

**ADDITIONAL ASSESSMENT AND
CORRECTIVE ACTION PLAN**

FOR

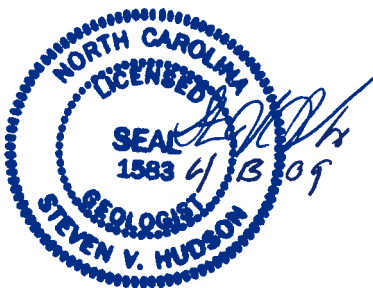
TC-341 PIPELINE

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

**NCDENR INCIDENT NO.: 23444
RISK CLASSIFICATION: INTERMEDIATE
LAND USE CLASSIFICATION: INDUSTRIAL/COMMERCIAL**

APRIL 13, 2009

**CONTRACT NO.: N62470-05-D-6200
DELIVERY ORDER NO.: 0036
CATLIN PROJECT NO.: 206-111**



PREPARED BY:

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TITLE PAGE

SITE IDENTIFICATION

Date of Report: April 13, 2009
Facility ID: N/A UST Incident Number (if known): 23444
Site Risk: Intermediate Site Rank: _____ Land Use Category: Industrial/Commercial
Site Name: TC-341 Pipeline
Site Location: Marine Corps Base, Camp Lejeune
City/Town: Jacksonville County: Onslow
Geographical Data Point: Approximate Release Point Location Method: GPS
Longitude: 77° 77' 06.55" W Latitude: 34° 44' 20.10" N

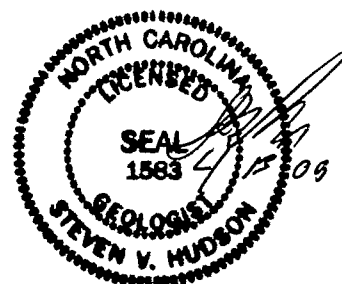
INFORMATION ABOUT CONTACTS ASSOCIATED WITH LEAKING UST SYSTEM

UST Owner: Commanding Officer Attn: Director I&E/EMD/EQB
Address: PSC Box 2004, MCB, Camp Lejeune, NC Phone: 910-451-5068
UST Operator: Same as above
Address: Same as above Phone: Same as above
Property Owner: Same as above
Address: Same as above Phone: Same as above
Property Occupant: None
Address: None Phone: Same as above
Consultant: CATLIN Engineers and Scientists
Address: 220 Old Dairy Road Phone: (910) 452-5861
Wilmington, North Carolina 28405
Analytical Lab.: SGS Environmental Services, Inc. State Cert. No.: _____
Address: 5500 Business Drive Phone: (910) 350-1903
Wilmington, North Carolina 28405

INFORMATION ABOUT RELEASE

Date Discovered: Unknown Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (Dispenser/Piping/UST): Suspected release from underground transfer pipeline associated with former Camp Geiger Fuel Farm.
Sizes and contents of UST system(s) from which the release occurred: 6-inch diameter fuel transfer line (TC-341 Pipeline). Contents reported to be Number 6 Fuel Oil and kerosene.

I, Steven V. Hudson a Professional Engineer/Licensed Geologist (circle one) for CATLIN Engineers and Scientists, do certify that the information contained in this report is correct and accurate to the best of my knowledge.



(Please Affix Seal and Signature)

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**ADDITIONAL ASSESSMENT
AND CORRECTIVE ACTION PLAN**

FOR

TC-341 PIPELINE

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

APRIL 13, 2009

EXECUTIVE SUMMARY

This Additional Assessment and Corrective Action Plan (CAP) report was prepared for the TC-341 Pipeline project site, formerly known as Site G-480, located at Camp Geiger which is part of the Marine Corps Base, Camp Lejeune military complex. The project site is located north of Building G-480, a classroom facility for Advanced Infantry Training Battalion (AITB), located within Camp Geiger between "E" and "F" Streets. The Pipeline Site is situated within the project limits of Operable Unit 10 (IR Site 35), the site of the former Camp Geiger Fuel Farm (CGFF). Free-phase product has been historically identified in monitoring well IR35-MW67A dating back to 1998 and during groundwater gauging and sampling activities conducted in the area. CATLIN Engineers and Scientists (CATLIN) prepared a Comprehensive Site Assessment (CSA) dated August 19, 2008 that showed the site surficial aquifer impacted with dissolved and free-phase petroleum constituents.

The CSA included the installation of 17 Type II and one Type III groundwater monitoring wells. In order to delineate dissolved phase petroleum contamination identified in the CSA, four additional Type II groundwater monitoring wells were installed as part of the Additional Assessment activities. Based on laboratory analytical results, eleven soil samples were identified with detected concentrations of target compounds above the lowest established Maximum Soil Contaminant Concentrations (MSCCs) Soil to Groundwater (STGW), but well below the Industrial Commercial (I/C) MSCCs.

A comprehensive groundwater gauging event was conducted on May 20, 2008. Groundwater elevations in the Type II monitoring wells across the site ranged from 4.26 to 10.24 feet (NAVD 88) and depth to water ranged from 7.80 ft. to 4.99 ft. below land surface (BLS). The generalized groundwater flow trend in the shallow aquifer was determined to be towards the east to northeast across the subject site at an approximate average linear flow velocity of 0.0268 ft/day.

Free-phase product gauging and recovery efforts have been conducted by OSAGE of Virginia (OSAGE) on a bi-weekly basis since completion of the CSA. To date, over 85 gallons of free-phase product have been recovered from the subject site.

Dissolved petroleum constituents were identified in groundwater samples collected during this investigation at concentrations above current applicable 2L Groundwater

Quality Standards (GWQS). Review of data compiled during this investigation indicates that the dissolved contaminant plume has been delineated horizontally and vertically to a depth of less than 30 feet below land surface (BLS).

Due to the presence of free-phase product at the subject site, an Intermediate Risk Classification has been assumed for the site. Therefore, the lower of Residential or Soil to Groundwater (STGW) Maximum Soil Contamination Concentrations (MSCCs) are the applicable regulatory limits for soil contamination and the 2L GWQS are the applicable regulatory limits for groundwater. By reducing the risk classification to a low risk site (i.e. removing free-phase product), the Industrial/Commercial MSCCs would become the applicable regulatory limits for soil contamination and the Gross Contaminant Levels (GCLs) would become the applicable regulatory limits for groundwater contamination.

The primary CAP goal is to contain and recover the site free-phase product. This CAP provides conceptual plans for active corrective measures in accordance with North Carolina Administrative Code (NCAC) Title 15A, Subchapter 2L, Section .0106(h) and the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ), Underground Storage Tank (UST) Section 2008 *Guidelines*. The design presented herein is conceptual in nature and may require field adjustment and/or modifications during construction and implementation.

Recommendations are to install two 8-inch diameter sump wells in the vicinity of the center of the free-phase product plume. The sump wells will be secured with a 24-inch wide by 24-inch long aluminum well shield (ground level). Then excavate two trenches extending from the sump wells parallel to F Street for an approximate distance of 150 feet.

Each recovery trench will be excavated to depth of approximately eight feet below grade. As a primary conduit, a four-inch diameter slotted, polyethylene pipe will be placed at the bottom of the trench. The trench will be backfilled, to within three feet of the ground surface, with 57 m washed granite stone (or approved equivalent). To prevent sediment infiltration within the backfilled stone, a layer of non-woven geotextile will be placed on top of the washed stone. The remainder of the trench will be back filled to land surface with the screened excavated material (see Figure 10). The disturbed land surface will be seeded with vegetation cover compatible with existing site vegetation.

Recovery events are initially recommended on a monthly basis for one year for recovery of free-phase product from the recovery trench system. A suction line installed within each recovery sump will be routed to a vacuum truck that will extract groundwater, free-phase product, and vapors from the trench system. The sump will be sealed around the suction line to allow a vacuum to develop within the trench system. This will lower the water table within the influence of the trench system inducing free-phase product and contaminated groundwater into the trenches to be collected in the recovery sump. The combination of groundwater table drawdown and the induced vacuum should enhance the free-phase product recovery.

Once free-phase product has been removed (<0.02' feet) at the site monitoring wells, recommendations are to obtain groundwater samples from the formerly free-phase product impacted wells for analysis per EPA Methods 602 + Xylenes and Methyl tert-butyl ether (MTBE), 625, Massachusetts Department of Environmental Protection (MADEP) Extractable Petroleum Hydrocarbons (EPH) and Volatile Petroleum Hydrocarbons (VPH) analytes to assess post free-phase product surficial groundwater quality. An evaluation of the site surficial groundwater quality, at the time, will determine if site conditions warrant further remediation.

ADDITIONAL ASSESSMENT AND CORRECTIVE ACTION PLAN

FOR

TC-341 PIPELINE

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

APRIL 13, 2009

1.0 INTRODUCTION

1.1 AUTHORIZATION

CATLIN was authorized to prepare this Additional Assessment and Corrective Action Plan (CAP) by the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC Mid-Atlantic) and Marine Corps Base (MCB), Camp Lejeune in accordance with Order for Supplies and Services Contract No. N62470-05-D-6200, Delivery Order Number 0036 dated April 9, 2007

This CAP was authorized based on the findings and recommendations of a Comprehensive Site Assessment Report (CSA) by CATLIN Engineers and Scientists (CATLIN), dated August 19, 2008 and in response to a Notice of Regulatory Requirements (NORR) dated September 25, 2008 issued by the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management (DWM) Underground Storage Tank (UST) Section. A copy of the NORR is included in Appendix A.

1.2 PURPOSE OF CORRECTIVE ACTION PLAN

This CAP evaluates various remedial approaches to address the presence of free-phase product accumulation at the TC-341 Pipeline project site aboard MCB, Camp Lejeune, North Carolina. This CAP provides conceptual plans for corrective actions in general accordance with Title 15A North Carolina Administrative Code (NCAC) Subchapter 2L Section .0106, and the document entitled "Guidelines for Assessment and Corrective Action for UST Releases" as released by the North Carolina NCDENR DWM, UST Section, effective July 15, 2008 (Guidelines).

2.0 SITE HISTORY AND CHARACTERIZATION

The site information discussed within is based on a site reconnaissance and site specific data presented within the CSA. Site TC-341 Pipeline is located to the immediate north of Building G-480 within Camp Geiger between "E" and "F"

Streets. Site TC-341 Pipeline is situated within the project limits of Operable Unit 10 (OU10) also known as Installation Restoration Site 35 (IR35), the site of the former Camp Geiger Fuel Farm (CGFF). Camp Geiger is located at the northwest corner of MCB, Camp Lejeune, North Carolina. Please refer to Figure 1 and Figure 4 for general location and site plan, respectively. Pertinent data is summarized in the following sections.

2.1 SOURCE INFORMATION

The source of petroleum impact at the project site is believed to be a 6-inch diameter pipeline that was previously used to transfer No. 6 fuel oil and kerosene from the CGFF to underground storage tank (UST) TC341 at the former Marine Corps Mess Hall Heating Plant located west of the project site.

The CGFF originally consisted of five 10,000 to 15,000-gallon above ground storage tanks (ASTs) used to store No. 6 fuel oil. The ASTs were later converted to store unleaded gasoline, diesel fuel, No. 6 fuel oil, and kerosene and the 6-inch diameter pipeline was replaced with a 3-inch diameter pipeline. The date of conversion is unknown. The CGFF additionally contained infrastructure such as pumping stations, loading/unloading pads, and underground distribution lines necessary to receive and deliver petroleum products. The CGFF fuel farm has been abandoned and demolished. Pipeline and UST information is presented on Table 1. The underground portion of the CGFF and associated piping accounted for 10.04% of the total volume of the system; therefore the regulatory framework for the TC-341 Pipeline project site may be based on the Risk Based Corrective Actions.

2.2 OWNERS AND OPERATORS

The TC-341 Pipeline site and is owned and operated by the Commanding Officer of MCB, Camp Lejeune. Building G-480 is currently used as an Explosive Ordnance and Disposal Armory and Office Supply. Previous uses of Building G-480 are not known. According to Baker Environmental, Inc. (1994), construction of Camp Geiger was completed in 1945. Refer to Table 2 for site owner/operator information.

2.3 RELEASE DESCRIPTION

Free-phase product has been historically identified in monitoring well IR35-MW67A dating back to 1998 and during groundwater gauging and sampling activities conducted in the area. Monitoring well IR35-MW67A is located adjacent to the TC-341 pipeline which is assumed to be the source of the free-phase product. As part of a 2003 "Hot Spot" Characterization conducted by Baker Environmental, Inc. (Baker), a synthetic distillation analysis was conducted on a sample of free-product collected from IR35-MW67A. Results of the analysis indicated that the

carbon number range of C8 to C17 corresponded to that of kerosene.

Additional releases in the area as provided in the 2004 CH2M HILL Engineering Evaluation/Cost Assessment for LNAPL Removal at Operable Unit 10 (Site 35) are summarized on Table 3 and include the following:

- Gasoline leak from underground fuel line between AST and dispenser at CGFF.
- Release of “several thousand gallons” from an underground distribution line at CGFF between 1957 and 1958.
- Unauthorized discharge from a tanker truck resulting in unknown volume of diesel or jet fuel along an unnamed drainage channel north of CGFF.
- Potential impact noted during closure of UST G-480 located immediately north of Building G-480.
- Additional undocumented fuel and chlorinated solvent releases are suspected in the area of the CGFF.

2.4 SITE CHARACTERISTICS

The following information was obtained from reconnaissance of the site and surrounding area in addition to review of previous documents.

2.4.1 Land Use

As previously discussed, TC-341 Pipeline is located adjacent to Building G-480. Building G-480 is located within Camp Geiger between “E” and “F” Streets. Camp Geiger, a satellite facility to MCB, Camp Lejeune, is home to the School of Infantry. The building is situated within the project limits of OU 10 (IR Site 35), the site of the former CGFF. The area located to the immediate east and northeast of the subject site is composed of the United States Highway 17 Bypass (US 17 Bypass), North Carolina Department of Transportation (NCDOT) right-of-way, and undeveloped lowland. The site vicinity is presented on Figure 1.

2.4.2 Site Topography

The project site is generally flat at an elevation of approximately 15 feet mean sea level (MSL) and covered by asphalt parking and grass. The topography slopes downward in the wooded area to the immediate east of Building G-480 towards manmade drainage ditches. A substantial elevation rise, of approximately 17 feet exists further to the east of the site in the fill areas associated with the US 17 Bypass.

2.4.3 Surface Water

According to the Camp Lejeune, USGS Topographic Quadrangle, the nearest named surface water body is Brinson Creek approximately 600 feet northeast of the subject site. Based on a review of the NCDENR DWQ Surface Water Classification, Brinson Creek is designated as SC; NSW whereas the water is classified as tidal salt water (SC) with a supplemental classification as a Nutrient Sensitive Water (NSW). A manmade drainage ditch is located approximately 100 feet east of Building G-480. During site reconnaissance the ditch was observed with standing water. The drainage ditch appears to flow to the northeast through a 48 inch diameter drainage pipe under the US Highway 17 Bypass and discharges into wetlands located to the northeast of the US Highway 17 Bypass. The surface water bodies are shown on Figures 1, 2, and 4.

2.4.4 Water Supply

As Illustrated on Figure 1 and listed on Table 4, no potable water supply wells are located within 1,500 feet of the subject site. The nearest water supply well is located approximately 2,200 feet southwest of the release.

Public water is provided to buildings within 1,500 feet of the subject site by water mains which carry treated potable water. Potable water is supplied to the site and surrounding areas by the MCB water supply system. Typically, groundwater obtained from the Castle Hayne aquifer is the raw water source for the treatment facilities.

2.5 ADJACENT PROPERTY OWNERS AND OCCUPANTS

As previously discussed, the project site is located within the boundaries of Camp Geiger aboard MCB, Camp Lejeune. The property located to the north, south, and west of the subject site has historically and continues to be occupied and owned by MCB, Camp Lejeune. US Highway 17 Bypass is located east of the release area. The US Highway 17 Bypass right-of-way is controlled and maintained by the NCDOT. Land located east of the bypass is predominantly thickly wooded wetland associated with the floodplain of Brinson Creek.

2.6 POTENTIAL RECEPTORS AT RISK

CATLIN conducted a receptor survey as part of the CSA and a manmade drainage ditch located approximately 150 feet southeast of the suspected release area. During site reconnaissance the ditch was observed with standing water. The drainage ditch appears to flow to the northeast

through a 48 inch diameter drainage pipe under the US Highway 17 Bypass and discharges into wetlands located to the northeast of the Bypass. Brinson Creek is located across US Highway 17 Bypass approximately 600 feet to the east northeast. Potential receptors are further detailed in Section 4.0.

2.7 PREVIOUS REPORTS

With the exception of the CSA completed by CATLIN, no additional reports have been completed specifically addressing the CGFF Pipeline. However, numerous investigations associated with the former CGFF, IR35/OU10, and Building TC-341 have been completed in the vicinity. These reports are on file at the NCDENR Wilmington Regional Office and MCB, Camp Lejeune.

2.8 INITIAL ABATEMENT AND CORRECTIVE ACTIONS

Free-phase gauging and recovery has been conducted at the project site on a bi-weekly basis by OSAGE of Virginia (OSAGE). When measurable thicknesses of free-phase product are identified, a peristaltic pump is used to recover product. Approximately 85 gallons of free-phase product has been recovered since recovery efforts were initiated in February 2008.

3.0 COMPREHENSIVE SITE ASSESSMENT

The following information was obtained from data presented in the CSA dated August 19, 2008. As recommended in the CSA, additional field activities were completed by CATLIN as part of this investigation and are also presented herein.

3.1 SCOPE OF WORK

The CSA investigation was conducted in multiple phases starting with a monitoring well inventory in which CATLIN personnel conducted field reconnaissance to locate existing monitoring wells in the vicinity of the project site. Data pertaining to monitoring well identification, location, diameter, condition, etc. was recorded in the field then compared to data in the Camp Lejeune Geographical Information System (GIS) to allow for preparation of an updated site map. Subsequent to the monitoring well inventory, four existing monitoring wells were gauged to determine depth to groundwater and free-phase product thickness, where present. Free-phase product was identified during the preliminary groundwater gauging activities in monitoring well IR35-MW67A. A receptor survey was conducted in order to obtain information necessary for the NCDENR to assign a land use classification and to classify risk level of the release. Information generated during the monitoring well inventory, gauging event, and receptor survey was utilized to assist with the proper placement of additional monitoring wells.

Five Type II monitoring wells were installed encircling existing monitoring well IR35-MW67A during the initial phase of drilling conducted by CATLIN personnel in May 2007. Based on the results of the gauging conducted on the initial groundwater monitoring wells, twelve additional Type II monitoring wells and one Type III monitoring well were installed at the project site and within the US Highway Bypass Right-of-Way by CATLIN personnel. As recommended in the CSA, four additional groundwater monitoring wells were installed, gauged, and sampled as part of this CAP to the north and east of the estimated dissolved contaminant plume in order to delineate the horizontal extent of contamination. Surface water samples were additionally collected during the additional assessment activities. Locations of groundwater monitoring wells and surface water sample locations are presented on Figure 4.

One soil sample for laboratory analysis was collected during installation of each monitoring well installed during the initial phases of drilling of the CSA investigation. No soil samples were submitted for laboratory analysis from monitoring wells installed within the US Highway 17 Bypass median or from wells installed as part of this CAP (wells USTG480-MW16 through USTG480-MW22). All work was conducted in accordance with the CATLIN Standard Methods of Investigation included in Appendix B.

3.2 REGIONAL GEOLOGY

The project site lies within the southeastern portion of the Outer Coastal Plain physiographic province of North Carolina. In Onslow County, the pre-Mesozoic crystalline basement rock, onto which the Coastal Plain was deposited, lies approximately 1,500 feet below mean sea level (MSL). The dominant structural features within the surrounding area of the subject site are the Cape Fear arch, a seaward (southeasterly) plunging anticline and the Albemarle Embayment. The axis of the Cape Fear arch is located roughly 100 miles southwest of the subject site.

As detailed in the Wellhead Management Program report (Geophex, 1991), geologic units identified beneath the nearby MCB, Camp Lejeune include the Cretaceous Peedee Formation that is composed of sands, clayey sands, and clay. The Peedee Formation does not outcrop anywhere on base and has only been identified from drill-hole data. The Upper Eocene Castle Hayne Formation lies unconformably on the Peedee Formation. The Castle Hayne Formation consists of widespread limestone units that are intermixed with substantial beds of calcareous sands and silty sands. Overlying the Castle Hayne Formation is moldic limestone of the upper Oligocene River Bend Formation. The uppermost limestone unit in much of the nearby area is the lower Miocene Belgrade Formation. The Belgrade rests unconformably on the River Bend or directly on the Castle Hayne Formation where the River Bend is absent. Undifferentiated surficial sediments throughout most of the surrounding area typically overlie the Belgrade.

3.3 REGIONAL HYDROGEOLOGY

Aquifers underlying MCB, Camp Lejeune includes the surficial, Castle Hayne, Beaufort, and Peedee. These aquifers are typically separated by confining units of less permeable materials consisting of beds or groups of clay and silt containing varying amounts of sand (Winner and Coble, 1989). Recharge to Coastal Plain aquifers occurs predominantly through direct surface recharge by rainfall in interstream areas (Cardinell, et al, 1993). The Castle Hayne aquifer is the primary source of potable water aboard MCB, Camp Lejeune.

3.4 SITE GEOLOGY

Representative soil samples were collected from each boring advanced during this investigation to facilitate the installation of groundwater monitoring wells. Soil samples were classified in accordance with the Unified Soils Classification System (USCS) and a boring log of each boring was produced. Boring logs are included in Appendix C.

Two geologic cross sections were generated based on the information obtained from monitoring well installation during this investigation. Figure 5 illustrates the plan view of the cross section layouts, and Figures 5A and 5B depict cross sections A-A' and B-B', respectively.

As depicted on the cross sections and within the boring logs, the site is underlain by interbedded sand, silty sand, and clayey sand to a depth of approximately 20 feet. The surficial material is underlain by limestone with varying degrees of weathering.

3.5 SITE HYDROGEOLOGY

Classification

The groundwater aquifer is classified as GA groundwater according to NCAC Title 2L Subchapter 15A, Section .0201 Groundwater Classification.

Depth to Groundwater and Groundwater Elevation

A groundwater gauging event was conducted on May 20, 2008 by CATLIN personnel. Groundwater elevations in the Type II monitoring wells across the site ranged from 4.26 (USTG480-MW16) to 10.24 (USTTC341-MW17) feet MSL. Depth to water measurements ranged from 7.80 ft. BLS (USTG480-MW11) to 4.99 ft. BLS (USTTC341-MW17). Monitoring well gauging data is included in Table 5. Figure 7 illustrates the water table elevation contours as of May 20, 2008.

Direction of Flow

As depicted on Figure 7 the generalized groundwater flow trend in the shallow aquifer is towards the east to northeast across the subject site. Hydraulic head differences between shallow and deep monitoring wells indicated the potential for both “upward” and “downward” movement of groundwater flow within the surficial aquifer.

Aquifer Characteristics

Based on the in-situ hydraulic conductivity tests performed on Type II monitoring well USTG480-MW09 on June 6, 2008, CATLIN estimated the hydraulic parameters for the surficial aquifer. The following summarizes these estimations:

Hydraulic Conductivity (K) = 1.06 feet/day
Effective Porosity = 0.437
Hydraulic Gradient = 0.011 feet/feet
Groundwater Flow Velocity = 0.0268 feet/day

3.6 SOIL SAMPLING RESULTS

During the installation of wells USTG480-MW01 through USTG480-MW17, soil samples were submitted to SGS Environmental Services, Inc. (SGS) of Wilmington, North Carolina for laboratory analysis for volatile organics + IPE + MTBE per EPA Method 8260 with 5030 preparation and base/neutrals/extractables per EPA Method 8270. Boring logs summarizing field data from the monitoring well boring advancement conducted during this investigation are included in Appendix C.

Due to the presence of free-phase product, the site Risk Classification has been assumed to be Intermediate. Therefore, the lowest MSCC for each of the identified petroleum constituents has been used to establish regulatory compliance. Laboratory analytical reports for the selected soil samples are included in Appendix E and are summarized as follows:

EPA METHOD 8260

The following compounds were identified at concentrations above the lowest NCDENR MSCCs: Benzene, n-Butylbenzene, sec-Butylbenzene, 2-Butanone, Chloromethane, Ethylbenzene, Isopropylbenzene, Methylene Chloride, Naphthalene, n-Propylbenzene, 1,2,3-Trichlorobbenzene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, and Total Xylenes. All other EPA Method 8260 compounds detected were below the established NCDENR STGW MSCCs and/or reported as below the method detection level (BMDL). The soil samples identified with concentrations greater than the lowest MSCCs were primarily located across the north to northeastern portion of the project site. Laboratory results are summarized on Table 6.

The estimated extent of EPA Method 8260 constituents above the lowest MSCCs in addition to summarized laboratory data are presented on Figure 6 included in Appendix D.

EPA METHOD 8270

The following compounds, Dibenzofuran, 2- Methylnaphthalene, and Naphthalene were detected in soil samples at concentrations that exceeded the lowest NCDENR MSCCs. All other EPA Method 8270 compounds detected were below the established NCDENR MSCCs and/or reported as BMDL. The soil samples identified with concentrations greater than the lowest MSCCs were consistent with those identified with EPA Method 8260 constituents above the lowest MSCCs. Laboratory results are summarized on Table 6A. The estimated extent of EPA Method 8270 constituents above the lowest MSCC in addition to summarized laboratory data are presented on Figure 6A included in Appendix D.

