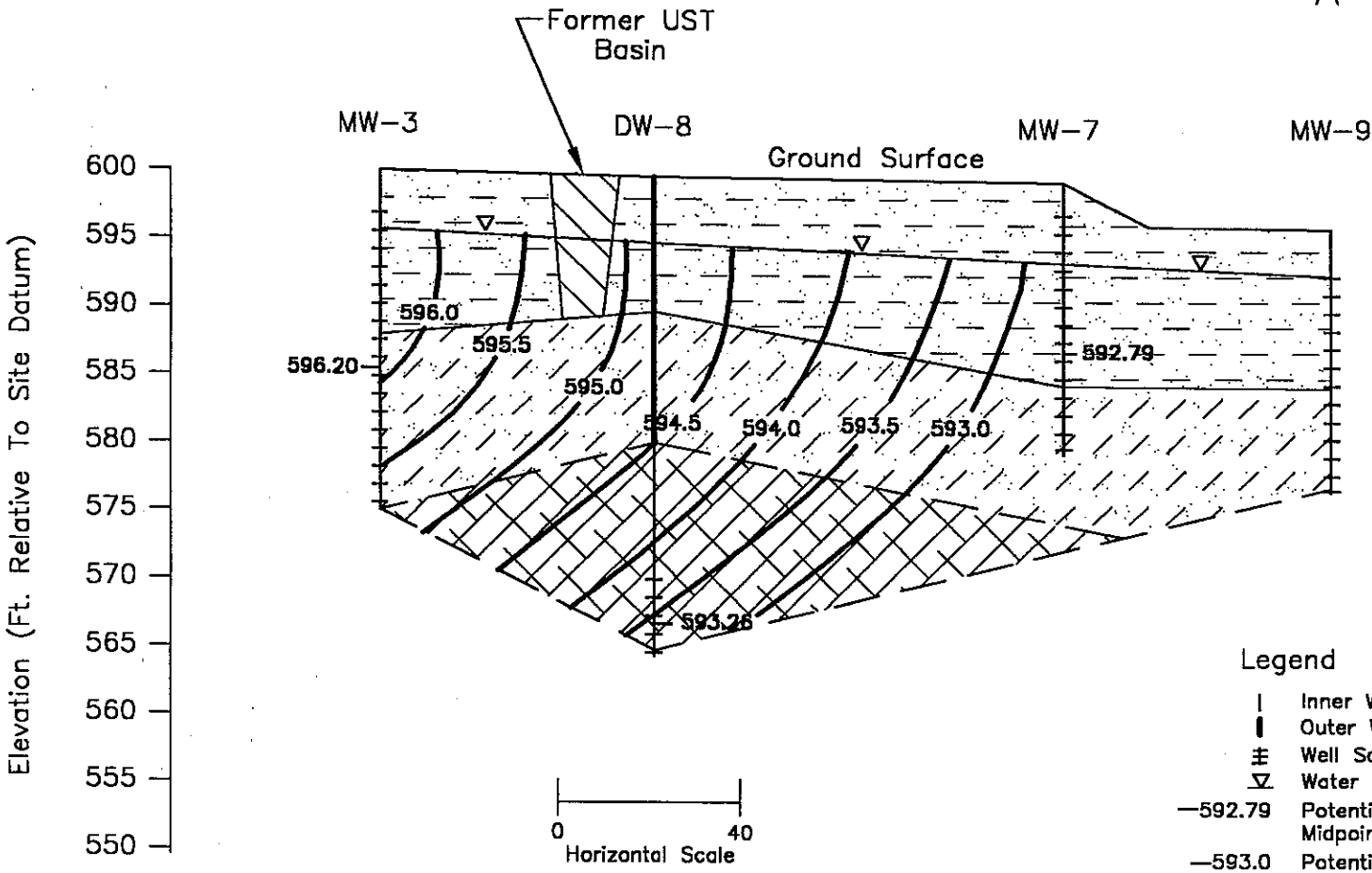


PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date:	Drawing Date: 2/20/96	ACAD File: 9506-1.DWG

Designed: PD	Results of Soil Analysis Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 13


HYDRAULIC GRADIENT A – A':
i = Ft(head) / Ft(horizontal)
= 3 ft / 110 ft
= 0.03
LEGEND:
MW–1 595.87 – TYPE II MONITORING WELL WITH GROUNDWATER/ELEVATION: 6/21/95
DW–8 (593.26) – TYPE III MONITORING WELL WITH GROUNDWATER/ELEVATION: 6/21/95
–596– – WATER TABLE CONTOUR
STORM SEWER INLET
CURB
NORTH MAIN STREET
U.S. 501
MW–5 593.12
MW–2 595.11
DW–8 (593.26)
596.20 MW–3
596'
595'
594'
593
A"
FENCE
MW–9
COVERED WALK
STORE BUILDING
MW–7 592.79
SOUTHERN STATES COOPERATIVE, INC.
CANOPY
UST AREA
A
MW–1 595.87
DISPENSERS
CONC.
ASPHALT
MW–4 596.26
MW–6 594.85
PARROTT ESTATE PROPERTY
MADISON BOULEVARD
N.C. 49
NEB KING OIL
LITTLE HUFF OIL
SCALE
0 25 50 100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date: 6/21/95
Drawing Date: 2/20/96
ACAD File: 9506–1.DWG
Designed: PD
Water Table Contour Map
Boulevard Kwik Pik
Detailed: DD
Client: Kenan Oil Company
Project No.: 9506
Checked: PD
Location: 1100 North Main Street Roxboro, North Carolina
Figure: 14



Legend

- Inner Well Casing
- Outer Well Casing
- Well Screen
- Water Table
- —592.79 Potentiometric Head at Screen Midpoint (6/21/95)
- —593.0 Potentiometric Head Contour

Fine Sandy Clay and Clayey Silt: Mottled Brown, Reddish Brown, and Gray; Occasional Silty Sand/Gravel Layers. (Fill Materials).

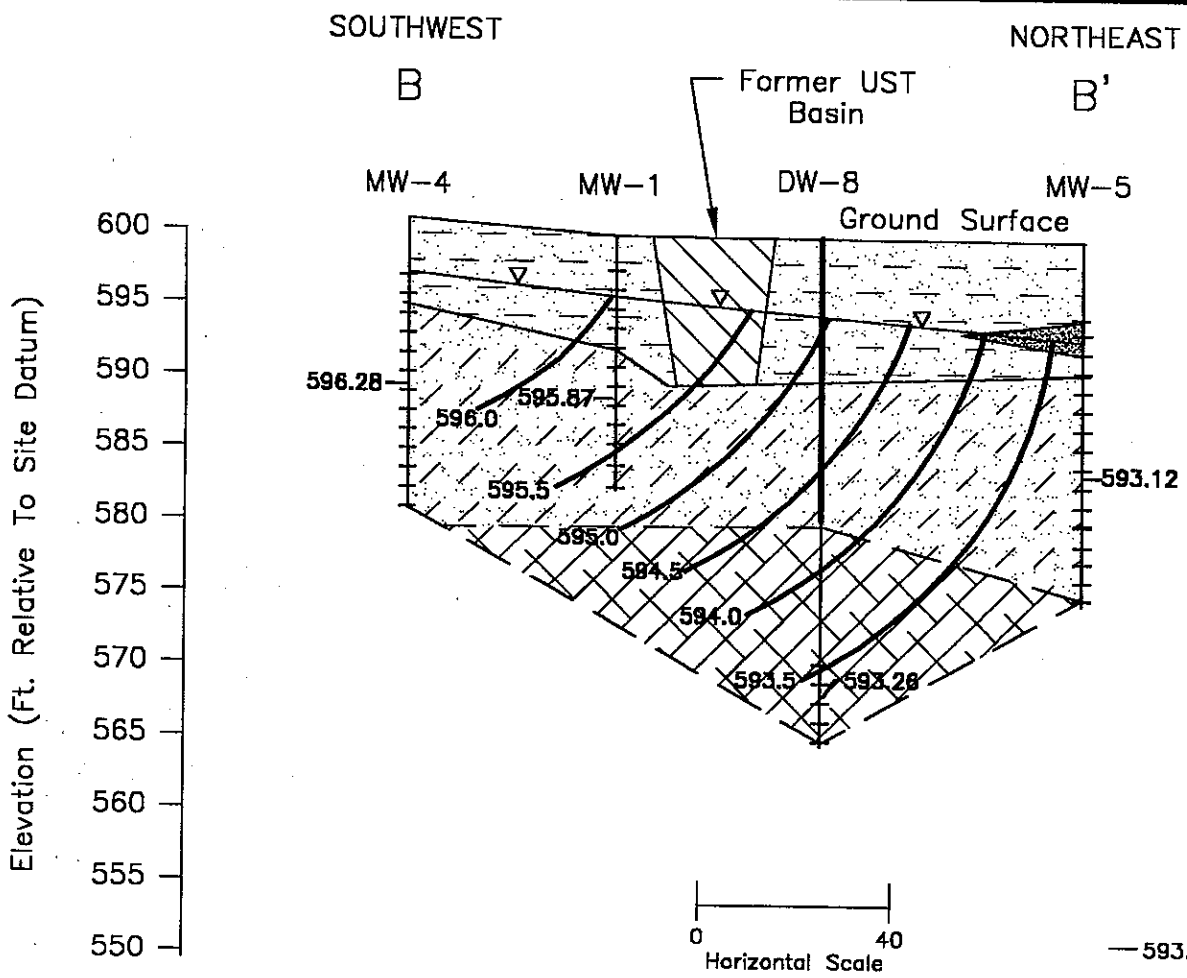
Clayey Silt and Sandy Silt with Relict Bedrock Structures: Brown, Grayish-Brown, and Whitish-Gray; Some Remnant Bedrock Fragments. (Saprolite).

Bedrock: Weathered Sandy Meta-Mudstone.

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date: 6/21/95	Drawing Date: 2/20/96	ACAD File: 9506.DWG

Designed: PD	Hydrogeologic Cross Section A-A' Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 15



Legend

- Inner Well Casing
- Outer Well Casing
- Well Screen
- Water Table
- —593.12 Potentiometric Head at Screen Midpoint (6/21/95)
- —593.5— Potentiometric Head Contour

Fine Sandy Clay and Clayey Silt: Mottled Brown, Reddish Brown, and Gray; Occasional Silty Sand/Gravel Layers. (Fill Materials).

Silty Sand; brown.

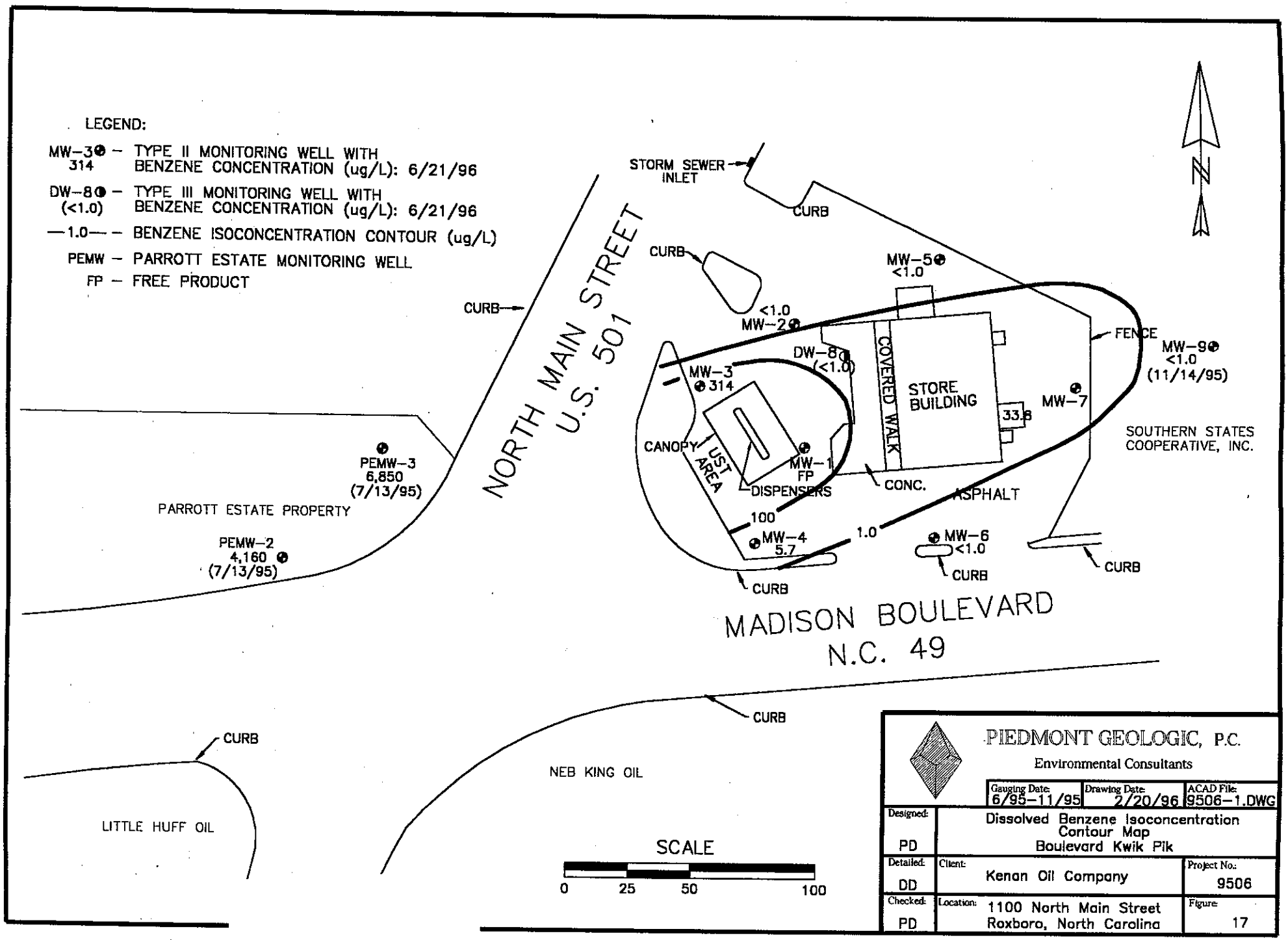
Clayey Silt and Sandy Silt with Relict Bedrock Structures: Brown, Grayish-Brown, and Whitish-Gray; Some Remnant Bedrock Fragments. (Saprolite).

Bedrock: Weathered Sandy Meta-Mudstone.

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date: 6/21/95	Drawing Date: 2/20/96	ACAD File: 9506.DWG

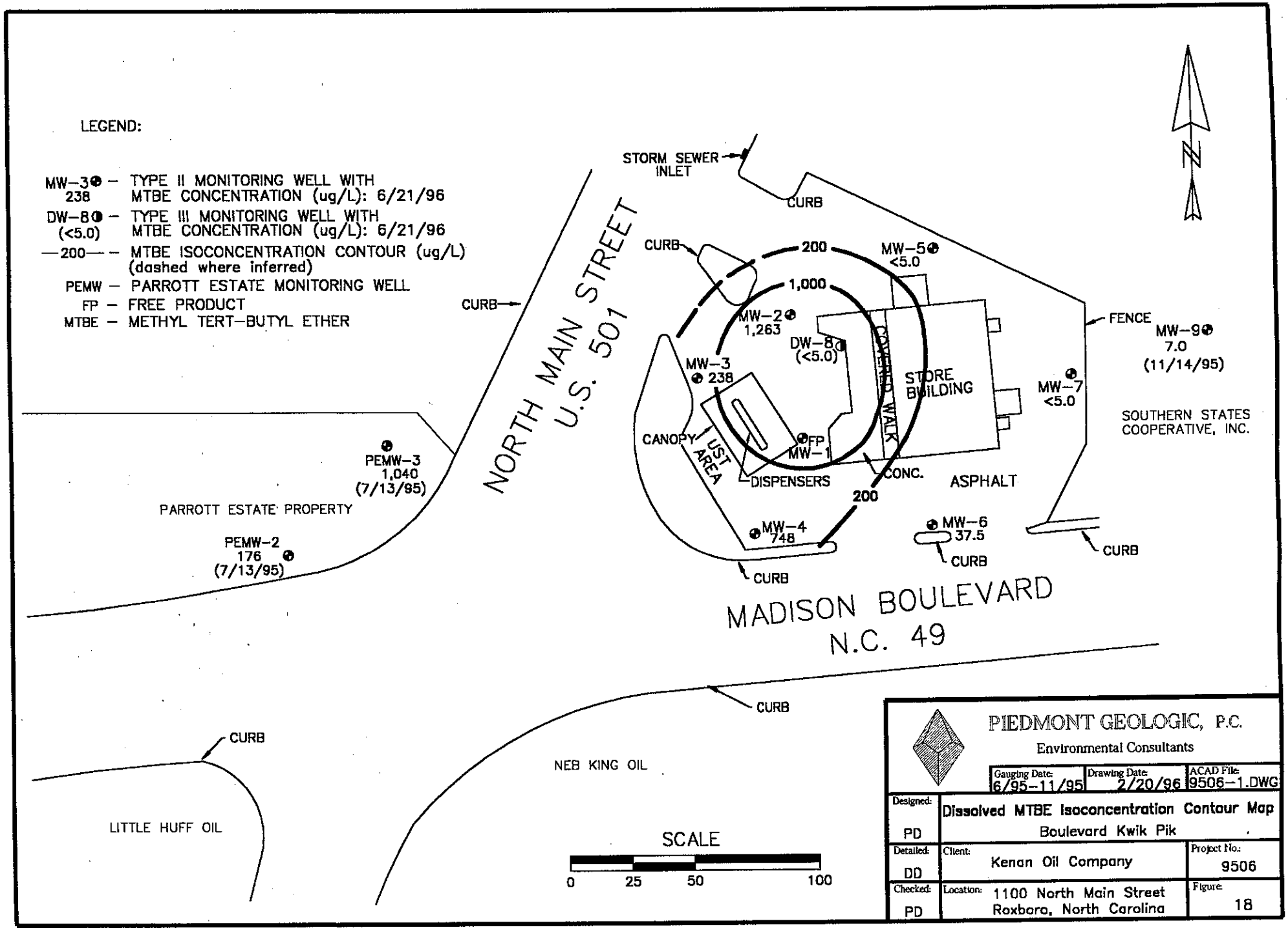
Designed: PD	Hydrogeologic Cross Section B-B' Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 16

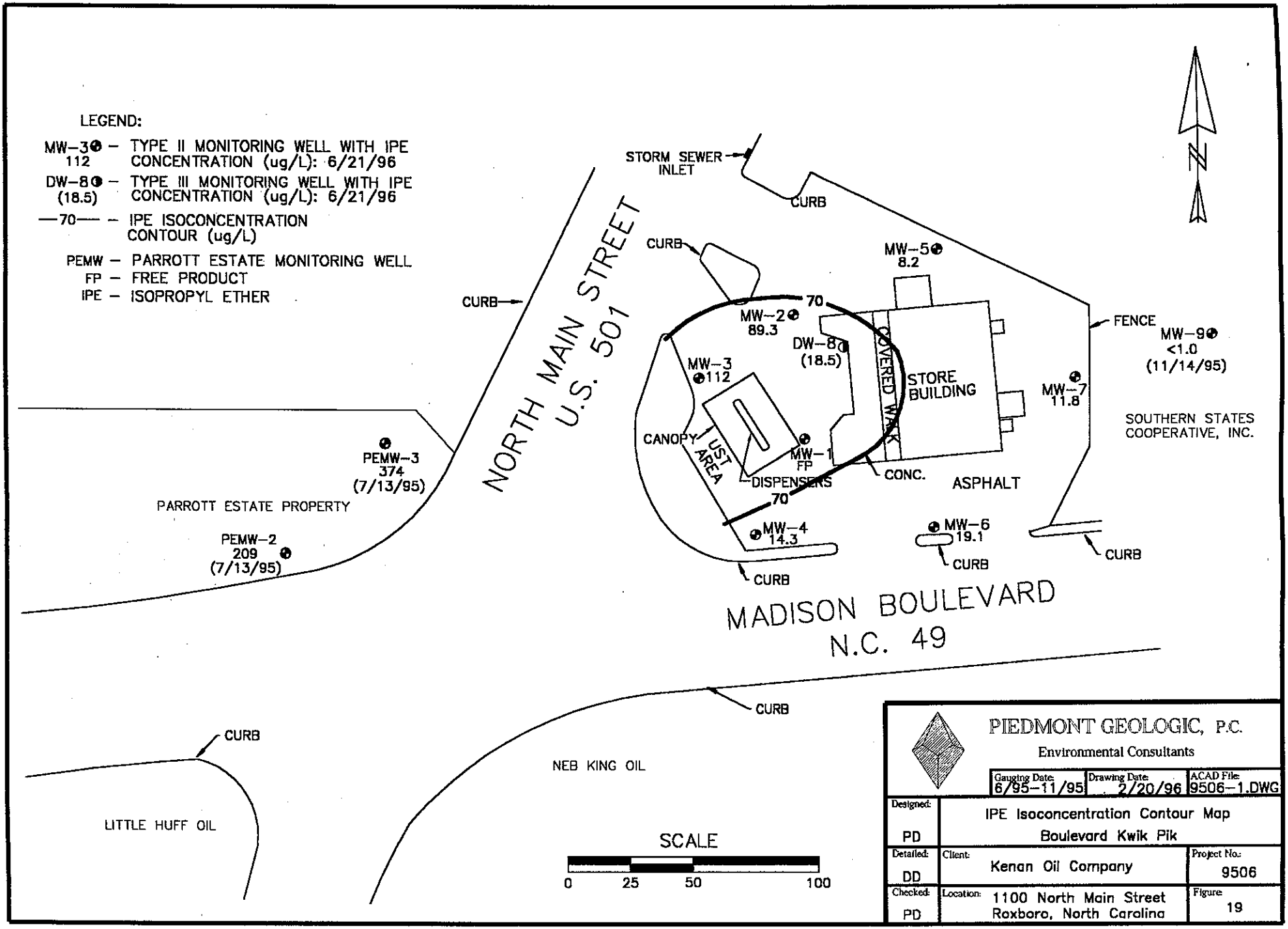


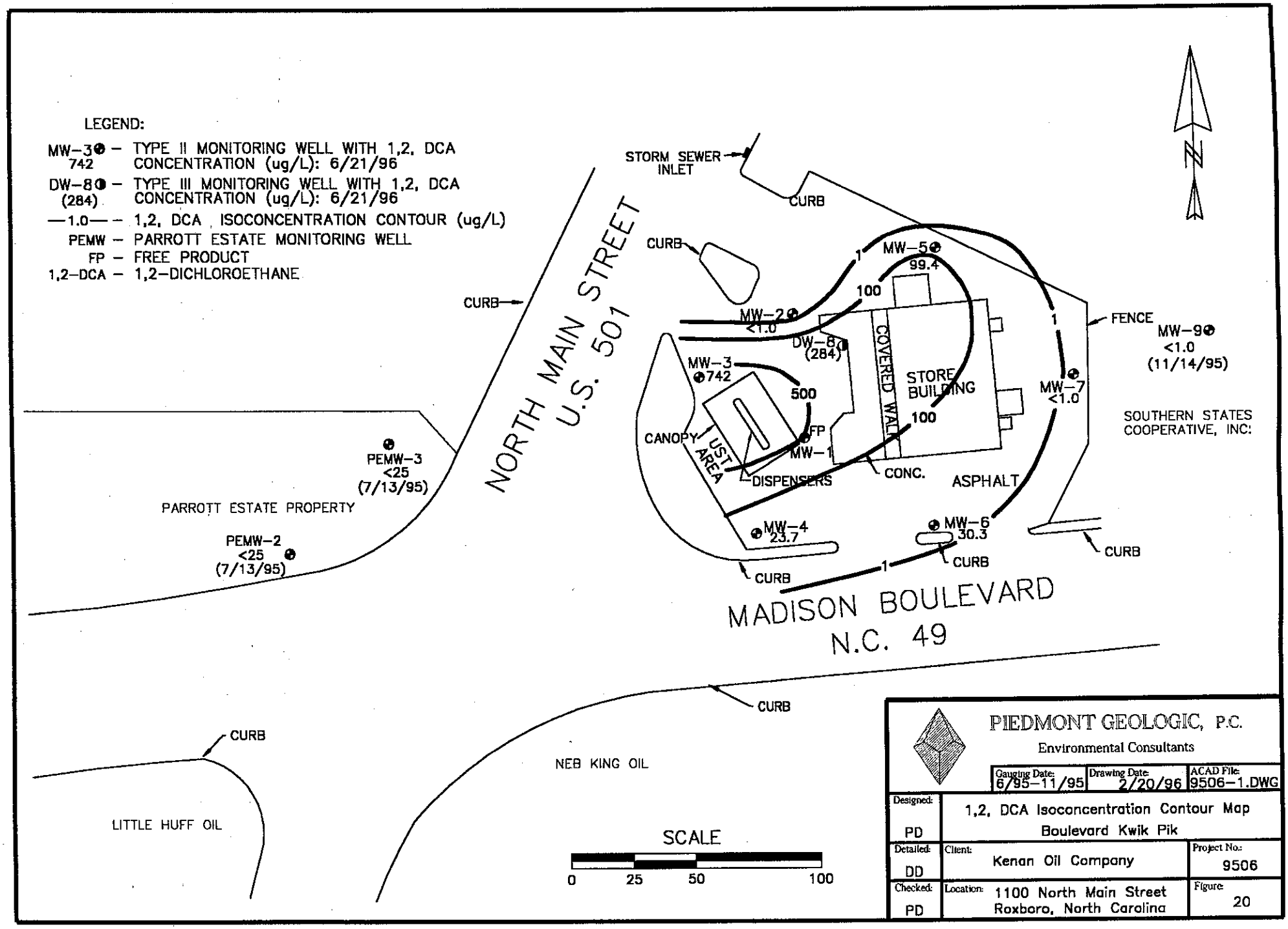
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

