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A Member of The IT Group

COPY

August 29, 2001

Mr. Kirk McDonald, P.G.
North Carolina Department of Environment and Natural Resources
Division of Waste Management - UST Section
Wilmington Regional Office
127 Cardinal Drive Extension
Wilmington, North Carolina 28405

Subject: **Comprehensive Site Assessment Addendum Report - On-Site Delineation Only**
Former Market Street Ogden Sunoco
6980 Market Street
Wilmington, New Hanover County, North Carolina 28405
NCDENR Groundwater Incident No. 10148
Site Priority Ranking: 180B (High)
Sunoco Facility DUNS # 0275-7292

Dear Mr. McDonald:

IT Corporation of North Carolina, Inc. (IT Corporation), on behalf of our client, Sunoco, Inc. (Sunoco), is pleased to present this *Comprehensive Site Assessment Addendum Report - On-Site Delineation Only* documenting monitoring and assessment activities performed at the subject site. This report includes a summary of previous work completed, the results of the installation of fourteen additional on-site monitoring wells, two additional off-site monitoring wells, groundwater sampling data, and a summary of free product recovery activities.

If there are any questions or concerns regarding this report, please contact Steve Brown at (919) 467-2227 extension 244.

Sincerely,
IT CORPORATION OF NORTH CAROLINA, INC.

LaKeshia M. Holley
Site Manager

Steve L. Brown
Project Manager

Attachments

cc: Mr. Dan Shine - Sunoco, Inc.
IT Corporation File - C-9
New Hanover County Health Department
New Hanover County Manager

COMPREHENSIVE SITE ASSESSMENT ADDENDUM REPORT
ON-SITE DELINEATION ONLY

Former Market Street Ogden Sunoco
Wilmington, New Hanover County, North Carolina
NCDENR Groundwater Incident No. 10148
Site Priority Ranking: 180B (High)
Sunoco Facility DUNS # 0275-7292

August 29, 2001

Prepared by:
IT CORPORATION OF NORTH CAROLINA, INC.
Project # 102591

Property Information	
Land Use:	Commercial
Responsible Party:	Sunoco, Inc. Blueball and Post Road P.O. Box 1135 Marcus, PA 19061
Contact:	Mr. Dan Shine (610) 859-1697
Current Owner:	Mid State Petroleum,Inc. 1820 S. Main Street Lexington, NC 27292
Contact:	Allan Denny (336) 249-0363
Release Information	
Date Discovered:	January 1993
Source:	Unknown
Estimated Quantity:	Unknown
USTs Present:	4-8,000 gallon fiberglass gasoline tanks, 1-4,000 gallon fiberglass kerosene tank, 1-6,000 gallon fiberglass diesel tank
Latitude:	34°15'89" North
Longitude:	77°49'54" West

IT CORPORATION OF NORTH CAROLINA, INC.

Steve L. Brown
Project Manager

IT CORPORATION OF NORTH CAROLINA, INC.

LaKeshia M. Holley
Site Manager

IT CORPORATION OF NORTH CAROLINA, INC.

NORTH CAROLINA PROFESSIONAL SEAL 18760 ENGINEER THOMAS P. RAYMOND

8/29/01

Tom Raymond, PE, RSM
Engineer In Responsible Charge

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1.0 INTRODUCTION

This report is being submitted to present additional assessment and monitoring data collected from the former Market Street Ogden Sunoco in Wilmington, New Hanover County, North Carolina. Information presented in this report fulfills only the requirements for on-site delineation of the dissolved hydrocarbon plume and the extent of free product. The recent work completed included: the installation of fourteen additional on-site monitoring wells, groundwater sampling activities, and free product recovery activities.

Additional assessment work is required in order to determine the extent of the off-site hydrocarbon plume. As part of this investigation, two downgradient monitoring wells MW-13 and MW-14 were installed. Laboratory analytical results indicate that the hydrocarbon plume has not been fully delineated. In an effort to fully delineate the off-site hydrocarbon plume an access agreement was forwarded to the property owner of parcel ID # 3158-49-8061000 in order to install two additional wells downgradient from the site. The property owner has not granted access to the property to date. The completed off-site delineation will be submitted in a separate report.

2.0 SITE LOCATION

The subject site is located at the intersection of Market Street (U.S. Hwy 17 North) and Military Cut-Off Road in Wilmington, New Hanover County, North Carolina. The site address is 6980 Market Street, Wilmington, NC. A portion of the Scotts Hill, NC USGS Quadrangle Topographic Map illustrating the location of the site is included as **Figure 1**. The former Sunoco facility is currently operating as a Citgo retail petroleum and convenience store. The site consists of a convenience store, a car wash, a metal canopy, three dispensing pump islands, two separate diesel dispensers, one kerosene dispenser, and the associated UST system. Local land use in the vicinity of the site is primarily commercial. A site map showing site features is presented as **Figure 2**.

3.0 SITE HISTORY AND ASSESSMENT

1990 Assessment Activities

According to the NCDENR files, a pollution incident was first reported to the NCDENR on April 20, 1990 by Kenan Transport Company. The pollution incident form indicated that Kenan Transport Company spilled approximately 37 gallons of gasoline onto the grass adjacent to the tank field on April 12, 1990 during tank filling operations. Before investigation took place, Kenan Transport Company contracted Clean Land and Harbor to excavate the contaminated soil. Reportedly, evidence of prior contamination was found during excavation at an approximate depth of 4-feet below surface during response activities. However, an explanation of this evidence was not disclosed. Kenan reported a concentration of TPH in the soil of 56 milligrams per kilograms (mg/kg) at the 4-foot depth. A summary of activities is included in a *Petroleum Spill Letter,* dated May 16, 1990 and submitted by Kenan Transport Company.

1992 through 1994 Assessment Activities

During January and February 1993, Law Engineering (Law) conducted additional environmental assessment activities at the site. The work scope of the initial environmental assessment included a sensitive receptor survey, the installation of four Type II groundwater monitoring wells (MW-1 through MW-4), soil and groundwater sampling/analysis, and drill cutting classification. The results of the assessment activities were described in a *Divestment Contamination Report,* dated February 25, 1993 and prepared by Law. The Law report indicated that the four soil samples contained detectable BTEX concentrations and two of the soil samples contained detectable TPH concentrations. The highest concentrations of BTEX (228.5 mg/kg) and TPH identified as diesel (33 mg/kg) were detected in the soil samples from MW-2 and MW-1 respectively. Total petroleum hydrocarbons (TPH) as gasoline was not detected in any of the soil samples collected. Total dissolved BTEX concentrations in

the groundwater samples ranged from below laboratory detection limits in monitoring well MW-3 to 6,890 micrograms per liter (ug/L) in MW-2. The highest concentrations of TPH identified as gasoline and as diesel were detected in MW-2 at concentrations of 29,000 ug/L and 8,100 ug/L, respectively. Liquid phase hydrocarbons (LPH) were not detected during this investigation.

Environmental assessment activities conducted by Richard Catlin & Associates, Inc. (RC&A) were summarized in a *Site Check and Initial Abatement Report,* dated March 11, 1993. The report indicated that a suspected petroleum release was identified at the site based on elevated readings from soils which were screened with an organic vapor analyzer (OVA) during installation of site monitoring wells. Results of the investigation are summarized in the referenced report.

In order to test the integrity of the underground storage tank (UST) system tightness test were performed on the tanks, lines, and leak detectors by Tanknology Corporation International of Houston, Texas on October 23, 1992, March 13, 1993, and March 23, 1993. During each of the events the UST system tested tight. On July 19, 1994 an automatic line leak detector test was performed by CBM Environmental Services, Inc. All tested line passed the leak detector test.

Further environmental assessment activities were summarized in a *Comprehensive Site Assessment (CSA) and Corrective Action Plan (CAP)*, dated November 1, 1993 and prepared by IT Corporation. The CSA portion of the report was prepared to further delineate and evaluate the extent of petroleum hydrocarbons in the subsurface at the site. Activities conducted under the work scope included: the installation of three Type II wells (MW-5 through MW-7) and one Type III well (VMW-8), well development, soil and groundwater sampling/analysis, drill material characterization, a sensitive receptor survey, and potable water well sampling.

In addition to the installation of MW-5 through MW-7 and VMW-8, four monitoring points (MP-1 through MP-4) were installed on September 23, 1993 to be utilized for data collection during a soil vapor extraction pilot test. The laboratory analytical results indicated that TPH was detected in soil samples. TPH as gasoline was detected in soil samples collected from MW-7 at a concentration of 56 mg/kg and at a concentration of 80 mg/kg in VMW-8. TPH as diesel was detected in the soil sample collected from MW-7 at a concentration of 550 mg/kg (mixture of diesel and light oil) and in VMW-8 at a concentration of 3,200 mg/kg. Dissolved phase BTEX constituents were detected in four of the eight groundwater samples at concentrations ranging from 60 ug/L at MW-1 to 22,000 ug/L at MW-6. Dissolved MTBE was detected in two groundwater samples at concentrations of 41 ug/L at MW-1 and 470 ug/L at MW-7. The highest total concentration of dissolved PAHs (naphthalene and 2-methylnaphthalene) were detected in well MW-2 at concentrations of 380 ug/L and 180 ug/L respectively.