MADEP EPH/VPH

As indicated in Tables 6B and 6C and illustrated on Figure 6B included in Appendix D, concentrations of Massachusetts Department of Environmental Protection (MADEP) Extractable Petroleum Hydrocarbons/Volatile Petroleum Hydrocarbons (EPH/VPH) constituents were identified in ten of the 15 soils samples above the current lowest NCDENR MSCCs for the C9-C22 Aromatics. Five of the samples were additionally identified with concentrations of the C9-C18 Aliphatics in excess of the lowest MSCCs. It should be noted that although soil sample USTG480-MW08 (3-5) was not confirmed to contain detectable levels of C9-C22 Aromatics, the method detection limit of 110 mg/kg is above the lowest MSCC (STGW) of 34 mg/kg. Only the soil sample collected from USTG480-MW06 from a depth of four to six feet BLS contained concentrations of C5-C8 Aliphatics (75 mg/kg) above the lowest MSCC of 72 mg/kg. No C19-C36 Aliphatics were identified above the lowest MSCCs. Soil samples with MADEP EPH/VPH concentrations identified above the lowest MSCCs were consistent with those identified with EPA Method 8260 and 8270 constituents above the lowest MSCCs.

The estimated areal extent of all soil results in excess of applicable NCDENR MSCCs is presented on Figure 6.

3.7 GROUNDWATER SAMPLING RESULTS

Groundwater samples were collected from newly installed and existing groundwater monitoring wells on July 16, 2007, May 8, 2008, and November 18, 2008. Groundwater samples were collected from 21 monitoring wells that did not contain measurable free-phase product at the time of gauging. After collection, the groundwater samples were placed in laboratory

glassware, labeled, placed immediately on ice in a cooler, and transported under proper Chain-of-Custody protocol to SGS Environmental Services Inc. (SGS) of Wilmington, North Carolina and analyzed per EPA Methods 602 and 625 plus Tentatively Identified Compounds (TICs) in addition to MADEP EPH/VPH. It should be noted that free-phase product was identified during subsequent gauging events in four of the groundwater monitoring wells (USTG480-MW01, USTG480-MW04, USTG480-MW10, and USTG480-MW13) from which samples were obtained. Analytical reports for the groundwater samples analyzed are included in Appendix E and are summarized as follows:

EPA METHOD 602

Concentrations of Benzene were detected in groundwater samples collected from 10 Type II monitoring wells above the 2L GWQS of 1 µg/L at concentrations ranging from 2.28 µg/L (USTG480-MW14) to 173 µg/L (USTG480-MW10). Total Xylenes concentrations of 702 µg/L were identified in the groundwater sample collected from USTG480-MW10. The current 2L GWQS for total Xylenes is 530 µg/L. All other EPA 602 compounds were below the 2L GWQS and/or reported as BMDL. Laboratory results are summarized on Table 7 and illustrated on Figure 8.

EPA METHOD 625 Plus TICs

As indicated in Table 7A and illustrated on Figure 8A, EPA Method 625 constituents were detected in ten groundwater samples at concentrations above current 2L GWQS. Naphthalene was reported in nine groundwater samples at concentrations above the current 2L GWQS of 21 µg/L ranging from 259 µg/L (USTG480-MW23) to 1,280 µg/L (USTG480-MW10). Bis(2-ethylhexyl) phthalate was identified in groundwater samples collected from two Type II monitoring wells, USTG480-MW18 and USTTC341-MW14, above the 2L GWQS of 2.5 µg/L at estimated concentrations 2.85 µg/L and 31.0 µg/L, respectively. Phenanthrene was identified at concentrations above the 2L GWQS of 210 µg/L in groundwater samples collected from USTG480-MW05, USTG480-MW10, and USTTC341-MW14 at concentrations of 262 µg/L, 408 µg/L, and 328 µg/L, respectively. All other EPA Method 625 target compounds were below the applicable 2L GWQS or reported as BMDL.

MADEP EPH/VPH

Groundwater samples collected from ten of the 21 monitoring wells contained one or more MADEP EPH and/or VPH constituents above current 2L GWQS. The C9-C18 Aliphatics (2L GWQS = 4,200 µg/L) were identified in eight samples at concentrations above the 2L GWQS ranging from 5,180 µg/L (USTG480-MW17) to 142,320 µg/L (USTG480-MW04). The C19-C36 Aliphatics (2L GWQS = 42,000 µg/L) were not identified at concentrations in

excess of the 2L GWQS in any of the submitted groundwater samples. The C9-C22 Aromatics (2L GWQS = 210 µg/L) were identified in ten samples at concentrations above the 2L GWQS ranging from 444 µg/L (USTG480-MW18) to 85,820 µg/L (USTG480-MW04). The C5-C8 Aliphatics were identified at concentrations above the 2L GWQS of 420 µg/L in samples USTG480-MW05 (466 µg/L) and USTG480-MW13 (727 µg/L). All other MADEP Aliphatic and Aromatic hydrocarbon fractions were below the 2L GWQS or reported as BMDL. Analytical results are summarized on Table 7B and compared to the 2L GWQS on Table 7C and on Figure 8B.

EPA METHOD 601

Groundwater sample collected from monitoring well IR35-MW14S on November 18, 2008 was analyzed per EPA Method 601. The well had been identified within the estimated extent of groundwater impacted with chlorinated solvents during previous investigations. As presented in the laboratory results summarized on Table 7D, cis-1,2-Dichloroethene (359 µg/L), Trichloroethene (37.5 µg/L), and Vinyl Chloride (2.06 µg/L) were identified at concentrations above the current 2L GWQS of 70 µg/L, 2.8 µg/L, and 0.015 µg/L, respectively.

3.8 SURFACE WATER SAMPLING RESULTS

Two surface water samples were collected during the November 2008 sampling event. One sample (USTG480-SW01) was collected from the standing water in the drainage ditch located in the wooded area approximately 50 feet east of Building G480 and the second sample (USTG480-SW02) was collected from standing water at the drainage pipe outfall located east of US Highway 17 Bypass. Both surface water samples were analyzed per EPA Method 602 + IPE, MTBE, and Xylenes, EPA Method 625 + TICs, and MADEP VPH/EPH. Laboratory results are summarized and compared to applicable Standards and criteria on Tables 9, 9A, 9B, and 9C for EPA Method 602, EPA Method 625, MADEP EPH/VPH, and MADEP EPH/VPH compared to applicable standards and criteria, respectively.

3.9 FREE-PHASE PRODUCT CONTAMINATION

According to previous documents, in April 1990, free-phase product was discovered by Camp Geiger personnel along two unnamed drainage ditches located northeast of the TC-341 Pipeline site. The source of the release was unknown but suspected to have been an unauthorized discharge from a tanker truck. The exact location of the drainage ditches is unknown but suspected to have been within the northeast portions of the excavation limits shown on Figure 4.

According to previous documents, free-phase product was noted in groundwater monitoring well IR35-MW67A 1998 and has been encountered consistently up to the present. As previously discussed, a groundwater monitoring well network was expanded around well IR35-67A, primarily to the northeast, during this investigation. Biweekly gauging has been conducted on select monitoring wells by OSAGE from February 2008 to the present. Free-phase product has been gauged in 10 of the newly installed monitoring wells at thickness ranging from 0.10 feet to 1.51 feet. Groundwater monitoring well gauging information is summarized on Table 5 and Appendix F. The estimated areal extent of free-phase product from a December 15, 2008 gauging and recovery event is displayed on Figure 9.

3.10 SUMMARY OF CORRECTIVE ACTIONS TO DATE

According to a *Contractor's Closeout Report* dated May 1997, OHM Remediation Services Corporation (currently Shaw Environmental Services) excavated approximately 15,700 tons of petroleum impacted soil from an area extending from approximately IR35-MW67A to 400 feet northeast. Excavation activities were conducted between September 1995 and May 1996. The approximate limits of the excavation are presented on Figure 4. According to the 1997 document, excavation continued both laterally and vertically until the remedial action objectives were achieved or the water table was encountered. Field screening and confirmatory sampling were conducted throughout the excavation activities to confirm that remedial action objectives were obtained.

Aggressive fluid vapor recovery (AFVR) was conducted on groundwater monitoring well IR35-MW67A by Shaw beginning in May 2003. Details of the AFVR events were unavailable at the time of this report. However, in the CH2MHILL report Engineering Evaluation/Cost Assessment LNAPL Removal - Operable Unit 10 (Site 35) dated September 2004, CH2MHILL noted that as July 21, 2004, 30 events had been completed by Shaw resulting in the recovery of 355 gallons of "petroleum product".

Subsequent to completion of the CSA by CATLIN, OSAGE commenced biweekly groundwater gauging and free-phase product recovery where applicable. Free-phase recovery is accomplished using a peristaltic pump and disposable plastic tubing. Gauging and recovery efforts have been conducted at the subject site from February 2008 to the present. As of December 2008, approximately 85 gallons of free-phase product (measured liquid) has been recovered by OSAGE. Summary sheets detailing each gauging and recovery event are included in Appendix F. A summary of cumulative free-phase product gauging and recovery efforts is included on Table 8.

No additional known corrective actions have been completed at the site.

4.0 RECEPTOR INFORMATION

As defined by the NCDENR in Section .0102 of NCAC T15A:02L, potential receptors include any human, plant, animal, or structure with the potential to be adversely affected by the release or migration of contaminants. Guidance documents issued by the regulatory agency indicate that structures may include items such as utility lines, basements, and elevator shafts. Although not specifically included in the rule definition (NCAC T15A:02L .0102), regulatory officials also consider potential receptors to include environmental resources such as water supply wells, surface waters, drinking water supplies, and "regions of groundwater that have been identified for planned resource development".

Performance of the potential receptors survey involved not only an evaluation of the presence of potential receptors but also an evaluation of transport mechanisms by which the contaminants are transported from the source to the receptor. Furthermore, with respect to human receptors, the survey also involved a cursory evaluation of exposure pathways including ingestion, inhalation, and adsorption. As petroleum fuel seeps through the subsurface, adsorption onto soil particles and volatilization into pore spaces occurs. The remaining petroleum fuel moves vertically downward (in the absence of preferred lateral routes of migration) until it reaches the capillary fringe (in the absence of a permeable barrier above the capillary fringe). Petroleum fuel, now in the liquid phase, spreads throughout the capillary fringe and dissolves into the groundwater.

Exposure to contaminated soils is contingent upon site disturbance through construction or remediation activities. Potential receptors can be exposed to petroleum hydrocarbons found in the soil through inhalation of volatilized compounds and dermal contact with contaminated soil.

4.1 WATER SUPPLY WELLS

As Illustrated on Figure 1 and listed on Table 4, no potable water supply wells are located within 1,500 feet of the subject site. The nearest water supply well is located approximately 2,200 feet southwest of the release.

4.2 PUBLIC WATER SUPPLIES

Public water is provided to buildings within 1,500 feet of the subject site by water mains which carry treated potable water. Potable water is supplied to the site and surrounding areas by the MCB water supply system. Typically, groundwater obtained from the Castle Hayne aquifer is the raw water source for the treatment facilities.

4.3 SURFACE WATER

According to the Camp Lejeune, USGS Topographic Quadrangle, the nearest named surface water body is Brinson Creek approximately 600 feet northeast of the subject site. Based on a review of the NCDENR

DWQ Surface Water Classification, Brinson Creek is classified as SC;NSW whereas the water is classified as tidal salt water (SC) with a supplemental classification as a Nutrient Sensitive Water (NSW). A manmade drainage ditch is located approximately 150 feet southeast of the suspect release area. During site reconnaissance the ditch was observed with standing water. The drainage ditch appears to flow to the northeast through a 48 inch diameter drainage pipe under the US Highway 17 Bypass and discharges into wetlands located to the northeast of the Bypass. The surface water bodies are shown on Figures 1, 2, and 4.

4.4 WELLHEAD PROTECTION AREAS

At the MCB Camp Lejeune, wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB Camp Lejeune has identified wellhead protection areas on the base. Based on the most recent Wellhead Protection Plan – 2002 Update, the potential source area is not located within a proposed wellhead protection area.

4.5 DEEP AQUIFERS IN THE COASTAL PLAIN PHYSIOGRAPHIC REGION

As identified in the Geologic Map of North Carolina (North Carolina Department of Natural Resources and Community Development, 1985), the subject site lies within the Coastal Plain physiographic province.

The potential source area is located just above an apparent unconfined surficial groundwater aquifer. While there is the potential for recharge by rainfall to the unconfined surficial aquifer at the Base, the surficial aquifer is not used for water supply aboard MCB, Camp Lejeune. Groundwater obtained from the Castle Hayne Aquifer is the raw water source for the MCB, Camp Lejeune potable water treatment facilities.

To determine deep aquifers underlying the subject site, the area was profiled in the “Visual Hydrogeologic Framework” database provided in the NCDENR Division of Water Resources website (VHF website). This is a database of well and soil boring log data from numerous locations across the North Carolina Coastal Plain.

Including the Surficial aquifer there are eleven identified aquifers (seven principal aquifers and four minor aquifers) within the North Carolina Coastal Plain physiographic region. Data from the USGS Test Hole T-15, advanced to the immediate south of the subject site, indicated the following:

Hydrogeologic Units	Approximate Depth (feet)
Surficial Aquifer	0-59
Castle Hayne Confining Unit	59-104
Castle Hayne Aquifer	104-302
Pee Dee Confining Unit	302+

4.6 SUBSURFACE STRUCTURES

With the exception of underground utilities no subsurface structures were identified at the subject site. Building G-480 is slab-on-grade construction. See Figure 3 for locations of utilities at the project site.

5.0 OBJECTIVES OF CORRECTIVE ACTION PLAN

5.1 GENERAL DESCRIPTION

The objective of this CAP is to present a proposed remedial method to address the presence of free-phase product accumulation at the TC-341 Pipeline site.

5.2 GOALS OF CORRECTIVE ACTION PLAN

The goals of this CAP are:

- Removal and recovery of the free-phase product to meet the site rehabilitation goals. Specifically, the goal of remediation is to reduce free-phase product accumulations to less than 0.01 feet, at which point the site will be re-evaluated and may be reclassified as "Low Risk" and GCLs will become the appropriate groundwater cleanup standard.
- Provide a schedule for the implementation and operation of the proposed corrective actions.
- Detail a monitoring plan with the capacity to evaluate the effectiveness of the proposed corrective actions at this site and to monitor the removal efficiency of the product recovery efforts.

6.0 EVALUATION OF REMEDIATION ALTERNATIVES

Numerous technologies that address the remediation of free-phase product from the subsurface are available. Specific remedial alternatives that were reviewed include the following: Excavation and Disposal, Product-only Skimmer System, Pump and Treat, Soil Vapor Extraction (SVE), Air Sparging, Aggressive Fluid Vapor Recovery (AFVR), Multi-Phase Extraction (MPE), Enhancement Methods

utilizing Steam, Surfactants, or Phased Soil Heating. Some of these technologies have demonstrated an acceptable level of success when implemented in the field, while others appear to have been ineffective. In certain instances, implementation of any available remediation technology by itself will not suffice. Hence, a combination of treatment technologies is at times more effective. Site specific conditions, nature and extent of contamination together with an analysis of a particular remediation technology's record of success with similar sites will allow the screening of technically feasible alternative technologies. The "best" remedial strategy is the one that can fulfill the established remediation objectives at the least cost.

Based on the site characteristics, free-phase product recovery through two trenches constructed in conjunction with recovery sumps is the recommended remediation. The trenches should be installed immediately east and west of F Street to one foot below the seasonal low depth to groundwater which is estimated to be approximately seven feet BLS. A recovery sump should be installed in the center or mid-point of each recovery trench and connected to slotted pipes that will be emplaced in the bottom of each trench. The trenches will then be backfilled with coarse gravel to approximately three feet BLS. The recovery system will be designed and constructed in a way to allow recovery of fluids by either MPE or a traditional pump and treat system.

7.0 PROPOSED REMEDIATION

It is recommended that an eight-inch diameter recovery sump well be installed in the center or mid-point of each recovery trench at the locations proposed on Figure 10. Each trench is recommended to be advanced parallel to F Street for an approximate distance of 150 feet.

Each recovery trench will be excavated to depth of approximately eight feet below grade. As a primary conduit, a four-inch diameter slotted, polyethylene pipe will be placed at the bottom of the trench. The trench will be backfilled, to within three feet of the ground surface, with 57 m washed granite stone (or approved equivalent). To prevent sediment infiltration within the backfilled stone, a layer of non-woven geotextile will be placed on top of the washed stone. The remainder of the trench will be back filled to land surface with clean borrow material. The disturbed land surface will be seeded with vegetation cover compatible with existing site vegetation.

Free-phase recovery events are initially recommended on a monthly basis for one year from the recovery trench system. A suction line installed within each recovery sump will be routed to a vacuum truck that will extract groundwater, free-phase product, and vapors from the trench system. The sump will be sealed around the suction line to allow a vacuum to develop within the trench system. This will lower the water table within the influence of the trench system inducing free-phase product and contaminated groundwater into the trenches to be collected in the recovery sump. Groundwater table drawdown and the induced vacuum should enhance the free-phase product recovery.

The recovered liquids (free-phase product and groundwater) will be stored on site in a tanker truck and periodically transported and disposed in an on-base groundwater treatment system. The recovery events will be scheduled to last 24 hours per day for three consecutive days.

8.0 MONITORING PLAN

8.1 GOALS OF MONITORING PLAN

The goals of the monitoring plan are to track the removal efficiency of the initial remedial activities in addition to implementing additional free-phase product removal events if necessary.

8.2 MONITORING ACTIVITIES AND SCHEDULE

The following monitoring activities are proposed upon completion of the excavation and free-phase product removal activities and installation of the recovery system components:

- Gauging of fourteen existing groundwater monitoring wells in addition to the two proposed recovery sumps to be performed every other week for six months following the initial remedial activities. If measurable free-phase product is encountered, conduct removal activities as necessary.
- Sampling of selected monitoring wells for groundwater analysis per EPA Methods 602 and 625 parameters and MADEP EPH/VPH parameters performed on an annual basis unless site conditions dictate more frequent sampling.
- When measurable free-phase product thickness is not identified for four consecutive quarters (one year) increase groundwater sampling frequency to bi-annual then re-evaluate site conditions with respect to NCDENR Risk Classification.

All monitoring and free-phase product gauging results will be included in the MCB, Camp Lejeune Closure and Management Program and submitted to the NCDENR semi-annually.

9.0 PERMITS

No permits are required.

10.0 PUBLIC NOTICE

In accordance with NCAC T15A:02L .0114(a), public notification is required by any person submitting a Corrective Action Plan proposing to cleanup

groundwater contamination to a standard other than 2L GWQS. The following parties are required to be notified:

- The local health director
- The chief administrative officer of each political jurisdiction in which the contamination occurs
- All property owners and occupants residing within or contiguous to the area containing contamination
- All property owners and occupants residing within or contiguous to the area where the contamination is expected to migrate

No public notification if necessary at this time.

11.0 LIMITATIONS

The field and groundwater data evaluated as part of this report provide isolated data points and may not represent conditions at every location in the project area. Analyses and conclusions of this report, being based on interpolation between data points at the project area, may not be completely representative of all site conditions. Conclusions and recommendations from this report are based on the best available data in an effort to comply with current regulatory requirements.

12.0 REFERENCES

- Baker Environmental, 1994, *Interim Proposed Remedial Action Plan, Operable Unit No. 10 Site 35, Camp Geiger Area Fuel Farm*, July 20, 1994
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- CATLIN Engineers and Scientists, *Leaking Underground Storage Tank Comprehensive Site Assessment Report for TC-341 Pipeline, Marine Corps Base, Camp Lejeune, NC*, dated August 19, 2008
- CH2MHILL, 2004, *Engineering Evaluation/Cost Assessment LNAPL Removal, Operable Unit 10 (Site 35)*, September 2004
- Geophex, Ltd., 1991, *Wellhead Management Program Engineering Study 91-36*, Prepared for Officer in Charge of Construction Marine Corps Base Camp Lejeune, North Carolina.
- OHM Remediation Services Corporation, 1997, *Final Contractor's Closeout Report, Soil Remediation Operable Unit 10, Site 35*. May 1997.
- OHM Remediation Services Corporation, 1997, *Final Interim Remedial Action Design Package, In-Situ Sparging Groundwater Treatment System, Operable Unit No. 10 (Site 35)*. August 14, 1997.
- North Carolina Department of Natural Resources and Community Development, 1985, *Geologic Map of North Carolina*.
- North Carolina Department of Environment and Natural Resources, *Guidelines for Assessment and Corrective Action for UST Releases, North Carolina Underground Storage Tank Section*, Effective July 15, 2008.
- Winner, M.D., Jr., and Coble, R.W., 1989, *Hydrogeologic Framework of the North Carolina Coastal Plain Aquifer System: U.S. Geological Survey Open-File Report 87-690*, 155p.

TABLES

TABLE 1
SITE HISTORY - UST SYSTEM INFORMATION

Incident Name / Number: TC-341 Pipeline / 23444

UST ID Number	Product (gasoline, diesel, jet fuel, etc.)	Capacity (gallons)	Date Installed	Date Permanently Closed (P), or Still in Use* (C) (m/dd/yy)	Was Release Associated With UST System? (Yes / No)
G-480-1	Diesel / #2 Fuel Oil	550	~ 1976	(P) 2/17/1994	Yes
Various**	Kerosene / #6 Fuel Oil	~ 7,900	~ 1941	(P) Unknown	Yes

* Still in use means not permanently closed.

** Numerous USTs and ASTs associated with former Camp Geiger Fuel Farm were source of fuel for TC-341 Pipeline.

TABLE 2
SITE HISTORY - UST OWNER/OPERATOR INFORMATION

Incident Name / Number: TC-341 Pipeline / 23444

Dates of Ownership / Operation	UST ID Number	Name of Owner/ Operator	Address	Telephone Number
~ 1941 - 1994	G-480-1	Commanding Officer Attn: Director I&E/EMD/EQB	PSC Box 20004 Marine Corps Base Camp Lejeune, NC 28542	(910) 451-5068
~ 1941 - Unknown	Various*	Commanding Officer Attn: Director I&E/EMD/EQB	PSC Box 20004 Marine Corps Base Camp Lejeune, NC 28542	(910) 451-5068

* Numerous USTs and ASTs associated with former Camp Geiger Fuel Farm were source of fuel for TC-341 Pipeline.

TABLE 3
CONTAMINANT SOURCE INVENTORY

Incident Name / Number: TC-341 Pipeline / 23444

SOURCE	PRODUCT TYPE	INSTALLATION DATE	SIZE	STATUS
UST G480-1	#2 Fuel Oil or Diesel	1976	500 Gallons	Abandoned
UST TC341	Kerosene / #6 Fuel Oil	1941	Unknown	Abandoned In Place
TC-341 Pipeline	Kerosene / #6 Fuel Oil	1941	~ 7,900 Gallons	Abandoned In Place
Camp Geiger Fuel Farm	Gasoline, Diesel, Kerosene, and #6 Heating Oil	1941	5 15,000-Gallon ASTs	Demolished
Gas Station Building 341	Gasoline and Diesel	Unknown	Unknown	Demolished

TABLE 4
WATER SUPPLY WELL INFORMATION

Incident Name / Number: TC-341 Pipeline / 23444

WELL NUMBER	LATITUDE LONGITUDE	TOTAL WELL DEPTH (FT.)	SCREEN INTERVAL	WELL USAGE AND STATUS	APPROXIMATE DISTANCE FROM SITE (FT.)
NC-052	34.7384	70	23 - 70	USGS Test Well	500
	-77.4575				
TC-600	37.7353	70	48 - 70	Water Supply - Abandoned	2,150
	-77.4574				
TC-700	34.7323	76	27.5 - 76 (OPEN HOLE)	Water Supply - Abandoned	3,000
	-77.4577				
TC-1253	34.7266	250	120 - 170	Water Supply - Active	4,800
	-77.4571				

USGS = United States Geological Society

**TABLE 5
MONITORING WELL CONSTRUCTION INFORMATION**

Incident Name / No.: TC-341 Pipeline / 23444

WELL IDENTIFICATION	DATE INSTALLED (m/dd/yy)	DATE WATER LEVEL MEASURED (m/dd/yy)	WELL CASING DEPTH (ft. BLS)	SCREENED INTERVAL (x to y ft. BLS)	BOTTOM OF WELL (ft. BLS)	TOP OF CASING ELEV.* (ft.)	DEPTH TO WATER From Top of Casing (ft.)	GROUND WATER ELEV.* (ft.)	FREE-PHASE PRODUCT THICKNESS (ft.)	COMMENTS
IR35- MW09S	ND	11/18/08	3.0	3.0 - 12.5	13.0	ND	7.63	NA	NMT	Existing Permanent Type II Stick-up.
IR35- MW14D	ND	5/20/08	24.5 Inner 20.0 Outer	24.5 - 28.0	28.5	16.51	10.21	6.30	NMT	Existing Permanent Type III Stick-up.
IR35- MW14S	ND	5/20/08	3.5	3.5 - 12.0	12.5	16.55	10.19	6.36	NMT	Existing Permanent Type II Stick-up.
IR35- MW67A	ND	5/20/08	5.0	5.0 - 14.5	15.0	14.17	7.41	7.41	0.79	Existing Permanent Type II Flush Mount.
USTG480- MW01	7/03/07	5/20/08	4.0	4.0 - 13.5	14.0	13.70	6.50	7.28	0.10	Permanent Type II Flush Mount.
USTG480- MW02	5/22/07	5/20/08	4.0	4.0 - 13.5	14.0	13.96	6.90	7.20	0.17	Permanent Type II Flush Mount.
USTG480- MW03	5/16/07	5/20/08	5.0	5.0 - 14.5	15.0	13.79	7.18	7.28	0.82	Permanent Type II Flush Mount.
USTG480- MW04	5/16/07	5/20/08	5.0	5.0 - 14.5	15.0	14.28	6.60	7.92	0.29	Permanent Type II Flush Mount.
USTG480- MW05	5/16/07	5/20/08	3.0	3.0 - 12.5	13.0	14.23	5.79	8.44	NMT	Permanent Type II Flush Mount.
USTG480- MW06	5/16/07	5/20/08	5.0	5.0 - 14.5	15.0	13.24	6.44	6.80	NMT	Permanent Type II Flush Mount.
USTG480- MW07	7/05/07	5/20/08	3.0	3.0 - 12.5	13.0	10.98	5.27	6.42	0.87	Permanent Type II Flush Mount.
USTG480- MW08	7/05/07	5/20/08	3.0	3.0 - 12.5	13.0	12.84	6.52	6.43	0.14	Permanent Type II Flush Mount.
USTG480- MW09	7/03/07	5/20/08	3.0	3.0 - 12.5	13.0	14.68	6.40	8.28	NMT	Permanent Type II Flush Mount.

