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January 28, 2005

Mr. Don Hwang  
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1131 Harbor Bay Parkway, Suite 250  
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Alameda County  
FEB 08 2005  
Environmental Health

Re: **Document Transmittal**  
Fuel Leak Case  
76 Station #1156  
4276 MacArthur  
Oakland, CA

Dear Mr. Hwang:

Please find attached Miller Brook's *Corrective Action Plan*, dated 1/28/05 for the referenced site. I declare, under penalty of perjury, that to the best of my knowledge the information and/or recommendations contained in the attached proposal or report is true and correct.

If you have any questions or need additional information, please call me at (916) 558-7666.

Sincerely,

Thomas H. Kosel  
Site Manger, Risk Management and Remediation  
ConocoPhillips  
76 Broadway, Sacramento, CA 95818

Attachment

cc: Jed Douglas, MB

**CORRECTIVE ACTION PLAN**

76 SERVICE STATION NO. 1156  
4276 MACARTHUR BOULEVARD  
OAKLAND, CALIFORNIA  
COP NO. WNO.1112

January 28, 2005

Alameda County  
Environmental Health  
FEB 08 2005



**MILLER BROOKS**  
*Environmental, Inc.*

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**CORRECTIVE ACTION PLAN**

76 SERVICE STATION NO. 1156  
4276 MACARTHUR BOULEVARD  
OAKLAND, CALIFORNIA  
COP NO. WNO.1112

Prepared For:

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Project Number 06-459-1156-07

January 28, 2005

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## 1.0 INTRODUCTION

Miller Brooks Environmental, Inc. (Miller Brooks), on behalf of ConocoPhillips, submits this *Corrective Action Plan* (CAP) to address soil impacted with adsorbed petroleum hydrocarbons and groundwater impacted with dissolved-phase petroleum hydrocarbons beneath and downgradient of the 76 Service Station No. 1156, located at 4276 MacArthur Boulevard in Oakland, California (Figure 1). This CAP was prepared at the request of ConocoPhillips, and is based on the guidelines presented in the California Code of Regulations, Title 23, Division 3, Chapter 16, Article II, Sections 2725(b), (d), and (e) through (g).

The current understanding of site conditions and the distribution of dissolved-phase petroleum hydrocarbons in the subsurface is based on completion of the Soil and Groundwater Investigation Phase. The site assessment and investigation activities that were conducted at the site from September 1997 through July of 2004 are summarized below and have been presented in detail in the referenced reports. The Corrective Action Plan Implementation Phase, including a schedule for implementation of the preferred remedial alternative is detailed later in this report. It has been established by previous assessment studies that the soil and groundwater beneath the site are impacted by petroleum hydrocarbons. However, due to shallow groundwater at the site, remedial alternatives for groundwater remediation only are discussed in this evaluation.

The main constituents of concern at this site are Total Petroleum Hydrocarbons as gasoline (TPHg), benzene, toluene, ethyl benzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) in soil and shallow groundwater. The goal of the corrective action is to remediate the dissolved-phase hydrocarbons from the shallow aquifer. The purpose of this CAP is to: 1) present a review of the site history, summarize the assessment and investigation activities that have been conducted at the site, and discuss the nature and extent (both laterally and vertically) of the hydrocarbon impact to soil and groundwater; 2) describe the available remedial alternatives that were evaluated and explain why an ozone microsparging remedial system was chosen as the primary preferred remediation alternative for this site; and, 3) provide details on the proposed remedial system, the schedule for implementation of the system, the proposed monitoring, sampling and evaluation activities, and the soil and groundwater cleanup levels. A schedule for proposed work including continuation of quarterly monitoring and sampling, installation of the sparge points and ozone system, and evaluation of the system performance is also presented in this report.

## 2.0 SITE DESCRIPTION

The site is located at the northeast corner of MacArthur Boulevard and High Street in Oakland, California, as shown on the Vicinity Map (Figure 1). Two 12,000-gallon gasoline underground storage tanks (USTs) are present in the southwestern portion of the site and two dispenser islands are present on the site, one to the northwest and one to the east of the USTs. A station building is present in the northeastern portion of the site. There are currently seven groundwater monitoring wells (MW1 through MW7) in addition to one tank backfill well (TP1) located at and in the vicinity of the site. Pertinent site features are shown on the Site Plan (Figure 2). Properties in the immediate vicinity of the site are utilized for commercial and residential purposes.

### 3.0 BACKGROUND

#### 3.1 GEOLOGIC AND HYDROGEOLOGIC SETTING

The site is located at an elevation of approximately 180 feet above mean sea level (MSL) and is underlain by recent alluvial deposits. Sediments encountered during previous subsurface investigations conducted at the site consisted of a mixture of clay, silt, sand, and gravel to the maximum depth explored, approximately 31.5 feet below ground surface (bgs). In general, clay and silt with varying amounts of sand and gravel (up to 40 percent) were encountered in the borings. In boring MW3, a gravel lens was encountered from approximately 22 to 25 feet bgs and again from approximately 26 to 28 feet bgs. In boring MW6, silty sand was encountered from approximately 18 feet bgs to the terminus of the boring (approximately 25 feet bgs).

The saturated zone has been encountered during drilling at depths ranging from 13 to 24 feet bgs beneath the site and consist primarily of sandy silt and clay with some gravel. A partially confined aquifer extends from approximately 13 to 24 feet bgs to at least 31.5 feet bgs. During quarterly groundwater monitoring and sampling events, groundwater has historically been present at depths ranging from 1.82 to 9.81 feet below the top of casing (TOC) with a hydraulic gradient ranging from 0.02 to 0.1 ft/ft. The groundwater flow direction has historically been reported towards the west.

#### 3.2 SUMMARY OF SOIL AND GROUNDWATER INVESTIGATIONS

In 1997, Pacific Environmental Group Inc. (PEG) advanced 5 soil/gas probes in the vicinity of the USTs, dispenser islands, and product lines to depths ranging from 3 to 15 feet bgs. Elevated soil vapor concentrations of TPHg, benzene, and MTBE were detected up to 4,700, 70, and 140 micrograms per liter ( $\mu\text{g/L}$ ), respectively.

In 1998, Tosco Marketing Company (Tosco, now ConocoPhillips) removed one 280-gallon used-oil UST and removed and replaced two 10,000-gallon gasoline USTs and associated piping and dispensers. The new USTs were installed in a separate excavation. TPH as diesel (TPHd), TPHg, benzene, and total recoverable petroleum hydrocarbons (TRPH) were detected in the soil sample from the used-oil UST cavity at a concentration of 78,000, 130, 0.55, and 8,400 milligrams per kilogram (mg/kg), respectively. Following the over-excavation of approximately 4.6 tons of soil from the used-oil UST cavity, concentrations of TPHd, TPHg, benzene, and TRPH were detected in soil samples collected from the used-oil UST cavity at concentrations up to 560, 81, 0.64, and 360 mg/kg, respectively. TPHg and benzene were detected in the soil samples from the gasoline UST cavity, dispenser islands, and product lines at concentrations up to 1,200 and 1.6 mg/kg, respectively. A groundwater sample collected from the gasoline UST cavity was reported to contain TPHg and MTBE at a concentration of 41,000 and 1,800  $\mu\text{g/L}$ , respectively. Benzene was not detected in the groundwater sample at or above the laboratory detection limit.

In 1999, Environmental Resolutions Inc. (ERI) performed a soil and groundwater evaluation including the installation of four on-site groundwater monitoring wells (MW1 through MW4). Soil samples collected from the borings at a depth of 10.5 feet bgs were reported to contain TPHg, benzene, and MTBE at concentrations up to 6,800, 2.6, and 0.71 mg/kg, respectively. The soil sample from MW1, near the former used-oil UST, was additionally analyzed for TPHd and TRPH, which were detected at a concentration of 140 and 73 mg/kg, respectively. In addition, a deep sample (20.5 feet bgs) collected from MW4 did not contain TPHg, benzene, or MTBE at or above the laboratory detection limit.

In July 2001, ERI installed a UST cavity backfill well (TP1) and initiated monthly purging of groundwater from the UST cavity. Monthly purging activities were performed on TP1 from January 2001 through December 2003, and a total of approximately 303,330 gallons of groundwater were removed during the purging events.

In August 2001, ERI installed three off-site groundwater monitoring wells (MW5 through MW7). TPHg and MTBE were not detected in the soil samples and benzene was only detected in one soil sample (MW7) at a concentration of 0.18 mg/kg.

Bi-weekly groundwater purging was conducted at the site on wells TP1 and MW1, from July 2001 through December 2004. In addition, during June and July 2004, the bi-weekly purging events included well MW7. A total of approximately 1,590-gallons were removed from well MW7, and a cumulative total of approximately 476,015-gallons have been removed from the site through December 2004. During 2004, Miller Brooks calculated that a total of approximately 5.91 pounds of TPHg, 0.60 pounds of benzene, and 0.23 pounds of MTBE were removed from the groundwater. Groundwater samples have not been collected on a regular basis from well TP1, therefore, calculations of total hydrocarbons removed since the initiation of purging events were not performed.

Quarterly groundwater monitoring and sampling commenced in July of 1999 and is currently ongoing. The most recently reported sampling event was conducted on July 12, 2004. During this event, groundwater was measured between 2.56 and 9.44 feet below TOC, and was reported to flow towards the west at a calculated gradient of 0.07 ft/ft. Copies of the groundwater flow direction map, groundwater concentration map, and the historical groundwater analytical tables are included in Appendix A.

#### **4.0 REMEDIAL ALTERNATIVES EVALUATION**

The main contaminants of concern at the site are adsorbed and dissolved gasoline hydrocarbons, including BTEX and MTBE in shallow soil and groundwater. The focus of the remedial efforts will be dissolved mass destruction in-situ. The majority of petroleum hydrocarbons appear to be limited to the immediate vicinity of the former UST cavity and southeastern dispenser island. However, based on low concentrations and limited extent of hydrocarbons in soil, only groundwater remediation alternatives are presented in this evaluation.

##### **4.1 SUMMARY OF THE IMPACTS AND SITE CONDITIONS**

In order to determine the most appropriate and feasible remedial option for the site, it is important to establish certain criteria upon which the selected remedial options are based. The criteria proposed for the selection of the remedial system is to understand 1) the site background, 2) the contaminants of concern and distribution/concentrations, and 3) the political and regulatory drivers.

###### **4.1.1 Site Background and Contaminants of Concern**

As previously discussed, petroleum hydrocarbon affected soil and groundwater was initially found at the site in 1997 and 1998, during the soil gas survey and UST removal and replacement. Assessment activities conducted to date include the installation of seven groundwater monitoring wells.

Previous assessments conducted to date and quarterly groundwater monitoring and sampling results demonstrate that the main contaminants of concern at the site are dissolved petroleum hydrocarbons and their components BTEX and MTBE. Based on the results of the Third Quarter 2004 groundwater monitoring and sampling data,

the current maximum dissolved-phase concentrations were reported: TPHg at 57,000 µg/l (MW-1); benzene at 6,900 µg/l (MW-1); and, MTBE at 12,000 µg/l (MW-7). The historical maximum dissolved-phase hydrocarbon concentrations in groundwater are: 120,000 µg/l of TPHg, 11,000 µg/l of benzene, and 66,500 µg/l of MTBE (TRC, Third Quarter 2004). Liquid Phase Hydrocarbons (LPH) have not historically been observed or measured at the site. Dissolved hydrocarbon concentrations are displayed on the TRC isoconcentration maps (Appendix A).

The effectiveness of remediation methods is directly linked to the physical and chemical characteristics of the contaminant(s) of concern (United States Environmental Protection Agency [USEPA], 1999). For selection of the most appropriate and feasible remedial option, it is important to understand the physical, chemical, and biodegradation characteristics of gasoline hydrocarbons and MTBE. MTBE differs from other gasoline hydrocarbons in several physical characteristics, being relatively more soluble (MTBE is 30 times more soluble than benzene in water) and less adsorptive. MTBE has a higher vapor pressure than other gasoline components. The study of the biodegradation of low molecular weight ethers like MTBE is relatively recent; however, recent studies have shown that MTBE is amenable to biodegradation under certain conditions.

#### 4.1.2 Contaminant Distribution

As previously discussed, results of previous subsurface investigations and groundwater monitoring and sampling indicate that the contaminants of concern are present in the shallow groundwater. The lateral extent of the dissolved plume has been delineated to the extent practical since a former Shell Service Station is located directly across MacArthur street to the west (downgradient) and has a hydrocarbon plume associated with it. Four monitoring wells (owned by Shell) are currently located in the vicinity of the former Shell Station. These wells are monitored and sampled during joint sampling events with the 76 site. During the third quarter joint sampling event, LPH was detected in two of the Shell monitoring wells (MW2 and MW3). The depth to shallow groundwater at the site is approximately 2 to 9 feet bgs. Appendix A contains maps and tables of current and historical groundwater concentrations.

#### 4.1.3 Regulatory Drivers

The main regulatory driver at the site is the potential use of the underlying aquifer for drinking water purposes. However, it does not appear that there are any drinking water wells near the site. In 2001, a GeoTracker® database search, conducted by ERI, revealed four public water supply wells, owned by the East Bay Regional Park District (Park District), within a ½ mile radius of the site. Representatives from the Park District were reported to have no knowledge or records of any wells located in this area and indicated that the wells may belong to the East Bay Municipal Utility District (EBMUD); however, EBMUD were also reported to have no knowledge or records of any wells located in this area.

A 2001 Department of Water Resources (DWR) database search conducted by ERI revealed four water supply wells, belonging to Mills College, within the search radius. A representative from Mills College indicated that all wells associated with Mills College had been destroyed approximately ten years ago (1991) and that Mills College is now connected to a municipal water supply. The DWR search also revealed a well located at 3397 Arkansas Street, approximately 880 feet outside of the search radius. No other wells, surface water-bodies, or potentially sensitive environmental habitats were identified during ERI's field receptor survey. Based on previous investigations and a sensitive receptor survey, it does not appear that any current drinking water wells are located within 2,000 feet downgradient of the site, and no other sensitive receptors have been reported in the site vicinity (i.e. schools, hospitals, daycare centers, etc.). The nearest surface water is a small pond located approximately 1,000 feet southwest of the site.

## 4.2 GROUNDWATER REMEDIAL OPTIONS

Five remedial alternatives are presented below and have been evaluated for remediation of the shallow groundwater at the site. These remedial methods include pump and treat, air sparging, natural attenuation, dual-phase extraction, and ozone microsparging.

### 4.2.1 Groundwater Pump and Treat

A pump and treat system is the process where groundwater is extracted from beneath the site, filtered through activated carbon, which has a very rough surface that hydrocarbon molecules adsorb to as they pass (USEPA, 2000), and discharged to the sanitary sewer. Provided the aquifer has a high yield, large amounts of water are able to be extracted from the ground, resulting in the potential for hydraulic control at the site. A discharge permit is generally obtained in order to discharge treated groundwater into the sewer. Monthly influent and effluent groundwater samples are collected in order to determine the effectiveness of treatment and ensure that the discharged groundwater is within acceptable levels as outlined in the permit.