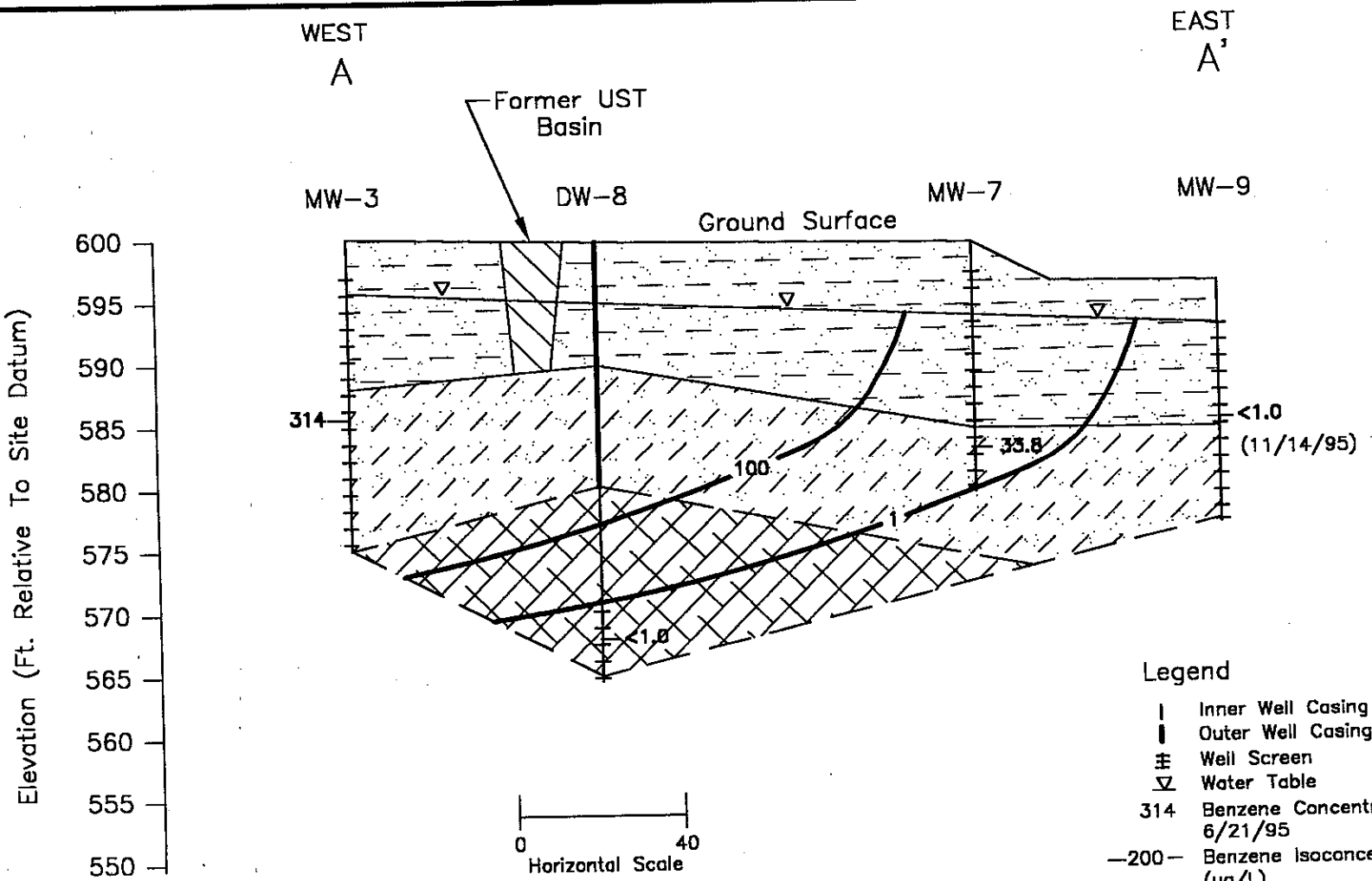
Gauging Date: 6/95–11/95	Drawing Date: 2/20/96	ACAD File: 9506–1.DWG

Designed: PD	Dissolved Benzene Isoconcentration Contour Map Boulevard Kwik Plk	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 17


LEGEND:
MW-3 238 – TYPE II MONITORING WELL WITH MTBE CONCENTRATION (ug/L): 6/21/96
DW-8 (<5.0) – TYPE III MONITORING WELL WITH MTBE CONCENTRATION (ug/L): 6/21/96
—200— – MTBE ISOCONCENTRATION CONTOUR (ug/L) (dashed where inferred)
PEMW – PARROTT ESTATE MONITORING WELL
FP – FREE PRODUCT
MTBE – METHYL TERT-BUTYL ETHER
STORM SEWER INLET
CURB
NORTH MAIN STREET
U.S. 501
MW-5 <5.0
200
1,000
MW-2 1,263
DW-8 (<5.0)
MW-3 238
COVERED WALK
STORE BUILDING
MW-7 <5.0
FENCE
MW-9 7.0 (11/14/95)
SOUTHERN STATES COOPERATIVE, INC.
CANOPY
UST AREA
FP MW-1
DISPENSERS
CONC.
ASPHALT
PEMW-3 1,040 (7/13/95)
PARROTT ESTATE PROPERTY
PEMW-2 176 (7/13/95)
MW-4 748
MW-6 37.5
MADISON BOULEVARD
N.C. 49
NEB KING OIL
LITTLE HUFF OIL
SCALE
0 25 50 100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date: 6/95-11/95
Drawing Date: 2/20/96
ACAD File: 9506-1.DWG
Designed: PD
Dissolved MTBE Isoconcentration Contour Map
Boulevard Kwik Pik
Detailed: DD
Client: Kenan Oil Company
Project No.: 9506
Checked: PD
Location: 1100 North Main Street Roxboro, North Carolina
Figure: 18


LEGEND:
MW-3 112 – TYPE II MONITORING WELL WITH IPE CONCENTRATION (ug/L): 6/21/96
DW-8 (18.5) – TYPE III MONITORING WELL WITH IPE CONCENTRATION (ug/L): 6/21/96
—70— – IPE ISOCONCENTRATION CONTOUR (ug/L)
PEMW – PARROTT ESTATE MONITORING WELL
FP – FREE PRODUCT
IPE – ISOPROPYL ETHER
STORM SEWER INLET
CURB
NORTH MAIN STREET
U.S. 501
MW-5 8.2
MW-2 89.3
70
DW-8 (18.5)
MW-3 112
COVERED WALK
STORE BUILDING
FENCE
MW-9 <1.0 (11/14/95)
MW-7 11.8
SOUTHERN STATES COOPERATIVE, INC.
CANOPY
UST AREA
MW-1 FP
DISPENSERS
CONC.
ASPHALT
PEMW-3 374 (7/13/95)
PARROTT ESTATE PROPERTY
PEMW-2 209 (7/13/95)
MW-4 14.3
MW-6 19.1
MADISON BOULEVARD
N.C. 49
NEB KING OIL
LITTLE HUFF OIL
SCALE
0 25 50 100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date: 6/95–11/95
Drawing Date: 2/20/96
ACAD File: 9506–1.DWG
Designed: PD
IPE Isoconcentration Contour Map
Boulevard Kwik Pik
Detailed: DD
Client: Kenan Oil Company
Project No.: 9506
Checked: PD
Location: 1100 North Main Street Roxboro, North Carolina
Figure: 19

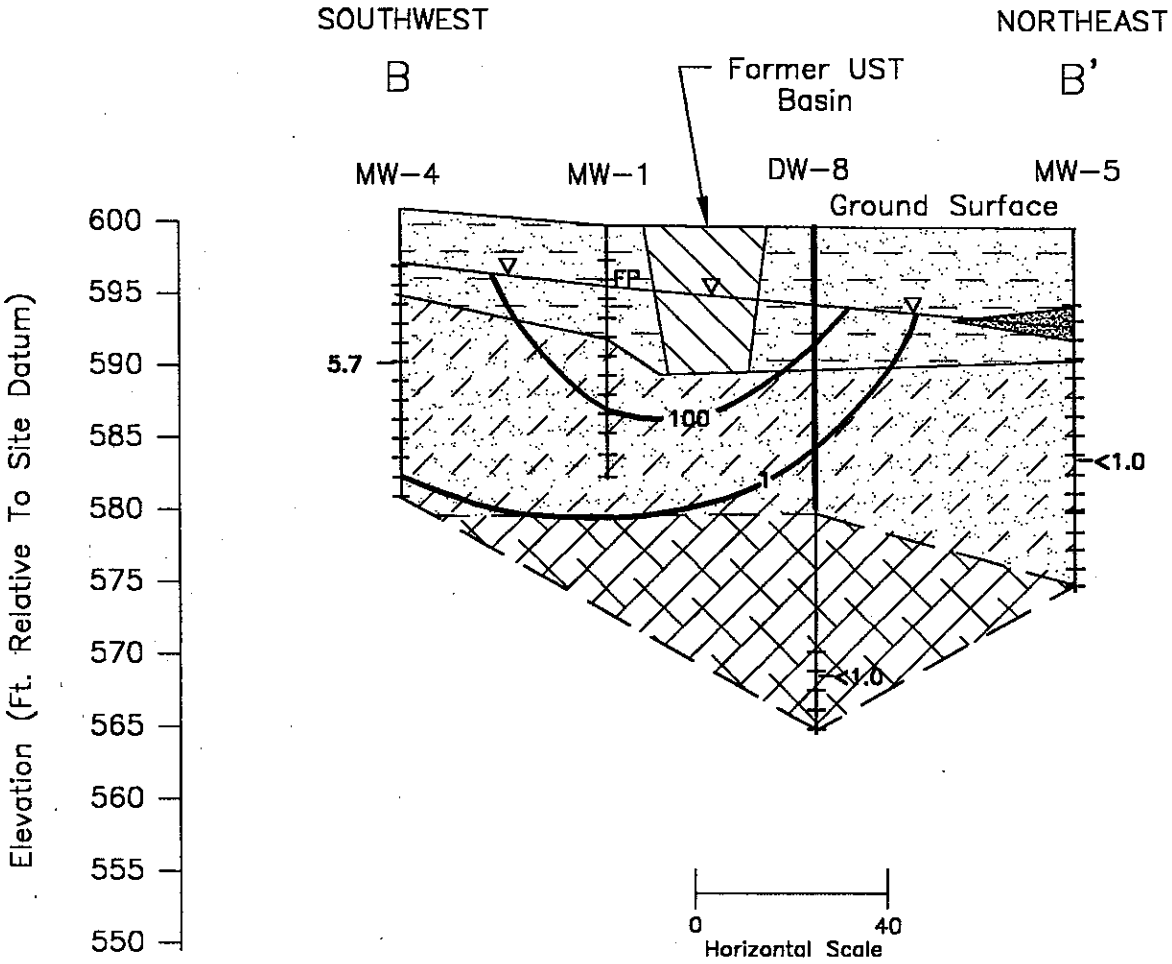

LEGEND:
MW-3 742 – TYPE II MONITORING WELL WITH 1,2, DCA CONCENTRATION (ug/L): 6/21/96
DW-8 (284) – TYPE III MONITORING WELL WITH 1,2, DCA CONCENTRATION (ug/L): 6/21/96
—1.0— – 1,2, DCA ISOCONCENTRATION CONTOUR (ug/L)
PEMW – PARROTT ESTATE MONITORING WELL
FP – FREE PRODUCT
1,2-DCA – 1,2-DICHLOROETHANE
STORM SEWER INLET
CURB
NORTH MAIN STREET
U.S. 501
MW-5 99.4
MW-2 <1.0
DW-8 (284)
MW-3 742
MW-1
FP
MW-4 23.7
MW-6 30.3
MW-7 <1.0
MW-9 <1.0 (11/14/95)
FENCE
COVERED WALK
STORE BUILDING
CANOPY
UST AREA
DISPENSERS
CONC.
ASPHALT
100
500
1
SOUTHERN STATES COOPERATIVE, INC.
PEMW-3 <25 (7/13/95)
PARROTT ESTATE PROPERTY
PEMW-2 <25 (7/13/95)
MADISON BOULEVARD
N.C. 49
NEB KING OIL
LITTLE HUFF OIL
SCALE
0 25 50 100
PIEDMONT GEOLOGIC, P.C.
Environmental Consultants
Gauging Date: 6/95-11/95
Drawing Date: 2/20/96
ACAD File: 9506-1.DWG
Designed: PD
1,2, DCA Isoconcentration Contour Map
Boulevard Kwik Pik
Detailed: DD
Client: Kenan Oil Company
Project No.: 9506
Checked: PD
Location: 1100 North Main Street Roxboro, North Carolina
Figure: 20



PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date: 6/95-11/95	Drawing Date: 2/20/96	ACAD File: 9506.DWG

Designed: PD	Dissolved Benzene Isoconcentration Cross Section A-A' Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 21



Legend

- Inner Well Casing
- Outer Well Casing
- Well Screen
- Water Table
- FP — Free Product
- 5.7 — Benzene Concentration (ug/L): 6/21/95
- —1— Benzene Isoconcentration Contour (ug/L)

Fine Sandy Clay and Clayey Silt: Mottled Brown, Reddish Brown, and Gray; Occasional Silty Sand/Gravel Layers. (Fill Materials).

Silty Sand; brown.

Clayey Silt and Sandy Silt with Relict Bedrock Structures: Brown, Grayish-Brown, and Whitish-Gray; Some Remnant Bedrock Fragments. (Saprolite).

Bedrock: Weathered Sandy Meta-Mudstone.

PIEDMONT GEOLOGIC, P.C.
Environmental Consultants

Gauging Date: 6/95-11/95	Drawing Date: 2/20/96	ACAD File: 9506.DWG

Designed: PD	Dissolved Benzene Isoconcentration Cross Section B-B' Boulevard Kwik Pik	
Detailed: DD	Client: Kenan Oil Company	Project No.: 9506
Checked: PD	Location: 1100 North Main Street Roxboro, North Carolina	Figure: 22

TABLE 1
FREE PRODUCT RECOVERY DATA: MW-1

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Date	Depth to Product (ft. below TOC)	Depth to Water (ft. below TOC)	Apparent Product Thickness (ft.)	Volume of Product Removed	Remarks
6/21/95	3.63	3.79	0.16	200 ml	Product bailed
6/28/95	3.09	3.15	0.06	50 ml	Product bailed
8/9/95	3.44	3.57	0.13	100 ml	Product bailed
10/3/95	3.92	4.05	0.13	165 ml	Passive bailer installed
10/25/95	3.13	ND	----	250 ml	Passive bailer installed
11/14/95	2.80	ND	----	0 ml	Passive bailer installed
12/12/95	3.05	ND	----	0 ml	Passive bailer installed
1/25/95	2.83	ND	----	0 ml	Passive bailer installed
2/29/96	2.76	ND	----	0 ml	Passive bailer installed
Total	----	----	----	**765 ml**	----

TOC = Top of casing
ml = milliliters

TABLE 2
SURROUNDING PROPERTY OWNERS*

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

MAP NO.	LOT NO.	OWNER NAME/ ADDRESS	TYPE OF PROPERTY
7	2, 3	Tom's Auto Supply of Roxboro, Inc. P.O. Box 561 Roxboro, NC 27573	Commercial
7	4, 6	Nesbit King, Jr. 1028 N. Main St. Roxboro, NC 27573	Commerical (Neb King Oil facility)
7	4-1, 29	C & G Supply Center, Inc. 111 Virgilina Rd. Roxboro, NC 27573	Commercial
7	5	Nesbit, A. and Bobbie B. King 1028 N. Main St. Roxboro, NC 27573	Commercial
7	19	William M. Clayton & others 833 Semora Rd. Roxboro, NC 27573	Commercial
7	20	Thelma Dunn 1032 N. Madison Blvd. Roxboro, NC 27573	Residence
7	21	Scottie S. Meads & others 357 Hammer Rd. Elizabeth City, NC 27909	Residence
7	22	William M. Perkins 313 High St. Roxboro, NC 27573	Residence
7	23	William O. Humphries P.O. Box 939 Roxboro, NC 27573	Commercial (Little Huff facility)
7	24	Bernard M. & Shirley A. Fogelman 427 Reade Dr. Roxboro, NC 27573	Commercial
8	2	Jack T. Parrot (Heirs) Box 931 c/o CCB Trust Dept. Durham, NC 27702	Commercial (Parrott Estate site)
8	2	Samuel P. Davis 2260 Onslow Dr. Jacksonville, NC 28540	Residence
8	3	Margaret D. Yarboro 314 Semora Dr. Roxboro, NC 27573	Residence
8	4	Top Investments, Inc. Box 1297 Roxboro, NC 27573	Commercial

TABLE 2 (continued)
SURROUNDING PROPERTY OWNERS*

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

MAP NO.	LOT NO.	OWNER NAME/ ADDRESS	TYPE OF PROPERTY
8	6	Doris W. Masten 497 Gravitte Rd. Roxboro, NC 27573	Residence
8	18	Harry Lee Oakley 1450B Oxford Rd. Roxboro, NC 27573	Commercial
8	19	Southern States Cooperative, Inc. P.O. Box 26234 Richmond, VA 23260	Commercial (Southern States store)
8	20, 21	Bernard M. & Shirley A. Fogelman 427 Reade Dr. Roxboro, NC 27573	Commercial (Boulevard Kwik Pik)
8	22	Jack & Rosalie Gates Drawer 720 Roxboro, NC 27573	Commercial
8	23-3	Walter O. Humpries, Jr. P.O. Drawer 1122 Danville, VA 24541	Commercial
8	23-6	George M. Lattimore P.O. Box 10767 Raleigh, NC 27605	Residence (apartments)
8	54	William T. Lattimore P.O. Box 10767 Raleigh, NC 27605	Residence (apartments)

* Source: Person County tax maps.
See Figure 6 for property locations.

TABLE 3
RESULTS OF FIELD SCREENING AND LABORATORY ANALYSIS OF SOIL SAMPLES

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Boring/Sample I.D.	Date	Sample Depth (ft below grade)	Headspace VOCs (ppm)*	TPH as Diesel (mg/kg) (Method 8015/3550)	TPH as Gasoline (mg/kg) (Method 8015/5030)
SW-1**	11/4/94	6.5	66.1	NA	9.3
SW-2**	11/4/94	6.5	47.4	NA	<2.0
SW-3**	11/4/94	6.5	427.3	NA	2.6
SW-4**	11/4/94	6.5	828.8	NA	54.8
D-1**	11/4/94	6.5	1954	NA	1,789
D-2**	11/4/94	6.5	1920	NA	7,671
MW-1**	1/10/95	3-5	2630	NA	221
	1/10/95	8-10	378	NA	NA
	1/10/95	13-15	23	NA	NA
MW-2**	1/10/95	3-5	159	NA	NA
	1/10/95	8-10	240	NA	4.2
	1/10/95	13-15	6	NA	NA
MW-3	6/13/95	4-6	465	NA	NA
	6/13/95	6-8	99	NA	NA
	6/13/95	8-10	1740	NA	NA
	6/13/95	10-12	2220	<1.3	<2.0
	6/13/95	12-14	165	NA	NA
	6/13/95	15-17	NR	NA	NA
	6/13/95	18-20	195	NA	NA
MW-4	6/14/95	0-4	80	NA	NA
	6/14/95	4-6	39	NA	NA
	6/14/95	6-8	27	NA	NA
	6/14/95	8-10	20	NA	NA
	6/14/95	10-12	42	NA	NA
	6/14/95	12-14	22	NA	NA
	6/14/95	14-16	84	<1.1	<2.0
MW-5	6/13/95	0-4	80	NA	NA
	6/13/95	4-6	42	NA	NA
	6/13/95	6-8	64	NA	NA
	6/13/95	8-10	69	NA	NA
	6/13/95	10-12	82	<1.2	<2.0
	6/13/95	12-14	79	NA	NA
	6/13/95	18-19	30	NA	NA

TABLE 3 (continued)
RESULTS OF FIELD SCREENING AND LABORATORY ANALYSIS OF SOIL SAMPLES

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Boring/Sample I.D.	Date	Sample Depth (ft below grade)	Headspace VOCs (ppm)*	TPH as Diesel (mg/kg) (Method 8015/3550)	TPH as Gasoline (mg/kg) (Method 8015/5030)
MW-6	6/13/95	0-4	70	NA	NA
	6/13/95	4-6	55	NA	NA
	6/13/95	6-8	56	NA	NA
	6/13/95	8-10	10	NA	NA
	6/13/95	10-12	21	NA	NA
	6/13/95	12-14	84	NA	NA
	6/13/95	15-17	142	<1.3	<2.0
	6/13/95	18-20	31	NA	NA
MW-7	6/13/95	4-6	86	NA	NA
	6/13/95	6-8	245	<1.2	13.2
	6/13/95	8-10	165	NA	NA
	6/13/95	10-12	240	NA	NA
	6/13/95	14-16	84	NA	NA
	6/13/95	18-19	46	NA	NA
DW-8	6/13/95	5-7	162	NA	NA
	6/13/95	10-12	279	<1.3	<2.0
	6/13/95	15-17	37	NA	NA
MW-9	11/1/95	0-2	0	NA	NA
	11/1/95	2-4	0	NA	<2.0
	11/1/95	4-6	0	NA	NA
	11/1/95	8-10	0	NA	NA
	11/1/95	13-15	0	NA	NA
	11/1/95	18-20	0	NA	NA

NA = Not analyzed
* Measured using photoionization detector calibrated to isobutylene standard
** Results as reported by ENSCI Environmental, Inc. (1994, 1995)

TABLE 4
MONITORING WELL SPECIFICATIONS

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Well No.	Date(s) Installed	Total Depth (1)	Outer Casing Depth (1)	Outer Casing I.D.	Outer Casing Material	Well Screen/ Casing I.D.	Well Screen/ Casing Material	Screen Interval (1)	Screen Slot Size	TOC Elev. (2)
MW-1	1/10/95	18	N/A	N/A	N/A	2"	Sch 40 PVC	3-18	0.010"	599.53
MW-2	1/10/95	18	N/A	N/A	N/A	2"	Sch 40 PVC	3-18	0.010"	599.46
MW-3	6/13/05	23	N/A	N/A	N/A	2"	Sch 40 PVC	3-23	0.010"	600.60
MW-4	6/14/95	19	N/A	N/A	N/A	2"	Sch 40 PVC	4-19	0.010"	600.29
MW-5	6/13/95	25	N/A	N/A	N/A	2"	Sch 40 PVC	5-25	0.010"	599.52
MW-6	6/13/95	18	N/A	N/A	N/A	2"	Sch 40 PVC	3-18	0.010"	598.07
MW-7	6/13/95	18	N/A	N/A	N/A	2"	Sch 40 PVC	3-18	0.010"	599.23
DW-8	6/13-14/95	35	20	6"	Sch 40 PVC	2"	Sch 40 PVC	30-35	0.010"	599.36
MW-9	11/1/95	20	N/A	N/A	N/A	2"	Sch 40 PVC	5-20	0.010"	

TOC = Top of casing
(1) Measured in feet below TOC.
(2) Measured in feet relative to site datum.