* Reference Point for Elevation Measurements (Survey Grade GPS), Assumed Elevation: (N/Aft.)

** If free-phase product present, groundwater elevation calculated by: [Top of Casing Elevation - Depth to Water] + [Free-Phase Product Thickness x 0.82]

ft. BLS = Feet Below Land Surface

NMT = No Measurable Thickness

ND = No Data

NA = Not Applicable

TABLE 5
MONITORING WELL CONSTRUCTION INFORMATION

Incident Name / No.: TC-341 Pipeline / 23444

WELL IDENTIFICATION	DATE INSTALLED (m/dd/yy)	DATE WATER LEVEL MEASURED (m/dd/yy)	WELL CASING DEPTH (ft. BLS)	SCREENED INTERVAL (x to y ft. BLS)	BOTTOM OF WELL (ft. BLS)	TOP OF CASING ELEV.* (ft.)	DEPTH TO WATER From Top of Casing (ft.)	GROUND WATER ELEV.* (ft.)	FREE-PHASE PRODUCT THICKNESS (ft.)	COMMENTS
USTG480- MW10	7/05/07	5/20/08	3.0	3.0 - 12.5	13.0	14.44	6.51	7.94	0.01	Permanent Type II Flush Mount.
USTG480- MW11	7/10/07	5/20/08	3.0	3.0 - 13.0	13.0	14.31	7.80	6.51	NMT	Permanent Type II Flush Mount.
USTG480- MW12	7/11/07	5/20/08	3.0	3.0 - 13.0	13.0	13.51	6.23	7.28	NMT	Permanent Type II Flush Mount.
USTG480- MW13	7/11/07	5/20/08	3.0	3.0 - 13.0	13.0	12.94	6.72	6.33	0.13	Permanent Type II Flush Mount.
USTG480- MW14	7/11/07	5/20/08	3.0	3.0 - 13.0	13.0	14.76	6.91	7.85	NMT	Permanent Type II Flush Mount.
USTG480- MW15	7/12/07	5/20/08	51.0 Inner 43.0 Outer	51.0 - 56.0	56.0	13.80	6.21	7.59	NMT	Permanent Type III Flush Mount.
USTG480- MW16	5/07/08	5/20/08	5.0	5.0 - 15.0	15.0	10.16	5.90	4.26	NMT	Permanent Type II Flush Mount.
USTG480- MW17	5/07/08	5/20/08	5.0	5.0 - 15.0	15.0	10.08	5.16	4.92	NMT	Permanent Type II Flush Mount.
USTG480- MW18	5/07/08	5/20/08	5.0	5.0 - 15.0	15.0	12.65	6.81	5.84	NMT	Permanent Type II Flush Mount.
USTG480- MW19	11/06/08	11/18/08	4.7	4.7 - 14.7	15.0	14.89	6.64	8.25	NMT	Permanent Type II Flush Mount.
USTG480- MW20	11/06/08	11/18/08	4.7	4.7 - 14.7	15.0	14.99	7.33	8.01	0.43	Permanent Type II Flush Mount.
USTG480- MW21	11/05/08	11/18/08	0.7	0.7 - 5.7	6.0	7.79	3.73	4.06	NMT	Permanent Type II Stick-up.
USTG480- MW22	11/06/08	11/18/08	1.2	1.2 - 6.2	6.5	10.85	6.55	4.30	NMT	Permanent Type II Stick-up.

* Reference Point for Elevation Measurements (Survey Grade GPS), Assumed Elevation: (N/Aft.)

** If free-phase product present, groundwater elevation calculated by: [Top of Casing Elevation - Depth to Water] + [Free-Phase Product Thickness x 0.82]

ft. BLS = Feet Below Land Surface

NMT = No Measurable Thickness

ND = No Data

TABLE 5
MONITORING WELL CONSTRUCTION INFORMATION

Incident Name / No.: TC-341 Pipeline / 23444

WELL IDENTIFICATION	DATE INSTALLED (m/dd/yy)	DATE WATER LEVEL MEASURED (m/dd/yy)	WELL CASING DEPTH (ft. BLS)	SCREENED INTERVAL (x to y ft. BLS)	BOTTOM OF WELL (ft. BLS)	TOP OF CASING ELEV.* (ft.)	DEPTH TO WATER From Top of Casing (ft.)	GROUND WATER ELEV.*(ft.)	FREE-PHASE PRODUCT THICKNESS (ft.)	COMMENTS
USTG480- MW23	11/17/08	11/18/08	4.7	4.7 - 14.7	15.0	14.83	6.06	8.77	NMT	Permanent Type II Flush Mount.
USTTC341- MW07	ND	11/18/08	3.0	3.0 - 12.5	13.0	19.32	7.77	11.55	NMT	Existing Permanent Type II Flush Mount.
USTTC341- MW14	ND	5/20/08	3.0	3.0 - 12.5	13.0	15.36	5.65	9.71	NMT	Existing Permanent Type II Flush Mount.
USTTC341- MW15	ND	5/20/08	25.0 Inner 22.0 Outer	25.0 - 29.5	30.0	15.33	5.77	9.56	NMT	Existing Permanent Type III Flush Mount.
USTTC341- MW17	ND	5/20/08	3.0	3.0 - 12.5	13.0	15.23	4.99	10.24	NMT	Existing Permanent Type II Flush Mount.

* Reference Point for Elevation Measurements (Survey Grade GPS), Assumed Elevation: (N/Aft.)

** If free-phase product present, groundwater elevation calculated by:[Top of Casing Elevation - Depth to Water] + [Free-Phase Product Thickness x0.82]

ft. BLS = Feet Below Land Surface

NMT = No Measurable Thickness

ND = No Data

TABLE 6
SUMMARY OF SOIL LABORATORY RESULTS
EPA METHOD 8260

Incident Name / Number: TC-341 Pipeline / 23444

Sample ID	Contaminant of Concern →		Acetone	Benzene	Bromomethane	2-Butanone	n-Butylbenzene	sec-Butylbenzene	Chloromethane	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Methylene chloride	Naphthalene	n-Propylbenzene	Toluene	1,2,3-Trichlorobenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Total Xylenes	All Other EPA Method 8260 Analytes
	Date Collected	Sample Depth (ft. BLS)																			
Residential MSCC (mg/kg) Industrial/Commercial MSCC (mg/kg) STGW MSCC (mg/kg)			1,564 40,880 2.8	18 164 0.0056	NE NE NE	NE NE NE	626 16,350 4.3	626 16,350 3.3	49 440 0.02	1,560 40,000 4.6	1,564 40,880 1.7	NE NE NE	85 763 0.02	313 8,176 0.58	626 16,350 1.7	3,200 82,000 7.3	NE NE NE	782 20,440 7.5	782 20,440 7.3	3,129 81,760 5	Varies Varies Varies
USTG480-MW01(0-2)	7/3/2007	0-2	0.141	BMDL	BMDL	0.00508 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW02 (3-5)	5/22/2007	3-5	BMDL	BMDL*	BMDL	BMDL	0.761	0.309	0.0907 J	0.293	0.253	0.28	BMDL*	1.19	0.516	BMDL	BMDL	1.89	0.781	0.2138 J	BMDL
USTG480-MW02 (3-5) DUP	5/22/2007	3-5	BMDL	BMDL*	BMDL	BMDL	1.33	0.480	0.0751 J	0.318	0.339	0.425	BMDL*	1.92	0.737	BMDL	BMDL	3.03	1.19	0.2293 J	BMDL
USTG480-MW03 (4-6)	5/16/2007	4-6	BMDL	BMDL*	BMDL	BMDL	5.67	2.61	0.385 J	4.07	2.49	2.03	BMDL*	12.5	4.44	BMDL	BMDL	12.6	2.42	2.89	BMDL
USTG480-MW04 (4-6)	5/16/2007	4-6	0.562 J	BMDL*	BMDL	BMDL	0.646	0.268	0.225	0.237	0.344	0.493	BMDL*	1.11	0.412	BMDL	BMDL	0.160 J	BMDL	BMDL	BMDL
USTG480-MW05 (4-6)	5/16/2007	4-6	1.48 J	BMDL*	BMDL	BMDL	7.43	4.12	0.502 J	3.11	3.78	2.59	BMDL*	13.9	7.52	BMDL	BMDL	7.92	1.77	0.817 J	BMDL
USTG480-MW06 (4-6)	5/16/2007	4-6	BMDL	BMDL*	BMDL	BMDL	6.51	2.64	0.620 J	4.98	2.73	3.12	BMDL*	18.6	4.54	BMDL	BMDL	21.4	7.34	8.86	BMDL
USTG480-MW07(0-2)	7/5/2007	0-2	0.0163 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW08 (3-5)	7/5/2007	3-5	0.0330 J	0.00305 J	BMDL	0.00567 J	BMDL	BMDL	BMDL	0.0204	0.0029 J	0.0317	BMDL	BMDL	0.00691	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW09 (4-6)	7/3/2007	4-6	BMDL	BMDL*	BMDL	BMDL	6.61	2.75	BMDL*	5.30	2.77	2.21	BMDL*	17.9	5.87	BMDL	BMDL	22.1	7.37	4.529 J	BMDL
USTG480-MW10 (3-5)	7/5/2007	3-5	BMDL	0.0248 J	BMDL	BMDL	2.36	1.07	BMDL	2.09	0.996	1.25	BMDL*	4.65	2.21	BMDL	BMDL	0.542	3.33	0.8465	BMDL
USTG480-MW11 (3-5)	7/10/2007	3-5	0.166 J	BMDL	BMDL	BMDL	0.295	0.188	BMDL	0.0184 J	0.0516 J	0.0459 J	0.282 J	0.606	0.13	0.0126 J	0.0275 J	BMDL	BMDL	BMDL	BMDL
USTG480-MW12 (3-5)	7/11/2007	3-5	0.0161 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13 (3-5)	7/11/2007	3-5	0.167 J	0.00935 J	0.0366 J	BMDL	0.529	0.199	BMDL	0.276	0.152	0.412	0.207 J	0.630	0.314	BMDL	BMDL	1.22	0.354	0.1962 J	BMDL
USTG480-MW14 (3-5)	7/11/2007	3-5	0.0141 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15 (2-4)	7/10/2007	2-4	0.0240 J	BMDL	BMDL	0.00331 J	BMDL	BMDL	BMDL	0.00265 J	BMDL	0.00514	BMDL	0.00385 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW20 (1-3)	11/6/2008	1-3	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	0.00084 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	0.001 J	< 0.00245 J

All results in milligrams per kilogram (mg/kg).
Bold results indicate concentrations above lowest established MSCC.
BMDL or < = Below Method Detection Limit
BMDL* = Below Method Detection Limit, Method Detection Limit above lowest MSCC

J = Estimated concentration, below calibration range and above method detection limit
ft. BLS = Feet Below Land Surface
MSCC = Maximum Soil Contaminant Concentration
STGW = Soil to Groundwater

TABLE 6A
SUMMARY OF SOIL LABORATORY RESULTS
EPA METHOD 8270

Incident Name / Number: TC-341 Pipeline / 23444

Sample ID	Contaminant of Concern		Acenaphthene	Anthracene	Dibenzofuran	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other EPA Method 8270 Analytes
	Date Collected	Sample Depth (ft. BLS)									
Residential MSCC (mg/kg)			940	4,600	62	620	63	313	469	469	Varies
Industrial/Commercial MSCC (mg/kg)			24,000	122,000	1,635	16,400	1,635	8,176	12,264	12,264	Varies
STGW MSCC (mg/kg)			8.2	1,000	4.7	44	1.7	0.58	60	290	Varies
USTG480-MW01 (0-2)	7/3/2007	0-2	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW02 (3-5)	5/22/2007	3-5	BMDL	BMDL	0.222 J	0.179 J	4.68	1.37	0.300 J	0.0880 J	BMDL
USTG480-MW03 (4-6)	5/16/2007	4-6	BMDL	1.44 J	3.69 J	3.69 J	56.3	12	9.71	BMDL	BMDL
USTG480-MW04 (4-6)	5/16/2007	4-6	1.90 J	9.03	4.14 J	4.42 J	56.1	8.56	8.76	BMDL	BMDL
USTG480-MW05 (4-6)	5/16/2007	4-6	5.38 J	4.43 J	9.38	10.4	116	24.8	22.7	BMDL	BMDL
USTG480-MW06 (4-6)	5/16/2007	4-6	2.63 J	2.02 J	5.39 J	5.73 J	75.0	19.8	11.3	BMDL	BMDL
USTG480-MW07 (0-2)	7/5/2007	0-2	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW08 (3-5)	7/5/2007	3-5	0.060 J	BMDL	BMDL	0.088 J	BMDL	BMDL	0.120 J	BMDL	BMDL
USTG480-MW09 (4-6)	7/3/2007	4-6	2.84 J	1.45 J	5.48 J	5.88 J	75.2	13.9	11.9	BMDL	BMDL
USTG480-MW10 (3-5)	7/5/2007	3-5	1.72 J	1.08 J	3.64	4.01	50.9	8.33	6.47	BMDL	BMDL
USTG480-MW11 (3-5)	7/10/2007	3-5	0.135 J	0.124 J	0.280 J	0.328 J	1.83	0.200 J	0.781	BMDL	BMDL
USTG480-MW12 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13 (3-5)	7/11/2007	3-5	BMDL	0.162 J	0.351	0.439	3.63	0.547	0.862	BMDL	BMDL
USTG480-MW14 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15 (2-4)	7/10/2007	2-4	BMDL	BMDL	BMDL	0.053 J	0.194 J	BMDL	0.113 J	BMDL	BMDL
USTG480-MW20 (1-3)	11/6/2008	1-3	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL

All results in milligrams per kilogram (mg/kg).

Bold results indicate concentrations above lowest established MSCC.

BMDL = Below Method Detection Limit

NE = None Established

J = Estimated concentration, below calibration range and above method detection limit

ft. BLS = Feet Below Land Surface

MSCC = Maximum Soil Contaminant Concentration

STGW = Soil to Groundwater

TABLE 6B
SUMMARY OF SOIL LABORATORY RESULTS
MADEP EPH/VPH

Incident Name / Number: TC-341 Pipeline / 23444

Sample ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Date Collected	Sample Depth (ft. BLS)						
USTG480-MW01 (0-2)	7/3/2007	0-2	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW02 (3-5)	5/22/2007	3-5	1,100	110	100	BMDL	53	28
USTG480-MW03 (4-6)	5/16/2007	4-6	3,000	BMDL	1,400	14	91	71
USTG480-MW04 (4-6)	5/16/2007	4-6	3,400	BMDL	1,500	BMDL	70	46
USTG480-MW05 (4-6)	5/16/2007	4-6	4,400	270	2,000	41	130	120
USTG480-MW06 (4-6)	5/16/2007	4-6	7,300	480	3,100	75	190	240
USTG480-MW07 (0-2)	7/5/2007	0-2	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW08 (3-5)	7/5/2007	3-5	360	22	100	BMDL	BMDL	BMDL
USTG480-MW09 (4-6)	7/3/2007	4-6	3,200	BMDL	1,900	58.2	232	301
USTG480-MW10 (3-5)	7/5/2007	3-5	3,600	BMDL	1,100	38.6	215	232
USTG480-MW11 (3-5)	7/10/2007	3-5	120	23	57	BMDL	34.0	34.2
USTG480-MW12 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13 (3-5)	7/11/2007	3-5	200	52.0	200	BMDL	50.8	48.4
USTG480-MW14 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15 (2-4)	7/10/2007	2-4	52.0	18.0	BMDL	BMDL	BMDL	BMDL
USTG480-MW20 (1-3)	11/6/2008	1-3	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL

All results in milligrams per kilogram (mg/kg).

ft. BLS = Feet Below Land Surface

BMDL = Below Method Detection Limit

TABLE 6C
SUMMARY OF SOIL LABORATORY RESULTS
MADEP EPH/VPH AS COMPARED TO NCDENR MSCCs

Incident Name / Number: TC-341 Pipeline / 23444

Sample ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics	C5-C8 Aliphatics
	Date Collected	Sample Depth (ft. BLS)				
Residential MSCC (mg/kg)			9,386	93,860	469	939
Industrial/Commercial MSCC (mg/kg)			245,280	#	12,264	24,528
STGW MSCC (mg/kg)			3,300	##	34	72
USTG480-MW01 (0-2)	7/3/2007	0-2	BMDL	BMDL	BMDL	BMDL
USTG480-MW02 (3-5)	5/22/2007	3-5	1,153	110	128	BMDL
USTG480-MW03 (4-6)	5/16/2007	4-6	3,091	BMDL	1,471	14
USTG480-MW04 (4-6)	5/16/2007	4-6	3,470	BMDL	1,546	BMDL
USTG480-MW05 (4-6)	5/16/2007	4-6	4,530	270	2,120	41
USTG480-MW06 (4-6)	5/16/2007	4-6	7,490	480	3,340	75
USTG480-MW07 (0-2)	7/5/2007	0-2	BMDL	BMDL	BMDL	BMDL
USTG480-MW08 (3-5)	7/5/2007	3-5	<370*	22	<110*	BMDL
USTG480-MW09 (4-6)	7/3/2007	4-6	3,432	BMDL	2,201	58.2
USTG480-MW10 (3-5)	7/5/2007	3-5	3,815	BMDL	1,332	38.6
USTG480-MW11 (3-5)	7/10/2007	3-5	154	23	91.2	BMDL
USTG480-MW12 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL
USTG480-MW13 (3-5)	7/11/2007	3-5	250.8	52.0	248.4	BMDL
USTG480-MW14 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL
USTG480-MW15 (2-4)	7/10/2007	2-4	<62.0*	18.0	BMDL	BMDL
USTG480-MW20 (1-3)	11/6/2008	1-3	BMDL	BMDL	BMDL	BMDL

All results in milligrams per kilogram (mg/kg).

Bold results indicate concentrations above lowest established MSCC.

ft. BLS = Feet Below Land Surface

BMDL or < = Below Method Detection Limit

= Health based level (>100%)

= Considered Immobile

STGW = Soil to Groundwater

MSCC = Maximum Soil Contaminant Concentration

* = The value represents the sum of the reported practical quantitation limit of one fraction and the detected concentration of the other fraction.

TABLE 7
SUMMARY OF GROUNDWATER LABORATORY RESULTS
EPA METHOD 602

Incident Name / Number: TC-341 Pipeline / 23444

Well ID	Contaminant of Concern →		Benzene	Diisopropyl ether (DIPE)	Ethylbenzene	Toluene	Total Xylenes	All Other EPA Method 602 Analytes
	Sample ID	Date Collected						
GCL (µg/L)			5,000	NE	84,500	257,500	87,500	Varies
2L GWQS (µg/L)			1	NE	550	1,000	530	Varies
USTG480-MW01	USTG480-MW01	7/16/2007	4.78 J	BMDL	175	BMDL	<191.67	BMDL
USTG480-MW01	USTG480-MW01 DUP	7/16/2007	5.31 J	BMDL	176	BMDL	<190.67	BMDL
USTG480-MW04	USTG480-MW04	7/16/2007	57.4	BMDL	278	14.6	401	BMDL
USTG480-MW05	USTG480-MW05	7/16/2007	13.9	BMDL	283	BMDL	<81.94	BMDL
USTG480-MW10	USTG480-MW10	7/16/2007	173	BMDL	431	94.7	702	BMDL
USTG480-MW11	USTG480-MW11	7/16/2007	4.16 J	BMDL	113	BMDL	<5.82 J	BMDL
USTG480-MW12	USTG480-MW12	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/16/2007	94.8	BMDL	325	BMDL	<194.7	BMDL
USTG480-MW14	USTG480-MW14	7/16/2007	2.28	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15	USTG480-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	BMDL	0.212 J	BMDL	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	61.5	BMDL	179	9.84	260.6	BMDL
USTG480-MW18	USTG480-MW18	5/8/2008	BMDL	BMDL	2.21	0.850 J	<1.517 J	BMDL
USTG480-MW19	USTG480-MW19	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW21	USTG480-MW21	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW22	USTG480-MW22	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW23	USTG480-MW23	11/18/2008	9.8	BMDL	59.6	BMDL	41.86	BMDL
USTG480-MW23	USTG480-MW23 DUP	11/18/2008	9.56	BMDL	64.9	BMDL	50.1	BMDL
USTTC341-MW07	USTTC341-MW07	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTTC341-MW14	USTTC341-MW14	7/16/2007	9.7	BMDL	39.2	BMDL	52.052 J	BMDL
USTTC341-MW15	USTTC341-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW09S	IR35-MW09S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S DUP	11/18/2008	0.761 J	0.283 J	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).

Bold results indicate concentrations above 2L GWQS or GCL.

BMDL and < = Below Method Detection Limit

NE = None Established

J = Estimated concentration, below calibration range and above method detection limit

GCL = Gross Contaminant Level

2L GWQS = NCAC T15A:02L Groundwater Quality Standards

TABLE 7A
SUMMARY OF GROUNDWATER LABORATORY RESULTS
EPA METHOD 625

Incident Name / Number: TC-341 Pipeline / 23444

Well ID	Contaminant of Concern →		Acenaphthene	Acenaphthylene	Anthracene	Bis(2-ethylhexyl)phthalate	Di-n-octylphthalate	Fluorene	Naphthalene	Phenanthrene	All Other EPA Method 625 Analytes
	Sample ID	Date Collected									
GCL (µg/L) 2L GWQS (µg/L)			2,120 80	1,965 210	2,100 2,100	2,500 2.5	NE 140	950 280	15,500 21	410 210	Varies Varies
USTG480-MW01	USTG480-MW01	7/16/2007	9.50 J	BMDL	BMDL	BMDL	BMDL	18.0 J	376	27.0 J	BMDL
USTG480-MW04	USTG480-MW04	7/16/2007	46.0 J	29.0 J	21.0 J	BMDL	18.0 J	91.0 J	691	187	BMDL
USTG480-MW05	USTG480-MW05	7/16/2007	59.0 J	BMDL	38.0 J	BMDL	BMDL	119	962	262	BMDL
USTG480-MW10	USTG480-MW10	7/16/2007	BMDL	BMDL	68.0 J	BMDL	BMDL	190 J	1,280	408	BMDL
USTG480-MW11	USTG480-MW11	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	8.50 J	328	9.50 J	BMDL
USTG480-MW12	USTG480-MW12	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/16/2007	35.0 J	BMDL	19.0 J	BMDL	BMDL	67.0 J	693	156	BMDL
USTG480-MW14	USTG480-MW14	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15	USTG480-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	20.8 J	BMDL	BMDL	BMDL	BMDL	26.6 J	373	46.4 J	BMDL
USTG480-MW18	USTG480-MW18	5/8/2008	2.39 J	BMDL	BMDL	2.85 J	BMDL	2.33 J	9.44	1.71 J	BMDL
USTG480-MW19	USTG480-MW19	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW21	USTG480-MW21	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW22	USTG480-MW22	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW23	USTG480-MW23	11/18/2008	7.81 J	BMDL	BMDL	BMDL	BMDL	16.1 J	259	24.0 J	BMDL

TABLE 7A
SUMMARY OF GROUNDWATER LABORATORY RESULTS
EPA METHOD 625

Incident Name / Number: TC-341 Pipeline / 23444

Well ID	Contaminant of Concern →		Acenaphthene	Acenaphthylene	Anthracene	Bis(2-ethylhexyl)phthalate	Di-n-octylphthalate	Fluorene	Naphthalene	Phenanthrene	All Other EPA Method 625 Analytes
	Sample ID	Date Collected									
GCL (µg/L)			2,120	1,965	2,100	2,500	NE	950	15,500	410	Varies
2L GWQS (µg/L)			80	210	2,100	2.5	140	280	21	210	Varies
USTTC341-MW07	USTTC341-MW07	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTTC341-MW14	USTTC341-MW14	7/16/2007	63.0 J	BMDL	34.0 J	31.0 J	BMDL	133	645	328	BMDL
USTTC341-MW15	USTTC341-MW15	7/16/2007	BMDL	BMDL	BMDL	1.50 J	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW09S	IR35-MW09S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).

Bold results indicate concentrations above 2L GWQS or GCL.

BMDL = Below Method Detection Limit

NE = None Established

J = Estimated concentration, below calibration range and above method detection limit

GCL = Gross Contaminant Level

2L GWQS = NCAC T15A:02L Groundwater Quality Standards

TABLE 7B
SUMMARY OF GROUNDWATER LABORATORY RESULTS
MADEP EPH/VPH

Incident Name / Number: TC-341 Pipeline / 23444

Well ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Sample ID	Date Collected						
USTG480-MW01	USTG480-MW01	7/16/2007	4,300	200	78,000	170	1,300	1,100
USTG480-MW04	USTG480-MW04	7/16/2007	140,000	9,200	83,000	398	2,320	2,820
USTG480-MW05	USTG480-MW05	7/16/2007	49,000	3,400	31,000	466	1,950	2,520
USTG480-MW10	USTG480-MW10	7/16/2007	97,000	13,000	51,000	360	1,340	989
USTG480-MW11	USTG480-MW11	7/16/2007	210	BMDL	1,400	BMDL	477	285
USTG480-MW12	USTG480-MW12	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/16/2007	38,000	BMDL	25,000	727	2,210	4,290
USTG480-MW14	USTG480-MW14	7/16/2007	BMDL	BMDL	BMDL	138	BMDL	BMDL
USTG480-MW15	USTG480-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	3,210	289	6,580	297	1,970	1,700
USTG480-MW18	USTG480-MW18	5/8/2008	112	BMDL	330	BMDL	115	114
USTG480-MW19	USTG480-MW19	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW21	USTG480-MW21	11/18/2008	BMDL	342	BMDL	BMDL	BMDL	BMDL
USTG480-MW22	USTG480-MW22	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW23	USTG480-MW23	11/18/2008	12,300	837	5550	BMDL	446	885
USTTC341-MW07	USTTC341-MW07	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTTC341-MW14	USTTC341-MW14	7/16/2007	140,000	6,800	4,000	418	1,820	3,150
USTTC341-MW15	USTTC341-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW09S	IR35-MW09S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).