The CAP portion of the 1993 CSA/CAP was prepared to address remediation of the soil and groundwater impacted by petroleum hydrocarbons. As part of the CAP submitted by IT Corporation, a technology screening matrix was included to aid in the evaluation of remedial alternatives. Technologies reviewed included: Excavation and Treatment/Disposal of Soils, Extraction and Treatment/Disposal of Groundwater (Air Stripping and Carbon Adsorption), Bioremediation, Soil Vapor Extraction (SVE), and Air Sparging. The matrix used to rate the technologies considered site specific advantages and disadvantages, operation and maintenance costs, and permit issues. Based on the site characteristics and the results of pilot testing, the use of soil vapor extraction in conjunction with groundwater extraction/treatment and re-infiltration were recommended in the CAP. A detailed evaluation of each remediation technology including a discussion of the limitations and feasibility is available in the CSA/CAP, dated November 1, 1993. The Corrective Action Plan was approved by the NCDENR Wilmington Regional Office on June 10, 1994.

A Corrective Action Addendum, dated February 22, 1994 was submitted to the NCDENR Wilmington Regional Office by IT Corporation. The November 1, 1993 CSA/CAP proposed a groundwater pump and treat system with re-infiltration using an on-site infiltration gallery. Due to the location of an on-site potable well and the fact

that the City of Wilmington' s municipal water system could not be utilized for supply and discharge of treated water, an alternative groundwater discharge methodology was considered. The CAP Addendum proposed the use of injection wells to re-infiltrate the treated water discharge from the groundwater extraction/treatment system. Based on field testing, the use of injection wells was proposed to handle the discharge water from the groundwater extraction system. A summary of the field results and drawings are included in the above reference CAP Addendum.

To further delineate the hydrocarbon plume an off-site monitoring well MW-9 was installed in the DOT right-of-way on the east side of Military Cutoff Road on July 29, 1994 by IT Corporation personnel. The well was installed using a hand auger and properly constructed and developed.

1995 Assessment Activities

Information about the proposed extraction and treatment system equipment, control system, and effluent characterization were submitted in a *National Pollutant Discharge Elimination System General Permit NCG510000 Application and Report*, dated September 5, 1995 and submitted by IT Corporation. The application/report also contained the Notice of Intent to discharge treated groundwater under the authority of the General Permit and engineering drawings of the proposed remedial system.

Additional monitoring data was prepared in a *Groundwater Sampling Report*, dated December 5, 1995 and submitted by IT Corporation to the NCDENR Wilmington Regional Office. The report included a discussion of field procedures, results of groundwater sampling, laboratory analytical reports, historical groundwater data tables, and contour maps.

1996 through 1998 Activities

The ratification of NC Senate Bill 1317 on June 21, 1996 suspended remedial activities at sites ranked as "CDE" or lower priority. The subject site was assigned a priority ranking of 180 E or low priority, therefore monitoring and remediation activities were suspended at the site on the legislative effective date of July 21, 1996.

Following the effective implementation date of January 2, 1998 for the NCAC 2L .0115 NC Risk Based Corrective Action (NC RBCA) rules, additional groundwater monitoring was conducted at the site by IT Corporation. Results of the sampling activities and a potential receptor survey were complied into a *Groundwater Monitoring Report*, dated April 30, 1998 and prepared by IT Corporation.

1999 through 2000 Activities

An Aggressive Fluid Vapor Recovery (AFVR) event was performed on December 21, 1999 and results were summarized in the *Free Product Recovery Report*, dated February 18, 2000. In addition, a groundwater sampling event was performed on November 15, 1999, two additional off-site monitoring wells MW-10 and MW-11 were installed on January 4, 2000 and groundwater samples from the two wells were collected on January 6, 2000. Also, a soil survey was conducted on February 10, 2000 in the vicinity of the pump islands and the tank field. These activities were summarized in the February 23, 2000 *Comprehensive Site Assessment Addendum*. An additional groundwater sampling event was conducted on December 6, 2000 and the results were included in the January 16, 2001 *Groundwater Monitoring Report*.

4.0 LAND USE

Local land use in the vicinity of the site is primary commercial. The adjacent property located northwest of the site contains a fabric store (Mill Village Outlet). An empty lot, Stone Garden (landscaping shop), and Hanover

Packing, Inc. occupy the properties located west of the site. Hardee's Restaurant and Express Lube are located south of the site. An empty lot and Prospect Cemetery are located east and southeast of the site across Military Cutoff Road. Northeast of the site is an empty lot (DOT right-of-way) across Military Cutoff Road. Adjacent property owner and occupant information is included as **Table 1** and an area map is presented as **Figure 3**.

5.0 RECEPTOR INFORMATION

IT Corporation personnel performed additional sensitive receptor survey reconnaissance within 1,500 feet of the subject site on June 10, 1998. Receptor survey activities included: a review of the New Hanover County tax records to determine property ownership; a review of the City of Wilmington public works records to determine water usage; and an area reconnaissance survey to locate potable and/or irrigation wells and to confirm well and/or municipal water usage.

5.1 Site Vicinity Water Supply Information

A review of the Wilmington Public Works Commission records indicate that water services are available in the vicinity of the subject site via Cape Fear Utilities. Reconnaissance of the site and the surrounding properties coupled with the performance of a door to door survey confirmed the presence of nine private wells within 1,500 feet of the site. Of the nine wells, one is located at the subject site. However, this well is no longer in use. The subject site is currently connected to the municipal water supply. A potential receptor survey map showing the locations of the wells is presented as **Figure 4** and water well information is included in **Table 2**.

5.2 Area Topography

Surface drainage in the vicinity of the site is generally to the southeast toward Howe Creek. The groundwater flow direction is also to the southeast based on historic groundwater elevation data. Surface water bodies have not been located within 1,500 feet of the site.

5.3 Local Groundwater and Classification

The site is located in the Coastal Plain physiographic province, an area underlain by sedimentary formations. The local groundwater aquifer is classified by North Carolina Environmental Management Commission as Class GA waters (North Carolina Administrative Code, Title 15, Subchapter 2L, section .0201).

6.0 RECENT SITE ACTIVITIES

Recent site activities included further assessment and abatement activities. The following is a summary of the activities conducted at the site during January through August 2001.

7.0 MONITORING WELL INSTALLATION ACTIVITIES

7.1 On-site Monitoring Well Installation

IT Corporation personnel supervised the installation of fourteen additional on-site Type II monitoring wells during May 15, 16, and 17, 2001 by Saedacco, Inc., of Charlotte, NC. These wells were installed to fully delineate the on-site hydrocarbon plume and the extent of free product. Monitoring wells MW-15 through MW-26 were drilled using a drill rig (mobile drill B59). Type II monitoring wells MW-15 through MW-26 were extended to a total depth of 15 feet below grade. The wells were constructed of 2-inch diameter schedule 40 PVC well screen and riser. The well consists of 12 feet of slotted well screen (0.010) and 3 feet of riser. The general procedure for constructing the monitoring wells was to insert the well screen/riser pipe assembly down the center of the hollow

stem augers/borehole. Silica sand was poured around the well screen, forming a filter pack within the annular space. Sufficient sand was added to extend the filter pack approximately 1 foot above the top of the well screen. A bentonite seal of one foot was placed directly above the sand and the remaining annular space was filled with cement grout.

Monitoring wells MW-27, MW-28, and MW-29 were installed under the pump island canopy. Due to the canopy having less than 20 feet of clearance from the ground and varies product and electrical lines, due care was taken to install these wells. These wells were installed using a truck mounted geoprobe GH-40. After the concrete was removed the wells were installed by driving a 3/8 inch diameter HQ core casing to a depth of 15 feet below grade. The 2-inch well assembly was put down the center of the casing/borehole. Silica sand was poured around the HQ core casing, forming a filter pack within the annular space to approximately 1 foot above the screen. The HQ core casing was carefully removed allowing the well assembly to be intact to depth. A bentonite seal of one foot was placed directly above the sand and the remaining annular space was filled with cement grout. While removing the HQ core casing from MW-27 and MW-28 the well assembly was slightly lifted from the depth. The well assembly for MW-27 and MW-28 had to be pushed down to depth. MW-27 and MW-28 were installed at 14.5 feet below grade. MW-27 and MW-28 consist of 12.5 feet of slotted well screen (0.010) and 2.5 feet of riser. Monitoring well MW-29 consist of 12 feet of slotted well screen (0.010) and 3 feet of riser.

7.2 Off-site Monitoring Well Installation

Downgradient monitoring wells MW-13 and MW-14 were installed on May 16, 2001 to further delineate the off-site hydrocarbon plume. Monitoring wells MW-13 and MW-14 were drilled using a drill rig (mobile drill B59). Type II monitoring wells MW-13 and MW-14 were extended to a total depth of 15 feet below grade. The wells were constructed of 2-inch diameter schedule 40 PVC well screen and riser. The well consists of 12 feet of slotted well screen (0.010) and 3 feet of riser. The general procedure for constructing the monitoring wells was to insert the well screen/riser pipe assembly down the center of the hollow stem augers/borehole. Silica sand was poured around the well screen, forming a filter pack within the annular space. Sufficient sand was added to extend the filter pack approximately 1 foot above the top of the well screen. A bentonite seal of one foot was placed directly above the sand and the remaining annular space was filled with cement grout.