TABLE 5
GROUNDWATER LEVEL DATA

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

JUNE 21, 1995				
WELL I.D.	**REF. POINT ELEV. (FT) (1)**	**DEPTH TO PRODUCT (FT) (2)**	**DEPTH TO WATER (FT) (2)**	**CORRECTED GROUNDWATER ELEVATION (2)(3)**
MW-1	599.53	3.63	3.79	595.87
MW-2	599.46	ND	4.35	595.11
MW-3	600.60	ND	4.40	596.20
MW-4	600.29	ND	4.01	596.28
MW-5	599.52	ND	6.40	593.12
MW-6	598.07	ND	3.22	594.85
MW-7	599.23	ND	6.44	592.79
DW-8	599.36	ND	6.10	593.26
JUNE 28, 1995				
WELL I.D.	**REF. POINT ELEV. (FT) (1)**	**DEPTH TO PRODUCT (FT) (2)**	**DEPTH TO WATER (FT) (2)**	**CORRECTED GROUNDWATER ELEVATION (2)(3)**
MW-1	599.53	3.09	3.15	596.43
MW-2	599.46	ND	4.25	595.21
MW-3	600.60	ND	3.36	597.24
MW-4	600.29	ND	3.25	597.04
MW-5	599.52	ND	5.80	593.72
MW-6	598.07	ND	2.61	595.46
MW-7	599.23	ND	4.95	594.28
DW-8	599.36	ND	4.86	594.50

(1) Relative to site datum
(2) Feet below reference point
(3) Corr. groundwater elev. = (ref point elev.) - (depth to water) + (product thick.)(product spec. gravity)
Assume product specific gravity = 0.80
ND= Not detected

TABLE 6
RESULTS OF LABORATORY ANALYSIS
GROUNDWATER SAMPLES COLLECTED 1/10/95*

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Sample I.D.	MW-1	MW-2	Class GA Standard
Sample Date	1/10/95	1/10/95	
Analysis (Units)(Method)			
Purgeable Halocarbons (EPA Method 601)(ug/L)**			
1,2-Dichloroethane	460	<40.0	0.38
Purgeable Aromatics (EPA Method 602 modified)(ug/L)			
Benzene	1600	<40.0	1.0
Toluene	2100	<40.0	1000
Ethylbenzene	1000	<40.0	29
Xylenes (total)	4600	<40.0	530
Methyl-tert-butyl Ether	1080	1840	200
Ethylene Dibromide	<100	<40.0	0.0004
Isopropyl Ether	<500	<200	70

* As reported by ENSCI Environmental, Inc. (2/10/95)
** Constituents detected in one or more samples are listed

TABLE 7
RESULTS OF LABORATORY ANALYSIS
GROUNDWATER SAMPLES COLLECTED 6/21/95 AND 11/14/95

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Sample I.D.	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	DW-8	MW-9	Class GA
Sample Date	6/21/95	6/21/95	6/21/95	6/21/95	6/21/95	6/21/95	6/21/95	6/21/95	11/14/95	Standard
Analysis (Units)(Method)										
Purgeable Halocarbons (EPA Method 601)(ug/L)*	NS									
1,2-Dichloroethane		<1.0	742	23.7	99.4	30.3	<1.0	284	<1.0	0.38
Purgeable Aromatics (EPA Method 602 modified)(ug/L)*	NS									
Benzene		<1.0	314	5.7	<1.0	<1.0	33.8	<1.0	<1.0	1.0
Toluene		<1.0	820	13.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
Ethylbenzene		<1.0	438	3.0	<1.0	<1.0	6.5	<1.0	<1.0	29
Xylenes (total)		<1.0	1286	10.6	<1.0	<1.0	11.3	<1.0	<1.0	530
Methyl-tert-butyl Ether		1263	238	748	<5.0	37.5	<5.0	<5.0	7.0	200
Ethylene Dibromide		<1.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.020**	0.0004
Isopropyl Ether		89.3	112	14.3	8.2	19.1	11.8	18.5	<1.0	70
Base Neutrals/Acid Extractables (EPA Method 625)(ug/L)	NS	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Total Lead (Standard Method 3030C)(mg/L)	NS	<0.001	0.007	<0.001	<0.001	0.001	<0.001	0.005	NA	0.015

NOTES:
* = Constituents detected in one or more samples are listed
** = Analyzed by EPA Method 504
NS = Not sampled due to presence of free product
NA = Not analyzed
BDL = All constituents below detection limit

TABLE 8
RESULTS OF CONFIRMATORY LABORATORY ANALYSIS
GROUNDWATER SAMPLES COLLECTED 8/9/95

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Sample I.D.	MW-3	MW-7	DW-8	Class GA Standard
Sample Date	8/9/95	8/9/95	8/9/95	
Analysis (Units)(Method)				
Purgeable Halocarbons (EPA Method 624)(ug/L)		NA		
1,2-Dichloroethane	233		132	0.38
Benzene	365		<1.0	1.0
Toluene	132		<1.0	1000
Ethylbenzene	150		<1.0	29
Isopropyl Ether	106		25.0	70
Purgeable Aromatics (EPA Method 602 modified)(ug/L)	NA		NA	
Benzene		43.0		1.0
Toluene		1.04		1000
Ethylbenzene		17.5		29
Xylenes (total)		8.05		530
Methyl-tert-butyl Ether		37.4		200
Isopropyl Ether		18.6		70

NA = Not analyzed

TABLE 9
RESULTS OF LABORATORY ANALYSIS
FREE PRODUCT SAMPLE COLLECTED 8/9/95: MW-1

Boulevard Kwik Pik
1100 N. Main Street
Roxboro, North Carolina
Kenan Oil Company

Sample I.D.	MW-1 PRODUCT
Sample Date	8/9/95
Analysis	
Product Identification (1)	Weathered gasoline
1,2-Dichloroethane (ug/L)	<607,000*
Isopropyl Ether (ug/L) (2)	<607,000*

(1) Analyzed by GC/FID/ELCD
(2) Analyzed by SW-846 Method 8240
* below practical quanititation limit

CORRECTIVE ACTION PLAN

Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina
Groundwater Incident # 16068
Priority Rank: Intermediate

Prepared for:

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February 1999

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CORRECTIVE ACTION PLAN

Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina
Groundwater Incident # 16068
Priority Rank: Intermediate

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

The completion of a Corrective Action Plan (CAP) is required for this site because

1.) soil impact is present above residential clean-up levels as listed in the January 2, 1998 *Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater, Volume II*, published by the North Carolina Department of Environment and Natural Resources (DENR); and

2.) dissolved benzene concentrations in samples from one monitoring well are above the GCL (as listed in the *Guidelines*).

The purpose of corrective action, in accordance with 15A NCAC Subchapter 2L Section .0106 (k), is to reduce concentrations of petroleum hydrocarbons in the soil and ground water at and near the source area with an active remediation system while monitoring natural attenuation on the periphery of the impacted area.

Corrective action in this manner appears to be feasible at this site for the following reasons:

- The source of petroleum hydrocarbons will be reduced by active remediation.
- Nonaqueous-phase liquid (NAPL) has not been observed at the site since 1995.
- The rate and direction of dissolved compound migration can be predicted.
- The site is located within the Roxboro municipal limits, and potable water is supplied to the area by the municipality.

1.2 DESCRIPTION OF SITE AND SURROUNDING AREA

The former Boulevard Kwik Pik is presently an active retail gasoline outlet and convenience store. The site is located at 1100 North Main Street in Roxboro, Person County, North Carolina north of the intersection of North Main Street (U.S. Highway 501) and Madison Boulevard (N.C. Highway 49) (Figures 1 and 2). The property is owned by Bernard and Shirley Fogleman. According to the 1995 Comprehensive Site Assessment prepared by Piedmont Geologic, P.C., Kenan Oil Company, Inc. owned the property prior to 1978. Kenan Oil Company, Inc. changed its name to Holmes Oil Company, Inc. in the summer of 1998.

The former underground storage tank (UST) systems were installed in 1978 and were removed in November 1994. Details of UST closure are included in the December 1994 UST Closure Report prepared by ENSCI Engineering Group, P.A. (ENSCI). The former UST and dispenser locations are shown in Figure 2.

Surrounding properties include Madison Boulevard (N.C. Highway 49) to the south, North Main Street (U.S. Highway 501) to the west, and Southern States Cooperative to the east, northeast, and north. Releases from petroleum USTs have been documented at four properties adjacent to or near the site: Southern States Cooperative, Inc. (Incident #15991) located adjacent to the site to the north and east, the Parrott Estate (Incident # 9814) located west of the site across U.S. Highway 501, Little Huff, Inc. (Incident # 5521) located across Madison Boulevard and North Main Street southwest of the site, and Neb King Oil Company (Incident # 10784) located across Madison Boulevard south of the site. Another Incident Number (8084) is assigned to Collins and Aikman, located at 1803 North Main Street, north of the site and Southern States. Residences are located within 500 feet of the site across North Main Street, and apartments are located behind these residences. Surrounding properties are shown in Figure 3.

Water-supply wells were not observed within 1,000 feet of the site, and no irrigation wells were observed within 250 feet of the site. The site and surrounding properties are connected

to a municipal water supply. The closest surface-water body to the site is Marlowe Creek located approximately 600 feet east of the site (Figure 1).

1.3 WORK COMPLETED TO DATE AND RESULTS

1.3.1 Underground Storage Tank Closure and Initial Abatement

Petroleum hydrocarbons were detected in soil samples collected during UST-system closure in November 1994. Four soil samples were collected from the sidewalls of the UST excavation above the static water level (at a depth of approximately 6½ feet below grade), and two soil samples were collected with a hand auger at each end of the dispenser island at the same depth. Only one of the four samples from the UST excavation was above the 10 mg/kg total petroleum hydrocarbons (TPH) action level. This sample exhibited 54.8 mg/kg TPH in the gasoline range. The two samples from the dispenser island exhibited 1,789 and 7,671 mg/kg TPH in the gasoline range. Approximately 412 tons of soil were removed during UST-system closure and heat volatilized at an off-site facility. The soil-sampling results from the UST-system removal were reported to DENR's Raleigh Regional Office in the December 1994 UST Closure Report prepared by ENSCI.

1.3.2 Initial Site Assessment and Report

Two soil borings were completed as monitoring wells MW-1 and MW-2 in January 1995 by ENSCI. Soil and ground-water samples were collected from the borings/wells, and samples from MW-1 exhibited adsorbed and dissolved petroleum hydrocarbons above action levels, with total dissolved volatile organic compounds (VOCs) of 10,840 µg/L. The soil and ground-water samples from MW-2 were below action levels except for dissolved methyl tertiary butyl ether (MTBE), which was detected at 1,840 µg/L. NAPL was not detected in the subsurface. The results were submitted to the DENR in the 1995 Release Response Report.

1.3.3 Comprehensive Site Assessment and Report

One deep and five shallow soil borings were advanced at the site in June 1995, and one shallow soil boring was completed on the Southern States Cooperative property east of the site in November 1995. These borings were competed as MW-3 through MW-9. The deep boring was completed as a deep well and labeled as MW-8. Soil and ground-water samples were collected and analyzed, and a Comprehensive Site Assessment (CSA) Report was submitted to the DENR by Piedmont Geologic, P.C. in June 1996. The results indicated that NAPL was detected in MW-1 in June through October 1995, but has not been detected on site since October 1995. Dissolved hydrocarbons were detected in samples from MW-3 and MW-4 which are located crossgradient and slightly upgradient of the former USTs and the dispenser island. Each property located on the intersection of North Main Street and Madison Boulevard has had a documented release, and some of the dissolved petroleum hydrocarbons are likely to be from off-site sources, particularly 1,2-dichloroethane. NAPL was detected upgradient and cross gradient of the site in a subgrade telephone vault in 1990. This NAPL appears to be from one of these off-site properties.

1.3.4 Additional Assessment

Soil and ground-water samples were collected near the dispenser island, present UST basin, and former UST basin in August 1998. Soil samples were collected with a push-probe rig and were analyzed in accordance with the standards set for in the January 2, 1998 *Guidelines*. Soil-sample results were below industrial/commercial standards. However one soil sample, GP-2, was above the residential clean-up standard for volatile petroleum hydrocarbons (VPH). Dissolved benzene (at 5,800 µg/L) was detected above the GCL in the ground-water sample from MW-1. No EPA Method 601 or 602 compounds were detected in the ground-water sample from the deep well MW-8. VPH in the C_5 to C_8 aliphatics range was detected at 0.35 mg/L (below the interim ground-water standard) in the sample from MW-8. The sampling results were submitted to the DENR in October 1998. Measurable NAPL was not detected in the subsurface during the August 1998 soil and ground-water sampling events. Water level measurements for this and other sampling events are listed with the well-

completion information in Table 1. Recent and historical ground-water sampling results are listed in Table 2 and the August 1998 soil sampling results are listed in Table 3. The results of soil sampling are also shown on Figure 4. A ground-water elevation contour map is shown in Figure 5, and total dissolved VOCs are shown on Figure 6. The soil-sample laboratory report is included in Appendix A, and the ground-water sample laboratory report is included in Appendix B.

1.3.5 Permits Received to Date

Other than monitoring-well permits, no permits relating to environmental activities have been obtained for the site as of the date of this report.

2.0 OBJECTIVES OF THE CORRECTIVE ACTION PLAN

The primary objective of the proposed corrective action is to reduce the concentration and extent of petroleum hydrocarbons in affected soil and ground water. The target clean-up concentrations for ground water were calculated from solute-transport models and are based on potential risk to the nearest potential receptor, Marlowe Creek, a class C stream. The target ground-water clean-up goals for active remediation on site are discussed here and are listed in Table 4. They are benzene: 2 mg/L, toluene: 2 mg/L, ethylbenzene: 2 mg/L, xylenes: 5 mg/L, MTBE: 2 mg/L, and isopropyl ether (IPE) 1 mg/L. Some of these goals are greater than concentrations observed in recent water samples. Active ground-water remediation will continue on site until samples from the monitoring wells are below the target clean-up goals listed above and in Table 4, or until the asymptotic slope of the reduction in concentration of the compounds is less than a ratio of 1:40 over a period of one year based on quarterly sampling (per 15A NCAC 2N).

The site is capped with concrete and asphalt and is located in a mixed commercial and residential area. Clean up of soil to Residential Clean-Up Levels is the goal of the proposed treatment system. If these levels are not feasible or economical to achieve, then soil will be

considered remediated when asymptotic concentrations, as measured in soil samples from the impacted areas, are observed. Concentrations of petroleum hydrocarbons detected in soil samples collected in 1998 are listed in Table 3 and are shown on Figure 4.

The scheduled remediation-system start-up date is 120 days from receipt of an approved Pre-Authorization Form for the remediation work from the DENR. The system will be shut down when monitoring indicates that the remediation goals or asymptotic values, as stated above, have been attained. The time frame to achieve clean-up goals on site is expected to be five years or less, based on sites with similar systems in similar geologic media. The time frame to achieve 2L standards may be many years, based on conservative solute-transport modeling. The monitoring schedule is listed in Table 4.

3.0 EXPOSURE ASSESSMENT

3.1 PROPERTIES OF SELECTED HYDROCARBONS

Results from ground-water sampling conducted in August 1998 indicate that concentrations of benzene, ethylbenzene, xylenes, MTBE, IPE, and 1,2-dichloroethane (1,2-DCA) were detected in samples from the monitoring wells (Table 3). Physical and chemical properties of the hydrocarbons of greatest concern in gasoline are discussed in this section and were obtained from USEPA (1986), IRIS (1989), (Verschueren, 1977), and Merck (1989). Vapor pressure and Henry's Law Constants are measures of the volatility of a compound. The higher the numbers, the more likely the compound is to volatilize. The solubility of a pure compound in water is the maximum dissolved concentration observed in water under equilibrium conditions. However, the presence of other compounds may make the actual dissolved concentration higher. The organic carbon partitioning coefficient (K_{oc}) measures the partitioning of the compound between water and organic carbon. The higher the K_{oc}, the more likely the compound is to bind to the soil.

Benzene is a colorless to light yellow liquid at standard temperature and pressure with an "aromatic" odor. It is relatively volatile (vapor pressure of 78 mm of Mercury (Hg) at 20°C, and Henry's Law constant of 0.00543 atm m^3/mole at 25°C) and has a relatively low K_{oc} of 5.2 L/kg. Benzene has a water solubility of 1,780 mg/L at 20°C. The estimated bioconcentration factor is 6.5, and the bioaccumulation of benzene is expected to be relatively low. Benzene is absorbed by inhalation, ingestion, and dermal contact. Exposure routes include inhalation of vapors on site. The risk of human exposure to benzene via surface water is relatively low due to a relatively short half life in water and relatively low bioconcentration factor. It is a known human carcinogen with a 10^5 cancer risk (1 chance in 100,000) of 10 µg/L in drinking water. The Safe Drinking Water Act's Maximum Contaminant Level (MCL) for benzene is 5 µg/L. The 2L ground-water standard is 1µg/L.

Ethylbenzene is a colorless liquid with a slightly sweet odor. It has a vapor pressure of 7 mm Hg at 20°C and a Henry's Law constant of 0.0079 atm m^3/mole at 25°C. Is has a water solubility of 152 mg/L at 20°C, and a K_{oc} of 681. Ethylbenzene is relatively volatile, but is less volatile and more likely to be adsorbed to soil particles than benzene. It also has a higher bioconcentration factor than benzene, and therefore has more of a tendency to bioaccumulate. The bioconcentration factor is estimated to be 37.5 L/kg. The carcinogenicity of ethylbenzene has not been classified. The Safe Drinking Water Act's MCL for ethylbenzene is 700 µg/L. The 2L ground-water standard is 29 µg/L.

Toluene is also a colorless liquid at standard temperature and pressure. It has an aromatic odor and a water solubility of 515 mg/l at 20°C. Toluene has a vapor pressure of 22 mm Hg at 20°C, and a Henry's Law constant of 0.00661 atm m^3/mole at 25°C. The K_{oc} is 259. With an estimated bioconcentration factor of 27.1 L/kg, toluene has a bioaccumulation potential similar to ethylbenzene. The carcinogenicity of toluene has not been classified. The Safe Drinking Water Act's MCL for toluene is 1,000 µg/L. The 2L ground-water standard is also 1,000 µg/L.

Xylenes (a combination of o-xylene, m-xylene, and p-xylene) are colorless liquids with an aromatic odor. Xylenes readily adsorb to soil particles and have a K_{oc} of 691. They are relatively volatile with a vapor pressure of 7 to 9 mm Hg at 20°C and a Henry's Law constant of 0.0049 to 0.007 at m^3/mole at 25°C. Xylenes have a relatively moderate bioaccumulation potential with an estimated bioconcentration factor of 69 L/kg. The carcinogenicity of xylenes has not been classified. The Safe Drinking Water Act's MCL for xylenes is 10,000 µg/L. The 2L ground-water standard is 530 µg/L.

MTBE is more soluble and less volatile than benzene. It is also less likely to adsorb to soil particles and has a bioconcentration factor of 2.53 L/kg. It has a vapor pressure of 245 mm Hg and a Henry's Law constant of 0.00058 at m^3/mole. The water solubility is 40 to 48 g/L at 20°C. The carcinogenicity of MTBE has not been classified. A federal MCL for MTBE does not presently exist. The 2L ground-water standard is 200 µg/L.

IPE is more soluble and more volatile than benzene. The water solubility is 90 g/L at 20° C. The 2L ground-water standard is 70 µg/L, but a MCL for IPE does not presently exist.

1,2-Dichloroethane (1,2-DCA or ethylene dichloride) is a colorless liquid used as an additive to gasoline, in the manufacturing of tetraethyl lead and insecticide, as tobacco flavoring, varnish remover, and metal degreaser. It is a possible human carcinogen. The MCL for 1,2-DCA is 5 µg/L. The 2L ground-water standard is 0.038 µg/L.

3.2 POTENTIAL RECEPTORS, HUMAN EXPOSURE PATHWAYS, AND SITE-SPECIFIC EXPOSURE POTENTIAL

Water-supply wells were not observed within 1,000 feet of the site and do not appear to be present between the site and the closest ground-water discharge point, Marlowe Creek, located approximately 600 feet east of the site (Figure 1). Marlowe Creek has a Stream Classification of "C." This stream is the closest ground-water receptor downgradient of the site. Because ground water is relatively shallow near the site (approximately 5 feet below land surface), subgrade utilities are potential receptors of impacted ground water in the area.

Utilities are also potential receptors of petroleum vapors. Ground water and vapors may migrate along buried utilities to utility vaults and buildings, where human exposure may occur. Subgrade utilities do not appear to be controlling petroleum hydrocarbon migration on site, but monitoring of utility vaults near the site will be incorporated into the site monitoring plan for corrective action.

The site is paved, and therefore direct human contact with impacted soil at the site is unlikely unless the soil is excavated with heavy equipment. Impacted soil will be a source of petroleum hydrocarbons for the ground water if it is not remediated.

The purpose of this CAP is to reduce petroleum hydrocarbons at the site and to put in place a monitoring plan to determine if the potential receptor might become impacted so that remediation can be extended to a larger area, if necessary.

3.3 REDUCTION OF EXPOSURE POTENTIAL THROUGH SOURCE REDUCTION AND NATURAL ATTENUATION

3.3.1 Analytical Model Inputs

Calculation of the dissolved-phase petroleum hydrocarbon concentrations over time has been conducted using a two-dimensional solute-transport model based on the solute-transport equation developed by Domenico (1987) from earlier work by Ogata and Banks (1961), Cherry *et al.* (1984), and other researchers. This program (BIOSCREEN version 1.3) was developed under the auspices of the U.S. Air Force Center for Environmental Excellence and the USEPA and has the option of incorporating natural biodegradation and the retardation of each constituent due to the effects of adsorption to the matrix. Longitudinal and transverse dispersivity are also factored into the model. Hydrodynamic dispersion is related to molecular diffusion and dynamic dispersivity, which is the mechanical mixing due to local variations in flow velocity. Field studies have indicated that hydrodynamic dispersion is scale dependent, and therefore one tenth of the plume length is a generally accepted

longitudinal dispersivity value (Pickens and Grisak, 1981). For this model, longitudinal dispersivity was one tenth of the distance from the source to the receptor.