BMDL = Below Method Detection Limit

TABLE 7C
SUMMARY OF GROUNDWATER LABORATORY RESULTS
MADEP EPH/VP AS COMPARED TO NCDENR 2L GWQS

Incident Name / Number: TC-341 Pipeline / 23444

Well ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics	C5-C8 Aliphatics
	Sample ID	Date Collected				
2L GWQS (µg/L)			4,200	42,000	210	420
USTG480-MW01	USTG480-MW01	7/16/2007	5,600	200	79,100	170
USTG480-MW04	USTG480-MW04	7/16/2007	142,320	9,200	85,820	398
USTG480-MW05	USTG480-MW05	7/16/2007	50,950	3,400	33,520	466
USTG480-MW10	USTG480-MW10	7/16/2007	98,340	13,000	51,989	360
USTG480-MW11	USTG480-MW11	7/16/2007	687	BMDL	1,685	BMDL
USTG480-MW12	USTG480-MW12	7/16/2007	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/16/2007	40,210	BMDL	29,290	727
USTG480-MW14	USTG480-MW14	7/16/2007	BMDL	BMDL	BMDL	138
USTG480-MW15	USTG480-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	BMDL	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	5,180	289	8,280	297
USTG480-MW18	USTG480-MW18	5/8/2008	227	BMDL	444	BMDL
USTG480-MW19	USTG480-MW19	11/18/2008	BMDL	BMDL	BMDL	BMDL
USTG480-MW21	USTG480-MW21	11/18/2008	BMDL	342	BMDL	BMDL
USTG480-MW22	USTG480-MW22	11/18/2008	BMDL	BMDL	BMDL	BMDL
USTG480-MW23	USTG480-MW23	11/18/2008	12,746	837	6,435	BMDL
USTTC341-MW07	USTTC341-MW07	11/18/2008	BMDL	BMDL	BMDL	BMDL
USTTC341-MW14	USTTC341-MW14	7/16/2007	141,820	6,800	7,150	418
USTTC341-MW15	USTTC341-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL
IR35-MW09S	IR35-MW09S	11/18/2008	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S	11/18/2008	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).

Bold results indicate concentrations above 2L GWQS.

2L GWQS = NCAC T15A:02L Groundwater Quality Standards

BMDL = Below Method Detection Limit

TABLE 7D
SUMMARY OF GROUNDWATER LABORATORY RESULTS
EPA METHOD 601

Incident Name / Number: TC-341 Pipeline / 23444

Well ID	Contaminant of Concern →		1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	All Other EPA Method 601 Analytes
	Sample ID	Date Collected						
GCL (µg/L)			7,000	70,000	100,000	2,800	15	VARIABLES
2L GWQS (µg/L)			7	70	100	2.8	0.015	VARIABLES
IR35-MW14S	IR35-MW14S	11/18/2008	0.410 J	359	26.4	37.5	2.06	BMDL

All results in micrograms per liter (µg/L).

BMDL = Below Method Detection Limit

Bold results indicate concentrations above 2L GWQS.

J = Estimated concentration, below calibration range and above method detection limit

GCL = Gross Contaminant Level

2L GWQS = NCAC T15A:02L Groundwater Quality Standards

TABLE 8
FREE-PHASE PRODUCT RECOVERY INFORMATION
FEBRUARY 2008 THROUGH DECEMBER 2008

Incident Name / Number: TC-341 Pipeline / 23444

WELL ID	PRODUCT TYPE	CASING DIAMETER (inches)	AVERAGE PRODUCT THICKNESS BEFORE RECOVERY (inches)	AVERAGE AMOUNT OF PRODUCT RECOVERED (gallons)	TOTAL AMOUNT OF PRODUCT RECOVERED (gallons)	AVERAGE DEPTH TO WATER (feet)*
USTG480-MW01	KEROSENE / #6 FUEL OIL	2	0.10	0.035	0.81	7.08
USTG480-MW02	KEROSENE / #6 FUEL OIL	2	0.84	0.506	10.77	8.05
USTG480-MW03	KEROSENE / #6 FUEL OIL	2	1.51	0.929	20.16	8.34
USTG480-MW04	KEROSENE / #6 FUEL OIL	2	0.53	0.280	6.00	7.38
USTG480-MW05	KEROSENE / #6 FUEL OIL	2	NMT	0.000	0.03	6.52
USTG480-MW06	KEROSENE / #6 FUEL OIL	2	0.32	0.128	1.48	7.28
USTG480-MW07	KEROSENE / #6 FUEL OIL	2	1.27	1.067	22.80	6.20
USTG480-MW08	KEROSENE / #6 FUEL OIL	2	1.01	0.707	12.48	7.82
USTG480-MW09	KEROSENE / #6 FUEL OIL	2	0.14	0.050	0.42	7.15
USTG480-MW10	KEROSENE / #6 FUEL OIL	2	NMT	0.000	0.00	7.16
USTG480-MW11	KEROSENE / #6 FUEL OIL	2	NMT	0.000	0.00	6.68
USTG480-MW12	KEROSENE / #6 FUEL OIL	2	NMT	0.000	0.00	6.92
USTG480-MW13	KEROSENE / #6 FUEL OIL	2	0.48	0.265	5.80	7.55
USTG480-MW14	KEROSENE / #6 FUEL OIL	2	NMT	0.000	0.00	7.62
USTG480-MW15	KEROSENE / #6 FUEL OIL	2	NMT	0.000	0.00	6.92
IR35-67A	KEROSENE / #6 FUEL OIL	2	1.51	0.186	4.09	7.82
CUMULATIVE TOTAL	--	--	--	--	84.84	--

* = Depth to Water as measured. Not adjusted for free-phase product thickness

NMT = No Measurable Thickness

TABLE 9
SUMMARY OF SURFACE WATER LABORATORY RESULTS
EPA METHOD 602

Incident Name / Number: TC-341 Pipeline / 23444

Contaminant of Concern →		Benzene	Diisopropyl ether (DIPE)	All Other EPA Method 602 Analytes
Sample ID	Date Collected			
Most Stringent Standard, Criteria, or Toxic Consideration Adopted per 15A NCAC 2B or are National Criteria per EPA		51.00 (HH)	NE	Varies
USTG480-SW01	11/18/2008	BMDL	BMDL	BMDL
USTG480-SW02	11/18/2008	1.56	0.827 J	BMDL

All results and Standards in micrograms per liter (µg/L).

BMDL and < = Below Method Detection Limit

NE = None Established

J = Estimated concentration, below calibration range and above method detection limit

(HH) = Human Health Standard 15A NCAC 2B or National Criteria per EPA

TABLE 9A
SUMMARY OF SURFACE WATER LABORATORY RESULTS
EPA METHOD 625

Incident Name / Number: TC-341 Pipeline / 23444

Contaminant of Concern →		Acenaphthene	Fluorene	Naphthalene	Phenanthrene	All Other EPA Method 625 Analytes
Sample ID	Date Collected					
Most Stringent Standard, Criteria, or Toxic Consideration Adopted per 15A NCAC 2B or are National Criteria per EPA		20 (SAL)	46 (FAL)	52 (SAL)	NE	Varies
USTG480-SW01	11/18/2008	0.765 J	BMDL	1.17 J	BMDL	BMDL
USTG480-SW02	11/18/2008	BMDL	1.24 J	BMDL	1.14 J	BMDL

All results and Standards in micrograms per liter (µg/L).

BMDL = Below Method Detection Limit

NE = None Established

J = Estimated concentration, below calibration range and above method detection limit

FAL = Freshwater Aquatic Life Standard 15A NCAC 2B or National Criteria per EPA

SAL = Saltwater Aquatic Life Standard 15A NCAC 2B or National Criteria per EPA

TABLE 9B
SUMMARY OF SURFACE WATER LABORATORY RESULTS
MADEP EPH/VPH

Incident Name / Number: TC-341 Pipeline / 23444

Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
Sample ID	Date Collected						
USTG480-SW01	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-SW02	11/18/2008	BMDL	BMDL	123	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).

BMDL = Below Method Detection Limit

TABLE 9C
SUMMARY OF SURFACE WATER LABORATORY RESULTS
MADEP EPH/VPH AS COMPARED TO SURFACE WATER STANDARDS / CRITERIA

Incident Name / Number: TC-341 Pipeline / 23444

Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C18-C32 Aliphatics	C9-C32 Aromatics
Sample ID	Date Collected				
Most Stringent Standard, Criteria, or Toxic Consideration Adopted per 15A NCAC 2B or are National Criteria per EPA		120 (HH)	S	S	400 (HH)
USTG480-SW01	11/18/2008	BMDL	BMDL	BMDL	170*
USTG480-SW02	11/18/2008	BMDL	BMDL	BMDL	BMDL

All results and Standards in micrograms per liter (µg/L).

BMDL and < = Below Method Detection Limit

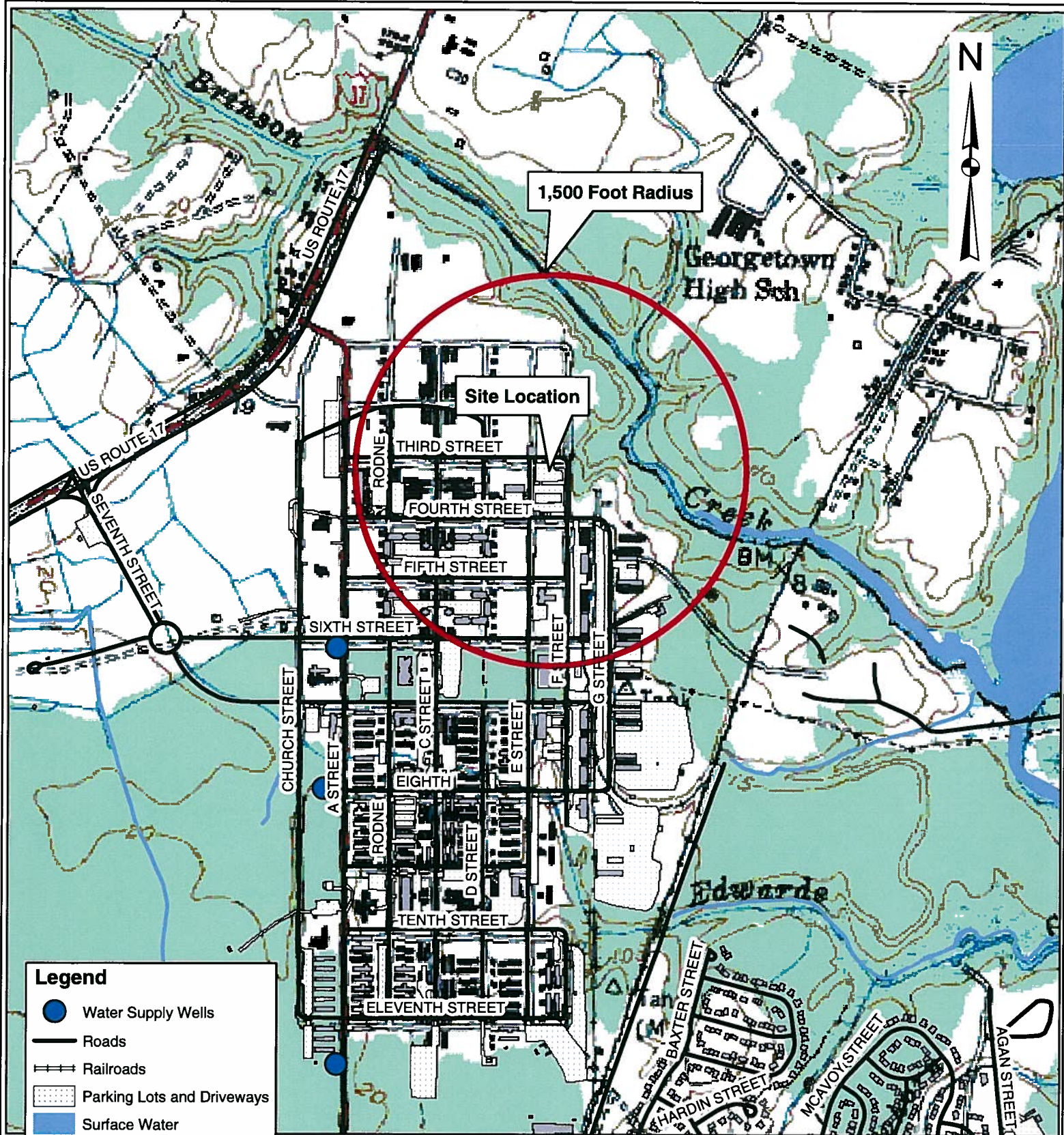
NE = None Established

* = The value represents the sum of the reported practical quantitation limit of one fraction and the detected concentration of the other fraction.

(HH) = Human Health Standard 15A NCAC 2B or National Criteria per EPA

S = Toxicity exceeds solubility, no visible sheen or free product in water or on sediment or shoreline.

FIGURES



Data Sources: GIS Data Layers provided by MCB Camp Lejeune GIS Office.
USGS Topographical Quad = Jacksonville South, NC 1952 (Photinspected 1971).

1,000 500 0 1,000 Feet
SCALE



PROJECT
CORRECTIVE ACTION PLAN
SITE TC-341 PIPELINE
MARINE CORPS BASE
CAMP LEJEUNE, NC

TITLE
**SITE VICINITY AND
WATER SUPPLY WELLS**

FIGURE

1

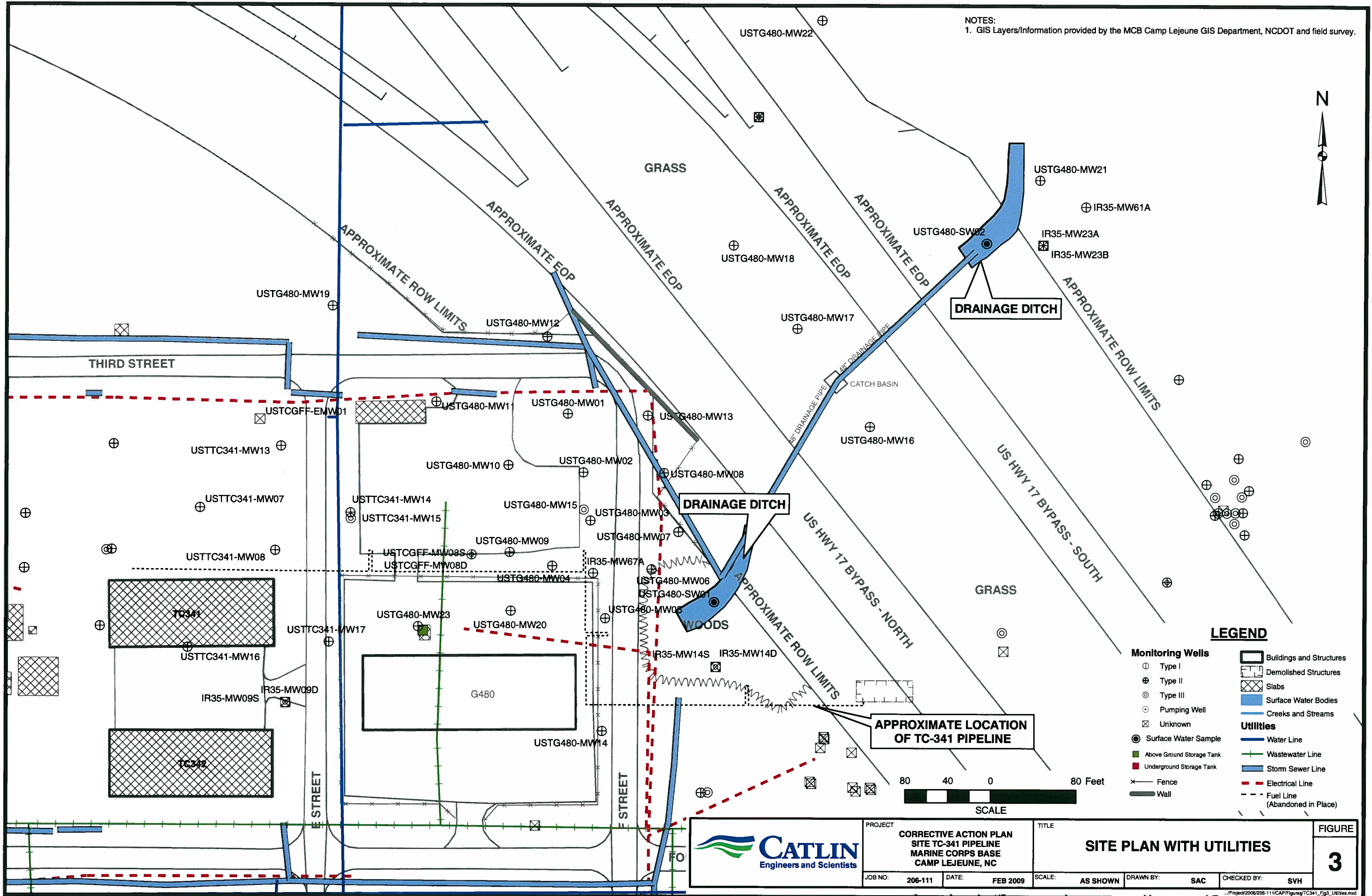
JOB NO. 206-111

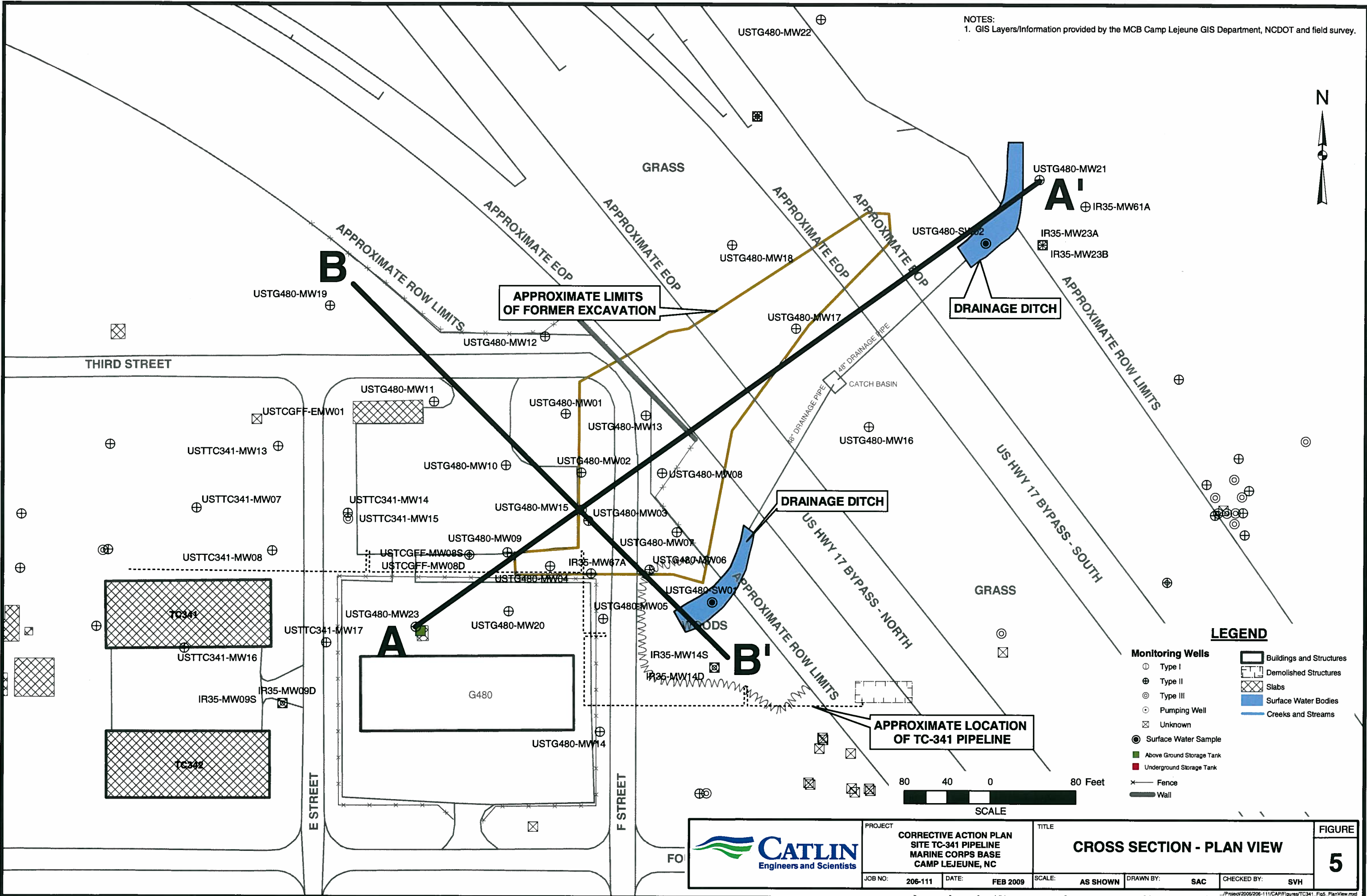
DATE FEB 2009

SCALE AS SHOWN

DRAWN BY SAC

CHECKED BY SVH





NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.



CATLIN
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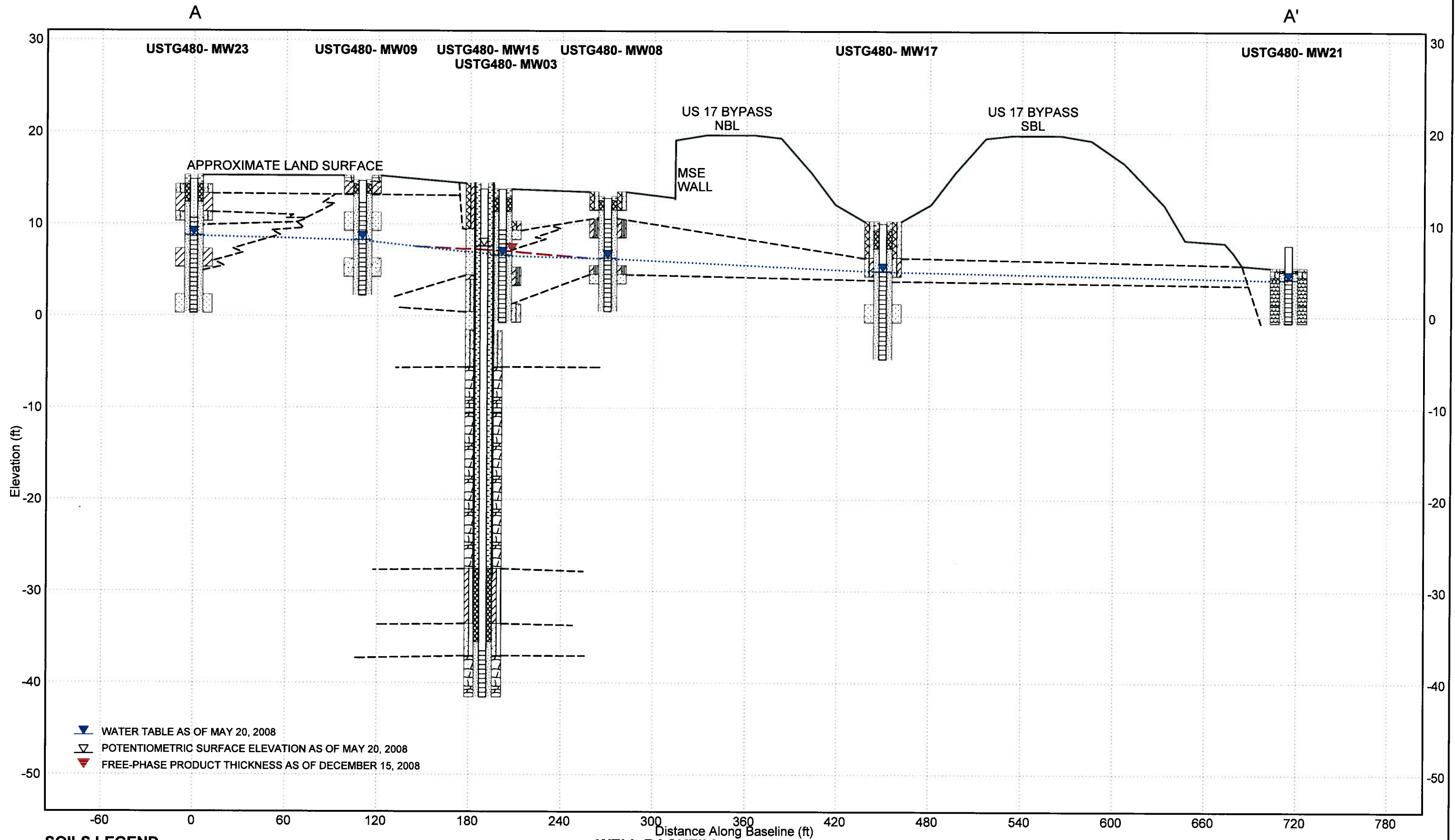
PROJECT
**CORRECTIVE ACTION PLAN
SITE TC-341 PIPELINE
MARINE CORPS BASE
CAMP LEJEUNE, NC**

