STRATUS
ENVIRONMENTAL, INC.

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June 13, 2007
Project No. 2007-0057-01

Mr. Barney Chan
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: Work Plan for Dual Phase Extraction and Air Sparge Hydrocarbon Mass Removal Event
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

Dear Mr. Chan:

Stratus Environmental, Inc. (Stratus), on behalf of USA Gasoline Corporation (USA), has prepared this *Work Plan for Dual Phase Extraction and Air Sparge Hydrocarbon Mass Removal Event* (Work Plan) for former USA Service Station No. 57 (the site), located at 10700 MacArthur Boulevard, Oakland, California (see Figure 1 and Figure 2). Between July 2004 and August 2006, Stratus completed six intermittent dual phase extraction (DPE) events at the site in order to mitigate residual and dissolved phase petroleum hydrocarbon impact beneath the subject property. In addition to the periodic DPE events, an iSOC™ in-situ groundwater remediation system has been utilized at the site since January 2006.

Based on historical groundwater analytical data, use of the iSOC™ groundwater remediation technology, in conjunction with intermittent DPE, has resulted in decreased concentrations of petroleum hydrocarbons in groundwater. However, petroleum hydrocarbon concentrations in groundwater remain elevated relative to state-established maximum contaminant levels (MCLs) and environmental screening levels (ESLs) established by the San Francisco Bay Regional Water Quality Control Board (SF-RWQCB) for select hydrocarbon contaminants.

In order to more aggressively manage the environmental case at this site towards closure, Stratus is proposing to complete an additional DPE event at the site. During this event, Stratus intends to complete simultaneous air sparging (AS), through two designated sparge wells, in order to improve hydrocarbon mass removal rates from the subsurface. Details associated with implementing combined DPE and AS, including installation of

the proposed AS wells and temporary modifications to the iSOC™ in-situ remedial system currently in use, are presented in the following subsections of this document.

BACKGROUND

The site is currently an undeveloped, partially paved parcel situated on the western corner of the intersection of 108th Avenue and Foothills Boulevard in Oakland, California, approximately 400 feet west of Interstate 580. This parcel comprises the southeastern corner of the Foothills Square Shopping Center. It is our understanding that the property owner intends to re-develop the portion of the Foothills Square Shopping Center formerly occupied by the site.

USA Station 57 was closed, and the gasoline underground storage tanks (UST's) were removed, in July 1994. Approximately 775 cubic yards of impacted soil was excavated from the vicinity of the UST pit and product lines between August and October 1994. The approximate former locations of the UST's and dispenser islands are shown on Figure 2.

Eight groundwater monitoring wells (S-1, S-2, and MW-3 through MW-8) were installed, and twelve exploratory soil borings (A through D and B-1 through B-8) were advanced, in order to assess the extent of subsurface petroleum hydrocarbon impact beneath the site. The well network has been monitored and sampled on a quarterly basis since 1995. Depth to groundwater has been reported in the monitoring wells at depths ranging from approximately 7 to 21 feet below ground surface (bgs) since groundwater monitoring was initiated.

Petroleum hydrocarbon impact to soil extends to the saturated zone in the vicinity of the former UST complex and fuel dispenser islands. Gasoline range organics (GRO), benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds), methyl tertiary butyl ether (MTBE), and tertiary butyl alcohol (TBA) have historically been reported in groundwater samples collected beneath the site.

Petroleum hydrocarbon mass reduction events using DPE technology have been periodically conducted at the site since July 2004. Six DPE events to reduce the subsurface petroleum hydrocarbon mass were conducted between July 2004 and August 2006. The first DPE event was conducted between July 6 and 25, 2004, using a 400 cubic feet per minute (cfm) DPE system. During the first DPE event, individual well DPE tests using wells S-1, S-2, and MW-3, and a combined DPE test using all three wells, were conducted to evaluate the technical viability of using DPE to mitigate the subsurface petroleum hydrocarbon impact. During the combined DPE test, an average applied vacuum of 22.66 inches mercury ("Hg) (or 308.18 inches water column ["WC]) resulted in an average soil vapor extraction rate of 86 cfm and an average groundwater extraction rate of 0.55 gallons per minute (gpm). Approximately 13.35 pounds of GRO

were extracted in vapor and aqueous phases during this DPE event. Based on the findings of this test and analytical results of subsequent quarterly monitoring, Stratus proposed (letter dated October 15, 2004) to conduct quarterly DPE events as an interim remedial measure to reduce the subsurface petroleum hydrocarbon mass. In a letter dated May 9, 2005, Alameda County Health Care Services Agency (ACHCSA) approved the proposal for conducting intermittent DPE events.

A second DPE petroleum hydrocarbon mass removal event was conducted at the site between June 6, 2005, and July 1, 2005, using a 400 cfm DPE system and wells S-1, S-2, and MW-3. During this DPE event, an applied vacuum in the range of 23 to 25 "Hg produced soil vapor flow rates in the range of 23 to 39.4 cfm, and an average groundwater extraction rate of 1.12 gpm. A total of 34,340 gallons of extracted groundwater were treated using the carbon vessels and discharged to the sanitary sewer. Approximately 6.449 pounds and 0.082 pounds of GRO were extracted in vapor and aqueous phases, respectively, during this DPE event.

Based on the findings of the first two DPE events, Stratus, in a work plan dated August 31, 2005, proposed installation of four shallow-screened (5 to 25 feet bgs) extraction wells to maximize the petroleum hydrocarbon mass removal rates. In addition, this work plan also proposed installation of an oxygen injection system to supplement the DPE events in reducing the dissolved petroleum hydrocarbon mass. This work plan was subsequently approved by ACHCSA in a letter dated September 9, 2005.

A third DPE petroleum hydrocarbon mass removal event was conducted at the site between August 29, 2005, and September 16, 2005, using a 200 cfm DPE system and wells S-1, S-2, MW-3, and MW-7. During this DPE event, an applied vacuum in the range of 16 to 18 "Hg produced soil vapor flow rates in the range of 37.3 to 62.5 cfm, and an average groundwater extraction rate of 2.45 gpm. A total of 54,730 gallons of extracted groundwater were treated using the carbon vessels and discharged to the sanitary sewer. GRO was not reported in any of the influent soil vapor samples collected during this DPE event. Approximately 0.014 pounds of GRO were extracted in aqueous phase during this DPE event.

Stratus oversaw the installation of four extraction wells (EX-1 through EX-4) on October 6 and 7, 2005. A *Well Installation Report* documenting the findings during the installation of wells EX-1 through EX-4 was submitted to ACHCSA on December 30, 2005.

The construction and installation of an oxygen injection system was completed during December 2005, and upon approval by the City of Oakland Fire Department, operation of the oxygen injection system was initiated on January 18, 2006.

A fourth DPE petroleum hydrocarbon mass removal event was conducted at the site between February 20, 2006, and March 24, 2006, using the newly installed extraction wells EX-1 through EX-4. During this DPE event, an applied vacuum in the range of 18.5 to 23 "Hg produced influent soil vapor flow rates in the range of 22.4 to 50.6 cfm, and an average groundwater extraction rate of 0.40 gpm. A total of 13,340 gallons of extracted groundwater were treated using the carbon vessels and discharged to the sanitary sewer. Approximately 25.83 pounds of GRO were extracted in vapor and aqueous phases during this DPE event.

A fifth DPE petroleum hydrocarbon mass removal event was conducted at the site between May 1, 2006, and May 25, 2006, using wells EX-1 through EX-4 for extraction. An applied vacuum in the range of 20 to 24.5 "Hg produced influent soil vapor flow rates in the range of 21.9 to 56.2 cfm, and an average groundwater extraction rate of 0.30 gpm. A total of 7,400 gallons of extracted groundwater were treated using the carbon vessels and discharged to the sanitary sewer. Based on influent soil vapor flow rates and concentrations, approximately 5.43 pounds of GRO were extracted in vapor phase and 0.027 pounds of GRO were removed from the subsurface in aqueous phase during this DPE event.

A sixth DPE petroleum hydrocarbon mass removal event was conducted at the site between July 17, 2006, and August 10, 2006, using wells EX-1 through EX-4 for extraction. An applied vacuum in the range of 16 to 18 "Hg produced influent soil vapor flow rates in the range of 70.7 to 114.8 cfm, and an average groundwater extraction rate of 0.06 gpm. A total of 1,900 gallons of extracted groundwater were treated using the carbon vessels and discharged to the sanitary sewer. Based on influent soil vapor flow rates and concentrations, approximately 47.63 pounds of GRO were extracted in vapor phase and 0.0072 pounds of GRO were removed from the subsurface in aqueous phase during the sixth DPE event. Tabulated summaries of the six previous DPE events completed at the site are included in Appendix A. Graphs depicting select water quality parameter and contaminant concentrations in select wells versus time are presented in Appendix B.

At the time of the first quarter 2007 groundwater sampling event (January 8, 2007), petroleum hydrocarbons or fuel additives were reported in samples collected from wells EX-1 through EX-4, S-1, S-2, MW-3, and MW-7. The highest concentrations of GRO (14,000 micrograms per liter [µg/L]), benzene (4,100 µg/L), and MTBE (90 µg/L) were detected in the sample collected from well EX-2. GRO, benzene, and MTBE concentrations at the time of the January 2007 well sampling event are presented on Figure 3. The lateral extent of petroleum hydrocarbon impact to groundwater appears to be adequately characterized based on historical analytical data, and is not known to extend off-site.

PROJECT APPROACH

Stratus is proposing to complete an additional mass removal event at the property in order to further mitigate the petroleum hydrocarbon impact at the site. In order to improve performance of the DPE mitigation approach, Stratus is proposing to simultaneously sparge air into the saturated zone. The wells will be completed to approximately 20 feet bgs, near the historically lowest depth to groundwater levels measured in the site monitoring well network. Air sparging should accelerate volatilization of residual and dissolved phase hydrocarbons, resulting in improved hydrocarbon recovery rates by the DPE system. In order to facilitate air sparging, Stratus is proposing to install two AS wells in the vicinity of the extraction well network. During historical DPE events, subsurface air flow has been measured at rates ranging from approximately 23 cfm to 115 cfm. Air sparging could also potentially improve subsurface air flow rates, allowing for improved recovery of petroleum hydrocarbons.

SCOPE OF WORK

The objectives of the proposed work are to:

- Install air sparge wells within the area of known impact in order to improve hydrocarbon mass removal rates
- Remove additional hydrocarbon impact from the subsurface in the residual and dissolved phases.

To accomplish these objectives, Stratus is proposing the following activities:

- Advance two (2) soil borings to approximately 20 feet bgs using hollow stem augers. These borings will be converted to 1-inch diameter air sparge wells AS-1 and AS-2.
- Collect soil samples in 5-foot intervals during the advancement of each boring for lithologic comparison and chemical analysis.
- Utilize wells EX-1 through EX-4 for extraction of soil vapors and groundwater using DPE.
- Inject air into the subsurface during the DPE event through sparge wells AS-1 and AS-2.

The proposed scope of work has been subdivided into tasks 1 through 5. Details are provided for the activities associated with each task. All geologic work will be conducted under the direct supervision of a State of California Professional Geologist or Engineer and will be conducted in accordance with standards established by the *Tri-Regional Board Recommendations for Investigation and Evaluation of Underground Tank Sites* (April 2004) and ACHCSA guidelines. A California-licensed C-57 well driller will perform all drilling and well construction activities. Field Practices and

Procedures to be utilized during implementation of the proposed drilling work are described in Appendix C.

Task 1: Pre-field Activities for Drilling Event

Following approval of this scope of work by the ACHCSA, the following activities will be completed:

- Obtain a well installation permit from Alameda County Public Works Department (ACPWD),
- Retain and schedule a licensed C-57 drilling contactor,
- Update the health and safety plan for the site,
- Mark boring locations and contact Underground Service Alert to locate underground utilities in the vicinity of the work areas, and
- Notify ACHCSA, ACPWD, USA, and the property owner of the scheduled field activities.

Task 2: Field Activities for Drilling Event

Task 2A: Soil Borings

A C-57-licensed well driller will advance the soil borings using a truck mounted drill rig equipped with 6-inch, 7-inch, or 8-inch diameter hollow stem augers. The borings will be advanced to approximately 20 feet bgs, and completed as air sparge wells as described below. The approximate location of each proposed well boring is shown on Figure 2. The actual drilling location will be based on accessibility and the location of underground utilities.

The initial 5 feet of each boring will be advanced with a hand auger and/or posthole digger to reduce the possibility of damaging underground utilities. Soil samples will be collected in 5-foot intervals using a California-type, split-spoon sampler equipped with three pre-cleaned brass tubes. The ends of the bottom-most, intact tube from each sample interval will be lined with Teflon™ sheets, capped, and sealed. Each sample will then be labeled, placed in a resealable plastic bag, and stored in an ice-chilled cooler. Strict chain-of-custody procedures will be followed from the time the samples are collected until the time the samples are relinquished to the laboratory. Soil contained in the remaining brass tubes will be screened for volatile organic compounds (VOCs) using a photo-ionization detector (PID). Stratus will record PID readings, soil types, and other pertinent geologic data on a borehole log. A minimum of two soil samples from each boring will be submitted for chemical analysis. Additional samples may be selected for chemical analysis based on soil type and field observations.

Task 2B: Air Sparge Well Installation

Wells AS-1 and AS-2 will be constructed using 1-inch diameter PVC casing and 2 feet 0.02-inch diameter machine slotted well screen, situated from approximately 18 to 20 feet bgs. A filter pack of #3 Lonestar™ sand will be placed in the annular space around the well casing from the bottom of the well screen to approximately two feet above the top of the well screen. Approximately three feet of bentonite will be placed on top of the filter pack and hydrated with clean water to provide a transition seal for the well. Neat cement will be used to backfill the remaining annular space around the well casing. A watertight locking cap will be placed over the top of the well casing, and a traffic rated vault box will be installed around the top of the well. The actual well construction may be modified in the field based on conditions encountered at the time of the investigation.

Task 2C: Waste Management

All drill cuttings and wastewater generated during the field activities will be contained in U.S. Department of Transportation-approved 55-gallon steel drums. The drums will be appropriately labeled and stored at the site pending proper disposal. A licensed contractor will transport the soil and wastewater to an appropriate facility for disposal.

Task 3: Proposed DPE and Air Sparge Event

Stratus is proposing to complete a 60-day combined DPE and AS event. Wells EX-1 through EX-4 will be used for extraction, and wells AS-1 and AS-2 will be used for air sparging. Prior to initiating the remediation event, the iSOC™ injection equipment situated within wells EX-1 and EX-2 will be re-installed within wells S-1 and MW-3. Wells S-1, S-2, MW-3, MW-6, MW-7, and MW-8 will be used as observation wells (for depth to water, vacuum) during the mass removal event. A 200 cfm DPE system (Serial Number: M1294) will be used to complete extraction. A blower (serial number 5146084) will be used to inject air into the subsurface through wells AS-1 and AS-2.

Prior to the commencement of the DPE event, in accordance with the Bay Area Air Quality Management District (BAAQMD) various locations permit (Application Number 12773 and Plant Number 17101) for the 200 cfm DPE system, Stratus will notify the BAAQMD of the work schedule. Stratus will discharge treated groundwater to the sewer system under an existing sewer discharge permit (dated May 31, 2005) from the East Bay Municipal Utility District (EBMUD) (valid until May 31, 2010). EBMUD will also be notified of the sewer discharge schedule. The site-specific health and safety plan will be updated and discussed prior to conducting field activities.