### 4.2.2 Air Sparging

Air sparging is a process where air is pumped from an aboveground compressor into the saturated zone to volatilize petroleum hydrocarbons in the saturated zone and increase dissolved oxygen content in groundwater. Air delivery is accomplished by utilizing injection wells that are screened exclusively below the groundwater surface. Normally, air sparging is performed in combination with vapor extraction of the unsaturated zone. Volatilized petroleum hydrocarbons from the saturated zone are collected by the vapor extraction well network and treated aboveground with the vapor extraction treatment equipment. Introduction of air into the aquifer also tends to increase biological degradation of the petroleum hydrocarbons and oxygenates by increasing dissolved oxygen content in groundwater and the vadose zone, thus increasing growth rates of naturally occurring microorganisms in the saturated and unsaturated zones.

### 4.2.3 Natural Attenuation

Natural attenuation is defined as a process whereby the mass or concentration of a chemical compound is reduced over time or distance from the source area due to naturally occurring physical, chemical, and biological processes. The processes involved in natural attenuation of petroleum hydrocarbons include aerobic and anaerobic biodegradation, dispersion, volatilization, and adsorption (American Society for Testing and Materials [ASTM], 1998). In general, for petroleum hydrocarbons, biodegradation is the most important natural attenuation mechanism; it is the only natural process that results in an actual reduction of petroleum constituent mass (Salanitro, 1993). Biodegradation is the process that naturally occurring microorganisms (yeast, fungi, or bacteria) use to break down, or degrade, hazardous substances into less toxic or nontoxic substances. Microorganisms eat and digest organic substances for nutrition and energy. Certain microorganisms can digest organic substances such as fuels or solvents that are hazardous to humans. Healthy microorganisms are important because they are responsible for the biodegradation of contaminants (USEPA, 1999).

The primary line of evidence to demonstrate that natural attenuation in groundwater is occurring at a site is to evaluate the plume status based on a review of the historical groundwater data; a stable or shrinking plume is direct evidence that natural attenuation is occurring at a site. If insufficient data are available to conduct this historical analysis, or if the analysis is inconclusive, secondary lines of evidence can be evaluated, such as an evaluation of groundwater geochemical parameters, microbiological studies, and the estimation of the natural attenuation rate (ASTM, 1998). To evaluate the applicability of using remediation by natural attenuation, the site must be adequately assessed and groundwater monitoring locations must include an upgradient monitoring

point, two or more monitoring points within the hydrocarbon plume, and a downgradient monitoring point. In some cases, where a sensitive receptor (drinking water well, surface water body, etc.) is located downgradient of the hydrocarbon plume and is potentially threatened, sentinel wells may be required between the downgradient edge of the hydrocarbon plume and the receptor (ASTM, 1998).

A prominent factor in the rate of aerobic degradation is the presence of adequate dissolved oxygen (DO) levels in the area containing dissolved-phase petroleum hydrocarbons (Salanitro, 1993). Aerobic biodegradation of dissolved-phase hydrocarbons is indicated through DO correlations within the hydrocarbon plume (i.e., low DO in the high concentration areas, high DO in the low concentration areas).

#### 4.2.4 Dual-Phase Extraction

Dual-phase extraction (DPE), also known as multi-phase extraction or vacuum-enhanced extraction, is a technology that uses a high vacuum system to remove various combinations of impacted groundwater, liquid-phase petroleum product, and hydrocarbon vapor from the subsurface. Extracted liquids and vapor are treated and collected for disposal.

In DPE systems for liquid/vapor treatment, a high vacuum system is utilized to remove liquid and vapor from low permeability or heterogeneous formations. The vacuum extraction well includes a screened section in the zone of impacted soils and groundwater to remove contaminants from above and below the water table. The system lowers the water table around the well, exposing more of the formation. Contaminants in the newly exposed vadose zone are then accessible to vapor extraction. Once above ground, the extracted vapors or liquid-phase organics and ground water are separated and treated. DPE for liquid/vapor treatment is generally combined with bioremediation, air sparging, or bioventing when the target contaminants include long-chained hydrocarbons. Use of DPE with these technologies can shorten the cleanup time at a site. It also can be used with pump-and-treat technologies to recover groundwater in higher-yielding aquifers.

#### 4.2.5 Ozone Microsparging

Ozone microsparging is a process where ozone in air is introduced into the groundwater through specially designed spargers to create small "microbubbles." As these microbubbles rise within the column of water, the dissolved VOCs are rapidly oxidized. Low total flow rates (2-6 cfm) are used. Any ozone not consumed in the direct reaction with hydrocarbons rapidly decomposes to oxygen. This has an added benefit of stimulating the natural biological degradation.

Ozone microsparging is a proven remedial technique for destroying contaminants in-situ, as opposed to merely transferring them to another medium (i.e. activated carbon). Ozone microsparging typically works faster in areas with porous subsurface sediments. There are multiple benefits to using ozone microsparging as a remedial alternative. Ozone microsparging is practical because of the low capital equipment cost, low operating cost, minimal site disturbance during installation, and low onsite profile. Remedial benefits include: hydrocarbons are remediated in-situ, hydrocarbon mass concentration decreases are relatively rapid in soil and groundwater, no vapor control is necessary, and there is no hazardous byproduct formed through the ozone microsparging activities (Kerfoot, 2004).

### 4.3 SELECTION OF SITE REMEDIAL OPTION

To select the most effective and most feasible remedial option for the remediation of hydrocarbons at the site, we must recall the criteria used for remedial selection, which is to understand, 1) the site background, 2) the contaminants of concern and distribution/concentrations, and 3) the regulatory drivers. A discussion of the most feasible remedial option is discussed below.

#### 4.3.1 Groundwater Pump and Treat

A groundwater pump and treat system would not be a feasible or cost effective remediation option for this site because of the following:

- Lawrence Livermore National Laboratory report issued in 1995 found that pump and treat remediation is recognized as being ineffective at reaching cleanup goals, since asymptotic levels are typically reached prior to achieving cleanup goals.
- Construction and operation costs for a pump and treat system would be high.
- During bi-weekly groundwater purging events, a cumulative total of approximately 5.91, 0.60, and 0.23 pounds of TPHg, benzene, and MTBE, respectively, were removed from approximately 48,070 gallons of groundwater extracted. The amount of hydrocarbons removed per gallon of groundwater (0.0001 lbs of hydrocarbons/gallon of groundwater) is extremely low and would not be very cost effective.
- The equipment from a groundwater pump and treat system takes up a large portion of space which is not generally available at this site.

Due to the reasons stated above, a groundwater pump and treat system would not be considered the most feasible or cost effective remedial option for petroleum hydrocarbon concentrations in groundwater at the site.

#### 4.3.2 Air Sparging

Air sparging would not be the most feasible and effective remediation tool to use at this site because the stratigraphic heterogeneities could result in air transport anisotropies which could reduce the effectiveness of the sparging process. Air sparging is also less effective for MTBE than for benzene due to its hydrophilic nature which results in more air being needed to volatilize the MTBE. When moving from the dissolved-phase to the vapor-phase, MTBE is ten times less volatile than benzene. The amount of dissolved oxygen delivered by air sparging to the groundwater is likely insufficient to significantly increase the biodegradation of MTBE relative to benzene (USEPA, 1999). In addition, vapor extraction would need to be combined with air sparging in order to capture vapors created by air sparging. The combination of vapor extraction with air sparging would be very expensive. It is also possible that air sparging could "push" the hydrocarbon plume further offsite.

#### 4.3.3 Natural Attenuation

Due to the contaminants of concern at this site, natural attenuation is not considered the most feasible remedial options. In addition, due to the elevated concentrations of TPHg (57,000 µg/L), benzene (6,900 µg/L), and MTBE (11,000 µg/L) present at the site, an active remedial option is needed for this site. Natural attenuation is considered a "passive" remedial option and would be expected to take an extended period of years to reduce dissolved concentration to below acceptable regulatory limits.

#### 4.3.4 Dual-Phase Extraction

Due to the depth to water at the site, mostly fine-grained stratigraphy, and relatively low concentrations of adsorbed hydrocarbons in the soil, DPE would not be the most feasible remedial option at the site. During several of the bi-weekly purging events during 2004, low groundwater recharge was encountered on wells not located within the UST backfill material. This indicates that groundwater recharge may be poor and therefore, not amenable for DPE remediation. DPE would only be primarily effective in the immediate area of groundwater removal, and would require a change in system approach as the soils and groundwater become less impacted. Ultimately the system would operate as a groundwater only removal tool, which requires excessive volumes of water be treated in order to remove residual impact. Operation of a permanent DPE system at the site is expected to be very expensive to operate and maintain over a long period of time. Therefore, this remedial option is not recommended since more time efficient and cost effective options are available.

#### 4.3.5 Ozone Microsparging

Out of the five remedial options evaluated in this report, the ozone microsparging remedial technology is the most appropriate option for remediation of the impacted groundwater beneath the site. The reason for selecting ozone microsparging is based on the chemical and physical properties of the contaminants of concern, the site conditions, the site drivers, the fact that microsparging is an "active" remedial option, the in-situ destruction of the contaminants, and the cost effectiveness of the technique. The case for selection of this remedial option is presented below.

Ozone microsparging has been used successfully at numerous sites throughout Northern California to remediate shallow aquifers containing dissolved-phase petroleum hydrocarbons. This remedial technique also provides a one system approach, which does not escalate in cost as the hydrocarbon concentrations decrease. Additionally, ozone microsparging chemically destroys the hydrocarbon impact, rather than merely transferring it to another medium (i.e. carbon). Based on this proven track record, Miller Brooks and ConocoPhillips believe that ozone microsparging will provide the most cost effective and surest method of mass removal.

### 5.0 **CORRECTIVE ACTION**

Details of the ozone microsparging treatment system chosen as the preferred remedial option for corrective action including remediation system design, permitting, construction, operation and maintenance schedule, system performance evaluation, and compliance reporting are discussed below. Based on the preparation and submittal of this CAP, the bi-weekly groundwater purging events have been discontinued.

#### 5.1 **OZONE MICROSPARGING REMEDIATION TREATMENT SYSTEM**

The focus of the remedial efforts will be the destruction of dissolved-phase hydrocarbons from within the shallow aquifer, and to prevent further lateral migration in the downgradient offsite direction. As stated above, ozone microsparging has been identified as the most feasible remedial approach to address the dissolved-phase petroleum hydrocarbon plume.

### 5.1.1 Ozone Microsparge Point Installation

The locations of the proposed 15 ozone sparge points were selected based on an anticipated radius of influence of approximately 15 feet (Figure 2). The typical radius of influence number (20 feet) is usually based on the manufacturers recommendation for a typical installation. However, based on the presence of less porous soil throughout the majority of the site, Miller Brooks chose a more conservative radius of influence of 10 to 15 feet. Drilling and sampling protocols are described in Miller Brooks General Field Procedures (Appendix B).

A well construction permit will be obtained from the Alameda County Health Care Services prior to installation, and all appropriate agencies will be notified prior to the start of field activities. The sparge points will be drilled and sampled to a depth of approximately 25 to 30 feet bgs, dependent upon encountered lithology, using 8-inch hollow-stem augers driven by a truck-mounted drill rig. The total depth of the sparge points may be adjusted based on field conditions, in order to place the sparge point in the most porous materials. Soil samples will be collected from the borings approximately every five feet. The onsite geologist will prepare a log of each boring and field screen the soil samples for the presence of volatile organic compounds utilizing a photoionization detector (PID). Field screening data are collected for reconnaissance purposes only, and are not intended to represent actual concentrations of hydrocarbons in the subsurface soils. Soil samples which are visually stained or provide a high PID reading may be submitted to a ConocoPhillips contract laboratory for analyses.

Upon completion of soil sampling, the borings will be completed as microsparge points with the installation of micro-porous sparge points attached to ¾-inch blank PVC casing through the hollow-stem augers. The sparge points are proposed to be constructed with 30-inch long sparge points. Lonestar No. 2/16 sand will be installed in the annular space from the bottom of the boring to approximately one foot above the top of the sparge point. Figure 3 presents the proposed construction details.

The remainder of the annular space in each boring will be sealed with hydrated bentonite, followed by neat cement to a depth of approximately 1.5 feet bgs. An 18-inch diameter steel, water-resistant, traffic-rated well box will be set into the ground around each well head with concrete.

Drill cuttings will be placed in steel 55-gallon DOT approved drums and stored onsite pending disposal. The drums will be removed from the site by a ConocoPhillips contractor and properly disposed of.

### 5.1.2 Ozone Microsparge System Installation and Startup

Prior to system installation, construction diagrams will be prepared and submitted to contractors for bidding purposes. Based on the manufacturers specifications and actual conditions at the site, the design and construction of the proposed remedial system may vary from the diagrams attached to this document. An approved ConocoPhillips contractor will install the remedial system and acquire any permits which may be required. The control panel will be mounted on a unistrut frame. The panel includes an ozone generator, air compressor, a programmable timer/controller, an oxygen concentrator and an ozone leak detector. Sparge points are connected to the panel by 3/8" HDPE tubing for runs under 100 feet. For runs greater than 100 feet, ½" tubing is used. Each sparge point has a dedicated line, and the tubing is run through schedule 40 PVC conveyance piping for added protection. An ozone sparge system flow schematic is presented on Figure 4. The system is intended to cycle ozone/air injection between 12 sparge points. The schedule should be set to cycle through each point 18 times per day, for six minutes per point per cycle. The schedule can be varied as part of the system evaluation process.

### 5.1.3 Remediation System Operation and Maintenance and Reporting

System operation and maintenance (O&M) will be performed on a monthly basis while the ozone system is being operated, unless the ozone system requires more frequent site visits to remain operational. Groundwater samples will be collected from select wells monthly for the first three months, and on a quarterly basis thereafter, in order to track the progress of the remedial action. The groundwater samples will be analyzed for TPHg, BTEX, MTBE, tertiary butyl alcohol (TBA), tertiary amyl methyl ether (TAME), di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), ethylene dibromide (EDB), 1,2-Dichloroethane (1,2-DCA), dissolved oxygen, oxidation-reduction potential and ferrous iron.

Once the ozone system has been installed and is fully operational, a system startup report will be issued. The startup report will document the sparge point well installation procedures and construction (boring logs), construction and installation of the sparge piping and ozone control panels, and the system startup testing and operational programming.