JOB NO: 206-111 DATE: FEB 2009

TITLE
CROSS SECTION - PLAN VIEW

SCALE: AS SHOWN DRAWN BY: SAC CHECKED BY: SVH

FIGURE
5



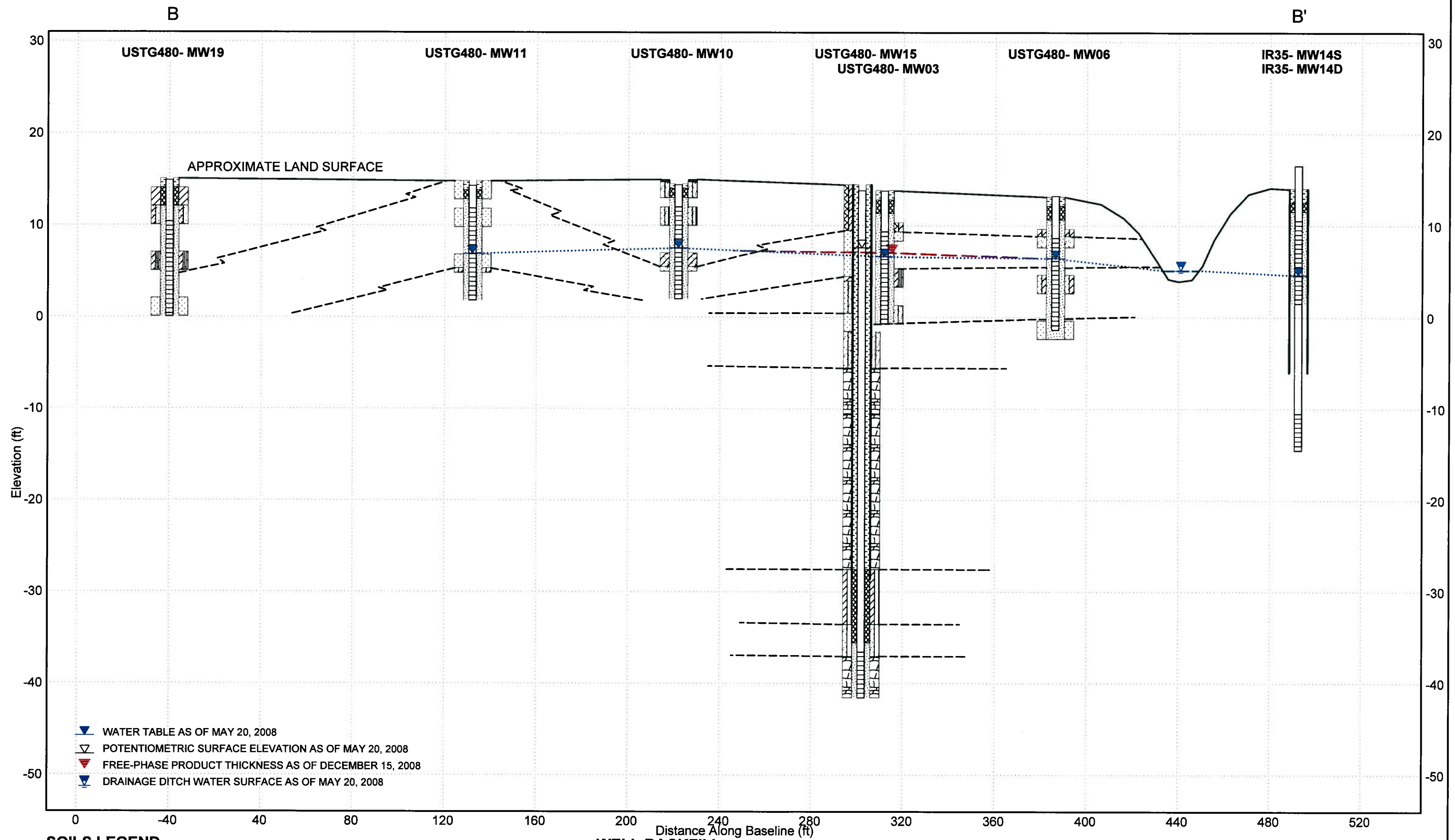
SOILS LEGEND

	CLAYEY SAND FILL		(SP) Poorly-graded Sand		(SC-SM) Clayey/Silty Sand		(SM) Silty Sand
	SILTY SAND FILL		Topsoil		(GW) Well-graded Gravel		(SC) Clayey Sand
	(SW) Well-graded Sand		(SP-SM) Poorly-graded Sand with Silt		Weathered Limestone		Limestone

WELL BACKFILL

	Portland Cement
	Bentonite Pellets
	#2 Medium Sand

CATLIN Engineers and Scientists WILMINGTON, NORTH CAROLINA	PROJECT CORRECTIVE ACTION PLAN SITE TC-341 PIPELINE MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE CROSS SECTION A - A'		FIGURE 5A
	JOB NO.: 206-111	DATE: FEB 2009	SCALE: VERT. 1"=10' HORZ. 1"=60'	



SOILS LEGEND

	CLAYEY SAND FILL		(SP) Poorly-graded Sand		(SC-SM) Clayey/Silty Sand (SP-SC)		(SM) Silty Sand
	(SC-CL) Clayey Sand to Sandy Clay (SP-SM)		(SW) Well-graded Sand		Poorly-graded Sand with Clay		Asphalt
	Poorly-graded Sand with Silt		(SC) Clayey Sand		Interbedded Sand and Clay		Weathered Limestone

WELL BACKFILL

	Portland Cement		Bentonite Pellets
	#2 Medium Sand		



PROJECT
CORRECTIVE ACTION PLAN
SITE TC-341 PIPELINE
MARINE CORPS BASE
CAMP LEJEUNE, NC

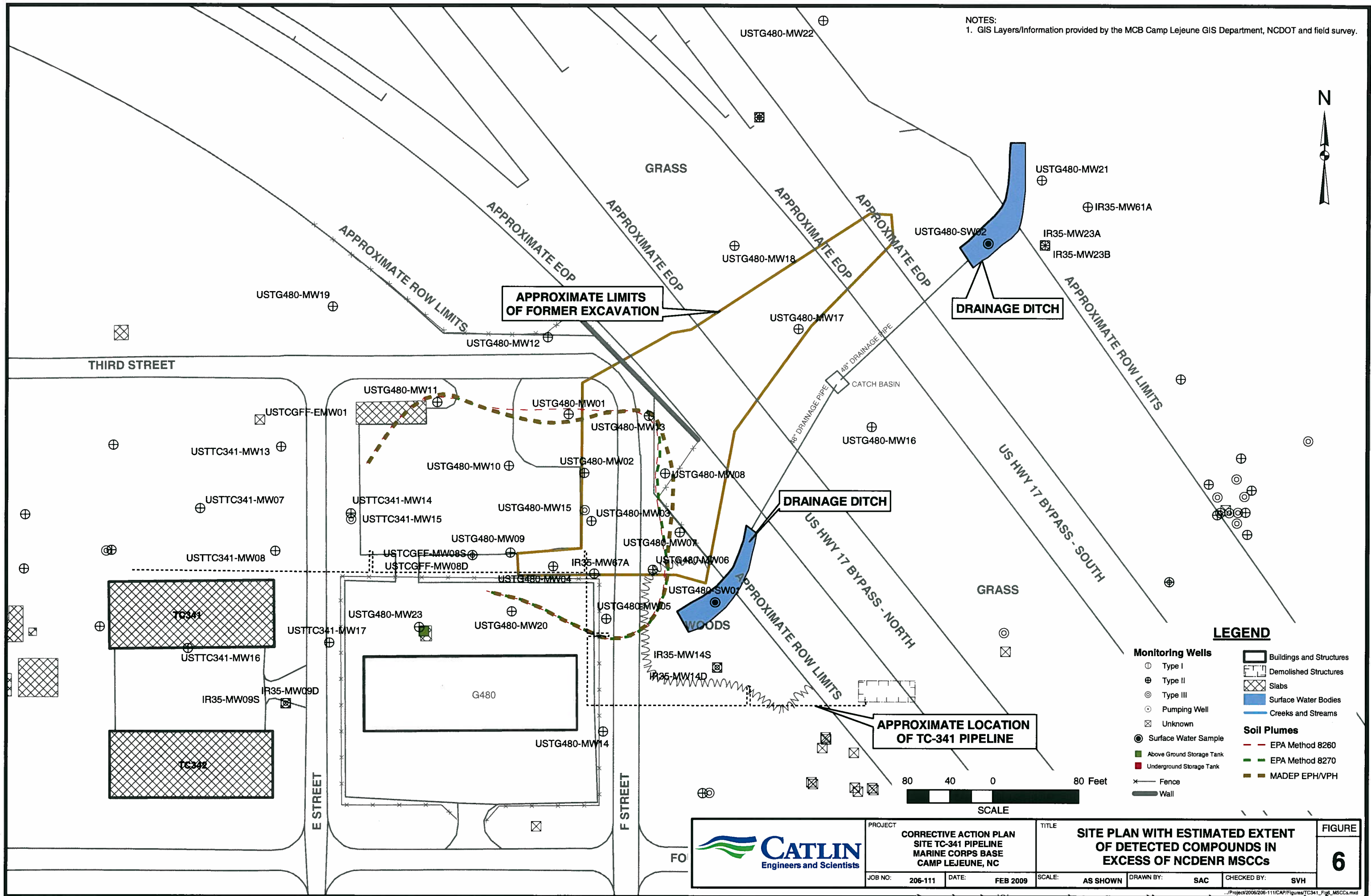
JOB NO. 206-111 DATE Feb 2009

TITLE
CROSS SECTION
B - B'

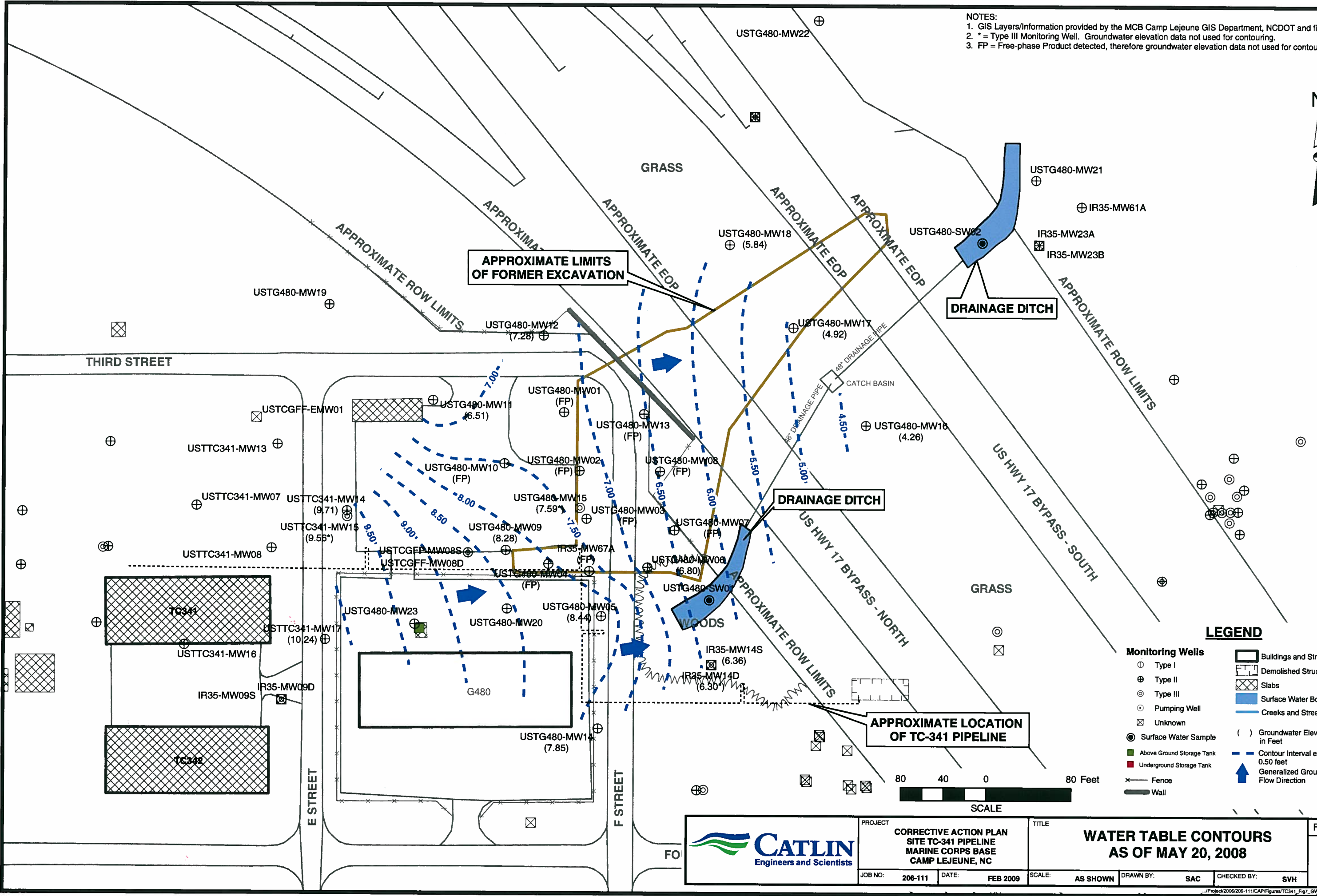
SCALE: VERT. 1"=10' HORZ. 1"=60'

DRAWN BY: SVH CHECKED BY: SVH

FIGURE
5B



NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.
2. * = Type III Monitoring Well. Groundwater elevation data not used for contouring.
3. FP = Free-phase Product detected, therefore groundwater elevation data not used for contouring.



LEGEND

- | | |
|---------------------------|--|
| Monitoring Wells | Buildings and Structures |
| ⊕ Type I | Demolished Structures |
| ⊕ Type II | Slabs |
| ⊙ Type III | Surface Water Bodies |
| ⊙ Pumping Well | Creeks and Streams |
| ⊗ Unknown | () Groundwater Elevation in Feet |
| ⊙ Surface Water Sample | Contour Interval equals 0.50 feet |
| Above Ground Storage Tank | Generalized Groundwater Flow Direction |
| Underground Storage Tank | |
| Fence | |
| Wall | |



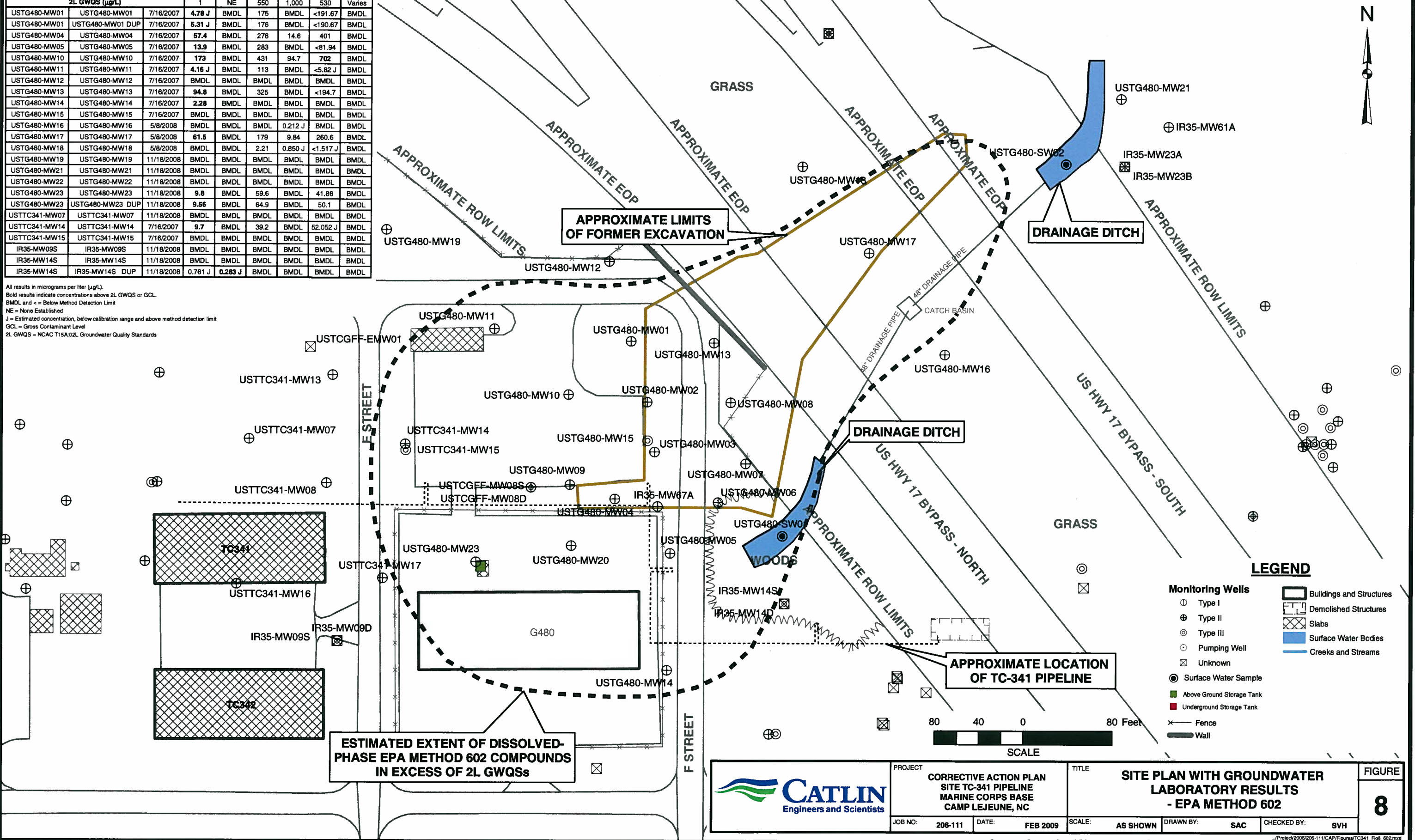
 Catlin Engineers and Scientists	PROJECT CORRECTIVE ACTION PLAN SITE TC-341 PIPELINE MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE WATER TABLE CONTOURS AS OF MAY 20, 2008		FIGURE 7
	JOB NO: 206-111	DATE: FEB 2009	SCALE: AS SHOWN	DRAWN BY: SAC	CHECKED BY: SVH

\\Project\2006\206-111\CAP\Figures\TC341_Fig7_GW_Conours.mxd

Well ID	Contaminant of Concern		Benzene	Disopropyl ether (DIPE)	Ethylbenzene	Toluene	Total Xylenes	All Other EPA Method 602 Analytes
	Sample ID	Date Collected						
GCL (µg/L)			5,000	NE	84,500	257,500	87,500	Varies
2L GWQS (µg/L)			1	NE	550	1,000	530	Varies
USTG480-MW01	USTG480-MW01	7/16/2007	4.78 J	BMDL	175	BMDL	<191.67	BMDL
USTG480-MW01	USTG480-MW01 DUP	7/16/2007	5.31 J	BMDL	176	BMDL	<190.67	BMDL
USTG480-MW04	USTG480-MW04	7/16/2007	67.4	BMDL	278	14.6	401	BMDL
USTG480-MW05	USTG480-MW05	7/16/2007	13.9	BMDL	283	BMDL	<81.94	BMDL
USTG480-MW10	USTG480-MW10	7/16/2007	173	BMDL	431	94.7	702	BMDL
USTG480-MW11	USTG480-MW11	7/16/2007	4.16 J	BMDL	113	BMDL	<5.82 J	BMDL
USTG480-MW12	USTG480-MW12	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/16/2007	94.8	BMDL	325	BMDL	<194.7	BMDL
USTG480-MW14	USTG480-MW14	7/16/2007	2.28	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15	USTG480-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	BMDL	0.212 J	BMDL	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	61.5	BMDL	179	9.84	260.6	BMDL
USTG480-MW18	USTG480-MW18	5/8/2008	BMDL	BMDL	2.21	0.850 J	<1.517 J	BMDL
USTG480-MW19	USTG480-MW19	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW21	USTG480-MW21	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW22	USTG480-MW22	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW23	USTG480-MW23	11/18/2008	9.8	BMDL	59.6	BMDL	41.86	BMDL
USTG480-MW23	USTG480-MW23 DUP	11/18/2008	9.56	BMDL	64.9	BMDL	50.1	BMDL
USTTC341-MW07	USTTC341-MW07	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTTC341-MW14	USTTC341-MW14	7/16/2007	9.7	BMDL	39.2	BMDL	52.052 J	BMDL
USTTC341-MW15	USTTC341-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW09S	IR35-MW09S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S	11/18/2008	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S DUP	11/18/2008	0.761 J	0.283 J	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).
 Bold results indicate concentrations above 2L GWQS or GCL.
 BMDL and < = Below Method Detection Limit
 NE = None Established
 J = Estimated concentration, below calibration range and above method detection limit
 GCL = Gross Contaminant Level
 2L GWQS = NCAC T15A-02L Groundwater Quality Standards

NOTES:
 1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.



PROJECT: CORRECTIVE ACTION PLAN
 SITE TC-341 PIPELINE
 MARINE CORPS BASE
 CAMP LEJEUNE, NC

JOB NO: 206-111 DATE: FEB 2009

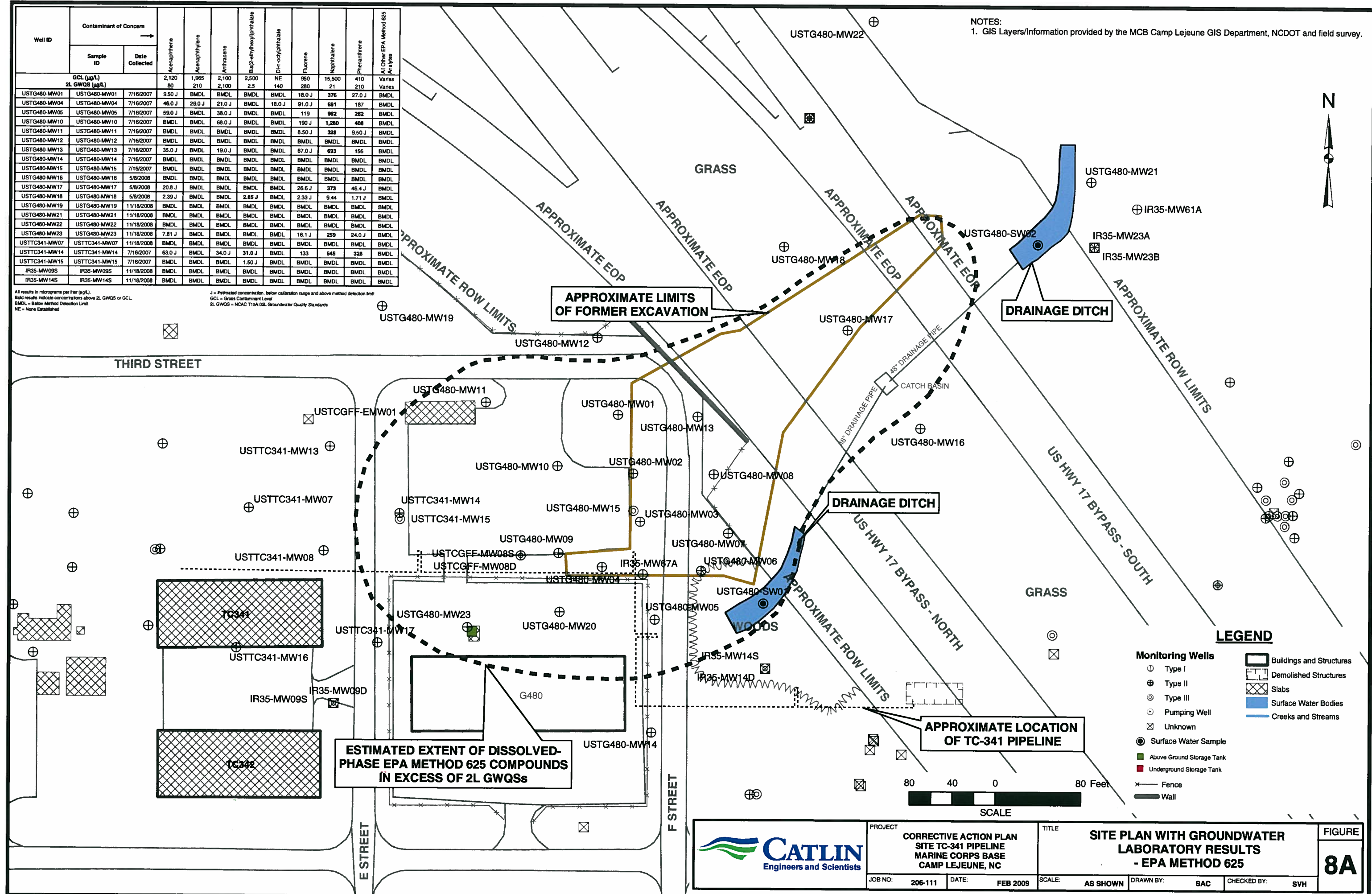
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 LABORATORY RESULTS
 - EPA METHOD 602

SCALE: AS SHOWN DRAWN BY: SAC CHECKED BY: SVH

FIGURE: 8

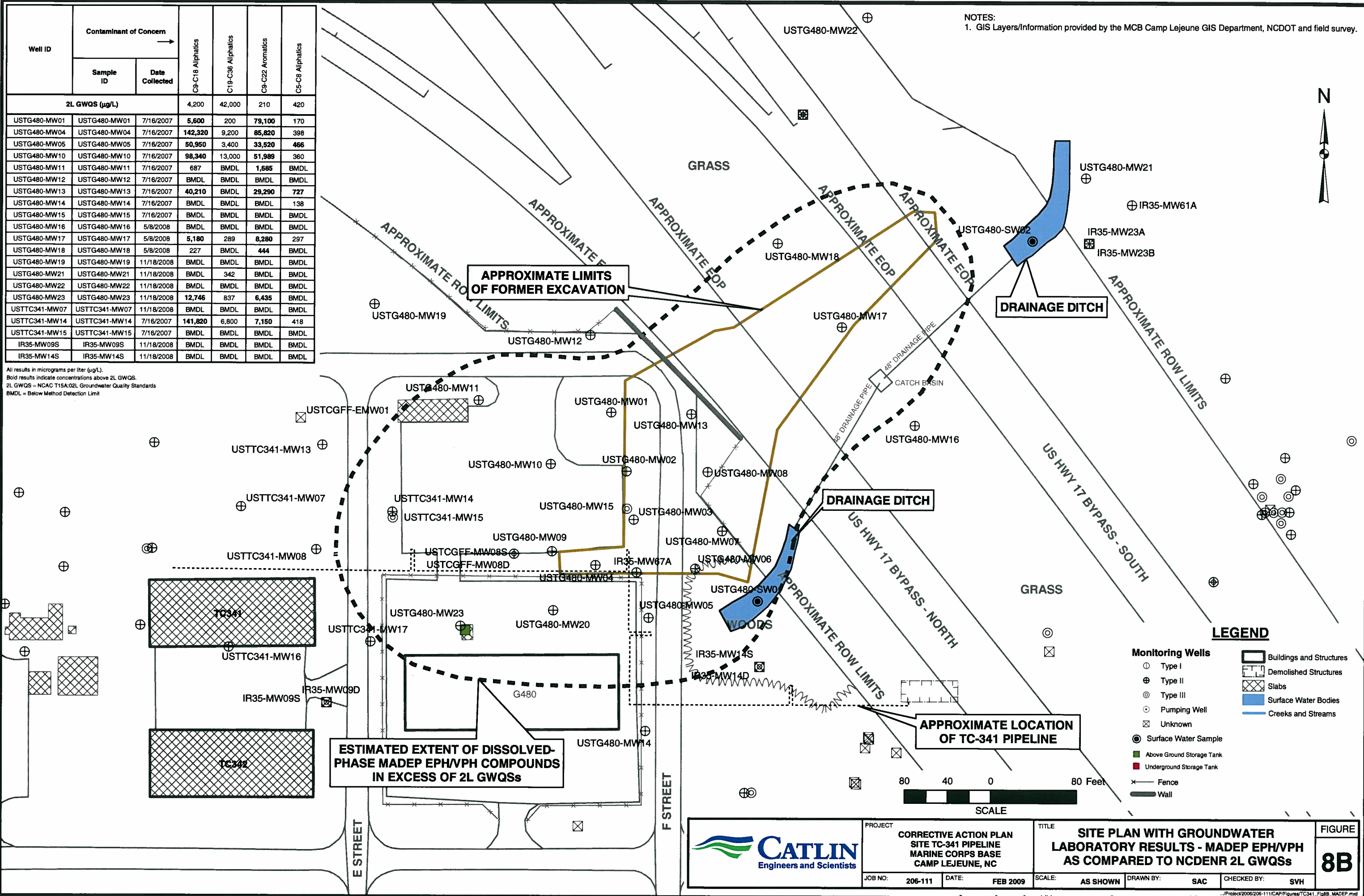
[illegible]

NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.