Well construction logs are for MW-13, MW-14, and MW-16 through MW-29 are presented in **Appendix A**. Per request from the NCDENR - Wilmington Regional Office soil samples were not collected during monitoring well installation activities.

8.0 Surveying

On June 7, 2001 the newly installed monitoring wells MW-13, MW-14, and MW-16 through MW-29 were measured for the top of each well casing to the nearest 0.01 foot by IT Corporation personnel. The top of casing elevations were measured relative to existing site datum.

9.0 Monitoring Well Development

After installation, monitoring wells MW-13, MW-14, and MW-16 through MW-29 were developed using a decontaminated well development pump. The wells were developed in order to remove soil particles which may have entered the well during construction. The wells were developed by evaluating water until clear of sediment. The development water generated during development was conveyed to steel 55-gallon drums for containment.

10.0 GROUNDWATER MONITORING ACTIVITIES

On June 6, 2001 all on-site and off-site monitoring wells were gauged. The wells were gauged using an

electronic Interface Probe to determine depth to water and the presence of LPH. All of the wells were sampled on June 6 and 7, 2001, with the exception of MW-7, MW-27, and MW-28, due to the detection of LPH. Also, off-site monitoring well MW-9 was not gauged or sampled due the well being damaged.

During the August 22, 2001 site visit monitoring well MW-14 was resampled. In addition, monitoring well MW-9 was successfully gauged and a 1" bailer was carefully lowered into the well and a sample was collected.

10.1 Monitoring Well Gauging Activities

On June 6, 2001 groundwater was encountered across the site at depths ranging from 13.96 feet below grade (MW-28) to 5.72 feet below grade (MW-29). During the August 22, 2001 site visit, groundwater was encountered at a depth of 9.76 feet (MW-14) and 6.83 feet (MW-9). A summary of the June and August 2001 liquid level data is presented in **Table 3** and historical liquid level data is provided as **Table 4**. A water table elevation contour map based on the liquid level data for the June 6, 2001 gauging event is presented as **Figure 5**. Hydrographs are included in **Appendix B**. Water-table elevation contours indicate that the direction of shallow groundwater flow is towards the southeast.

10.2 Monitoring Well Sampling Activities

10.2.1 June 6 and 7, 2001 Sampling Event

Groundwater samples were collected from MW-1 through MW-4, MW-6, VMW-8, MW-10, MW-11, MW-13 through MW-26, and MW-29 on June 6 and 7, 2001. Well MW-7, MW-27 and MW-28 were not sampled due to the detection of LPH. Also, well MW-9 was not sampled due to the well being damaged. Each sample was properly preserved and placed on ice in a cooler immediately after collection. The groundwater samples obtained from the monitoring wells were forwarded to Environmental Science Corporation in Mount Juliet, Tennessee. The June samples were analyzed by EPA Methods 601 and 602 for plus MTBE and IPE.

10.2.2 August 22, 2001 Sampling Event

Due to miscommunication with the laboratory for the reporting of BTEX constituents, monitoring well MW-14 was resampled on August 22, 2001. BTEX constituents were not reported in the laboratory reports received in June 2001. A laboratory representative informed IT Corporation that if constituents were not reported they were not present in the sample. In August 2001 IT Corporation requested that BTEX constituents be added to the laboratory reports regardless if they had been detected. In August 2001, IT Corporation received the laboratory reports with the addition of BTEX constituents. A concentration of 380 ug/L for benzene was reported to have been detected in the sample collected from MW-14.

Due to the detection of benzene above the 2L Standard of 1 ug/L in the most downgradient well from the site, MW-14, another sample was deemed necessary to be collected. Therefore, a sample was collected from MW-14 on August 22, 2001. Although, monitoring well MW-9 was found to be damaged during previous site visits the well was reassessed during the August 22, 2001 visit. MW-9 was determined to be slightly bent due to the concrete pad being damaged. However, the well was gauged and was purged and sampled using a 1" bailer. The August 22, 2001 samples collected from MW-9 and MW-14 were analyzed by EPA Methods 601 and 602 plus MTBE and IPE.

10.3 Groundwater Laboratory Analyses and Results

10.3.1 On-Site Wells

The laboratory analytical results for the June 6 and 7, 2001 sampling event for the on-site wells indicate that hydrocarbon constituents were detected in all site monitoring wells, with the exception of MW-13, MW-18, and MW-25. Benzene was detected above the 2L Standard of 1 ug/L in the following wells: MW-1, MW-2, MW-6, MW-11, MW-14, MW-16, MW-17, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-26, and MW-29. The 2L Standard for ethylbenzene, total xylenes, MTBE, and tetrachoroethene (PCE), and cholorform were exceeded in various wells.

10.3.2 Off-Site Wells

The laboratory analytical results for the June 6 and 7, 2001 sampling event for the off-site wells indicate that hydrocarbon constituents were detected in wells MW-11 and MW-14. 2L Standards were exceeded in MW-14 for benzene, toluene, ethylbenzene, and total xylenes. The 2L Standard was exceeded for benzene in MW-13.

Laboratory reports from the August 22, 2001 samples collected from monitoring wells MW-9 and MW-14 indicate that hydrocarbon constituents were below detection limit in MW-9. Benzene was detected above the 2L Standard of 1 ug/L in MW-14.

A summary of groundwater analytical data for EPA Method 602 from June and August 2001 is included in **Tables 5**. Historical groundwater analytical data is presented in **Tables 6** through **10**. **Figures 6, 7,** and **8** show groundwater concentration for benzene, BTEX, and MTBE from the June 6 and 7, 2001 sampling event. Time-Series Analytical Data (BTEX, MTBE, and IPE) is presented in **Appendix C**. Laboratory analytical reports for the June 6 and 7, 2001 and August 22, 2001 sampling events are included in **Appendix D**.

11.0 LIQUID PHASE HYDROCARBON RECOVERY

11.1 January 2001 AFVR Event

An Aggressive Fluid Vapor Recovery event was conducted at the site on January 15, 2001 to remove free product from monitoring wells MW-6 and MW-7. Prior to the event, LPH were measured in MW-6 at a thickness of 0.06 feet and 0.14 feet in MW-7. The event was performed for a total of seven hours. The event was terminated at seven hours due to collection of fluid reaching the tanker's 3,000 gallon capacity. During the event surrounding wells MW-1, MW-2, MW-3, and MW-4 were monitored every 30 minutes. At the conclusion of the event monitoring wells MW-6 and MW-7 were gauged with no measurable LPH detected. A summary of the AFVR event, including data tables and calculations is provided in the *Free Product Recovery Report,* dated January 17, 2001 and prepared by IT Corporation. The following is a summary of key results of the AFVR event:

- A total of 2,889 gallons of impacted groundwater was recovered during the event; and
- At the conclusion of the event, LPH was not detected in MW-6 or MW-7.

11.2 Confirmatory Gauging Events

Confirmatory gauging events were conducted at the site on February 14, 2001 and April 4, 2001. During the February 14, 2001 event, LPH was detected in MW-7 at a depth of 0.04 feet a sheen was detected in MW-6. On April 4, 2001 a sheen was detected in MW-6 and LPH was detected at a thickness of 0.02 feet in MW-7.

11.3 June and August 2001 AFVR Events

During the June 6, 2001 gauging event, LPH was detected in newly installed monitoring wells MW-27 at a thickness of 4.95 feet and at a thickness of 5.92 feet in MW-28. Also, LPH was detected in MW-7 at a thickness of 0.02 feet. Due to the minimum amount of LPH detected in MW-7 absorbent socks were placed in the well. In order to address the LPH detected in MW-27 and MW-28, additional AFVR events have been conducted at the site. The following is a brief summary of each event:

- June 12, 2001 - A six-hour AFVR event was performed at the site. Prior to the start of the event LPH was gauged in monitoring well MW-27 at a thickness of 5.46 feet and at a thickness of 5.73 feet in MW-28. The vacuum was applied to MW-27 and MW-28 during the event.

- August 3, 2001 - A six-hour AFVR event was performed at the site. Prior to the start of the event , LPH was gauged in monitoring well MW-27 at a thickness of 4.75 feet and in MW-28 at a thickness of 7.33 feet. The vacuum was applied to MW-27 and MW-28 during the event. In addition, monitoring wells MW-6 and MW-7 were gauged prior to the event and LPH was not detected. Absorbent socks from MW-7 were replaced.

- August 22, 2001 - A seven-hour AFVR event was performed at the site. Prior to the start of the event, LPH was gauged in monitoring well MW-27 at a thickness of 5.34 feet and in MW-28 at a thickness of 5.89 feet. The vacuum was applied to MW-27 and MW-28 during the event. Also, monitoring wells MW-6 and MW-7 were gauged prior to the event. LPH was detected in MW-6 at a thickness of 0.01 feet, however LPH was not detected in MW-7. Due to historical detection of LPH in MW-6 and MW-7, absorbent socks were placed in both wells.

The June and August 2001 AFVR events, along with one additional AFVR to be performed in September 2001 will be summarized in a Free Product Recovery Report.