To calculate the velocity of each constituent due to retardation, the advective velocity in a homogeneous isotropic formation is first calculated with the following equation:

$$\mathbf{v = (K/n)(dh/dl)} \qquad \textbf{(1)}$$

where:

v	= average ground-water (advective) velocity (feet/year)
K	= average hydraulic conductivity (feet/year)
dh/dl	= average hydraulic gradient (feet/foot)
n	= effective porosity (dimensionless)

The advective ground-water velocity was calculated to be approximately 4.26 feet per year using the horizontal hydraulic gradient calculated from the August 1998 water-level data and slug test data collected by Piedmont Geologic during the CSA (submitted in 1996). Hydraulic conductivity values were recalculated from the slug test data because the values used in the CSA appeared to be derived from early time-water level data when water drains from the porous filter pack around the well screen. The newly calculated hydraulic conductivities ranged from 0.053 feet per day to 0.126 feet per day (all on the order of 10^{-5} cm/sec). The slug test and velocity calculations are included in Appendix C. Because the hydraulic conductivity values had the same order of magnitude, the arithmetic mean (rather than the geometric mean) of the values was used to calculate the average advective velocity (approximately 4.26 feet per year, assuming a porosity of 0.25, a horizontal hydraulic gradient of 0.032, homogeneous and isotropic conditions). The BIOSCREEN model input sheet (included in Appendix C) rounded this value to 5 feet per year when it was entered. This velocity may not represent the velocity of individual compounds within the formation. The movement of these compounds within the formation is affected by variations in geologic conditions (which are somewhat accounted for by the longitudinal dispersivity value α_X), organic carbon content, dilution, sorption, volatilization, and biodegradation.

The constituent velocity is calculated using the following equation:

$$v_i = v/R_i \quad (2)$$

where:

v_i = velocity of constituent i (feet/year)
v = ground-water (advective) velocity (feet/year)

and

R_i = retardation factor of constituent i, a number which accounts for adsorption to organic carbon in the matrix

The retardation factor, R, was estimated from total organic carbon (TOC) concentrations detected in soil samples from the site (samples GP-2, GP-4, and GP-8). The laboratory report and retardation factor calculations are included in Appendix C. TOC concentrations were relatively high for this site resulting in large values of R. These values were reduced in the model because modeled results could not mimic actual data collected from the site with the relatively large R values calculated from site TOC samples.

Biodegradation appears to be occurring at the site, but at a relatively slow pace. Aerobic and anaerobic heterotrophic plate counts were conducted on three water samples (MW-1 – the most impacted, MW-7 – somewhat impacted, and MW-9 – not impacted) and three soil samples (GP-2 – the most impacted, GP-4 – not impacted, and GP-8 – somewhat impacted). The results indicate that both anaerobic and aerobic bacteria are present in soil and ground water. The soil samples indicated that the sample from GP-4 (without petroleum impact) had the highest plate counts, the sample from GP-8 (with some petroleum hydrocarbons) had fewer bacteria, and the sample from GP-2 (the sample with the highest petroleum hydrocarbons concentrations) had the least colony forming units of bacteria. More anaerobic bacteria were detected than aerobic bacteria in the sample from GP-2. The number of colony forming units for aerobic and anaerobic bacteria were the same for GP-8, and aerobic bacteria far outnumbered anaerobic in the sample from GP-4. These results indicate that more oxygen is needed in the most impacted part of the site to facilitate additional biodegradation.

Heterotrophic plate counts from the ground-water samples indicated that, as expected, anaerobic bacteria outnumbered aerobic bacteria in all three samples. The sample with no petroleum impacts had the fewest colony forming units, the sample with some petroleum

impact had the greatest number of colony forming units, and the sample with the greatest concentration of dissolved hydrocarbons exhibited numbers between the other two samples.

Dissolved iron, sulfate, nitrogen as nitrate, and nitrogen as ammonia were analyzed in the ground-water samples. These compounds can be used as electron acceptors by bacteria (usually after oxygen is depleted, in the case of aerobic bacteria). No trends were evident in the results except that the concentrations of the potential electron acceptors (including oxygen) appear to be relatively low in ground-water at the site.

Temperature, pH, dissolved oxygen, and carbon dioxide were measured in the field from the three wells. Temperature ranged from 68 to 72°F, and pH ranged from 6.82 to 7.5. These values are conducive to biodegradation. Dissolved oxygen ranged from 1.3 mg/L to 1.6 mg/L. The water from MW-1 had the greatest concentration of carbon dioxide, a byproduct of respiration, and the sample from MW-9 had the least carbon dioxide. This may indicate that biological activity is greatest in the area of the most-impacted well.

The laboratory and field data indicate that bioactivity is occurring but the introduction of oxygen to the subsurface is needed to facilitate additional biodegradation by introducing more electron acceptors into the soil and ground water.

Based on the advective velocity calculated by Equation 1, the unretarded travel time of a dissolved constituent on site is assumed to be approximately 4.26 feet per year. Therefore, the distance equal to one year's advective ground-water movement upgradient of surface water is approximately 5 feet. The downgradient monitoring wells at the site, MW-7 and MW-9, are located at a distance greater than 5 feet upgradient of the nearest potential receptor. These wells will be used to monitor dissolved hydrocarbon movement and the progress of corrective action. If ground-water samples from these well exhibit compounds above those listed in Table 4, an additional monitoring well will be installed downgradient of these wells, but at least 5 feet upgradient of the unnamed tributary to Marlowe Creek.

3.3.2 Modeling Results

One model run was conducted for each compound detected on August 18, 1998 (benzene, toluene, ethylbenzene, xylenes, IPE, and MTBE) assuming no mechanical reduction of

concentrations on site. This model was used to adjust input data (specifically retardation and half life) so that it produced concentrations that best mimicked actual concentrations observed on site. The distance from the well with the maximum detected hydrocarbons (MW-1) to the surrounding monitoring wells was used so that actual laboratory data could be compared to numbers generated by the model. Concentrations of dissolved-phase petroleum hydrocarbons were calculated for five distances from MW-1: 0.0001 feet (MW-1, itself), approximately 120 feet (to MW-5 and MW-7), 600 feet (the distance to the nearest surface water). Input parameters used in the model were relatively conservative.

Then a second model was run for each constituent. The second model run used the half life and retardation factor from the first model run, but assumed that the concentration at the source would decrease more quickly (because the site would be undergoing active remediation) than under natural conditions. This model run was used to determine clean-up goals on site. The source concentration was decreased until the resulting concentration 600 feet away was acceptable. This new source concentration becomes the remediation clean-up goal for the dissolved compound on site. Because petroleum hydrocarbons may be migrating onto the site from off-site sources, an infinite source was used in the model rather than a "slug" of constituent. The model inputs and results are listed in Table 5. The model input and output sheets are included in Appendix C.

4.0 EVALUATION OF REMEDIAL ALTERNATIVES

4.1. SOIL TECHNOLOGIES

The technologies listed below are the methods available for reimbursement under the State Trust Fund. The following descriptions have been excerpted, in many cases verbatim, from the January 2, 1998 *Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater, Volume II.*

extent possible. The remediation goals for high risk sites are specified in 15A NCAC 2L .0115(f) and in 15A NCAC 2L .0115(g) for intermediate risk sites.

Advantages of Natural Attenuation

- Minimal disturbance to site operations
- Potential use below buildings and other areas that can not be excavated
- Does not require large capital costs

Disadvantages of Natural Attenuation

- Not effective where constituent concentrations are relatively high
- Not suitable for sites where receptors have been impacted or are likely to be impacted (i.e., water supply wells, surface waters, utilities, etc.)
- Monitoring costs may be relatively high because monitoring may need to be conducted for several years
- A longer period of time may be required to reduce contaminants to acceptable levels

5.0 PROPOSED CORRECTIVE ACTION PLAN

5.1 OVERVIEW

The recommended corrective action for this site is the use of bio-sparging with soil vapor extraction including three sparge wells and approximately 55 feet of horizontal soil-vapor extraction (SVE) screen. Drawing G1 presents the proposed layout of the system including the wells, piping, and enclosure. The proposed system will be housed in a 5' x 2.5' steel enclosure located in the rear of the existing building.

5.2 CONCEPTUAL DESIGN

Three air sparge (AS) wells will be constructed proximal to the former UST basin and pump island for "hot spot" remediation. These wells are placed to provide remediation by introducing oxygen to stimulate natural biodegradation within the "hot spot." The design of the downwell diffuser maximizes the transfer of oxygen to the aquifer while minimizing

mounding which is often associated with sparging. Details for the construction of the well and the downwell assembly are shown in Drawings D1 and D2.

The vapor extraction portion of the remediation system will facilitate movement of air through the soil enhancing bioremediation by removing carbon dioxide and volatile constituents. The approximate locations of the various wells, the horizontal SVE screen, and system building are shown on drawing G1.

A Gast model R4P315 regenerative blower will provide the air flow from the horizontal vapor extraction screen at a flow of approximately 60 CFM at 52 inches of water column vacuum. Discharge from the blower will be directed outside the enclosure a minimum of 8 feet above the ground surface. Schedule 80 PVC buried approximately 18 inches below grade will join the SVE screen to the system enclosure. A Process and Instrumentation Diagram (P&ID) for the SVE unit is shown in Drawing P1. The Operation and Control Description and P&ID Equipment Summary Table are included in Appendix D.

A Gast® model 2567-P132-G475 oilless rotary vane compressor will provide the air flow to the diffusers at a rate of approximately 10 cfm (3.3 cfm per well) at 20 psig. The compressor will draw ambient air from outside the enclosure to minimize the potential for introducing air recovered by the SVE blower. Air will be distributed to the wells through ABS compressed air pipe that is run within the SVE pipe or within a separate conduit. ABS compressed air pipe, flexible tubing, and brass fittings will be used to provide the connection within the vaults. The flow rate for each well can be adjusted at the flow control board located inside the enclosure. A P&ID for the compressed air system is shown in Drawing P2.

The Equipment Arrangement is illustrated in Drawing L1. Additional information concerning the equipment is included in Appendix D.

5.3 BASIS FOR SELECTION OF RECOMMENDED REMEDIATION

The corrective action was selected based on the goals of remediation, feasibility, site geology, distribution of hydrocarbon constituents, and overall cost. Data collected from the site indicates that conditions are conducive to enhanced biodegradation if more oxygen can be supplied to the subsurface. This in-situ remedial alternative is relatively simple and inexpensive compared to other alternatives because no soil or water will be removed. Biosparging in this manner has proven to be very effective at other petroleum-impacted sites in similar geologic media.

5.4 SYSTEM SECURITY AND SAFETY MEASURES

The sparge wells will be protected by traffic rated cast iron well vaults that are provided with bolt-down covers. In addition, the wells are provided with a PVC pressure cap that provides a watertight seal should the vault be filled with surface water. The SVE piping is schedule 80 PVC pipe buried to approximately 18 inches below grade. The sparge compressor and SVE blower will be housed in a secure steel enclosure. The enclosure interior will be wired to meet National Electric Code Class I, Division 2 requirements. Controls for the equipment will be mounted in a NEMA 4 lockable steel enclosure attached to the front of the enclosure. The panel will be of the "dead front" design with all operators secured behind an outer steel door. Relief valves will be provided for the compressor and blower. The compressor and blower will be interlocked so that the sparge compressor can only operate when the SVE blower is operating. Warning and informational signs will be provided on the enclosure. These will include "No Smoking," "Auto-Starting Equipment," and the name and telephone number of the company responsible for operation of the system.

5.5 OPERATION AND MAINTENANCE OF THE SYSTEM

During start-up the system will be observed for a period of 4 to 8 hours to insure that the flow rates, pressures, and cycle times are within the design parameters. One air sample will be collected during the system start-up to assess the need for off-gas treatment. In addition the off-gas will be checked on-site with an explosimeter to insure that the discharge is below the Lower Explosive Limit (LEL).

The system will be checked bimonthly following the initial start up. During each site visit the flow rates, pressures, and system and monitoring well integrity will be checked. In addition, the system will be serviced during the monthly visit including lubrication of the electric motors and replacement of filter elements (if necessary). The downwell diffusers will be cleaned quarterly or as required to maintain proper flow. Inflation of the bladders used to isolate the diffusers in the wells will be checked monthly and will be adjusted as needed. The relief valves will be visually inspected monthly and tested annually. Faulty relief valves will be replaced before continuing operation of the system.

5.6 FOLLOW-UP MONITORING, SYSTEM EVALUATION, AND REPORTING

To determine if the proposed corrective action is remediating the site, a monitoring plan consisting of ground-water sampling from the monitoring wells and air sampling from the off gases is proposed. Ground-water samples would be collected quarterly for the first year from all of the monitoring wells and analyzed for volatile petroleum-hydrocarbons by USEPA Method 602 (benzene, toluene, ethylbenzene, xylenes, MTBE, and isopropyl ether) and USEPA Method 601. After the first year, ground-water samples will be collected from all of the monitoring wells semiannually. Ground-water sampling will continue until samples from the wells are below the target clean-up goals listed in Table 4, or until the asymptotic slope of the reduction in concentration of the compounds is less than a ratio of 1:40 over a period of one year based on quarterly sampling, per Title 15A NCAC 2N. Samples from vapor-extraction off gases will be collected after system start up and periodically thereafter. The air samples will be analyzed for BTEX and TPH by USEPA method 18. When ground-water clean-up goals are reached, soil samples from the impacted area identified during site assessments will be collected and analyzed for volatile hydrocarbons by USEPA Method 8260. The proposed monitoring schedule is listed in Table 5.

Ground-water samples will be collected from the monitoring wells with dedicated or properly decontaminated bailers. At least three well volumes of water will be removed from each well prior to sampling. At the time of ground-water sampling, field measurements including

dissolved-oxygen and ground-water levels in the monitoring wells will be recorded. The corrective action program will be re-evaluated after each sampling event to monitor concentrations at the site.

5.7 NOTIFICATION OF CORRECTIVE ACTION

The surrounding property owners, those property owners anticipated to be affected by the proposed corrective action, the Mayor of Roxboro, and the director of the Person County Health Department were sent letters notifying them of the intended corrective action. Copies of the letters sent and all but one of the return-receipt cards are included in Appendix E. Neither the return receipt card nor the original letter sent to Mr. Clifton Henderson has been received as of the date of this CAP. The card will be forwarded to the Raleigh Regional Office as soon as it is received.

6.0 PERMITS

The installation of the system will require building and electrical permits from Roxboro or Person County. A permit to install the proposed sparge wells is required and will be submitted to the Raleigh Regional Office prior to installation.

An air permit is not expected to be necessary as the vapor emissions are anticipated to be under five tons 15A NCAC 2e .0102 (b)(2)(E). However, the system must be registered as a source with the Raleigh Regional Office. Prior to operation the Division of Air Quality will be notified of the expected emissions.

7.0 REPORT QUALIFICATION

The conceptual design of the active remediation system and conceptual system drawings for the proposed active remediation system were prepared in accordance with generally accepted engineering practices. This evaluation of site conditions is based on our understanding of the site and the project information and other data provided to us. The general subsurface conditions portrayed in this evaluation have been based on interpolation of subsurface data between discrete sampling points and on solute-transport models based on analytical equations developed and accepted by the scientific community.

Table 1

WATER LEVELS AND WELL COMPLETION INFORMATION

Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina

Well	Date Measured	Top of Casing Elevation (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Water Elevation (feet)	Total Well Depth (feet)	Screened Interval (feet)	Well Diameter (inches)
MW-1	**08/19/98**	**599.53**	**3.65**	**ND**	**595.88**	**18**	**3 to 18**	**2**
	02/29/96		2.76	ND	596.77			
	01/25/95		2.83	ND	596.70			
	12/12/95		3.05	ND	596.48			
	11/14/95		2.8	ND	596.73			
	10/25/95		3.13	ND	596.40			
	10/3/95		3.92	ND	595.61			
	8/9/95		3.44	ND	596.09			
	06/28/95		3.15	**0.06**	596.38			
	06/21/95		3.79	**0.16**	595.74			
MW-2	**08/19/98**	**599.46**	**4.13**		**595.33**	**18**	**3 to 18**	**2**
	06/28/95		4.25		595.21			
	06/21/95		4.35		595.11			
MW-3	**08/19/98**	**600.60**	**4.60**		**596.00**	**23**	**3 to 23**	**2**
	06/28/95		3.36		597.24			
	06/21/95		4.40		596.20			
MW-4	**08/19/98**	**600.29**	**4.74**		**595.55**	**19**	**4 to 19**	**2**
	06/28/95		3.25		597.04			
	06/21/95		4.01		596.28			
MW-5	**08/19/98**	**599.52**	**6.80**		**592.72**	**25**	**5 to 25**	**2**
	06/28/95		5.80		593.72			
	06/21/95		6.40		593.12			
MW-6	**08/19/98**	**598.07**	**3.25**		**594.82**	**18**	**3 to 18**	**2**
	06/28/95		2.61		595.46			
	06/21/95		3.22		594.85			
MW-7	**08/19/98**	**599.23**	**5.72**		**593.51**	**18**	**3 to 18**	**2**
	06/28/95		4.95		594.28			
	06/21/95		6.44		592.79			
MW-8 deep	**08/19/98**	**599.36**	**5.29**		**594.07**	**35**	**30 to 35**	**2**
	06/28/95		4.86		594.50			6" outer casing
	06/21/95		6.10		593.26			to 20' depth
MW-9	**08/19/98**		4.25			20	5 to 20	2

ENVIRONMENTAL ANSWERS, LLC

Table 2

GROUND-WATER SAMPLE ANALYTICAL RESULTS

Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina

Sample	Date Sampled	benzene (µg/L)	toluene (µg/L)	ethyl-benzene (µg/L)	xylenes (µg/L)	EDB (504.1) (µg/L)	MTBE (µg/L)	IPE (µg/L)	1,2-DCA (µg/L)	total VOCs (µg/L)	VPH C_5-C_8 Aliphatics (mg/L)	VPH C_9-C_{12} Aliphatics (mg/L)	VPH C_9-C_{10} Aromatics (mg/L)	ex-tract-able lead (µg/L)
MW-1	8/19/98	5,800	13,000	4,400	22,000	ND	1,500	300	ND	47,000	12	20	15	13
	3/6/98	8,000	14,000	4,300	21,600	not analyzed	4,300	1500	not analyzed	53,700	not analyzed	not analyzed	not analyzed	not analyzed
	2/19/98	7,300	11,000	5,000	16,000	ND	5,000	not analyzed	not analyzed	44,300	not analyzed	not analyzed	not analyzed	not analyzed
	8/9/95	NAPL PRESENT; GROUND WATER NOT ANALYZED					---	---	---	---	not analyzed	not analyzed	not analyzed	not analyzed
	6/21/95	NAPL PRESENT; GROUND WATER NOT ANALYZED					---	---	---	---	not analyzed	not analyzed	not analyzed	not analyzed
	1/10/95	1,600	2,100	1,000	4,600	ND	1,080	ND	460	10,840	not analyzed	not analyzed	not analyzed	not analyzed
MW-2	8/19/98	14	ND	ND	ND	ND	160	ND	ND	174	0.41	0.034	0.06	ND
	6/21/95	ND	ND	ND	ND	ND	1,263	89.3	ND	1352.3	not analyzed	not analyzed	not analyzed	ND
	1/10/95	ND	ND	ND	ND	ND	1,840	ND	ND	1840	not analyzed	not analyzed	not analyzed	not analyzed
MW-3	8/19/98	220	11	300	581	ND	250	60	ND	1422	2	0.89	0.78	10
	8/9/95	365	132	150	ND	---	ND	106	233	986	not analyzed	not analyzed	not analyzed	not analyzed
	6/21/95	314	820	438	1,286	ND	238	112	742	3950	not analyzed	not analyzed	not analyzed	7
MW-4	8/19/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	0.04	ND	ND
	6/21/95	5.7	13	3	10.6	ND	748	14.3	23.7	818.3	not analyzed	not analyzed	not analyzed	ND
MW-5	8/19/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.054	ND	ND	11
	6/21/95	ND	ND	ND	ND	ND	ND	8.2	99.4	107.6	not analyzed	not analyzed	not analyzed	ND
MW-6	8/19/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.65	0.013	ND	ND
	6/21/95	ND	ND	ND	ND	ND	37.5	19.1	30.3	86.9	not analyzed	not analyzed	not analyzed	1
MW-7	8/19/98	14	2.7	5.9	5.61	ND	ND	ND	ND	28	0.36	0.36	0.24	ND
	8/9/95	43	1.04	17.5	8.05	---	37.4	18.6	ND	125.59	not analyzed	not analyzed	not analyzed	not analyzed
	6/21/95	33.8	ND	6.5	11.3	ND	ND	11.8	ND	63.4	not analyzed	not analyzed	not analyzed	ND
MW-8 deep	8/19/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.35	ND	ND	2
	8/9/95	ND	ND	ND	ND	---	ND	25	132	157	not analyzed	not analyzed	not analyzed	not analyzed
	6/21/95	ND	ND	ND	ND	ND	ND	18.5	284	303	not analyzed	not analyzed	not analyzed	5
MW-9	8/19/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/95	ND	ND	ND	ND	---	ND	ND	ND	ND	not analyzed	not analyzed	not analyzed	not analyzed
Gross Contaminant Level		5,000	257,500	29,000	87,500	50	200,000	70,000	380	---	---	---	---	15,000
2L STANDARDS		1	1,000	29	530	0.0004	200	70	0.38	---	0.42	4.2		0.015

ND: not detected
MTBE: methyl tertiary butyl eth
IPE: isopropyl ether
EDB: ethylene dibromide
µg/L: milligram per liter
mg/L: microgram per liter
DCA: dichloroethane
VOCs: volatile organic compounds
VPH: volatile petroleum hydrocarbons

Table 3
SOIL-SAMPLE RESULTS COLLECTED IN 1998 FROM FORMER UST BASIN
Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina

SAMPLE ID	DATE COLLECTED	DEPTH (feet)	VPH			USEPA METHOD 8260									
			C_5-C_8 Aliphatics (mg/kg)	C_9-C_{12} Aliphatics (mg/kg)	C_9-C_{10} Aromatics (mg/kg)	methyl tert-butyl ether (mg/kg)	benzene (mg/kg)	ethyl-benzene (mg/kg)	iso-propyl-benzene (mg/kg)	naph-thalene (mg/kg)	propyl-benzene (mg/kg)	toluene (mg/kg)	1,2,4-trimethyl-benzene (mg/kg)	1,3,5-trimethyl-benzene (mg/kg)	total xylenes (mg/kg)
GP-1	8/19/98	0 to 2	50	27	18	0.046	0.17	0.077	0.26	0.14	ND	ND	0.33	0.072	0.062
GP-2	8/19/98	2 to 4	1,100	830	680	ND	0.45	1.7	0.15	0.69	ND	6	6	1.3	8.4
GP-3	8/19/98	2 to 4	0.74	1.1	0.99	ND	ND	0.47	ND	0.5	0.3	ND	1.7	0.5	1.5
GP-4	8/19/98	2 to 4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-5	8/19/98	2 to 4	ND	0.24	ND	0.051	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-6	8/19/98	2 to 4	2.8	0.78	0.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-7	8/19/98	2 to 4	ND	ND	ND	ND	0.019	ND	ND	ND	ND	ND	ND	ND	ND
GP-8	8/19/98	2 to 4	130	90	44	0.13	ND	0.58	0.46	0.82	ND	ND	30	12	ND
Industrial/Commercial Levels			24,528	245,280	12,264	200	200	40,000	40,880	1,635	4,088	82,000	20,440	20,440	200,000
Residential			939	9,386	469	22	22	1,560	1,564	63	156	3,200	782	782	32,000
Soil-to-Ground Water Levels			72	3,255	34	0.0056	0.0056	0.24	2	0.58	2	7	8	7	5