DPE Equipment

A 200 cfm thermal oxidizer with a 15-horsepower (hp) liquid-ring pump will be used to apply vacuum and extract soil vapors and groundwater from wells EX-1 through EX-4. The trailer-mounted system also houses a 100-gallon water/condensate knockout tank and a 2-hp liquid discharge pump to drain the knockout tank. A 15-kilowatt propane generator will be used to power the DPE unit. Liquid propane will be used as supplemental fuel to maintain combustion temperatures in the thermal oxidizer. The DPE system, generator, and the carbon vessels will be situated within a temporary fence enclosure during the DPE event (see Figure 2 for approximate location of fencing placement).

The wellheads of the extraction wells will be temporarily modified to provide a seal for vacuum conditions and to facilitate insertion of a drop-tube (1-inch diameter) to extract soil vapors and groundwater.

The liquid ring pump will be used to extract groundwater and soil vapors from the extraction wells, and the extracted groundwater and soil vapor (dual phase flow) will be directed to the knockout tank. The soil vapors, separated from the groundwater in the knockout tank, will be directed to the thermal oxidizer for abatement before discharging to the atmosphere. The groundwater in the knockout tank of the DPE unit will be treated using two USFilter Westates 500-pound granular activated carbon vessels, connected in series, prior to discharge to the sanitary sewer.

Air Sparging Equipment

Air sparging will be conducted using a blower/air compressor system to inject air into the subsurface through wells AS-1 and AS-2. The blower/air compressor (Quincy 2-hp oil-less compressor rated at 9.6 cfm, or similar) will be powered by the same propane generator as the DPE system. The AS-1 and AS-2 well heads will be temporarily modified to facilitate air injection.

Remediation Event Procedure

The DPE-AS event will be conducted by lowering a 1-inch diameter drop tube into each extraction well. The drop tube (stinger) will be installed near the base of each extraction well casing. The liquid ring pump will be used to apply high vacuum to the stinger to extract groundwater and soil vapors from the wells. Air will be injected into the subsurface at approximately 150 to 200 percent of the static head pressure observed at wells AS-1 and AS-2 at the beginning of the test. A flow rate of approximately 2 to 5 cfm will be injected into each air sparge well.

Wells S-1, S-2, MW-3, MW-6, MW-7, and MW-8 will be used as observation wells to monitor for changes in groundwater elevation and/or induced vacuums during the DPE event. Magnahelic gauges will be used to measure induced vacuum. Hand-operated electric water-level sounders will be used to measure depth-to-groundwater in the observation wells. The DPE system will be equipped to measure the groundwater extraction rate (discharge from the centrifugal pump after the knockout tank) and the soil vapor flow rate. A flow totalizer will be installed between the carbon vessels and the sewer discharge point to record the volume of treated groundwater discharged during the DPE event. Influent soil vapor concentrations will be monitored using a PID. Stratus will visit the site on a periodic basis (approximately bi-weekly) to monitor performance of the remediation event.

Soil vapor and groundwater samples will be collected during the DPE event to evaluate performance of the DPE system and to verify compliance with the air and water discharge permits. Soil vapor samples will be retained in laboratory supplied tedlar bags, while groundwater samples will be collected in preserved glass containers (VOAs) and stored in an ice-chilled cooler. All samples collected will be forwarded to the laboratory for chemical analysis under strict chain-of-custody procedures.

Task 4: Analytical Testing

Soil samples collected during the drilling event, and air and groundwater samples collected during the DPE/air sparge event, will be forwarded to a state-certified analytical laboratory for chemical analysis. The samples will be analyzed for GRO using EPA Method SW8015B/DHS LUFT Manual, and for BTEX, MTBE, TBA, ethyl tertiary butyl ether (ETBE), di-isopropyl ether (DIPE), and tertiary amyl methyl ether (TAME) using EPA Method SW8260B.

Task 5: Report Preparation

Stratus will prepare a report documenting the installation of the AS wells. The report will include, at a minimum, a scaled site plan, soil boring logs, well details, tabulated soil analytical results, and certified analytical results.

Following completion of the mass removal event, a separate report will be prepared to document the DPE-AS event. The report will include, at a minimum, the following items:

- Tabulated field data such as flow rates, dissolved oxygen, groundwater measurements, and induced vacuums,
- Tabulated concentrations of petroleum hydrocarbons in extracted soil vapors and groundwater,

- Certified analytical reports, and
- Estimated mass extraction rates.

Both reports will be submitted within approximately 6 weeks of receiving all analytical results.

If you have any questions or comments concerning this Work Plan, please contact Scott Bittinger at (530) 676-2062 or Gowri Kowtha at (530) 676-6001.

Sincerely,

STRATUS ENVIRONMENTAL, INC.

Scott G. Bittinger, P.G.
Project Manager

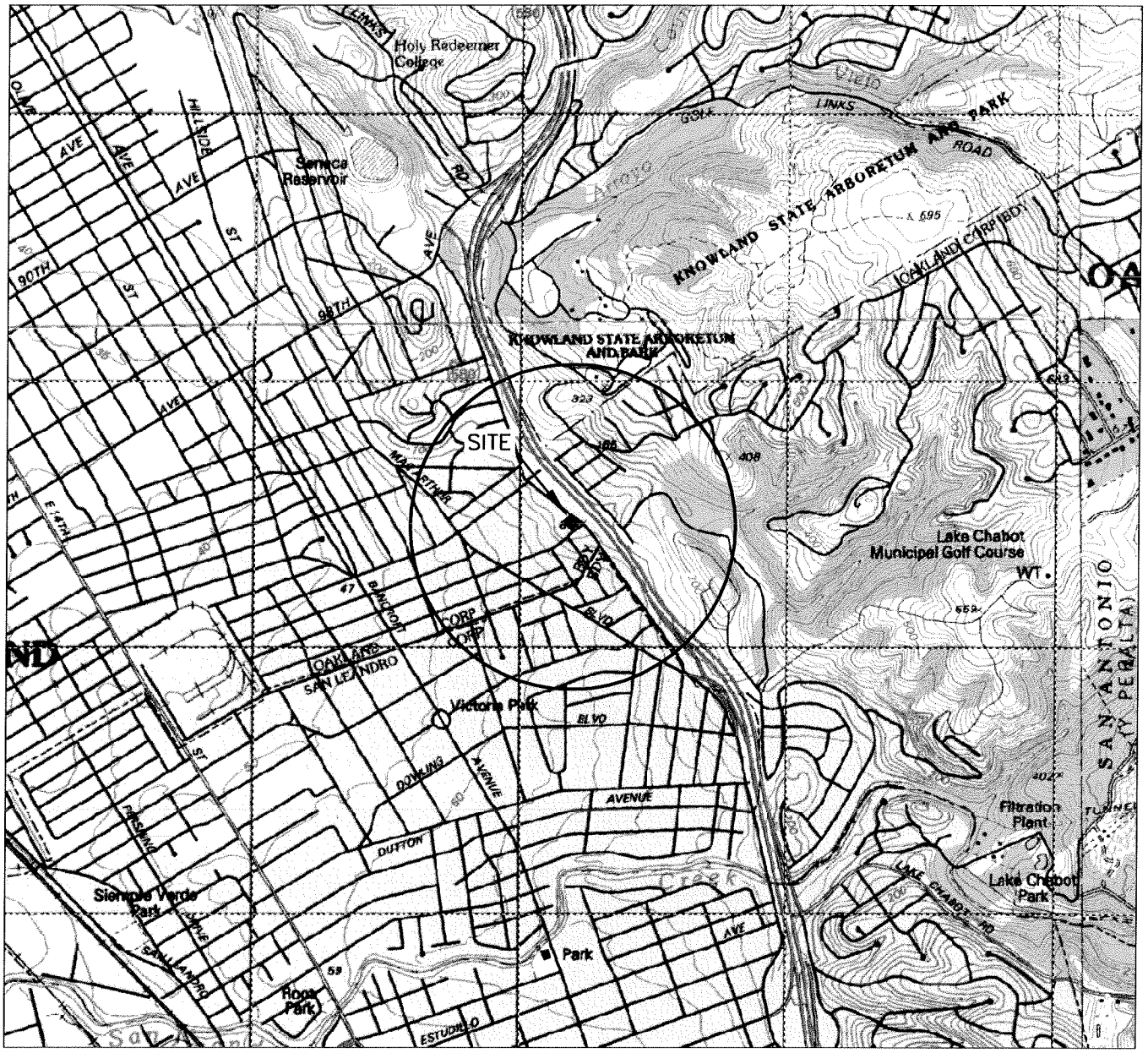
PROFESSIONAL GEOLOGIST
Scott G. Bittinger
No. 7477
STATE OF CALIFORNIA

Gowri S. Kowtha, P.E.
Principal

Attachments:

Figure 1	Site Location Map
Figure 2	Site Plan
Figure 3	Groundwater Analytical Summary, First Quarter 2007
Appendix A	Data Table Summaries of Previous DPE Events
Appendix B	Water Quality Parameter and Contaminant Concentrations Versus Time Graphs
Appendix C	Field Practices and Procedures

cc: Mr. Charles Miller, USA Gasoline Corporation
Mr. Ken Phares, Jay-Phares Corporation
Mr. John Jay, Jay-Phares Corporation
Mr. Peter McIntyre, AEI Consultants



GENERAL NOTES:
BASE MAP FROM U.S.G.S.
OAKLAND, CA
7.5 MINUTE TOPOGRAPHIC
PHOTOREVISED 1980

North

QUADRANGLE LOCATION

0 2000 FT

SCALE 1:24,000

STRATUS ENVIRONMENTAL, INC.

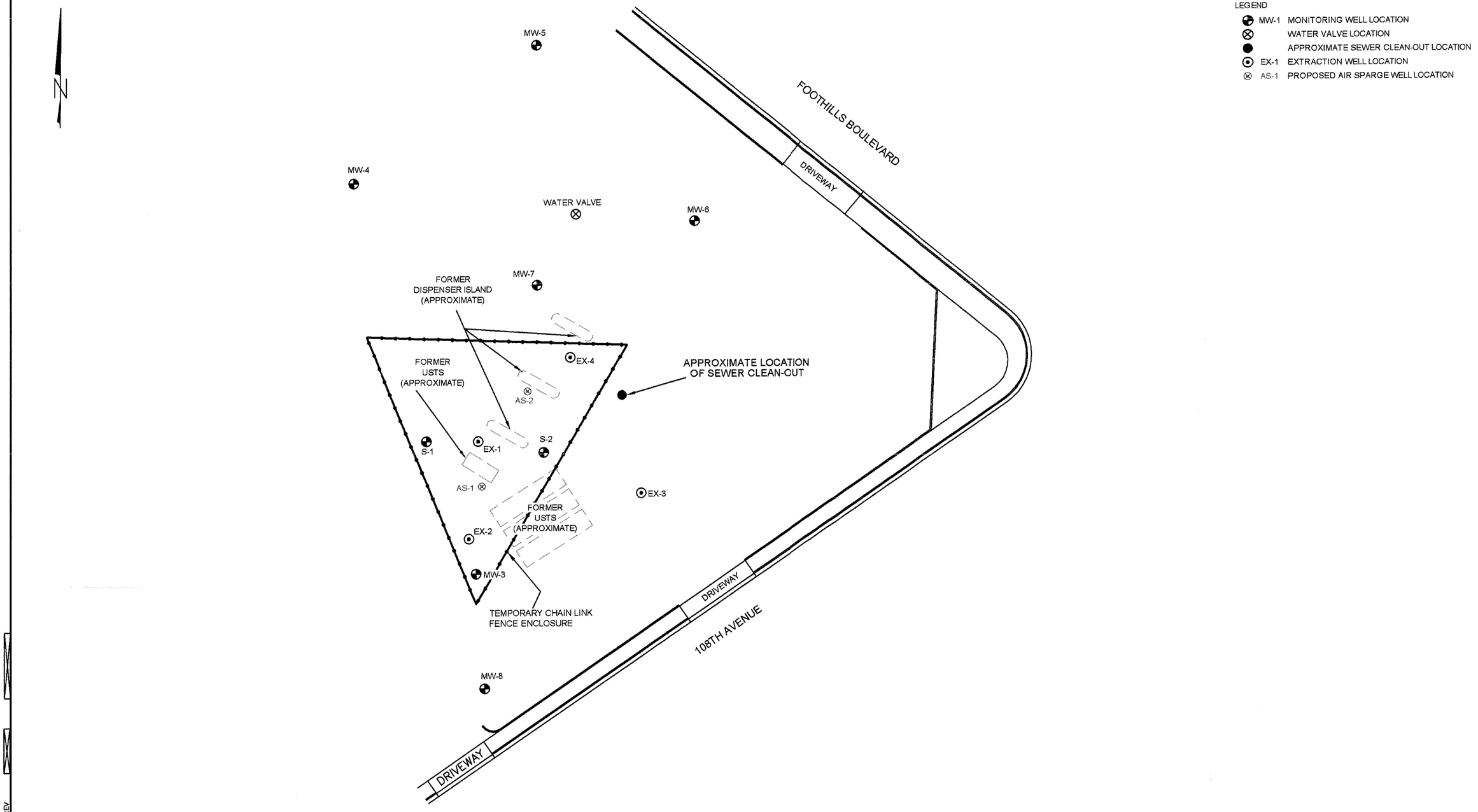
FORMER USA SERVICE STATION NO. 57
10700 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SITE LOCATION MAP

FIGURE
1

PROJECT NO.
2007-0057-01

USA57\Quarterly JMP May 14, 2007 USA 57Site Location Map.dwg



REV
JMP
USA\570\DPE

STRATUS
ENVIRONMENTAL, INC.