12.0 LIQUID PHASE HYDROCARBON SAMPLING AND ANALYSIS

During the June 7, 2001 site visit, product samples were collected from monitoring wells MW-27 and MW-28. The samples were properly preserved and packaged and submitted to Southern Petroleum Laboratory (SPL), Inc. In Houston, Texas in August 2001 for piano and age dating analysis. The laboratory analytical reports indicate that the sample collected from MW-27 was mostly diesel range hydrocarbons (C7-C22) with some weathered gasoline range hydrocarbons (C4-C13). The estimated age of the sample was >5 years and <10 years. The laboratory analytical reports indicate that the sample collected from MW-28 was mostly diesel range hydrocarbons (C7-C22) with some weathered gasoline range hydrocarbons (C4-C13). The estimated age of the sample was moderate >5 years and <10 years. Copies of the laboratory analytical reports are included in **Appendix E**.

13.0 FUTURE PLANNED SITE ACTIVITIES

13.1 On-site Activities

The hydrocarbon plume and the extent of free product on-site has been completely delineated. As such, the next phase for the addressing the impact of on-site groundwater is to develop a Correction Action Plan. Free product recovery events will continue on-site to recover detected LPH.

13.2 Off-Site Activities

Due to the detection of hydrocarbon constituents above the 2L Standards in the most downgradient monitoring well MW-14, additional monitoring wells in the downgradient direction are required in order to fully delineate the extent of the off-site hydrocarbon plume. IT Corporation has submitted an access agreement to the property owner of parcel ID # 3158-49-8061000 in order to install two additional wells downgradient from the site. During several telephone conversations with the property owner, Mr. Nicholas Batuyios (telephone number - 631-744-6693) he was reluctant to grant access to the property. During the most recent conversation of August 27, 2001, Mr. Batuyios (the property owner) indicated that he was not going to allow access to the property. IT Corporation will attempt to receive a written response from Mr. Batuyios for his denial of access. IT Corporation will submit a letter to the NCDENR requesting assistance in receiving access to the Batuyios property.

14.0 CONCLUSIONS AND RECOMMENDATIONS

14.1 Conclusions

Based on the information presented the following conclusions are made:

- The site meets the criteria to be characterized as "High Risk", due to the presence of potable water wells within 1,000 feet of the site and the exceedance of constituents above the 2L Standards;
- The laboratory analytical results for the June 6 and 7, 2001 groundwater sampling event for the on-site monitoring wells indicate that hydrocarbon constituents were detected in all site monitoring wells, with the exception of MW-13, MW-18, and MW-25;
- Laboratory analytical reports for the June 6 and 7, 2001 groundwater sampling event of on-site monitoring wells indicate that benzene was detected above the 2L Standard of 1 ug/L in the following wells: MW-1, MW-2, MW-6, MW-11, MW-14, MW-16, MW-17, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-26, and MW-29. The 2L Standard for ethylbenzene, total xylenes, MTBE, and tetrachoroethene (PCE), and cholorform were exceeded in varies wells;
- Prior to the start of the last AFVR event on August 22, 2001, LPH was gauged in monitoring well MW-27 at a thickness of 5.34 feet and in MW-28 at a thickness of 5.89 feet. The vacuum was applied to MW-27 and MW-28 during the event. Also, monitoring wells MW-6 and MW-7 were gauged prior to the event. LPH was detected in MW-6 at a thickness of 0.01 feet, however LPH was not detected in MW-7;
- During the June 7, 2001 site visit product samples were collected from monitoring wells MW-27 and MW-28. The laboratory analytical reports indicate that the sample collected from MW-27 was mostly diesel range hydrocarbons (C7-C22) with some weathered gasoline range hydrocarbons (C4-C13). The estimated age of the sample was >5 years and <10 years. The laboratory analytical reports indicate that the sample collected from MW-28 was mostly diesel range hydrocarbons (C7-C22) with some weathered gasoline range hydrocarbons (C4-C13). The estimated age of the sample was moderate >5 years and <10 years;
- The hydrocarbon plume and the extent of free product on-site has been completely been delineated; and
- Due to the detection of hydrocarbon constituents above the 2L Standards in the most downgradient monitoring well MW-14, additional monitoring wells in the downgradient direction are required in order to fully delineate the extent of the off-site hydrocarbon plume.

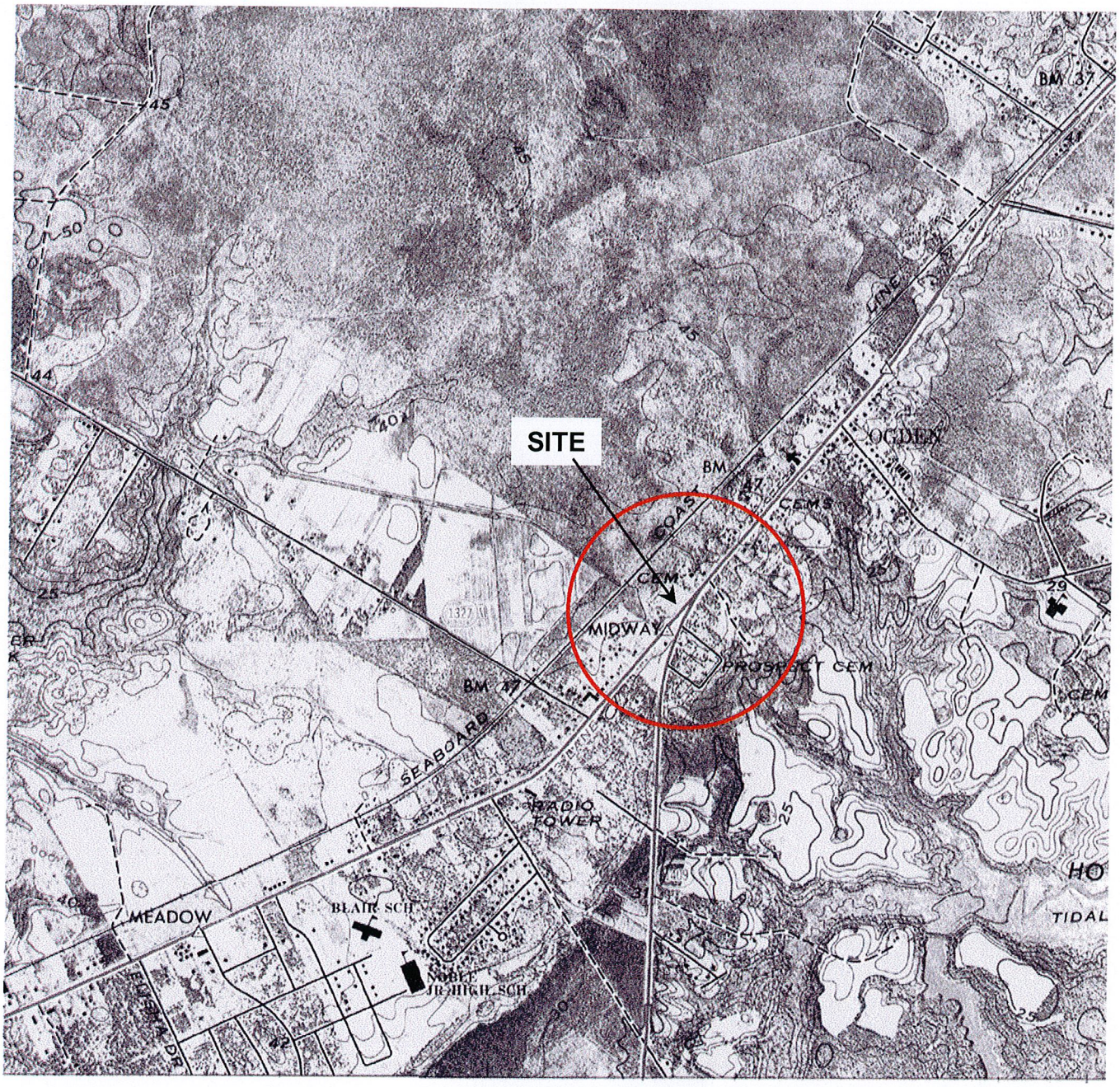
Based on the available site data, IT Corporation recommends the following:

14.2 Recommendations

- Proceed with the development of a Corrective Action Plan to address the impact of groundwater on-site;
- Continue abatement measures to recover LPH detected on-site;
- IT Corporation will submit a letter to the NCDENR requesting assistance in receiving access the Batuyios property to install two additional downgradient monitoring wells; and
- A full round of groundwater sampling in September 2001 to determine groundwater trends.

A pre-approval task authorization will be submitted under separate cover by September 10, 2001 for the proposed activities that have not yet been approved.