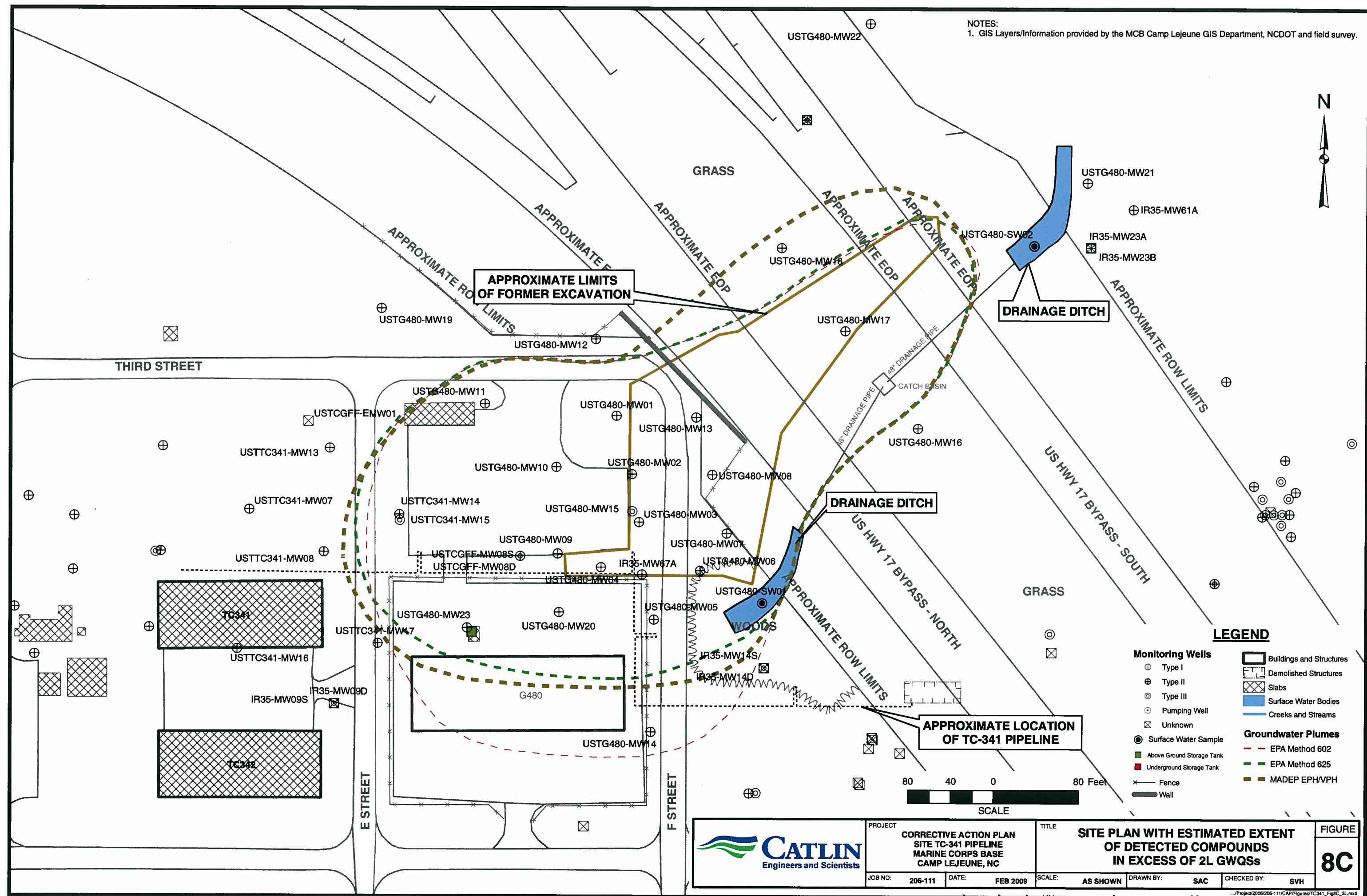


Well ID	Contaminant of Concern		C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics	C5-C8 Aliphatics
	Sample ID	Date Collected				
2L GWQS (µg/L)			4,200	42,000	210	420
USTG480-MW01	USTG480-MW01	7/16/2007	5,600	200	79,100	170
USTG480-MW04	USTG480-MW04	7/16/2007	142,320	9,200	85,820	398
USTG480-MW05	USTG480-MW05	7/16/2007	50,950	3,400	33,520	466
USTG480-MW10	USTG480-MW10	7/16/2007	98,340	13,000	51,989	360
USTG480-MW11	USTG480-MW11	7/16/2007	687	BMDL	1,685	BMDL
USTG480-MW12	USTG480-MW12	7/16/2007	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/16/2007	40,210	BMDL	29,290	727
USTG480-MW14	USTG480-MW14	7/16/2007	BMDL	BMDL	BMDL	138
USTG480-MW15	USTG480-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	BMDL	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	5,180	289	8,280	297
USTG480-MW18	USTG480-MW18	5/8/2008	227	BMDL	444	BMDL
USTG480-MW19	USTG480-MW19	11/18/2008	BMDL	BMDL	BMDL	BMDL
USTG480-MW21	USTG480-MW21	11/18/2008	BMDL	342	BMDL	BMDL
USTG480-MW22	USTG480-MW22	11/18/2008	BMDL	BMDL	BMDL	BMDL
USTG480-MW23	USTG480-MW23	11/18/2008	12,746	837	6,435	BMDL
USTTC341-MW07	USTTC341-MW07	11/18/2008	BMDL	BMDL	BMDL	BMDL
USTTC341-MW14	USTTC341-MW14	7/16/2007	141,820	6,800	7,150	418
USTTC341-MW15	USTTC341-MW15	7/16/2007	BMDL	BMDL	BMDL	BMDL
IR35-MW09S	IR35-MW09S	11/18/2008	BMDL	BMDL	BMDL	BMDL
IR35-MW14S	IR35-MW14S	11/18/2008	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).
 Bold results indicate concentrations above 2L GWQS.
 2L GWQS = NCAC T15A:02L Groundwater Quality Standards
 BMDL = Below Method Detection Limit



NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.



APPROXIMATE LIMITS
OF FORMER EXCAVATION

DRAINAGE DITCH

DRAINAGE DITCH

APPROXIMATE LOCATION
OF TC-341 PIPELINE

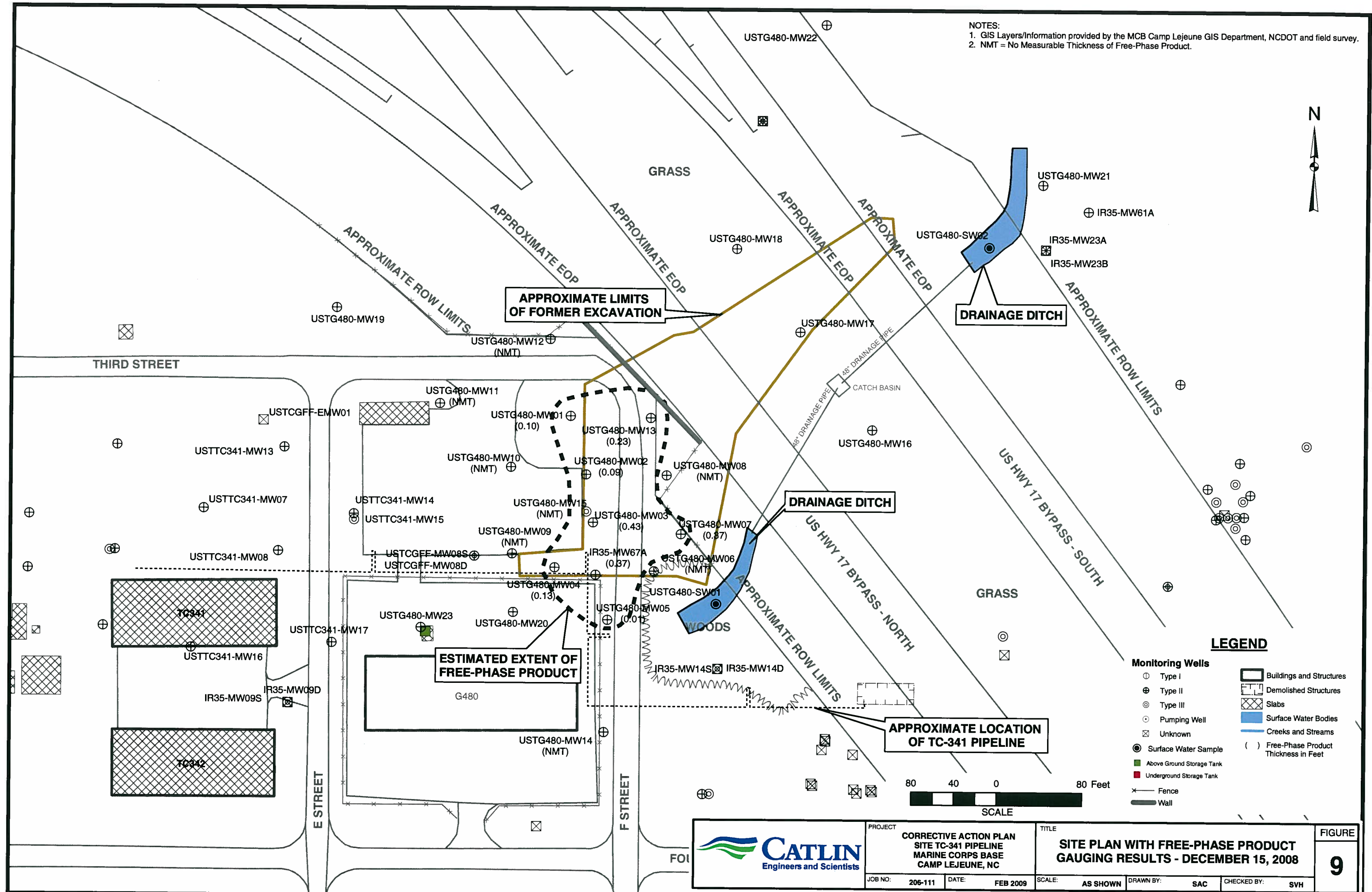
LEGEND

- | | |
|---------------------------|---------------------------|
| Monitoring Wells | Buildings and Structures |
| Type I | Demolished Structures |
| Type II | Slabs |
| Type III | Surface Water Bodies |
| Pumping Well | Creeks and Streams |
| Unknown | |
| Surface Water Sample | Groundwater Plumes |
| Above Ground Storage Tank | EPA Method 602 |
| Underground Storage Tank | EPA Method 625 |
| Fence | MADEP EPH/VPH |
| Wall | |

 CATLIN Engineers and Scientists	PROJECT CORRECTIVE ACTION PLAN SITE TC-341 PIPELINE MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE SITE PLAN WITH ESTIMATED EXTENT OF DETECTED COMPOUNDS IN EXCESS OF 2L GWQSS	FIGURE 8C
	JOB NO: 206-111 DATE: FEB 2009	SCALE: AS SHOWN DRAWN BY: SAC CHECKED BY: SVH	

..Project\2006\206-111\CAP\Figures\TC341_Fig8C_2L.mxd

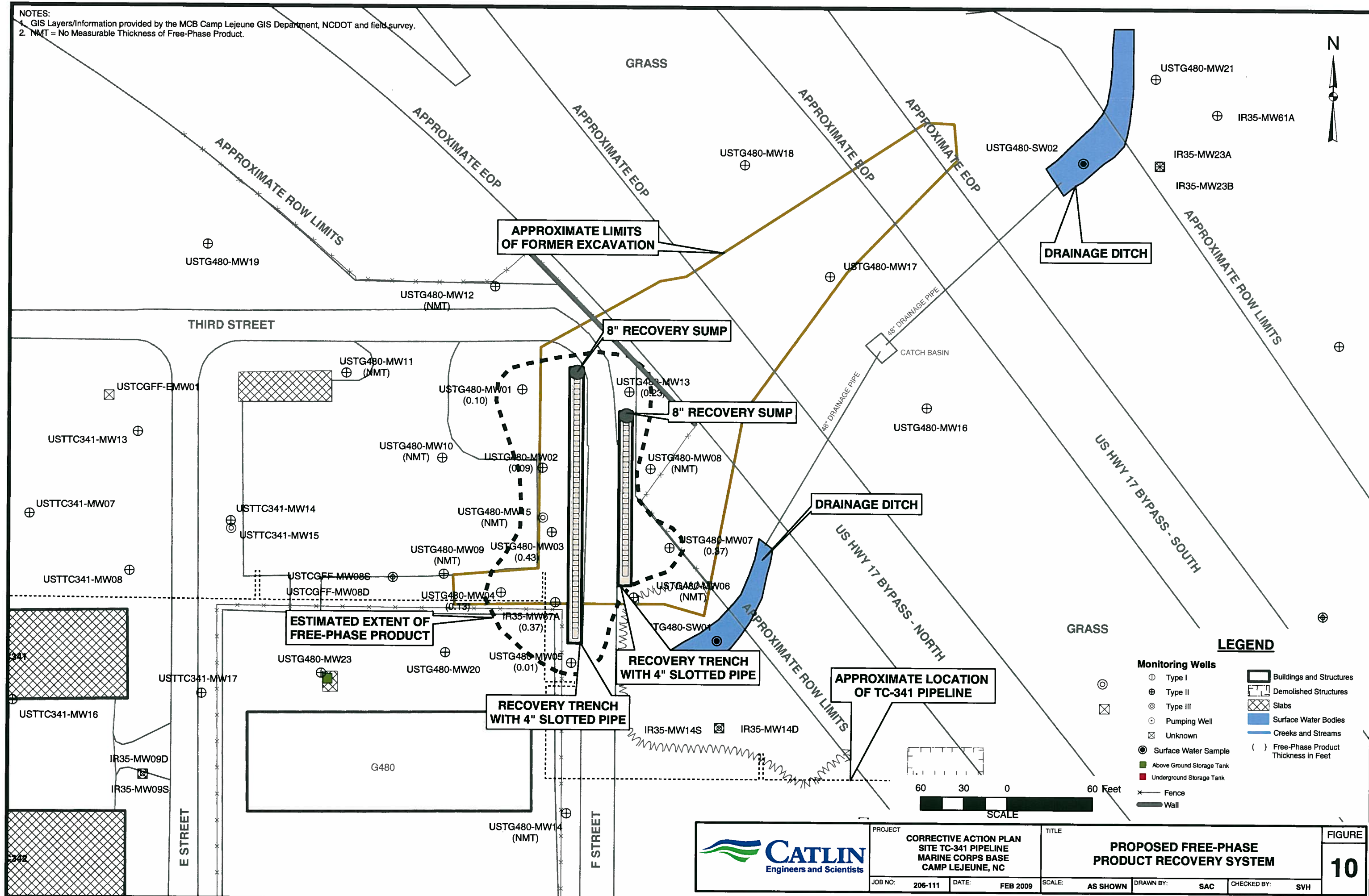
NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.
2. NMT = No Measurable Thickness of Free-Phase Product.



 Catlin Engineers and Scientists	PROJECT CORRECTIVE ACTION PLAN SITE TC-341 PIPELINE MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE SITE PLAN WITH FREE-PHASE PRODUCT GAUGING RESULTS - DECEMBER 15, 2008		FIGURE 9
	JOB NO: 206-111	DATE: FEB 2009	SCALE: AS SHOWN	DRAWN BY: SAC	CHECKED BY: SVH

.../Project/2006/206-111/CAP/figures/TC341_Fig9_FP.mxd

NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department, NCDOT and field survey.
2. NMT = No Measurable Thickness of Free-Phase Product.



APPENDIX A
NCDENR NORR



North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor
William G. Ross Jr., Secretary

Division of Waste Management
Underground Storage Tank Section

Dexter R. Matthews, Director

September 25, 2008

Commanding Officer
Attn: I&E/EMD/EQB Dr. Johanna Arnold,
Building 12
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

Re: Notice of Regulatory Requirements
15A NCAC 2L .0405
Risk-based Assessment and Corrective Action
for Petroleum Underground Storage Tanks

USMC Camp Lejeune Bldg. G-480
Fourth Street, Camp Lejeune
Onslow County
Incident number: 23444
Risk Classification: U
Ranking: U

Dear Dr. Arnold:

The UST Closure Report received by the UST Section, Wilmington Regional Office on February 28, 1994 has been reviewed. The report indicates that soil contamination exceeds or equals the 10 mg/kg total petroleum hydrocarbons (TPH) screening limit established in Title 15A NCAC 2L .0411) and/or that groundwater contamination exceeds the standards or interim standards established in Title 15A NCAC 2L.0202. Therefore, the UST Section hereby confirms that Camp Lejeune must comply with assessment and reporting requirements of Title 15A NCAC 2L .0405, within the timeframes specified in the attached rule.

The requirements of Title 15A NCAC 2L .0405 include the preparation and submittal of a Limited Site Assessment (LSA) Report, in accordance with the rule and the most recent version of the *UST Section Guidelines for Assessment and Corrective Action*, within 120 days of discovery of the release.

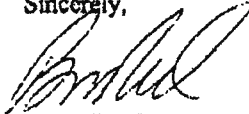
Because a release or discharge has been confirmed, a Licensed Geologist or a Professional Engineer, certified by the State of North Carolina, is required to prepare and certify all reports submitted to the Department in accordance with Title 15A NCAC 2L .0103(e) and 2L .0111(b).

Please note that before you sell, transfer, or request a "No Further Action" determination for a property that has not been remediated to below "unrestricted use" standards, you must file a Notice of Residual Petroleum ("Notice") with the Register of Deeds in the county where the property is located (NCGS 143B-279.9 and 143B-279.11).

Failure to comply with the State's rules in the manner and time specified may result in the assessment of civil penalties and/or the use of other enforcement mechanisms.

If you have any questions regarding trust fund eligibility or reimbursement from the Commercial or Noncommercial Leaking Petroleum Underground Storage Tank Cleanup Funds, please contact the UST Section Trust Fund Branch at (919) 733-8486. If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact me at the address or telephone number listed below.

Sincerely,



Bruce Reed
Hydrogeologist II
Wilmington Regional Office

Enclosures: Title 15A NCAC 2L .0405
A Brief History of North Carolina Session Laws, Rules, and General Statutes...

cc: George O'Daniel, Onslow County Health Department
WiRO-UST

UST Regional Offices

Asheville (ARO) – 2090 US Highway 70, Swannanoa, NC 28776 (828) 296-4500

Fayetteville (FAY) – 225 Green Street, Suite 714, Systel Building, Fayetteville, NC 28301 (910) 433-3300

Mooreville (MOR) – 610 East Center Avenue, Suite 301, Mooresville, NC 28115 (704) 663-1699

Raleigh (RRO) – 1628 Mail Service Center, Raleigh, NC 27699 (919) 791-4200

Washington (WAS) – 943 Washington Square Mall, Washington, NC 27889 (252) 946-6481

Wilmington (WIL) – 127 Cardinal Drive Extension, Wilmington, NC 28405 (910) 796-7215

Winston-Salem (WS) – 585 Woughtown Street, Winston-Salem, NC 27107 (336) 771-5000

Guilford County Environmental Health, 1203 Maple Street, Greensboro, NC 27405, (336) 641-3771

S:\bruce\arnoldg480.lsa

APPENDIX B

CATLIN STANDARD METHODS OF INVESTIGATION

CATLIN STANDARD METHODS OF INVESTIGATION

1.0 DATA COLLECTION

1.1 BACKGROUND DATA

Background data and history information relevant to the site investigation is generated through numerous sources. These sources may include, but are not limited to, the following:

- Conversations with the client and regulatory officials involved with the incident.
- Review of pertinent regulatory correspondence.
- Review of previous and existing reports and other technical data.
- Review of available historical records.

1.2 SURVEYS AND POTENTIAL RECEPTOR DATA

Physical survey and potential receptor data are collected in accordance with the intended level of investigation. In general, the purpose is to collect sufficient information for site assessment and corrective action planning.

Individual receptors are identified and evaluated in the context of their potential for contaminant impact. Potential receptors of contamination can include surface water bodies, groundwater supply wells, wellhead protection areas, and subsurface building structures.

1.2.1 Horizontal Survey

Horizontal survey data are generated using either accepted general field surveying techniques, or existing survey maps; or by using a combination of existing data and field generated information. The survey area generally extends to a point at least 50 feet beyond suspected plume boundaries. A receptor scale survey of a larger area surrounding a site will be made if appropriate and necessary.

1.2.2 Vertical Survey

A vertical survey is conducted at the site typically within an accuracy of 0.01 foot. The datum plane is generally assumed unless otherwise noted. Assumed temporary benchmarks (TBM) are selected near ground level. The vertical survey includes such points as top of all well casings, selected ground shots, important utility inverts, utility fluid levels, important surface water levels, and other items determined to be significant.

1.3 DRILLING AND MONITORING WELL/PIEZOMETER INSTALLATION

Necessary permits are applied for and obtained in accordance with federal, state, and local requirements prior to drilling or well construction activities. Additionally, the well locations are scanned for underground utilities prior to conducting intrusive subsurface activities. Wells are installed under applicable licensing requirements, and are designed and constructed in accordance with accepted standards and practices. Any wells purposely installed at off-site locations are permitted through appropriate right-of-entry agreements with all necessary property owners and/or their agents.

1.3.1 Drilling Methods and Subsurface Data Collection

Drilling is accomplished utilizing one or more of the following methods:

Auger Drilling

Auger drilling is the preferred, most often used method of subsurface investigation and is accomplished using a vehicle or trailer mounted drill rig. Continuous flight auger types used vary upon the site and situation; ranging from the 4-inch outside diameter solid stem to the 12-inch outside diameter hollow stem. Auger type is selected based upon appropriateness and/or site-specific requirements.

Hand Augering

Hand augering is utilized when economically and scientifically feasible, or when no other method is suitable. Hand augers typically produce three-inch diameter holes and are generally limited to depths of less than 15 feet.

Direct Push

Direct push methods of subsurface investigation are used generally for soil screening purposes or collection of groundwater samples where permanent wells are not viable.

Other Methods

Other drilling methods, such as mud and air rotary, rock coring, cable tool, and large bucket augering are used when site conditions or project requirements dictate.

Regardless of the drilling method used, the drill rig(s) and all drilling tools are thoroughly cleaned between boreholes to prevent cross introduction of contaminants. Split spoon samples are collected and field-described at intervals of five feet or less, and cuttings are continuously monitored for organic vapors. Drill cuttings are containerized for off-site disposal or are spread on the ground surface in proximity to the well or boring in accordance with North Carolina Department of Environment and Natural Resources (NCDENR) requirements. A geologist or engineer, trained in using visual/manual techniques, is always present during drilling and is

responsible for subsurface contaminant and geologic data collection. Soils are classified in general agreement with the Unified Soils Classification System (USCS).

1.3.2 Hydropunch Installation

Hydropunch penetrometers (Hydropunches) are used to delineate the spatial extent of dissolved and free phase plumes. Soil borings are advanced to the appropriate depth and then the Hydropunch is advanced through the soil boring into undisturbed material. Groundwater samples are collected by pulling back on the body of the Hydropunch and allowing the groundwater to enter the screened portion of the sample chamber. Samples are retrieved using a decontaminated Teflon bailer or peristaltic pump.

1.3.3 Well Installation

Wells are typically constructed of threaded PVC casing and screen. No glues or cements are used in joining PVC components. Well diameter, slot sizes, and protective covers vary depending upon site-specific conditions or situation-specific requirements.

1.3.4 Well Development

Wells are developed by over-pumping or surging using appropriate pumps, blocks, or bailers. Through development, unwanted fine materials are removed from the natural formation surrounding the well. Well development will be performed no sooner than 24-hours after grouting is completed for the Type III wells. Water generated during development is containerized and properly disposed or is discharged onto the ground in proximity of the well in accordance with NCDENR requirements.

1.4 HYDROGEOLOGIC DATA COLLECTION

Data used to help characterize hydrogeologic conditions at a site are obtained through various procedures including, but not necessarily limited to, those described below:

1.4.1 Regional Geology

Information pertaining to the regional geologic framework is compiled from existing publications, maps, and scientific papers.