## 6.0 SYSTEM PERFORMANCE EVALUATION

The performance of the proposed ozone treatment system will be monitored through analytical data from the monthly (first three months) and quarterly groundwater samples. Monitoring of groundwater elevations and dissolved-phase concentrations will be performed to verify remediation of the dissolved-phase plume. The schedule of groundwater sampling may be modified if the results of the previous sampling events indicate a more frequent or less frequent schedule is warranted. During system operation, data will be tabulated and utilized to evaluate system performance and determine the system's effectiveness in decreasing dissolved-phase hydrocarbon concentrations in accordance with the groundwater cleanup levels stipulated below in section 6.2. Remediation progress reporting will be performed, as described below.

### 6.1 EVALUATION OF CONCENTRATION TRENDS

Groundwater concentration data will be collected from the wells during the quarterly groundwater monitoring and sampling program. Additionally, monthly samples will be collected from wells MW1, MW2 and MW7. Dissolved-phase concentration data will be obtained by laboratory analysis of groundwater samples for TPHd, TPHg, BTEX, MTBE, TAME, TBA, ETBE, and DIPE.

### 6.2 GROUNDWATER CLEANUP LEVELS

Final cleanup level goals for hydrocarbon constituents are proposed to be the California Department of Health Services Maximum Contaminant Levels (MCLs), which are 13 ppb for MTBE, 1.0 ppb for benzene, 150 ppb for toluene, 300 ppb for ethyl benzene, and 1,750 ppb for xylenes. If the MCL cleanup levels cannot be attained, then remediation will cease when asymptotic concentrations are reached. Concentrations will be declared to be asymptotic when no statistically significant changes are observed.

### 6.3 REMEDIATION PROGRESS REPORTING

Data gathered for system performance evaluation will be presented in Annual Status Reports (ASRs). The ASRs will be submitted to the governing agency/agencies at the required frequency. At a minimum, ASRs will be prepared on an annual basis, and will provide a summary of:

- Site background
- Field activities performed during the quarter
- Hours of treatment system operation
- Non-scheduled operations and maintenance activities performed
- Analytical data
- Monitoring data
- Graphic presentations of concentration changes over time
- Other pertinent information

### 7.0 PROPOSED WORK SCHEDULE

Upon receipt of regulatory approval of this CAP, system design, and permitting will commence. After the appropriate permits are received, sparge point installation activities will be scheduled. Once the sparge points have been installed, and the construction bid has been awarded, construction of the remedial system will be scheduled.

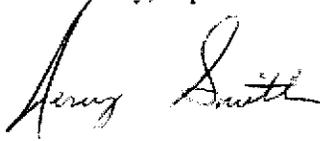
A report will be prepared upon completion of the sparge point installation activities and upon system startup. The report will include a summary of field activities, results of laboratory analysis of soil and groundwater samples, graphic illustrations of the site and subsurface (including site plan, soil boring logs, and sparge point construction details), findings, and conclusions. A California Registered Geologist will review and sign the report. In addition, soil and water analytical results will be reported in electronic deliverable format (EDF) to the SWRCB, per the requirements of Assembly Bill AB 2886.

### 8.0 SITE SAFETY PLAN

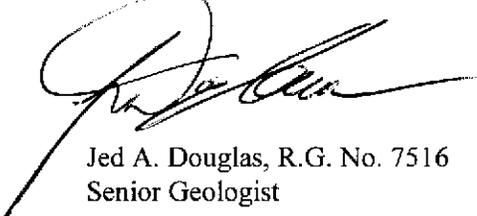
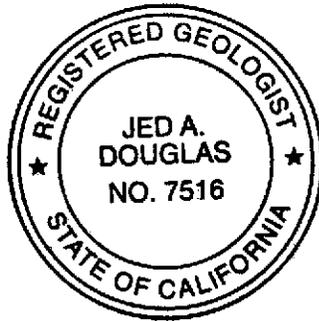
All work activities, except for the remedial system construction performed by others, will be conducted in accordance with requirements of the Miller Brooks Corporate Health and Safety Program. A site-specific Health and Safety Plan, designed to promote project personnel safety and preparedness during the activities described in this work plan will be prepared prior to the start of field activities.

## 9.0 STATEMENT OF LIMITATIONS AND PROFESSIONAL CERTIFICATION

This report was prepared for the sole use of ConocoPhillips. Any other use without the express written consent of Miller Brooks is prohibited. The conclusions presented herein are based solely upon the agreed upon scope of work outlined in this report. Miller Brooks makes no warranties or guarantees as to the accuracy or completeness of information provided or compiled by others. It is possible that information exists beyond the scope of this investigation. Additional information that was not found or available to Miller Brooks at the time of writing this report, may result in modification of the conclusions presented. This report is not a legal opinion. The services performed by Miller Brooks have been conducted in a manner consistent with the level of care ordinarily exercised by members of our profession currently practicing under similar conditions. No other warranty, expressed or implied, is made.



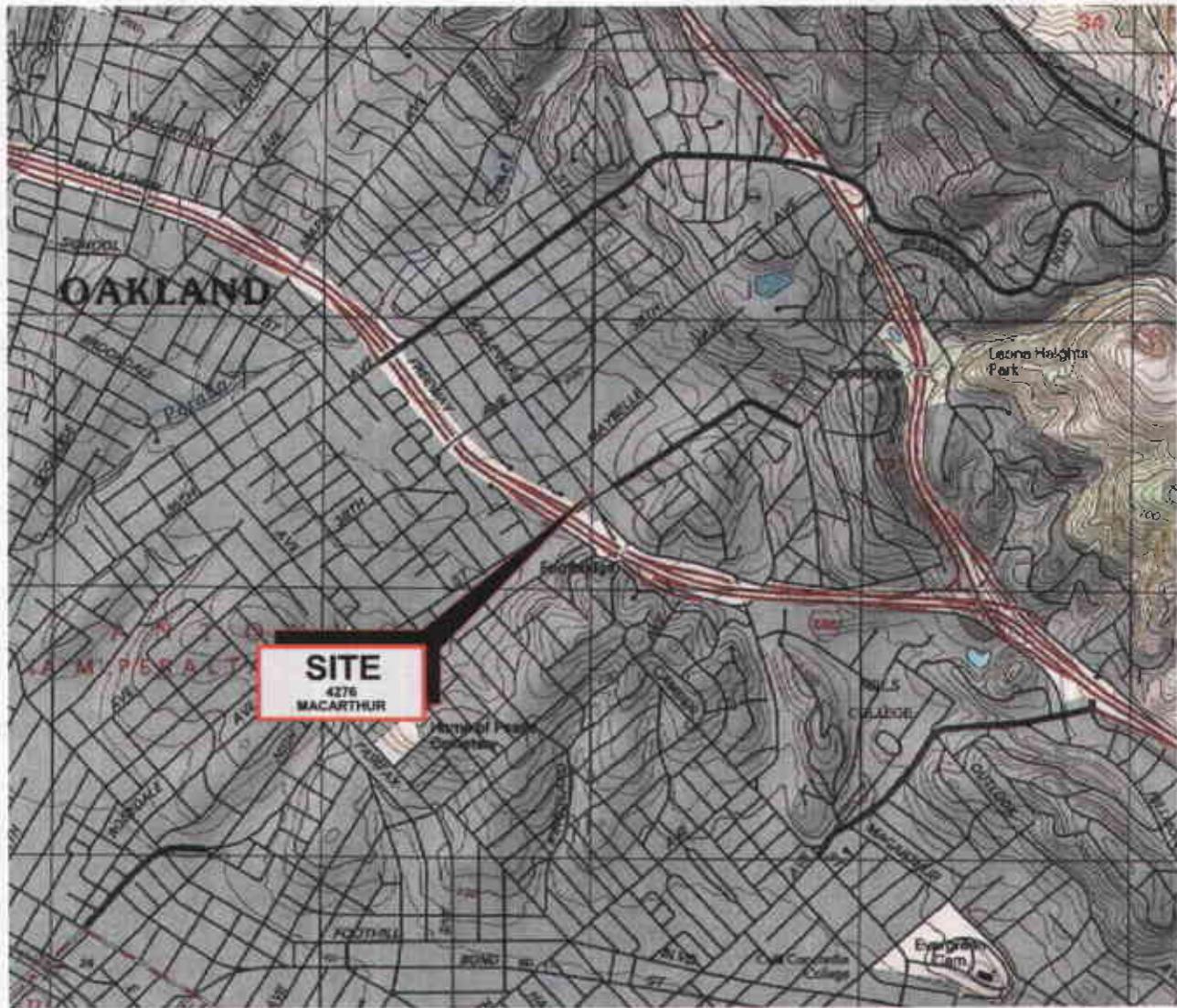
Jeremy A. Smith  
Senior Staff Scientist



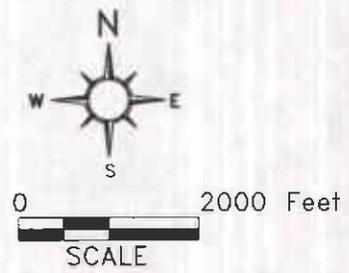
Jed A. Douglas, R.G. No. 7516  
Senior Geologist

## 10.0 REFERENCES

- TRC Companies Inc., 2004, Quarterly Monitoring Report July Through September 2004, 76 Station #1156, 4276 MacArthur Blvd., Oakland, California; dated October 8, 2004.
- Kerfoot Technologies, 2004, <http://www.kva-equipment.com/product.php?22,0,9795...Index>, May 12, 2004.
- Environmental Resolutions, Inc., 2002, Supplemental Evaluation of Soil and Groundwater and Site Conceptual Model, Tosco Service Station 1156, 4276 MacArthur Blvd., Oakland, California; dated January 4, 2002.
- United States Environmental Protection Agency, 2000, Permeable Reactive Barriers Research Team website, <http://www.epa.gov/ada/research/prb/charter.html>, dated March 1, 2000.
- Environmental Resolutions, Inc., 1999, Evaluation of Soil and Groundwater at Tosco Service Station 1156, 4276 MacArthur Blvd., Oakland, California; dated October 11, 1999.
- United States Environmental Protection Agency, 1999, Microbial Processes Affecting Monitored Natural Attenuation of Contaminants in the Subsurface, dated September, 1999.
- Environmental Resolutions, Inc., 1998, Underground Storage Tank and Associated Piping and Dispenser Replacement, Tosco (Unocal) Service Station 1156, 4276 MacArthur Blvd., Oakland, California; dated August 24, 1998.
- American Society for Testing and Materials, 1998, Standard Guide for Remediation of Ground Water by Natural Attenuation at Petroleum Release Sites, E 1943-98, August 1998.
- Pacific Environmental Group Inc., 1997, Soil Gas Survey Results, Unocal Service Station 1156, 4276 MacArthur Blvd., Oakland, California, dated October 29, 1997.
- Salanitro, Joseph P., 1993, The Role of Bioattenuation in the Management of Aromatic Hydrocarbon Plumes in Aquifers; *Ground Water Monitoring & Remediation* v. 13, no. 4: p. 150-161.
- United States Geological Survey (USGS), 1959, Oakland East, California Quadrangle, 7.5- Minute Topographic Series, Scale 1:24,000, photorevised 1980.



FROM: U.S. GEOLOGICAL SURVEY, 1981  
 QUADRANGLE: ALAMEDA  
 COUNTY: ALAMEDA  
 SERIES: 7.5-MINUTE QUAD  
 NOTE: ALL BOUNDARIES AND LOCATIONS ARE APPROXIMATE

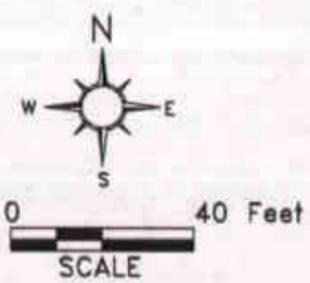


	DRAWN BY: AIL	SITE LOCATION MAP	<b>FIGURE</b>  <b>1</b>
	DATE: 02/26/04		
2124 MAIN STREET, SUITE 200 HUNTINGTON BEACH, CA. 92648 (714) 960-4088	REVISED BY: AIL	76 STATION 1156 4276 MACARTHUR BLVD. OAKLAND, CA.	
	REVISED: 02/26/04		
PROJECT NO. 06-459-1156	APPROVED BY: JAD	FILE: K:\DWGS\C-P\ NO. 1156 (4276 MACARTHUR BLVD.)\LOCATION MAP DATE PLOTTED: 02/26/04	
	DATE: 02/26/04		

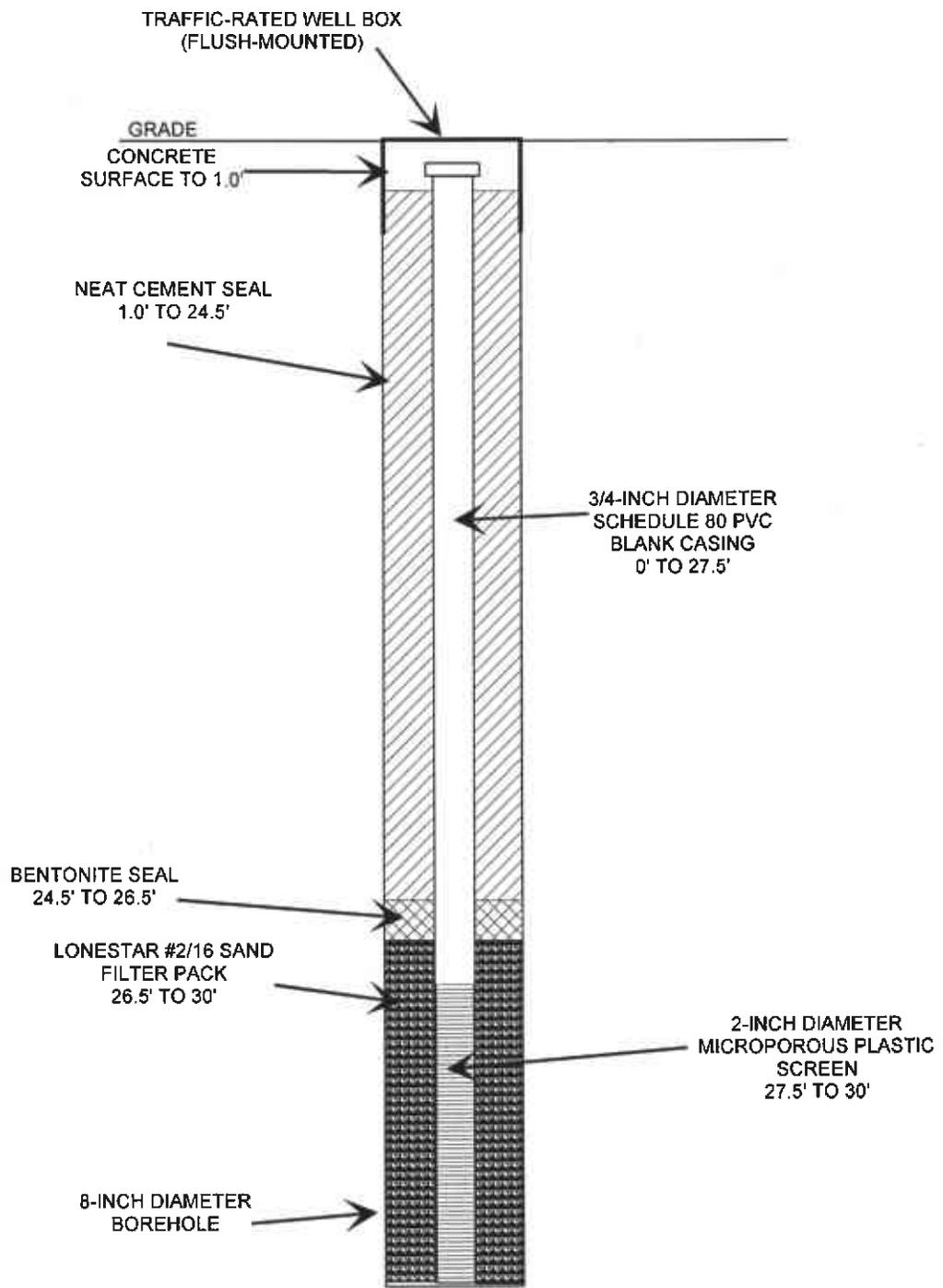


**LEGEND**

- MW1 GROUNDWATER MONITORING WELL (76)
- MW2 GROUNDWATER MONITORING WELL (SHELL)
- TP1 TANK PIT BACKFILL WELL
- TB2 DESTROYED TANK BACKFILL WELL (SHELL)
- PROPOSED SPARGE POINT WITH ESTIMATED RADIUS OF INFLUENCE
- UNDERGROUND STORAGE TANK