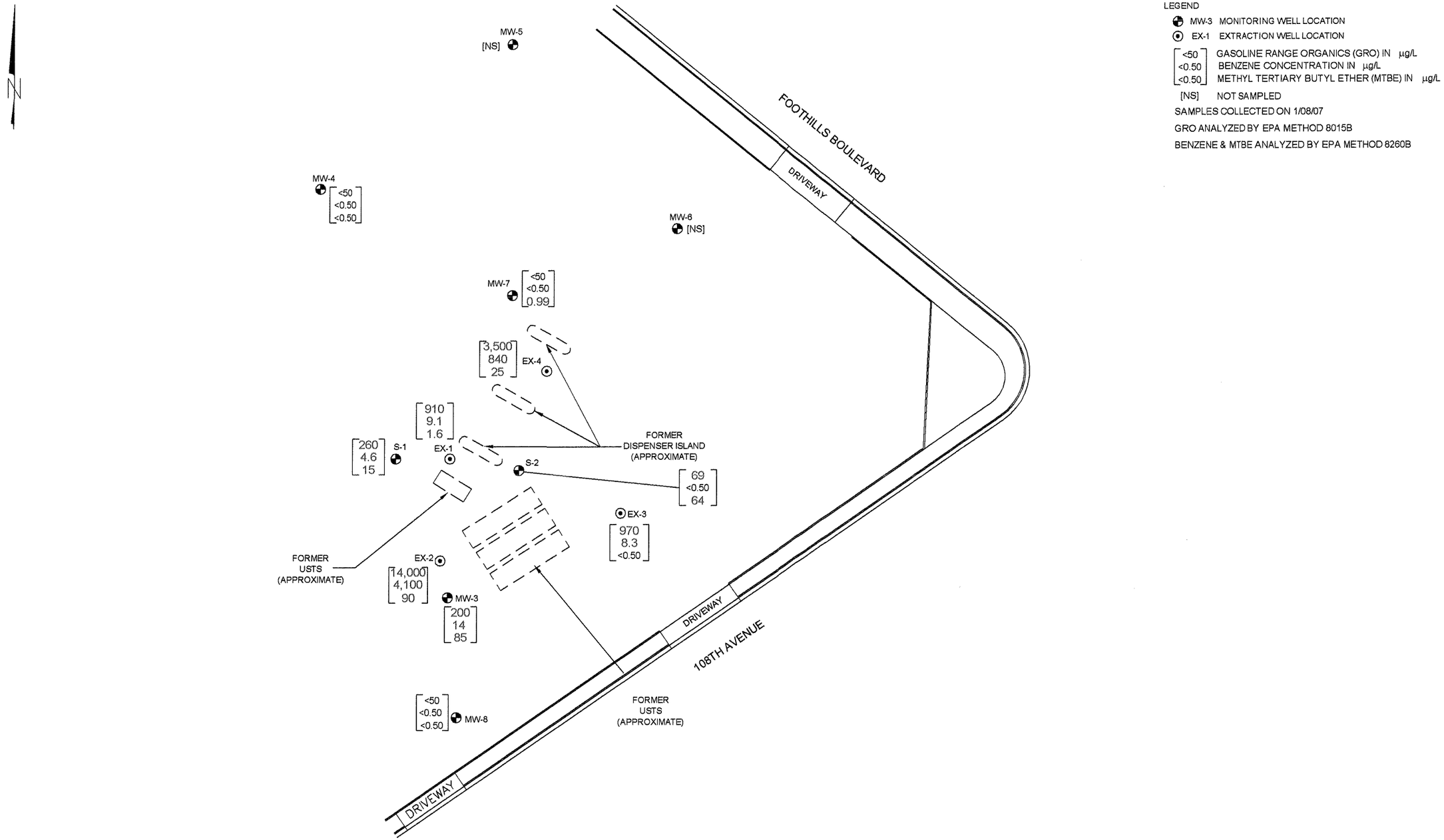
0 40 FT
SCALE

FORMER USA STATION NO. 57
10700 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SITE PLAN

FIGURE
2

PROJECT NO.
2007-0057-01



LEGEND

- MW-3 MONITORING WELL LOCATION
- EX-1 EXTRACTION WELL LOCATION
- [<50 / <0.50 / <0.50] GASOLINE RANGE ORGANICS (GRO) IN µg/L; BENZENE CONCENTRATION IN µg/L; METHYL TERTIARY BUTYL ETHER (MTBE) IN µg/L
- [NS] NOT SAMPLED

SAMPLES COLLECTED ON 1/08/07

GRO ANALYZED BY EPA METHOD 8015B

BENZENE & MTBE ANALYZED BY EPA METHOD 8260B

STRATUS ENVIRONMENTAL, INC.

0 40 FT

HORZ. SCALE

FORMER USA SERVICE STATION NO. 57
10700 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

GROUNDWATER ANALYTICAL SUMMARY
1st QUARTER 2007

FIGURE
3

PROJECT NO.
2007-0057-01

USA57\Quarterly JMP REV May 14, 2007 USA 57 Quarterly Figure.dwg

APPENDIX A

DATA TABLE SUMMARIES OF PREVIOUS DPE EVENTS

TABLE 1
DPE TEST USING WELL S-2
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date & Time	TE	Appl Vac	Air Flow	Totalizer Reading	GW Ext Rate	Inf PID	Oper Temp	Induced Vacuum ("WC) &/or DTW (feet bgs) Data in Observation Wells													
								S-1			MW-3			MW-4		MW-5		MW-7			MW-8	
	hh:mm	"Hg	cfm	gallons	gpm	ppmv	deg F	Vac	DTW	DD	Vac	DTW	DD	DTW	DD	DTW	DD	Vac	DTW	DD	DTW	DD
7/6/2004 7:00				42,120					18.13			15.70		12.26		18.07			18.19		19.55	
7/6/2004 8:30		Start Up Test using well S-2, DTW =20.26 feet bgs and DPE unit hour meter reading = 839.6																				
7/6/2004 9:00	00:30	25.50	87	42,120	--	2.9	1,450	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/6/2004 10:00	01:30	NM	NM	42,120	--	23.0	NM	0.35	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/6/2004 11:00	02:30	26.25	88	42,130	0.07	29.0	1,466	1.30	18.38	0.25	0.0	15.70	0.00	12.27	0.01	18.08	0.01	0.0	18.30	0.11	19.58	0.03
7/6/2004 12:00	03:30	26.50	87	42,200	0.33	24.0	1,444	0.50	18.58	0.45	0.0	15.69	-0.01	12.25	-0.01	18.05	-0.02	0.0	18.35	0.16	19.51	-0.04
7/7/2004 6:30	22:00	23.50	86	42,820	0.47	7.1	1,456	0.20	18.65	0.52	0.0	15.70	0.00	12.26	0.00	18.04	-0.03	0.0	18.38	0.19	19.55	0.00
7/7/2004 6:50	22:20	Discontinue Test on S-2																				
Distance to Extraction Well S-2								50			60			135		170		70			100	
Screening Interval 20 - 40 (S-2)								20 - 40			24 - 44			10 - 40.5		10 - 40		10 - 40.5			10 - 35	

Notes:

TE - Time Elapsed, hours: minutes
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
ppmv - parts per million by volume
Temp - Temperature
deg F - degree Farenheit
Ext. - Extraction
cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
GW Ext - Groundwater Extraction
PID - Photo Ionization Detector
All induced vacuum measured in observation wells were in "WC
gpm - gallons per minute
"Hg - Inches Mercury
bgs - below ground surface
NM - Not measured

TABLE 2
DPE TEST USING WELL S-1
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date & Time	TE	Appl Vac	Air Flow	Totalizer Reading	GW Ext Rate	Inf PID	Oper Temp.	Induced Vacuum ("WC) &/or DTW (feet bgs) Data in Observation Wells													
								S-2			MW-3			MW-4		MW-5		MW-7			MW-8	
	hh:mm	"Hg	cfm	gallons	gpm	ppmv	deg F	Vac	DTW	DD	Vac	DTW	DD	DTW	DD	DTW	DD	Vac	DTW	DD	DTW	DD
7/7/2004 7:05	Start Up Test using Well S-1																					
7/7/2004 7:05	0.00	NM	NM	42,820	NM	NM	NM	NM	NM		NM	15.70		12.26		18.07			18.38		19.55	
7/7/2004 7:30	00:25	24.00	86	42,890	2.80	1.5	1,459	+7.4	30.08		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/7/2004 8:00	00:55	24.00	87	42,890	--	0.6	1,456	+4.4	25.35	-4.73	0.0	15.70	0.00	12.25	-0.01	18.06	-0.01	0.0	18.38	0.00	19.55	0.00
7/7/2004 9:00	01:55	24.00	87	42,960	0.61	0.0	1,457	+0.2	22.16	-7.92	0.0	15.70	0.00	12.25	-0.01	18.07	0.00	0.0	18.38	0.00	19.55	0.00
7/7/2004 9:05	02:00	Discontinue Test on S-1																				
Distance to Extraction Well S-1								50			60			110		170		80			105	
Screening Interval 20 - 40 (S-1)								20 - 40			24 - 44			10 - 40.5		10 - 40		10 - 40.5			10 - 35	

Notes:

TE - Time Elapsed, hours: minutes
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
ppmv - parts per million by volume
Temp - Temperature
deg F - degree Farenheit
Ext. - Extraction
cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
GW Ext - Groundwater Extraction
PID - Photo Ionization Detector
All induced vacuum measured in observation wells were in "WC
gpm - gallons per minute
"Hg - Inches Mercury
bgs - below ground surface
NM - Not measured

TABLE 3
DPE TEST USING WELL MW-3
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date & Time	TE	Appl Vac	Air Flow	Totalizer Reading	GW Ext Rate	Inf PID	Oper Temp	Induced Vacuum ("WC) &/or DTW (feet bgs) Data in Observation Wells														
								S-1			S-2			MW-4		MW-5		MW-7			MW-8	
	hh:mm	"Hg	cfm	gallons	gpm	ppmv	deg F	Vac	DTW	DD	Vac	DTW	DD	DTW	DD	DTW	DD	Vac	DTW	DD	DTW	DD
7/7/2004 9:25	Start Up Test using Well MW-3																					
7/7/2004 9:25	0.00	NM	NM	42,960	--	NM	NM	NM	NM	--	NM	22.16	--	12.26	--	18.07	--	NM	18.38	--	19.55	NM
7/7/2004 10:00	00:35	24.50	87	42,960	--	0.0	1,450	0.0	NM	--	NM	NM	--	NM	--	NM	--	NM	NM	--	NM	NM
7/7/2004 10:30	01:05	25.50	87	42,960	--	0.0	1,447	0.0	19.38	--	+0.6	21.00	-1.16	12.25	0.00	18.06	-0.01	0.0	18.36	-0.02	19.53	-0.02
7/7/2004 11:30	02:05	26.00	87	42,960	--	0.0	1,456	0.0	19.11	-0.27	+0.2	20.91	-1.25	12.25	0.00	18.06	-0.01	0.0	18.35	-0.03	19.53	-0.02
7/7/2004 11:35	02:10	Discontinue test on MW-3																				
Distance to Extraction Well MW-3								60			60			170		220		120			50	
Screening Interval	24-44 (MW-3)							20 - 40			20 - 40			10 - 40.5		10 - 40		10 - 40.5			10 - 35	

Notes:

TE - Time Elapsed, hours: minutes
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
ppmv - parts per million by volume
Temp - Temperature
deg F - degree Farenheit
Ext. - Extraction

cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
GW Ext - Groundwater Extraction
PID - Photo Ionization Detector
All induced vacuum measured in observation wells were in "WC
gpm - gallons per minute
"Hg - Inches Mercury
bgs - below ground surface
NM - Not measured

TABLE 4
COMBINED DPE TEST USING WELLS S-1, S-2, AND MW-3
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date & Time	TE	Appl Vac	Air Flow	Totalizer Reading	GW Ext Rate	Inf PID	Oper Temp	MW-4		MW-5		MW-6		MW-7			MW-8		
	hh:mm	"Hg	cfm	gallons	gpm	ppmv	deg F	DTW	DD	DTW	DD	Vac	DTW	Vac	DTW	DD	Vac	DTW	DD
7/7/2004 11:35	Start Test on S-1, S-2 and MW-3																		
7/7/2004 11:35	0.00	NM	NM	42,960	NM	NM	NM	12.25	--	18.06	--	NM	DRY	NM	18.35	--	NM	19.53	--
7/8/2004 6:15	18:40	22.25	87	44,610	1.47	4.0	1,460	12.25	0.00	18.11	0.05	0.0	DRY	0.0	18.63	0.28	0.0	19.70	0.17
7/9/2004 6:00	42:25	23.00	86	46,960	0.92	2.3	1,440	12.33	0.08	18.18	0.12	0.0	DRY	0.0	18.72	0.37	0.0	20.02	0.49
7/10/2004 6:00	66:25	23.00	86	48,690	0.43	3.5	1,460	12.41	0.16	18.26	0.2	0.0	DRY	0.0	18.78	0.43	0.0	20.32	0.79
7/11/2004 6:00	90:25	21.00	86	50,760	0.38	3.2	1,456	12.41	0.16	18.27	0.21	0.0	DRY	0.0	18.81	0.46	0.0	20.58	1.05
7/12/2004 6:30	114:55	22.50	86	52,780	0.29	3.0	1,453	12.42	0.17	18.32	0.26	0.0	DRY	0.0	18.84	0.49	0.0	20.75	1.22
7/15/2004 6:00	186:25	22.50	86	58,760	0.53	4.0	1,446	12.27	0.02	18.36	0.3	0.0	DRY	0.0	18.90	0.55	0.0	21.17	1.64
7/19/2004 5:45	282:10	23.25	86	66,320	0.45	3.2	1,459	11.67	-0.58	18.23	0.17	0.0	DRY	0.0	18.98	0.63	0.0	21.50	1.97
7/22/2004 5:45	354:10	23.25	86	71,870	0.26	3.0	1,458	12.05	-0.20	18.33	0.27	0.0	DRY	0.0	19.03	0.68	0.0	21.65	2.12
7/25/2004 10:36	431:01			77,720	0.23	**Discontinue DPE Test. DPE unit hour meter reading = 1,297.7**													
Distance to Nearest Extraction Well								110		170		110		70			50		
Screening Interval								10 - 40.5		10 - 40		10 - 40.5		10 - 40.5			10 - 35		

Notes:

TE - Time Elapsed, hours: minutes
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
ppmv - parts per million by volume
Temp - Temperature
deg F - degree Farenheit
Ext. - Extraction

cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
GW Ext - Groundwater Extraction
PID - Photo Ionization Detector
All induced vacuum measured in observation wells were in "WC
gpm - gallons per minute
"Hg - Inches Mercury
bgs - below ground surface
NM - Not measured

TABLE 5
SOIL VAPOR ANALYTICAL RESULTS
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	Sample Type	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE
07/06/04	1030	Eff Air	Air	<12	<0.12	<0.12	<0.12	<0.12	<0.12
07/06/04	1032	Inf Cat Air	Air	**660**	**2.1**	**0.38**	**1.2**	**1.1**	**1.0**
07/07/04	0904	Inf Cat Air S-1	Air	<12	<0.12	<0.12	<0.12	<0.12	**0.29**
07/07/04	1126	Inf Cat Air MW-3	Air	<12	<0.12	<0.12	<0.12	<0.12	**0.13**
07/19/04	0641	Eff Air	Air	<12	<0.12	<0.12	<0.12	<0.12	<0.12
07/19/04	0644	Inf Cat Air	Air	**88**	**0.26**	<0.12	<0.12	**0.19**	**0.25**

All air sample values reported in milligrams per cubic meter (mg/m^3)

TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether

Analytical Laboratory
Alpha Analytical, Inc. (ELAP #2019)

Analytical Methods
TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX and MTBE analyzed by EPA Method SW8260B

TABLE 6
GROUNDWATER ANALYTICAL RESULTS
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	Sample Type	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA	DIPE	ETBE	TAME	Methanol	Ethanol
07/06/04	1050	S-2	Water	2200	13	1.8	10	26.9	66	170	<1.0	<1.0	<1.0	<5,000	<5,000
07/08/04	0854	Influent	Water	<100[1]	<0.50	<0.50	0.66	4.4	16	NA	NA	NA	NA	NA	NA
07/08/04	0905	GAC Influent	Water	110	<0.50	<0.50	<0.50	1.89	17	NA	NA	NA	NA	NA	NA
07/08/04	1030	Effluent	Water	<50	<0.50	<0.50	<0.50	<0.50	<0.50	NA	NA	NA	NA	NA	NA
07/19/04	0623	Effluent	Water	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0	NA	NA
07/19/04	0630	Influent	Water	<50	<0.50	<0.50	<0.50	0.52	3.7	56	<1.0	<1.0	<1.0	NA	NA
07/27/04	1118	Effluent	Water	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0	NA	NA

All water sample values reported in micrograms per liter (µg/L)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
NA = Not analyzed
[1] Reporting limits were increased due to sample foaming

Analytical Laboratory
Alpha Analytical , Inc. (ELAP #2019)

Analytical Methods
TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, ETBE, & TAME analyzed by EPA Method SW8260B
Methanol & Ethanol analyzed by EPA Method SW8260B-DI

TABLE 7
PETROLEUM HYDROCARBON MASS EXTRACTION RATES SUMMARY
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Test Well ID	Flowrate (cfm)	Influent Concentration (mg/m^3)			Soil Vapor Extraction Rate from Wells (lbs/day)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period[1] lbs	Total lbs
07/06/04	S-2	87.0	660	2.1	1.0	5.16	0.01	0.01	5.16	5.16
07/07/04	S-1	87.0	<12	<0.12	0.29	<0.09	<0.001	0.002	0.01	5.17
07/07/04	MW-3	87.0	<12	<0.12	0.13	<0.09	<0.001	0.001	0.01	5.18
07/19/04	S-1, S-2, MW-3	86.0	88	0.26	0.25	0.68	0.002	0.002	8.16	13.34