UST: Underground Storage Tank
MADEP: Massachusetts Division of Environmental Protection
VPH: volatile petroleum hydrocarbons by the MADEP Method
EPH: extractable petroleum hydrocarbons by the MADEP Method

mg/kg: milligrams per kilogram
ND: Not Detected at stated detection limit
--- : not analyzed or not detected

Table 4

PROPOSED MONITORING SCHEDULE AND TARGET CLEAN-UP GOALS
Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina

DESCRIPTION	LOCATION	FREQUENCY	PARAMETERS	CLEAN-UP GOALS	METHODS
Ground-Water Sampling	all monitoring wells	Quarterly until samples are below clean-up goals for two consecutive sampling events or reach asymptotic levels	benzene, toluene, ethylbenzene, xylenes, isopropyl ether (IPE), methyl tertiary butyl ether (MTBE), and 1,2-dichloroethane (1,2-DCA)	benzene: 2 mg/L ethylbenzene: 2 mg/L toluene: 2 mg/L xylenes: 5 mg/L MTBE: 2 mg/L IPE: 1 mg/L 1,2-DCA monitor only, may be from off site	USEPA Methods 602 and 601
Soil Sampling	near the MW-1/ GP-2 area	when ground-water clean-up goals are met	volatile organics	residential clean-up levels	USEPA Method 8260
Air Sampling	system off-gases	as needed	gasoline-range organics	asymptotic levels	USEPA Method 18

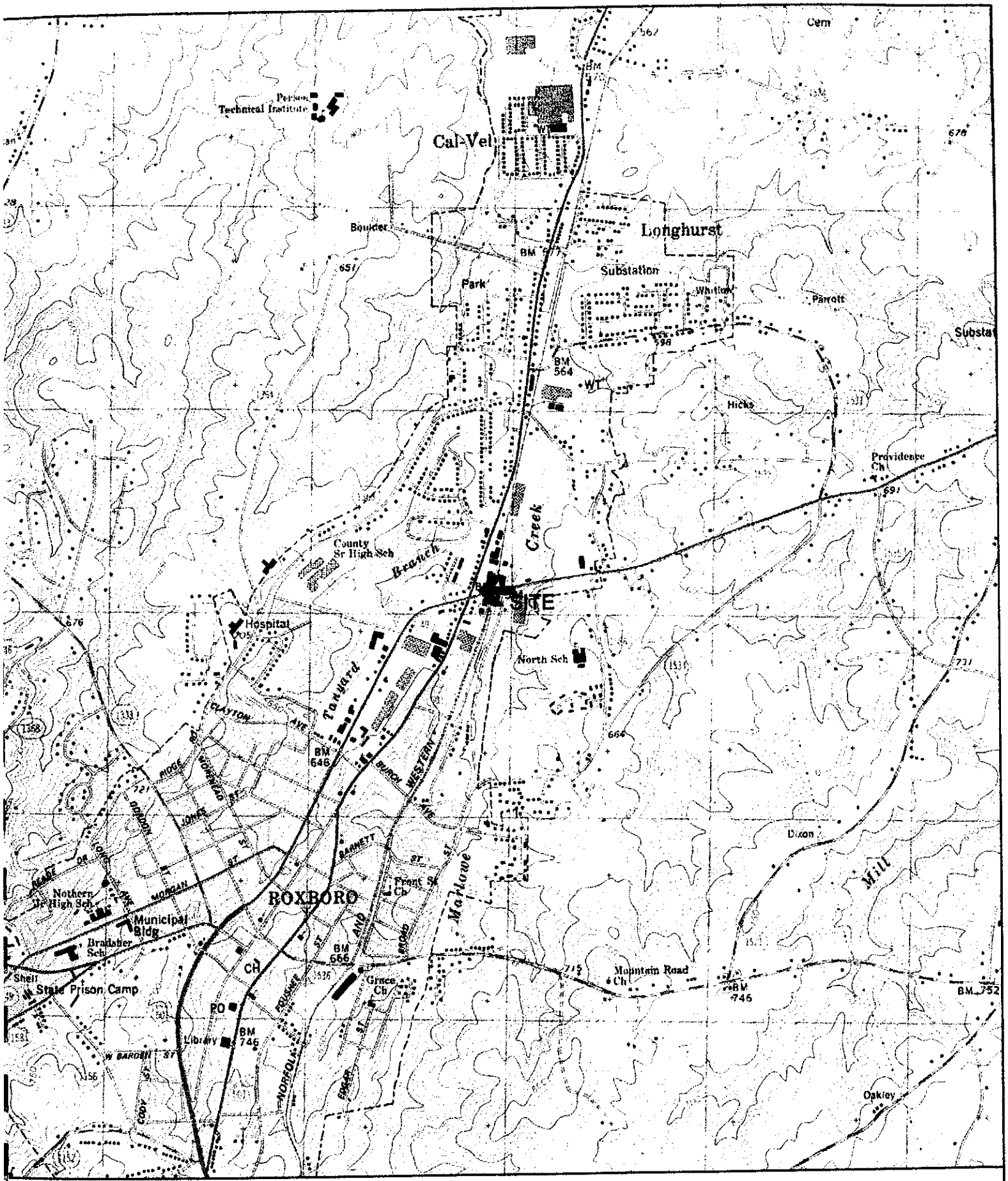
TABLE 5

SOLUTE-TRANSPORT MODELING RESULTS

Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina

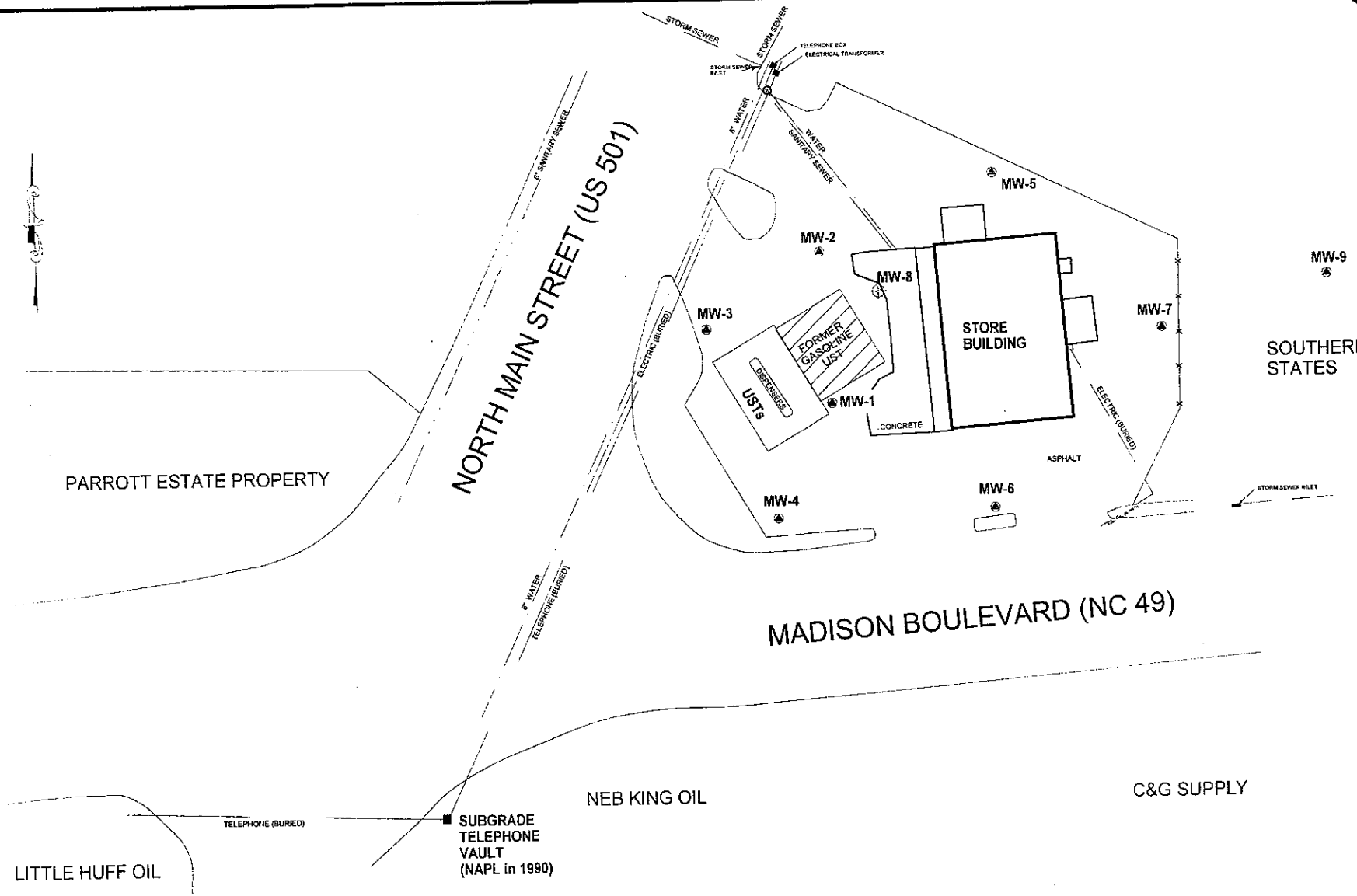
Run No.	Compound	Half Life (years)	Velocity* (feet/year)	Retardation Factor (dimensionless)	Initial Concentration at Source (µg/L)	Longitudinal Dispersivity (feet)	Expected Maximum Concentration 600 feet from MW-1 (µg/L)	Assumptions
1	benzene	20	5	1.2	7,000	60	2	no action on site
1	benzene	0	5	1.2	7,000	60	71	no action on site
2	benzene	20	5	1.2	2,000	60	1	corrective action on site
2	benzene	0	5	1.2	2,000	60	24	corrective action on site
1	toluene	12	5	3.6	14,000	60	ND	no action on site
1	toluene	0	5	3.6	14,000	60	12	no action on site
2	toluene	12	5	3.6	2,000	60	ND	corrective action on site
2	toluene	0	5	3.6	2,000	60	2	corrective action on site
1	ethylbenzene	25	5	4.3	5,000	100	ND	no action on site
1	ethylbenzene	0	5	4.3	5,000	100	12	no action on site
2	ethylbenzene	25	5	4.3	2,000	100	ND	corrective action on site
2	ethylbenzene	0	5	4.3	2,000	100	5	corrective action on site
1	xylenes	20	5	3.2	22,000	60	ND	no action on site
1	xylenes	0	5	3.2	22,000	60	26	no action on site
2	xylenes	20	5	3.2	5,000	60	ND	corrective action on site
2	xylenes	0	5	3.2	5,000	60	6	corrective action on site
1	methyl tertiary butyl ether (MTBE)	25	5	1	5,000	60	6	no action on site
1	MTBE	0	5	1	5,000	60	68	no action on site
2	MTBE	25	5	1	2,000	60	3	corrective action on site
2	MTBE	0	5	1	2,000	60	29	corrective action on site
1	isopropyl ether (IPE)	25	5	1	1,500	60	2	no action on site
1	IPE	0	5	1	1,500	60	24	no action on site
2	IPE	25	5	1	2,000	60	1	corrective action on site
2	IPE	0	5	1	2,000	60	12	corrective action on site

ND: Not Detected
µg/L: micrograms per liter
*: the model rounded 4.26 feet/year to 5 feet/year



Name: ROXBORO
Date: 2/10/99
Scale: 1 inch equals 2000 feet

Location: 036° 24.5895' N 078° 58.2697' W
Caption: Fig 1. TOPOGRAPHIC LOCATION MAP
Former Kwik Pik
Roxboro, NC



ENVIRONMENTAL ANSWERS, LLC

Environmental Compliance and Case Closure

364 Patteson Drive,#288, Morgantown, West Virginia 26505

Phone: (304) 598-0015 •• Fax: (304) 598-0016

SCALE

Ø 25 5Ø

(IN FEET)

1 inch = 5Ø feet

- MONITORING WELL
- DEEP WELL
- SOIL SAMPLE/BORING

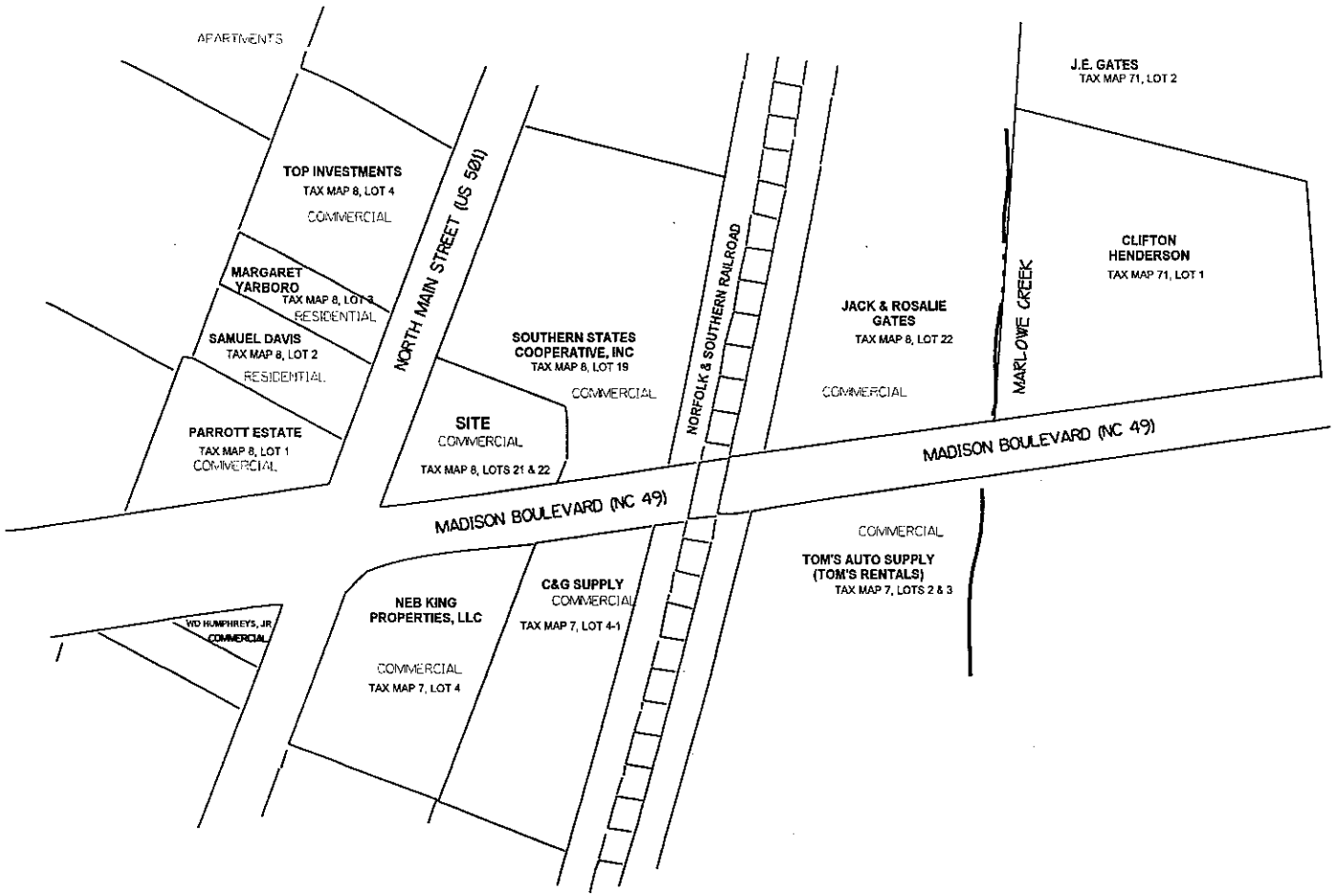
FIGURE NO. 2

TITLE: SITE MAP

SITE: FORMER BOULEVARD KWIK PIK

ADDRESS: 1100 N. MAIN ST., ROXBORO, PERSON COUNTY, NC

FROM THE BASE MAP BY: PIEDMONT GEOLOGIC, PC



ENVIRONMENTAL ANSWERS, LLC
Environmental Compliance and Case Closure
364½ Patteson Drive, #288, Morgantown, West Virginia 26505
Phone: (304) 598-0015 •• Fax: (304) 598-0016

SCALE
0 100 200
(IN FEET)
1 inch = 200 feet

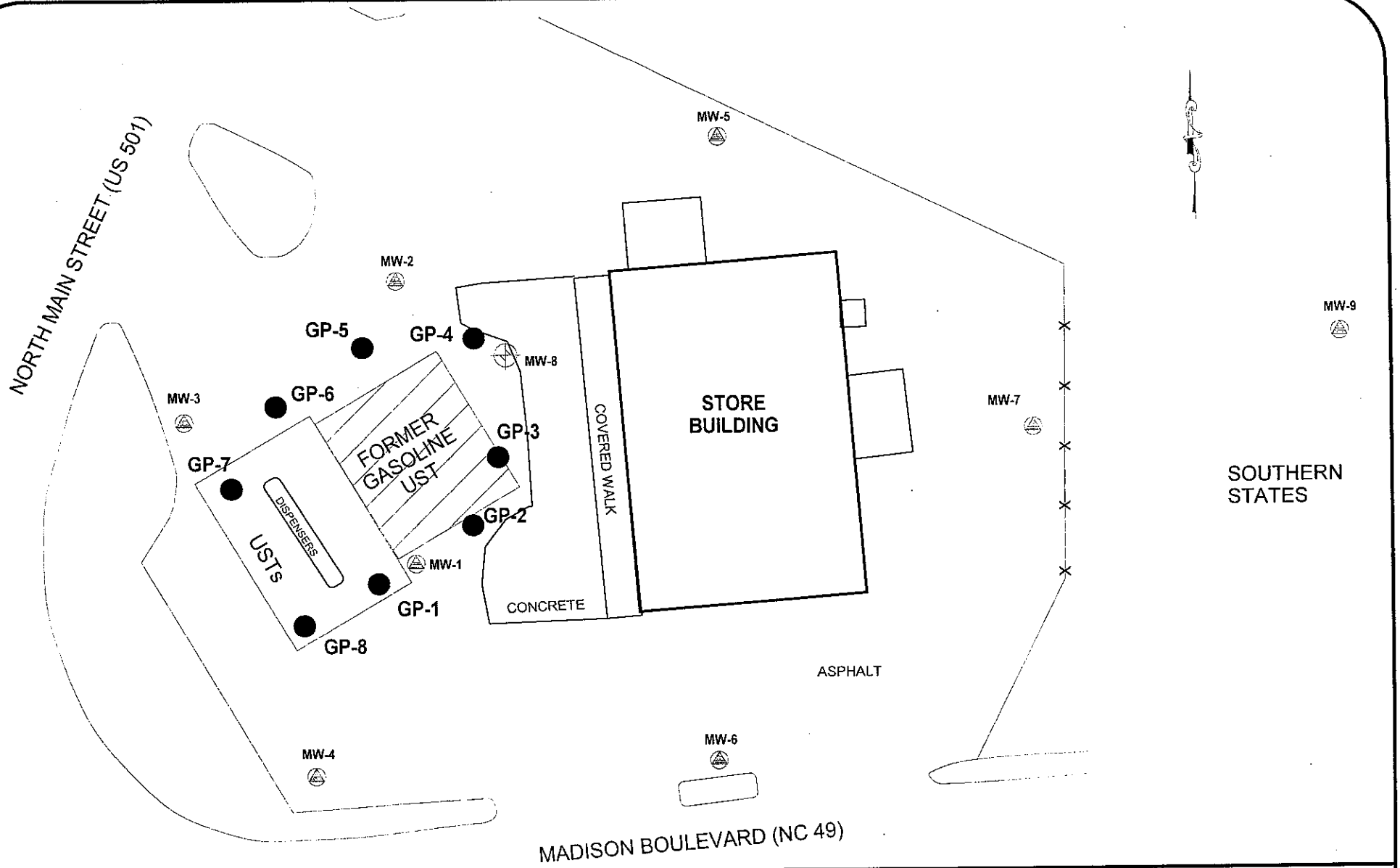
FIGURE NO.
3

TITLE
AREA MAP

SITE
FORMER BOULEVARD KWIK PIK

ADDRESS
1100 N. MAIN ST., ROXBORO, PERSON COUNTY, NC

FROM THE BASE MAP BY
PIEDMONT GEOLOGIC, PC



ENVIRONMENTAL ANSWERS, LLC

Environmental Compliance and Case Closure

364½ Patteson Drive,#288, Morgantown, West Virginia 26505

Phone: (304) 598-0015 ⇔ Fax: (304) 598-0016

SCALE

Ø 12.5 25

(IN FEET)

1 Inch = 25 feet

- MONITORING WELL
- DEEP WELL
- SOIL SAMPLE/BORING
- TOTAL PETROLEUM HYDROCARBONS
- TPH CONCENTRATION IN MG/KG
- NOT DETECTED