	DRAWN BY: AIL	<h2>SITE PLAN</h2>	<b>FIGURE</b>  <b>2</b>
	DATE: 02/24/04		
720 SOUTHPOINT BLVD., SUITE 207 PETALUMA, CA. 94954 (707) 765-0466	REVISOR: PEL	76 SERVICE STATION 1156 4276 MACARTHUR BOULEVARD OAKLAND, CA.	
PROJECT NO. 06-459-1156-01	REVISOR: 06/29/04		
	APPROVED BY: JAD		
	DATE: 06/29/04		
		FILE: K:\DWGS\C-P\NO. 1156 (4276 MACARTHUR BLVD)SITE PLAN DATE PLOTTED: 06/29/04	



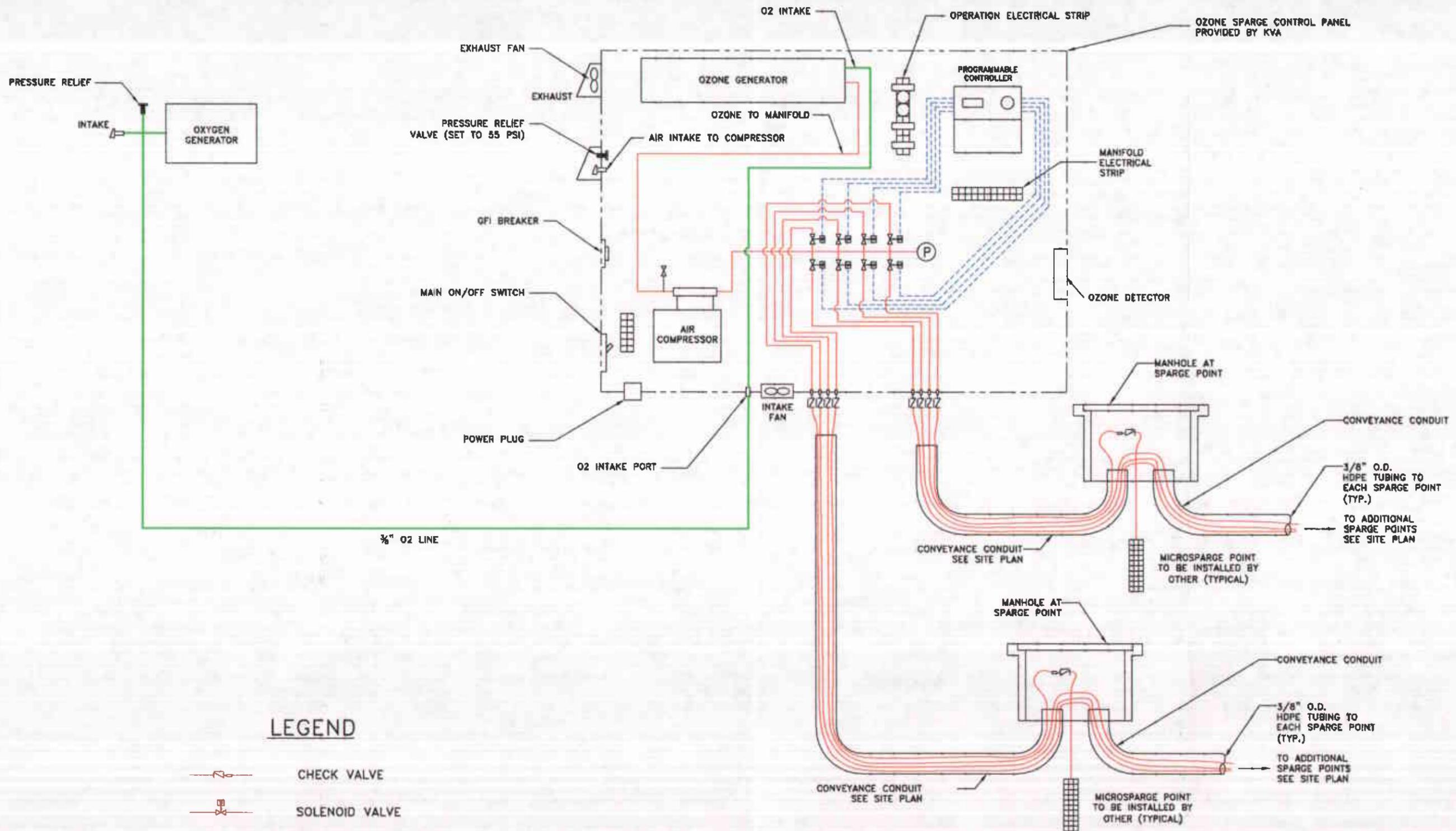
76 SERVICE STATION 1156  
4276 MACARTHUR BLVD  
OAKLAND, CALIFORNIA



FIGURE 3  
PROPOSED OZONE MICROSPARGE POINT  
CONSTRUCTION DETAIL

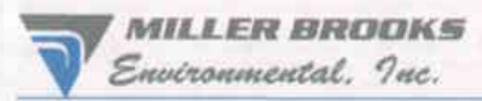
PROJECT NUMBER 06-459-1156-07

06-459-1156-07



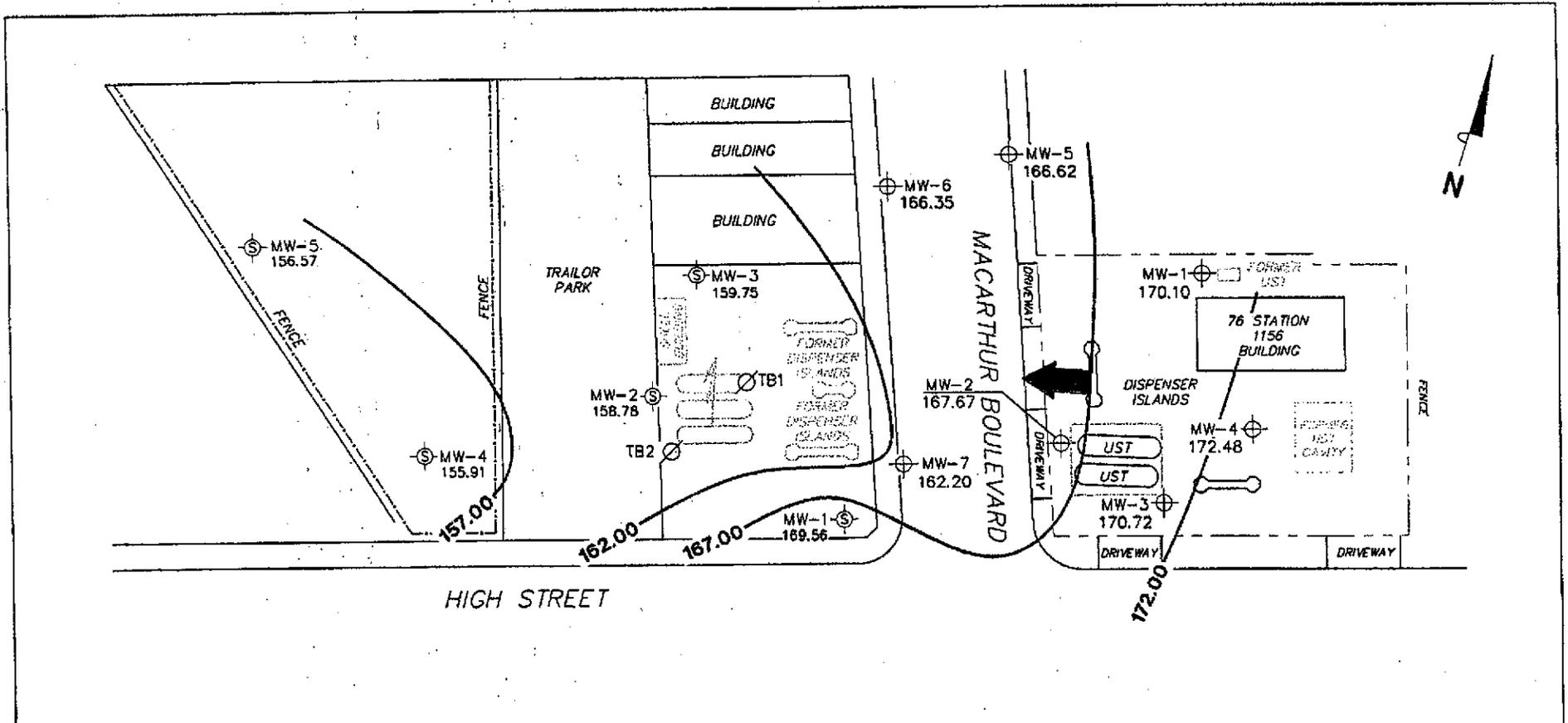
**LEGEND**

-  CHECK VALVE
-  SOLENOID VALVE
-  PRESSURE GAUGE (0-60 PSI)
-  CONTROL WIRING
-  PROCESS TUBING

	DRAWN BY: AIL	OZONE SPARGE SYSTEM FLOW SCHEMATIC	<b>FIGURE</b>  <b>4</b>
	DATE: 12/03/03		
720 SOUTHPOINT BOULEVARD, SUITE 207 PETALUMA, CA. 94954 (707) 765-0466	REVISED BY: PEL	76 STATION 1156 4276 MACARTHUR BLVD OAKLAND, CA	
PROJECT NO. 06-459-1156-07	APPROVED BY: JAD	FILE: K:\DWG3\C-P\NO. 1156 (4276 MACARTHUR BLVD., OAKLAND)\SITE PLAN DATE PLOTTED: 12/13/04	

APPENDIX A

GROUNDWATER FLOW DIRECTION AND CONCENTRATION MAPS AND  
HISTORICAL GROUNDWATER ANALYTICAL DATA



**NOTES:**

Contour lines are interpretive and based on fluid levels measured in monitoring wells. Elevations are in feet above mean sea level. UST = underground storage tank. Shell data provided by Blaine Tech. Services.

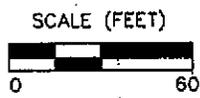
**LEGEND**

- MW-7 ⊕ 76 Monitoring Well with Groundwater Elevation (feet)
- MW-14 ⊕ Shell Monitoring Well with Groundwater Elevation
- TB2 ⊘ Destroyed Shell Well
- 172.00 — Groundwater Elevation Contour
- ➔ General Direction of Groundwater Flow

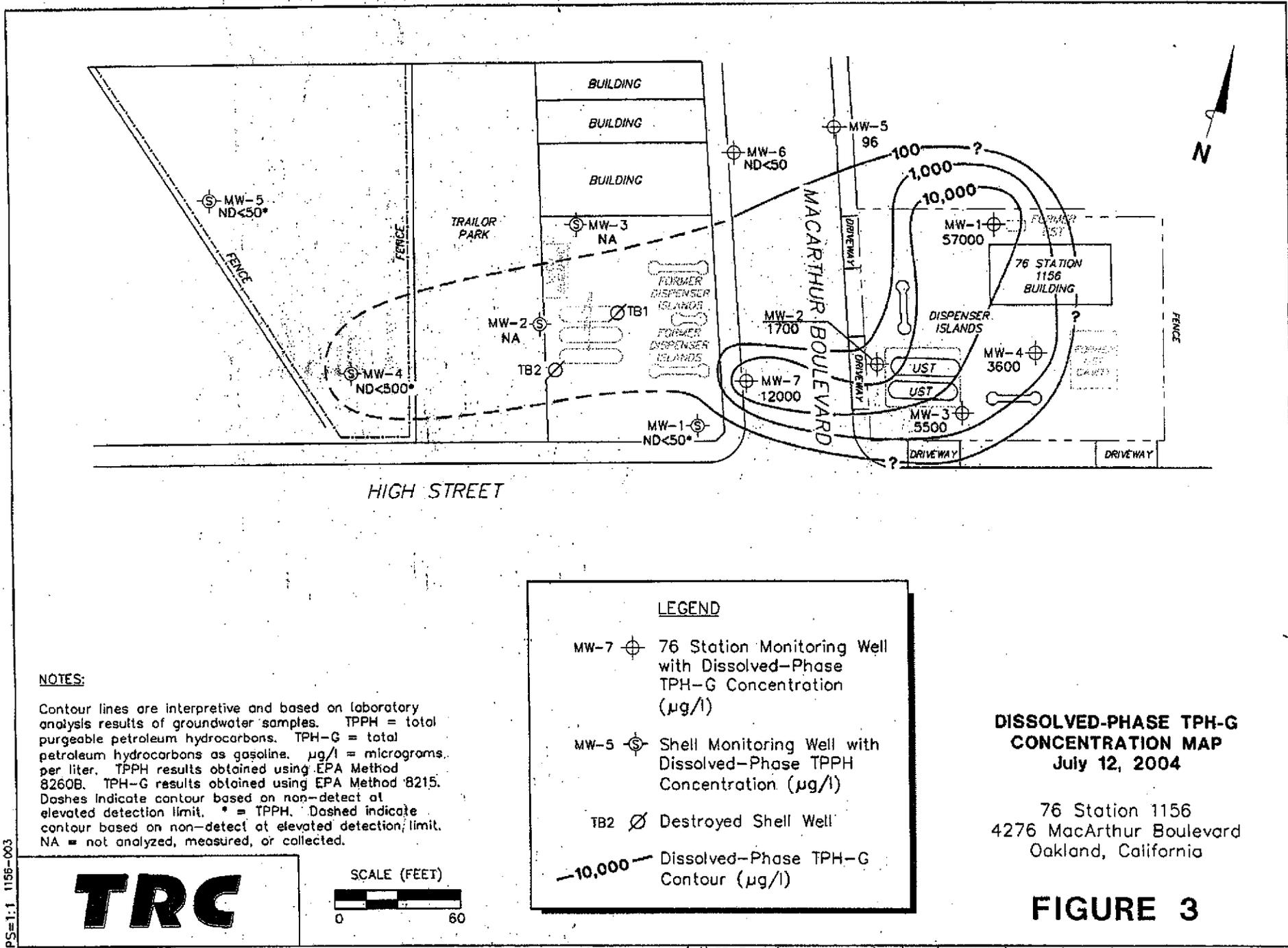
**GROUNDWATER ELEVATION  
CONTOUR MAP  
July 12, 2004**

76 Station 1156  
4276 MacArthur Boulevard  
Oakland, California

**FIGURE 2**



PS=1:1 1156-003



**NOTES:**

Contour lines are interpretive and based on laboratory analysis results of groundwater samples. TPH = total purgeable petroleum hydrocarbons. TPH-G = total petroleum hydrocarbons as gasoline. µg/l = micrograms per liter. TPH results obtained using EPA Method 8260B. TPH-G results obtained using EPA Method 8215. Dashes indicate contour based on non-detect at elevated detection limit. \* = TPHH. Dashed indicate contour based on non-detect at elevated detection limit. NA = not analyzed, measured, or collected.