FIGURES



QUADRANGLE LOCATION

SCALE 1:24,000

0 2000 4000

SCALE IN FEET

N

SOURCE: TOPOGRPHAY TAKEN FROM USGS 7.5 MINUTE QUADRANGLE SCOTTS HILL, NC

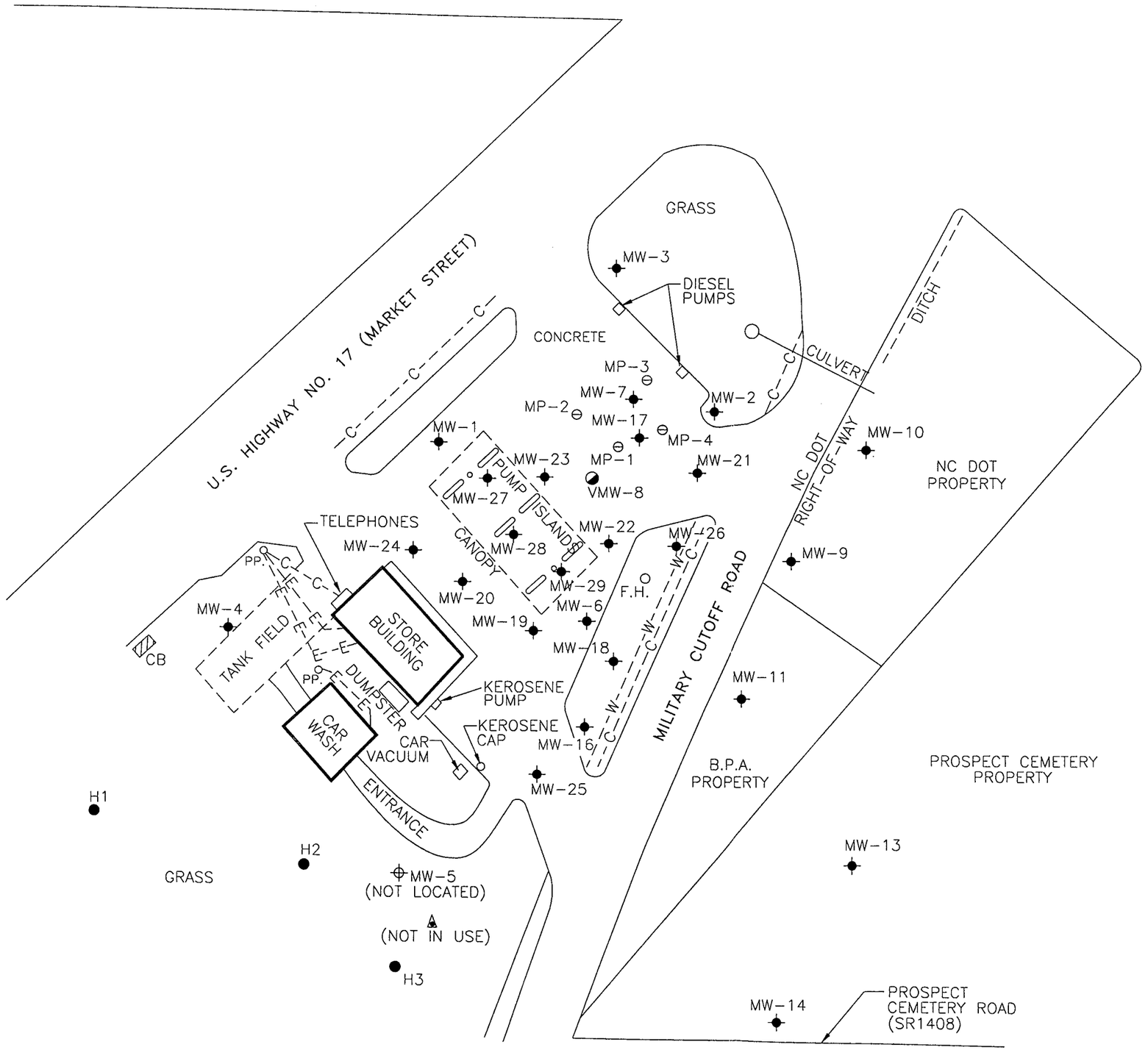
IT CORPORATION of NORTH CAROLINA, INC. *A Member of The IT Group*

2200 Gateway Centre Blvd.
Suite 205
Morrisville, NC 27560
(919) 467-2227

REV.	DRAWING DATE: 08/27/01	ACAD FILE:	

PORTION OF SCOTTS HILL, NC USGS TOPOGRAPHIC MAP

CLIENT:	SUNOCO, INC.		PM: SLB
LOCATION:	6980 Market Street Wilmington, North Carolina		PE/RG: TR
DESIGNED:	DETAILED: LMH	PROJECT NO: 102591	FIGURE: 1



LEGEND

- MONITORING WELL
- VERTICAL DEFINITION MONITORING WELL
- MONITORING POINT
- POTABLE WATER WELL
- F.H. FIRE HYDRANT
- PP. POWER POLE
- MONITORING WELL (DESTROYED)
- CB CATCH BASIN
- ——C—— COMMUNICATION LINE (UNDERGROUND)
- ——E—— ELECTRIC LINE (UNDERGROUND)
- ——W—— WATER LINE

NOTE: ● H1

H1, H2, AND H3 ARE HAND PUMP WATERING POINTS FOR LAWN HOSE CONNECTIONS (CITY WATER SUPPLIED)

N

0 60 120

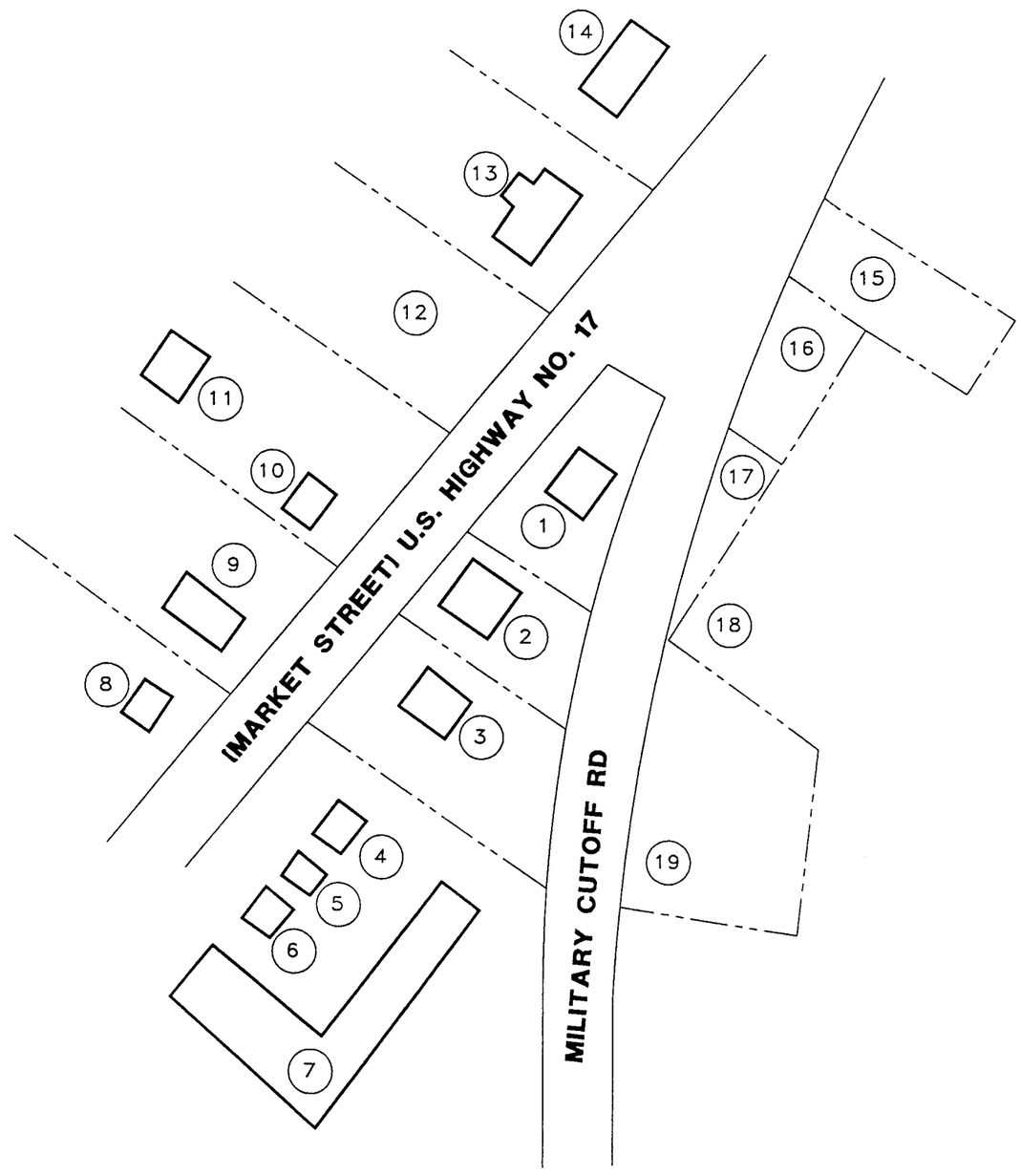
SCALE FEET

IT CORPORATION OF NORTH CAROLINA, INC.
A Member of The IT Group
2200 GATEWAY CENTRE BLVD.
SUITE 205
MORRISVILLE, NC 27560
(919) 467-2227

REV. NO.:	DRAWING DATE:	ACAD FILE:
	8/27/01	102591SITE

SITE MAP

CLIENT:		PM:
SUNOCO, INC.		SLB
LOCATION: 6980 MARKET ST. WILMINGTON, NC		PE/RG: TR
DESIGNED: LMH	DETAILED: RHW	PROJECT NO.: 102591
		FIGURE: 2