Date	Test Well ID	Volume of groundwater extracted[2], gallons	Influent Concentration (µg/L)			Mass Extracted from groundwater (lbs)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period lbs	Total lbs
07/06/04	S-2	80	2,200	13	66	0.001	0.00001	0.00004	0.001	0.001
07/08/04	S-1, S-2, MW-3	2,490	<100	<0.50	16	<0.002	<0.00001	0.0003	0.012	0.014
07/19/04	S-1, S-2, MW-3	21,710	<50	<0.50	4	<0.01	<0.0001	0.001	0.008	0.015

Sample Calculations

Ext. Rate from Wells (vapor) = $\frac{40 \text{ cu ft}}{\text{min}} \times \frac{8{,}400 \text{ mg}}{\text{cu meter}} \times \frac{\text{lb}}{453593 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{day}} \times \frac{\text{x cu meter}}{35.314 \text{ cu ft}}$

= 30.21 lbs/day

Mass removed from groundwater = concentration (µg/L) x gallons extracted x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L)

[1] For mass estimates between the sampling dates, average mass extraction rate and time elapsed (operational uptime) between the sampling events were used

[2] Volume estimated based on flow totalizer measurements taken on the sampling days

Based on average groundwater extraction rate of 0.63 gpm and the average concentrations, the mass extraction rate for is calculated using:

Mass removed from groundwater (lbs/day) = concentration (µg/L) x average flowrate (gpm) x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L) * 60 (mins/hr)*24 (hr/day)

TPHG = 0.017 lbs/day
Benzene = 0.0001 lbs/day
MTBE = 0.0002 lbs/day

TABLE 2
DPE EVENT FIELD OBSERVATION SUMMARY
2nd DPE Event - June/July 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Hour Meter Reading	TE days	Appl Vac "Hg	Air Flow cfm	Totalizer Reading gallons	GW Ext Rate gpm	Inf PID ppmv	Oper Temp deg F	MW-4		MW-5		MW-6			MW-7			MW-8		
									DTW	DD	DTW	DD	Vac	DTW	DD	Vac	DTW	DD	Vac	DTW	DD
06/06/05	**Begin June/July 2005 DPE Event, Using Wells S-1, S-2, and MW-3 for Extraction; Hour Meter Reading Prior to Test Start up = 3361.2**																				
06/06/05	3361.20	--	24.00	26.6	23,710	--	125.0	1,471	6.65	--	10.91	--	0.00	15.67	--	0.00	14.79	--	0.00	14.08	--
06/07/05	3383.60	0.93	24.00	NM	25,480	1.32	NM	1,443	NM	NM	NM	NM	0.02	NM	NM	0.00	NM	NM	0.00	NM	NM
06/09/05	3416.60	2.31	23.00	27.7	27,160	0.85	6.0	1,473	6.10	-0.55	10.62	-0.29	0.00	14.58	-1.09	0.00	13.58	-1.21	0.00	14.90	0.82
06/14/05	3468.10	4.45	24.00	28.4	31,000	1.24	6.0	1,450	6.35	-0.30	10.80	-0.11	0.00	15.60	-0.07	0.00	13.56	-1.23	0.00	14.81	0.73
06/16/05	3515.00	6.41	25.00	23.0	34,450	1.23	5.0	1,472	6.33	-0.32	10.98	0.07	0.00	15.85	0.18	0.00	13.97	-0.82	0.00	14.98	0.90
06/21/05	3638.20	11.54	25.00	39.4	43,130	1.17	0.0	1,470	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
06/28/05	3804.80	18.48	24.00	39.3	53,540	1.04	NM	1,456	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
07/01/05	3877.30	21.50	24.00	31.9	57,950	1.01	5.0	1,473	6.46	-0.19	11.09	0.18	0.00	15.65	-0.02	0.00	14.18	-0.61	0.00	16.35	2.27
07/01/05	3878.10	21.54	Event End Hr. Meter		58,050		**Discontinue DPE Event**														
Distance to Nearest Extraction Well									**110**		**170**		**110**			**70**			**50**		
Screening Interval									**10 - 40.5**		**10 - 40**		**10 - 40.5**			**10 - 40.5**			**10 - 35**		

Notes:

TE - Time Elapsed, days
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
* = time elapsed based on hour meter readings
ppmv - parts per million by volume
Temp - Temperature
deg F - degree Farenheit
Ext. - Extraction
cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
GW Ext - Groundwater Extraction
PID - Photo Ionization Detector
All induced vacuum measured in observation wells were in "WC
gpm - gallons per minute
"Hg - Inches Mercury
bgs - below ground surface
NM - Not measured

TABLE 3
SOIL VAPOR ANALYTICAL RESULTS
2nd DPE Event - June/July 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA
06/06/05	11:18	SYS INF Air	**160**	**4.4**	**0.72**	**0.55**	**1.35**	**3.6**	<7.5
06/06/05	11:15	Eff Air	<15	<0.30	<0.30	<0.30	<0.30	<0.30	<7.5
06/28/05	06:16	Inf Air	<15	<0.15	<0.15	<0.15	<0.15	<0.15	NA
07/01/05	05:41	SYS INF AIR*	<50	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0
07/01/05	05:39	EFF AIR*	<50	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0

Notes

All air sample values reported in milligrams per cubic meter (mg/m^3)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
DIPE = Di-isopropyl ether
DIPE, ETBE, and TAME were reported below laboratory reporting limits in all samples.
NA = Not Analyzed

Analytical Laboratory

Alpha Analytical, Inc. (Alpha [ELAP #2019])
* = Analyzed by Severn Trent Laboratories (STL [ELAP #2496])

Analytical Methods

TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual (Alpha) & by 8260B (STL)
BTEX, MTBE, TBA, DIPE, TAME, and ETBE analyzed by EPA Method SW8260B

TABLE 4
GROUNDWATER ANALYTICAL RESULTS
2nd DPE Event - June/July 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA	DIPE	ETBE	TAME
06/06/05	11:34	Influent	**590**	**11**	**3.8**	**6.1**	**33**	**62**	**140**	<1.0	<1.0	<1.0
06/07/05	09:41	MID (Fluent)	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
06/07/05	09:39	EFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
06/28/05	06:08	Influent	<50	<0.50	<0.50	<0.50	<0.50	**2.6**	**52**	<1.0	<1.0	<1.0
06/28/05	06:04	Mid GAC	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
06/28/05	06:00	Effluent	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
07/01/05	05:46	INF	<50	<0.50	<0.50	<0.50	<0.50	**2.2**	**64**	<1.0	<1.0	<1.0
07/01/05	05:54	GAC-1	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
07/01/05	05:58	EFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0

All water sample values reported in micrograms per liter (µg/L)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether

Analytical Laboratory
Alpha Analytical , Inc. (ELAP #2019)

Analytical Methods
TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, ETBE, & TAME analyzed by
EPA Method SW8260B

TABLE 5
PETROLEUM HYDROCARBON MASS EXTRACTION SUMMARY
2nd DPE Event June/July 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Time Elapsed (days)	Flowrate (cfm)	Influent Concentration (mg/m^3)			Soil Vapor Extraction Rate from Wells (lbs/day)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period[1] lbs	Total lbs
Petroleum hydrocarbon mass removed during first DPE event conducted during July 2004									13.34	13.34
06/06/05	-	26.6	160	4.4	3.6	0.378	0.010	0.009	0.378	13.718
06/28/05	18.48	39.3	<15	<0.15	<0.15	<0.052	<0.001	<0.001	3.980	17.698
07/01/05	21.54	31.9	<50	<0.50	<0.50	<0.142	<0.001	<0.001	<2.091	19.789

Date		Volume of groundwater extracted[2], gallons	Influent Concentration (µg/L)			Mass Extracted from groundwater (lbs)			Cumulative Mass Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	TPHG lbs	MTBE lbs
Petroleum hydrocarbon mass removed during first DPE event conducted during July 2004									0.015	0.00149
06/06/05	-	56[3]	590	11	62	0.00028	0.00001	0.00003	0.01528	0.00152
06/28/05	18.48	29,830	<50.0	<0.50	2.6	0.07966	0.00143	0.00804	0.09493	0.00956
07/01/05	21.54	4,510	<50.0	<0.50	2.2	<0.00188	<0.00002	0.00009	0.09682	0.00965

Sample Calculations

Ext. Rate from Wells (vapor) = $\frac{40 \text{ cu ft}}{\text{min}} \times \frac{8{,}400 \text{ mg}}{\text{cu meter}} \times \frac{\text{lb}}{453{,}593 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{day}} \times \frac{\text{x cu meter}}{35.314 \text{ cu ft}}$

30.21 lbs/day

Mass removed from groundwater = concentration (µg/L) x gallons extracted x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L)

[1] For mass estimates between the sampling dates, average mass extraction rate and time elapsed (operational uptime) between the sampling events were used

[2] Volume estimated based on flow totalizer measurements taken on the sampling days

[3] Volume estimated based on average groundwater extraction rate and the time elapsed between the sample collection and start-up

The mass extraction rate is calculated by multiplying the mass extracted per day by the operational uptime for the period.

TABLE 1
DPE EVENT FIELD OBSERVATION SUMMARY
3rd DPE Event - August/September 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Hour Meter Reading	TE days	Appl Vac "Hg	Air Flow cfm	Totalizer Reading gallons	GW Ext Rate gpm	Inf PID ppmv	Oper Temp deg F	Depth to Water, feet bgs and Induced Vacuum, "WC									
									MW-4		MW-5		MW-6			MW-8		
									DTW	DD	DTW	DD	Vac	DTW	DD	Vac	DTW	DD
8/29/05 5:30	Baseline measurements prior to start of third DPE event								8.71	--	12.90	--	0.00	DRY	--	0.00	16.75	--
8/29/05 7:00	**Begin Third DPE Event, Using Wells S-1, S-2, MW-3, and MW-7 for Extraction; Hour Meter Reading Prior to Test Start up = 435.6. Totalizer reading = 22,580**																	
8/29/05 8:30	437.00	0.06	18.00	48.8	22,740	1.90	5.5	1,458	NM	NM	NM	NM	NM	NM	--	NM	NM	--
8/31/05 5:00	480.70	1.88	18.00	37.3	29,840	2.71	5.5	1,456	8.73	0.02	13.18	0.28	0.00	DRY	--	0.00	17.21	0.46
9/6/05 6:00	619.10	7.65	NM	NM	51,690	2.63	System observed non-functional due to low propane											
9/6/05 9:15	System re-started after propane delivery. Based on hour meter readings for 8/31/5 at 0500 hrs & 9/6/5 at 0600 hrs, the DPE system was likely shutdown on 9/5/05 at 23:14 hrs																	
9/6/05 10:15	620.10	7.69	18.00	62.5	51,850	2.67	16.1	1,447	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
9/9/05 5:00	685.70	10.42	16.00	45.0	61,390	2.42	8.1	1,450	8.99	0.28	13.61	0.71	0.00	DRY	--	0.00	18.68	1.93
9/13/05 5:30	780.20	14.36	16.00	40.4	75,020	2.40	2.0	1,457	9.14	0.43	13.78	0.88	0.00	18.67	-0.33	0.00	19.08	2.33
9/16/05 5:00	796.10	15.02	NM	NM	77,310	2.40	System observed non-functional due to high water level in the knockout tank. Based on hour meter readings between 9/13/05 5:30 and 9/16/05 5:00, the DPE system was likely shutdown on 9/13/05 21:24 hrs. Since the influent concentrations were low, the third DPE event was discontinued.											
Distance to Nearest Extraction Well									**86**		**99**		**70**			**48**		
Screening Interval, feet bgs : S-1=20-40 , S-2=20-40, MW-3=24-44, & MW-7=10-40									**10 - 40.5**		**10 - 40**		**10 - 40.5**			**10 - 35**		

Notes:

TE - Time Elapsed calculated as difference of hour meter readings, days
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
Ext. - Extraction
GW Ext - Groundwater Extraction
GW Ext Rate = Difference of Totalizer Readings, gallons

cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
bgs - below ground surface
gpm - gallons per minute
"Hg - Inches Mercury

Temp - Temperature
deg F - degree Farenheit
PID - Photo Ionization Detector
ppmv - parts per million by volume
NM - Not measured
-- = Not applicable

[1] Flow rate measured using a digital anemometer at 3" diameter steel pipe; flow rate = velocity X area of pipe (e.g.: flow rate = 994 feet per minute X 0.05 sq.ft)

TABLE 2
SOIL VAPOR ANALYTICAL RESULTS
3rd DPE Event - August/September 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA
08/29/05	09:01	USA57ASYSINF	<15	**0.59**	<0.15	**0.23**	**0.44**	**0.41**	<1.5
08/29/05	09:05	USA57ASYSEFF	<15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5
09/06/05	10:30	Sys Inf Air	<15	<0.15	<0.15	<0.15	<0.15	<0.15	<7.5
09/13/05	05:45	USA57ASYSINF	<15	**0.19**	<0.15	<0.15	<0.15	<0.15	<7.5

Notes

All air sample values reported in milligrams per cubic meter (mg/m^3)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
DIPE = Di-isopropyl ether

Analytical Laboratory

Alpha Analytical, Inc. (Alpha [ELAP #2019])

Analytical Methods

TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, TAME, and ETBE analyzed by EPA Method SW8260B

DIPE, ETBE, and TAME were reported below laboratory reporting limits in all samples (<0.30 mg/m^3).

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
3rd DPE Event - August/September 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA	DIPE	ETBE	TAME
08/29/05	09:30	USA57WINF	**55**	**3.3**	**<0.50**	**0.68**	**3.3**	**17**	**160**	<1.0	<1.0	<1.0
08/29/05	09:35	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
09/06/05	10:36	Inf Water	<50	<0.50	<0.50	<0.50	<0.50	**4.7**	**61**	<1.0	<1.0	<1.0
09/13/05	06:20	USA57WINF	<50	<0.50	<0.50	<0.50	<0.50	**2.6**	**29**	<1.0	<1.0	<1.0
09/13/05	06:22	USA57WGAC1	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
09/13/05	06:25	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
09/16/05	5:32	USA57WINF	**67**	<0.50	<0.50	<0.50	**3.8**	**2.3**	**25**	<1.0	<1.0	<1.0

All water sample values reported in micrograms per liter (µg/L)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether

Analytical Laboratory
Alpha Analytical , Inc. (ELAP #2019)

Analytical Methods
TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, ETBE, & TAME analyzed by
EPA Method SW8260B

TABLE 4
PETROLEUM HYDROCARBON MASS EXTRACTION SUMMARY
3rd DPE Event August/September 2005
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Time Elapsed (days)	Flowrate (cfm)	Influent Concentration (mg/m^3)			Soil Vapor Extraction Rate (lbs/day)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period[1]	Total
									lbs	lbs
Petroleum hydrocarbon mass removed during the previous DPE events									19.789	19.789
08/29/05	-	48.8	<15	0.59	0.41	<0.065	0.003	0.002	--	--
09/06/05	7.69	62.5	<15	<0.15	<0.15	<0.083	<0.001	<0.001	<0.570	19.789
09/13/05	6.67	40.4	<15	0.19	<0.15	<0.054	0.001	<0.001	<0.458	19.789

Date	Time Elapsed (days)	Volume of groundwater extracted[2], gallons	Influent Concentration (µg/L)			Mass Extracted from groundwater (lbs)			Cumulative Mass Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	TPHG	MTBE
									lbs	lbs
Petroleum hydrocarbon mass removed during the previous DPE events									0.09682	0.00965
08/29/05	-	160	55	3.3	17	0.00007	0.000004	0.00002	0.09689	0.00967
09/06/05	7.69	29,110	<50	<0.50	4.7	0.01275	0.00046	0.00264	0.10965	0.01231
09/13/05	6.67	23,170	<50	<0.50	2.6	<0.00967	<0.00010	0.00071	0.10965	0.01231
09/16/05	0.66	2,290	67	<0.50	2.3	0.00112	<0.00001	0.00005	0.11076	0.01231

Sample Calculations

Ext. Rate from Wells (vapor) = $\frac{40 \text{ cu ft}}{\text{min}} \times \frac{8{,}400 \text{ mg}}{\text{cu meter}} \times \frac{\text{lb}}{453{,}593 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{day}} \times \frac{\text{cu meter}}{35.314 \text{ cu ft}}$

30.21 lbs/day

Mass removed from groundwater = concentration (µg/L) x gallons extracted x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L)

[1] For mass estimates between the sampling dates, average mass extraction rate and time elapsed (operational uptime) between the sampling events were used

[2] Volume estimated based on flow totalizer measurements taken on the sampling days

The mass extraction rate is calculated by multiplying the mass extracted per day by the operational uptime for the period.