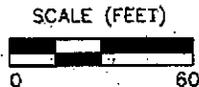
**LEGEND**

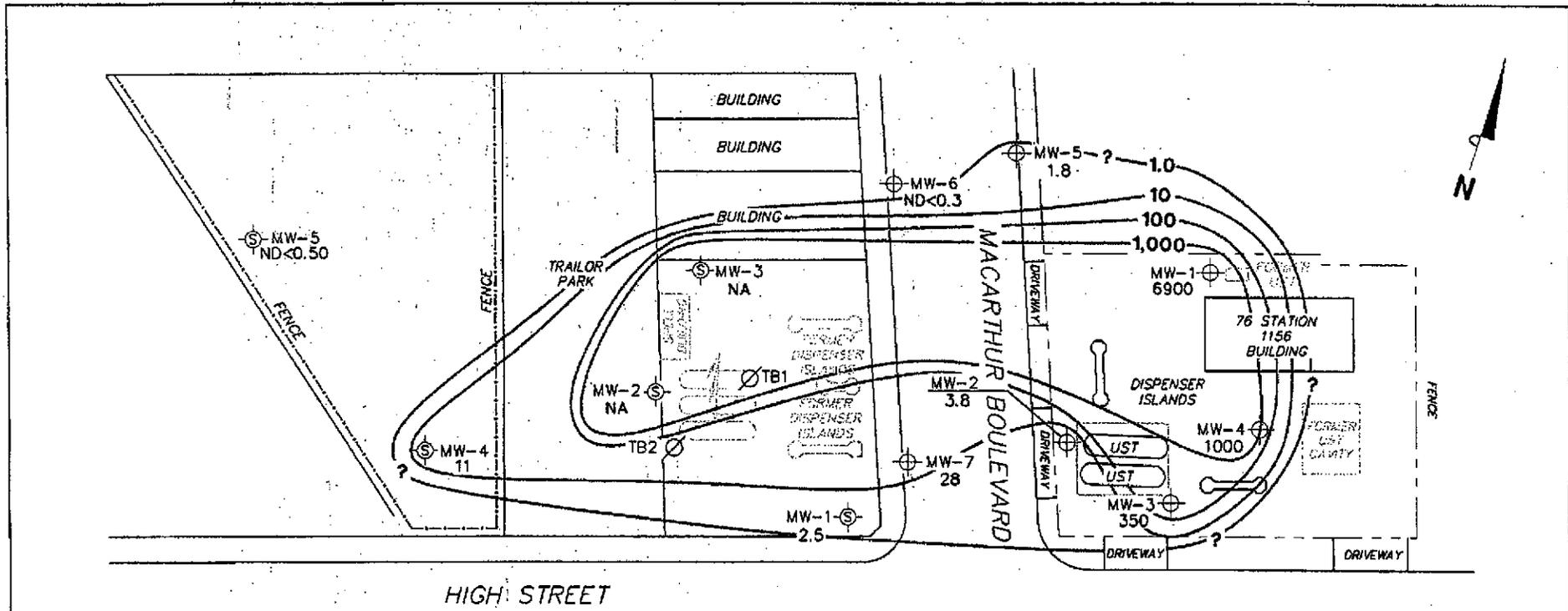
- MW-7 ⊕ 76 Station Monitoring Well with Dissolved-Phase TPH-G Concentration (µg/l)
- MW-5 ⊕ Shell Monitoring Well with Dissolved-Phase TPH Concentration (µg/l)
- TB2 ∅ Destroyed Shell Well
- 10,000- Dissolved-Phase TPH-G Contour (µg/l)

**DISSOLVED-PHASE TPH-G CONCENTRATION MAP**  
July 12, 2004

76 Station 1156  
4276 MacArthur Boulevard  
Oakland, California

**FIGURE 3**





**NOTES:**

Contour lines are interpretive and based on laboratory analysis results of groundwater samples.  $\mu\text{g/l}$  = micrograms per liter. ND = not detected at limit indicated on official laboratory report. UST = underground storage tank. NA = not analyzed, measured, or collected.

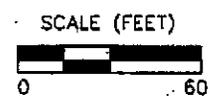
**LEGEND**

- MW-5 76 Monitoring Well with Dissolved-Phase Benzene Concentration ( $\mu\text{g/l}$ )
- MW-7 Shell Monitoring Well
- TB2 Destroyed Shell Well
- 1,000- Dissolved-Phase Benzene Contour ( $\mu\text{g/l}$ )

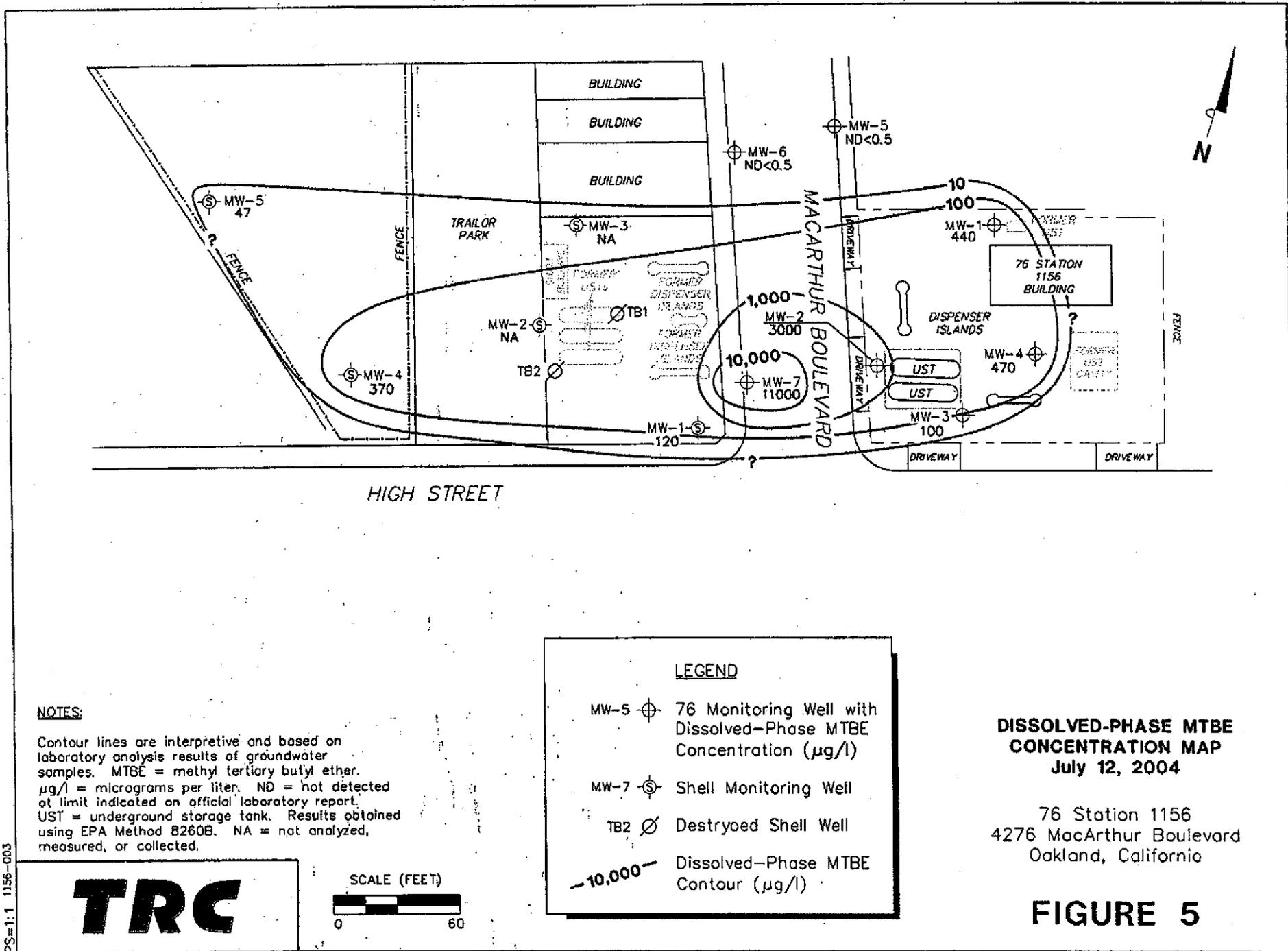
**DISSOLVED-PHASE BENZENE  
CONCENTRATION MAP  
July 12, 2004**

76 Station 1156  
4276 MacArthur Boulevard  
Oakland, California

**FIGURE 4**

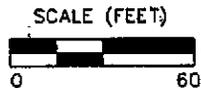


PS-1:1 1156-003



PS=1:1 1156-003

**TRC**



## TABLE KEY

### STANDARD ABBREVIATIONS

--	=	not analyzed, measured, or collected
LPH	=	liquid-phase hydrocarbons
Trace	=	less than 0.01 foot of LPH in well
µg/l	=	micrograms per liter (approx. equivalent to parts per billion, ppb)
mg/l	=	milligrams per liter (approx. equivalent to parts per million, ppm)
ND <	=	not detected at or above laboratory detection limit
TOC	=	top of casing (surveyed reference elevation)

### ANALYTES

BTEX	=	benzene, toluene, ethylbenzene, and (total) xylenes
DIPE	=	di-isopropyl ether
ETBE	=	ethyl tertiary butyl ether
MTBE	=	methyl tertiary butyl ether
PCB	=	polychlorinated biphenyls
PCE	=	tetrachloroethene
TBA	=	tertiary butyl alcohol
TCA	=	trichloroethane
TCE	=	trichloroethene
TPH-G	=	total petroleum hydrocarbons with gasoline distinction
TPH-D	=	total petroleum hydrocarbons with diesel distinction
TPPH	=	total purgeable petroleum hydrocarbons
TRPH	=	total recoverable petroleum hydrocarbons
TAME	=	tertiary amyl methyl ether
1,1-DCA	=	1,1-dichloroethane
1,2-DCA	=	1,2-dichloroethane (same as EDC, ethylene dichloride)
1,1-DCE	=	1,1-dichloroethene
1,2-DCE	=	1,2-dichloroethene (cis- and trans-)

### NOTES

1. Elevations are in feet above mean sea level. Depths are in feet below surveyed top-of-casing.
2. Groundwater elevations for wells with LPH are calculated as:  $\text{Surface Elevation} - \text{Measured Depth to Water} + \frac{\text{Dp} \times \text{LPH Thickness}}$ , where Dp is the density of the LPH, if known. A value of 0.75 is used for gasoline and when the density is not known. A value of 0.83 is used for diesel.
3. Wells with LPH are generally not sampled for laboratory analysis (see General Field Procedures).
4. Comments shown on tables are general. Additional explanations may be included in field notes and laboratory reports, both of which are included as part of this report.
5. A "J" flag indicates that a reported analytical result is an estimated concentration value between the method detection limit (MDL) and the practical quantification limit (PQL) specified by the laboratory.
6. Other laboratory flags (qualifiers) may have been reported. See the official laboratory report (attached) for a complete list of laboratory flags.
7. Concentration graphs based on tables (presented following Figures) show non-detect results prior to the Second Quarter 2000 plotted at fixed values for graphical display. Non-detect results reported since that time are plotted at reporting limits stated in the official laboratory report.
8. Groundwater vs. Time graphs may be corrected for apparent level changes due to re-survey.

### REFERENCE

TRC began groundwater monitoring and sampling for 76 Station 1156 in October 2003. Historical data compiled prior to that time were provided by Gettler-Ryan Inc.