LEGEND

1. CITGO STATION (SITE)
2. HARDEE'S
3. EXPRESS LUBE
4. WAFFLE HOUSE
5. HOLLYWOOD VIDEO
6. ECKERD DRUG STORE
7. SHOPPING CENTER
8. CUSTOM COLORS
9. MINI STORAGE
10. STONE GARDEN
11. HANOVER PACKING INC.
12. EMPTY LOT
13. MILL OUTLET VILLAGE
14. CAROLINA CUSTOM GOLF
15. PAGES CREEK
16. EMPTY LOT
17. EMPTY LOT
18. PROSPECT CEMETARY
19. EMPTY LOT

N

0 200 400
SCALE FEET

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SUITE 205
MORRISVILLE, NC 27560
(919) 467-2227

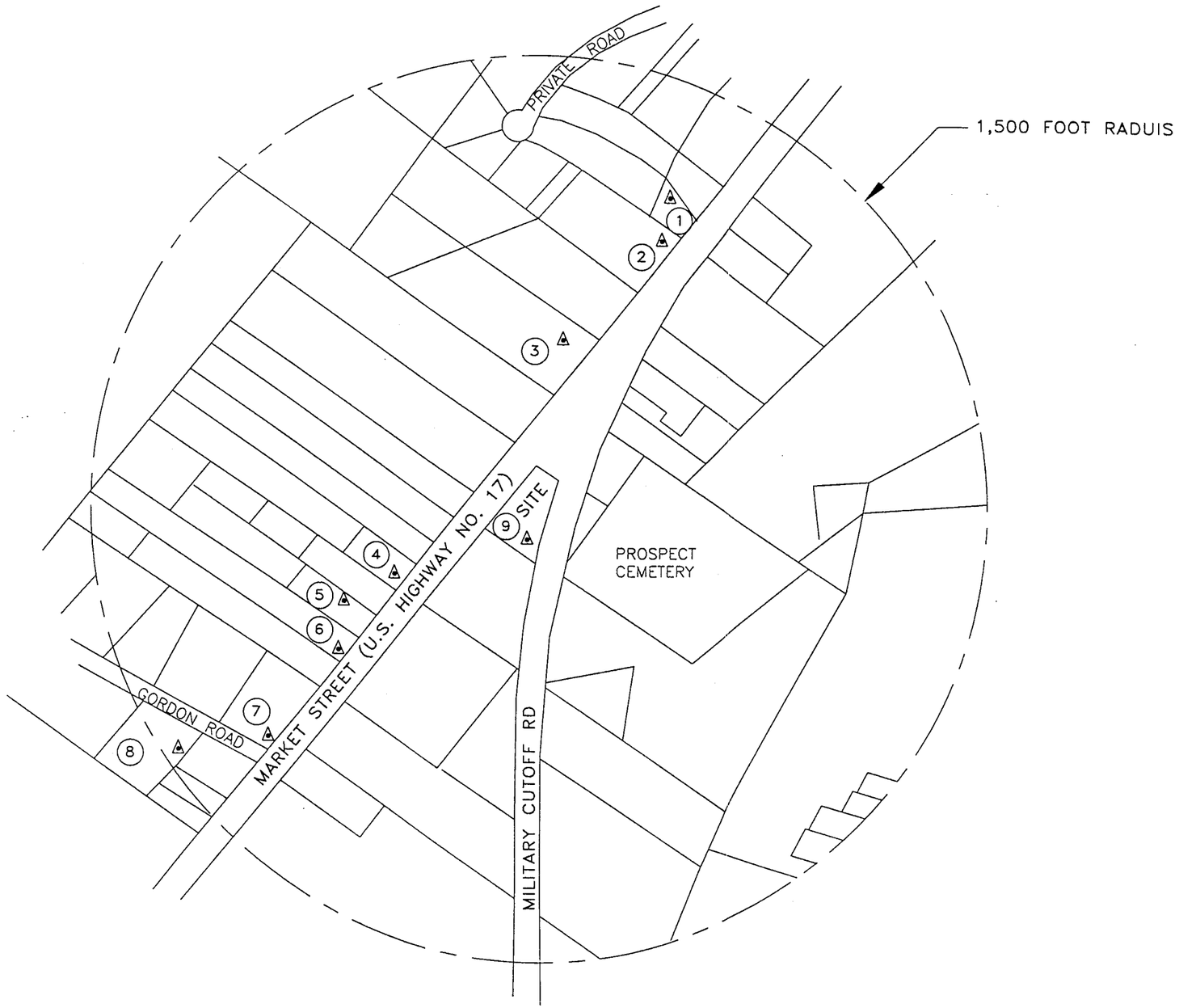
REV. NO.:	DRAWING DATE:	ACAD FILE:
	8/27/01	2591SITE

AREA MAP

AS OF AUGUST 22, 2001

CLIENT:	PM:
SUNOCO, INC.	SB
LOCATION: 6980 MARKET ST. WILMINGTON, NC	PE/RG: TR

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
LMH	RHW	102591	**3**



LEGEND

- POTABLE WATER WELL
- (1) FOUR SEASONS DRY CLEANING
- (2) ENOCH CHAPEL BAPTIST CHURCH
- (3) MILL OUTLET VILLAGE
- (4) CUSTOM COLORS PAINT STORE
- (5) KOHL'S FROZEN CUSTARD
- (6) SOUTHWINDS HAIR DESIGN
- (7) THOMPSON'S SIGNS
- (8) GENERAL RENTAL
- (9) (SITE) CITGO STATION

NOTE:
WELL LOCATED ON THE SITE IS NO LONGER IN USE (PUMP REMOVED) AND INACCESSIBLE.

N

0 600 1200
SCALE FEET

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REV. NO.:	DRAWING DATE: 8/27/01	ACAD FILE: 2591VIC

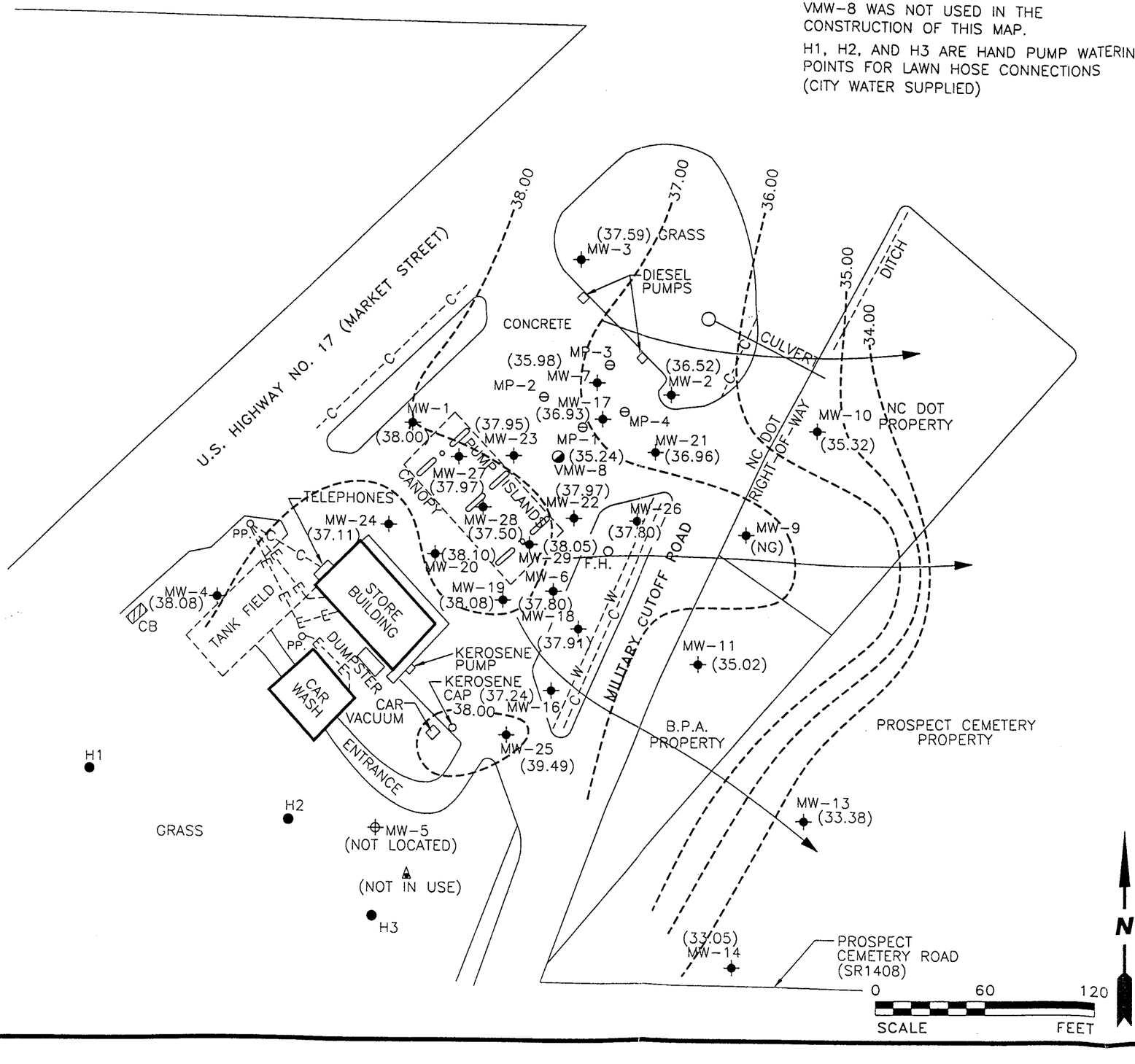
POTENTIAL RECEPTOR SURVEY MAP AS OF JUNE 10, 1998

CLIENT: SUNOCO, INC			PM: SB
LOCATION: 6980 MARKET ST. WILMINGTON, NC			PE/RG: TR
DESIGNED: LMH	DETAILED: RHW	PROJECT NO.: 102591	FIGURE: 4

NOTES:

VMW-8 WAS NOT USED IN THE CONSTRUCTION OF THIS MAP.