TABLE 1
DPE EVENT FIELD OBSERVATION SUMMARY
4th DPE Event - February/March 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Hour Meter Reading	TE days	Appl Vac "Hg	Air Flow cfm	Totalizer Reading gallons	GW Ext Rate gpm	Inf PID ppmv	Oper Temp deg F	Depth to Water, feet bgs and Induced Vacuum, "WC															
									S-1		S-2		MW-3		MW-6			MW-7			MW-8			
									DTW	DD	DTW	DD	DTW	DD	Vac	DTW	DD	Vac	DTW	DD	Vac	DTW	DD
2/20/06 5:30	**Begin fourth DPE event using wells EX-1, EX-2, EX-3, and EX-4. Hour Meter Reading = 3,086.3. Totalizer reading = 94,450 gallons**																							
2/20/06 5:30	3,086.30	0.00	20.00	40.3	94,450	--	360	1,460	14.47	--	16.61	--	10.79	--	NM	15.70	--	NM	13.74	--	NM	13.82	--
2/24/06 5:15	3,161.30	3.13	System observed non-functional and re-started by resetting power supply. Based on hour meter readings, the DPE system was likely shutdown on 2/23/06 around 0830 hrs																					
2/24/06 5:15	3,161.30	3.13	18.50	50.6	98,740	0.95	150	1,462	14.45	-0.02	16.53	-0.08	11.82	1.03	0.00	15.64	-0.06	0.00	13.65	-0.09	0.00	14.29	0.47
3/3/06 7:00	3,262.40	7.34	23.00	29.0	100,540	0.30	212	1,451	14.20	-0.27	16.30	-0.31	11.55	0.76	0.00	15.10	-0.60	0.10	13.26	-0.48	0.00	14.38	0.56
3/9/06 6:30	3,403.10	13.20	23.00	22.4	103,490	0.35	150	1,470	13.97	-0.50	16.00	-0.61	11.47	0.68	0.00	14.49	-1.21	3.03	13.11	-0.63	3.05	13.69	-0.13
3/16/06 5:30	3,566.70	20.02	23.00	25.5	105,780	0.23	68	1,457	13.61	-0.86	15.60	-1.01	11.15	0.36	0.00	14.15	-1.55	0.00	12.55	-1.19	3.15	13.03	-0.79
3/24/06 5:00	3,752.80	27.77	23.00	30.5	107,790	0.18	35	1,459	13.10	-1.37	14.68	-1.93	10.73	-0.06	0.03	13.82	-1.88	0.05	11.99	-1.75	0.00	12.83	-0.99
3/24/06 5:30	Discontinue fourth DPE event.																							
Average	--	--	**21.75**	**33.04**	--	**0.40**	**162.5**	**1,460**	**13.97**	**-0.60**	**15.95**	**-0.79**	**11.25**	**0.55**	**0.01**	**14.82**	**-1.06**	**0.64**	**13.05**	**-0.83**	**1.24**	**13.67**	**-0.18**
Distance to Nearest Extraction Well, feet									**20**		**27**		**15**		**75**			**33**			**62**			
Screening Interval : EX-1=EX-2=EX-3=EX-4= 5 to 25 feet bgs									**20 - 40**		**20 - 40**		**24 - 44**		**10 - 40.5**			**10 - 40**			**10 - 35**			

Notes:

TE - Time Elapsed calculated as difference of hour meter readings, days
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
Ext. - Extraction
GW Ext - Groundwater Extraction
GW Ext Rate = Difference of Totalizer Readings, gallons

cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
bgs - below ground surface
gpm - gallons per minute
"Hg - Inches Mercury

Temp - Temperature
deg F - degree Farenheit
PID - Photo Ionization Detector
ppmv - parts per million by volume
NM - Not measured
-- = Not applicable

[1] Flow rate measured using a digital anemometer at 3" diameter steel pipe;
flow rate = velocity X area of pipe (e.g.: flow rate = 994 feet per minute X 0.05 sq.ft)

TABLE 2
SOIL VAPOR ANALYTICAL RESULTS
4th DPE Event - February/March 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA
02/20/06	07:18	USA57ASysEff	<15	<0.15	<0.15	<0.15	<0.15	<0.15	<7.5
02/20/06	07:20	USA57ASysInf	690	8.3	20	17	107	<0.60	<30
03/03/06	07:25	USA57ASYSINF	480	8.6	7.0	8.8	19.9	0.29	<7.5
03/09/06	06:46	USA57ASysInf	320	2.0	10	11	40.5	<0.30	<15
03/24/06	05:30	USA57ASYSINF	98	0.39	0.50	1.6	7.2	<0.15	<7.5

Notes

All air sample values reported in milligrams per cubic meter (mg/m^3)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl meihyl ether
DIPE = Di-isopropyl ether

DIPE, ETBE, and TAME were below laboratory reporting limits in all samples.

Analytical Laboratory

Alpha Analytical, Inc. (Alpha [ELAP #2019])

Analytical Methods

TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, TAME, and ETBE analyzed by EPA Method SW8260B

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
4th DPE Event - February/March 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA	DIPE	ETBE	TAME
02/20/06	07:28	USA57WINF	3,800	65	300	71	740	2.7	160	<5.0[1]	<5.0[1]	<5.0[1]
02/20/06	07:42	USA57WGAC1	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
02/20/06	07:39	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
03/03/06	07:25	USA57WSYSINF	1,100	96	20	30	120	10	47	<1.0	<1.0	<1.0
03/09/06	07:24	USA57WINF	510	3.1	3.3	10	65	1.1	23	<1.0	<1.0	<1.0
03/09/06	07:26	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
03/09/06	07:28	USA57GAC1	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
03/24/06	05:15	USA57WINF	130	2.7	1.9	2.8	27	<0.50	28	<1.0	<1.0	<1.0
03/24/06	05:20	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0

All water sample values reported in micrograms per liter (µg/L)
TPHG = Total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
[1] = Reporting limits were increased due to high concentrations of target analytes

Analytical Laboratory
Alpha Analytical , Inc. (ELAP #2019)

Analytical Methods
TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, ETBE, & TAME analyzed by EPA Method SW8260B

TABLE 4
PETROLEUM HYDROCARBON MASS EXTRACTION SUMMARY
4th DPE Event February/March 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Time Elapsed (days)	Flowrate (cfm)	Influent Concentration (mg/m^3)			Soil Vapor Extraction Rate (lbs/day)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period[1]	Total
									lbs	lbs
Petroleum hydrocarbon mass removed during the previous DPE events									19.789	19.789
02/20/06	--	40.3	690	8.3	<0.60	2.47	0.03	<0.002	--	--
03/03/06	7.34	29.0	480	8.6	0.29	1.24	0.02	0.001	13.608	33.397
03/09/06	5.86	22.4	320	2.0	<0.30	0.64	0.004	<0.001	5.495	38.892
03/24/06	14.57	30.5	98	0.39	<0.15	0.27	0.001	<0.0004	6.578	45.469

Date	Time Elapsed (days)	Volume of groundwater extracted[2], gallons	Influent Concentration (µg/L)			Mass Extracted from groundwater (lbs)			Cumulative Mass Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	TPHG	MTBE
									lbs	lbs
Petroleum hydrocarbon mass removed during the previous DPE events									0.11076	0.01231
02/20/06	-	48	3,800	65	2.7	0.00152	0.000026	0.000001	0.11228	0.01231
03/03/06	7.34	6,090	1,100	96	10.0	0.12451	0.00409	0.00032	0.23679	0.01263
03/09/06	5.86	2,950	510	3.1	1.1	0.01982	0.00122	0.00014	0.25661	0.01277
03/24/06	14.57	4,300	130	2.7	<0.50	0.01148	0.00010	0.00003	0.26809	0.01280

Sample Calculations

Ext. Rate from Wells (vapor) = $\frac{40.3 \text{ cu ft}}{\text{min}} \times \frac{690 \text{ mg}}{\text{cu meter}} \times \frac{\text{lb}}{453{,}593 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{day}} \times \frac{\text{cu meter}}{35.314 \text{ cu ft}}$

= 2.47 lbs/day

Mass removed from groundwater = concentration (µg/L) x gallons extracted x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L)

[1] For mass estimates between the sampling dates, average mass extraction rate and time elapsed (operational uptime) between the sampling events were used

[2] Volume estimated based on flow totalizer measurements taken on the sampling days. For February 20, 2006, the volume of groundwater extracted was estimated based on the average groundwater extraction rate (0.40 gpm) and time elapsed between the start-up and sample collection

TABLE 1
DPE EVENT FIELD OBSERVATION SUMMARY
5th DPE Event - May 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Hour Meter Reading	TE days	Appl Vac "Hg	Air Flow[1] cfm	Totalizer Reading gallons	GW Ext Rate gpm	Inf PID ppmv	Oper Temp deg F	Depth to Water, feet bgs and Induced Vacuum, "WC													
									S-1		S-2		MW-3		MW-6			MW-7			MW-8		
									DTW	DD	DTW	DD	DTW	DD	Vac	DTW	DD	Vac	DTW	DD	Vac	DTW	DD
5/1/06 9:30	**Begin fifth DPE event using wells EX-1, EX-2, EX-3, and EX-4. Hour Meter Reading = 3,758. Totalizer reading = 107,790 gallons**																					
5/1/06 9:30	3,758.00	0.00	24.50	29.5	107,790	--	12	1,451	9.43	--	11.37	--	7.84	--	0.00	11.00	--	0.00	8.41	--	0.00	11.16	--
5/3/06 5:30	3,826.80	2.87	24.00	21.9	110,790	0.73	15	1,479	9.55	0.12	11.04	-0.33	8.85	1.01	0.00	11.05	0.05	0.00	8.37	-0.04	0.01	11.04	-0.12
5/8/06 6:00	3,923.20	6.88	22.00	26.1	112,920	0.37	17	1,450	9.58	0.15	11.42	0.05	9.51	1.67	0.00	11.08	0.08	0.00	8.35	-0.06	0.00	11.46	0.30
5/16/06 5:30	4,006.80	10.37	Upon arrival the DPE system was observed to be non-operating due to generator malfunction. Based on the hour meter readings, the DPE system was likely shutdown at 17:36 hrs on 5/11/06. The DPE system system was re-started at 5:30 hrs on 5/16/06 after troubleshooting the generator malfunction.																					
5/16/06 5:30	4,006.80	10.37	21.00	56.2	113,780	0.17	50	1,460	9.63	0.20	11.47	0.10	9.95	2.11	0.00	11.28	0.28	0.00	8.43	0.02	0.00	11.86	0.70
5/22/06 5:30	4,150.40	16.35	21.00	38.8	114,830	0.12	43	1,460	9.54	0.11	11.39	0.02	9.85	2.01	0.00	11.10	0.10	0.00	8.39	-0.02	0.00	11.88	0.72
5/25/06 5:30	4,190.20	18.01	Upon arrival the DPE system was observed to be non-operating due to generator malfunction. Based on the hour meter readings, the DPE system was likely shutdown at 21:18 hrs on 5/23/06. The DPE system system was re-started at 5:30 hrs on 5/25/06 after troubleshooting the generator malfunction.																					
5/25/06 5:30	4,190.20	18.01	20.00	48.4	115,090	0.11	20	1,452	NM	--	NM	--	NM	--	NM	NM	--	NM	NM	--	NM	NM	--
5/25/06 6:40	4,191.10	18.05	Discontinue fifth DPE event. Totalizer reading = 115,190 gallons																			
Average	--	--	**22.08**	**36.79**	--	**0.30**	**26.2**	**1459**	**9.55**	**0.15**	**11.34**	**-0.04**	**9.20**	**1.70**	**0.00**	**11.10**	**0.13**	**0.00**	**8.39**	**-0.03**	**0.00**	**11.48**	**0.40**
Distance to Nearest Extraction Well, feet									**20**		**27**		**15**		**75**			**33**			**62**		
Screening Interval : EX-1=EX-2=EX-3=EX-4= 5 to 25 feet bgs									**20 - 40**		**20 - 40**		**24 - 44**		**10 - 40.5**			**10 - 40**			**10 - 35**		

Notes:

TE - Time Elapsed calculated as difference of hour meter readings, days
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
Ext. - Extraction
GW Ext - Groundwater Extraction
GW Ext Rate = Difference of Totalizer Readings, gallons

cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
bgs - below ground surface
gpm - gallons per minute
"Hg - Inches Mercury

Temp - Temperature
deg F - degree Farenheit
PID - Photo Ionization Detector
ppmv - parts per million by volume
NM - Not measured
-- = Not applicable

[1] Flow rate measured using a digital anemometer at 3" diameter steel pipe;
flow rate = velocity X area of pipe (e.g.: flow rate = 600 feet per minute X 0.05 sq.ft)

TABLE 2
SOIL VAPOR ANALYTICAL RESULTS
5th DPE Event - May 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA
05/01/06	10:40	USA57ASysEff	<15	<0.15	<0.15	<0.15	<0.15	<0.15	<7.5
05/01/06	10:45	USA57ASysInf	37	5.4	2.3	0.58	2.25	<0.15	<7.5
05/08/06	06:10	USA57ASYSINF	37	0.31	0.25	0.49	2.73	<0.15	<7.5
05/25/06	06:20	USA57ASysInf	180	1.1	0.22	0.32	0.58	<0.15	<7.5

Notes

All air sample values reported in milligrams per cubic meter (mg/m^3)
TPHG = Total petroleum hydrocarbons as gasoline (Gasoline Range Organics [GRO] C4-C13)
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
DIPE = Di-isopropyl ether

Analytical Laboratory

Alpha Analytical, Inc. (Alpha [ELAP #2019])

Analytical Methods

TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual

BTEX, MTBE, TBA, DIPE, TAME, and ETBE analyzed by EPA Method SW8260B

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
5th DPE Event - May 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA	DIPE	ETBE	TAME
05/01/06	10:28	USA57WINF	**990**	**170**	**96**	**15**	**205**	**12**	**66**	<2.0[1]	<2.0[1]	<2.0[1]
05/04/06	06:28	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
05/04/06	06:32	USA57WGAC1	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
05/08/06	06:45	USA57WINF	**110**	**0.61**	**<0.50**	**0.66**	**11.1**	**0.61**	**29**	<1.0	<1.0	<1.0
05/25/06	06:35	USA57WInf	**290**	**19**	**2.7**	**3.5**	**22.3**	**20**	**42**	<1.0	<1.0	<1.0
05/25/06	06:39	USA57WMid	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0