**Table 1**  
**CURRENT FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 12, 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
MW-1		(Screen Interval in feet: 5.0-25.0)												
07/12/04	177.54	7.44	0.00	170.10	-1.01	57000	--	6900	7200	1600	580	490	440	
MW-2		(Screen Interval in feet: 5.0-25.0)												
07/12/04	173.50	5.83	0.00	167.67	-0.62	1700	--	3.8	18	2.6	16	3000	3000	
MW-3		(Screen Interval in feet: 5.0-25.0)												
07/12/04	178.13	7.41	0.00	170.72	-0.78	5500	--	350	310	120	350	180	100	
MW-4		(Screen Interval in feet: 5.0-25.0)												
07/12/04	178.96	6.48	0.00	172.48	-0.80	3600	--	1000	14	260	72	710	470	
MW-5		(Screen Interval in feet: DNA)												
07/12/04	169.18	2.56	0.00	166.62	-0.55	96	--	1.8	3.3	0.54	3.6	2.8	ND<0.5	
MW-6		(Screen Interval in feet: DNA)												
07/12/04	169.04	2.69	0.00	166.35	-0.51	ND<50	--	ND<0.3	ND<0.3	ND<0.3	ND<0.6	6.4	ND<0.5	
MW-7		(Screen Interval in feet: DNA)												
07/12/04	171.64	9.44	0.00	162.20	-0.74	12000	--	28	14	330	200	12000	11000	

**Table 2**  
**HISTORIC FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 1999 Through July 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
<b>MW-1 (Screen Interval in feet: 5.0-25.0)</b>														
07/20/99	174.86	7.50	0.00	167.36	--	120000	--	11000	27000	3300	18000	ND	--	
09/28/99	174.86	8.75	0.00	166.11	-1.25	6020	--	1030	1040	68.5	412	321	333	
01/07/00	174.86	9.05	0.02	165.82	-0.29	72700	--	7410	13900	2070	9620	ND	--	GWE corrected
03/31/00	174.86	7.18	0.00	167.68	1.86	92000	--	10000	23000	3200	14000	ND	--	
07/14/00	174.86	7.68	0.00	167.18	-0.50	108000	--	8250	18700	3750	17800	ND	--	
10/03/00	174.86	7.99	0.00	166.87	-0.31	96000	--	8760	20000	3350	15600	ND	--	
01/03/01	174.86	9.18	0.00	165.68	-1.19	37000	--	5800	13000	1700	8100	2,200	--	
04/04/01	174.86	8.05	0.00	166.81	1.13	86900	--	7780	18500	2470	11800	ND	481	
07/17/01	174.86	7.01	0.00	167.85	1.04	79000	--	5600	11000	2800	12000	ND	230	
10/03/01	177.54	7.89	0.00	169.65	1.80	99000	--	8200	18000	3000	16000	ND<2500	--	
10/05/01	177.54	7.91	0.00	169.63	-0.02	--	--	--	--	--	--	--	--	
01/28/02	177.54	5.98	0.00	171.56	1.93	110000	--	8900	19000	2600	12000	3000	440	
04/25/02	177.54	6.19	0.00	171.35	-0.21	93000	--	8100	18000	3000	15000	810	670	
07/18/02	177.54	6.99	0.00	170.55	-0.80	69000	--	5400	10000	2100	10000	ND<500	620	
10/07/02	177.54	7.73	0.00	169.81	-0.74	82000	--	9200	20000	2600	13000	1300	760	
01/06/03	177.54	5.48	0.00	172.06	2.25	82000	--	6500	18000	2700	11000	ND<1000	790	
04/07/03	177.54	6.30	0.00	171.24	-0.82	74000	--	7000	15000	2400	11000	1000	800	
07/07/03	177.54	6.47	0.00	171.07	-0.17	60000	--	6400	11000	2600	11000	600	530	
10/09/03	177.54	7.85	0.00	169.69	-1.38	91000	81000	8100	17000	3200	14000	--	660	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	177.54	6.69	0.00	170.85	1.16	98000	--	8000	21000	2600	15000	ND<1300	ND<800	
04/28/04	177.54	6.43	0.00	171.11	0.26	93000	--	9000	20000	1300	10000	1400	560	
07/12/04	177.54	7.44	0.00	170.10	-1.01	57000	--	6900	7200	1600	580	490	440	
<b>MW-2 (Screen Interval in feet: 5.0-25.0)</b>														

**Table 2**  
**HISTORIC FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 1999 Through July 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
MW-2 continued														
07/20/99	173.01	5.40	--	167.61	--	ND	--	ND	ND	ND	ND	4500	11000	
09/28/99	173.01	5.60	0.00	167.41	-0.20	1390	--	124	ND	62.9	43.1	5280	6150	
01/07/00	173.01	5.92	0.00	167.09	-0.32	1450	--	99	ND	23.8	16	33100	--	
03/31/00	173.01	5.23	0.00	167.78	0.69	ND	--	42	ND	ND	ND	17000	--	
07/14/00	173.01	5.52	0.00	167.49	-0.29	ND	--	44.7	ND	ND	ND	66500	--	
10/03/00	173.01	6.04	0.00	166.97	-0.52	ND	--	56.7	ND	ND	ND	57500	--	
01/03/01	173.01	6.42	0.00	166.59	-0.38	ND	--	ND	ND	ND	ND	49000	--	
04/04/01	173.01	6.14	0.00	166.87	0.28	ND	--	ND	ND	ND	ND	38700	37800	
07/17/01	173.01	5.30	0.00	167.71	0.84	ND	--	ND	ND	ND	ND	65000	56000	
10/03/01	173.50	7.38	0.00	166.12	-1.59	ND<250	--	2.7	ND<2.5	ND<2.5	ND<2.5	14000	18000	
01/28/02	173.50	5.68	0.00	167.82	--	ND<250	--	2.5	4.4	2.8	7.4	11000	10000	
04/25/02	173.50	5.82	0.00	167.68	-0.14	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	8400	8100	
07/18/02	173.50	6.90	0.00	166.60	-1.08	ND<500	--	ND<5.0	ND<5.0	ND<5.0	ND<5.0	4300	8800	
10/07/02	173.50	7.54	0.00	165.96	-0.64	4300	--	ND<10	27	21	75	7100	5900	
01/06/03	173.50	6.79	0.00	166.71	0.75	5900	--	ND<5.0	ND<5.0	ND<5.0	ND<5.0	31000	35000	
04/07/03	173.50	6.49	0.00	167.01	0.30	1500	--	ND<10	14	11	38	2000	1500	
07/07/03	173.50	6.72	0.00	166.78	-0.23	ND<2500	--	ND<25	ND<25	ND<25	ND<25	5500	8300	
10/09/03	173.50	7.16	0.00	166.34	-0.44	3500	ND<5000	ND<50	ND<50	ND<50	ND<100	--	8500	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	173.50	5.53	0.00	167.97	1.63	3200	--	ND<25	ND<25	ND<25	ND<25	2600	3200	
04/28/04	173.50	5.21	0.00	168.29	0.32	22000	--	ND<3	9.2	ND<3	ND<6	35000	22000	
07/12/04	173.50	5.83	0.00	167.67	-0.62	1700	--	3.8	18	2.6	16	3000	3000	
MW-3 (Screen Interval in feet: 5.0-25.0)														
07/20/99	178.44	8.50	--	169.94	--	1000	--	76	52	79	76	330	--	

**Table 2**  
**HISTORIC FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 1999 Through July 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
MW-3 continued														
09/28/99	178.44	8.31	0.00	170.13	0.19	1860	--	174	95.4	71.8	135	443	288	
01/07/00	178.44	8.56	0.00	169.88	-0.25	28400	--	2450	3090	1560	3910	1940	--	
03/31/00	178.44	8.42	0.00	170.02	0.14	26000	--	1300	2900	2600	3500	2800	--	
07/14/00	178.44	8.61	0.00	169.83	-0.19	24500	--	1850	2630	2750	3900	548	--	
10/03/00	178.44	9.14	0.00	169.30	-0.53	22000	--	1910	2020	2400	2680	965	--	
01/03/01	178.44	9.06	0.00	169.38	0.08	14000	--	1600	1100	2300	1400	3300	--	
04/04/01	178.44	8.98	0.00	169.46	0.08	19600	--	1150	1470	2100	1820	1050	450	
07/17/01	178.44	7.46	0.00	170.98	1.52	26000	--	1500	2100	2100	3400	ND	350	
10/03/01	178.13	9.81	0.00	168.32	-2.66	22000	--	830	1900	1700	3000	ND<1000	--	
01/28/02	178.13	7.39	0.00	170.74	--	30000	--	880	2600	1800	4300	3200	210	
04/25/02	178.13	7.86	0.00	170.27	-0.47	18000	--	500	2000	1300	3800	500	260	
07/18/02	178.13	8.83	0.00	169.30	-0.97	37000	--	1800	3800	2200	8000	ND<250	270	
10/07/02	178.13	9.71	0.00	168.42	-0.88	26000	--	600	2000	1800	6400	ND<120	ND<200	
01/06/03	178.13	7.40	0.00	170.73	2.31	27000	--	800	2100	2000	6400	440	110	
04/07/03	178.13	8.17	0.00	169.96	-0.77	28000	--	660	2200	1900	6300	440	100	
07/07/03	178.13	8.35	0.00	169.78	-0.18	33000	--	1200	2500	2700	8300	280	100	
10/09/03	178.13	9.39	0.00	168.74	-1.04	3800	6000	120	260	390	1200	--	190	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	178.13	6.86	0.00	171.27	2.53	5100	--	120	240	310	720	190	230	
04/28/04	178.13	6.63	0.00	171.50	0.23	7300	--	250	440	580	1300	740	240	
07/12/04	178.13	7.41	0.00	170.72	-0.78	5500	--	350	310	120	350	180	100	
MW-4 (Screen Interval in feet: 5.0-25.0)														
07/20/99	179.10	7.40	--	171.70	--	69	--	2.7	0.77	ND	7.1	100	--	
09/28/99	179.10	7.19	0.00	171.91	0.21	4050	--	1250	72	51.3	133	416	459	

**Table 2**  
**HISTORIC FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 1999 Through July 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
MW-4 continued														
01/07/00	179.10	8.98	0.00	170.12	-1.79	7010	--	2260	167	271	276	764	--	
03/31/00	179.10	7.26	0.00	171.84	1.72	5500	--	1800	230	330	400	1000	--	
07/14/00	179.10	7.67	0.00	171.43	-0.41	7940	--	2810	332	450	247	1530	--	
10/03/00	179.10	8.12	0.00	170.98	-0.45	11400	--	3110	437	519	816	1040	--	
01/03/01	179.10	9.10	0.00	170.00	-0.98	8600	--	2500	340	480	960	850	--	
04/04/01	179.10	8.63	0.00	170.47	0.47	9950	--	2380	126	416	725	1140	819	
07/17/01	179.10	6.49	0.00	172.61	2.14	10000	--	2300	110	410	800	1200	900	
10/03/01	178.96	7.01	0.00	171.95	-0.66	7800	--	2100	85	380	390	580	820	
01/28/02	178.96	6.21	0.00	172.75	--	12000	--	2100	130	350	670	1100	500	
04/25/02	178.96	5.49	0.00	173.47	0.72	3300	--	1300	42	270	250	680	600	
07/18/02	178.96	8.28	0.00	170.68	-2.79	4800	--	1300	71	290	220	530	760	
10/07/02	178.96	7.49	0.00	171.47	0.79	5100	--	1400	110	330	380	650	540	
01/06/03	178.96	6.36	0.00	172.60	1.13	5600	--	1100	57	260	320	370	520	
04/07/03	178.96	6.24	0.00	172.72	0.12	5100	--	1100	55	190	370	550	420	
07/07/03	178.96	6.43	0.00	172.53	-0.19	3000	--	920	28	170	330	480	450	
10/09/03	178.96	7.97	0.00	170.99	-1.54	530	700	100	2.2	5.4	14	--	270	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	178.96	6.30	0.00	172.66	1.67	530	--	88	4.1	9.9	11	150	180	
04/28/04	178.96	5.68	0.00	173.28	0.62	1200	--	200	5.3	21	13	490	310	
07/12/04	178.96	6.48	0.00	172.48	-0.80	3600	--	1000	14	260	72	710	470	
MW-5 (Screen Interval in feet: DNA)														
10/03/01	169.18	2.81	0.00	166.37	--	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1800	2100	
01/28/02	169.18	1.88	0.00	167.30	--	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	650	550	
04/25/02	169.18	1.99	0.00	167.19	-0.11	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2200	2400	

**Table 2**  
**HISTORIC FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 1999 Through July 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
MW-5 continued														
07/18/02	169.18	2.49	0.00	166.69	-0.50	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	530	690	
10/07/02	169.18	2.80	0.00	166.38	-0.31	140	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	300	330	
01/06/03	169.18	1.86	0.00	167.32	0.94	120	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	410	350	
04/07/03	169.18	2.15	0.00	167.03	-0.29	220	--	0.53	ND<0.50	ND<0.50	ND<0.50	450	420	
07/07/03	169.18	2.26	0.00	166.92	-0.11	120	--	ND<1.2	ND<1.2	ND<1.2	ND<1.2	220	200	
10/09/03	169.18	2.72	0.00	166.46	-0.46	560	210	ND<1.0	ND<1.0	ND<1.0	ND<2.0	--	290	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	169.18	2.00	0.00	167.18	0.72	560	--	ND<2.5	ND<2.5	ND<2.5	ND<2.5	670	760	
04/28/04	169.18	2.01	0.00	167.17	-0.01	760	--	ND<0.3	1.8	ND<0.3	ND<0.6	1200	790	
07/12/04	169.18	2.56	0.00	166.62	-0.55	96	--	1.8	3.3	0.54	3.6	2.8	ND<0.5	
MW-6 (Screen Interval in feet: DNA)														
10/03/01	169.04	2.87	0.00	166.17	--	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	200	270	
01/28/02	169.04	1.82	0.00	167.22	--	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5	--	
04/25/02	169.04	2.01	0.00	167.03	-0.19	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5	--	
07/18/02	169.04	2.44	0.00	166.60	-0.43	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5	ND<2.0	
10/07/02	169.04	2.72	0.00	166.32	-0.28	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5	ND<2.0	
01/06/03	169.04	1.90	0.00	167.14	0.82	ND<50	--	0.62	1.2	1.2	3.5	ND<2.0	ND<2.0	
04/07/03	169.04	2.02	0.00	167.02	-0.12	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	46	46	
07/07/03	169.04	2.21	0.00	166.83	-0.19	ND<50	--	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.0	ND<2.0	
10/09/03	169.04	2.71	0.00	166.33	-0.50	ND<50	ND<50	0.95	3.0	1.4	5.5	--	ND<2.0	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	169.04	2.00	0.00	167.04	0.71	ND<50	--	ND<0.50	0.57	ND<0.50	0.64	ND<5.0	ND<2.0	
04/28/04	169.04	2.18	0.00	166.86	-0.18	ND<50	--	0.39	0.78	ND<0.3	ND<0.6	ND<1	ND<0.5	
07/12/04	169.04	2.69	0.00	166.35	-0.51	ND<50	--	ND<0.3	ND<0.3	ND<0.3	ND<0.6	6.4	ND<0.5	

MW-7 (Screen Interval in feet: DNA)

**Table 2**  
**HISTORIC FLUID LEVELS AND SELECTED ANALYTICAL RESULTS**  
**July 1999 Through July 2004**  
**76 Station 1156**

Date Sampled	TOC Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	TPH-G (µg/l)	TPPH 8260B (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	MTBE 8021B (µg/l)	MTBE 8260B (µg/l)	Comments
MW-7 continued														
10/03/01	171.64	7.62	0.00	164.02	--	10000	--	210	ND<50	ND<50	800	35000	40000	
01/28/02	171.64	7.21	0.00	164.43	--	ND<1000	--	ND<10	ND<10	ND<10	ND<10	42000	38000	
04/25/02	171.64	7.25	0.00	164.39	-0.04	ND<5000	--	660	ND<50	ND<50	ND<50	42000	45000	
07/18/02	171.64	8.12	0.00	163.52	-0.87	ND<5000	--	130	ND<50	ND<50	ND<50	51000	53000	
10/07/02	171.64	7.71	0.00	163.93	0.41	18000	--	ND<50	ND<50	ND<50	ND<50	33000	38000	
01/06/03	171.64	7.63	0.00	164.01	0.08	410	--	0.61	1.0	0.89	2.9	3900	3100	
04/07/03	171.64	7.58	0.00	164.06	0.05	13,000	--	ND<20	ND<20	ND<20	ND<20	32000	28000	
07/07/03	171.64	7.56	0.00	164.08	0.02	990	--	8.2	ND<0.50	1.2	ND<0.50	36000	45000	
10/09/03	171.64	7.72	0.00	163.92	-0.16	6800	ND<13000	ND<130	ND<130	ND<130	ND<250	--	20000	Sampled for TPH-G by 8015M on 11/14/03.
01/14/04	171.64	6.97	0.00	164.67	0.75	19000	--	ND<100	ND<100	ND<100	ND<100	20000	25000	
04/28/04	171.64	8.70	0.00	162.94	-1.73	19000	--	ND<3	ND<3	ND<3	ND<6	30000	21000	
07/12/04	171.64	9.44	0.00	162.20	-0.74	12000	--	28	14	330	200	12000	11000	