1.4.2 Site Geology

Shallow site geology is generally determined from field descriptions and borehole samples. Interpretations with regard to hydrogeologically important contacts, zones, fractures, faults, cleavage, and facies changes are made when possible.

1.4.3 Groundwater Occurrence and Characteristics

Groundwater data is obtained utilizing a number of methods and procedures, not limited to the general list below:

Well Water Levels

After well development, wells are allowed to stabilize for a minimum of 24 hours prior to measuring. Water level and free product thickness (where applicable) measurements are performed using an electronic interface probe or steel tape with water/product finding pastes.

The specific gravity of any accumulated product is determined and used to calculate true hydraulic grade from measured water levels. This information is combined with vertical survey data to determine relative potentiometric surface elevations for all wells.

Aquifer Testing

Various aquifer tests may be used to make determinations of hydraulic conductivity. Slug or pumping tests are often used to characterize site hydrogeologic conditions and to develop remedial action alternatives utilizing appropriate pumping technologies.

Other Methods

Other methods may be deemed appropriate for determining various groundwater characteristics. These other methods may include nested well configurations and/or clustered piezometer installations; sieve or pipette analysis; fracture trace analysis; computer modeling; and geophysical logging.

1.5 PETROLEUM HYDROCARBON DATA COLLECTION

1.5.1 Collection Methods

Petroleum hydrocarbon data is obtained through various methods including, but not limited to, the following:

Field Analysis

- Direct thickness measurement of phase separated components using tapes and/or probes.
- Manual vapor analysis using a photoionization detector (PID) or flame ionization detector (FID).
- Detectable odor and visual observation.

Laboratory Analysis

- Laboratory analysis of phase-separated products.

- Laboratory vapor, soil, and groundwater analysis using appropriate EPA Methods.

1.5.2 Field Sampling

Field sampling procedures are performed in accordance with recommended protocol, accepted industry standards, and under appropriate chain-of-custody procedures. Generally, sampling procedures are as follows:

Product Samples

Product samples are obtained using clean equipment and containers. Each is shipped to the analytical laboratory in protective containers.

Vapor Samples

PID/FID readings are measured from soil sample headspace using containerized samples that have been brought to ambient temperature.

Carbon tubes are utilized in conjunction with a laboratory-calibrated vacuum pump to obtain vapor samples. The carbon tubes are sealed and refrigerated for shipment to the analytical laboratory (This method is known as the Carbon Adsorption Method).

Soil Samples

Soil samples are immediately packed into clean containers, and refrigerated for shipment to the analytical laboratory.

Groundwater Samples

Groundwater samples are collected in accordance with the following procedures:

- Creeks/Lakes/Etc.

Grab samples are obtained.

- Domestic Wells

Wells are pumped for a time sufficient to completely purge the well and any pressure or holding tanks prior to sampling.

- Monitoring Wells

Water level measurements are made and well volumes calculated for each well.

Three well volumes are removed from each well using a thoroughly cleaned Teflon bailer or appropriate purging pump. If it is not possible to

remove three volumes, due to very low yields, a minimum of one volume is removed prior to obtaining a sample.

Where analysis for metals is required, wells are typically sampled utilizing low flow techniques, which reduce turbidity and the potential for matrix interference.

Samples are collected and containerized in a manner that minimizes agitation and contact with the air.

Sampling records are field prepared.

Samples are labeled and proper Chain-of-Custody documents are maintained.

Samples are promptly protectively packed, refrigerated, and shipped to the analytical laboratory for analysis.

2.0 DATA EVALUATION

Data obtained as a result of the site investigation is compiled and evaluated and a report is prepared for client review and distribution to the appropriate agencies. Generally, specific data are evaluated as follows:

- Background data are evaluated in context with the suspected or confirmed problem.
- Survey data are utilized to develop site maps and to evaluate contaminant receptors.
- Well construction records are compiled and presented as part of the report. As-built information is used in combination with other data to evaluate subsurface conditions and monitoring well screen settings as they relate to the investigation.
- Subsurface drilling logs are used to develop geologic cross-sections, fence diagrams, isopaths, structure contours, or other constructions. Regional geologic data are used to obtain an overall framework.
- Hydrogeologic data are used to develop contour maps, flow nets and other constructions. The data is also used to calculate various hydrogeologic parameters that describe aquifer characteristics.
- Hydrocarbon data are utilized to develop various plume geometry and isoconcentration maps.
- All data are compiled and utilized for making specific recommendations with regard to remedial action alternatives.

APPENDIX C

BORING LOGS, MONITORING WELL CONSTRUCTION DETAILS, AND NORTH CAROLINA WELL CONSTRUCTION RECORDS

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

206-111
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 206-111	STATE: N.C.	COUNTY: Onslow	LOCATION: MCB Camp Geiger
PROJECT NAME: TC-341 Pipeline		LOGGED BY: Tom Stetler	WELL ID: USTG480-MW19
NORTHING: 3846898.0	EASTING: 275461.5	DRILLER: John E. Wood, III	
SYSTEM: UTM NAD83 (m)		CREW: Roger Caulder	
BORING LOCATION: In grass North of 3rd St.		T.O.C. ELEV.: 14.89	
DRILL MACHINE: Diedrich D-50	METHOD: H.S. Augers	0 HOUR DTW: 7.3	TOTAL DEPTH: 15.0
START DATE: 11/6/08	FINISH DATE: 11/6/08	24 HOUR DTW: 6.6	WELL DEPTH: 15.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	SOIL AND ROCK DESCRIPTION		ELEVATION	WELL DETAIL
	6in	6in	6in	6in					DEPTH			
									0.0	LAND SURFACE	15.1	0.0
1.0					33.8		CL		1.0		14.1	-0.2
3.0					41.9		SC/CL		3.0	Brown to lt. brown, f. SANDY CLAY. Low plasticity. Moist. No HCO.	12.1	1.0
									5.0	Same as above, but increasing sand content with depth. Moist. No HCO. Tr. orange-brown mottling.	10.1	3.0
8.0					30.5		SC/SM		8.0		7.1	4.7
									10.0	Lt. grayish brown, SILTY to CLAYEY vf. SAND. Wet. No HCO. Soft at top of interval.	5.1	2" Slot .010 Sch. 40 PVC
13.0					38.0		SP		13.0		2.1	
									15.0	Orange-brown, f. SAND. Tr. silt. Saturated. No HCO.	0.1	14.7
										Boring Terminated at Elevation 0.1 ft	15.0	15.0

Portland Cement

Bentonite Pellets

#2 Medium Sand

CATLIN BORING LOG 206-111 TC-341 G.P.I. CATLIN GDT 3/10/08

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS
206-111
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 206-111	STATE: N.C.	COUNTY: Onslow	LOCATION: MCB Camp Geiger
PROJECT NAME: TC-341 Pipeline	LOGGED BY: Tom Stetler	WELL ID: USTG480-MW20	
NORTHING: 3846811.2	EASTING: 275512.5	DRILLER: John E. Wood, III	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: Inside G-480 compound, rear of bldg	CREW: Roger Caulder	
DRILL MACHINE: Diedrich D-50	METHOD: H.S. Augers	0 HOUR DTW: 7.4	T.O.C. ELEV.: 14.99
START DATE: 11/6/08	FINISH DATE: 11/6/08	24 HOUR DTW:	TOTAL DEPTH: 15.0
			WELL DEPTH: 15.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U	S	C	S	L	O	G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in													
														0.0	LAND SURFACE	15.3	0.0
														0.2	ASPHALT	15.1	- 0.3
1.0														1.0		14.3	
					35.9	*MW20 (1-3)	SM							2.0	Brown, SILTY vf. SAND. Tr. clay. Moist. No HCO.	13.3	1.5
3.0							CL							4.0	Brown to orange-brown, SILTY to vf. SANDY CLAY. Low plasticity. Slight HCO.	11.3	3.0
					228		SM							5.0	Brown, SILTY vf. SAND. Moist. Strong HCO.	10.3	4.7
8.0														8.0		7.3	
					275		SP/SC							10.0	Gray, CLAYEY med. to vf. SAND. Mod. HCO. Mod. grading. Moist with product?	5.3	2" Sct 010 Sch 40 PVC
13.0														13.0		2.3	
					377		SP							15.0	Gray to orange-brown with depth, vf. SAND. Uniform. Poorly graded. Saturated. Mod. HCO.	0.3	14.7 15.0
															Boring Terminated at Elevation 0.3 ft * = Sample prefaced with "USTG480-"		15.0

CATLIN BORING LOG 206-111 TC-341 G&I CATLIN.GDI 3/10/09



Portland Cement



Bentonite Pellets



#2 Medium Sand

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS

206-111
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 206-111	STATE: N.C.	COUNTY: Onslow	LOCATION: MCB Camp Geiger
PROJECT NAME: TC-341 Pipeline	LOGGED BY: Tom Stetler	WELL ID: USTG480-MW21	
	DRILLER: John E. Wood, III		
NORTHING: 3846934.0	EASTING: 275662.9	CREW: Roger Caulder	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: In woods East of Hwy 17 Bypass	T.O.C. ELEV.: 7.79	
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: 3.0	TOTAL DEPTH: 6.0
START DATE: 11/5/08	FINISH DATE: 11/5/08	24 HOUR DTW: 3.7	WELL DEPTH: 6.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in									
0.0					25.1		SM		0.0	LAND SURFACE	5.4	2.4
									0.3	TOPSOIL and organic debris at surface.	5.1	0.0
									1.0	Brown to lt. brown, SILTY f. SAND. Moist.	4.4	0.3
2.0					23.7		CH/PT			Dark brown, SILTY to vf. SANDY CLAY with root fragments. Mod. to high organic content. Strong organic odor. Saturated at approximately 1.5' BLS.		0.7
									4.0		1.4	2" Slot 010 Sch. 40 PVC
4.0					NM		CH/PT			No return. Assume same as above.		2" Slot 010 Sch. 40 PVC
									6.0		-0.6	5.7
										Boring Terminated at Elevation -0.6 ft		6.0



Portland Cement



Bentonite Pellets



#2 Medium Sand

CATLIN BORING LOG 206-111 TC-341.GPJ CATLIN.GDT 3/10/08

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS
206-111
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 206-111	STATE: N.C.	COUNTY: Onslow	LOCATION: MCB Camp Geiger
PROJECT NAME: TC-341 Pipeline		LOGGED BY: Tom Stetler	WELL ID: USTG480-MW22
NORTHING: 3846979.2		EASTING: 275600.6	CREW: Roger Caulder
SYSTEM: UTM NAD83 (m)		BORING LOCATION: In woods East of Hwy 17 Bypass	T.O.C. ELEV.: 10.85
DRILL MACHINE: Hand Auger		METHOD: Hand Auger	0 HOUR DTW: 4.7
START DATE: 11/3/08		FINISH DATE: 11/6/08	24 HOUR DTW: 4.5
			TOTAL DEPTH: 7.5
			WELL DEPTH: 6.5

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
0.0					26.1				0.0	LAND SURFACE	8.8	2.1
									1.0	TOPSOIL and organic debris at surface.	7.8	0.3
2.0					40.9		SM		4.0	Lt. brown, SILTY vf. SAND. Moist. No odor. Tr. root fragments. Decreasing silt content and tr. med. sand with depth.	4.8	1.2
4.0					38.6		SC		5.0	Lt. brown, SILTY to CLAYEY cse. to vf. SAND. Well graded. Wet. No odor.	3.8	2" Std. 40 PVC
6.0					32.8		SP/SM		7.5	Lt. brown, f. to vf. SAND. Tr. silt. Saturated at 5' BLS. No odor. Refusal on hard layering at base of interval (white quartzite gravels in last bucket).	1.3	6.2
										Boring Terminated at Elevation 1.3 ft		6.5

Portland Cement
 Bentonite Pellets
 #2 Medium Sand

CATLIN BORING LOG 206-111 TC-341.GPJ CATLIN.GDT 3/10/09

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

206-111
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 206-111 STATE: N.C. COUNTY: Onslow LOCATION: MCB Camp Geiger
PROJECT NAME: TC-341 Pipeline LOGGED BY: Tom Stetler WELL ID: USTG480-MW23
NORTHING: 3846806.7 EASTING: 275486.2 DRILLER: Bobbie D. Fowler
SYSTEM: UTM NAD83 (m) BORING LOCATION: Corner of excavated area. T.O.C. ELEV.: 14.83
DRILL MACHINE: Diedrich D-50 METHOD: H.S. Augers 0 HOUR DTW: 6.0 TOTAL DEPTH: 15.0
START DATE: 11/17/08 FINISH DATE: 11/17/08 24 HOUR DTW: 6.1 WELL DEPTH: 15.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	SOIL AND ROCK		WELL DETAIL
	6in	6in	6in	6in					DEPTH	DESCRIPTION	
									0.0	LAND SURFACE	15.3
1.0					537.1		SM		1.0	Brown to gray, SILTY vf. SAND. Moist. No HCO.	14.3
3.0					1972		CL		2.0		13.3
									4.0	Brown to orange-brown, SILTY CLAY. Mod to low plasticity. Moist. Soft. Mottled. No HCO.	11.3
							SM		5.0	Gray, SILTY vf. SAND. Tr. clay. Wet at base of interval. Mod. HCO.	10.3
8.0					1503		CL		8.0		7.3
									10.0	Orange-brown to gray, mottled, low plasticity, SILTY CLAY. Moist. Strong HCO at top of interval.	5.3
13.0					236.3		SP		13.0		2.3
									15.0	Gray, f to vf. SAND. Tr. silt. Saturated. Slight HCO.	0.3
										Boring Terminated at Elevation 0.3 ft	



Portland Cement



Bentonite Pellets



#2 Medium Sand

CATLIN BORING LOG 206-111 TC-341 G.P.I. CATLIN GDT 3/10/09



Non RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR CERTIFICATION #: 2799

1. WELL CONTRACTOR:

John E. Wood, III

Well Contractor (Individual) Name

CATLIN Engineers and Scientists

Well Contractor Company Name

STREET ADDRESS 220 Old Dairy Road

Wilmington North Carolina 28405

City or Town State Zip Code

(910) - 452-5861

Area code - Phone number

2. WELL INFORMATION

SITE WELL ID #(if applicable): USTG480- MW19

STATE WELL PERMIT #(if applicable): N/A

DWQ or OTHER PERMIT # (if applicable): N/A

WELL USE (Check Applicable Box): Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use):

DATE DRILLED: 11/06/2008

TIME COMPLETED: 17:00 AM ☐ PM ☒

3. WELL LOCATION:

CITY: MCB Camp Geiger COUNTY: Onslow

2nd & F Street, 28540

(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING

Slope ☐ Valley ☐ Flat ☒ Ridge ☐ Other: _____

NORTHING: 3,846,898.0

EASTING: 275,461.5

UTM NAD83 (m)

May be in degrees, minutes, seconds, or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topo. map

(Location of well must be shown on a USGS topo map and attached to this form if not using a GPS.)

4. FACILITY - is the name of the business where the well is located.

FACILITY ID #(if applicable) N/A

NAME OF FACILITY: Pipeline near Building G-480

STREET ADDRESS: 2nd & F Street

MCB Camp Geiger NC 28540

City or Town State Zip Code

CONTACT PERSON: Dr. Johanna Arnold

STREET ADDRESS: Attn: I&E/ EMD/ EQB/ PSC Box 20004

Camp Lejeune NC 28542-0004

City or Town State Zip Code

(910)- 451-9017

Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 15

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: 6.64 FT.

(Use "+" if Above Top of Casing)

d. TOP OF CASING IS -0.17 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C.0118

e. YIELD (gpm): N/A METHOD OF TEST: N/A

f. DISINFECTION: Type N/A Amount: N/A

g. WATER ZONES (depth):

From _____ To _____ From _____ To _____

From _____ To _____ From _____ To _____

From _____ To _____ From _____ To _____

6. CASING:

Depth	Diameter	Thickness/Weight	Material
From 0.17 To 4.7 ft.	2"	Sch. 40	PVC
From _____ To _____ ft.	"		
From _____ To _____ ft.	"		

7. GROUT:

Depth	Material	Method
From 0 To 1 Ft.	Portland Cement	Surface Pour
From 1 To 3 Ft.	Bent. Pellets	Surface Pour
From _____ To _____ Ft.		

8. SCREEN:

Depth	Diameter	Slot Size	Material
From 4.7 To 14.7 Ft.	2 in.	Slot .010in.	PVC
From _____ To _____ Ft.	in.	in.	
From _____ To _____ Ft.	in.	in.	

9. SAND/GRAVEL PACK:

Depth	Size	Material
From 3 To 15 Ft.	#2 Medium	Torpedo Sand
From _____ To _____ Ft.		
From _____ To _____ Ft.		

10. DRILLING LOG

From To Formation Description

SEE ATTACHED

11. REMARKS:

Permanent Type II Flush Mount.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR

DATE

John E. Wood, III

PRINTED NAME OF PERSON CONSTRUCTING THE WELL



Non RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR CERTIFICATION #: 2799

1. WELL CONTRACTOR:

John E. Wood, III

Well Contractor (Individual) Name

CATLIN Engineers and Scientists

Well Contractor Company Name

STREET ADDRESS 220 Old Dairy Road

Wilmington North Carolina 28405

City or Town State Zip Code

(910) - 452-5861

Area code - Phone number

2. WELL INFORMATION

SITE WELL ID #(if applicable): USTG480- MW20

STATE WELL PERMIT #(if applicable): N/A

DWQ or OTHER PERMIT # (if applicable): N/A

WELL USE (Check Applicable Box): Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use):

DATE DRILLED: 11/06/2008

TIME COMPLETED: 17:00 AM ☐ PM ☒

3. WELL LOCATION:

CITY: MCB Camp Geiger COUNTY: Onslow

2nd & F Street, 28540

(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING

Slope ☐ Valley ☐ Flat ☒ Ridge ☐ Other: _____

NORTHING: 3,846,811.2

EASTING: 275,512.5

UTM NAD83 (m)

May be in degrees, minutes, seconds, or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topo. map

(Location of well must be shown on a USGS topo map and attached to this form if not using a GPS.)

4. FACILITY - is the name of the business where the well is located.

FACILITY ID #(if applicable) N/A

NAME OF FACILITY: Pipeline near Building G-480

STREET ADDRESS: 2nd & F Street

MCB Camp Geiger NC 28540

City or Town State Zip Code

CONTACT PERSON: Dr. Johanna Arnold

STREET ADDRESS: Attn: I&E/ EMD/ EQB/ PSC Box 20004

Camp Lejeune NC 28542-0004

City or Town State Zip Code

(910)- 451-9017

Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 15

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: 7.40 FT.

(Use "+" if Above Top of Casing)

d. TOP OF CASING IS -0.31 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C.0118

e. YIELD (gpm): N/A METHOD OF TEST: N/A

f. DISINFECTION: Type N/A Amount: N/A

g. WATER ZONES (depth):

From _____ To _____ From _____ To _____

From _____ To _____ From _____ To _____

From _____ To _____ From _____ To _____

6. CASING:

From	To	Depth	Diameter	Thickness/Weight	Material
From 0.31	To 4.7	ft.	2"	Sch. 40	PVC
From _____	To _____	ft.	"		
From _____	To _____	ft.	"		

7. GROUT:

From	To	Depth	Material	Method
From 0	To 1.5	Ft.	Portland Cement	Surface Pour
From 1.5	To 3	Ft.	Bent. Pellets	Surface Pour
From _____	To _____	Ft.		

8. SCREEN:

From	To	Depth	Diameter	Slot Size	Material
From 4.7	To 14.7	Ft.	2 in.	Slot .010in.	PVC
From _____	To _____	Ft.	in.	in.	
From _____	To _____	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

From	To	Depth	Size	Material
From 3	To 15	Ft.	#2 Medium	Torpedo Sand
From _____	To _____	Ft.		
From _____	To _____	Ft.		

10. DRILLING LOG

From To Formation Description

SEE ATTACHED

11. REMARKS:

Permanent Type II Flush Mount.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR

DATE

John E. Wood, III

PRINTED NAME OF PERSON CONSTRUCTING THE WELL



Non RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR CERTIFICATION #: 2799

1. WELL CONTRACTOR:

John E. Wood, III
Well Contractor (Individual) Name
CATLIN Engineers and Scientists
Well Contractor Company Name
STREET ADDRESS 220 Old Dairy Road
Wilmington North Carolina 28405
City or Town State Zip Code
(910) - 452-5861
Area code - Phone number

2. WELL INFORMATION

SITE WELL ID #(if applicable): USTG480- MW21
STATE WELL PERMIT #(if applicable): N/A
DWQ or OTHER PERMIT # (if applicable): N/A
WELL USE (Check Applicable Box): Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use):
DATE DRILLED: 11/05/2008
TIME COMPLETED: 17:00 AM ☐ PM ☒

3. WELL LOCATION:

CITY: MCB Camp Geiger COUNTY: Onslow
2nd & F Street, 28540
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING
Slope ☐ Valley ☐ Flat ☒ Ridge ☐ Other: _____

NORTHING: 3,846,934.0
EASTING: 275,662.9
UTM NAD83 (m)

May be in degrees, minutes, seconds, or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topo. map
(Location of well must be shown on a USGS topo map and attached to this form if not using a GPS.)

4. FACILITY - is the name of the business where the well is located.

FACILITY ID #(if applicable) N/A
NAME OF FACILITY: Pipeline near Building G-480
STREET ADDRESS: 2nd & F Street
MCB Camp Geiger NC 28540
City or Town State Zip Code
CONTACT PERSON: Dr. Johanna Arnold
STREET ADDRESS: Attn: I&E/ EMD/ EQB/ PSC Box 20004
Camp Lejeune NC 28542-0004
City or Town State Zip Code
(910)- 451-9017
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 6
b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
c. WATER LEVEL Below Top of Casing: 3.73 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 2.42 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C.0118

e. YIELD (gpm): N/A METHOD OF TEST: N/A

f. DISINFECTION: Type N/A Amount: N/A

g. WATER ZONES (depth):

From _____ To _____ From _____ To _____
From _____ To _____ From _____ To _____
From _____ To _____ From _____ To _____

6. CASING:

Depth	Diameter	Thickness/Weight	Material
From 0 To 0.7 ft.	2"	Sch. 40	PVC
From _____ To _____ ft.	"		
From _____ To _____ ft.	"		

7. GROUT:

Depth	Material	Method
From 0 To 0.25 Ft.	Portland Cement	Surface Pour
From 0.25 To 0.5 Ft.	Bent. Pellets	Surface Pour
From _____ To _____ Ft.		

8. SCREEN:

Depth	Diameter	Slot Size	Material
From 0.7 To 5.7 Ft.	2 in.	Slot .010in.	PVC
From _____ To _____ Ft.	in.	in.	
From _____ To _____ Ft.	in.	in.	

9. SAND/GRAVEL PACK:

Depth	Size	Material
From 0.5 To 6 Ft.	#2 Medium	Torpedo Sand
From _____ To _____ Ft.		
From _____ To _____ Ft.		