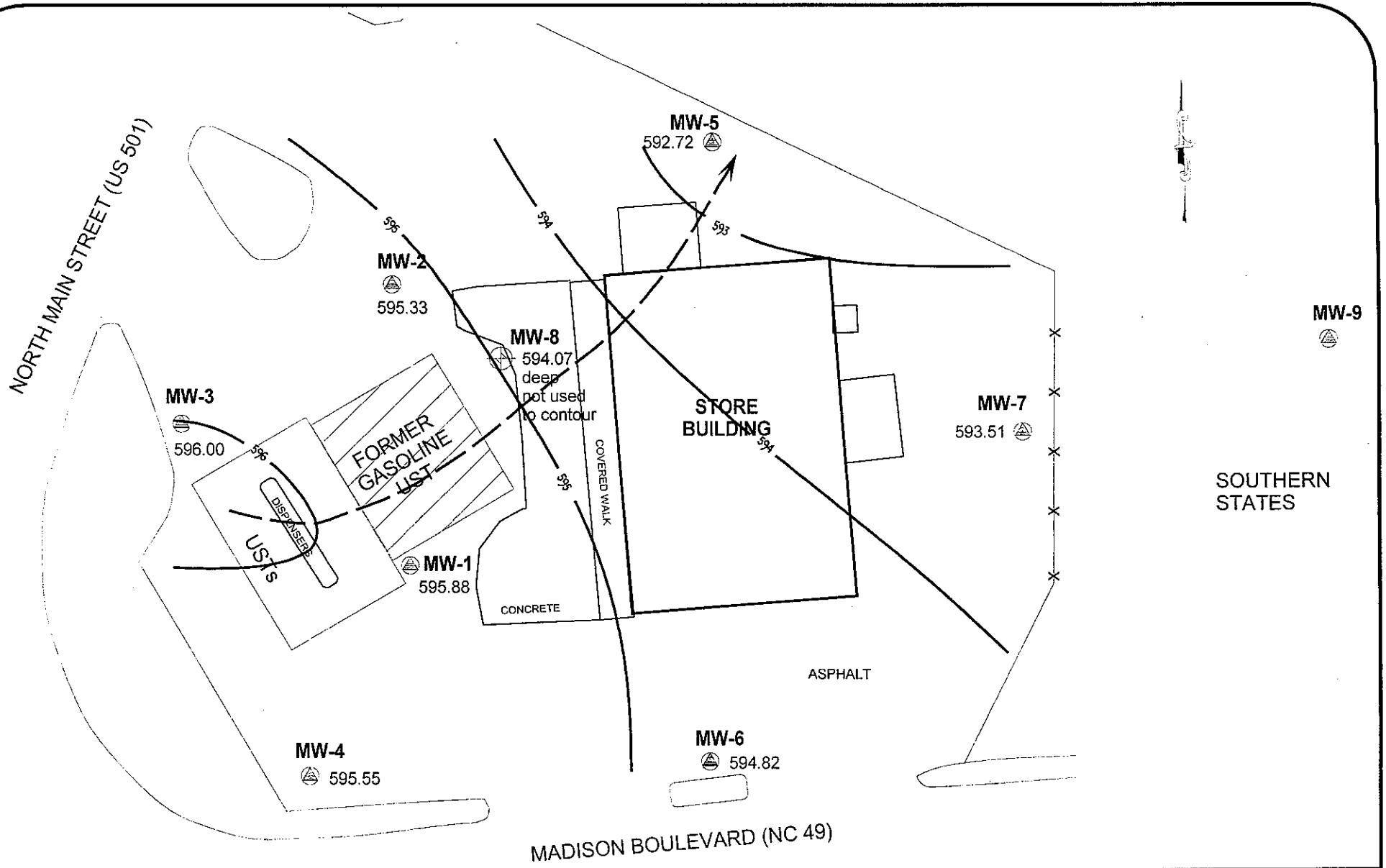
FIGURE NO.
4

TITLE
SOIL-SAMPLE RESULTS

SITE
FORMER BOULEVARD KWIK PIK

ADDRESS
1100 N. MAIN ST., ROXBORO, PERSON COUNTY, NC

FROM THE BASE MAP BY
PIEDMONT GEOLOGIC, PC



ENVIRONMENTAL ANSWERS, LLC

Environmental Compliance and Case Closure

364 Patteson Drive,#288, Morgantown, West Virginia 26505
Phone: (304) 598-0015 •• Fax: (304) 598-0016

SCALE
Ø 12.5 25
(IN FEET)
1 inch = 25 feet

- MONITORING WELL
- DEEP WELL
- 595.88 WATER ELEVATION IN WELL (ft)
- 595 WATER ELEVATION CONTOUR (ft)
- APPROXIMTE FLOW DIRECTION

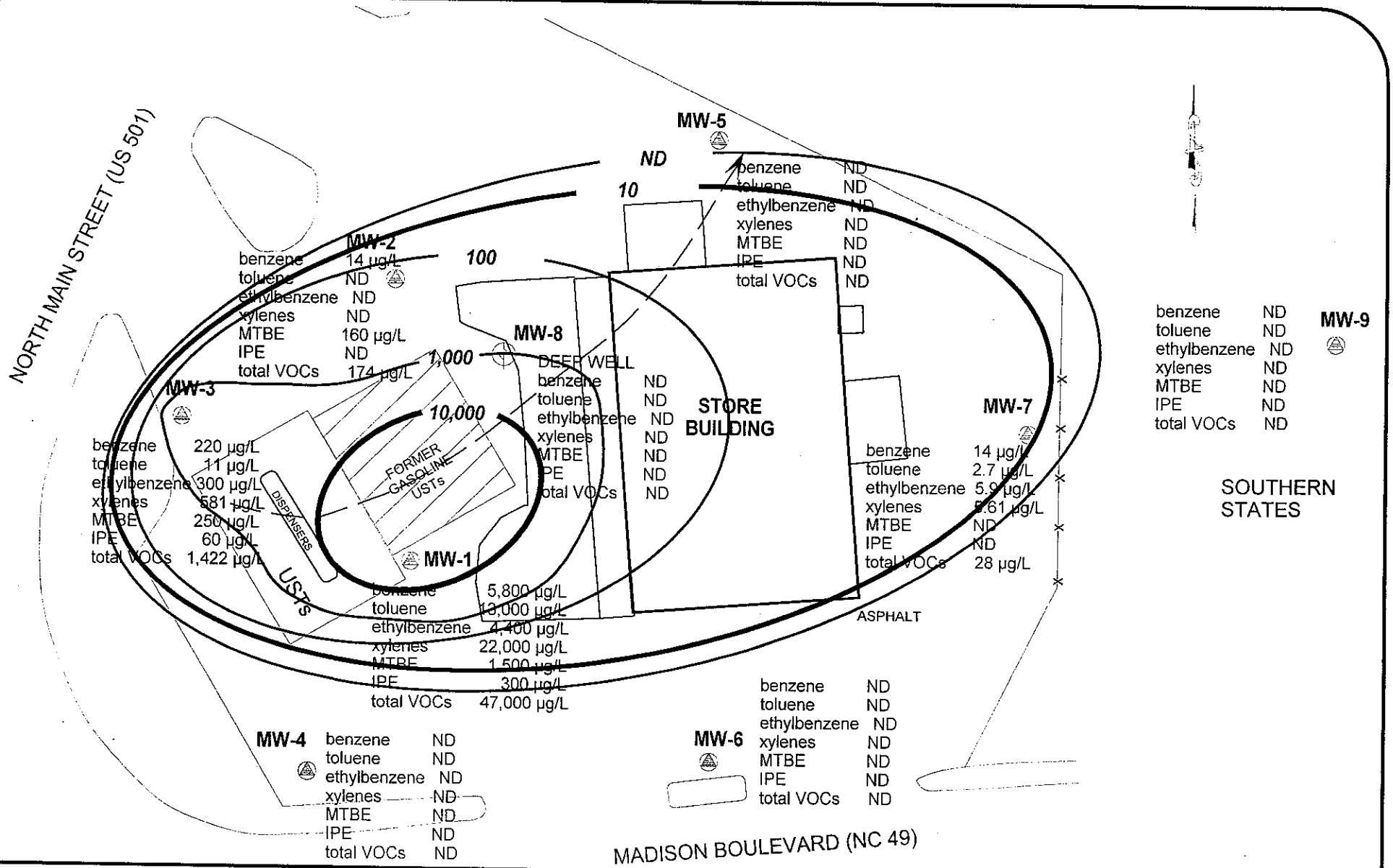
FIGURE NO.
5

TITLE
GROUND-WATER CONTOUR MAP (08/19/98)

SITE
FORMER BOULEVARD KWIK PIK

ADDRESS
1100 N. MAIN ST., ROXBORO, PERSON COUNTY, NC

FROM THE BASE MAP BY
PIEDMONT GEOLOGIC, PC



ENVIRONMENTAL ANSWERS, LLC

Environmental Compliance and Case Closure

364 Patteson Drive,#288, Morgantown, West Virginia 26505
Phone: (304) 598-0015 •• Fax: (304) 598-0016

SCALE

Ø 12.5 25

(IN FEET)

1 Inch = 25 feet

MONITORING WELL

DEEP WELL

14 CONCENTRATION IN SAMPLE (ug/L)

10 CONCENTRATION CONTOUR (ug/L)

APPROXIMTE FLOW DIRECTION

ND NOT DETECTED

VOCs VOLATILE ORGANIC COMPOUNDS

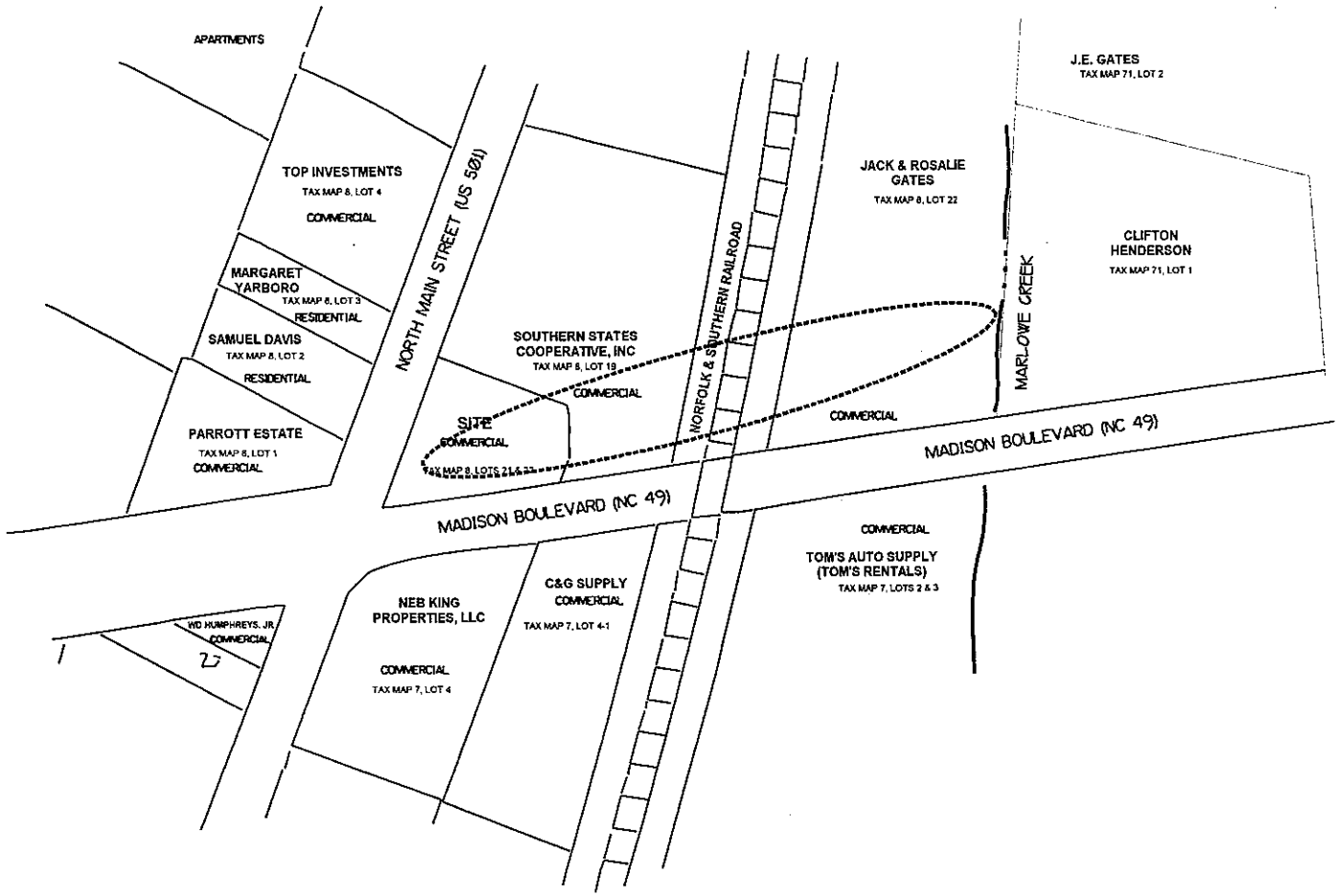
FIGURE NO.
6

TITLE
TOTAL VOCs ISOCONTOUR MAP (08/19/98)

SITE
FORMER BOULEVARD KWIK PIK

ADDRESS
1100 N. MAIN ST., ROXBORO, PERSON COUNTY, NC

FROM THE BASE MAP BY
PIEDMONT GEOLOGIC, PC



ENVIRONMENTAL ANSWERS, LLC

Environmental Compliance and Case Closure

364½ Patteson Drive,#288, Morgantown, West Virginia 26505
Phone: (304) 598-0015 ▪ Fax: (304) 598-0016

SCALE
0 100 200
(IN FEET)
1 inch = 200 feet

PROJECTED EXTENT OF GROUND-WATER IMPACT ABOVE 2L STANDARDS

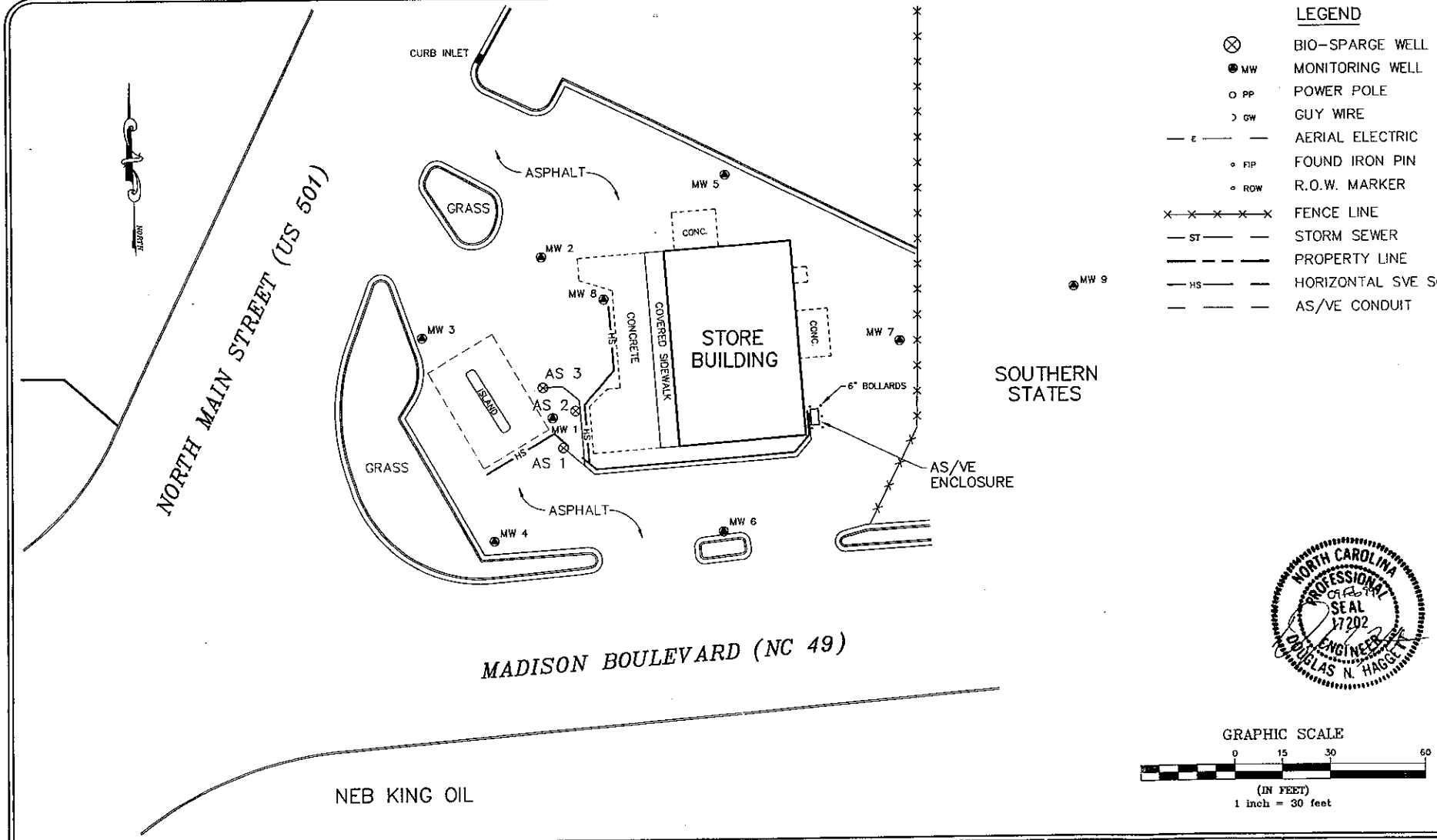
FIGURE NO.
7

TITLE
PROJECTED GROUND-WATER IMPACT MAP
(ASSUMING REMEDIATION ON SITE)

SITE
FORMER BOULEVARD KWIK PIK

ADDRESS
1100 N. MAIN ST., ROXBORO, PERSON COUNTY, NC

FROM THE BASE MAP BY
PIEDMONT GEOLOGIC, PC



HAGGETT ENGINEERING ASSOCIATES, INC.

5849 SOUTH COLLEGE ROAD
WILMINGTON, NORTH CAROLINA 28412
PHONE: (910) 397-0808

KENAN OIL COMPANY
FORMER BOULEVARD KWIK PIK
1100 NORTH MAIN STREET
ROXBORO, NORTH CAROLINA
AQUIFER AIR SPARGE/SOIL VAPOR EXTRACTION SYSTEM
PROPOSED LAYOUT

DRAWN: D. HAGGETT	DATE: JANUARY 29, 1999
DFT CHECK: DNH	SCALE: AS SHOWN
ENG CHECK: SFH	JOB: 99-1002
APPROVAL:	FILE: 91002G1

REFERENCES: BASE MAP PROVIDED BY ENVIRONMENTAL ANSWERS, LLC

DRAWING NO.: G1

ENVIRONMENTAL
ANSWERS, LLC
of North Carolina

(PS)

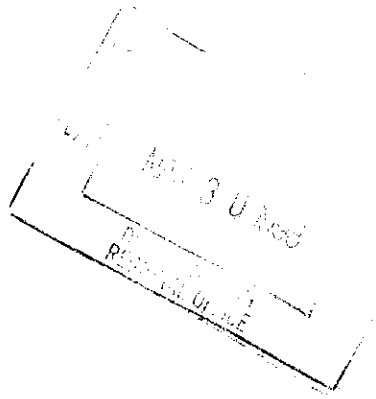
via Certified Mail, Article Number P 349 635 885
Return receipt requested.

CONFIRMATION OF
INTERMEDIATE RISK
CLASSIFICATION.

March 25, 1998

Mr. Phil Orozco
North Carolina Department of Environment and Natural Resources
Division of Water Quality
3800 Barrett Drive, Suite 101
Raleigh, North Carolina 27609

Subject: **Ground-Water Sampling Results**
Former Boulevard Kwik Pik
1100 North Main Street
Roxboro, Person County, North Carolina
Groundwater Incident # ~~28997~~ 16068
Priority Rank 70E



Dear Mr. Orozco:

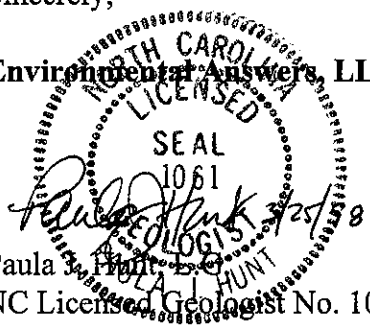
Environmental Answers, LLC and ENCOM Associates, Inc., on behalf of Holmes Oil Company, Inc., are submitting this information in accordance with 15A NCAC .115(r) for the referenced site. Monitoring well MW-1 has contained nonaqueous-phase liquid (NAPL) in the past. MW-1 was gauged on February 19, 1998 and NAPL was not observed. Ground water was sampled from this well and analyzed for extractable lead and for hydrocarbons by USEPA Methods 601 and 602. A second sample from this well was collected on March 6, 1998 to verify the results of the first sample.

The February 19, 1998 sample from MW-1 exhibited 7,300 µg/L benzene, and the March 6, 1998 sample exhibited 8,000 µg/L benzene. The laboratory reports are attached.

If you have any questions or require further information please contact Bill Cook at (919) 676-7898 or Paula Hunt at (304) 598-0015.

Sincerely,

Environmental Answers, LLC



Paula J. Hunt, L.G.
NC Licensed Geologist No. 1061

ENCOM Associates, Inc.

for Bill Cook
Project Manager

enclosure
copy: Ms. Doris Bridges, Holmes Oil Company, Inc.

364½ Patteson Drive, #288 • Morgantown, West Virginia 26505 ☎ Phone: (304) 598-0015 🖷 Fax: (304) 598-0016

ATTACHMENT B

Pyramid Project # 2007163

GEOPHYSICAL INVESTIGATION REPORT

EM61 & GPR SURVEYS

BERNARD FOGLEMAN PROPERTY (PARCEL 9)
Roxboro, North Carolina

July 16, 2007

Report prepared for: **Mike Branson**
Earth Tech, Inc.
701 Corporate Center Drive, Suite 475
Raleigh, North Carolina 27607

Prepared by: _____
Mark J. Denil, PG

Reviewed by: _____
Douglas Canavello, PG

PYRAMID ENVIRONMENTAL & ENGINEERING, P.C.
700 NORTH EUGENE ST.
GREENSBORO, NC 27401
(336) 335-3489

Earth Tech of North Carolina, Inc.
GEOPHYSICAL INVESTIGATION REPORT
BERNARD FOGLEMAN PROPERTY (PARCEL 9)
Roxboro, North Carolina

TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

Pyramid Environmental conducted geophysical investigations for Earth Tech of North Carolina, Inc. within the proposed Right-of-Way (ROW) area at the Bernard Fogleman property (Parcel 9) located along the north side of NC 49 (Virginia Road) in Roxboro, North Carolina. The site consists of an active Phillips 66 and the Kwik Pik gas station and store surrounded primarily by an asphalt and concrete covered lot. The geophysical investigation was conducted during the period of June 21-26, 2007 to determine if unknown, metallic, underground storage tanks (USTs) were present beneath the proposed ROW area of the property. The work was done as part of the North Carolina Department of Transportation (NCDOT) road-widening project.

Earth Tech's representative Mr. Michael Branson, PG, provided site maps that outlined the geophysical survey area (ROW area) of the site and visited the site with a Pyramid Environmental representative prior to conducting the investigation. Photographs of the Bernard Fogleman property (Parcel 9) and the geophysical equipment used at this site are shown in **Figure 1**.

2.0 FIELD METHODOLOGY

Prior to conducting the geophysical investigation, a 10-foot by 10-foot survey grid was established across the proposed ROW area of Parcel 9 using water-based marking paint and pin flags. These marks were used as X-Y coordinates for location control when collecting the geophysical data and establishing base maps for the geophysical results.

The geophysical investigations consisted of electromagnetic (EM) induction-metal detection surveys and ground penetrating radar (GPR) surveys. The EM surveys were performed on June 21, 2007, using a Geonics EM61-MK1 metal detection instrument. According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. The EM61 data were digitally collected along easterly-westerly parallel survey lines spaced five feet apart. The data were downloaded to a computer and reviewed in the office using the Geonics DAT61W and Surfer for Windows Version 7.0 software programs.

Contour plots of the EM61 bottom coil results and the EM61 differential results for Parcel 9 are presented in **Figures 2 and 3**, respectively. The bottom coil results represent the most sensitive component of the EM61 instrument and detect metal objects regardless of size. The bottom coil response can be used to delineate metal conduits or utility lines, small, isolated metal objects, and areas containing insignificant metal debris.

The differential results are obtained from the difference between the top and bottom coils of the EM61 instrument. The differential results focus on the larger metal objects such as drums and USTs and ignore the smaller insignificant metal objects.

GPR surveys were conducted on June 26, 2007, across selected EM61 differential anomalies using a GSSI SIR-2000 unit equipped with a 400 MHz antenna. GPR data were digitally collected in a continuous mode along X and/or Y survey lines, spaced two to five feet apart using a vertical scan of 512 samples, at a rate of 48 scans per second. An 80 MHz high pass filter and an 800 MHz low pass filter were used during data acquisition with the 400 MHz antenna. GPR data were collected down to a maximum depth of approximately five feet, based on an estimated two-way travel time of 9 nanoseconds per foot. The GPR data were downloaded to a field computer and later reviewed in the field and office using Radprint software.

Preliminary contour plots of the EM61 bottom coil and the differential results for the site were emailed to Mr. Branson during the week of July 2, 2007.