**Table 3**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	TPH-D (µg/l)	cis-1,3-dichloro-propene (µg/l)	trans-1,3-Dichloro-propene (µg/l)	1,4-Dichloro-benzene (µg/l)	EDC (µg/l)	Chloro-benzene (µg/l)	DBCM (µg/l)	PCE (µg/l)	cis-1,2-DCE (µg/l)	trans-1,2-DCE (µg/l)	1,3-Dichloro-benzene (µg/l)	Carbon Tetra-chloride (µg/l)	Chloro-form (µg/l)	1,1,1-TCA (µg/l)	Bromo-methane (µg/l)
<b>MW-1</b>															
07/20/99	16000	--	--	--	--	12	--	--	3.6	--	--	--	--	--	--
09/28/99	2410	--	--	--	--	--	--	--	--	--	--	--	--	--	--
01/07/00	7870	--	--	--	--	--	--	--	--	--	--	--	--	--	--
03/31/00	3600	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/14/00	8580	--	--	--	--	--	--	334	--	--	--	--	--	--	--
10/03/00	9260	--	--	--	--	--	--	--	--	--	--	--	--	--	--
01/03/01	11000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
04/04/01	14000	--	--	--	ND	5.6	--	--	3.4	--	--	--	--	--	--
07/17/01	2200	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
10/05/01	13000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
01/28/02	4400	--	--	--	--	--	--	--	--	--	--	--	--	--	--
04/25/02	9000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/18/02	9200	--	--	1.3	ND<10	5.9	--	ND<0.60	1.3	--	--	--	--	--	--
10/07/02	3400	--	--	--	ND<200	--	--	--	--	--	--	--	--	--	--
01/06/03	5100	--	--	--	ND<400	--	--	--	--	--	--	--	--	--	--
04/07/03	2800	--	--	--	ND<200	--	--	--	--	--	--	--	--	--	--
07/07/03	7000	--	--	--	ND<500	ND<120	--	ND<120	ND<120	--	--	--	--	--	--
10/09/03	4300	--	--	--	ND<400	--	--	--	--	--	--	--	--	--	--
01/14/04	6200	--	--	--	ND<800	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	ND<50	--	--	--	--	--	--	--	--	--	--
07/12/04	270	ND<10	ND<10	ND<2	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<2	ND<10	ND<10	ND<10	ND<20
<b>MW-2</b>															
04/04/01	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
07/17/01	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
07/18/02	--	--	--	--	ND<100	--	--	--	--	--	--	--	--	--	--
10/07/02	--	--	--	--	ND<400	--	--	--	--	--	--	--	--	--	--

**Table 3**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	TPH-D (µg/l)	cis-1,3-dichloro-propene (µg/l)	trans-1,3-Dichloro-propene (µg/l)	1,4-Dichloro-benzene (µg/l)	EDC (µg/l)	Chloro-benzene (µg/l)	DBCM (µg/l)	PCE (µg/l)	cis-1,2-DCE (µg/l)	trans-1,2-DCE (µg/l)	1,3-Dichloro-benzene (µg/l)	Carbon Tetra-chloride (µg/l)	Chloro-form (µg/l)	1,1,1-TCA (µg/l)	Bromo-methane (µg/l)
<b>MW-2 continued</b>															
01/06/03	--	--	--	--	ND<1000	--	--	--	--	--	--	--	--	--	--
04/07/03	--	--	--	--	ND<40	--	--	--	--	--	--	--	--	--	--
07/07/03	--	--	--	--	ND<100	--	--	--	--	--	--	--	--	--	--
10/09/03	--	--	--	--	ND<200	--	--	--	--	--	--	--	--	--	--
01/14/04	--	--	--	--	ND<50	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	ND<0.5	--	--	--	--	--	--	--	--	--	--
07/12/04	--	--	--	--	ND<3	--	--	--	--	--	--	--	--	--	--
<b>MW-3</b>															
04/04/01	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
07/17/01	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
07/18/02	--	--	--	--	ND<5.0	--	--	--	--	--	--	--	--	--	--
10/07/02	--	--	--	--	ND<200	--	--	--	--	--	--	--	--	--	--
01/06/03	--	--	--	--	ND<80	--	--	--	--	--	--	--	--	--	--
04/07/03	--	--	--	--	ND<80	--	--	--	--	--	--	--	--	--	--
07/07/03	--	--	--	--	ND<40	--	--	--	--	--	--	--	--	--	--
10/09/03	--	--	--	--	ND<20	--	--	--	--	--	--	--	--	--	--
01/14/04	--	--	--	--	ND<20	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	ND<3	--	--	--	--	--	--	--	--	--	--
07/12/04	--	--	--	--	ND<10	--	--	--	--	--	--	--	--	--	--
<b>MW-4</b>															
04/04/01	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
07/17/01	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
07/18/02	--	--	--	--	49	--	--	--	--	--	--	--	--	--	--
10/07/02	--	--	--	--	ND<200	--	--	--	--	--	--	--	--	--	--
01/06/03	--	--	--	--	ND<20	--	--	--	--	--	--	--	--	--	--
04/07/03	--	--	--	--	ND<20	--	--	--	--	--	--	--	--	--	--

**Table 3**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	TPH-D (µg/l)	cis-1,3-dichloro-propene (µg/l)	trans-1,3-Dichloro-propene (µg/l)	1,4-Dichloro-benzene (µg/l)	EDC (µg/l)	Chloro-benzene (µg/l)	DBCM (µg/l)	PCE (µg/l)	cis-1,2-DCE (µg/l)	trans-1,2-DCE (µg/l)	1,3-Dichloro-benzene (µg/l)	Carbon Tetra-chloride (µg/l)	Chloro-form (µg/l)	1,1,1-TCA (µg/l)	Bromo-methane (µg/l)
MW-4 continued															
07/07/03	--	--	--	--	ND<20	--	--	--	--	--	--	--	--	--	--
10/09/03	--	--	--	--	ND<4.0	--	--	--	--	--	--	--	--	--	--
01/14/04	--	--	--	--	6.5	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	ND<0.5	--	--	--	--	--	--	--	--	--	--
07/12/04	--	--	--	--	14	--	--	--	--	--	--	--	--	--	--
MW-5															
07/18/02	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
10/07/02	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
01/06/03	ND<50	--	--	--	ND<2.0	ND<0.50	--	ND<0.50	ND<0.50	--	--	--	--	--	--
04/07/03	--	--	--	--	ND<10	--	--	--	--	--	--	--	--	--	--
07/07/03	--	--	--	--	ND<4.0	--	--	--	--	--	--	--	--	--	--
10/09/03	--	--	--	--	ND<4.0	--	--	--	--	--	--	--	--	--	--
01/14/04	--	--	--	--	ND<40	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	1.8	--	--	--	--	--	--	--	--	--	--
07/12/04	--	--	--	--	0.76	--	--	--	--	--	--	--	--	--	--
MW-6															
07/18/02	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
10/07/02	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
01/06/03	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
04/07/03	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
07/07/03	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
10/09/03	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
01/14/04	--	--	--	--	ND<2.0	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	ND<0.5	--	--	--	--	--	--	--	--	--	--
07/12/04	--	--	--	--	ND<0.5	--	--	--	--	--	--	--	--	--	--
MW-7															

**Table 3**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	TPH-D (µg/l)	cis-1,3-dichloro-propene (µg/l)	trans-1,3-Dichloro-propene (µg/l)	1,4-Dichloro-benzene (µg/l)	EDC (µg/l)	Chloro-benzene (µg/l)	DBCM (µg/l)	PCE (µg/l)	cis-1,2-DCE (µg/l)	trans-1,2-DCE (µg/l)	1,3-Dichloro-benzene (µg/l)	Carbon Tetra-chloride (µg/l)	Chloro-form (µg/l)	1,1,1-TCA (µg/l)	Bromo-methane (µg/l)
MW-7 continued															
07/18/02	--	--	--	--	ND<20	--	--	--	--	--	--	--	--	--	--
10/07/02	--	--	--	--	ND<400	--	--	--	--	--	--	--	--	--	--
01/06/03	ND<50	--	--	--	ND<200	ND<50	--	ND<50	ND<50	--	--	--	--	--	--
04/07/03	--	--	--	--	ND<800	--	--	--	--	--	--	--	--	--	--
07/07/03	--	--	--	--	ND<400	--	--	--	--	--	--	--	--	--	--
10/09/03	--	--	--	--	ND<500	--	--	--	--	--	--	--	--	--	--
01/14/04	--	--	--	--	ND<800	--	--	--	--	--	--	--	--	--	--
04/28/04	--	--	--	--	6.8	--	--	--	--	--	--	--	--	--	--
07/12/04	--	--	--	--	5.1	--	--	--	--	--	--	--	--	--	--

**Table 3b**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Chloro-methane (µg/l)	Chloro-ethane (µg/l)	Vinyl chloride (µg/l)	Methylene chloride (µg/l)	Bromoform (µg/l)	BDCM (µg/l)	1,1-DCA (µg/l)	1,1-DCE (µg/l)	Trichloro-fluoro-methane (µg/l)	Trichloro-trifluoro-ethane (µg/l)	1,2-dichloro-propane (µg/l)	1,1,2-TCA (µg/l)	TCE (µg/l)	1,1,2,2-Tetrachloro-ethane (µg/l)	1,2-DCB (µg/l)
<b>MW-1</b>															
07/20/99	--	--	--	--	--	--	2.0	--	--	--	0.92	--	--	--	3.9
03/31/00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.2
04/04/01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.6
07/17/01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18
07/18/02	--	1.1	--	--	--	--	--	--	--	--	--	--	--	--	5.8
07/12/04	ND<10	ND<10	ND<10	ND<20	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<2

**Table 3c**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Dichloro-difluoro-methane (µg/l)	n-Propyl-benzene (µg/l)	EDB (µg/l)	1,3,5-Trimethyl-benzene (µg/l)	1,2,4-Trichloro-benzene (µg/l)	HCBD (µg/l)	1,2,4-Trimethyl-benzene (µg/l)	Naphth-alene (µg/l)	TAME 8260B (µg/l)	TBA 8260B (µg/l)	DIPE 8260B (µg/l)	ETBE 8260B (µg/l)	Ethanol 8015B (mg/l)	Acenaph-thylene (µg/l)	Acenaph-thene (µg/l)
<b>MW-1</b>															
07/20/99	--	--	--	--	--	--	--	600	--	--	--	--	--	--	--
09/28/99	--	--	--	318	--	--	1240	534	ND	ND	ND	ND	--	--	--
01/07/00	--	371	--	597	--	--	2210	1050	--	--	--	--	--	--	--
03/31/00	--	--	--	--	--	--	--	140	--	--	--	--	--	--	--
07/14/00	--	--	--	--	--	--	--	690	--	--	--	--	--	--	--
10/03/00	--	--	--	--	--	--	--	361	--	--	--	--	--	--	--
01/03/01	--	--	--	--	--	--	--	400	--	--	--	--	--	--	--
04/04/01	--	--	ND	--	--	--	--	490	ND	ND	ND	ND	--	--	--
07/17/01	--	--	ND	--	--	--	--	740	ND	ND	ND	ND	--	--	--
07/18/02	--	--	ND<10	--	--	--	--	910	ND<10	ND<100	ND<10	ND<10	--	--	--
10/07/02	--	--	ND<200	--	--	--	--	--	ND<200	ND<10000	ND<200	ND<200	--	--	--
01/06/03	--	--	ND<400	--	--	--	--	--	ND<400	ND<20000	ND<400	ND<400	--	--	--
04/07/03	--	--	ND<200	--	--	--	--	--	ND<200	ND<10000	ND<200	ND<200	--	--	--
07/07/03	--	--	ND<500	--	--	--	--	850	ND<500	ND<25000	ND<500	ND<500	ND<120000	--	--
10/09/03	--	--	ND<400	--	--	--	--	--	ND<400	ND<20000	ND<400	ND<400	--	--	--
01/14/04	--	--	ND<800	--	--	--	--	--	ND<800	ND<40000	ND<800	ND<800	--	--	--
04/28/04	--	--	ND<50	--	--	--	--	--	ND<1	800	ND<1	ND<1	--	--	--
07/12/04	ND<10	--	ND<10	--	ND<2	ND<2	--	450	ND<20	1100	ND<20	ND<20	--	ND<2	ND<2
<b>MW-2</b>															
09/28/99	--	--	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--
04/04/01	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--
07/17/01	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--
07/18/02	--	--	ND<100	--	--	--	--	--	ND<100	ND<1000	ND<100	ND<100	--	--	--
10/07/02	--	--	ND<400	--	--	--	--	--	ND<400	ND<20000	ND<400	ND<400	--	--	--
01/06/03	--	--	ND<1000	--	--	--	--	--	ND<1000	ND<50000	ND<1000	ND<1000	--	--	--
04/07/03	--	--	ND<40	--	--	--	--	--	ND<40	ND<2000	ND<40	ND<40	--	--	--