Notes:

All water sample values reported in micrograms per liter (µg/L)
TPHG = Total petroleum hydrocarbons as gasoline (Gasoline Range Organics [GRO] C4-C13)
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether

Analytical Laboratory
Alpha Analytical , Inc. (ELAP #2019)

Analytical Methods
TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, ETBE, & TAME analyzed by
EPA Method SW8260B

[1] = Reporting limits were increased due to high concentrations of target analytes

TABLE 4
PETROLEUM HYDROCARBON MASS EXTRACTION SUMMARY
5th DPE Event - May 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Time Elapsed (days)	Flowrate (cfm)	Influent Concentration (mg/m^3)			Soil Vapor Extraction Rate (lbs/day)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period[1] lbs	Total lbs
Petroleum hydrocarbon mass removed during the previous DPE events									45.469	45.469
05/01/06	--	29.5	37	5.4	<0.15	0.10	0.01	<0.0004	--	--
05/08/06	6.88	26.1	37	0.31	<0.15	0.09	0.00	<0.0003	0.629	46.098
05/25/06	11.16	48.4	180	1.1	<0.15	0.77	0.005	<0.001	4.801	50.900

Date	Time Elapsed (days)	Volume of groundwater extracted[2], gallons	Influent Concentration (µg/L)			Mass Extracted from groundwater (lbs)			Cumulative Mass Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	TPHG lbs	MTBE lbs
Petroleum hydrocarbon mass removed during the previous DPE events									0.26809	0.01280
05/01/06	-	18	990	170	12	0.00015	0.000026	0.000002	0.26824	0.01280
05/08/06	6.88	5,130	110	0.61	0.61	0.02355	0.00365	0.00027	0.29178	0.01307
05/25/06	11.16	2,270	290	19	20	0.00379	0.00019	0.00020	0.29557	0.01327

Sample Calculations

Ext. Rate from Wells (vapor) = $\frac{40.3 \text{ cu ft}}{\text{min}} \times \frac{690 \text{ mg}}{\text{cu meter}} \times \frac{\text{lb}}{453{,}593 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{day}} \times \frac{\text{cu meter}}{35.314 \text{ cu ft}}$

= 2.47 lbs/day

Mass removed from groundwater = concentration (µg/L) x gallons extracted x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L)

[1] For mass estimates between the sampling dates, average mass extraction rate and time elapsed (operational uptime) between the sampling events were used

[2] Volume estimated based on flow totalizer measurements taken on the sampling days. For May 1, 2006, the volume of groundwater extracted was estimated based on the average groundwater extraction rate (0.30 gpm) and time elapsed between the start-up and sample collection

TABLE 1
DPE EVENT FIELD OBSERVATION SUMMARY
6th DPE Event - July/August 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Hour Meter Reading	TE	Appl Vac	Air Flow[1]	Totalizer Reading	GW Ext Rate	Inf PID	Oper Temp	Depth to Water, feet bgs and Induced Vacuum, "WC													
									S-1		S-2		MW-3		MW-6			MW-7			MW-8		
									DTW	DD	DTW	DD	DTW	DD	Vac	DTW	DD	Vac	DTW	DD	Vac	DTW	DD
7/17/06 7:00	**Begin sixth DPE event using wells EX-1, EX-2, EX-3, and EX-4. Hour Meter Reading = 4,410.7. Totalizer reading = 121,580 gallons**																					
7/17/06 7:00	4,410.70	0.00	18.00	113.1	121,580	--	106	1,479	11.00	--	12.98	--	10.08	--	0.00	12.75	--	0.00	9.94	--	0.00	13.08	--
7/17/06 8:30	4,412.10	0.06	18.00	113.4	121,690	1.31	105	1,470	NM	--	NM	--	NM	--	NM	NM	--	NM	NM	--	NM	NM	--
7/21/06 5:00	4,505.10	3.93	18.00	111.5	122,200	0.09	100	1,450	NM	--	NM	--	NM	--	NM	NM	--	NM	NM	--	NM	NM	--
7/25/06 9:45	4,605.60	8.12	16.50	70.7	122,518	0.05	98	1,450	11.53	0.53	13.47	0.49	11.05	0.97	NM	13.13	0.38	NM	10.35	0.41	NM	13.51	0.43
7/27/06 6:00	4,651.40	10.03	17.00	59.9	122,633	0.04	77	1,457	NM	--	NM	--	NM	--	NM	NM	--	NM	NM	--	NM	NM	--
8/3/06 5:00	4,818.10	16.98	16.50	114.8	123,070	0.04	23	1,450	11.95	0.95	13.90	0.92	11.66	1.58	0.00	13.56	0.81	0.00	10.83	0.89	0.00	14.10	1.02
8/10/06 6:45	4,988.00	24.05	17.50	88.9	123,570	0.05	20	1,460	12.25	1.25	14.22	1.24	11.93	1.85	0.00	13.85	1.10	0.00	11.15	1.21	0.00	14.35	1.27
8/10/06 7:00																							
Average	--	--	**17.36**	**96.05**	--	**0.06**	**75.6**	**1,459**															
Distance to Nearest Extraction Well, feet									**20**		**27**		**15**		**75**			**33**			**62**		
Screening Interval : EX-1=EX-2=EX-3=EX-4= 5 to 25 feet bgs									**20 - 40**		**20 - 40**		**24 - 44**		**10 - 40.5**			**10 - 40**			**10 - 35**		

Notes:

TE - Time Elapsed calculated as difference of hour meter readings, days
Appl - Applied
Oper - Operating
Vac - Vacuum
DTW - depth to groundwater
" WC - Inches water column
Ext. - Extraction
GW Ext - Groundwater Extraction
GW Ext Rate = Difference of Totalizer Readings, gallons

cfm - cubic feet per minute
Inf - Influent
DD - Drawdown
bgs - below ground surface
gpm - gallons per minute
"Hg - Inches Mercury

Temp - Temperature
deg F - degree Farenheit
PID - Photo Ionization Detector
ppmv - parts per million by volume
NM - Not measured
-- = Not applicable

[1] Flow rate measured using a digital anemometer at 3" diameter steel pipe;
flow rate = velocity X area of pipe (e.g.: flow rate = 600 feet per minute X 0.05 sq.ft)

TABLE 2
SOIL VAPOR ANALYTICAL RESULTS
6th DPE Event - July/August 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA
07/17/06	8:25	USA57ASysEff	<15	<0.15	<0.15	<0.15	<0.15	<0.15	<7.5
07/17/06	8:28	USA57ASysInf	370	3.8	0.96	1.8	3.72	<0.30	<15
08/03/06	5:42	USA57ASysInf	80	<0.15	<0.15	0.20	2.33	<0.15	<7.5
08/10/06	07:00	USA57ASysInf	220	2.6	17	5.5	27.6	<0.15	<7.5

Notes

All air sample values reported in milligrams per cubic meter (mg/m^3)
TPHG = Total petroleum hydrocarbons as gasoline (Gasoline Range Organics [GRO] C4-C13)
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
MTBE = Methyl tertiary butyl ether
TBA = Tertiary butyl alcohol
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
DIPE = Di-isopropyl ether

Analytical Laboratory

Alpha Analytical, Inc. (Alpha [ELAP #2019])

Analytical Methods

TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual
BTEX, MTBE, TBA, DIPE, TAME, and ETBE analyzed by EPA Method SW8260B

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
6th DPE Event - July/August 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Sample Date	Sample Time	Sample ID	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	TBA	DIPE	ETBE	TAME
07/17/06	8:10	USA57WINF	**900**	**170**	**56**	**13**	**130**	**34**	**130**	<5.0[1]	<5.0[1]	<5.0[1]
08/03/06	5:55	USA57WEFF	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
08/03/06	5:57	USA57WGAC1	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<1.0	<1.0	<1.0
08/03/06	5:59	USA57WINF	**150**	<0.50	<0.50	<0.50	**17.9**	**0.79**	**18**	<1.0	<1.0	<1.0

Notes:

All water sample values reported in micrograms per liter (µg/L)

TPHG = Total petroleum hydrocarbons as gasoline (Gasoline Range Organics [GRO] C4-C13)

BTEX = Benzene, toluene, ethylbenzene, and total xylenes

MTBE = Methyl tertiary butyl ether

TBA = Tertiary butyl alcohol

DIPE = Di-isopropyl ether

ETBE = Ethyl tertiary butyl ether

TAME = Tertiary amyl methyl ether

Analytical Laboratory

Alpha Analytical , Inc. (ELAP #2019)

Analytical Methods

TPHG analyzed by EPA Method SW8015B/DHS LUFT Manual

BTEX, MTBE, TBA, DIPE, ETBE, & TAME analyzed by EPA Method SW8260B

[1] = Reporting limits were increased due to high concentrations of target analytes

TABLE 4
PETROLEUM HYDROCARBON AND GROUNDWATER MASS EXTRACTION SUMMARY
6th DPE Event - July/August 2006
Former USA Station No. 57
10700 MacArthur Boulevard
Oakland, California

Date	Time Elapsed (days)	Flowrate (cfm)	Influent Concentration (mg/m^3)			Soil Vapor Extraction Rate (lbs/day)			Cumulative Mass (TPHG) Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	Period[1]	Total
									lbs	lbs
Petroleum hydrocarbon mass removed during the previous DPE events									50.900	50.900
07/17/06	--	113.4	370	3.8	<0.30	3.73	0.04	<0.0030	--	--
08/03/06	16.98	114.8	80	<0.15	<0.15	0.82	<0.002	<0.0015	38.596	89.496
08/10/06	7.07	88.9	220	2.6	<0.15	1.74	0.021	<0.0012	9.032	98.527

Date	Time Elapsed (days)	Volume of groundwater extracted[2], gallons	Influent Concentration (µg/L)			Mass Extracted from groundwater (lbs)			Cumulative Mass Removed	
			TPHG	Benzene	MTBE	TPHG	Benzene	MTBE	TPHG	MTBE
									lbs	lbs
Petroleum hydrocarbon mass removed during the previous DPE events									0.29557	0.01327
07/17/06	-	91.7	900	170	34	0.00069	0.000130	0.000026	0.29626	0.01330
08/03/06	16.98	1,490	150	<0.50	0.79	0.00653	<0.00106	0.00022	0.30279	0.01351

Groundwater extracted to date 186,800 gallons

Sample Calculations

Ext. Rate from Wells (vapor) = $\frac{40.3 \text{ cu ft}}{\text{min}} \times \frac{690 \text{ mg}}{\text{cu meter}} \times \frac{\text{lb}}{453{,}593 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{day}} \times \frac{\text{cu meter}}{35.314 \text{ cu ft}}$

= 2.47 lbs/day

Mass removed from groundwater = concentration (µg/L) x gallons extracted x (2.2046×10^{-9})(lb/mg) / 0.26418 (gal/L)

[1] For mass estimates between the sampling dates, average mass extraction rate and time elapsed (operational uptime) between the sampling events were used.

[2] Volume estimated based on flow totalizer measurements taken on the sampling days. For July 17, 2006, the volume of groundwater extracted was estimated based on the groundwater extraction rate (1.31 gpm) and time elapsed between the start-up and sample collection .

APPENDIX B

WATER QUALITY PARAMETER AND CONTAMINANT CONCENTRATIONS VERSUS TIME GRAPHS

Figure 4
DO Variation with Time at Injection Wells
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

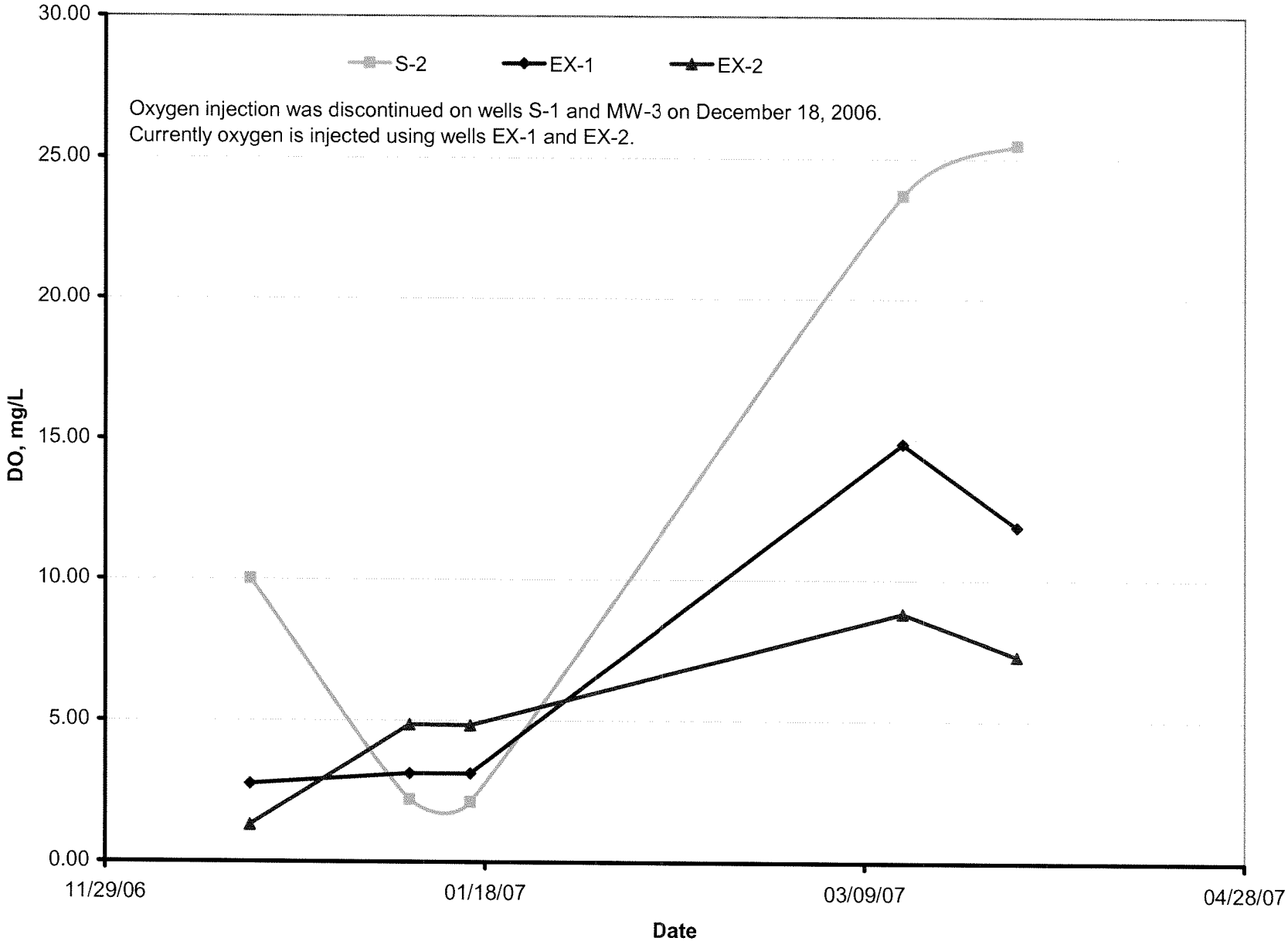


Figure 5
DO Variation with Time at Observation and Background Wells
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