H1, H2, AND H3 ARE HAND PUMP WATERING POINTS FOR LAWN HOSE CONNECTIONS (CITY WATER SUPPLIED)



LEGEND

- MONITORING WELL
- VERTICAL DEFINITION MONITORING WELL
- MONITORING POINT
- POTABLE WATER WELL
- F.H. FIRE HYDRANT
- PP. POWER POLE
- MONITORING WELL (DESTROYED)
- CB CATCH BASIN
- ---C--- COMMUNICATION LINE (UNDERGROUND)
- ---E--- ELECTRIC LINE (UNDERGROUND)
- ---W--- WATER LINE
- (37.59) GROUNDWATER ELEVATION (FT)
- (NG) NOT GAUGED-WELL DAMAGED
- DIRECTION OF SHALLOW GROUNDWATER FLOW

CONTOUR INTERVAL = 1.0'

NOTES:

DUE TO THE DETECTION OF LPH, MW-7, MW-27, AND MW-28 WERE NOT USED IN THE CONSTRUCTION OF THIS MAP.

THE HIGHER WATER-TABLE ELEVATION IN MW-25 MAY BE CAUSED BY ARTIFICAL RECHARGE FROM THE CAR WASH.

THE BULDGE IN THE CONTOURS MAY BE DUE TO DISPLACED WATER FROM LPH.

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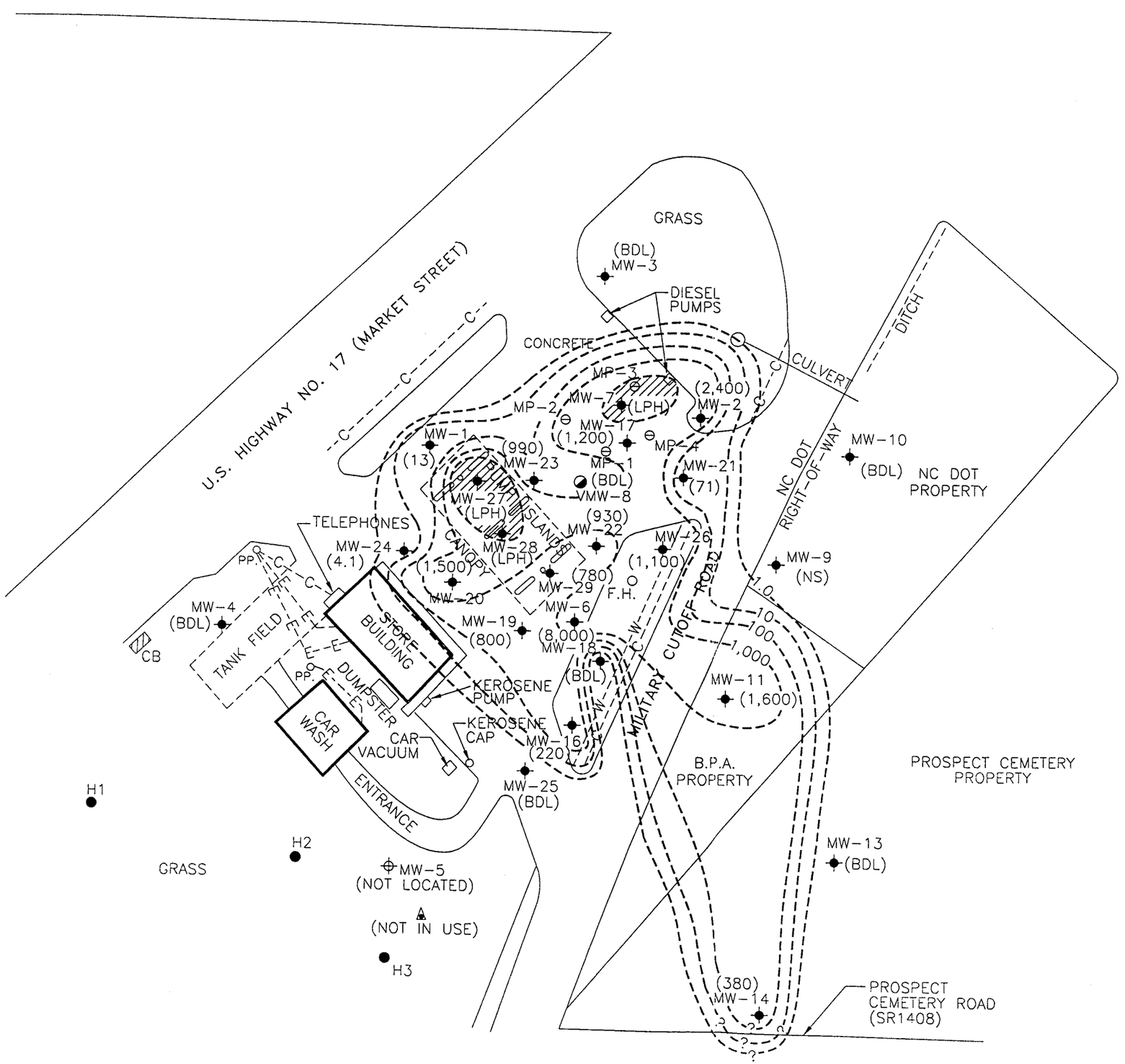
REV. NO.:	DRAWING DATE:	ACAD FILE:
	8/27/01	259X601

WATER-TABLE ELEVATION CONTOUR MAP

JUNE 6, 2001

CLIENT:	PM:
SUNOCO, INC.	SLB
LOCATION: 6980 MARKET ST. WILMINGTON, NC	PE/RG: TR

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
LMH	RHW	102591	5



LEGEND

- MONITORING WELL
- VERTICAL DEFINITION MONITORING WELL
- MONITORING POINT
- POTABLE WATER WELL
- F.H. FIRE HYDRANT
- PP. POWER POLE
- MONITORING WELL (DESTROYED)
- CB CATCH BASIN
- ---C--- COMMUNICATION LINE (UNDERGROUND)
- ---E--- ELECTRIC LINE (UNDERGROUND)
- ---W--- WATER LINE
- (13) BENZENE CONCENTRATION (ug/L)
- (BDL) BELOW LABORATORY DETECTION LIMIT
- (NS) NOT SAMPLED
- (LPH) LIQUID PHASE HYDROCARBONS
- 100 INFERRED BENZENE ISOCONCENTRATION CONTOUR

NOTES:

VMW-8 WAS NOT USED IN THE CONSTRUCTION OF THIS MAP.

H1, H2, AND H3 ARE HAND PUMP WATERING POINTS FOR LAWN HOSE CONNECTIONS (CITY WATER SUPPLIED)

0 60 120

SCALE FEET

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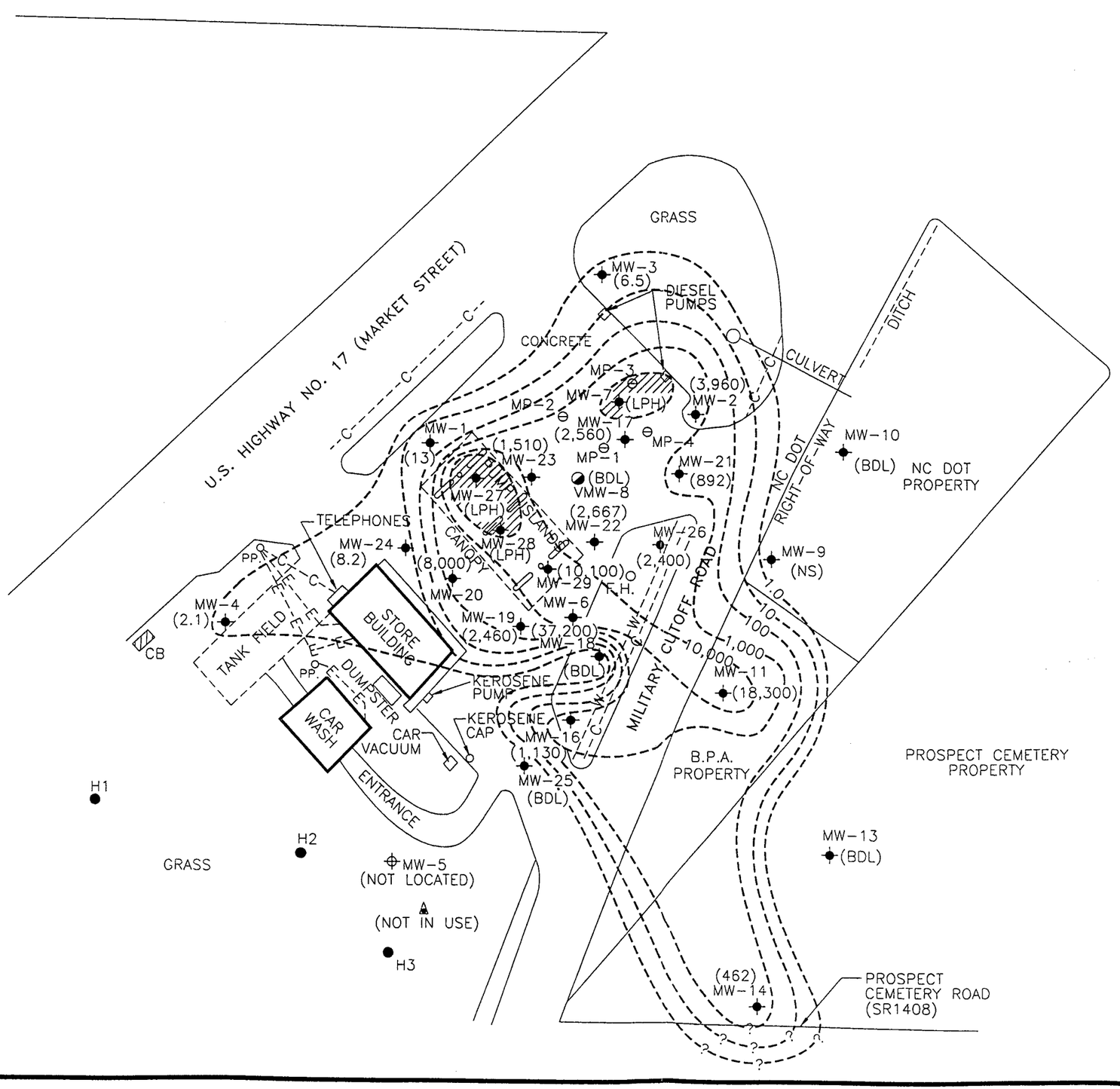
REV. NO.:	DRAWING DATE:	ACAD FILE:
	8/27/01	259X801