10. DRILLING LOG

From To Formation Description

SEE ATTACHED

11. REMARKS:

Permanent Type II
Stick-up.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

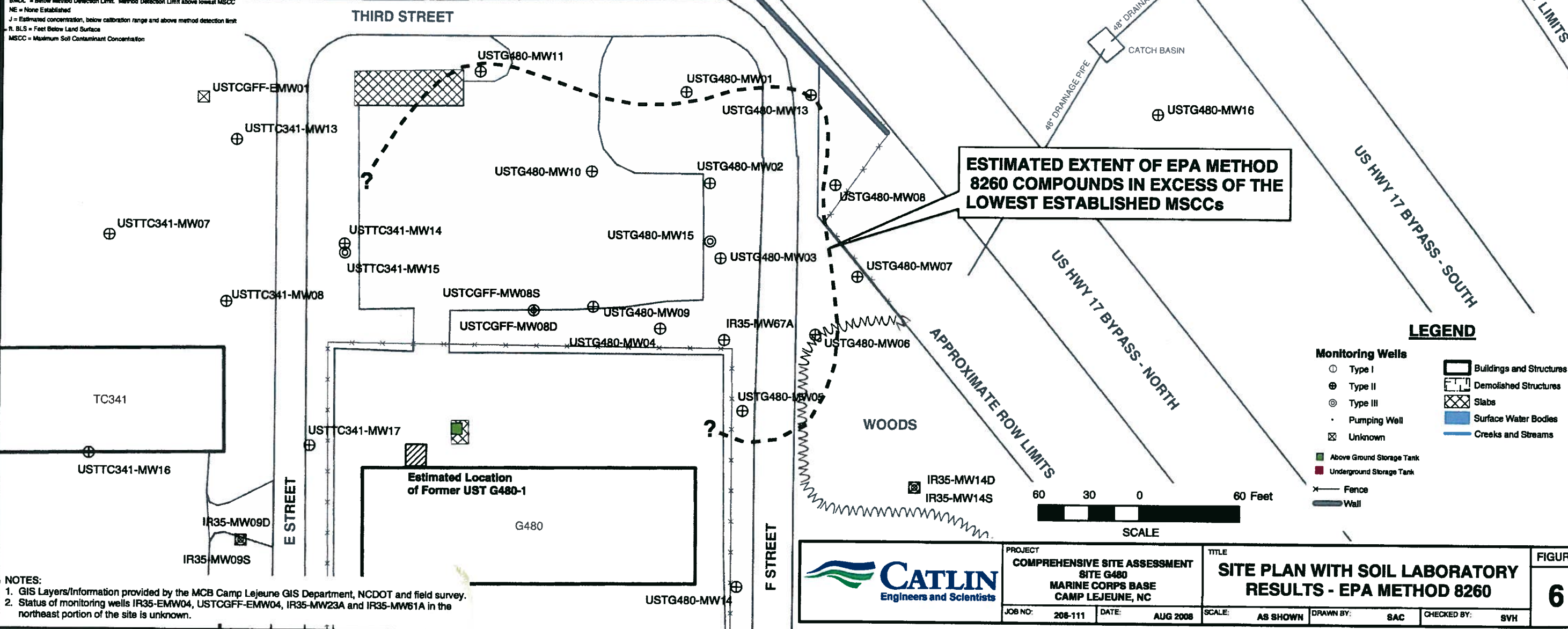
John E. Wood, III

PRINTED NAME OF PERSON CONSTRUCTING THE WELL

APPENDIX D
SELECTED FIGURES FROM PREVIOUS REPORTS

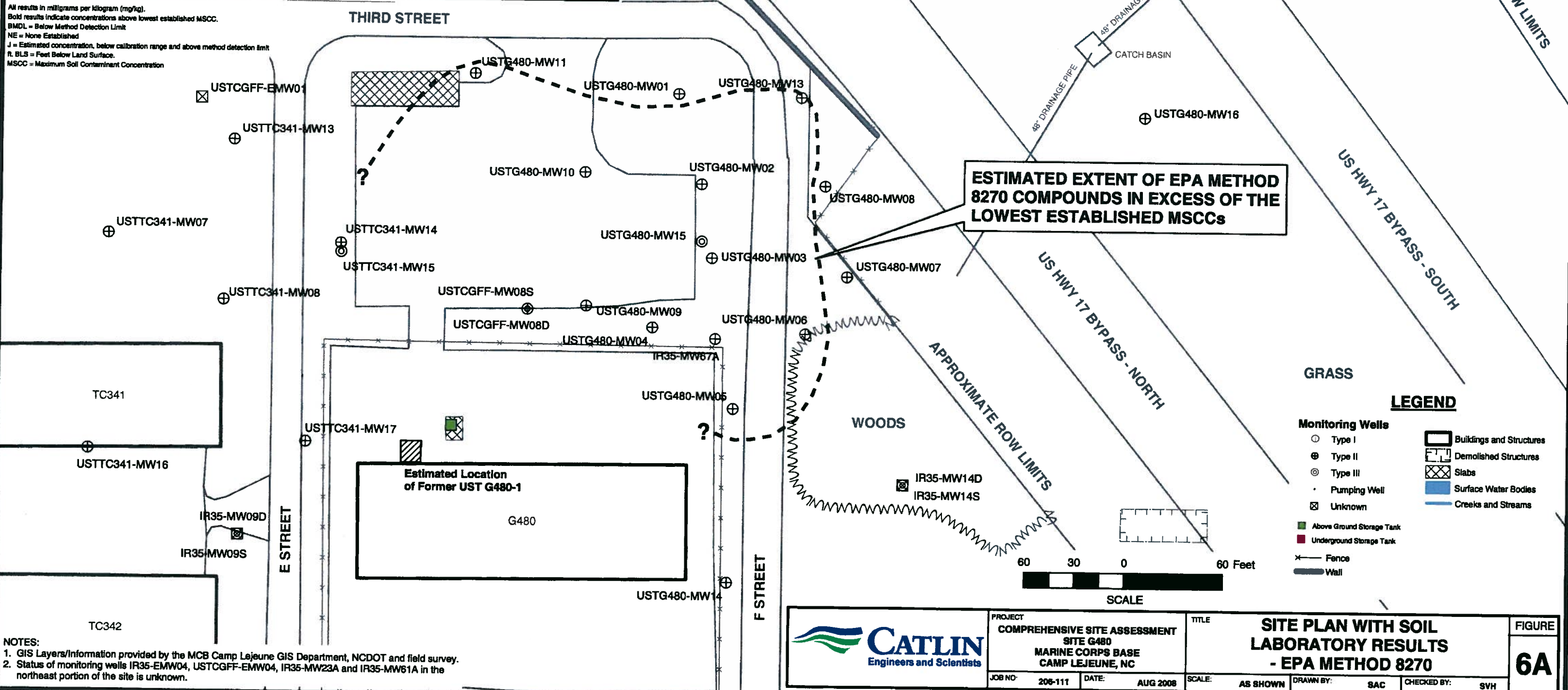
Sample ID	Contaminant of Concern		Acetone	Benzene	Bromomethane	2-Butanone	n-Butylbenzene	sec-Butylbenzene	Chloromethane	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Methylene chloride	Naphthalene	n-Propylbenzene	Toluene	1,2,3-Trichlorobenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Total Xylenes	All Other EPA Method 8260 Analytes
	Date Collected	Sample Depth (ft. BLS)																			
Residential MSCC (mg/kg)			1,564	18	NE	NE	626	626	49	1,560	1,564	NE	85	313	626	3,200	NE	782	782	3,129	Varies
Industrial/Commercial MSCC (mg/kg)			40,880	164	NE	NE	16,350	16,350	440	40,000	40,880	NE	763	8,176	16,350	82,000	NE	20,440	20,440	81,760	Varies
STGW MSCC (mg/kg)			2.8	0.0066	NE	NE	4.3	3.3	0.02	4.6	1.7	NE	0.02	0.58	1.7	7.3	NE	7.5	7.3	5	Varies
USTG480-MW01 (0-2)	7/3/2007	0-2	0.141	BMDL	BMDL	0.00806 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW02 (3-5)	5/22/2007	3-5	BMDL	BMDL	BMDL	BMDL	0.761	0.309	0.0907 J	0.293	0.253	0.29	BMDL	1.19	0.516	BMDL	BMDL	1.09	0.781	0.2136 J	BMDL
USTG480-MW02 (3-5) DUP	5/22/2007	3-5	BMDL	BMDL	BMDL	BMDL	1.33	0.480	0.0751 J	0.319	0.339	0.425	BMDL	1.92	0.737	BMDL	BMDL	3.03	1.19	0.2293 J	BMDL
USTG480-MW03 (4-6)	5/16/2007	4-6	BMDL	BMDL	BMDL	BMDL	6.67	2.61	0.385 J	4.07	2.49	2.05	BMDL	12.5	4.44	BMDL	BMDL	12.6	2.42	2.89	BMDL
USTG480-MW04 (4-6)	5/16/2007	4-6	0.582 J	BMDL	BMDL	BMDL	0.646	0.268	0.225	0.237	0.344	0.483	BMDL	1.11	0.412	BMDL	BMDL	0.180 J	BMDL	BMDL	BMDL
USTG480-MW05 (4-6)	5/16/2007	4-6	1.48 J	BMDL	BMDL	BMDL	7.49	4.12	0.602 J	3.11	3.75	2.59	BMDL	12.9	7.82	BMDL	BMDL	7.82	1.77	0.817 J	BMDL
USTG480-MW06 (4-6)	5/16/2007	4-6	BMDL	BMDL	BMDL	BMDL	8.61	2.64	0.629 J	4.98	2.73	3.12	BMDL	18.6	4.54	BMDL	BMDL	21.4	7.34	4.86	BMDL
USTG480-MW07 (0-2)	7/5/2007	0-2	0.0183 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	0.00289 J	0.0113 J	BMDL	BMDL
USTG480-MW08 (3-5)	7/5/2007	3-5	0.0330 J	0.00305 J	BMDL	0.00887 J	BMDL	BMDL	BMDL	0.0204	0.0029 J	0.0317	BMDL	BMDL	0.00881	BMDL	BMDL	0.00289 J	0.0113 J	BMDL	BMDL
USTG480-MW09 (4-6)	7/3/2007	4-6	BMDL	BMDL	BMDL	BMDL	6.61	2.75	BMDL	5.30	2.77	2.21	BMDL	17.9	6.87	BMDL	BMDL	22.1	7.37	4.529 J	BMDL
USTG480-MW10 (3-5)	7/5/2007	3-5	BMDL	0.0048 J	BMDL	BMDL	2.96	1.07	BMDL	2.09	0.996	1.26	BMDL	4.66	2.21	BMDL	BMDL	0.542	3.33	0.6465	BMDL
USTG480-MW11 (3-5)	7/10/2007	3-5	0.186 J	BMDL	BMDL	BMDL	0.295	0.168	BMDL	0.0184 J	0.0516 J	0.0469 J	0.282 J	0.13	0.0126 J	0.0376 J	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW12 (3-5)	7/11/2007	3-5	0.0181 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13 (3-5)	7/11/2007	3-5	0.167 J	0.00935 J	0.0088 J	BMDL	0.529	0.199	BMDL	0.276	0.152	0.412	0.207 J	0.630	0.314	BMDL	BMDL	1.22	0.394	0.1862 J	BMDL
USTG480-MW14 (3-5)	7/11/2007	3-5	0.0141 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15 (2-4)	7/10/2007	2-4	0.0240 J	BMDL	BMDL	0.00391 J	BMDL	BMDL	BMDL	0.00295 J	BMDL	0.00814	BMDL	0.00385 J	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL

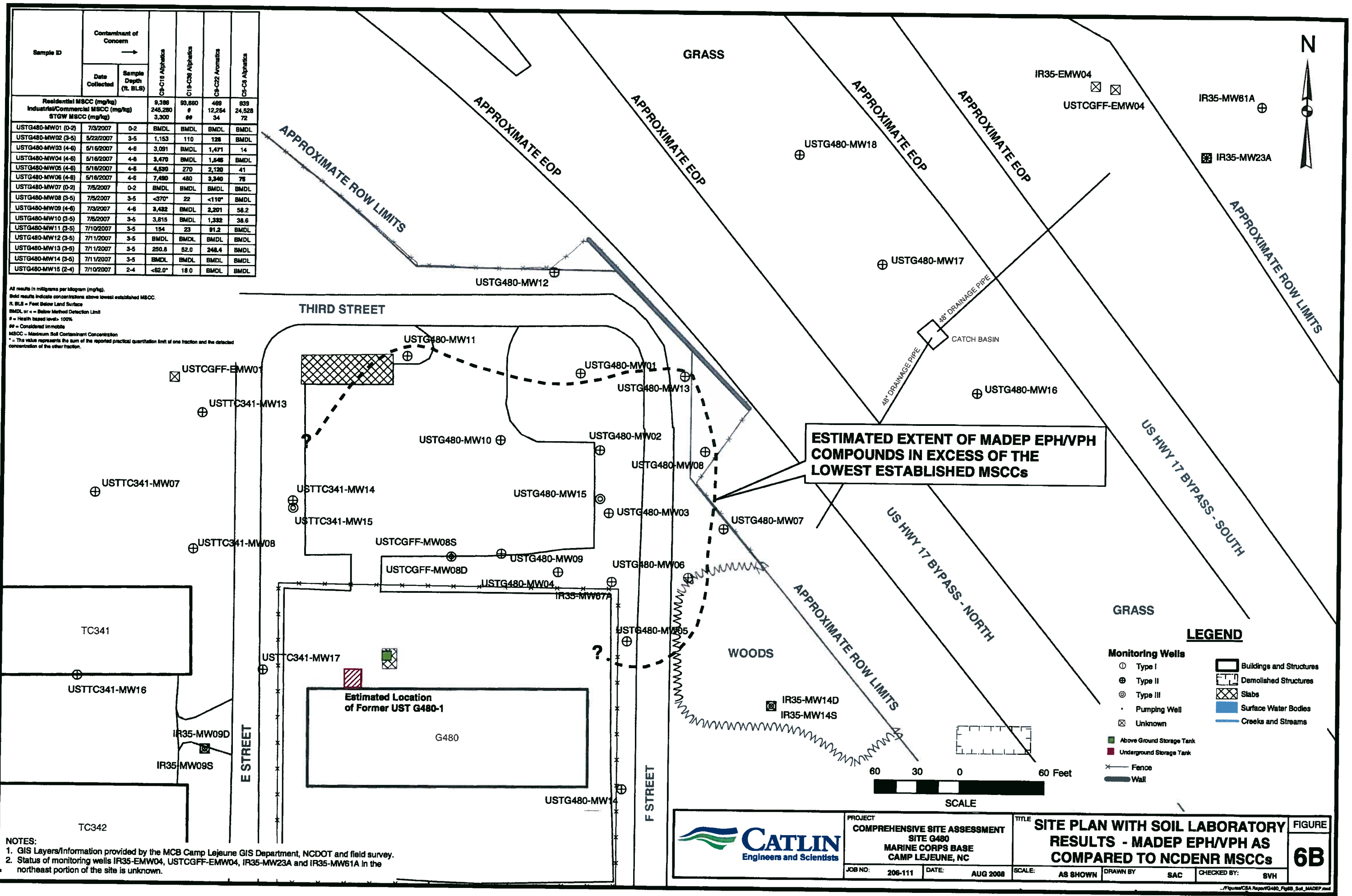
All results in milligrams per kilogram (mg/kg).
 Bold results indicate reportable concentrations or concentrations above lowest established MSCC.
 BMDL or < = Below Method Detection Limit
 BMDL = Below Method Detection Limit. Method Detection Limit above lowest MSCC
 NE = None Established
 J = Estimated concentration, below calibration range and above method detection limit
 ft. BLS = Feet Below Land Surface
 MSCC = Maximum Soil Contaminant Concentration

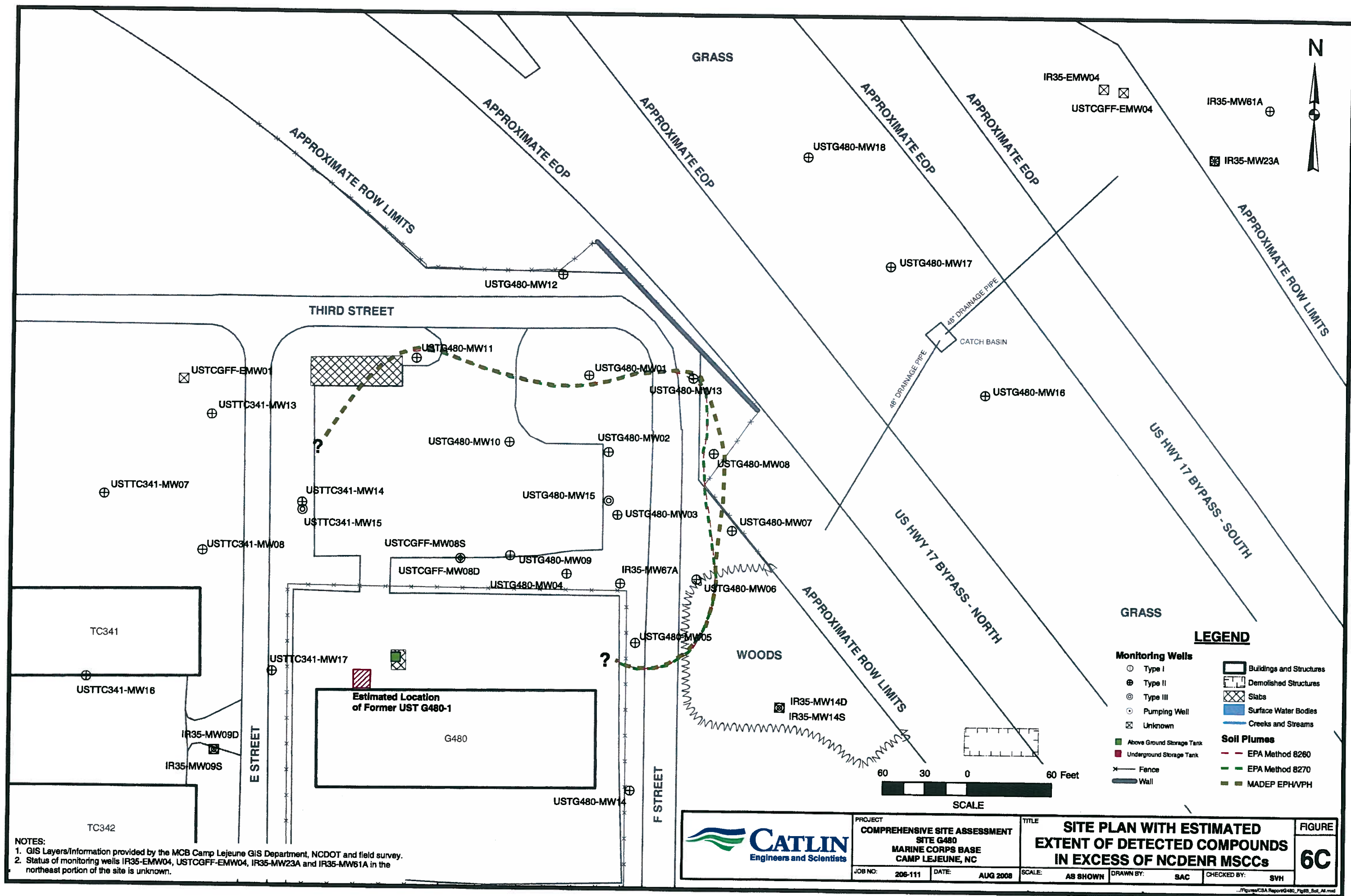


Sample ID	Contaminant of Concern		Date Collected	Sample Depth (ft. BLS)	Asenaphthene	Anthracene	Dibenzofuran	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other EPA Method 8270 Analytes
	Residential MSCC (mg/kg)	Industrial/Commercial MSCC (mg/kg)											
	940	4,600											Varies
	24,000	122,000											Varies
	8.2	1,000											Varies
USTG480-MW01 (0-2)	7/3/2007	0-2	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW02 (3-5)	5/22/2007	3-5	BMDL	BMDL	0.222 J	0.179 J	4.68	1.37	0.300 J	0.0880 J	BMDL	BMDL	BMDL
USTG480-MW03 (4-6)	5/18/2007	4-6	BMDL	1.44 J	3.89 J	3.69 J	56.3	12	9.71	BMDL	BMDL	BMDL	BMDL
USTG480-MW04 (4-6)	5/16/2007	4-6	1.90 J	9.03	4.14 J	4.42 J	56.1	8.56	8.76	BMDL	BMDL	BMDL	BMDL
USTG480-MW05 (4-6)	5/16/2007	4-6	5.36 J	4.43 J	9.36	10.4	116	24.8	22.7	BMDL	BMDL	BMDL	BMDL
USTG480-MW06 (4-6)	5/16/2007	4-6	2.63 J	2.02 J	5.39 J	5.73 J	75.0	19.8	11.3	BMDL	BMDL	BMDL	BMDL
USTG480-MW07 (0-2)	7/5/2007	0-2	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW08 (3-5)	7/5/2007	3-5	0.060 J	BMDL	BMDL	0.088 J	BMDL	BMDL	0.120 J	BMDL	BMDL	BMDL	BMDL
USTG480-MW09 (4-6)	7/3/2007	4-6	2.84 J	1.45 J	5.48 J	5.88 J	75.2	13.9	11.9	BMDL	BMDL	BMDL	BMDL
USTG480-MW10 (3-5)	7/5/2007	3-5	1.72 J	1.08 J	3.64	4.01	50.9	8.33	6.47	BMDL	BMDL	BMDL	BMDL
USTG480-MW11 (3-5)	7/10/2007	3-5	0.135 J	0.124 J	0.280 J	0.328 J	1.83	0.200 J	0.781	BMDL	BMDL	BMDL	BMDL
USTG480-MW12 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW13 (3-5)	7/11/2007	3-5	BMDL	0.162 J	0.351	0.439	3.63	0.547	0.882	BMDL	BMDL	BMDL	BMDL
USTG480-MW14 (3-5)	7/11/2007	3-5	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
USTG480-MW15 (2-4)	7/10/2007	2-4	BMDL	BMDL	BMDL	0.053 J	0.194 J	BMDL	0.113 J	BMDL	BMDL	BMDL	BMDL

All results in milligrams per kilogram (mg/kg).
 Bold results indicate concentrations above lowest established MSCC.
 BMDL = Below Method Detection Limit
 NE = None Established
 J = Estimated concentration, below calibration range and above method detection limit
 ft. BLS = Feet Below Land Surface
 MSCC = Maximum Soil Contaminant Concentration

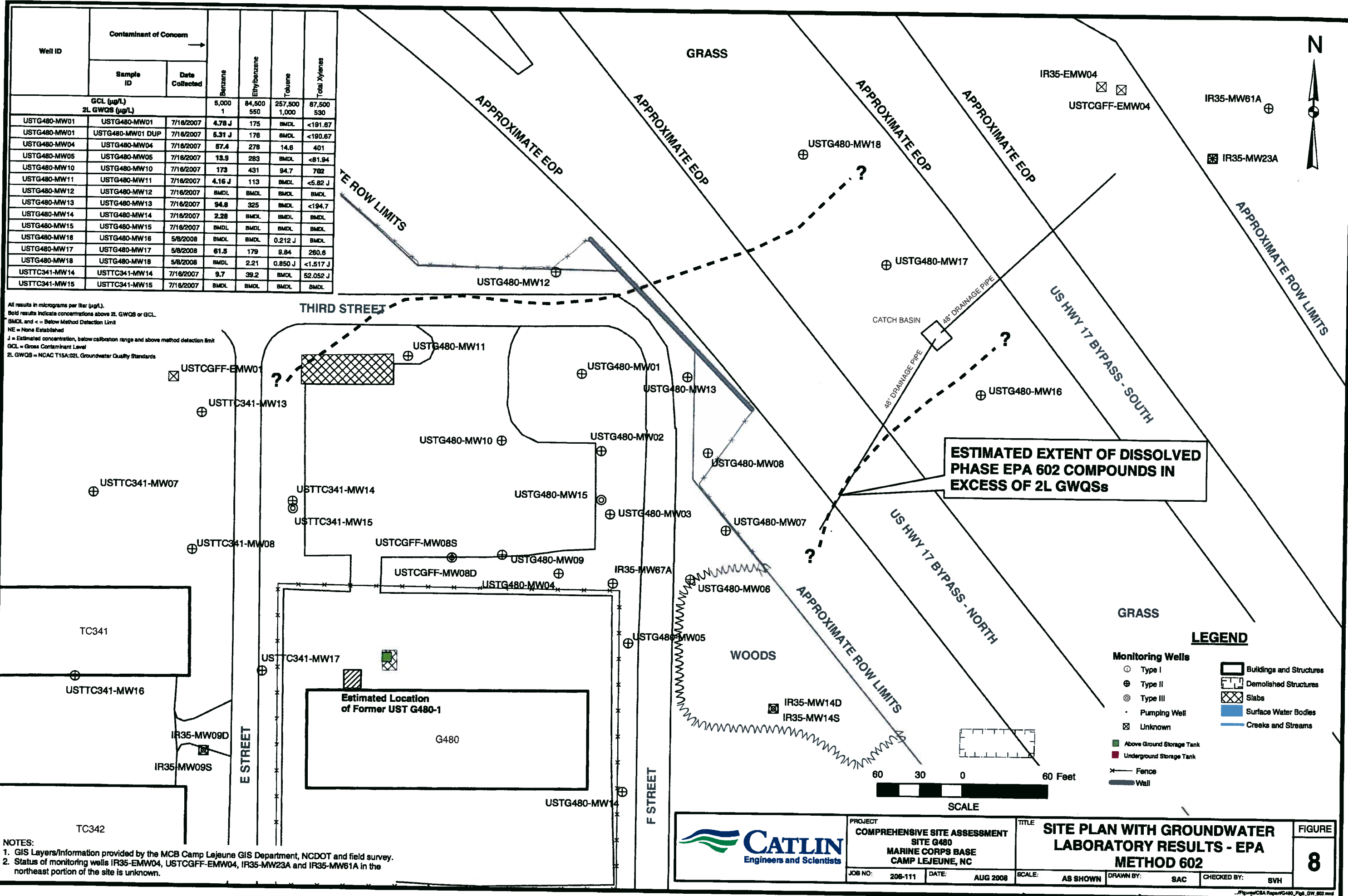






Well ID	Contaminant of Concern		Benzene	Ethylbenzene	Toluene	Total Xylenes
	Sample ID	Date Collected				
	GCL (µg/L) 2L GWQS (µg/L)		5,000 1	84,500 550	257,500 1,000	87,500 530
USTG480-MW01	USTG480-MW01	7/18/2007	4.78 J	175	BMDL	<191.87
USTG480-MW01	USTG480-MW01 DUP	7/18/2007	5.31 J	178	BMDL	<190.67
USTG480-MW04	USTG480-MW04	7/18/2007	57.4	278	14.6	401
USTG480-MW05	USTG480-MW05	7/18/2007	13.9	283	BMDL	<81.94
USTG480-MW10	USTG480-MW10	7/18/2007	173	431	94.7	702
USTG480-MW11	USTG480-MW11	7/18/2007	4.16 J	113	BMDL	<5.82 J
USTG480-MW12	USTG480-MW12	7/18/2007	BMDL	BMDL	BMDL	BMDL
USTG480-MW13	USTG480-MW13	7/18/2007	94.8	325	BMDL	<194.7
USTG480-MW14	USTG480-MW14	7/18/2007	2.28	BMDL	BMDL	BMDL
USTG480-MW15	USTG480-MW15	7/18/2007	BMDL	BMDL	BMDL	BMDL
USTG480-MW16	USTG480-MW16	5/8/2008	BMDL	BMDL	0.212 J	BMDL
USTG480-MW17	USTG480-MW17	5/8/2008	61.5	179	9.84	260.8
USTG480-MW18	USTG480-MW18	5/8/2008	BMDL	2.21	0.850 J	<1.517 J
USTTC341-MW14	USTTC341-MW14	7/18/2007	9.7	39.2	BMDL	52.052 J
USTTC341-MW15	USTTC341-MW15	7/18/2007	BMDL	BMDL	BMDL	BMDL

All results in micrograms per liter (µg/L).
 Bold results indicate concentrations above 2L GWQS or GCL.
 BMDL and < = Below Method Detection Limit.
 NE = None Established
 J = Estimated concentration, below calibration range and above method detection limit.
 GCL = Gross Contaminant Level
 2L GWQS = NCAC T15A-02L Groundwater Quality Standards



PROJECT
COMPREHENSIVE SITE ASSESSMENT
 SITE G480
 MARINE CORPS BASE
 CAMP LEJEUNE, NC

JOB NO: 208-111 DATE: AUG 2008

TITLE
**SITE PLAN WITH GROUNDWATER
 LABORATORY RESULTS - EPA
 METHOD 602**

SCALE: AS SHOWN DRAWN BY: SAC CHECKED BY: BVH