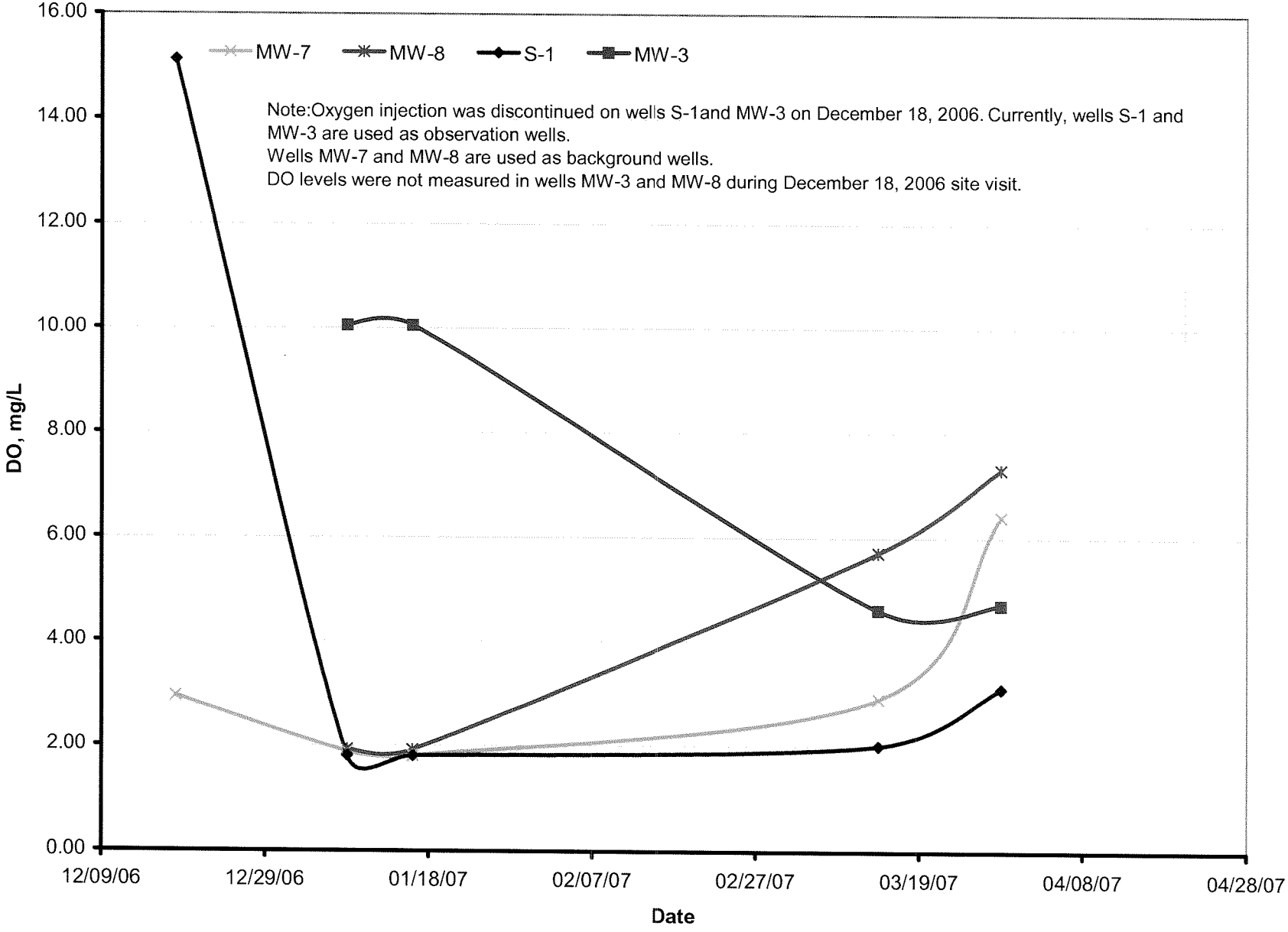


Figure 6
GRO, Benzene, MTBE, and Depth to Water Variation with Time at S-1
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

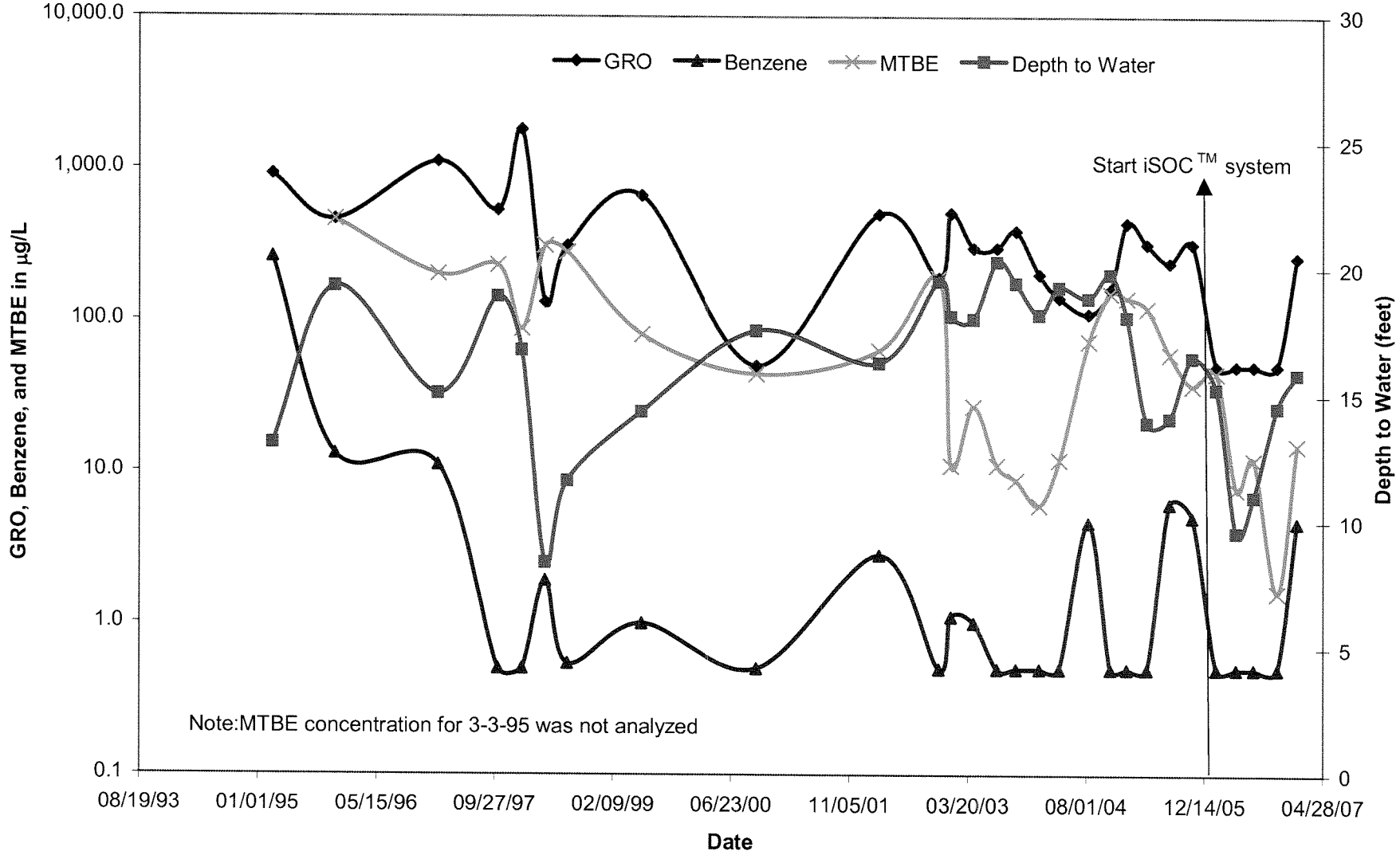


Figure 7
GRO, Benzene, MTBE, and Depth to Water Variation with Time at S-2
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

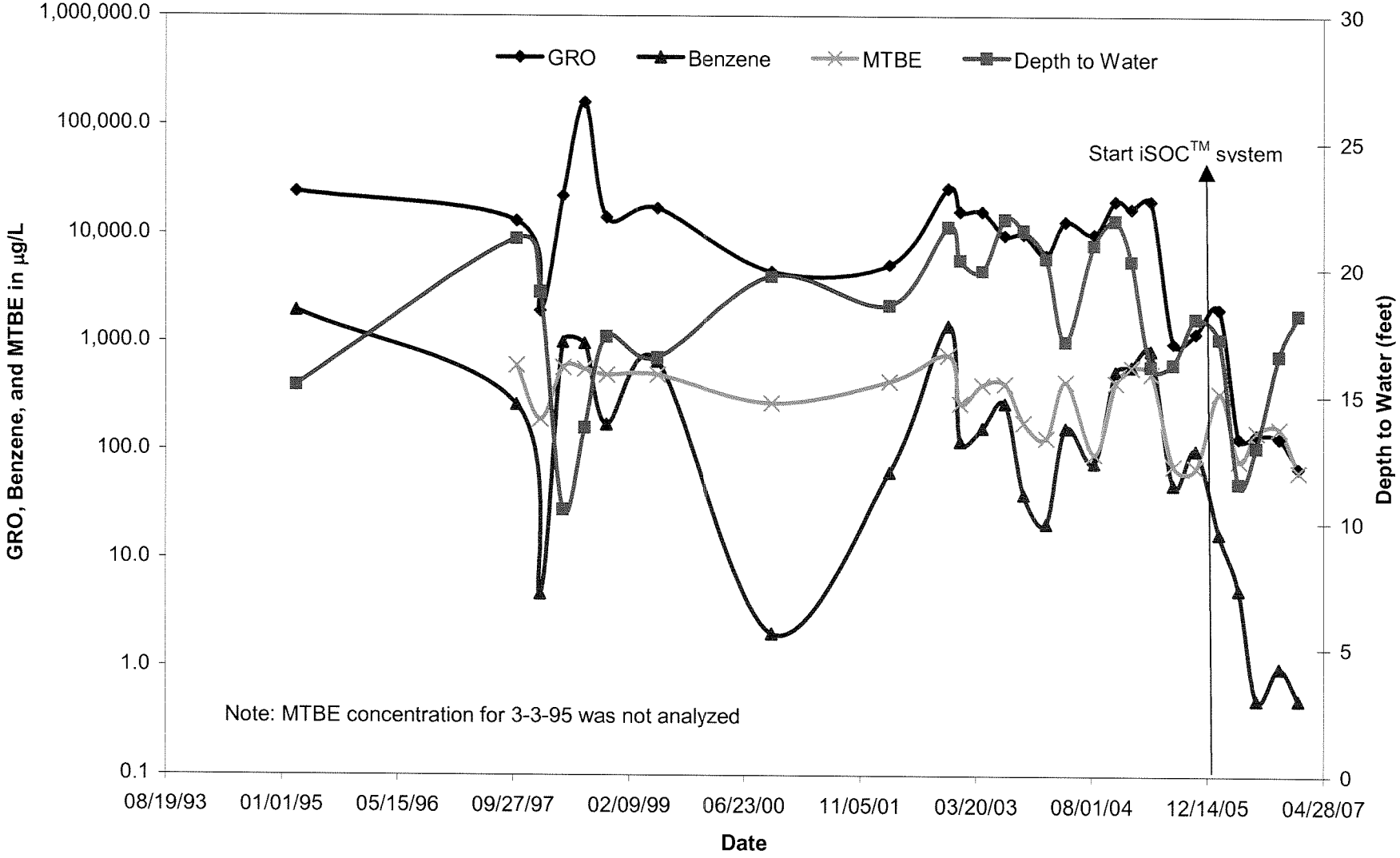


Figure 8
GRO, Benzene, MTBE, and Depth to Water Variation with Time at MW-3
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

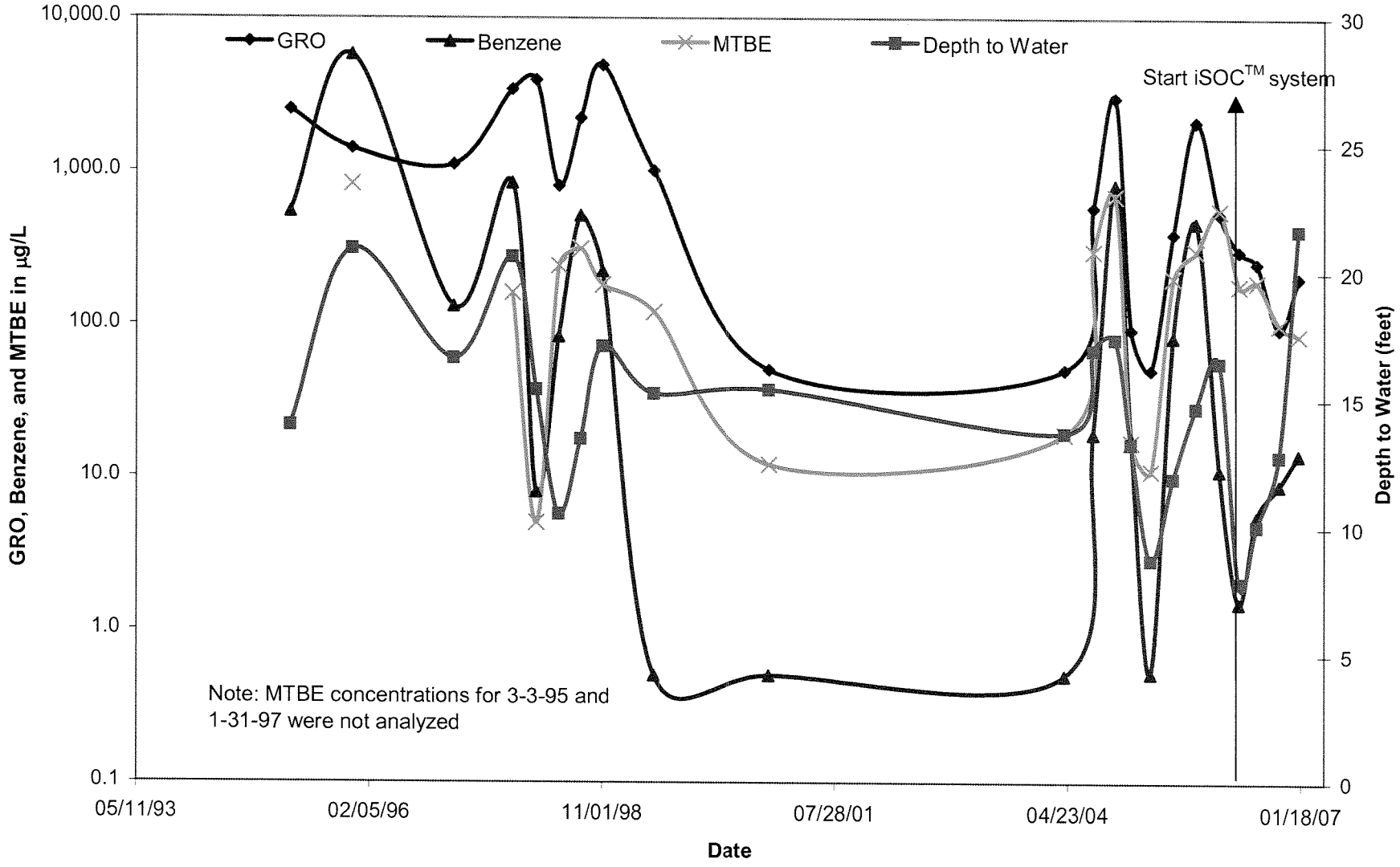


Figure 9
GRO, Benzene, MTBE, and Depth to Water Variation with Time at EX-1
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California