**Table 3c**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Dichloro-difluoro-methane (µg/l)	n-Propyl-benzene (µg/l)	EDB (µg/l)	1,3,5-Trimethyl-benzene (µg/l)	1,2,4-Trichloro-benzene (µg/l)	HCBD (µg/l)	1,2,4-Trimethyl-benzene (µg/l)	Naphth-alene (µg/l)	TAME 8260B (µg/l)	TBA 8260B (µg/l)	DIPE 8260B (µg/l)	ETBE 8260B (µg/l)	Ethanol 8015B (mg/l)	Acenaph-thylene (µg/l)	Acenaph-thene (µg/l)
MW-2 continued															
07/07/03	--	--	ND<100	--	--	--	--	--	ND<100	ND<5000	ND<100	ND<100	--	--	--
10/09/03	--	--	ND<200	--	--	--	--	--	ND<200	ND<10000	ND<200	ND<200	--	--	--
01/14/04	--	--	ND<50	--	--	--	--	--	ND<50	ND<2500	ND<50	ND<50	--	--	--
04/28/04	--	--	ND<0.5	--	--	--	--	--	11	13000	ND<1	ND<1	--	--	--
07/12/04	--	--	ND<3	--	--	--	--	--	ND<5	110	ND<5	ND<5	--	--	--
MW-3															
09/28/99	--	--	--	--	--	--	--	--	8.80	ND	ND	ND	--	--	--
04/04/01	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--
07/17/01	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--
07/18/02	--	--	ND<5.0	--	--	--	--	--	ND<5.0	ND<50	ND<5.0	ND<5.0	--	--	--
10/07/02	--	--	ND<200	--	--	--	--	--	ND<200	ND<10000	ND<200	ND<200	--	--	--
01/06/03	--	--	ND<80	--	--	--	--	--	ND<80	ND<4000	ND<80	ND<80	--	--	--
04/07/03	--	--	ND<80	--	--	--	--	--	ND<80	ND<4000	ND<80	ND<80	--	--	--
07/07/03	--	--	ND<40	--	--	--	--	--	ND<40	ND<2000	ND<40	ND<40	--	--	--
10/09/03	--	--	ND<20	--	--	--	--	--	ND<20	ND<1000	ND<20	ND<20	--	--	--
01/14/04	--	--	ND<20	--	--	--	--	--	ND<20	ND<1000	ND<20	ND<20	--	--	--
04/28/04	--	--	ND<3	--	--	--	--	--	ND<1	ND<12	ND<1	ND<1	--	--	--
07/12/04	--	--	ND<10	--	--	--	--	--	ND<20	350	ND<20	ND<20	--	--	--
MW-4															
09/28/99	--	--	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--
04/04/01	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--
07/17/01	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--
07/18/02	--	--	ND<10	--	--	--	--	--	ND<10	ND<100	ND<10	ND<10	--	--	--
10/07/02	--	--	ND<200	--	--	--	--	--	ND<200	ND<10000	ND<200	ND<200	--	--	--
01/06/03	--	--	ND<20	--	--	--	--	--	ND<20	ND<1000	ND<20	ND<20	--	--	--
04/07/03	--	--	ND<20	--	--	--	--	--	ND<20	ND<1000	ND<20	ND<20	--	--	--

**Table 3c**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Dichloro- difluoro- methane (µg/l)	n-Propyl- benzene (µg/l)	EDB (µg/l)	1,3,5- Trimethyl- benzene (µg/l)	1,2,4- Trichloro- benzene (µg/l)	HCBD (µg/l)	1,2,4- Trimethyl- benzene (µg/l)	Naphth- alene (µg/l)	TAME 8260B (µg/l)	TBA 8260B (µg/l)	DIPB 8260B (µg/l)	ETBE 8260B (µg/l)	Ethanol 8015B (mg/l)	Acenaph- thylene (µg/l)	Acenaph- thene (µg/l)
MW-4 continued															
07/07/03	--	--	ND<20	--	--	--	--	--	ND<20	ND<1000	ND<20	ND<20	--	--	--
10/09/03	--	--	ND<4.0	--	--	--	--	--	ND<4.0	ND<200	ND<4.0	ND<4.0	--	--	--
01/14/04	--	--	ND<4.0	--	--	--	--	--	ND<4.0	ND<200	ND<4.0	ND<4.0	--	--	--
04/28/04	--	--	ND<0.5	--	--	--	--	--	ND<1	150	ND<1	ND<1	--	--	--
07/12/04	--	--	ND<3	--	--	--	--	--	ND<5	210	ND<5	ND<5	--	--	--
MW-5															
07/18/02	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<20	ND<2.0	ND<2.0	--	--	--
10/07/02	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
01/06/03	--	--	ND<2.0	--	--	--	--	ND<10	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
04/07/03	--	--	ND<10	--	--	--	--	--	ND<10	ND<500	ND<10	ND<10	--	--	--
07/07/03	--	--	ND<4.0	--	--	--	--	--	ND<4.0	ND<200	ND<4.0	ND<4.0	--	--	--
10/09/03	--	--	ND<4.0	--	--	--	--	--	ND<4.0	ND<200	ND<4.0	ND<4.0	--	--	--
01/14/04	--	--	ND<40	--	--	--	--	--	ND<40	ND<2000	ND<40	ND<40	--	--	--
04/28/04	--	--	ND<0.5	--	--	--	--	--	ND<1	ND<12	ND<1	ND<1	--	--	--
07/12/04	--	--	ND<0.5	--	--	--	--	--	ND<1	ND<12	ND<1	ND<1	--	--	--
MW-6															
07/18/02	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<20	ND<2.0	ND<2.0	--	--	--
10/07/02	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
01/06/03	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
04/07/03	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
07/07/03	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
10/09/03	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
01/14/04	--	--	ND<2.0	--	--	--	--	--	ND<2.0	ND<100	ND<2.0	ND<2.0	--	--	--
04/28/04	--	--	ND<0.5	--	--	--	--	--	ND<1	ND<12	ND<1	ND<1	--	--	--
07/12/04	--	--	ND<0.5	--	--	--	--	--	ND<1	ND<12	ND<1	ND<1	--	--	--
MW-7															

Table 3c  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Dichloro-difluoromethane (µg/l)	n-Propylbenzene (µg/l)	EDB (µg/l)	1,3,5-Trimethylbenzene (µg/l)	1,2,4-Trichlorobenzene (µg/l)	HCBD (µg/l)	1,2,4-Trimethylbenzene (µg/l)	Naphthalene (µg/l)	TAME 8260B (µg/l)	TBA 8260B (µg/l)	DIPE 8260B (µg/l)	ETBE 8260B (µg/l)	Ethanol 8015B (mg/l)	Acenaphthylene (µg/l)	Acenaphthene (µg/l)
MW-7 continued															
07/18/02	--	--	ND<20	--	--	--	--	--	ND<20	33000	ND<20	ND<20	--	--	--
10/07/02	--	--	ND<400	--	--	--	--	--	ND<400	26000	ND<400	ND<400	--	--	--
01/06/03	--	--	ND<200	--	--	--	--	ND<10	ND<200	ND<10000	ND<200	ND<200	--	--	--
04/07/03	--	--	ND<800	--	--	--	--	--	ND<800	ND<40000	ND<800	ND<800	--	--	--
07/07/03	--	--	ND<400	--	--	--	--	--	ND<400	27000	ND<400	ND<400	--	--	--
10/09/03	--	--	ND<500	--	--	--	--	--	ND<500	ND<25000	ND<500	ND<500	--	--	--
01/14/04	--	--	ND<800	--	--	--	--	--	ND<800	ND<40000	ND<800	ND<800	--	--	--
04/28/04	--	--	ND<0.5	--	--	--	--	--	12	9200	ND<1	ND<1	--	--	--
07/12/04	--	--	ND<5	--	--	--	--	--	ND<10	4600	ND<10	ND<10	--	--	--

**Table 3d**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Fluorene (µg/l)	Phenanthrene (µg/l)	Anthracene (µg/l)	Fluoranthene (µg/l)	Pyrene (µg/l)	Benzo(a)Anthracene (µg/l)	Chrysene (µg/l)	B(b)Fl (µg/l)	B(k)F (µg/l)	Benzo(a)Pyrene (µg/l)	DB(a,h)A (µg/l)	Benzo(g,h,i)-Perylene (µg/l)	Indeno(1,2,3c,d)-Pyrene (µg/l)	Ethanol 8260B (µg/l)	Bis(2-ethylhexyl)-phthalate (µg/l)
<b>MW-1</b>															
03/31/00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10
10/03/00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	51.6
04/04/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	55
07/17/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	400
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<2500000	120
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<50000000	--
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<100000000	--
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<50000000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	70
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<100000	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<200000	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
07/12/04	ND<2	ND<2	ND<2	ND<2	ND<2	ND<2	ND<2	ND<2	ND<2	ND<2	ND<3	ND<2	ND<2	ND<20000	ND<5
<b>MW-2</b>															
04/04/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
07/17/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<25000000	--
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<100000000	--
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<250000000	--
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<10000000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<25000000	--
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<50000	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<13000	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
07/12/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<4000	--
<b>MW-3</b>															

**Table 3d**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Fluorene (µg/l)	Phenanthrene (µg/l)	Anthracene (µg/l)	Fluoranthene (µg/l)	Pyrene (µg/l)	Benzo (a)Anthracene (µg/l)	Chrysene (µg/l)	B(b)Fl (µg/l)	B(k)F (µg/l)	Benzo(a) Pyrene (µg/l)	DB(a,h)A (µg/l)	Benzo (g,h,i)-Perylene (µg/l)	Indeno (1,2,3c,d)-Pyrene (µg/l)	Ethanol 8260B (µg/l)	Bis(2-ethylhexyl) - phthalate (µg/l)
MW-3 continued															
04/04/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
07/17/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1200000	--
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<50000000	--
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	23000000	--
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<20000000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<10000000	--
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<5000	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<5000	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
07/12/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<20000	--
MW-4															
04/04/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
07/17/01	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<2500000	--
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<50000000	--
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<5000000	--
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<5000000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<5000000	--
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
07/12/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<4000	--
MW-5															
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--

**Table 3d**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Fluorene (µg/l)	Phenanthrene (µg/l)	Anthracene (µg/l)	Fluoranthene (µg/l)	Pyrene (µg/l)	Benzo (a)Anthracene (µg/l)	Chrysene (µg/l)	B(b)F1 (µg/l)	B(k)F (µg/l)	Benzo(a) Pyrene (µg/l)	DB(a,h)A (µg/l)	Benzo (g,h,i)-Perylene (µg/l)	Indeno (1,2,3c,d)-Pyrene (µg/l)	Ethanol 8260B (µg/l)	Bis(2-ethylhexyl)-phthalate (µg/l)
MW-5 continued															
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	ND<5.0
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<2500000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000000	--
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<10000	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
07/12/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<800	--
MW-6															
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500000	--
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<500	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--
07/12/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<800	--
MW-7															
07/18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<5000000	--
10/07/02	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<10000000	--
01/06/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<50000000	ND<5.0
04/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<200000000	--
07/07/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<100000000	--
10/09/03	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<130000	--
01/14/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<200000	--
04/28/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<1000	--

**Table 3d**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	Fluorene (µg/l)	Phenan- threne (µg/l)	Anthra- cene (µg/l)	Fluoran- thene (µg/l)	Pyrene (µg/l)	Benzo (a)Anth- racene (µg/l)	Chrysene (µg/l)	B(b)Fl (µg/l)	B(k)F (µg/l)	Benzo(a) Pyrene (µg/l)	DB(a,h)A (µg/l)	Benzo (g,h,i)- Perylene (µg/l)	Indeno (1,2,3c,d)- Pyrene (µg/l)	Ethanol 8260B (µg/l)	Bis(2- ethylhexyl) - phthalate (µg/l)
MW-7 continued 07/12/04	--	--	--	--	--	--	--	--	--	--	--	--	--	ND<8000	--

**Table 3e**  
**ADDITIONAL ANALYTICAL RESULTS**  
**76 Station 1156**

Date Sampled	2-Methyl-phenol (µg/l)	4-Methyl-phenol (µg/l)	1,2 DCE (µg/l)	2-Methylnaphthalene (µg/l)
<b>MW-1</b>				
07/20/99	--	27	--	240
09/28/99	26.4	35.6	--	87.4
01/07/00	--	--	--	315
03/31/00	31	18	--	73
07/14/00	--	--	--	300
10/03/00	--	28.9	--	98.1
01/03/01	--	--	--	180
04/04/01	--	--	--	78
07/17/01	47	25	--	290
07/18/02	13	25	--	420
07/07/03	ND<5.0	22	ND<120	260
<b>MW-5</b>				
01/06/03	ND<5.0	ND<5.0	--	ND<5.0
<b>MW-7</b>				
01/06/03	ND<5.0	ND<5.0	--	ND<5.0

## GENERAL FIELD PROCEDURES – OZONE SPARGE POINT INSTALLATION

### DRILLING AND SOIL SAMPLING

Soil borings are drilled using a continuous-flight, hollow-stem auger drilling rig. Soil excavated from the borings are contained in labeled, Department of Transportation (DOT) approved, 55-gallon drums or sealed roll-off bins and stored onsite pending appropriate disposal.

Soil samples are obtained from each boring for soil description, field hydrocarbon vapor screening, and possible laboratory analysis. Soil samples are generally retrieved from the borings at 5-foot depth intervals using a standard penetration or California-modified split-spoon sampler lined with three 2-inch diameter brass sample inserts. The sampler is driven approximately 18 inches beyond the lead auger with a 140-pound hammer dropped from a height of 30 inches.

Upon retrieval, soil samples are immediately removed from the sampler and sealed with Teflon sheeting and polyurethane caps. Each sample is labeled with the project number, boring number, sample depth, geologist's initials, and date of collection. After the samples have been labeled and documented in the chain of custody record, they are placed in a cooler with ice at approximately 4 degrees Celsius for transport to an offsite state-certified laboratory. Samples not selected for immediate analysis may be transported in a cooler with ice and archived in a frostless refrigerator at approximately 4 degrees Celsius for possible future testing.

During sampling activities, soil adjacent to the laboratory sample is screened for organic vapors using a photoionization detector (PID). For each vapor screening event, a sandwich size Ziploc bag is filled approximately 1/3 full with the soil sample. The PID probe is then inserted into the bag, and a reading is taken after approximately 15 seconds and recorded on the boring log. The remaining soil recovered is removed from the sample tube and described in accordance with the Unified Soil Classification System. For each sampling interval, field estimates of soil type, color, density/consistency, moisture, and grading are recorded on the boring logs.

### OZONE SPARGE POINT INSTALLATION

Ozone Sparge Points are constructed of 3/4-inch diameter, flush-threaded, Schedule 80, polyvinyl chloride (PVC) blank and screened casing (microporous plastic screen size). Ozone Sparge Points typically extend up approximately 20 feet below the groundwater surface, provided that no competent clay layer is penetrated. The annular space surrounding the screened casing intervals is backfilled with Number 2/16 Monterey sand (filter pack) to approximately 2 feet above the top of the screened section.

A 2-foot thick hydrated bentonite annular seal is placed above the well filter pack. The remaining annular space is sealed with a neat cement grout to the surface. Utility access boxes are installed slightly above grade at the surface, and locking, watertight caps are installed to prevent unauthorized access to the sparge point and limit infiltration of surface fluids.

## CHAIN OF CUSTODY PROTOCOL

Chain of custody protocol is followed for all soil and groundwater samples selected for laboratory analysis. The chain of custody form accompanies the samples from the sampling locality to the laboratory, providing a continuous record of possession prior to analysis.

## DECONTAMINATION

Drilling equipment is decontaminated by steam cleaning before being brought onsite. Prior to use, the sampler and sampling tubes are brush-scrubbed in a Liqui-nox and potable water solution, and rinsed twice in clean potable water. Sampling equipment and tubes are also decontaminated before each sample is collected to avoid cross-contamination between borings.