DISSOLVED PHASE BENZENE ISOCONCENTRATION MAP

JUNE 6 AND 7, 2001

CLIENT:	PM:
SUNOCO, INC.	SLB
LOCATION: 6980 MARKET ST. WILMINGTON, NC	PE/RG: TR

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
LMH	RHW	102591	6



LEGEND

- MONITORING WELL
- VERTICAL DEFINITION MONITORING WELL
- MONITORING POINT
- POTABLE WATER WELL
- F.H. FIRE HYDRANT
- PP. POWER POLE
- MONITORING WELL (DESTROYED)
- CB CATCH BASIN
- ---C--- COMMUNICATION LINE (UNDERGROUND)
- ---E--- ELECTRIC LINE (UNDERGROUND)
- ---W--- WATER LINE
- (9,130) BTEX CONCENTRATION (ug/L)
- (BDL) BELOW LABORATORY DETECTION LIMIT
- (NS) NOT SAMPLED–WELL DAMAGED
- (LPH) LIQUID PHASE HYDROCARBONS
- ---100--- INFERRED BTEX ISOCONCENTRATION CONTOUR

NOTES:

VMW-8 WAS NOT USED IN THE CONSTRUCTION OF THIS MAP.

H1, H2, AND H3 ARE HAND PUMP WATERING POINTS FOR LAWN HOSE CONNECTIONS (CITY WATER SUPPLIED)

0 60 120

SCALE FEET

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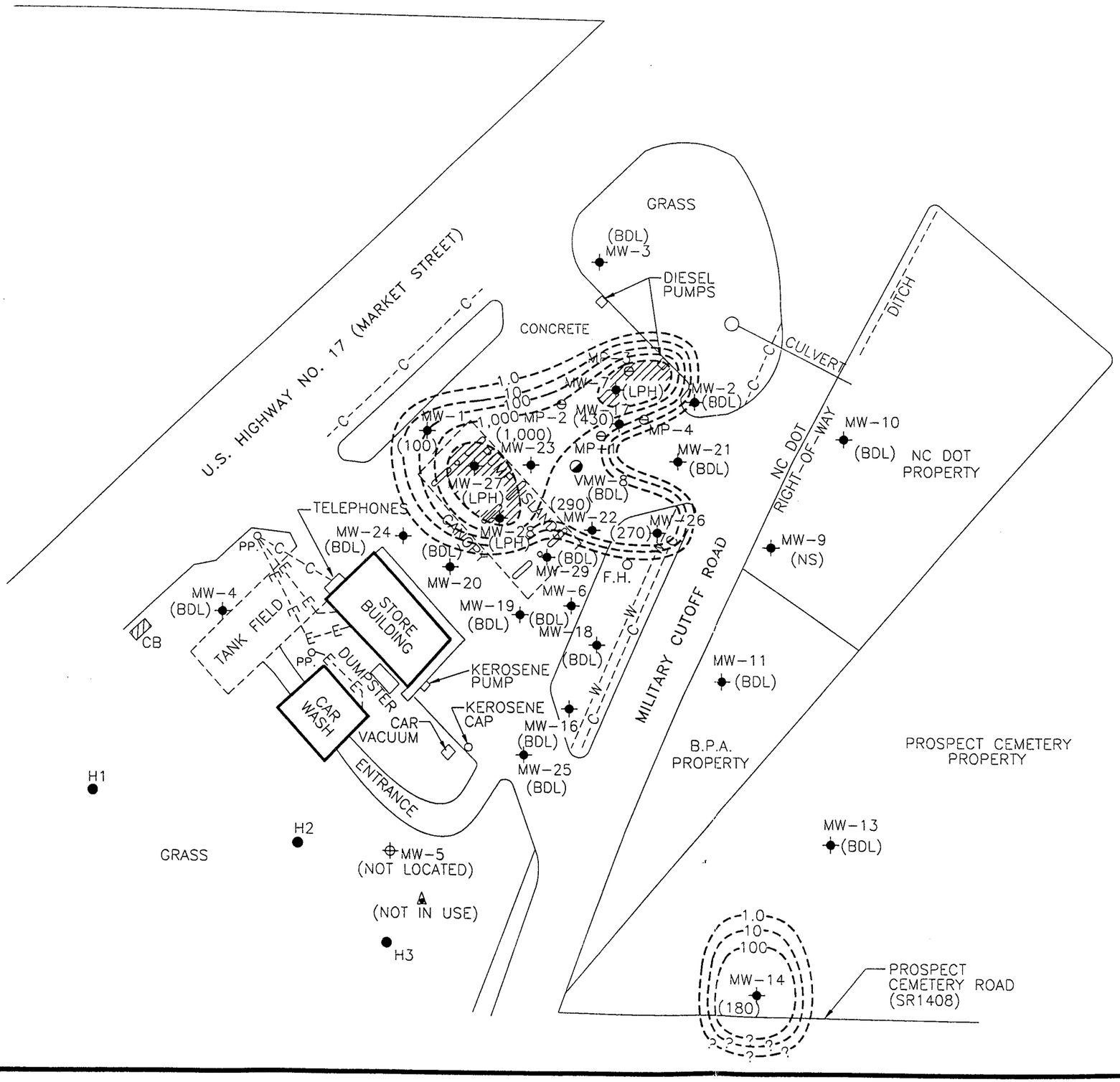
REV. NO.:	DRAWING DATE:	ACAD FILE:
	8/28/01	259X801

DISSOLVED PHASE BTEX ISOCONCENTRATION MAP

JUNE 6 AND 7, 2001

CLIENT:		PM:
SUNOCO, INC.		SLB
LOCATION:		PE/RG:
6980 MARKET ST. WILMINGTON, NC		TR
DESIGNED:	DETAILED:	PROJECT NO.:
LMH	RHW	102591

FIGURE: **7**



LEGEND

- MONITORING WELL
- VERTICAL DEFINITION MONITORING WELL
- MONITORING POINT
- POTABLE WATER WELL
- F.H. FIRE HYDRANT
- PP. POWER POLE
- MONITORING WELL (DESTROYED)
- CB CATCH BASIN
- ---C--- COMMUNICATION LINE (UNDERGROUND)
- ---E--- ELECTRIC LINE (UNDERGROUND)
- ---W--- WATER LINE
- (270) MTBE CONCENTRATION (ug/L)
- (BDL) BELOW LABORATORY DETECTION LIMIT
- MTBE METHYL TERT BUTYL ETHER
- (LPH) LIQUID PHASE HYDROCARBONS
- (NS) NOT SAMPLED–WELL DAMAGED
- ---100-- INFERRED MTBE ISOCONCENTRATION CONTOUR

NOTE:
H1, H2, AND H3 ARE HAND PUMP WATERING POINTS FOR LAWN HOSE CONNECTIONS (CITY WATER SUPPLIED), VMW-8 WAS NOT USED IN THE CONSTRUCTION OF THIS MAP.

0 60 120
SCALE FEET

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(919) 467-2227

REV. NO.:	DRAWING DATE:	ACAD FILE:
	8/27/01	259M801

DISSOLVED PHASE MTBE ISOCONCENTRATION MAP

JUNE 6 AND 7, 2001

CLIENT:	PM:
SUNOCO, INC.	SLB
LOCATION: 6980 MARKET ST. WILMINGTON, NC	PE/RG: TR

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
LMH	RHW	102591	8