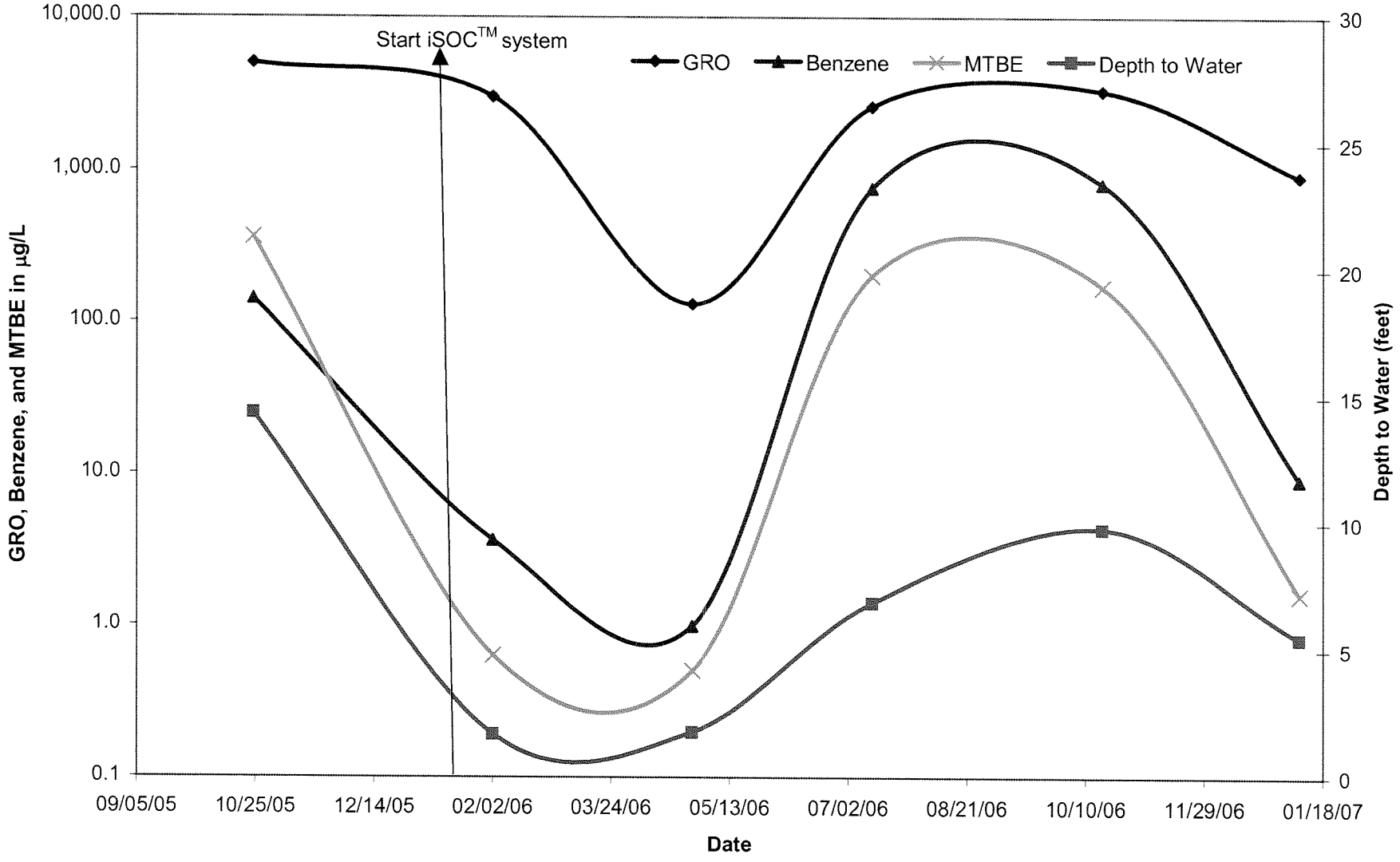
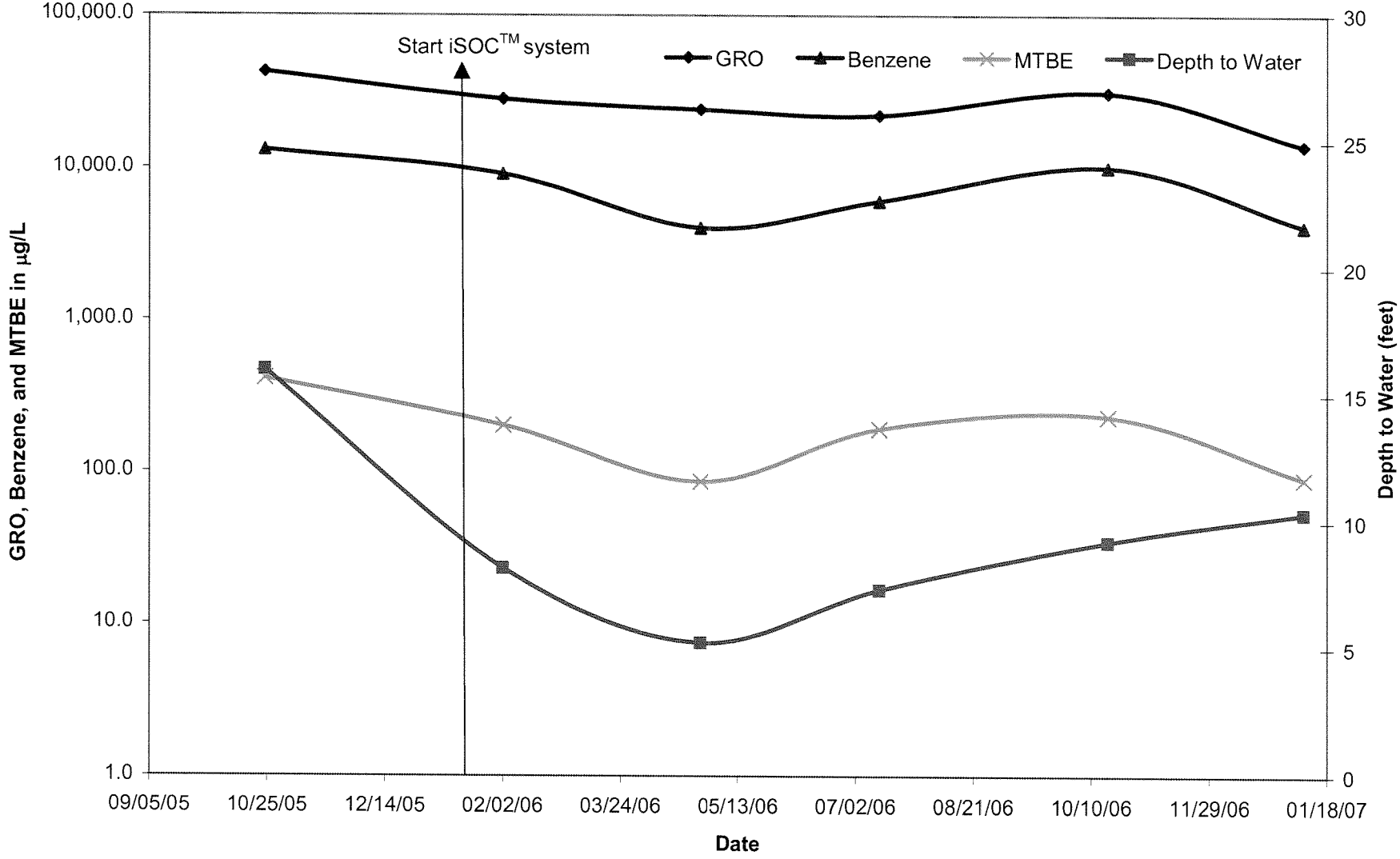


Figure 10
GRO, Benzene, MTBE, and Depth to Water Variation with Time at EX-2
Former USA Service Station No. 57
10700 MacArthur Boulevard
Oakland, California



APPENDIX C

FIELD PRACTICES AND PROCEDURES

FIELD PRACTICES AND PROCEDURES

General procedures used by Stratus in site assessments for drilling exploratory borings, collecting samples, and installing monitoring wells are described herein. These general procedures are used to provide consistent and reproducible results; however, some procedure may be modified based on site conditions. A California state-registered geologist supervises the following procedures.

PRE-FIELD WORK ACTIVITIES

Health and Safety Plan

Field work performed by Stratus at the site is conducted according to guidelines established in a Site Health and Safety Plan (SHSP). The SHSP is a document which describes the hazards that may be encountered in the field and specifies protective equipment, work procedures, and emergency information. A copy of the SHSP is at the site and available for reference by appropriate parties during work at the site.

Locating Underground Utilities

Prior to commencement of any work that is to be below surface grade, the location of the excavation, boring, etc., is marked with white paint as required by law. An underground locating service such as Underground Service Alert (USA) is contacted. The locating company contacts the owners of the various utilities in the vicinity of the site to mark the locations of their underground utilities. Any invasive work is preceded by hand augering to a minimum depth of five feet below surface grade to avoid contact with underground utilities.

FIELD METHODS AND PROCEDURES

Exploratory Soil Borings

Soil borings will be drilled using a truck-mounted, hollow stem auger drill rig. Soil samples for logging will be obtained from auger-return materials and by advancing a modified California split-spoon sampler equipped with brass or stainless steel liners into undisturbed soil beyond the tip of the auger. Soils will be logged by a geologist according to the Unified Soil Classification System and standard geological techniques. Drill cuttings well be screened using a portable photoionization detector (PID) or a flame ionization detector (FID). Exploratory soil borings not used for monitoring well installation will be backfilled to the surface with a bentonite-cement slurry pumped into the boring through a tremie pipe.

Soil sampling equipment will be cleaned with a detergent water solution, rinsed with clean water, and equipped with clean liners between sampling intervals. Augers and

samplers will be steam cleaned between each boring to reduce the possibility of cross contamination. Steam cleaning effluent will be contained in 55-gallon drums and temporarily stored on site. The disposal of the effluent will be the responsibility of the client.

Drill cuttings generated during the drilling procedure will be stockpiled on site. Stockpiled drill cuttings will be placed on and covered with plastic sheeting. The stockpiled soil is typically characterized by collecting and analyzing composite samples from the stockpile. Stratus Environmental will recommend an appropriate method for disposition of the cuttings based on the analytical results. The client will be responsible for disposal of the drill cuttings.

Soil Sample Collection

During drilling, soil samples will be collected in cleaned brass, two by six inch tubes. The tubes will be set in an 18-inch-long split-barrel sampler. The sampler will be conveyed to bottom of the borehole attached to a wire-line hammer device on the drill rig. When possible, the split-barrel sampler will be driven its entire length, either hydraulically or by repeated pounding a 140-pound hammer using a 30-inch drop. The number of drops (blows) used to drive the sampler will be recorded on the boring log. The sampler will be extracted from the borehole, and the tubes containing the soil samples will be removed. Upon removal, the ends of the lowermost tube will be sealed with Teflon sheets and plastic caps. Soil samples for chemical analysis will be labeled, placed on ice, and delivered to a state-certified analytical laboratory, along with the appropriate chain-of-custody documentation.

Soil Classification

As the samples are obtained in the field, they will be classified by the field geologist in accordance with the Unified Soil Classification System. Representative portions of the samples will be retained for further examination and for verification of the field classification. Logs of the borings indicating the depth and identification of the various strata and pertinent information regarding the method of maintaining and advancing the borehole will be prepared.

Soil Sample Screening

Soil samples selected for chemical analysis will be determined from a head-space analysis using a PID or an FID. The soil will be placed in a Ziploc® bag, sealed, and allowed to reach ambient temperature, at which time the PID probe will be inserted into the Ziploc® bag. The total volatile hydrocarbons present are detected by the PID and reported in parts per million by volume (ppmv). The PID will be calibrated to an isobutylene standard.

Generally two soil samples from each soil boring will be submitted for chemical analysis unless otherwise specified in the scope of work. Soil samples selected for analysis typically represent the highest PID reading recorded for each soil boring and the sample just above first-encountered groundwater.

Stockpiled Drill Cuttings and Soil Sampling

Soil generated during drilling operations will be stockpiled on-site. The stockpile will be set on and covered by plastic sheeting in a manner to prevent rain water from coming in contact with the soil. Prior to collecting soil samples, Stratus personnel will calculate the approximate volume of soil in the stockpile. The stockpile will then divided into sections, if warranted, containing the predetermined volume sampling interval. Soil samples will be collected at 0.5 to 2 feet below the surface of the stockpile. Four soil samples will be collected from the stockpile and composited into one sample by the laboratory prior to analysis. The soil samples will be collected in cleaned brass, two by six inch tubes using a hand driven sampling device. To reduce the potential for cross-contanlination between samples, the sampler will be cleaned between each sampling event. Upon recovery, the sample container will be sealed at each end with Teflon sheeting and plastic caps to minimize the potential of volatilization and cross-contanlination prior to chemical analysis. The soil sample will be labeled, placed on ice, and delivered to a state-certified analytical laboratory, along with the appropriate chain-of-custody documentation.

Direct Push Technology, Water Sampling

A well known example of direct push technology for water sampling is the Hydropunch®. For the purpose of this field method the term hydropunch will be used instead of direct push technology for water sampling.

The hydropunch is typically used with a drill rig. A boring is drilled with hollow stem-augers to just above the sampling zone. In some soil conditions the drill rig can push directly from the surface to the sampling interval. The hydropunch is conveyed to the bottom of the boring using drill rods. Once on bottom the hydropunch is driven a maximum of five feet. The tool is then opened by lifting up the drill rod no more than four feet. Once the tool is opened, water enters and a sample can be collected with a bailer or tubing utilizing a peristaltic pump. Soil particles larger than silt are prevented from entering the tool by a screen within the tool. The water sample is collected, labeled, and handled according to the Quality Assurance Plan.

Monitoring Well Installation

Monitoring wells will be completed by installing 2 to 6 inch-diameter Schedule 40 polyvinyl chloride (PVC) casing. The borehole diameter for a monitoring well will be a minimum of four inches larger than the outside diameter of the casing. The

2-inch-diameter flush-threaded casing is generally used for wells dedicated for groundwater monitoring purposes.

A monitoring well is typically cased with threaded, factory-perforated and blank Schedule 40 PVC. The perforated interval consists of slotted casing, generally with 0.01 or 0.02 inch-wide by 1.5-inch-long slots, with 42 slots per foot. The screened sections of casing are factory machine slotted and will be installed approximately 5 feet above and 10 feet below first-encountered water level. The screened interval will allow for seasonal fluctuation in water level and for monitoring floating product. A threaded or slip PVC cap is secured to the bottom of the casing. The slip cap can be secured with stainless steel screws or friction; no solvents or cements are used. Centering devices may be fastened to the casing to ensure even distribution of filter material and grout within the borehole annulus. The well casing is thoroughly washed and/or steam cleaned, or may be purchased as pre-cleaned, prior to completion.

A filter pack of graded sand will be placed in the annular space between the PVC casing and the borehole wall. Sand will be added to the borehole through the hollow stem of the augers to provide a uniform filter pack around the casing and to stabilize the borehole. The sand pack will be placed to a maximum of 2 feet above the screens, followed by a minimum 1-foot seal consisting of bentonite pellets.

Cement grout containing 5 percent bentonite or concrete will be placed above the bentonite seal to the ground surface. A concrete traffic-rated vault box will be installed over the monitoring well(s). A watertight locking cap will be installed over the top of the well casing. Reference elevations for each monitoring well will be surveyed when more than two wells will be located on site. Monitoring well elevations will be surveyed by a California licensed surveyor to the nearest 0.01-foot relative to mean sea level (MSL). Horizontal coordinates of the wells will be measured at the same time.

Exploratory boring logs and well construction details will be prepared for the final written report.