3.0 DISCUSSION OF RESULTS

The high amplitude EM61 anomalies centered near grid coordinates X=135 Y=47 and X=165 Y=60 are probably in response to the store and dumpster. GPR surveys conducted across the high amplitude EM61 anomalies centered near grid coordinates X=70 Y=74 and X=110 Y=57 are probably in response to steel reinforced concrete lying at the surface or beneath the asphalt pavement.

The high amplitude EM anomaly centered near X=50 and Y=55 are probably in response to the metallic UST covers. The EM61 results and GPR surveys acquired across this area suggest the presence of one large fiberglass, compartmental type of UST. Based on the GPR results, the UST appears to be approximately 25 feet long, 15 feet wide and buried 1.5 feet below surface. An image of a GPR survey line crossing the known UST and a photograph showing the location of the known UST are presented in **Figure 4**.

The linear bottom coil anomaly intersecting grid coordinates X=85 Y=50 is probably in response to a buried conduit. The remaining EM61 anomalies recorded within the proposed ROW area are probably in response to known cultural features or to buried miscellaneous metal debris or objects.

4.0 SUMMARY & CONCLUSIONS

Our evaluation of the EM61 and GPR data collected across the proposed ROW area at the Bernard Fogleman property (Parcel 9) located in Roxboro, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the surveyed portions of the proposed ROW area of the site.

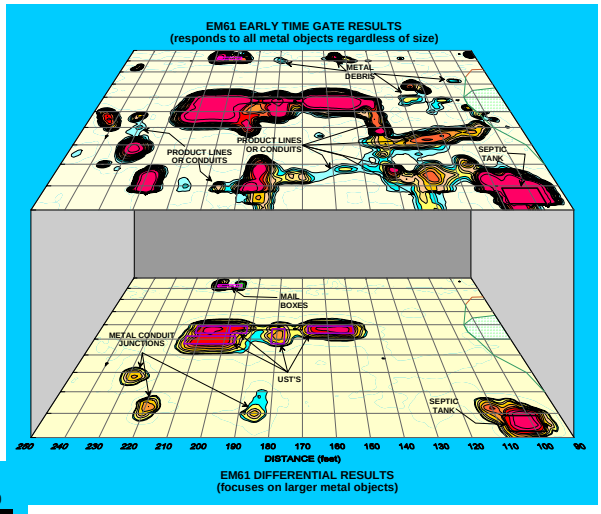
- The high amplitude EM anomaly centered near X=50 and Y=55 are probably in response to the metallic UST covers. The EM61 results and GPR surveys acquired across this area suggest the presence of one large fiberglass, compartmental type of UST.

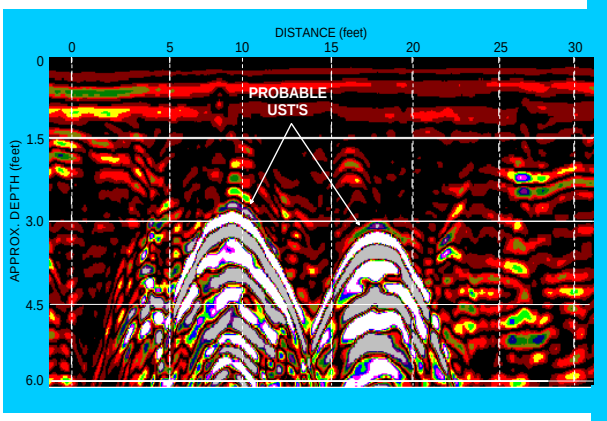
- The linear bottom coil anomaly intersecting grid coordinates X=85 Y=50 is probably in response to a buried conduit.

- The remaining EM61 anomalies recorded within the proposed ROW area are probably in response to known cultural features, steel reinforced concrete or to buried miscellaneous metal debris or objects.

5.0 LIMITATIONS

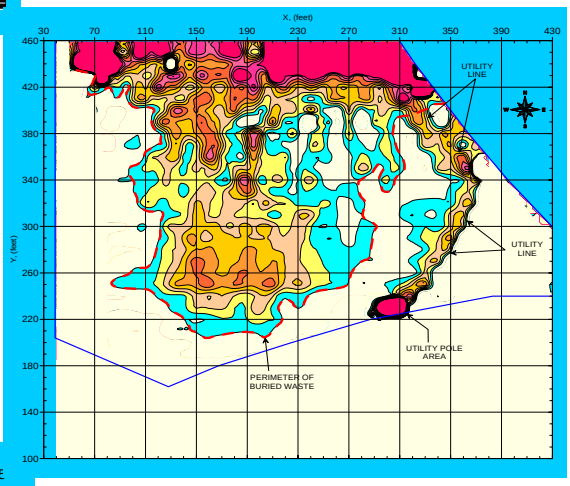
EM61 and GPR surveys have been performed and this report prepared for Earth Tech of North Carolina, Inc. in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project do not conclusively determine that all of the metallic USTs were detected within the proposed ROW area but did detect the perimeter of the known UST that lies within the proposed ROW area of the site.

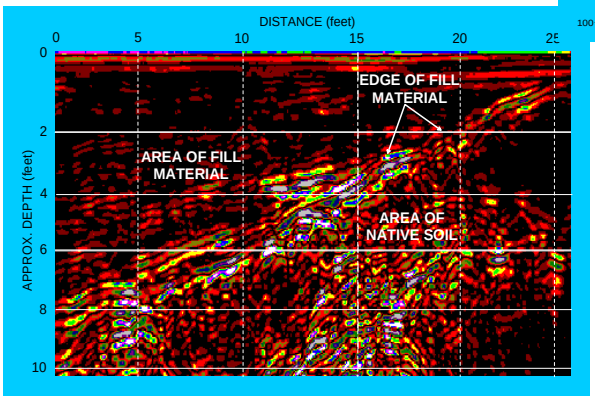




FIGURES

(on the following pages)





The photo shows the Geonics EM61 metal detector that was used to conduct the metal detection survey at Parcel 9 on June 21, 2007.

The photos show the SIR-2000 GPR system equipped with a 400 MHz antenna that were used to conduct the ground penetrating radar investigation at Parcel 9 on June 26, 2007.

The photograph shows a portion of the geophysical survey area located at Parcel 9. The photo is viewed in a northeasterly direction.

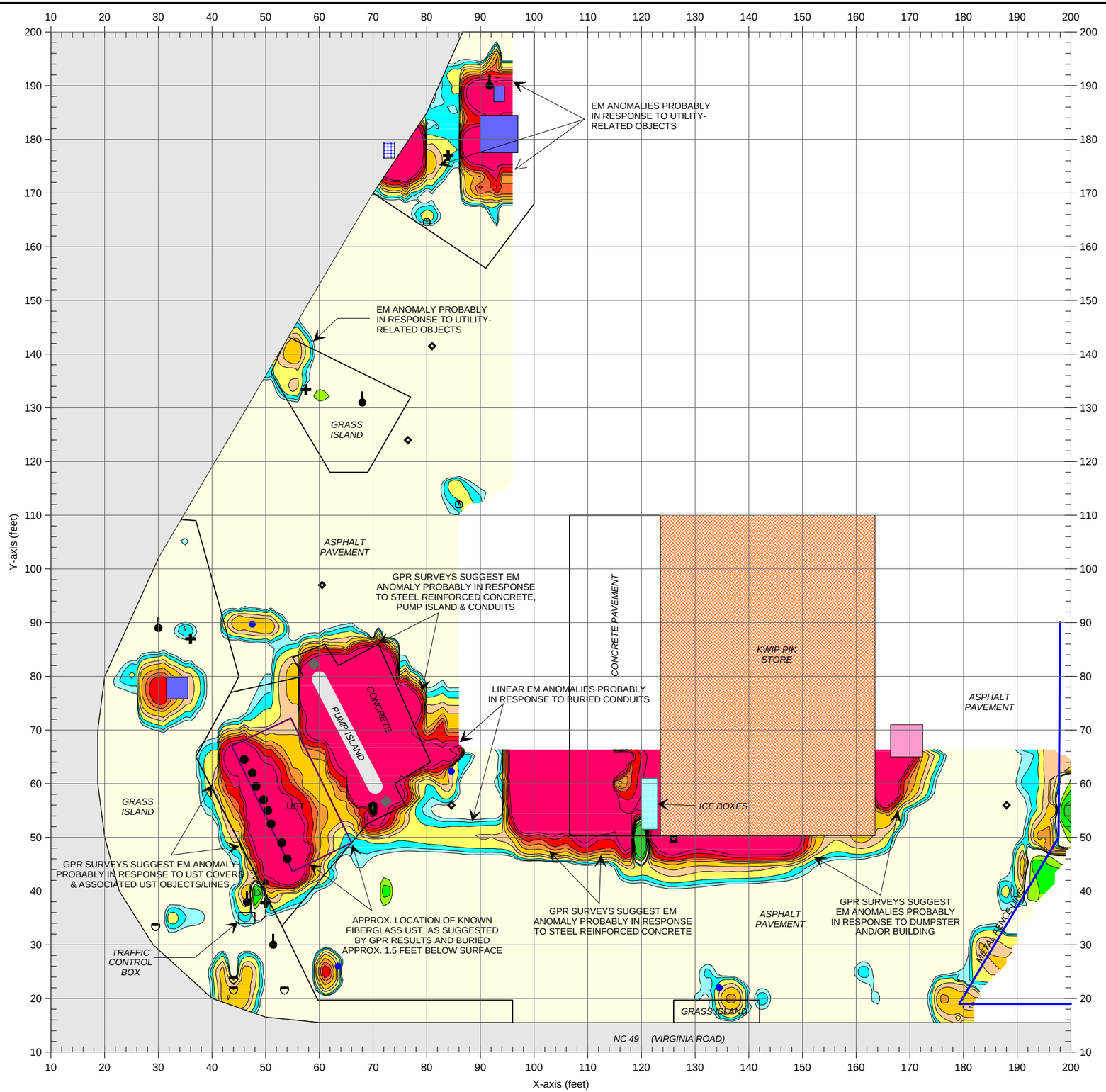
PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

CLIENT	EARTH TECH OF NORTH CAROLINA, INC.	DATE	07/13/07	DRWN	MJD
SITE	BERNARD FOGLEMAN PROPERTY - PARCEL 9	LAY		CHKD	
CITY	ROXBORO	STATE	NORTH CAROLINA	DWG	
TITLE	GEOPHYSICAL RESULTS	JNO	2007-163	FIGURE	

GRAPHIC SCALE IN FEET

PHOTOGRAPHS OF GEOPHYSICAL EQUIPMENT & SURVEY AREA

FIGURE 1



APPROXIMATE NORTH

LEGEND

- SURVEY AREA: EM61 DATA ACQUIRED ALONG EASTERLY-WESTERLY TRENDING LINES SPACED 15 FEET APART
- UST COVER
- STORM SEWER GRATE
- TCE Marker
- CANOPY SUPPORT POLES
- MONITORING WELL
- GUY WIRE
- LIGHT OR UTILITY POLE
- WATER METER OR VALVE COVER
- ROAD SIGN
- UST VENT PIPE
- DUMPSTER
- ELECTRICAL OR UTILITY BOX
- AIR-VAC PUMP
- UST — APPROX. FOOT PRINT OF KNOWN FIBERGLASS UST, AS SUGGESTED BY THE GPR RESULTS

EM61 BOTTOM COIL RESPONSE (MILLIVOLTS)

-5000 -400 -200 -100 -50 -25 0 25 50 75 100 150 200 300 400 500 750 1000

Note: The contour plot shows the bottom coil (most sensitive) response of the EM61 instrument in millivolts (mV). The bottom coil response shows buried metallic objects regardless of size. The EM metal detection data were collected on June 21, 2007 using a Geonics EM61 instrument. Ground penetrating radar (GPR) data were acquired on June 26, 2007 using a Geophysical Survey Systems SIR 2000 instrument with a 400 MHz antenna.

FIGURE 2

EM61 BOTTOM COIL RESULTS

GRAPHIC SCALE IN FEET

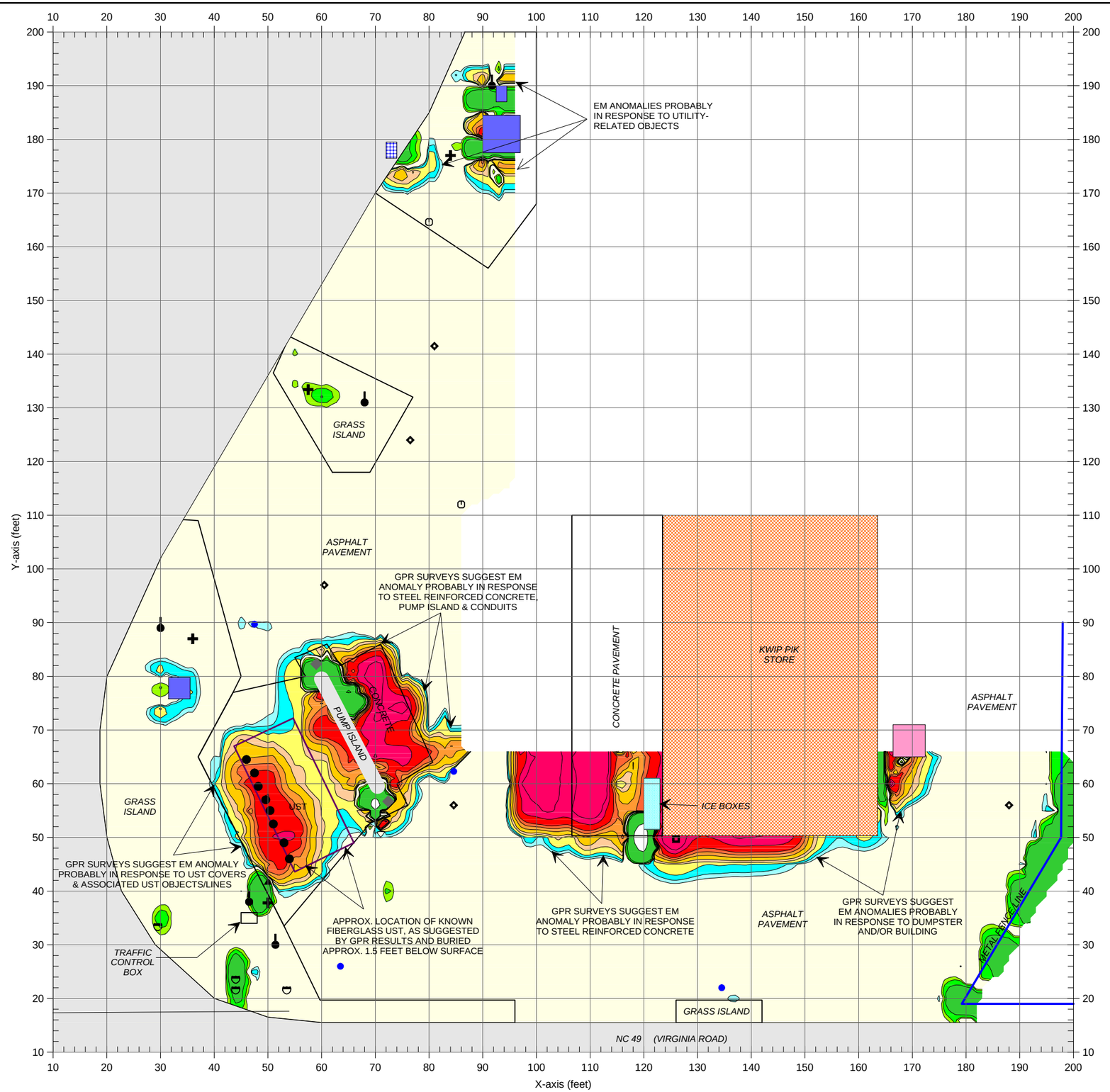
DRWN	MJD
CHKD	
DATE	07/13/07
LAY	
DWG	
J-NO.	2007-163
FIGURE	

CLIENT	EARTH TECH OF NORTH CAROLINA, INC.
SITE	BERNARD FOGLEMAN PROPERTY - PARCEL 9
CITY	ROXBORO
STATE	NORTH CAROLINA
TITLE	GEOPHYSICAL RESULTS

PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

EM61 DIFFERENTIAL RESULTS

FIGURE 3



APPROXIMATE NORTH

LEGEND

- SURVEY AREA: EM61 DATA ACQUIRED ALONG EASTERLY-WESTERLY TRENDING LINES SPACED 15 FEET APART
- UST COVER
- STORM SEWER GRATE
- TCE Marker
- CANOPY SUPPORT POLES
- MONITORING WELL
- GUY WIRE
- LIGHT OR UTILITY POLE
- WATER METER OR VALVE COVER
- ROAD SIGN
- UST VENT PIPE
- DUMPSTER
- ELECTRICAL OR UTILITY BOX
- AIR-VAC PUMP
- UST — APPROX. FOOT PRINT OF KNOWN FIBERGLASS UST, AS SUGGESTED BY THE GPR RESULTS

EM61 DIFFERENTIAL RESPONSE (MILLIVOLTS)

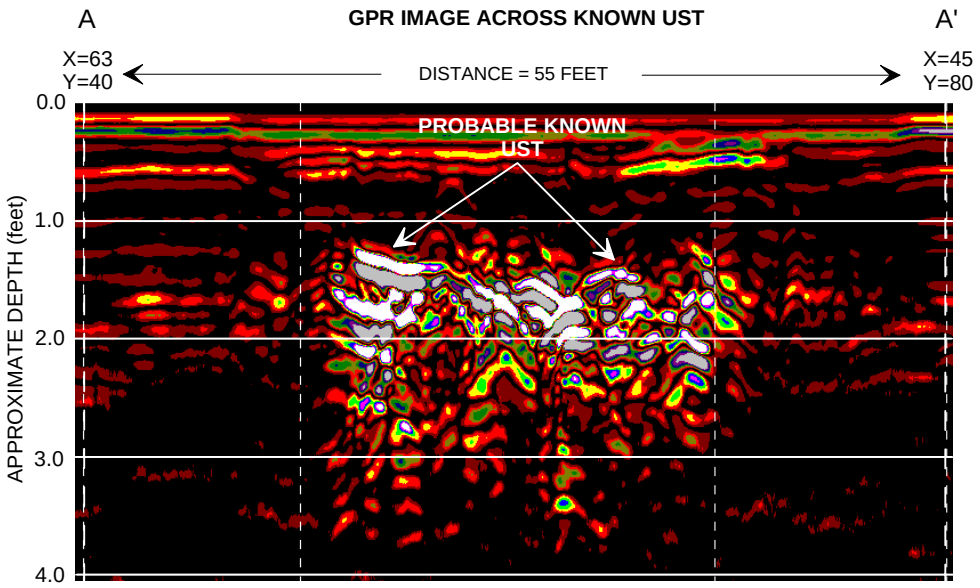
-5000 -400 -200 -100 -80 -55 -80 -75 100 150 200 300 400 500 750 1000

Note: The contour plot shows the differential response between the bottom and top coils of the EM61 instrument in millivolts (mV). The differential response focuses on larger, buried metallic objects such as drums and UST's and ignores smaller miscellaneous, buried, metal debris. The EM61 data were collected on June 21, 2007 using a Geonics EM61 instrument. Ground penetrating radar (GPR) data were acquired on June 26, 2007 using a Geophysical Survey Systems SIR 2000 instrument with a 400 MHz antenna.

GRAPHIC SCALE IN FEET

CLIENT	EARTH TECH OF NORTH CAROLINA, INC.
SITE	BERNARD FOGLEMAN PROPERTY - PARCEL 9
CITY	ROXBORO
STATE	NORTH CAROLINA
TITLE	GEOPHYSICAL RESULTS
J-NO.	2007-163
DWG	
LAY	
DATE	07/13/07
DRWN	MJD
CHKD	
FIGURE	

PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.



The GPR image obtained across the axis of the known UST shows the high amplitude reflections (shaded in white) that are probably in response to the fiberglass UST. The GPR data suggest that the UST is a compartmental-type of UST that is approximately 25 feet long and 15 feet wide and buried 1.5 feet below surface. The solid purple line in the photograph shows the location of the GPR survey line shown above. The photograph is veiwed in a northwesterly direction.

PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

CLIENT	EARTH TECH OF NORTH CAROLINA, INC.	DATE	07/13/07	DRWN	MJD
SITE	BERNARD FOGLEMAN PROPERTY - PARCEL 9	LAY		CHKD	
CITY	ROXBORO	STATE	NORTH CAROLINA	DWG	
TITLE	GEOPHYSICAL RESULTS	JNO	2007-163	FIGURE	

GRAPHIC SCALE IN FEET

KNOWN UST
LOCATION

FIGURE 4

ATTACHMENT C

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-1
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			3.68		6" ASPHALT/GRAVEL, MEDIUM BROWN TO TAN PLASTIC CLAY, DRY, NO ODOR.
			10.97		AS ABOVE, DRY, NO ODOR.
			16.85		MOTTLED MEDIUM BROWN, TAN, AND WHITE SLIGHTLY SILTY CLAY, DRY, NO ODOR.
5.0					
			1021		AS ABOVE, DRY, NO ODOR.
			19,500		AS ABOVE, DRY, MODERATE ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
10.0			95		AS ABOVE, DRY, NO ODOR.
					BORING TERMINATED AT 12 FEET. NO GROUNDWATER ENCOUNTERED.
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-2
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			1.15		4" TOPSOIL, MEDIUM BROWN SILTY CLAY, DRY, NO ODOR.
			1.18		AS ABOVE, DRY, NO ODOR.
			8.46		MOTTLED MEDIUM BROWN, TAN, AND WHITE SLIGHTLY SILTY CLAY, DRY, NO ODOR.
5.0					
			1459		AS ABOVE, WET AT 7.5 FEET, SLIGHT ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
					BORING TERMINATED AT 8 FEET. GROUNDWATER ENCOUNTERED AT 7.5 FEET.
10.0					
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-3
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			1.03		4" TOPSOIL, MEDIUM TO REDDISH BROWN SILTY CLAY, DRY, NO ODOR.
			1.06		AS ABOVE, DRY, NO ODOR.
			12.08		MOTTLED MEDIUM BROWN, TAN, AND WHITE SLIGHTLY SILTY CLAY, DRY, NO ODOR.
5.0					
			223		AS ABOVE, DRY, SLIGHT ODOR.
			4952		AS ABOVE, DRY, MODERATE ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
10.0			4623		AS ABOVE, BECOMONG GRAY, WET AT 12 FEET, MODERATE ODOR.
					BORING TERMINATED AT 12 FEET. GROUNDWATER ENCOUNTERED AT 12 FEET.
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-4
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			3.14		6" ASPHALT/GRAVEL, MEDIUM BROWN TO YELLOW BROWN STIFF SILTY CLAY, DRY, NO ODOR.
			4.29		AS ABOVE, DRY, NO ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
5.0			0.91		MOTTLED MEDIUM BROWN, TAN, AND WHITE STIFF SILTY CLAY, DRY, NO ODOR.
			1.21		AS ABOVE, DRY, NO ODOR.
			0.92		AS ABOVE, DRY, NO ODOR.
10.0			0.70		AS ABOVE, DRY, NO ODOR.
					BORING TERMINATED AT 12 FEET. NO GROUNDWATER ENCOUNTERED.
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-5
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			41		6" ASPHALT/GRAVEL, MEDIUM BROWN TO TAN SILTY CLAY, DRY, SLIGHT ODOR.
			549		AS ABOVE, DRY, MODERATE ODOR.
			13,100		AS ABOVE, BECOMING OLIVE GRAY, DRY, STRONG ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
5.0			7471		AS ABOVE, DRY, STRONG ODOR.
			741		AS ABOVE, DRY, STRONG ODOR.
10.0			131		MOTTLED MEDIUM BROWN, TAN, AND WHITE SILTY CLAY, DRY, MODERATE ODOR.
					BORING TERMINATED AT 12 FEET. NO GROUNDWATER ENCOUNTERED.
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-6
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			0.12		4" TOPSOIL, MEDIUM BROWN SANDY CLAY/CLAYEY SAND, DRY, NO ODOR.
			0.08		AS ABOVE, DRY, NO ODOR.
			0.06		MOTTLED MEDIUM BROWN, TAN, AND WHITE SLIGHTLY SILTY CLAY, DRY, NO ODOR.
5.0					
			0.17		AS ABOVE, DRY, NO ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
			0.01		AS ABOVE, DRY, NO ODOR.
10.0			0.07		AS ABOVE, DRY, NO ODOR.
					BORING TERMINATED AT 12 FEET. NO GROUNDWATER ENCOUNTERED.
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-7
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			8.65		6" ASPHALT/GRAVEL, MOTTLED MEDIUM BROWN, TAN, AND WHITE SILTY CLAY, DRY, NO ODOR.
			102		AS ABOVE, DRY, NO ODOR.
			205		AS ABOVE, DRY, NO ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
5.0					
			132		AS ABOVE, DRY, SLIGHT ODOR.
			10.02		AS ABOVE, DRY, NO ODOR.
10.0			28		AS ABOVE, DRY, NO ODOR.
					BORING TERMINATED AT 12 FEET. NO GROUNDWATER ENCOUNTERED.
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-8
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			2.68		6" ASPHALT/GRAVEL, MOTTLED MEDIUM BROWN, TAN, AND WHITE SILTY CLAY, DRY, NO ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
			1.39		AS ABOVE, DRY, NO ODOR.
			0.51		LIGHT TAN AND WHITE SILTY CLAY/CLAYEY SILT, DRY, NO ODOR.
5.0					
			0.91		AS ABOVE, DRY, NO ODOR.
					BORING TERMINATED AT 8 FEET. NO GROUNDWATER ENCOUNTERED.
10.0					
15.0					
20.0					

TEST BORING REPORT

PROJECT KIM PROPERTY (PARCEL 9)
CLIENT NCDOT (R-2241A)
PROJECT NUMBER 100407 (34406.1.1)
CONTRACTOR REGIONAL PROBING
EQUIPMENT GEOPROBE

BORING NUMBER KM-9
PAGE 1
ELEVATION
DATE JULY 9, 2007
DRILLER OPPER
PREPARED BY BRANSON

DEPTH IN FEET	CASING BLOWS FOOT	BLOWS PER 6 INCHES	OVA (ppm)	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
			85		6" ASPHALT/GRAVEL, MEDIUM TO REDDISH BROWN SILTY CLAY, DRY, NO ODOR.
			211		OLIVE GRAY SILTY CLAY, DRY, SLIGHT ODOR. SUBMIT TO LABORATORY FOR ANALYSIS.
			97		MEDIUM BROWN SILTY CLAY, DRY, SLIGHT ODOR.
5.0			45		AS ABOVE, DRY, NO ODOR.
					BORING TERMINATED AT 8 FEET. NO GROUNDWATER ENCOUNTERED.
10.0					
15.0					
20.0					

ATTACHMENT D

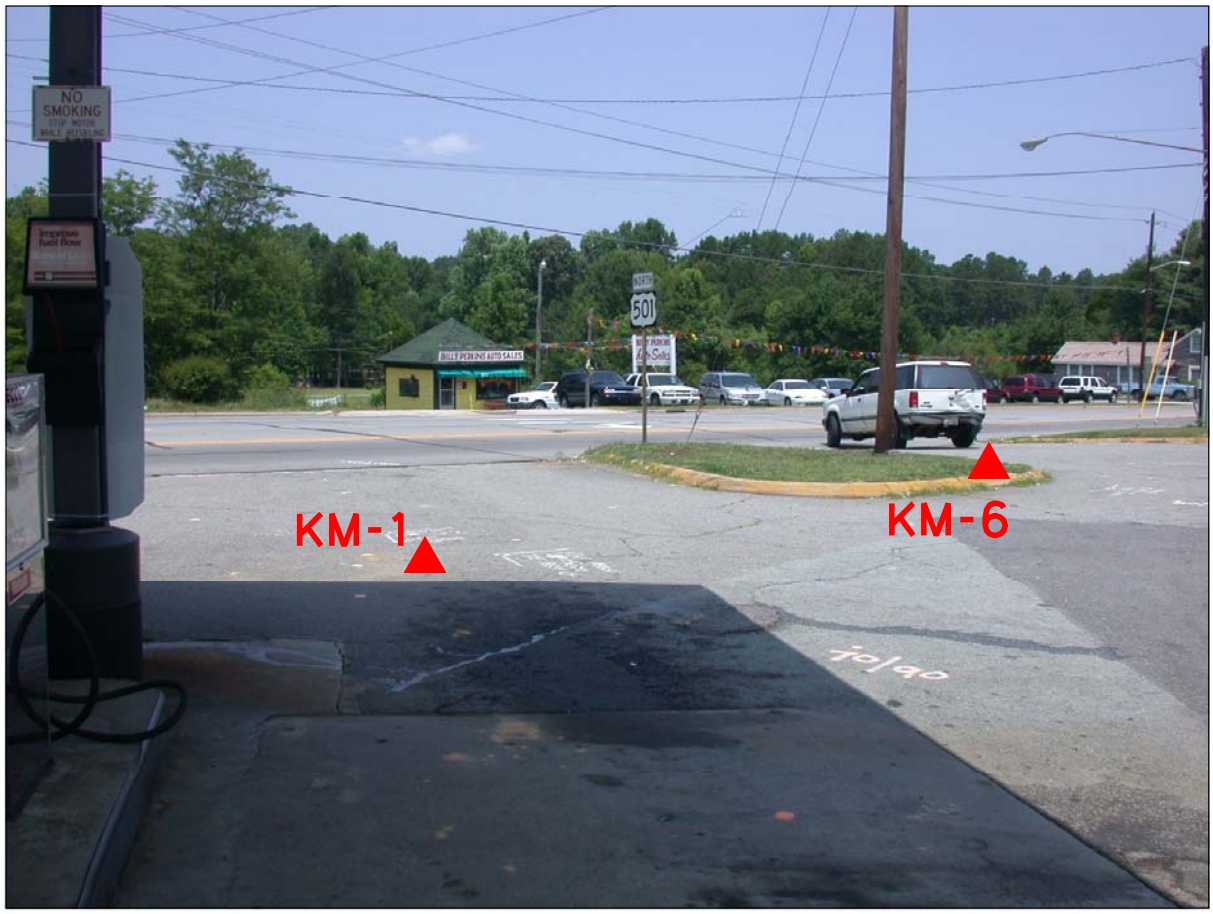


PHOTO 1 - BORINGS AT KIM PROPERTY LOOKING WEST FROM PUMP ISLAND

PHOTO 2 - BORINGS AT KIM PROPERTY LOOKING SOUTH FROM PUMP ISLAND

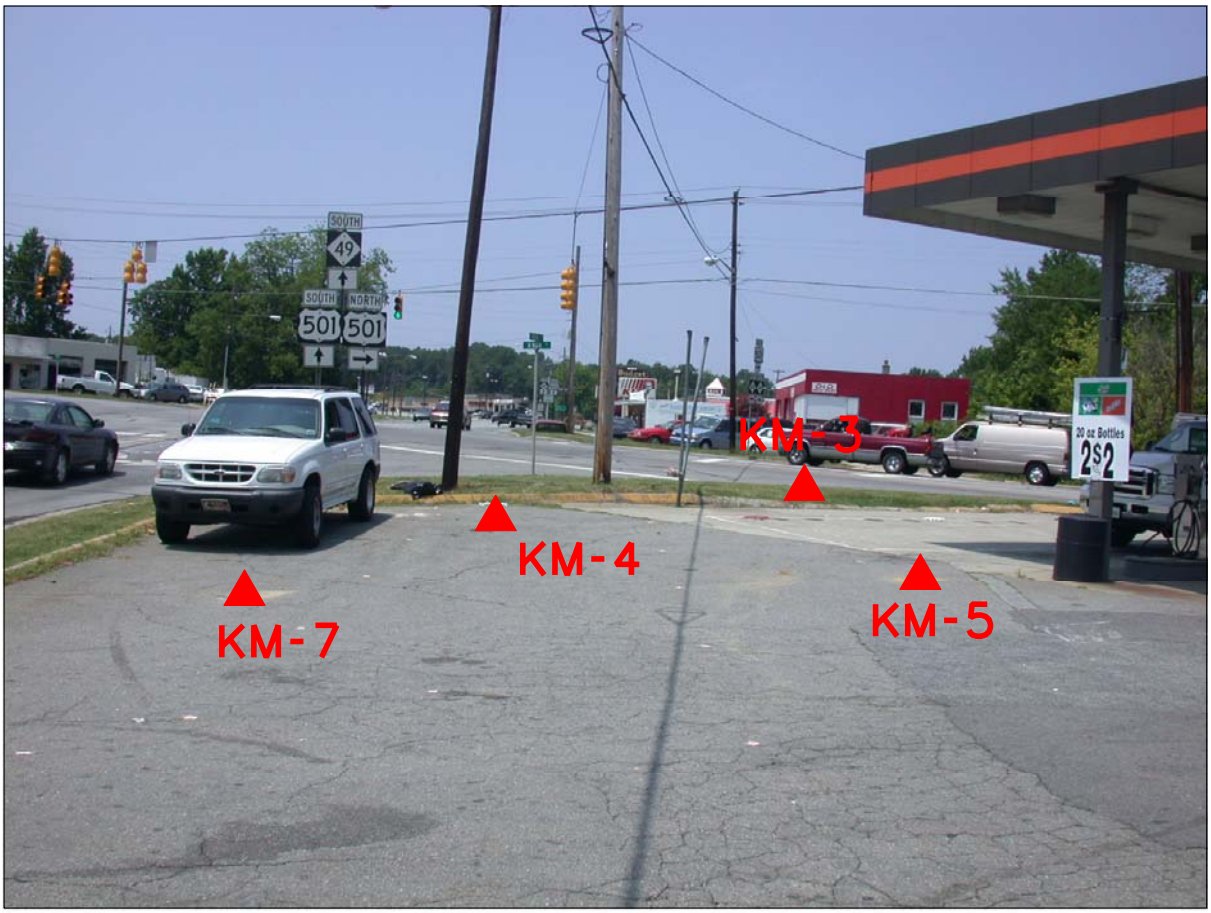


PHOTO 3 - BORINGS AT KIM PROPERTY LOOKING WEST FROM BUILDING

PHOTO 4 - BORINGS AT KIM PROPERTY LOOKING EAST FROM PUMP ISLAND

ATTACHMENT E

PRISM
LABORATORIES, INC.

Case Narrative

Date: 07/25/07
Company: N. C. Department of Transportation
Contact: Mike Branson
Address: c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Client Project ID: NCDOT - Kim
Prism COC Group No: G0707273
Collection Date(s): 07/09/07
Lab Submittal Date(s): 07/11/07

Client Project Name Or No: WBS# 34406.1.1

This data package contains the analytical results for the project identified above and includes a Case Narrative, Laboratory Report and Quality Control Data totaling 11 pages. A chain-of-custody is also attached for the samples submitted to Prism for this project.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative. Quality control statements and/or sample specific remarks are included in the sample comments section of the laboratory report for each sample affected.

Semi Volatile Analysis

No Anomalies Reported

Volatile Analysis

No Anomalies Reported

Metals Analysis

N/A

Wet Lab and Micro Analysis

N/A

Please call if you have any questions relating to this analytical report.

Date Reviewed by: Paula A. Gilleland
Signature: Paula A. Gilleland
Review Date: 07/25/07

Project Manager: Angela D. Overcash
Signature:
Approval Date: 07/25/07

Data Qualifiers Key Reference:

B: Compound also detected in the method blank.
#: Result outside of the QC limits.
DO: Compound diluted out.
E: Estimated concentration, calibration range exceeded.
J: The analyte was positively identified but the value is estimated below the reporting limit.
H: Estimated concentration with a high bias.
L: Estimated concentration with a low bias.
M: A matrix effect is present.

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-1
Prism Sample ID: 186782
COC Group: G0707273
Time Collected: 07/09/07 9:15
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**79.1**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**50**	mg/kg	8.8	1.1	1	8015B	07/20/07 16:15	jvogel	Q25201
Sample Preparation:			25.08 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	106	49 - 124

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Sample Weight Determination									
Weight 1	**6.15**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**6.53**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**1300**	mg/kg	63	6.6	500	8015B	07/18/07 12:13	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	DO #	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

The results in this report relate only to the samples submitted for analysis and meet state certification requirements other than NELAC certification except for those instances indicated in the case narrative and/or test comments.

All results are reported on a dry-weight basis

Angela D. Overcash, V.P. Laboratory Services

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543

Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-2
Prism Sample ID: 186783
COC Group: G0707273
Time Collected: 07/09/07 9:40
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**69.5**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**85**	mg/kg	10	1.3	1	8015B	07/20/07 16:52	jvogel	Q25201
Sample Preparation:			25.11 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	97	49 - 124

Sample Weight Determination									
Weight 1	**6.35**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**6.44**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**1300**	mg/kg	72	7.5	500	8015B	07/18/07 12:44	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	DO #	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

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PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-3
Prism Sample ID: 186784
COC Group: G0707273
Time Collected: 07/09/07 10:00
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**68.2**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**180**	mg/kg	10	1.3	1	8015B	07/20/07 17:29	jvogel	Q25201
Sample Preparation:			25.21 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	105	49 - 124

Sample Weight Determination									
Weight 1	**5.38**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**5.71**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**2000**	mg/kg	73	7.6	500	8015B	07/18/07 13:15	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	DO #	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

The results in this report relate only to the samples submitted for analysis and meet state certification requirements other than NELAC certification except for those instances indicated in the case narrative and/or test comments.

All results are reported on a dry-weight basis

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PRISM LABORATORIES
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-4
Prism Sample ID: 186785
COC Group: G0707273
Time Collected: 07/09/07 10:15
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**80.4**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**11**	mg/kg	8.7	1.1	1	8015B	07/20/07 18:06	jvogel	Q25201
Sample Preparation:			25.2 g /		1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	99	49 - 124

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Sample Weight Determination									
Weight 1	**6.87**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**6.61**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**BRL**	mg/kg	6.2	0.65	50	8015B	07/18/07 11:09	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	71	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

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All results are reported on a dry-weight basis

Angela D. Overcash, V.P. Laboratory Services

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-5
Prism Sample ID: 186786
COC Group: G0707273
Time Collected: 07/09/07 10:45
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**68.0**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**430**	mg/kg	51	6.5	5	8015B	07/23/07 12:22	jvogel	Q25201
Sample Preparation:			25.26 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	115	49 - 124

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Sample Weight Determination									
Weight 1	**5.91**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**5.75**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**500**	mg/kg	37	3.8	250	8015B	07/18/07 13:47	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	DO #	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

The results in this report relate only to the samples submitted for analysis and meet state certification requirements other than NELAC certification except for those instances indicated in the case narrative and/or test comments.

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NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-6
Prism Sample ID: 186787
COC Group: G0707273
Time Collected: 07/09/07 11:00
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**87.0**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**BRL**	mg/kg	8.0	1.0	1	8015B	07/20/07 19:20	jvogel	Q25201
Sample Preparation:			25.27 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	96	49 - 124

Sample Weight Determination									
Weight 1	**5.28**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**5.61**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**BRL**	mg/kg	5.7	0.60	50	8015B	07/17/07 21:13	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	104	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

The results in this report relate only to the samples submitted for analysis and meet state certification requirements other than NELAC certification except for those instances indicated in the case narrative and/or test comments.

All results are reported on a dry-weight basis

Angela D. Overcash, V.P. Laboratory Services

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543

Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-7
Prism Sample ID: 186788
COC Group: G0707273
Time Collected: 07/09/07 11:30
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**75.1**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**35**	mg/kg	9.3	1.2	1	8015B	07/20/07 19:56	jvogel	Q25201
Sample Preparation:			25.36 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	102	49 - 124

Sample Weight Determination									
Weight 1	**6.97**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**6.48**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**9.7**	mg/kg	6.7	0.69	50	8015B	07/17/07 21:45	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	80	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

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Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-8
Prism Sample ID: 186789
COC Group: G0707273
Time Collected: 07/09/07 11:40
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**79.4**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**BRL**	mg/kg	8.8	1.1	1	8015B	07/20/07 20:33	jvogel	Q25201
Sample Preparation:			25.18 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	66	49 - 124

Sample Weight Determination									
Weight 1	**6.37**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**7.62**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**BRL**	mg/kg	6.3	0.65	50	8015B	07/17/07 22:16	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	86	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

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All results are reported on a dry-weight basis

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Full Service Analytical & Environmental Solutions

NC Certification No. 402
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NC Drinking Water Cert. No. 37735

Laboratory Report

07/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1
Sample Matrix: Soil

Client Sample ID: KM-9
Prism Sample ID: 186790
COC Group: G0707273
Time Collected: 07/09/07 12:00
Time Submitted: 07/11/07 16:10

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Percent Solids Determination									
Percent Solids	**82.8**	%			1	SM2540 G	07/19/07 15:02	ddixon	
Diesel Range Organics (DRO) by GC-FID									
Diesel Range Organics (DRO)	**45**	mg/kg	8.5	1.1	1	8015B	07/20/07 21:10	jvogel	Q25201
Sample Preparation:			25.23 g	/	1 mL	3545	07/19/07 11:30	jvogel	P18952

Surrogate	% Recovery	Control Limits
o-Terphenyl	96	49 - 124

Sample Weight Determination									
Weight 1	**7.30**	g			1	GRO	07/17/07 0:00	lbrown	
Weight 2	**6.60**	g			1	GRO	07/17/07 0:00	lbrown	
Gasoline Range Organics (GRO) by GC-FID									
Gasoline Range Organics (GRO)	**15**	mg/kg	6.0	0.63	50	8015B	07/17/07 22:47	hwagner	Q25096

Surrogate	% Recovery	Control Limits
aaa-TFT	69	55 - 129

Sample Comment(s):

BRL = Below Reporting Limit

J- Estimated value between the Reporting Limit and the MDL

The results in this report relate only to the samples submitted for analysis and meet state certification requirements other than NELAC certification except for those instances indicated in the case narrative and/or test comments.

All results are reported on a dry-weight basis

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Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

NC Certification No. 402
SC Certification No. 99012
NC Drinking Water Cert. No. 37735

Level II QC Report

7/25/07

N. C. Department of Transportation
Attn: Mike Branson
c/o Earth Tech Remediation
701 Corporate Center Dr. Ste 475
Raleigh, NC 27607

Project ID: NCDOT - Kim
Project No.: WBS# 34406.1.1

COC Group Number: G0707273
Date/Time Submitted: 7/11/07 16:10

Gasoline Range Organics (GRO) by GC-FID, method 8015B

Method Blank	Result	RL	Control Limit	Units	QC Batch ID
Gasoline Range Organics (GRO)	ND	5	<2.5	mg/kg	Q25096

Laboratory Control Sample	Result	Spike Amount	Units	Recovery %	Recovery Ranges %	QC Batch ID
Gasoline Range Organics (GRO)	44.55	50	mg/kg	89	67-116	Q25096

Matrix Spike Sample ID:	Result	Spike Amount	Units	Recovery %	Recovery Ranges %	QC Batch ID
186665 Gasoline Range Organics (GRO)	59.9	50	mg/kg	97	57-113	Q25096

Matrix Spike Duplicate Sample ID:	Result	Spike Amount	Units	Recovery %	Recovery Ranges %	RPD %	RPD Range %	QC Batch ID
186665 Gasoline Range Organics (GRO)	60.45	50	mg/kg	98	57-113	1	0 - 23	Q25096

Diesel Range Organics (DRO) by GC-FID, method 8015B

Method Blank	Result	RL	Control Limit	Units	QC Batch ID
Diesel Range Organics (DRO)	ND	7	<3.5	mg/kg	Q25201

Laboratory Control Sample	Result	Spike Amount	Units	Recovery %	Recovery Ranges %	QC Batch ID
Diesel Range Organics (DRO)	81.6	80	mg/kg	102	55-109	Q25201

Matrix Spike Sample ID:	Result	Spike Amount	Units	Recovery %	Recovery Ranges %	QC Batch ID
186672 Diesel Range Organics (DRO)	91.9	80	mg/kg	115	50-117	Q25201

Matrix Spike Duplicate Sample ID:	Result	Spike Amount	Units	Recovery %	Recovery Ranges %	RPD %	RPD Range %	QC Batch ID
186672 Diesel Range Organics (DRO)	85.8	80	mg/kg	107	50-117	7	0 - 24	Q25201

#-See Case Narrative

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

PAGE 1 OF 1 QUOTE # TO ENSURE PROPER BILLING: _____

Project Name: NCDOT - Kim
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: NCDOT
Address: _____

Client Company Name: Earth Tech
Report To/Contact Name: Mike Branson
Reporting Address: 701 Corporate Center Dr. Ste 475 Raleigh, NC 27607
Phone: 9198546238 Fax (Yes) (No): 9198546259
Email (Yes) (No) Email Address Mike.Branson@aecom.com
EDD Type: PDF ✓ Excel ___ Other ___
Site Location Name: Kim
Site Location Physical Address: 1100 N Main

Purchase Order No./Billing Reference WBS# 34406.1.1
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☑ Standard 10 days ☐ Rush Work Must Be Pre-Approved
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	✓		
Received ON WET ICE? Temp 4.4°C	✓		
PROPER PRESERVATIVES indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?			
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification: NELAC ___ USACE ___ FL ___ NC X
SC ___ OTHER ___ N/A ___
Water Chlorinated: YES ___ NO ___
Sample Iced Upon Collection: YES ✓ NO ___

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	NO.	SIZE	PRESERVATIVES	ANALYSES REQUESTED DRO	GRO	REMARKS	PRISM LAB ID NO.
KM-1	7/9/07	0915	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186782
KM-2	7/9/07	0940	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186783
KM-3	7/9/07	1000	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186784
KM-4	7/9/07	1015	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186785
KM-5	7/9/07	1045	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186786
KM-6	7/9/07	1100	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186787
KM-7	7/9/07	1130	Soil	CG	3	4oz VOA	MeOH ~~HCl~~	✓	✓		186788
KM-8	7/9/07	1140	Soil	CG	3	4oz/VOA	MeOH ~~HCl~~	✓	✓		186789
KM-9	7/9/07	1200	Soil	CG	3	4oz/VOA	MeOH	✓	✓		186790

Sampler's Signature M Branson | Sampled By (Print Name) M Branson | Affiliation Earth Tech

PRESS DOWN FIRMLY - 3 COPIES

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) M Branson	Received By: (Signature) Alex Lassiter	7-10-07	1445
Relinquished By: (Signature) Alex Lassiter	Received By: (Signature) David Morris	7/11/07	1435
Relinquished By: (Signature) David Morris	Received For Prism Laboratories By:	7/12/07	1610

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other _____

COC Group No. GP467273

Additional Comments: INVOICE NCDOT UNDER BLANKET PO

PRISM USE ONLY

Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC	☒ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC
☐ ___	☐ ___	☐ ___	☐ ___	☐ ___	☐ ___	☐ ___	☐ ___	☐ ___

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL