RECEIVED

5:42 pm, Mar 13, 2012

Alameda County
Environmental Health

February 21, 2012

Barbara Jakub, P.G.
Alameda County Environmental Health (ACEH)
1131 Harbor Bay Parkway
Alameda, California 94502

Subject: **TRANSMITTAL LETTER & CERTIFICATION STATEMENT**

Location: **Former Exxon Station, 3055 35th Avenue, Oakland ("Site")**

ACEH LOP#: **RO-0000271; GeoTracker #: T0600100538;**

Date of Report	Title of Report
February 21, 2011	*Workplan for Limited Soil and Groundwater Data Gap Assessment*

As the legally authorized representative for the responsible party, I certify the following statement to satisfy regulatory requirements for technical report submittals:

- ***I declare, under penalty of perjury, that the information and/or recommendations contained in the aforementioned report, prepared on my behalf by WEBER, HAYES AND ASSOCIATES, are true and correct to the best of my knowledge.***

Sincerely,

Lynn Worthington

Mr. Lynn Worthington

c/o: **Golden Empire Properties, Inc.**
3055 35th Avenue
Oakland, California 94605

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Dr., Watsonville, CA 95076
(831) 722-3580 Fax (831) 722-1159
www.weber-hayes.com

February 21, 2012
Project 2X103

Barbara Jakub, P.G.
Alameda County Environmental Health (ACEH)
1131 Harbor Bay Parkway
Alameda, California 94502

Mr. Lynn Worthington
c/o: Golden Empire Properties, Inc.
5942 MacArthur Blvd # B
Oakland, CA 94605-1698

Subject: **Workplan for Limited Soil and Groundwater Data Gap Assessment**

Location: **Former Exxon Station, 3055 35th Avenue, Oakland ("Site")**
ACEH LOP #: RO-0000271; GeoTracker #: T0600100538.

This *Workplan* proposes tasks for a *Limited Soil and Groundwater Data Gap Assessment* at the former Exxon Station (see Figure 1, the Site) to address a historic release of gasoline from a former leaking underground storage tank system that was removed in 1991. This proposed limited data gap assessment is designed to: 1) confirm whether or not there are significant, contaminant contribution(s) originating from upgradient active and/or abandoned fueling facilities, and 2) collect soil quality data at a few, previously untested, potential source locations (i.e., beneath the former UST locations and fueling dispensers) to assess the *current* magnitude of residual, on-site soil impacts. This proposed data gap assessment is needed in order to lay the groundwork for selecting an appropriate remedial alternative for the Site. Note: the vast majority of existing soil data collected at the Site is over 17 years old, and recent data collected in 2008[1] did not address these likely source areas.

1.0 BACKGROUND

Since 1991, soil, groundwater and soil vapor samples have been collected from twenty-four (24) on-site borings and thirteen (13) off-site borings, fourteen (14) wells have been installed on-site (4 monitoring and 10 remediation wells), and dual-phase remedial actions removed approximately 6,500 lbs of gasoline contaminants from the subsurface (2000-2004). The State Underground Storage Tank Fund (State Cleanup Fund) has reimbursed over $1 million dollars in assessment and remediation costs to date and despite significant characterization and remedial efforts, the Site soil and groundwater remains contaminated at concentrations well above regulatory threshold limits. Aside from on-going, semi-annual groundwater monitoring, the most recent investigative work was completed in 2008, and included milestone assessment of the extent and magnitude of contaminant concentrations in off-site soil, groundwater and soil vapor (CRA, 2009). The downgradient extent of the dissolved gasoline plume has been reasonably defined using GeoProbe grab groundwater samples approximately 200-255 feet off-site.

[1]: Constoga, Rovers and Associates (CRA), *Site Characterization Report,* February 2009 .

A detailed summary of site conditions and previous investigations (*Site Description and Background of Previously Completed Environmental Investigations)* and an *Updated Site Conceptual Model* are included as Appendix A as a reference.

Alameda County Environmental Health (ACEH) is the lead regulatory agency overseeing characterization and cleanup activities at the subject Site and has recently commented on the State Cleanup Fund's *5-Year Summary Report* (October 2010), which included a summary of Site information, a risk evaluation, and recommendations to complete the following tasks:

1. Update the site model conceptual (SCM) / preferential pathway survey.
2. Delineate the extent of the dissolved plume with off-site wells.
3. Complete an assessment of risk to human health and the environment.
4. Complete a C*orrective Action Plan*.

ACEH concurred with the State Cleanup Fund's recommendation to update the SCM[2], and a subsequent *Updated Site Conceptual Model*[3] was identified the following data gaps:

- The lack of upgradient groundwater data needed to confirm whether or two nearby gasoline stations (i.e., an *abandoned* Texaco Gas Station located immediately upgradient of the Site, and/or an *active* QuikStop Gas Station located 100 feet upgradient of the Site) are contributing dissolved gasoline concentrations to the Site. The long term influx of dissolved contamination from either of these sites would have effected the efficiency of previous remedial efforts as well as would effect the selection of future remedial options.

  Note: Shallow soil impacts (i.e., 5 feet below the ground surface) were detected in a 2008 boring (B-20), located in the curb and gutter just in front of the *abandoned* Texaco Service Station (see Figure 2). This detection of shallow, near-surface gasoline contamination suggests that a second release has occurred, which originates across the street and upgradient of the subject Site.

- Aside from samples collected from two, recent on-site borings (2008), all on-site soil data is over 17 years old, and the lab results predate active remediation at the site (2000-2004). No samples were collected from beneath the former tank pit or dispensers (known contaminant source areas and likely residual "hot-spot" areas). Only two of the seventy-two laboratory-tested soil samples collected from the Site were obtained from depths shallower than 10 feet. Accordingly:
  - The magnitude of known shallow sources of soil contamination (i.e., USTs and

[2]: Electronic directive, Barbara Jakub, January 21, 2011, in response to proposed *Workplan to Address the State Fund's 5-year Review Comments*.

[3]: Weber, Hayes, and Associates: *Updated Site Conceptual Model – Fuel Release Investigation - Former Exxon Station, 3055 35th Avenue, Oakland*, dated June 24, 2011

dispensers) or potential shallow sources of shallow soil contamination (i.e., product piping runs) have not been identified;

- The *Site Conceptual Model* currently does not have the data set capable of eliminating construction worker direct exposure to soil as pathway for Site risk (i.e., shallow soils less than 10 feet deep). Direct exposure to residual, deeper soil contamination may be present, and would be limited to construction trenching or grading operations.

Based on the June 2011, *Updated Site Conceptual Model* evaluation that identified data gaps, we recommended the following:

1. Submittal of a Data Gap Workplan: Given the strong evidence of a secondary, contributing source of gasoline contamination, we recommended submitting a *Workplan* designed to delineate a potential upgradient, off-site source. In addition, recommendations included coring a few extra on-site borings to assess whether residual gasoline mass resides beneath untested source locations (i.e., shallow soils beneath dispensers/piping runs and dispensers, and beneath the former UST tank pit). This data will assist in choosing the appropriate remedial alternative for the Site cleanup.
2. Reduce Groundwater Sampling to Annual Monitoring: Given that there is an extremely long groundwater monitoring record at this site (over 66 monitoring events over a 17 year span) and relatively stable trends of seasonal fluctuations in plume concentrations, we recommended conserving remaining funding for this project by transitioning the *Monitoring and Reporting Program* from semi-annual to annual.

ACEH responded[4] by requiring a *Soil and Groundwater Workplan* and this submittal is designed to satisfy that requirement.

2.0 PURPOSE AND SCOPE

This proposed *Limited Soil and Groundwater Data Gap Assessment* addresses the collection of subsurface data that is needed prior to effectively select an appropriate remedial alternative for the Site. Tasks will address the need to: 1) approximate the residual mass of fuel sorbed onto soils in order to determine the feasibility of remedial alternatives (particularly at the unsampled UST pit and dispenser locations), and 2) confirm whether or not there is contaminant contribution originating from upgradient, gas dispensing sites.

Once these data gaps are closed, a *Corrective Action Plan* can effectively assess the feasibility of a number of remedial alternatives that: 1) reduce residual source contamination from continuing

[4]: ACEH: *Request for a Workplan*, September 2011.

to contribute to the degradation of on-site and off-site groundwater, 2) create an environment to catalyze natural attenuation, and 3) reduce contaminant concentrations to cleanup goals within a reasonable timeframe. Given the incomplete cleanup following four years of Dual Phase Extraction technology at the Site (2000-2004), and the remaining budget left in the State Cleanup Fund's commitment to the Site, it appears that one of the following remedial options will likely be the most cost effective, remedial solution for the Site:

- Targeted mass removal of source contamination (up to 20 feet bgs) using large-diameter augers/excavation equipment;

- Multiple, high-pressure injections of specialty chemical oxidizers, with emphasis on getting the oxidizer in contact (destroying) with the smear zone contamination; and/or

- A permeable reactive barrier installed along the downgradient property boundary

Our proposed scope includes the installation of nine (9) strategically placed driven probe (DP) soil borings that are designed to fill in the following data gaps (see Figure 2 for proposed boring locations):

- **Borings DP-1, 2, and 3:** Soil and groundwater samples will be collected from these three proposed off-site borings to determine weather or not the *abandoned* Texaco Station located immediately to the northeast (upgradient), and/or the *active* QuikStop fueling facility located approximately 100 feet to the east (upgradient) are contributing to a flux of groundwater contamination entering the Site. Based on numerous drilling logs produced from previous subsurface investigations at the Site, semi-confined groundwater is expected at depths of less than 25 feet below the ground surface (bgs).

- **Boring DP-4, 5, and 6:** Soil samples will be collected to depths of approximately 20 feet bgs at, and immediately adjacent to the former UST locations in order to confirm the current magnitude of residual soil impacts from this obvious source area.

- **Borings DP-7, 8, and 9:** Soil samples will be collected to depths of approximately 20 feet bgs at the former dispenser island locations in order to confirm or deny the presence of a shallow release at these suspect locations. We note that "strong hydrocarbon odor" was noted at a depth of 5 feet bgs in a remediation well #RW-11 installed adjacent to proposed driven probe boring DP-8 (Appendix A).

Based on the results obtained from DP-1, 2 and 3, we will install one to two off-site, upgradient groundwater monitoring wells positioned to monitor the potential influx of groundwater contaminants that appear to originate from on off-site source or sources.

2.1 Proposed Hydraulic Driven Probe Drilling & Sampling Operations

We propose to mobilize a hydraulically-driven Geoprobe soil coring drill rig to advance proposed driven probe borings DP-1 through DP-9 at locations described above. Fieldwork will be conducted according to our *Field Methodology for Hydraulic Driven Probes*, which is presented as Appendix B. Soil samples will be continuously cored in approximate 4-foot intervals to the following depths: 1) approximately 30 feet bgs for off-site borings DP-1 through DP-3 in order to vertically profile any potential soil contamination and as well as for the collection of grab groundwater samples, and 2) approximately 20 feet bgs in the on-site borings (DP-4 through DP-9) to vertically profile residual soil contamination. No on-site groundwater sample collection is proposed as an extensive on-site groundwater analytical record already exists. An experienced geologist will carefully log the continuously cored borings and a Photoionization Detector (PID) will be used to monitor potential volatile organic vapors. Drilling and sampling work tasks will include:

- Preparation of a *Site Health and Safety Plan* in accordance with OSHA standards (included in Appendix C);
- Procuring the required soil boring permits through the Alameda County Public Works Agency (ACPWA – Water Resources Dept.), and an encroachment permit through the City of Oakland for boring installations proposed in the public right of way (i.e., borings DP-1, 2, & 3);
- Confirming the location of subsurface utilities with Underground Service Alert and a private utility locator;
- Contracting with a professional traffic control service to provide the required traffic safety and control devices for work in the public right of way; and
- Contracting a C-57-licensed, driven probe drilling rig, and scheduling the appropriate agencies for field inspection.

Following boring installation and sample collection, each boring will be completely sealed with neat cement grout and the ground surface will be restored to match existing grade. All investigative wastes will be properly containerized, temporarily stored at the Site and disposed of following this field investigation.

Soil Sampling: Soils will be carefully logged by an experienced field geologist, specifically noting any chemical odors or discoloration. Soil samples will be collected and analyzed based on field evidence of potential contamination. We will collect two to three soil samples per boring for laboratory testing in order to vertically delineate observed soil impacts.

Groundwater Sampling: Groundwater samples will only be collected from off-site, upgradient borings DP-1, 2, and 3 only in order to determine if groundwater impacts are present at these locations, therefore confirming or denying the presence of potential off-site contaminant plume contribution.

Collected soil and groundwater samples will be submitted to a State-certified testing laboratory for the following analysis by EPA Method 8260B – GC/MS:

- TPH-gasoline, Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and the fuel oxygenates Methyl-tert-Butyl-Ether (MTBE) and tert-Butanol (TBA).
- Note: we currently do not have clear documentation as to whether or not diesel was historically dispensed at the Site; however, previous soil and groundwater investigations conducted at the Site have detected TPH-diesel range hydrocarbons in both soil and groundwater. The presence of diesel range hydrocarbons may be a result of the weathered nature of this old gasoline release (i.e., the chromatographic pattern of aged gasoline will tend to shift towards the diesel quantification range as lighter constituents naturally degrade). Therefore, we will include TPH-diesel by EPA Method 8015M in the suite of soil and groundwater analysis proposed for this data gap assessment and will have the testing laboratory attempt to fingerprint the results to determine if TPH-diesel is a Site *Contaminant of Concern* (COC).

2.2 Proposed Monitoring Well Installation

Based on the results of groundwater samples obtained from off-site, upgradient borings DP-1, 2, and 3 we will install approximately one to two dedicated groundwater monitoring wells to monitor seasonal fluctuations in shallow groundwater. **We will confer with lead regulatory staff and obtain regulatory approval of monitoring well locations and construction details prior to installation.** At a minimum we anticipate the installation of at least one up-gradient well.

Monitoring well installation will follow our standard *Field Methodology for Hollow Stem Auger Drilling and Monitoring Well Installation*, which is included in Appendix B. Monitoring wells will be installed by a licensed C-57 drilling subcontractor and will be constructed of 2-inch PVC casing with approximately 10-feet of 0.010-inch slot screen placed so the screened section extends across stabilized groundwater. Well installation work tasks will include:

- Similar to those drilling tasks described above (Section 2.2), we will prepare a *Site Health and Safety Plan* (included in Appendix C), procure the required well installation and encroachment permits through the ACPWA–Water Resources Department and the City of Oakland, and confirm the location of subsurface utilities with Underground Service Alert and a private utility locator.

- Contracting a licensed C-57 well drilling contractor, and scheduling the appropriate agencies for field inspection.

- Following monitoring well installation the well(s) will be surveyed by a licensed land surveyor and tied into the existing well network for calculating groundwater gradient and flow direction, and satisfy State GeoTracker requirements.

All investigative wastes will be properly containerized, temporarily stored at the Site and disposed of following this field investigation.

No sooner than 48 hours following well installation, well(s) will be developed according to the methodology described in our *Field Methodology for Hollow Stem Auger Drilling and Monitoring Well Installation* (Appendix B) and a post-development sample will be collected and submitted to s State-certified testing laboratory for the following analysis by EPA Method 8260B – GC/MS:

- TPH-gasoline, Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and the fuel oxygenates Methyl-tert-Butyl-Ether (MTBE) and tert-Butanol (TBA)

- As noted above, we will also include analysis for TPH-diesel by EPA Method 8015M in the suite of analysis to confirm the presence of absence of this potential COC.

The additional well(s) will subsequently be added to the groundwater monitoring and reporting schedule for the Site.

3.0 SCHEDULE

Following *Workplan* approval by ACEH, we will complete the tasks described above according to the following schedule:

1. Following approval of the tasks outlined in this *Workplan* we will begin permitting and scheduling the appropriate subcontractors to complete the drilling and sampling phase of work. Drilling should be completed approximately four to five weeks following *Workplan* Approval.
2. Following the receipt of all laboratory analytical data we will provide rationale and a proposed well location map to lead regulatory staff and obtain written approval (email) of monitoring well locations prior to installation.
3. Following monitoring well installation and post-development sampling we will prepare a

summary report for submittal to the ACEH to include tables and figures summarizing the collected data and will include conclusions and recommendations for completing a *Corrective Action Plan*.

4.0 LIMITATIONS

Our service consists of professional opinions and recommendations made in accordance with generally accepted geologic and engineering principles and practices. This warranty is in lieu of all others, be it expressed or implied. The analysis and conclusions in this report are based on sampling and testing which are necessarily limited. Additional data from future work may lead to modification of the opinions expressed herein.

All work related to the UST investigation and remediation at this site is done under the direct supervision of a Professional Geologist or Engineer, registered in California, and experienced in environmental remediation.

Thank you for the opportunity to participate in the monitoring and remediation of your site. If you have any questions or comments regarding this project please call us at (831) 722 - 3580.

Sincerely yours,

Weber, Hayes and Associates

By

Jered Chaney, PG# 8452
Project Geologist

Pat Hoban, PG# 7795
Senior Geologist

cc: Jeffrey S. Lawson < jsl@svlg.com >
Silicon Valley Law Group 408-573-5700
25 Metro Drive, Suite 600
San Jose, CA 95110

Attachments:

Figure 1:	Locations Map
Figure 2:	Site Map with Proposed Data Gap Investigation Locations
Appendix A:	Site Description and Background of Previously Completed Environmental Investigations, and an Updated Site Conceptual Model
Appendix B:	Field Methodologies
Appendix :C	Site Health and Safety Plan

REFERENCES

Alameda County Environmental Health directives for: 3055 35th Avenue, Oakland**:**

- Upload/download website (site ID#:RO-0000271):
  http://ehgis.acgov.org/adeh/lop_results.jsp?trigger=2&enterd_search=RO0000271&searchfield=RECORD_ID
- 2005-December: *Electronic Report Upload (ftp) Instructions,* revision.
- 2006, Dec-6: *Response to Cambria Oct-17, 2006 "Request for Reconsideration of Recommendations".*
- 2007, Mar-1: *Approval of Cambria Jan-12, 2007 "Off-site and Soil Gas Work Plan".*
- 2007, Mar-1: *Approval of Conestoga-Rovers and Associates (CRA) Apr-11, 2008: "Workplan Addendum for Additional Characterization and Soil Vapor Sampling"*
- 2008, Apr-7: *Request to Present Phase I Results and Submit a Soil Vapor Workplan.*
- 2008, Jul-24: *Groundwater Monitoring Requirements: Reduction to Semi-Annual Groundwater Monitoring.*
- 2011, Jan-21: *Request for Updated Site Conceptual Model,* electronic directive dated
- 2011, Sept-20: *Request for a Workplan.*

California Environmental Protection Agency

- 1995-July: *Guidelines for Hydrogeologic Characterization of Hazardous Substance Released Sites*

Cambria Environmental Technology (Cambria) reports for: 3055 35th Avenue, Oakland**:**

- 1996, June-20: *Investigation Work Plan*
- 1997, June-27: *Risk-Based Corrective Action Analysis*
- 1998, April 8: *Corrective Action Plan*
- 1998, May-28: *Corrective Action Plan Addendum*
- 1998, Dec-07: *Well Installation and Supplemental Subsurface Investigation Report*
- 1999, Aug-14: *Second Quarter 1999 Monitoring and Interim Remedial Action Report*
- 2004, Oct-29: *Groundwater Monitoring and System Progress Report*
- 2005, Feb-22: *Remediation Work Plan*
- 2006, Jan-30: *Revised Remediation Work Plan*
- 2006, July-13: *Site Conceptual Model and Off-site Work Plan.*
- 2007, Jan-12: *Offsite Soil Gas Workplan ,*

Conestoga-Rovers and Associates (CRA) reports for: 3055 35th Avenue, Oakland**:**

- 2008, Apr-11: *Workplan for Additional Characterization and Soil Vapor Sampling*
- 2009, Feb-28: *Site Characterization Report*
- 2010, Oct-18: *Semi-Annual Groundwater Monitoring Report (dry season)*
- 2011, May-5: *Semi-Annual Groundwater Monitoring Report (wet season).*

Consolidated Technologies reports for: 3055 35th Avenue, Oakland**:**

- 1991: *Results for Preliminary Subsurface Site Investigation*
- 1992, Sept*: Work Plan for a Subsurface Petroleum Hydrocarbon Contamination Assessment*

REFERENCES (Continued)

Leu, D. J., et al., 1989, *Leaking Underground Fuel Tank Field (LUFT) Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure, State Water Resources Control Board*

State Water Resources Control Board:

- Upload/download website (site ID#:T0600100538): http://geotracker.swrcb.ca.gov/profile_report.asp?global_id=T0600100538
- 2010, Dec-28: Division of Financial Assistance *Preliminary 5-Year Review Summary Report For Claim # 1275*
- 2005, May-2008: *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*

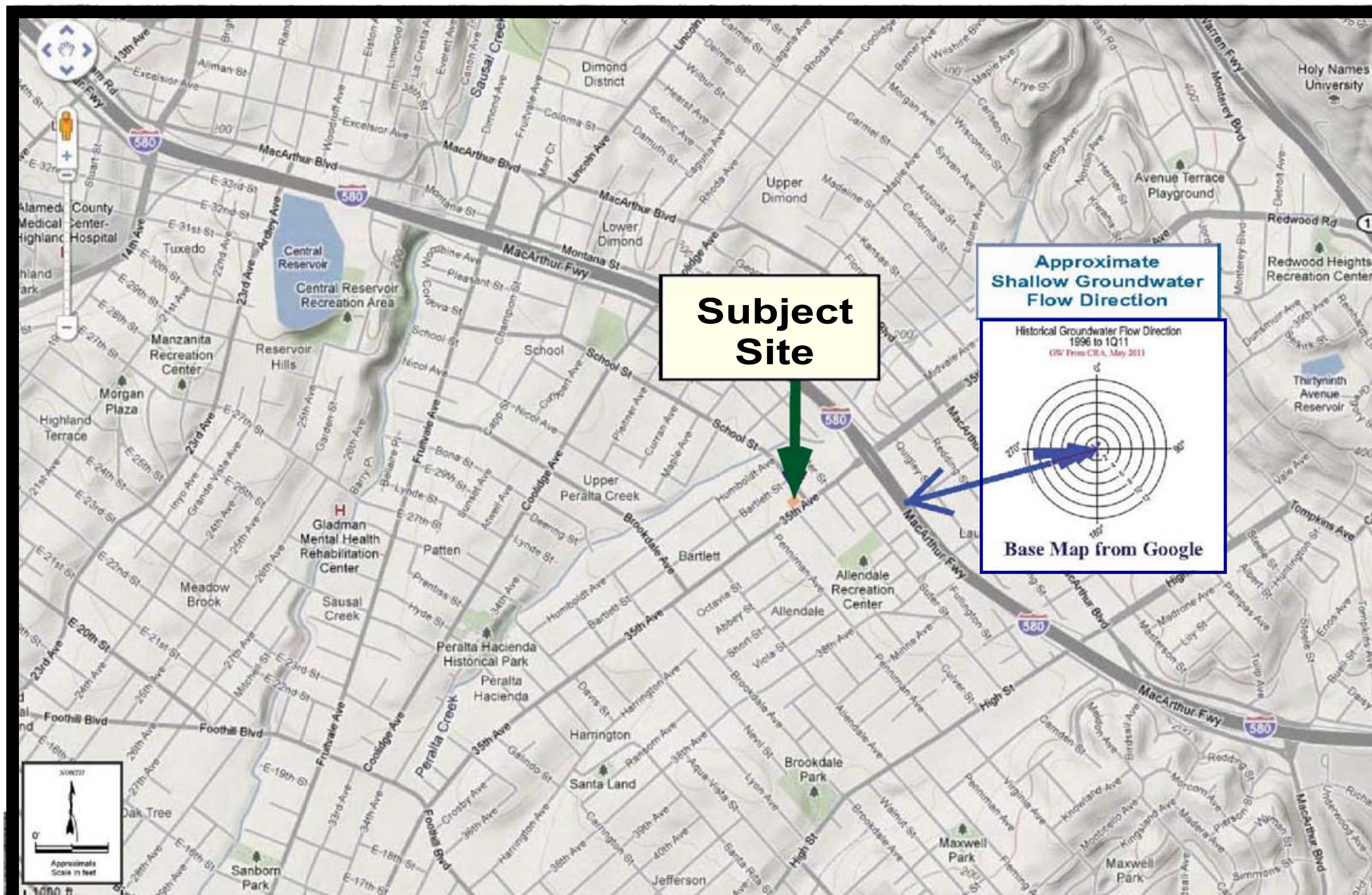
Weber, Hayes and Associates reports for: 3055 35th Avenue, Oakland:

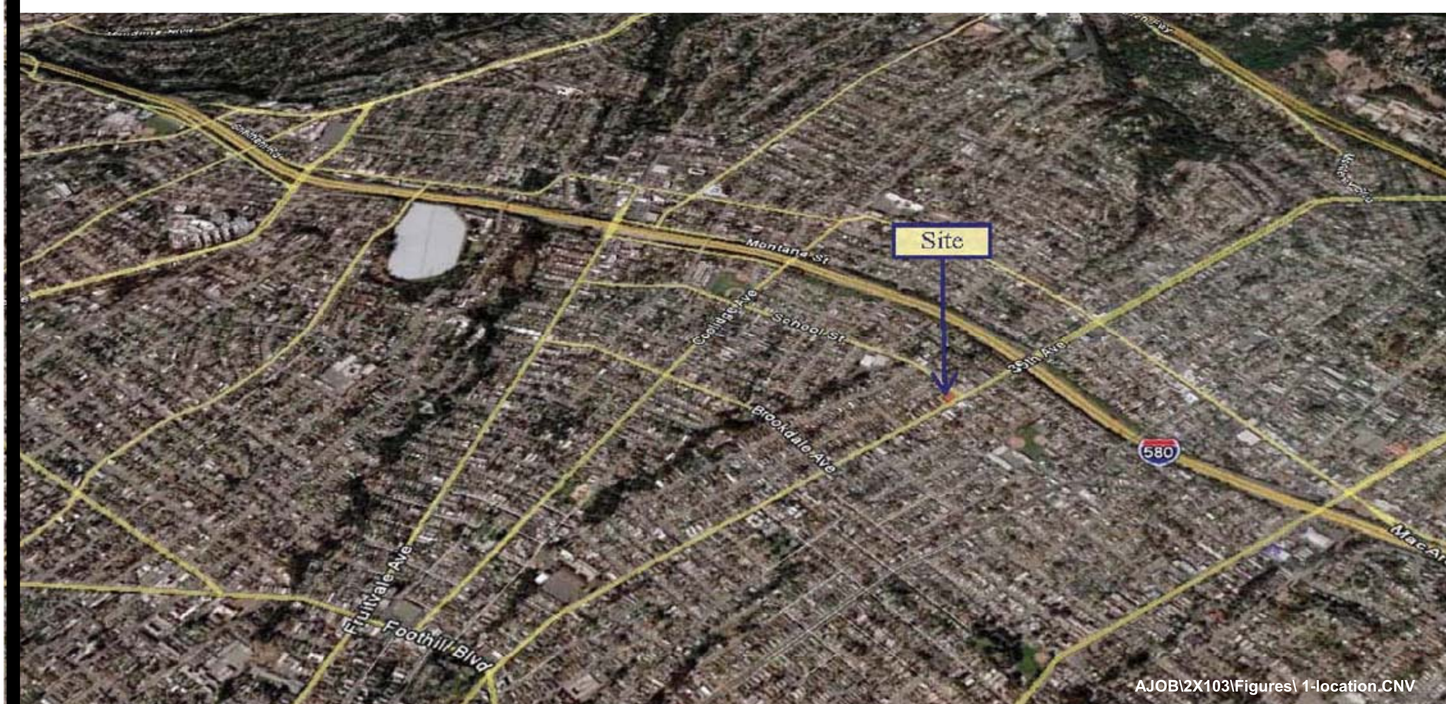
- 2011, June-24: *Updated Site Conceptual Model – Fuel Release Investigation*

ACRONYMS

ACEH	Alameda County Environmental Health
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAP	Corrective Action Plan
CHHSL:	California Human Health Screening Level
COC:	Chemical of Concern
CRA	Conestoga-Rovers & Associates
CRWQCB:	California Regional Water Quality Control Board, Central Coast Region
DPE	Dual-Phase Extraction
EBMUD	East Bay Municipal Utility District
ESLs	Environmental Screening Levels
ISCO	In-Situ Chemical Oxidation
ppm_v	parts per million by volume
SCM:	Site Conceptual Model
SVE	Soil Vapor Extraction
TPH-gas	Total Petroleum Hydrocarbons as gasoline
State Cleanup Fund	State Underground Storage Tank Fund
USTs	Underground Fuel Storage Tanks
WHA:	Weber, Hayes and Associates

Figures





Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA 95076
(831) 722 - 3580 Fax (831) 722 - 1159
www.weber-hayes.com

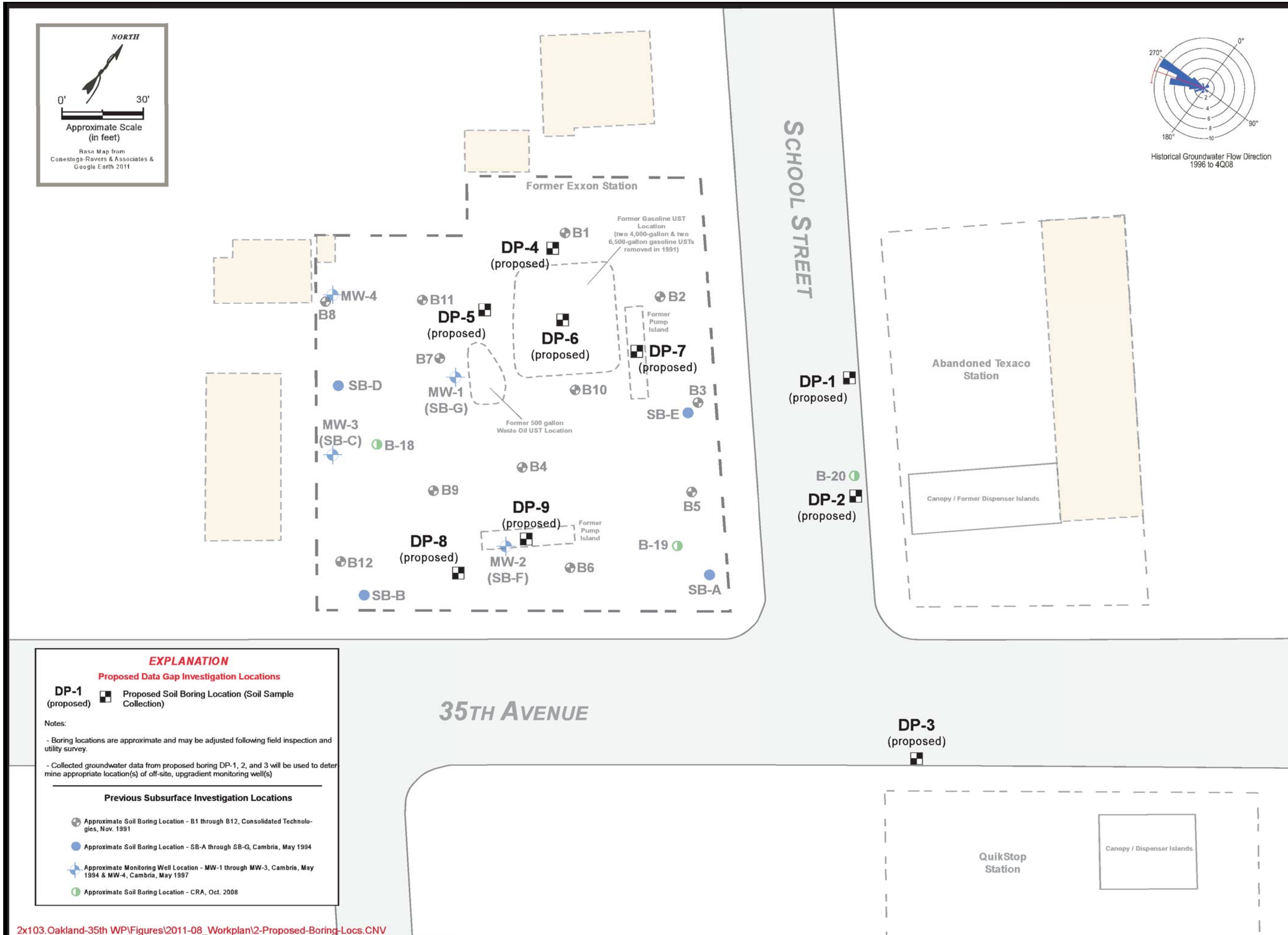
Location Map
Former Exxon Station
3055 35th Avenue
Oakland, California

FIGURE 1
Job # 2X103

Figure 2

Project 2X103

Site Map with Proposed Data Gap Investigation Locations
Former Exxon Station
3055 35th Avenue
Oakland, California



Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, Ca. 95076
(831) 722 - 3580 Fax (831) 722 - 1159
www.weber-hayes.com

Appendix A

Site Description and Background of Previously Completed Environmental Investigations
&
Updated Site Conceptual Model

SITE DESCRIPTION AND SURROUNDING LAND USE

The vacant, undeveloped subject Site is a former Exxon Service Station located at the northeast corner of 35th Avenue and School Street, in Oakland, California (see aerial photo, right). The Site is flat-lying, but the regional topography generally slopes southwestward from the Oakland hills towards the San Francisco Bay (see regional see terrain/aerial maps, Figure 1).

Historical aerial photographs dated 1959, 1980, and 2000, agree with reports stating the Site's gas dispensing station was constructed around 1970 and was decommissioned in 1991, when the Site's five (5) underground storage tanks (USTs) were removed and the gasoline fuel release was first discovered. The Site has remained an undeveloped, unpaved vacant lot since it was decommissioned. The general area surrounding the Site is a mixture of commercial businesses along the main thoroughfares and residential neighborhoods beyond the thoroughfares. An abandoned, former Texaco gas station is located immediately upgradient of the Site, across School Street to the east. Previous reports indicate the UST's from this station were removed in approximately 1984, but there is no record that closure soil samples were collected.

Site Information Details		
Site Address:	3055 35th Avenue, Oakland -- currently a vacant lot	(APN No. 027-0890-006-02).
Owner:	Golden Empire Properties, Inc	Mr. Lynn Worthington
Agency Contacts:	Alameda County Environmental Health (Case #RO 0000271[3]) San Francisco Bay RWQCB (Case #: 01-0585 [4])	Barbara Jakub Barbar.Jakub@acgov.org CherieMcCaulou cmccaulou@waterboards.ca.gov

[3]: ACEH Site website: http://ehgis.acgov.org/dehpublic/dehpublic.jsp

[4]: RWQCB Site website: http://geotracker.swrcb.ca.gov/profile_report.asp?global_id=T0600100538

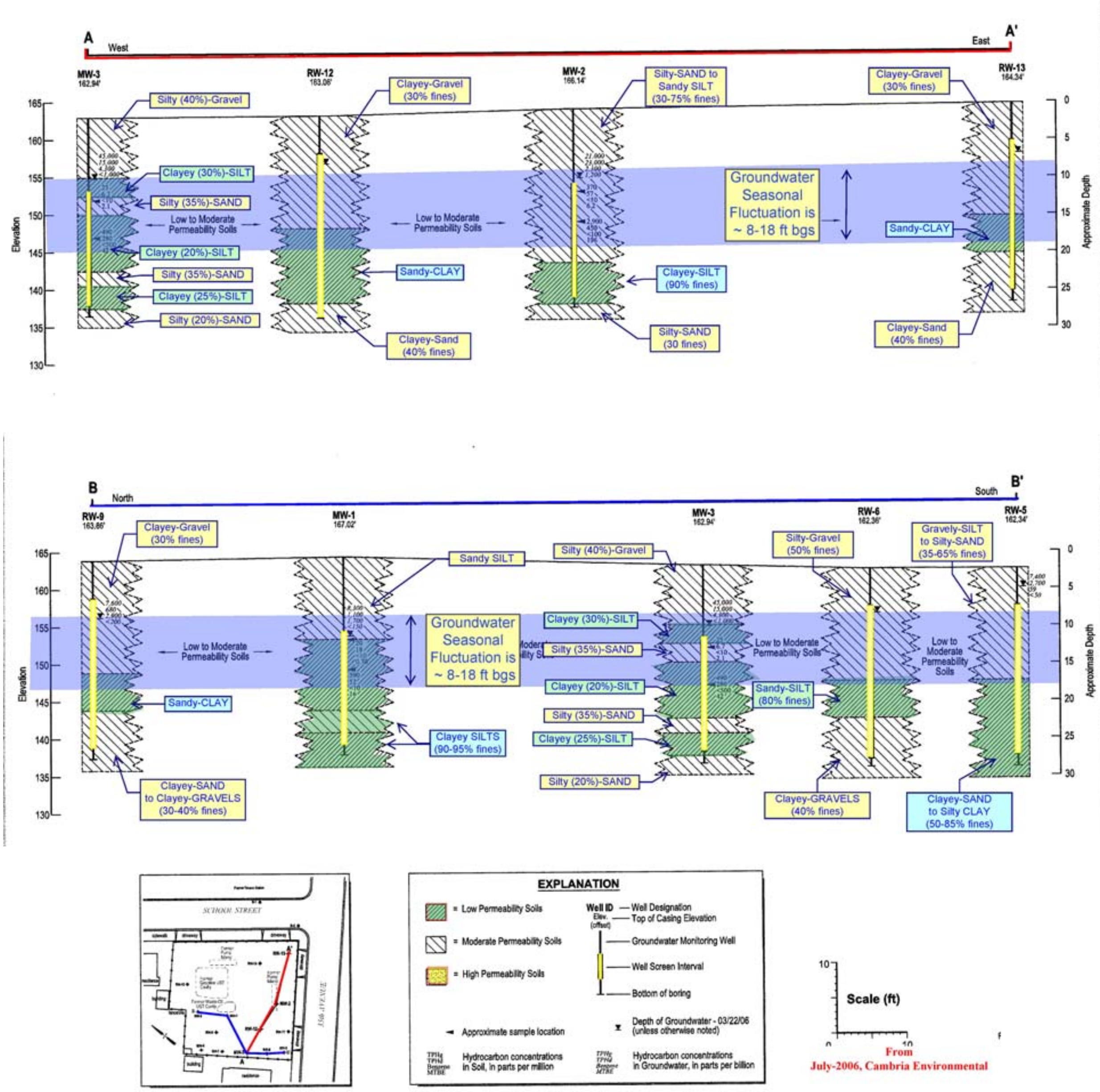
LOCAL GEOLOGY AND HYDROGEOLOGY

The Site is located within a large, regional, northwest-trending alluvial basin (the East Bay Plain Subbasin), that reportedly extends beneath the San Francisco Bay to the west. The Subbasin's regional aquifer in the vicinity of the Site has a westerly groundwater flow direction, towards San Francisco Bay. The East Bay Municipal Utility District (EBMUD) has provided water supply to Oakland and other communities since the 1930's because of historical over-pumping that reportedly damaged the water supply by seepage or saltwater intrusion. EBMUD obtains its drinking supply from protected Sierra runoff from the Mokelumne River watershed, which eliminated the need for local groundwater supply wells.

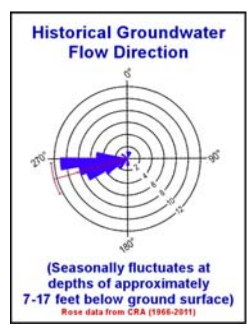
Shallow soil conditions have been logged during the installation of twenty-four (24) on-site borings and thirteen (13) off-site borings drilled to a maximum depth of 45 feet. First-encountered groundwater beneath the Site fluctuates seasonally, roughly between the depths of 8-to-18 feet below ground surface (bgs). Exploratory borings have been logged by a number of field geologists since subsurface drilling investigations were initiated in 1991. Soil samples obtained from the earlier exploratory borings and well installation borings were collected using hollow stem drill rigs (5-foot sample intervals) while more recently sampling (2007-8) was completed using driven probe rigs (continuous core sampling). Although drill logs show individual geologist variation with logging descriptions, designations, and opinions of permeability, the unifying theme is that the subsurface soils consist of an extremely heterogeneous mix of the following soil types:

- The dominant soil type encountered consisted of low-permeability soils that included clays, clayey-mixtures (clayey-silts and clayey-sands), and silty-mixtures (sandy-silts);
- The secondary soil type encountered consisted of moderately-permeable sandy units (high silt content, fine-grained sand units identified as silty-sands with clay binder), and
- Occasionally, some relatively thin, discontinuous, highly-permeable sand lenses were encountered (low silt content silty-sands).

The following geologic cross-sections of soil types logged across the Site show: 1) the interbedded, heterogeneous nature of soils beneath the Site; 2) the ubiquitous presence of fine-grained clays and/or silts in the soil mixtures (low-to-moderately permeable units), which generally retard the vertical and lateral movement of precipitation, chemicals and groundwater, and 3) a visual, presentation of the seasonal groundwater fluctuation across these relatively low-permeability units.



Note: Remediation feasibility testing by soil vapor extraction, air sparging, and groundwater extraction techniques showed only limited air and groundwater flow rates (no vacuum influence/easy dewatering but no groundwater drawdown at nearby wells), which confirms the low permeability conditions beneath the Site (Cambria, 1996).

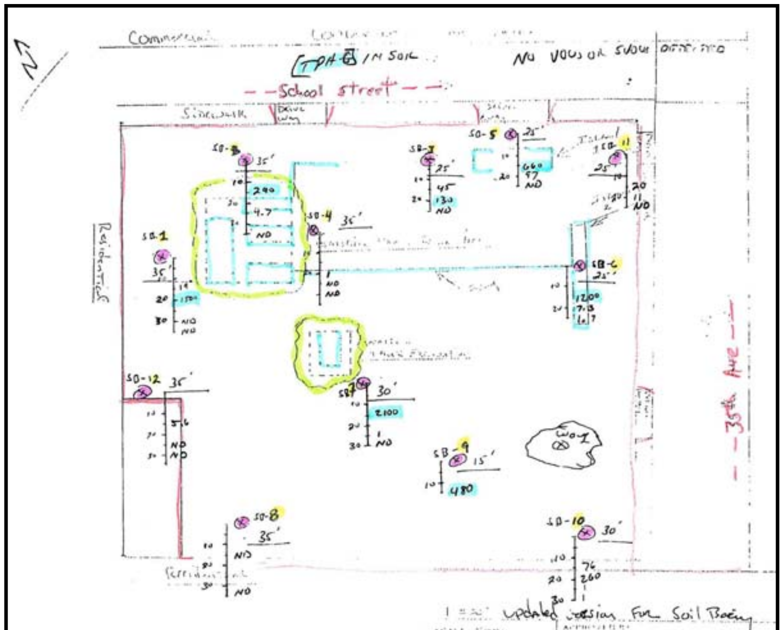


First-encountered groundwater levels in Site monitoring wells have been measured to fluctuate as much as from approximately 6 to 19-ft bgs, but seasonal fluctuations generally fall between 8-18 feet[5]. Survey-calculated groundwater flow direction beneath the Site is primarily towards the west, as shown by the cumulative-flow, rose diagrams presented on Figures 1, 2, and 3. Gradient is approximately 0.009 ft/ft (approximately 1 foot of groundwater drop for 111 feet of lateral run).

SUMMARY OF PREVIOUS SOIL AND GROUNDWATER INVESTIGATIONS AND CORRECTIVE ACTIONS

1991, Fuel Tank Removals: In January 1991, Pacific Excavators is reported to have removed two (2) 4,000-gallon, and two (2) 6,500-gallon gasoline USTs, as well as one (1) 500-gallon waste oil UST from the Site. While there are some figures indicating soil stockpiles were present on-site, there is no record of tank pit over-excavation or off-site disposal. Figure 3 identifies tank excavation (cavity) and dispenser locations. Subsequent environmental reports indicated that no UST closure samples were analyzed.

1991, Initial Soil Sampling Investigation: In November 1991, Consolidated Technologies drilled twelve (12) hollow stem augured soil borings (B-1 to B-12) and collected soil samples from depths of 15 to 35-ft below ground surface (bgs). Locations are shown in figure clip (right). A gasoline release was confirmed based on field observations of moderate-to-strong petroleum odors in eleven of the twelve soil borings generally encountered at depths of approximately 12-to-22 feet (in the groundwater fluctuation, "smear" zone) and confirmation laboratory detections of total petroleum hydrocarbons as gasoline (TPH-gas) concentrations in samples collected from eleven of the twelve soil borings [the maximum concentration was detected at boring B-7 = 2,100 mg/kg (or parts per million, ppm].



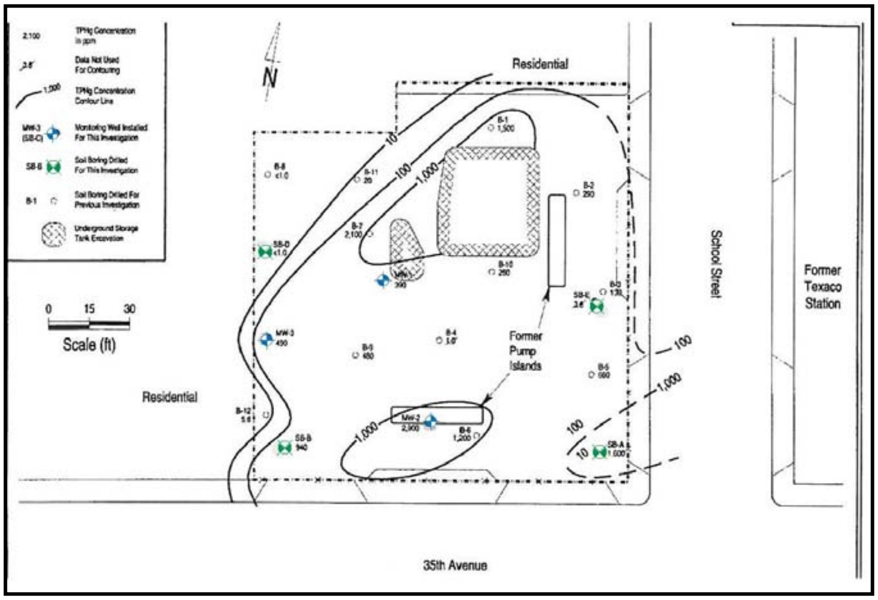
(From 1991 Report:
Results of Preliminary Subsurface Site Investigation,
by Consolidated Technologies)

The highest concentrations of TPH-gas and the volatile constituent compounds of benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected in samples collected at 15 and 20 feet bgs. Note: A boring targeting the waste oil tank (B7), contained no additional contaminants of

5: Note: Water depths for MW-1 and MW-2 are not reflective of groundwater levels below ground surface due to their elevated casing height within monument well boxes.

concern from a suite of analysis including: diesel, petroleum oil and grease, semi volatile organics (Method 8270 SVOCs), or other volatile solvent compounds aside from BTEX (Method 8010). Of note: only limited contamination was observed in the two downgradient borings, B-8 and B-12.

1994, Follow-up Subsurface Investigation & Monitoring Well Installations: In May 1994, Cambria drilled seven (7) hollow-stem augured soil borings (SB-A through SB-G, (see figure, right), analyzed two soil samples per boring, and converted three of the borings into on-site monitoring wells (MW-1 through MW-3, each screened from 10-25 ft bgs). Groundwater samples were analyzed from the 3 newly installed wells in addition to 3 of the exploratory borings (grab samples). Boring logs indicated moderate to very strong, weathered gasoline odors in all the borings starting a depth of eight feet below ground surface.



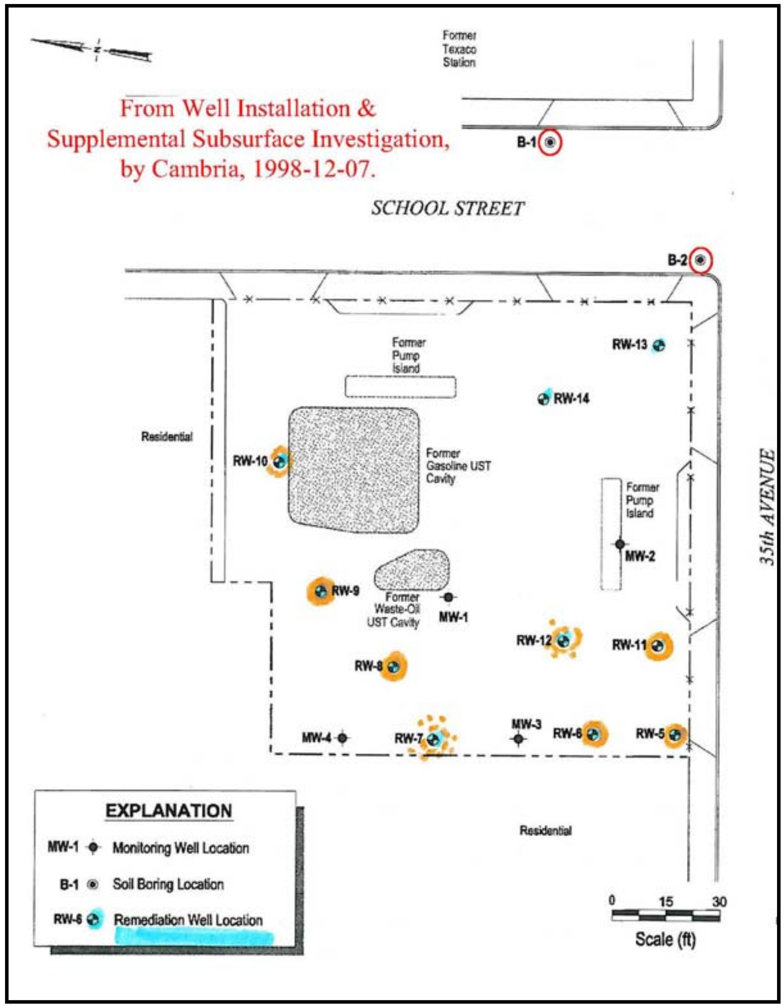
- Soil: TPH-gas concentrations were detected in soil samples collected for analysis in six of the seven soil borings, (max concentration = 2,900 ppm in MW-2 at 15-ft),

- Groundwater: TPH-gas/benzene concentrations were detected in all six groundwater samples. The maximum TPH-gas/benzene concentrations detected in grab groundwater samples were 120,000/10,000 ug/L (or parts per billion, ppb, in SB-B @ 15-ft), max TPH-gas/benzene concentrations in a developed monitoring well were 120,000/22,000 (MW-1 @ 16.8-ft). Tabulated analytical results are provided in Appendix B.

1996, Feasibility Testing: In July 1996, Cambria conducted a series of remediation feasibility tests involving soil vapor extraction-only (SVE), SVE/air sparging, and SVE/aquifer pumping. SVE vacuums of up to 150 inches-of-water were applied to the three monitoring wells for 20-to-45 minutes (approx. 5-ft of well screen available for SVE above groundwater). TPH-gas soil vapor concentrations collected from each well at the end of the SVE test ranged from less than 250 parts per million by volume (ppm_v) in test wells MW-1 and MW-2, to greater than 10,000 ppm_v in test well MW-3. Cambria did not note any significant increases in air flow or soil vapor concentrations when SVE was combined with air sparging (no radius of influence of vacuum or groundwater drawdown was observed in any monitored well). However, Cambria stated that they believed dewatering combined with SVE could enhance remedial efforts.

The generally low air and groundwater flow rates are indicative of low permeability soils. Results of the remedial testing indicated that SVE-alone, or SVE combined with air sparging would not be effective in removing hydrocarbons from the subsurface soils. However, it was believed that Dual Phase Extraction was a promising remedial alternative.

1997, Additional Downgradient, Monitoring Well: In February 1997, Cambria installed one additional on-site monitoring well (MW-4, screened from 10-30 ft bgs) at the downgradient (west) corner of the parcel. Soil samples for logging were obtained on 5-foot intervals using hollow-stem augers but no field measurements (photoionization meter) or contaminant observations were logged but two analyzed soil samples contained TPH-gasoline contamination The maximum concentration of TPH-gas in soil was detected at a depth of 15-ft bgs (@ 530 ppm). TPH-gas and benzene concentrations in groundwater were detected at concentrations of 47,000, and 11,000 ppb, respectively.

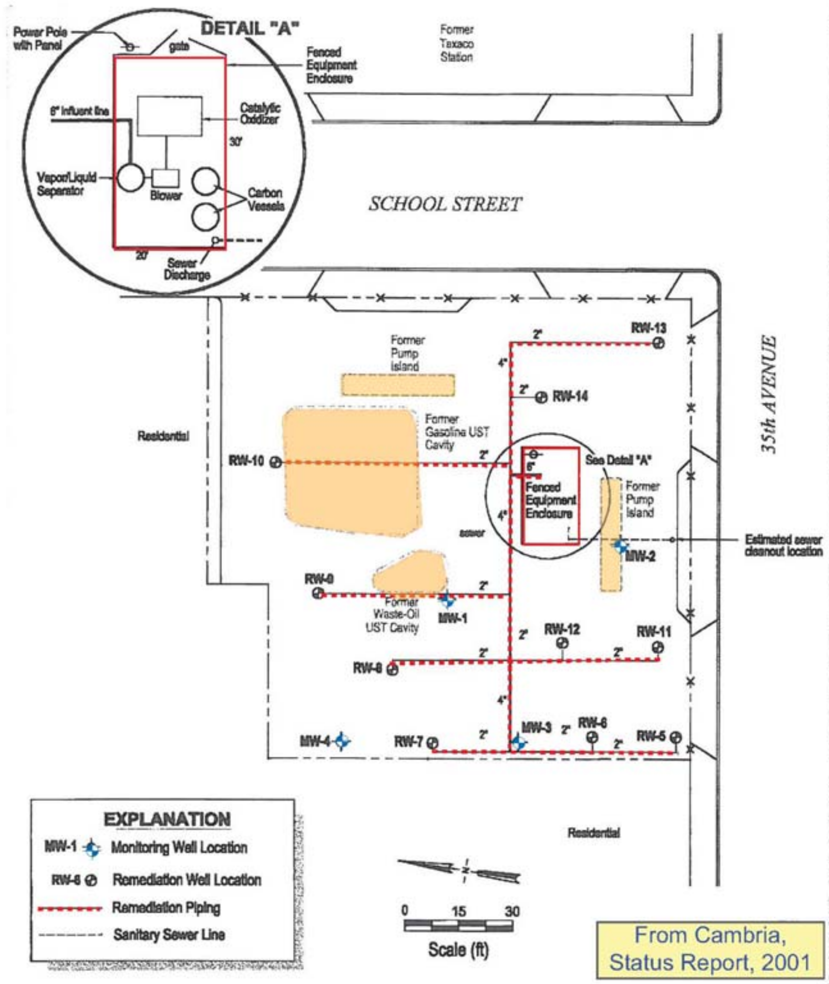


1998, Remediation Well Installation (see figure, right): In August 1998, Cambria installed ten (10), on-site, 4-inch diameter, dual-phase extraction (DPE) remediation wells (RW-5 through RW-14). Soil samples for logging were obtained from the hollow-stem augers on 5-foot intervals (5 borings) or directly from augured drill cuttings (5 borings) and the majority of borings had very similar subsurface logs (low permeability clayey sands/gravels, and sandy clays having strong to moderate petroleum hydrocarbon odors in the groundwater fluctuation, smear zone). No soil samples were laboratory analyzed.

In addition to the 10 installed remediation wells, an attempt was made to obtain upgradient, hydropunch-type, grab groundwater samples (two geoprobe borings, B-1 and B-2), on School Street. Sampling rods were advanced directly to depths of 28 and 38 feet (no soil cores collected). Apparently, the low permeability soils encountered at those depths did not produce groundwater, so no water samples could be collected.

1999, Interim Remedial Action - Injection of Hydrogen Peroxide: In August 1999, Cambria poured a limited volume (7-12 gallons) of a hydrogen peroxide solution into each of the four monitoring wells and ten remediation wells in an attempt to oxygenate impacted groundwater while Dual Phase Extraction (DPE) remediation system planning was underway. Dissolved oxygen concentrations in groundwater did not significantly increase nor did contaminant concentrations decrease following the placement of 7.5% hydrogen peroxide into all fourteen on-site wells and the results did not change ongoing plans for installing DPE remediation system.

2000-2004, Site Remediation by Dual-Phase Vacuum Extraction: In October 2000, Cambria initiated remediation by DPE which consisted of extraction from the Site's 10 remediation wells by a 200 cfm positive-displacement blower. The blower simultaneously extracted liquid/dissolved-phase contaminants to a centrally located treatment compound where vapor phase hydrocarbons were destroyed using a catalytic oxidizer; dissolved phase hydrocarbons were treated using two, 1,000-lb carbon vessels and was discharged to the sanitary sewer. In August 2002, the blower was upgraded in an effort to increase hydrocarbon removal. The positive-placement blower was replaced by a more powerful, 20-HP liquid ring vacuum pump capable of generating higher vacuums. The system design included simultaneous extraction of soil vapor and groundwater from the 4 monitoring wells (MW-1 though MW-4) and the ten, on-site, 4-inch diameter, remediation wells (RW-5 through RW-14) using 1-inch diameter suction hose stingers lowered to depths typically ranging from 16-20 feet bgs.



In September 2004, the DPE system was dismantled due to asymptotically low hydrocarbon removal rates. Approximately 6,545 pounds of vapor-phase hydrocarbons were removed after 13,965 hours of extraction and 11 pounds of dissolved-phase hydrocarbons were removed from 1,447,419 gallons of DPE pumped groundwater (equal to an average of 1.7 gal/min extracted).

2006, Proposed Additional Remedial Actions (January), and Off-site Delineation Workplan (July): Following the cessation of the DPE remediation, Alameda County Health Care Services (AC-HCS) requested that a *Workplan* be prepared to implement an alternative remedial technique (December 2004). Post-remediation monitoring (2005) of six on-site wells (MW-1 though MW-4, RW-5 and RW-9) showed sheen was present in each of the wells along with elevated concentrations of residual dissolved fuel contaminants, primarily as TPH-gas, benzene, and MTBE. Maximum 2005 concentrations detected in these 6 monitoring wells ranged from 9,400-to-53,000 ppb for TPH-gas, 1,200-to-6,100 ppb for benzene, and non-detect-to-2,300 for MTBE.

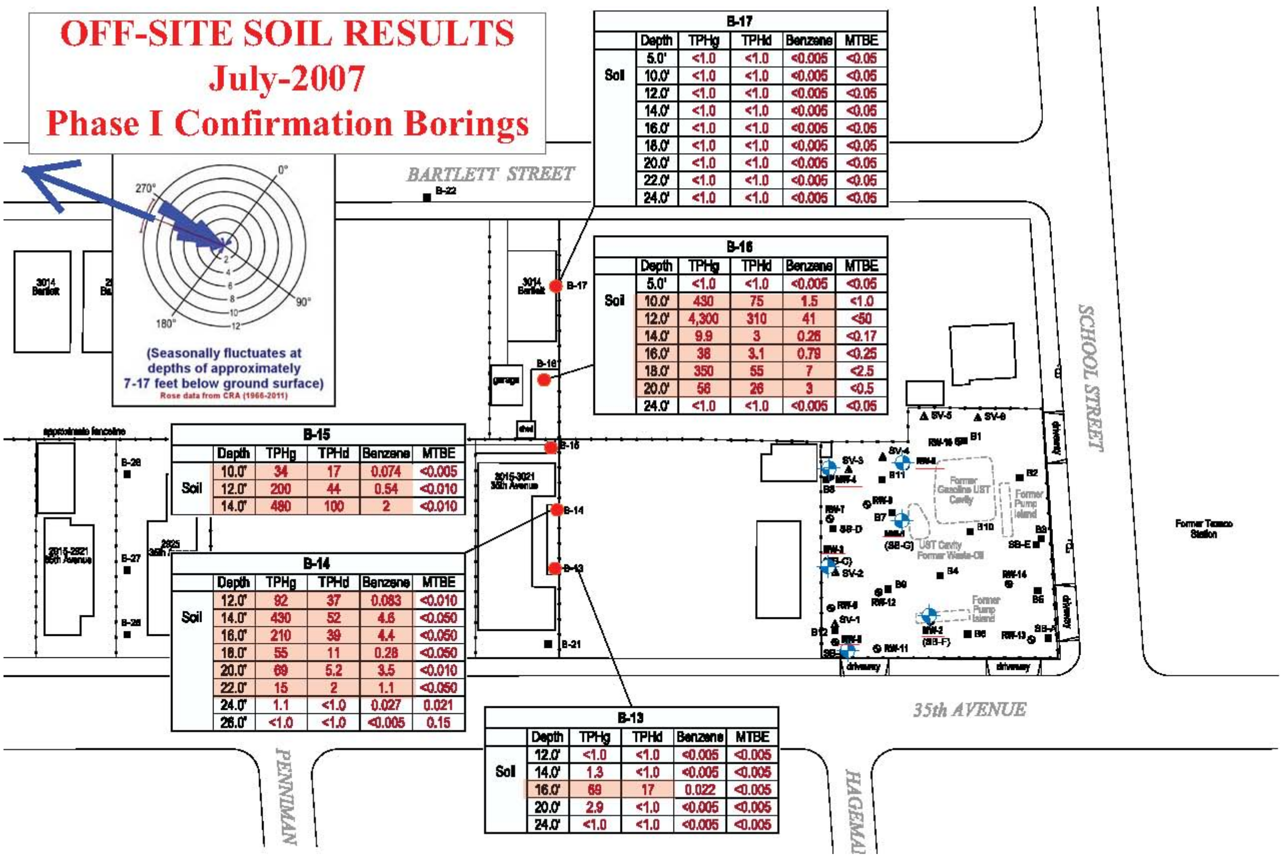
Cambria's *Revised Remediation Workplan* proposed completing interim remedial pilot testing of seven (7) sparge points in order to confirm the ability and cost-effectiveness of *In-Situ Chemical Oxidation* (ISCO) injection as an option for cleanup of residual, fuel-impacted groundwater in a low-permeability, shallow aquifer. Gaseous ozone was selected as the ISCO oxidizer because of: 1) ozone gas' reported ability to transfer though fine-grained, saturated soils, and 2) ozone's ability to destroy hydrocarbons on contact.

AC-HCS determined that previous Dual Phase Extraction remediation at the Site (2000-2004) was not successful due to the low permeability restrictions that Site soils have on air and groundwater flow, and those same restrictions would likely limit the distribution of sparged ozone from coming into contact with residual contamination (May-2006). AC-HCS instead requested that: 1) the original *Corrective Action Plan* (dated 1996) be updated with new understandings of the subsurface conditions in order to better evaluate proposed remedial options, and 2) an *Off-site Soil & Groundwater Investigation Workplan/Site Conceptual Model* be submitted to delineate extent of off-site soil contamination, the extent of groundwater plume migration, and a survey of wells within 2,000 feet and other sensitive receptors.

Cambria's *Well and Sensitive Receptor Survey* (July 2006) concluded that none of the active supply wells identified within a 2,000-foot radius of the Site were likely to be impacted based on their relative upgradient/sidegradient locations. A review of other potential sensitive receptors (schools, churches, and surface water bodies) concluded there were negligible direct risks from impacted groundwater but there did exist a potential risk for plume off-gassing (vapor intrusion) if the residual hydrocarbon plume extended under residences (identified data gap). Cambria's proposed data gap sampling plan called for off-site soil and groundwater sampling of six (6) downgradient borings installed at distances ranging between ~300-600 feet off-site.

AC-HCS's response opinion was that the distance between the proposed boring locations and the source was such that collected data would not be useful for Site characterization or delineation of the dissolved plume (Oct-2006). In addition to requesting new proposed boring locations, AC-HCS requested completion of a soil gas investigation in the vicinity of the western property boundary.

2007, Phase I Off-site Characterization and On-Site Soil Gas Investigations: In May and July 2007, a preliminary round of off-site groundwater and soil samples, and on-site soil gas samples were collected and analyzed by Conestaoga-Rovers & Associates (CRA, which mergered with Cambria). The objectives of the Phase I investigation (and a follow-up Phase II characterization



Phase I Borings –

investigation completed in Nov-2008) were to: 1) investigate the extent of the dissolved petroleum hydrocarbon plume in groundwater; 2) determine the soil smear-zone impacts resulting from lateral plume migration and seasonal groundwater fluctuation; and 3) identify whether subsurface soil gas concentrations (vapor) indicated a potential vapor intrusion risk. The Phase I investigation included the collection of soil and groundwater samples from a transect of five (5) downgradient, continuously cored driven probe locations (B-13 through B-17, see figure below), and the collection of six (6) on-site soil gas sampling locations (V-1 through V-6).

Off-site, smear zone gasoline contamination was observed during continuous core logging of the Phase I transect borings, which were placed at accessible locations, approximately perpendicular to dominant groundwater flow and 150-ft downgradient of the Site . Results of laboratory-tested off-site soil samples confirmed field observations as elevated gasoline constituent concentrations were present within the initial transect borings (see shaded results, above). Results of laboratory-tested off-site groundwater grab samples from these initial Phase I transect borings contained elevated gasoline, benzene, and MTBE concentrations, indicating that a portion of the dissolved gasoline plume extended to this transect. In addition, Phase I, on-site soil gas sampling along the property line contained elevated vapor concentrations (summarized with Phase II results, below).

2008, Phase II Additional Off-Site Characterization and Limited On-Site Investigations: In October-November, 2008, a follow-up round of *Phase II Off-site Characterization Sampling* was completed to address previous detections of elevated gasoline constituent concentrations in soil, groundwater, and soil gas. The follow-up, Phase II investigation included:

- Eight (8), continuously cored step-out soil borings (off-site), one installed as an infill boring (B-21) and the remaining seven (B-22 to B-28) positioned downgradient of the Phase I transect (the second transect was placed at accessible locations generally 230-ft downgradient of the initial, Phase I transect).
- One upgradient (off-site) and two on-site soil borings were continuously-cored to a depth of 45-ft bgs to: 1) inspect for potential upgradient contribution from an abandoned gas station site (Texaco), and 2) inspect post-remediation, on-site soil conditions.
- Eight (8), grab groundwater samples were collected from on-site boring B-18, and off-site borings B-21 through B-28.

Phase II Soil Sampling Results

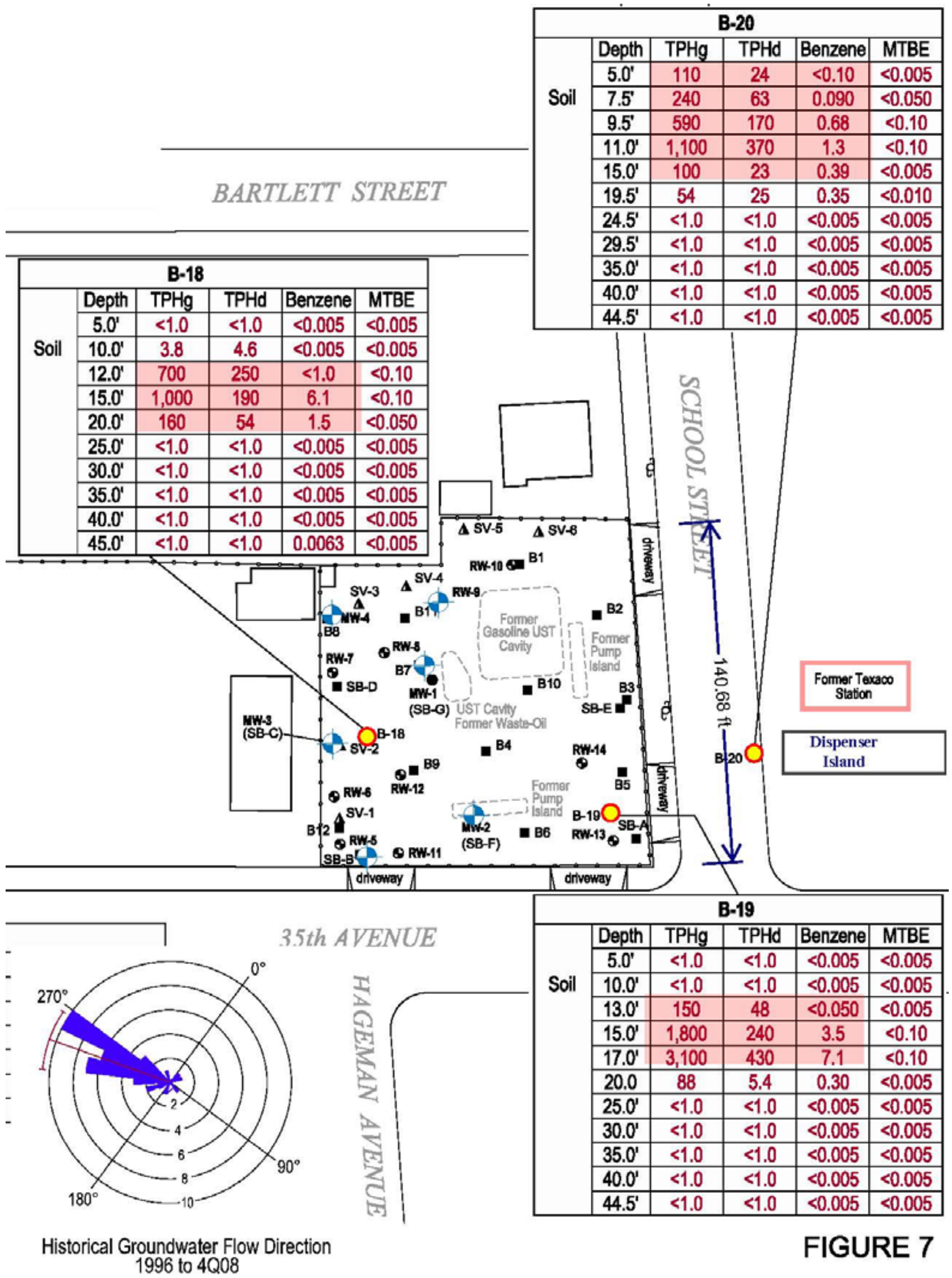
Off-site Soils: No additional off-site, smear zone gasoline contamination was observed during continuous core logging of the second, downgradient boring transect or in lab samples, which indicates smear zone impacts from lateral plume transport/fluctuating groundwater have not extended as far as the second transect. Results of laboratory-tested off-site soil samples confirmed field observations as no contaminant concentrations were detected.

On-site Soils: Smear zone gasoline contamination was observed in continuous soil cores collected from two, post-remediation borings drilled at the downgradient (B-18) and upgradient (B-19) sides of the property. Field observations and laboratory results confirm elevated concentrations of residual gasoline contamination remain within the smear zone created by fluctuating groundwater, primarily found at depths of approximately 11 to 20 feet (see highlighted impact elevations in the graphic below). Despite the removal of over 6,500 lbs of gasoline from the subsurface during four years of Dual Phase Extraction, residual constituent concentrations continue to exceed regulatory threshold limits. The lack of remedial success using Dual Phase Extraction as a cleanup technique is likely due to:

1. Dual phase extraction's inability to efficiently pull residual fuel contamination from low permeability soils present beneath the Site. And,
2. Contribution from a secondary, upgradient source (the abandoned Texaco Station across School Street). Specifically, data collected from exploratory boring B-20 (see figure on next page), which was drilled immediately adjacent to Texaco Station's former fuel dispenser islands. Field observations of soil cores and confirmation laboratory testing contained elevated gasoline contamination at very shallow depths (<5 feet below ground surface, see graphic next page). These elevated, off-site gasoline concentrations, combined with the elevated gasoline concentrations detected in borings installed along the subject Site's upgradient property line indicate the abandoned Texaco station is a secondary source of contamination (see recent boring B-19, and previous borings SB-A & B-4).

In addition to the shallow contamination detected in upgradient boring (DP-20, see figure below) indicating a nearby, off-site source, it is notable that soil and groundwater data suggest this second source has no apparent evidence of the fuel additive MTBE. Specifically:

- There were no detections of MTBE in soil samples analyzed from the upgradient Texaco Station site.
- Results of groundwater collected from upgradient property line wells (RW-13, RW-14) did not contain the fuel additive, while mid-site and downgradient property line wells (MW-1 through MW-3 and RW-6 and RW-9) have contained MTBE. These distinctively different fuel fingerprints indicate a second source originates off site and the resulting plume is migrating onto the property (discussed further below).



B-20

	Depth	TPHg	TPHd	Benzene	MTBE
Soil	5.0'	110	24	<0.10	<0.005
	7.5'	240	63	0.090	<0.050
	9.5'	590	170	0.68	<0.10
	11.0'	1,100	370	1.3	<0.10
	15.0'	100	23	0.39	<0.005
	19.5'	54	25	0.35	<0.010
	24.5'	<1.0	<1.0	<0.005	<0.005
	29.5'	<1.0	<1.0	<0.005	<0.005
	35.0'	<1.0	<1.0	<0.005	<0.005
	40.0'	<1.0	<1.0	<0.005	<0.005
	44.5'	<1.0	<1.0	<0.005	<0.005

B-18

	Depth	TPHg	TPHd	Benzene	MTBE
Soil	5.0'	<1.0	<1.0	<0.005	<0.005
	10.0'	3.8	4.6	<0.005	<0.005
	12.0'	700	250	<1.0	<0.10
	15.0'	1,000	190	6.1	<0.10
	20.0'	160	54	1.5	<0.050
	25.0'	<1.0	<1.0	<0.005	<0.005
	30.0'	<1.0	<1.0	<0.005	<0.005
	35.0'	<1.0	<1.0	<0.005	<0.005
	40.0'	<1.0	<1.0	<0.005	<0.005
	45.0'	<1.0	<1.0	0.0063	<0.005

B-19

	Depth	TPHg	TPHd	Benzene	MTBE
Soil	5.0'	<1.0	<1.0	<0.005	<0.005
	10.0'	<1.0	<1.0	<0.005	<0.005
	13.0'	150	48	<0.050	<0.005
	15.0'	1,800	240	3.5	<0.10
	17.0'	3,100	430	7.1	<0.10
	20.0	88	5.4	0.30	<0.005
	25.0'	<1.0	<1.0	<0.005	<0.005
	30.0'	<1.0	<1.0	<0.005	<0.005
	35.0'	<1.0	<1.0	<0.005	<0.005
	40.0'	<1.0	<1.0	<0.005	<0.005
	44.5'	<1.0	<1.0	<0.005	<0.005

FIGURE 7

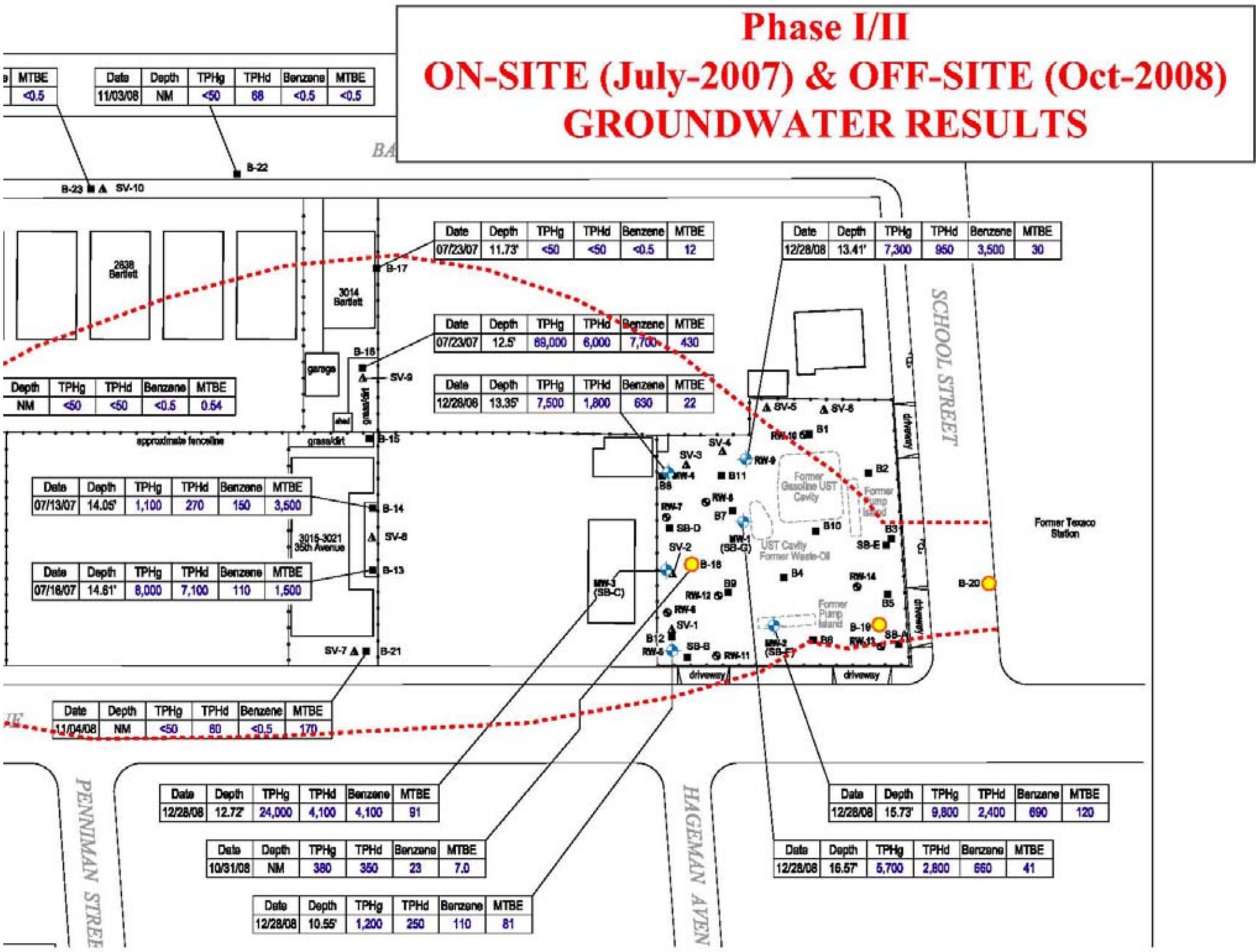
PHASE II HYDROCARBON CONCENTRATIONS in SOIL

Phase II, Post-remediation on-site borings (B-18, B-19) and upgradient boring B-20 (2008).

Phase I & II Groundwater Sampling Results:

Grab groundwater samples were collected from Phase I and Phase II transects, and from on-site boring B-18. The data was compared with monitoring well results (2008 fourth quarter event). No groundwater sample was obtained from the upgradient boring B-20.

Groundwater Results (Phase I & II borings, and monitoring wells).



- TPH-gasoline was detected in all on-site wells and borings (380-24,000 ppb, max in MW-3), and five of the six first transect borings (from "not detected" to 69,000 ppb, max. in DP-16). No TPH-gasoline was detected in the downgradient, Phase II transect borings.
- Benzene was detected in all on-site wells and borings (23-4,100 ppb, max in MW-3), and five of the six first transect borings (from "not detected" to 7,700 ppb, max. in DP-16). No benzene was detected in the downgradient, Phase II transect borings.
- MTBE, was detected in all on-site wells and borings (7-120 ppb, max in MW-2), and all the first transect borings (12 to 3,500 ppb, max. in DP-14). MTBE was detected in five

of the seven downgradient, Phase II transect borings primarily as trace to non-detectable concentrations borings (from "not detected" to 150 ppb, max. in DP-27).

- The set of groundwater data suggests two sources because results of groundwater collected from upgradient property line wells (RW-13, RW-14) did not contain the fuel additive, while mid-site and downgradient property line wells (MW-1 through MW-3 and RW-6 and RW-9) have contained MTBE. These differing fuel fingerprints indicates one source originates on-site and a second plume is migrating onto the property. It is likely that the 4 years of Dual Phase Extraction conducted at the subject Site would have also pulled residual contamination from the abandoned, upgradient Texaco Station to the on-site cleanup system.

The set of groundwater test results indicates that a thin plume of MTBE extends from the Site to the second transect (330 feet) but that the low concentrations detected in the downgradient grab samples suggests the downgradient limit of the MTBE plume is in close proximity to the Phase II transect borings. The lack of TPH-gasoline and benzene detections in the second transect indicates that TPH-gasoline and constituent compounds are attenuated and limited to a distance between the two transects (approximately 200-225 ft from the Site).

Phase I & II Soil Gas Survey Results:

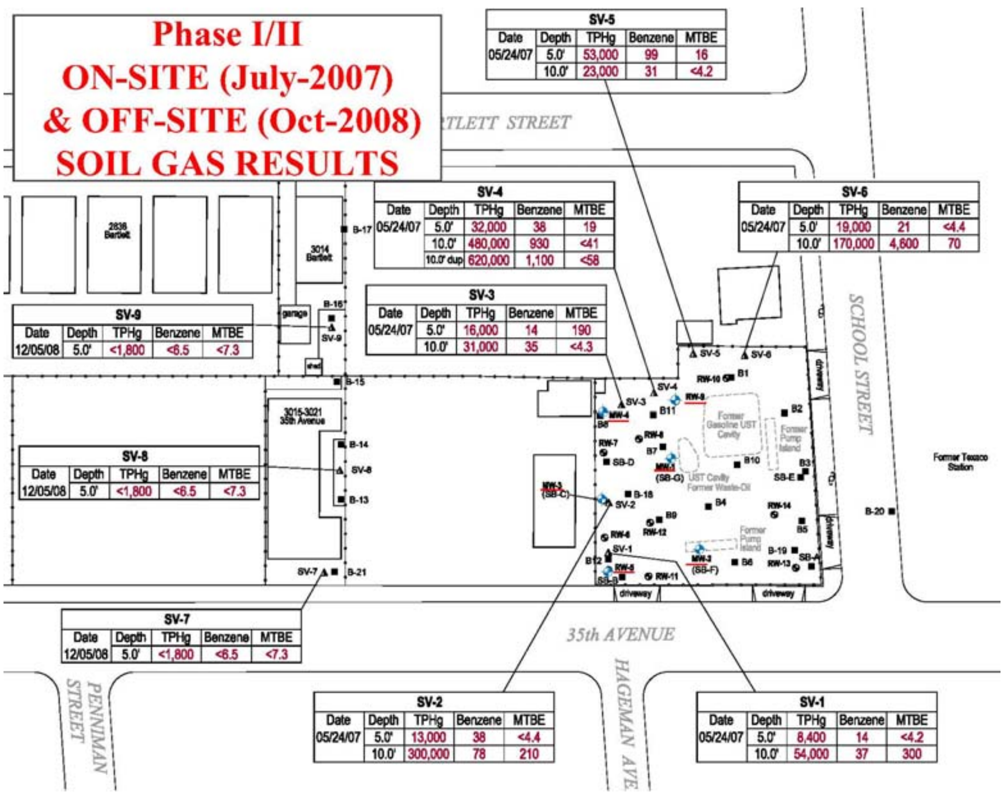
A second round of vapor samples were collected in October-2008 because elevated concentrations were detected in the initial round of Phase I, on-site soil gas sampling locations positioned along the property line (July-2007). Phase II sampling was completed at accessible locations along the two previously described soil and groundwater sampling transects, positioned approximately 150 feet (V-7 through V-9), and approximately 330 feet (V-10 through V-14), from the Site in the downgradient groundwater direction.

- TPH-gasoline was detected in all on-site, soil gas wells (@5-ft: 8,400-53,000 ug/m^3, max at SV-5; and increasing at the 10-ft sampling interval: 23,000-620,000 ug/m^3, max at SV-4_{dup}). No TPH-gasoline soil gas was detected in any of the seven, off-site soil gas wells (SV-7 through SV-14).
- Benzene was also detected in all on-site, soil gas wells (@5-ft: 14-99 ug/m^3, max at SV-5; and again increasing at the 10-ft sampling interval: 31-4,600 ug/m^3, max at SV-6). No benzene was detected in soil gas from any of the seven, off-site soil gas wells (SV-7 through SV-14). The residential/commercial threshold limits for benzene in soil gas is 36/122 ug/m^3, respectively[6].

[6]: The California Human Health Screening Levels (CHHSLs, 2005) were developed as a tool to assist in the evaluation of contaminated sites for potential adverse threats to human health. Residential and commercial/industrial land use screening levels for soil gas are based on soil gas data collected five feet below a

- MTBE was detected in all on-site, soil gas wells but in only three of the shallow sampling intervals (@5-ft: "not detected" to 190 ug/m^3, max at SV-3; the 10-ft sampling interval concentrations ranged from not detected in three of the soil gas wells to 300 ug/m^3, max at SV-1). No MTBE was detected in soil gas from any of the seven, off-site soil gas wells (SV-7 through SV-14). The residential/commercial threshold limits for MTBE in soil gas is 4,000/13,400 ug/m^3, respectively
- Toluene, Ethylbenzene, and Xylenes: Trace concentrations of these constituent gasoline compounds were detected in a few offsite soil gas wells (SV-7, -10 & -13) but at levels well below established threshold limits.

Soil Vapor Survey Results
Includes Phase I borings (SV-1 thought SV-6, July 2007) & Phase II (SV-7 through SV-14) borings.



The set of soil gas test results indicates that elevated soil gas concentrations persist at the Site, 7 years after the Dual Phase Extraction system was decommissioned. The lack of soil gas detections in any of the off-site samples indicates that dissolved plume off-gassing is not a risk at distances of 150 ft from the Site.

Documents relating to the discovery, investigation and remediation of the fuel releases release

building foundation or the ground surface. Intended for evaluation of potential vapor intrusion into buildings and subsequent impacts to indoor-air. Screening levels apply to sites that overlie plumes of VOC impacted groundwater.

are listed in the reference section at the end of this report.

UPDATED SITE CONCEPTUAL MODEL

Source of Contamination: The source of on-site gasoline hydrocarbon contamination originated from multiple sources associated with the former USTs and associated appurtenances that were removed in 1991. Elevated gasoline concentrations were found at the former UST pit and dispensers locations and continue to have the highest detections during on-going groundwater monitoring. In addition, data collected from an off-site, upgradient exploratory boring indicates additional gasoline contamination is coming onto the Site from a second, gasoline release source and it appears to be feeding the plume. The upgradient off-site source is an abandoned, former Texaco Gas Station.

Nature and Extent of Contamination:

Soils: After the initial source zone excavations in 1991, gasoline-range petroleum hydrocarbons and volatile constituent compounds were identified as the Contaminants of Concern (COCs) for the site. Specifically, Total Petroleum Hydrocarbons as gasoline [TPH-gas], benzene, toluene, ethylbenzene, and xylenes [BTEX], and Methyl tert Butyl Ether [MTBE]) were found at concentrations in excess of Tier I Environmental Screening Levels[7] for Residential/Commercial land uses (ESLs), both in on-site and off-site soils. Diesel-range Total Petroleum Hydrocarbons (TPH-diesel) were also encountered but generally identified as overlapping lighter fraction gasoline hydrocarbons detected within the diesel range.

Tier 1 Soil Screening Threshold Concentrations (mg/kg, or ppm)
(Groundwater IS a current or potential Source of Drinking Water)

Chemical of Concern	Residential		Commercial	
	Shallow (< 10 feet)	Deep (> 10 feet)	Shallow (< 10 feet)	Deep (> 10 feet)
TPH-gas TPH-diesel	83	83	83	83
Benzene	0.044	0.044	0.044	0.044
Toluene	2.9	2.9	2.9	2.9
Ethylbenzene	2.3	3.3	3.3	3.3
Xylenes	2.3	2.3	2.3	2.3
MTBE	0.023	0.023	0.023	2.3

- Reference: *Screening For Environmental Concerns at Sites with Contaminated Soil and Groundwater*

7: Environmental Screening Levels (ESLs): California Regional Water Quality Control Board - San Francisco Bay Region has developed these ESLs in a document entitled*: Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (interim Final, November 2007, Revised May 2008). The ESLs are intended to provide guidance on whether or not remediation of detected contamination is warranted based on conservative risk.

(November 2007), http://www.waterboards.ca.gov/sanfranciscobay/esl.htm
- No additional fuel oxygenates or lead scavengers were detected.

As noted in Section 4 (see summary write-up of the 2007-8 Soils Investigation, above), on-site smear zone gasoline contamination was observed in two, post-remediation (2008) continuously-cored exploratory borings (B-18, and B-19). Field observations and laboratory results confirm that elevated concentrations of residual gasoline contamination remains within the smear zone created by fluctuating groundwater (e.g., observed smear zone is primarily encountered at depths of between 11 to 20 feet below ground surface). Note: confirmation lab analysis of shallow on-site soils (i.e., < 10 feet bgs) is very limited because only 2 of the 72 analyzed soil samples collected on-site were laboratory-analyzed. Despite the removal of over 6,500 lbs of gasoline from the on-site remediation wells during four years of Dual Phase Extraction, residual constituent concentrations in on-site soils continue to exceed regulatory threshold limits. The persistence of on-site petroleum hydrocarbon contamination appears due in part to: 1) DPE's inability to pull residual fuel contamination from low permeability soils, and 2) the apparent contribution from a secondary, upgradient source (the abandoned Texaco Station across School Street, see Figure 2).

The extent of off-site, smear zone gasoline contamination was determined by logging 13 off-site borings and laboratory-analyzing 91 discrete soil samples. Smear zone gasoline was observed during continuous core logging of the Phase I transect borings, placed at accessible locations approximately 150-ft downgradient of the Site. Laboratory-tested soil and groundwater samples confirmed field observations, indicating that a portion of the dissolved gasoline plume extended to this transect. Smear zone contamination did not extend to the second set of transect borings, placed at accessible locations approximately 330-ft downgradient of the Site.

Groundwater: On-site groundwater has been sampled seasonally since 1994 and chemicals of concern have consistently been detected at concentrations in excess of ACEH groundwater quality objectives.

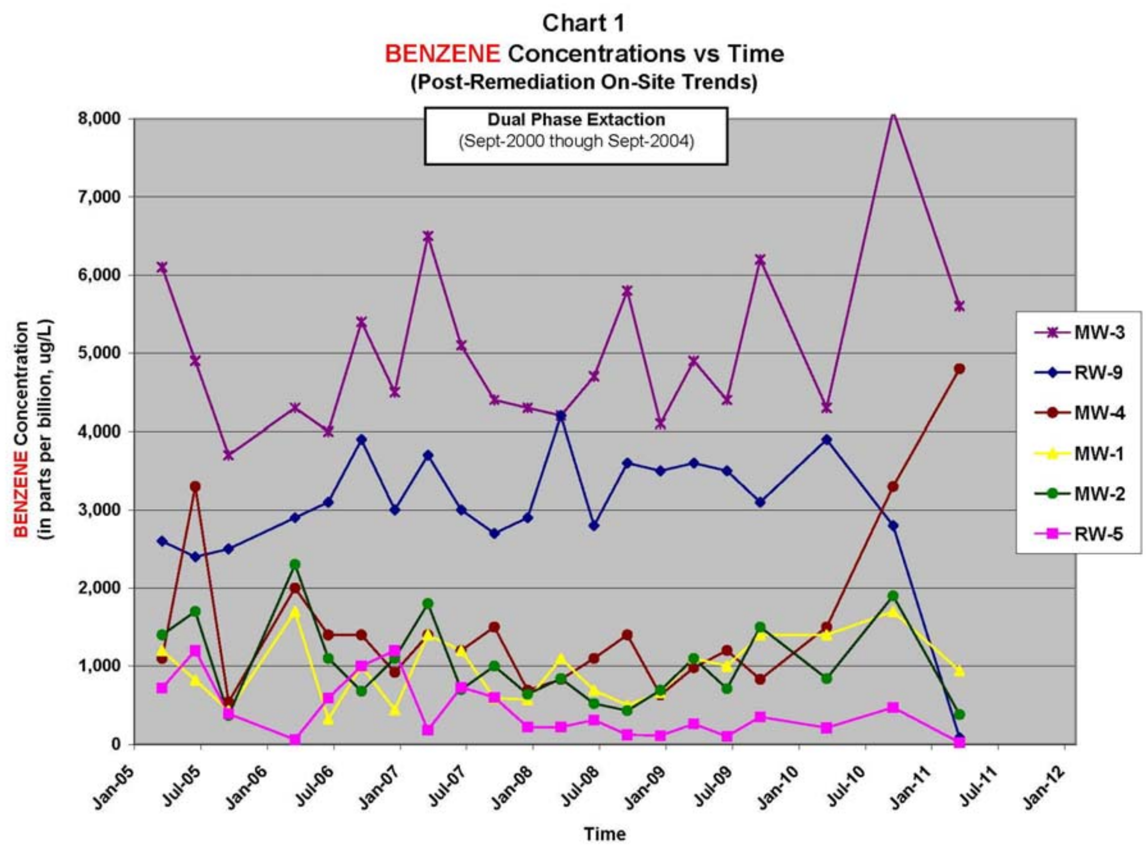
Chemical of Concern	Groundwater Quality Goal (µg/L)
Total Petroleum Hydrocarbons	1,000
Benzene	1
Toluene	150
Ethylbenzene	300
Xylenes	1,750
MTBE	5

Note: The East Bay Municipal Utility District (EBMUD) provides water supply to Oakland and obtains its drinking supply from Sierra runoff (Mokelumne River watershed), which eliminated the need for local groundwater wells.

Post remediation water quality monitoring (sampling, testing, and reporting) has been completed on 6 on-site wells since 2004. Individual concentration-v-time charts for benzene and TPH-gasoline have been placed on an aerial photograph of the Site to assess changes and trends. Benzene concentrations appear to be stable or deceasing in four of the monitored wells (MW-1,

& -2, and RW-5, & -9), and have upward trends in two of the downgradient, property line wells (MW-3 and MW-4). The upward trends may be the result of post remediation rebound, lateral transport of source-zone mass (residual fuel release contaminants), or a combination of the two. No new source of contamination is expected since the site has remained undeveloped since 1991. TPH-gas concentrations on the other hand, have deceasing trends in most of the wells (MW-2, -3, & -4, and RW-5, & -9), and a stable trend in MW-1.

A number of additional charts have been generated to see if any other trends or conditions exist. Chart 1 presents post remediation benzene concentrations in all six monitored wells. Chart 2 presents a similar data for TPH-gas. Chart 3 presents seasonal groundwater fluctuation data. (see Chart below):



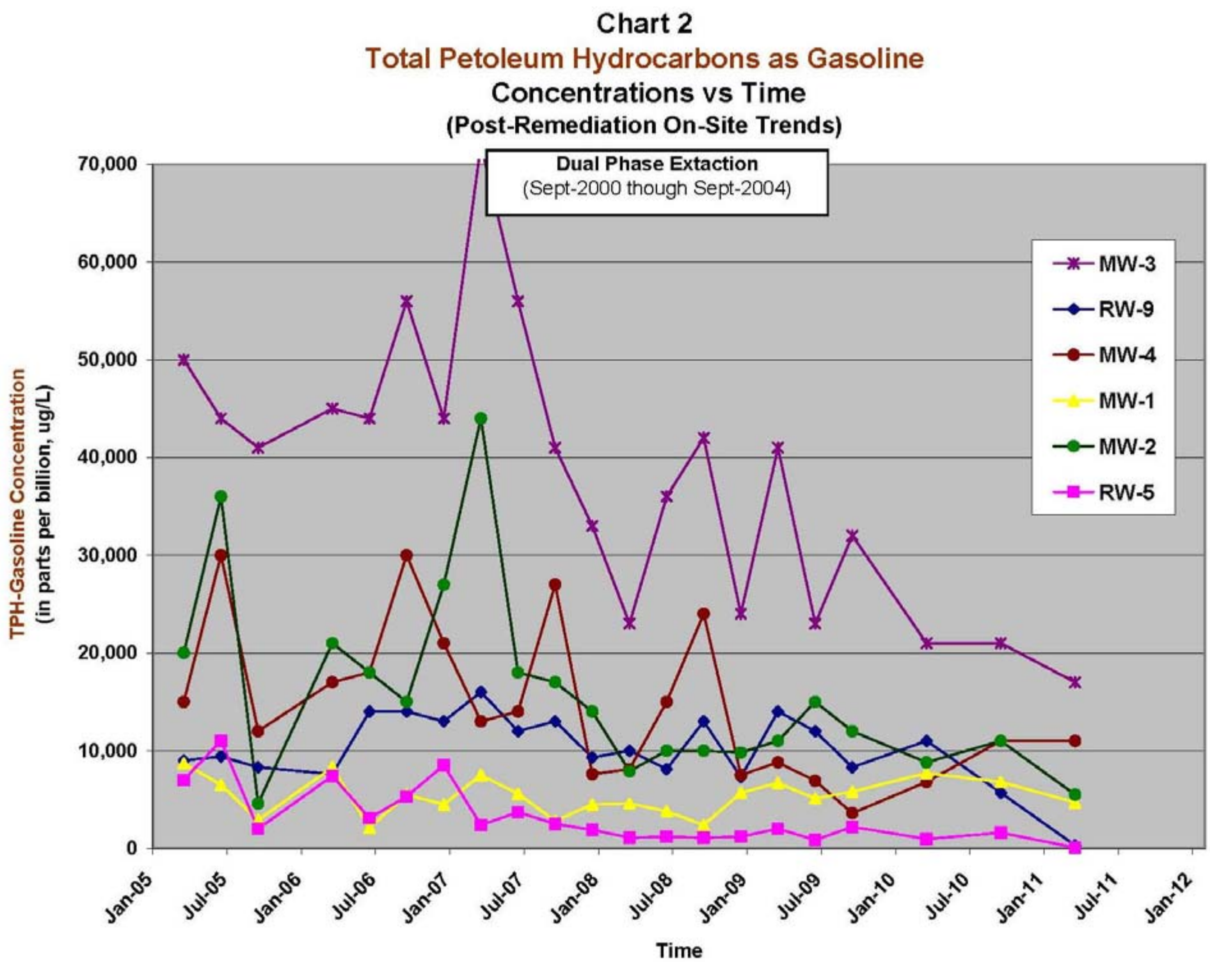
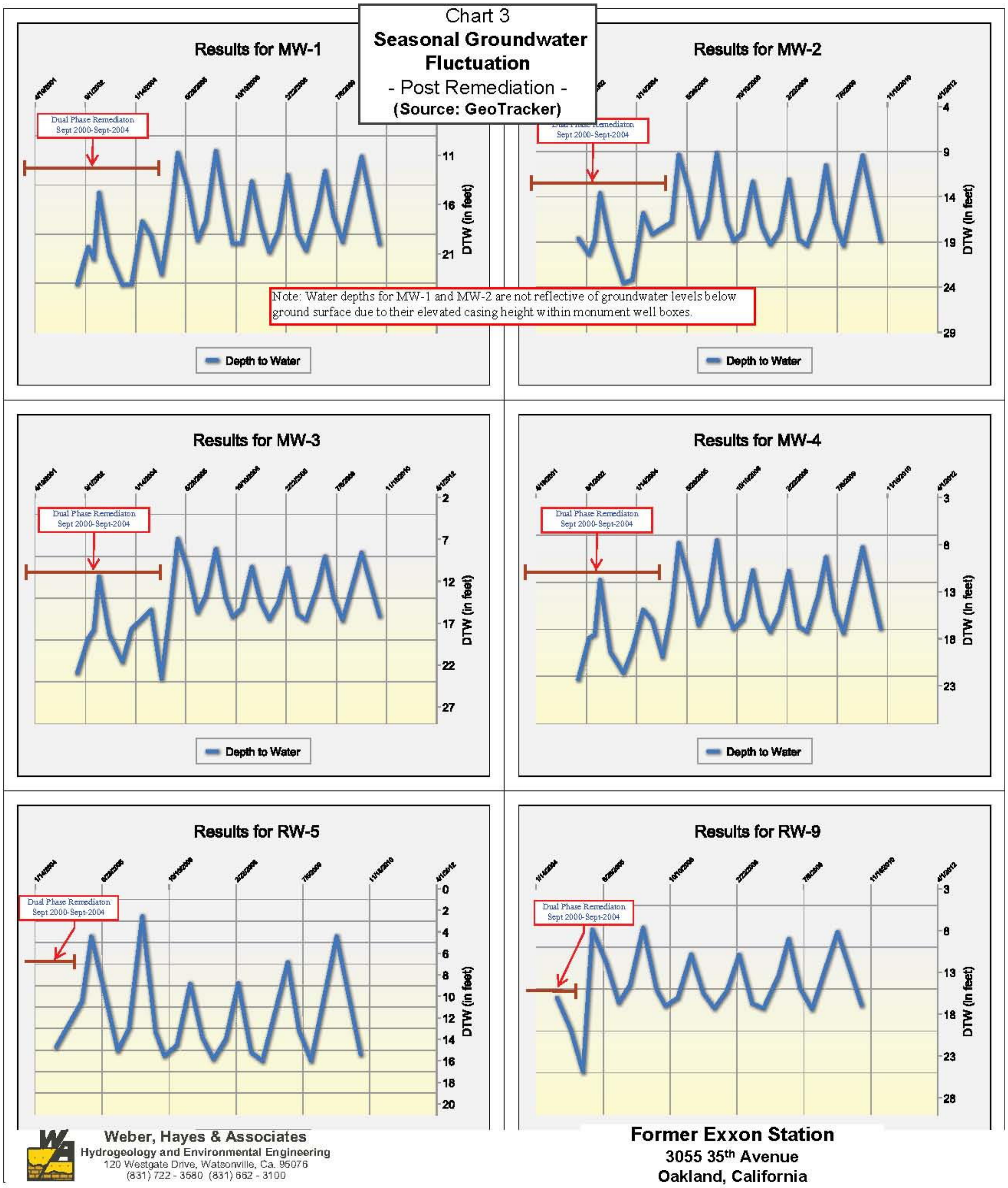


Chart 2
Total Petoleum Hydrocarbons as Gasoline
Concentrations vs Time
(Post-Remediation On-Site Trends)
Dual Phase Extaction
(Sept-2000 though Sept-2004)
TPH-Gasoline Concentration
(in parts per billion, ug/L)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Time
MW-3
RW-9
MW-4
MW-1
MW-2
RW-5



The data suggests:

- Seasonal fluctuations in groundwater generally fall between 8-18 feet (see Chart 3). Note MW-1 and MW-2 have casing stick-up above ground surface. Gradient is approximately 0.009 ft/ft (approximately 1 foot of groundwater drop for 111 feet of lateral run) towards the west.

- The fluctuations in contaminant concentrations do not follow a consistent pattern across the Site (i.e., concentrations do not consistently rise or fall with seasonal rise/fall of groundwater).

In summary, the post-remediation set of groundwater test results (wells and groundwater grab samples) indicate:

- A thin plume of MTBE extends off-site to the second transect (330 feet).
- The low concentrations detected in to the second transect suggest the downgradient limit of the MTBE plume is in close proximity;
- The lack of TPH-gasoline and benzene detections in the second transect indicates that TPH-gasoline and constituent compounds are attenuated and limited to a distance between the two transects (i.e., approximately 200-225 ft from the Site).

Soil Gas: The completed set of soil gas test results generated during two mobilizations (on-site, off-site) indicate that elevated soil gas concentrations persist on-site, 7 years after the Dual Phase Extraction system was decommissioned

Tier 1 Shallow Soil Gas Human Health Screening Levels for Vapor Intrusion

(Concentrations in ug/m^3)

Chemical of Concern	Land Use	
	Residential	Commercial
TPH-gas TPH-diesel	Not Established	
Benzene	36.2	122
Toluene	135,000	378,000
Ethylbenzene	Not Established	
Xylenes	31,500	87,900
MTBE	4,000	13,400

- Reference: *California Human Health Screening Levels*[8] *for Indoor air and soil gas (CHHSLs)* (January 2005). Soil gas screening levels are based on soil gas data collected five feet below a building foundation or the ground surface. Intended for evaluation of potential vapor intrusion into buildings and subsequent impacts to indoor-

[8]: California Human Health Screening Levels for indoor air and soil gas (CHHSLs): The California Human Health Screening Levels are concentrations of 54 Hazardous Chemicals in soil or soil gas that the California Environmental Protection Agency (Cal/EPA) considers to be below thresholds of concern for risks to human health. The CHHSLs were developed by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of Cal/EPA.

air. For sites with significant areas of VOC-impacted soil or sites that overlie plumes of VOC-impacted groundwater.

Benzene concentrations slightly exceeded the Tier 1 threshold limits in three of the six property boundary locations (SV-2, -4, & -5) --- no other volatile compound thresholds were exceeded. The lack of soil gas detections in any of the off-site samples indicates that dissolved plume off-gassing is not a risk at distances of 150 ft from the site.

Dominant Fate and Transport Characteristics

The dominant fate and transport characteristics of hydrocarbons released at the Site are that they drain by gravity through the low-to-moderately permeable soil matrix to groundwater. During this process a portion of the hydrocarbon mass is adsorbed onto soil particles in the unsaturated zone.

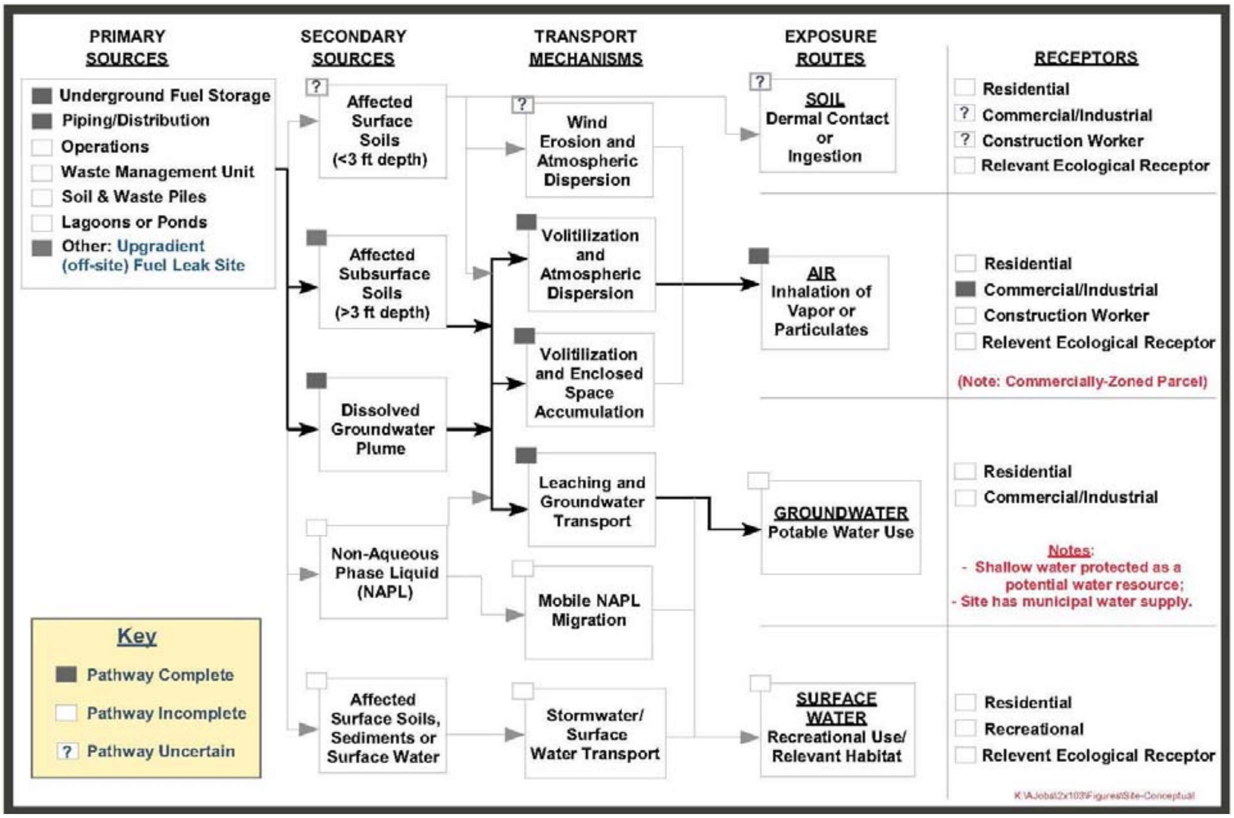
Hydrocarbons reached the saturated zone in sufficient quantity to form a sheen on top of the first encountered groundwater beneath the Site. No measurable free product has been documented during over 65 monitoring events, although sheen was observed in all 6 wells in the monitoring network.

In the saturated zone at this Site hydrocarbons have been transported by groundwater through advective and dispersive processes in the general downgradient direction (west). Off-site characterization drilling and sampling results suggest that a thin plume of MTBE extends from the Site to the second transect (330 feet); however, the low concentrations detected in the downgradient grab sample borings suggest the downgradient limit of the MTBE plume is in close proximity to the Phase II transect borings. The lack of TPH-gasoline and benzene detections in the second transect indicates that TPH-gasoline and constituent compounds are attenuated and limited to a distance between the two transects (approximately 200-225 ft from the Site). The truncated plume indicates natural attenuation processes are at equilibrium with dissolved contaminant flux at the periphery of the plume. Natural attenuation, combined with source removal of the leaking USTs/infrastructure, and four years of vapor and groundwater extraction appear to limit the advective and dispersive transport of hydrocarbons by groundwater.

When a volatile organic compound, such as gasoline's constituent compound benzene, is released to the environment, it will partition into different phases. It can: 1) be adsorbed onto soil particles, 2) be dispersed into soil vapor, 3) remain as free phase gasoline in soil interstices or floating on groundwater (this is known as "light non-aqueous phase liquid", or free product/sheen), and 4) be dissolved into groundwater. Gasoline/VOCs will reach a dynamic equilibrium between these phases, all of which have been observed at the Site.

Potential Exposure Pathways

Currently there are no buildings present on the property and groundwater is not being used for drinking water. The potential exposure pathways (the ways humans or the environment may be exposed to the hydrocarbons that have been released at the Site) are presented graphically in the flow-chart presented below.



A limited risk remains associated with on-site vapor intrusion (residual soil gas) if the site is developed without vapor intrusion mitigations. A limited risk associated with dermal contact exists because there is a shallow soil sampling data gap. A description of potential exposure pathways follows:

- Direct exposure to residual, surface soil contamination is unlikely because the Site has remained a fenced, unpaved vacant lot since the former Exxon Service Station was completely removed approximately 20 years ago. In addition, four years of soil vapor extraction removed residual impacts to shallow soils. Direct exposure to residual, deeper soil contamination would be limited to construction trenching or grading operations. If development were to occur, a *Soil Management Plan* would be put into effect for the handling of any residually impacted soils. Additional shallow soil sampling will be proposed to confirm post remediation concentrations in shallow soils (< 10 feet bgs) at worst case locations (dispensers, product piping runs) since currently only 2 of 72 on-site soil samples have been laboratory-analyzed.

- Exposure to soil vapors containing hydrocarbons. The completed soil gas survey indicates the volatile constituent gasoline compound of benzene was detected at concentrations slightly exceeded the Tier 1 threshold limits in three of the six property boundary locations (SV-2, -4, & -5) --- no other volatile compound thresholds were exceeded. The lack of soil gas detections in any of the off-site samples indicates that dissolved plume off-gassing is not a risk at distances of 150 ft from the Site.
- Ingesting (drinking) hydrocarbon contaminated groundwater. This exposure pathway is incomplete – a previously completed 2,000-ft radius well survey investigation determined there are no drinking water wells screened within or near the dissolved hydrocarbon plume.
- Groundwater quality is considered a sensitive receptor that must be protected from degradation by hydrocarbons (all State groundwaters are considered a potential water supply resource). Active remediation of groundwater impacted by hydrocarbons was undertaken with the goal of removing hydrocarbons to a point where natural processes will restore groundwater quality to what it was prior to degradation by hydrocarbons.

Potential Sensitive Receptors

A 2,000-ft radius, sensitive receptor survey was completed in 2006 (Cambria, 2006), which researched potential supply wells, schools, churches, hospitals, and known daycare facilities within the target radius. The survey concluded that within the target radius, no water supply wells existed and the residual dissolved gasoline plume was not likely to impact the three identified irrigation wells, the closest well being 750 feet away in a sidegradient direction (north). Additionally, none of the other potential sensitive receptors (schools, churches, rec-parks) are located downgradient of the plume footprint, and therefore are unlikely to be impacted by the dissolved plume.

The nearest surface water body is west-flowing Peralta Creek, located approximately 600-ft northwest of the site (see Figure 1). It is highly unlikely that dissolved gasoline plume compounds could reach Peralta Creek based on distance, attenuated plume limits (approximately 300 ft), and the low transmissivity of site soils.

Potential sensitive receptors that may be exposed to hydrocarbons from the release at the site include site users and groundwater as a potential drinking water resource. The release poses no immediate threats to site users because the Site remains undeveloped. Though groundwater is degraded by hydrocarbons at the site, there is no complete pathway for drinking water ingestion as there are no water supply wells in the immediate vicinity of the site. Protection of groundwater as a sensitive receptor, and site development vapor intrusion protection will be addressed during completion of a *Corrective Action Plan (CAP).*

Data Gaps

1) The most obvious data gap is the lack of an upgradient well(s) to confirm whether or not an abandoned Texaco Gas Station is contributing dissolved gasoline concentrations to the subject Site. The long term influx of dissolved contamination onto the subject Site would have affected the efficiency of previous remedial system operation as well as the selection of future remedial options.

2) The downgradient extent of dissolved gasoline plume has been reasonably defined using GeoProbe grab groundwater samples approximately 200-255 feet off-site.

3) Aside from samples collected from two, recent on-site borings (2007), all on-site soil data is over 14 years old, and the lab results predate active remediation at the site (2000-2004). No samples were collected from beneath the former tank pit or dispensers (known contaminant source areas). Only two of the seventy-two laboratory-tested soil samples collected from the Site were obtained from depths shallower than 10 feet. Accordingly:

   - The magnitude of known shallow sources of soil contamination (i.e., dispensers) or potential shallow sources of shallow soil contamination (i.e., product piping runs) have not been identified;

   - The *Site Conceptual Model* currently does not have the data set capable of eliminating construction worker *direct exposure to soil* as pathway for site risk. As noted above, direct exposure to residual, surface soil contamination is highly unlikely because the Site has remained a fenced, unpaved vacant lot for over 20 years and four years of soil vapor extraction has actively removed residual impacts from shallow soils. Direct exposure to residual, deeper soil contamination may be present, and would be limited to construction trenching or grading operations.

As noted in this report's introduction, and described throughout, a significant effort and expense has been made to remove residual gasoline contaminants from the Site subsurface. Despite the removal of approximately 6,500 lbs of gasoline in soil-gas and in groundwater during four years of Dual Phase Extraction, residual constituent concentrations still significantly exceed regulatory threshold limits. Residual gasoline contamination remains trapped within the seasonally-submerged, smear zone where vertically fluctuating and laterally migrating groundwater has impacted low-permeability soils, primarily at depths between 11 to 20 feet (groundwater seasonally fluctuates between approximately 8-18 feet bgs).

The lack of success with the Dual Phase Extraction remediation technology appears to be due to: 1) its inability to effectively pull residual fuel contamination sorbed within low permeability soils, and 2) apparent ongoing contribution from a secondary, upgradient source (the abandoned Texaco Station across School Street).

Once current soil conditions are confirmed (ie. identify where the bulk of the residual gasoline mass resides), and contaminant contribution from an off-site source is confirmed, a Corrective

Action Plan should assess the most cost effective remedial alternative that: 1) reduces residual source contamination from continuing to significantly impact on-site and off-site groundwater[9], and 2) creates an environment for natural attenuation to thrive and reduces contaminant concentrations to cleanup goals within a reasonable timeframe. Given the lack of success with Dual Phase Extraction and the remaining budget left in the State Cleanup Fund's commitment to the Site, remedial options will likely include:

1) Targeted mass removal of source contamination (up to 20 feet bgs) using large-diameter augers/excavation equipment.
2) Multiple, high-pressure injections of specialty chemical oxidizers, with emphasis on getting the oxidizer in contact (destroying) the smear zone contamination.
3) A permeable reactive barrier installed along the downgradient property boundary.

An effort should be made to select a remedial option that can be incorporated with development plans for the Site, if desired. The property has remained undeveloped for 20 years and previous efforts to develop the Site have been sidetracked out of fear of contaminant liability and risk. Remediation should be able to be completed in conjunctions with redevelopment in order to prevent loss of local property values and to prevent Brownfield blight.

[9]: Remediation feasibility testing by soil vapor extraction, air sparging, and groundwater extraction techniques showed only limited air and groundwater flow rates (no vacuum influence/easy dewatering but no groundwater drawdown at nearby wells), which confirms the low permeability conditions beneath the Site (Cambria, 1996).

Appendix B

Standard Field Methodology For:

Hydraulic Driven Probes
&
Hollow Stem Auger Drilling and Monitoring Well Installation

Field Methodology for:
Hydraulic Driven Probes
Using Macro-Core®, Large Bore® or Dual Tube® Hydraulic Driven Probes

Direct push exploratory borings are "drilled" by a GEOprobe rig, which hydraulically drives and vibrates steel probes into the soil. No drill cuttings are produced. This sampling technology has the ability for either continuous or discrete sampling using a 4-foot long nickel-plated sampling probes fitted with clear acetate liners. During coring operations, the sampler remains open as it is driven into undisturbed soil over its entire 4-foot sampling interval. After drilling, all exploratory boreholes are grouted according to county regulations

The soil cores are logged by an experienced geologist using the Unified Soil Classification System (USCS), noting in particular, the lithology of the soils, moisture content, and any unusual odor or discoloration. Relatively undisturbed soil samples are obtained for both lithologic logging and laboratory analysis. A portion of individual soil cores are stored in a sealed plastic bags for field screening of hydrocarbons and/or volatile organic compounds by an Organic Vapor Analyzer (Photoionization Detector, PID). Vapor readings in parts per million (ppm) are recorded on the boring logs. The PID is also used during drilling for monitoring the work area for site safety.

All drilling equipment is steam cleaned prior to arriving on-site to prevent possible transfer of contamination from another site. The sampling probe and all other soil sampling equipment are thoroughly cleaned between each sampling event by washing in a Liqui-Nox or Alconox solution followed by a double rinsing with distilled water to prevent the transfer of contamination.

Samples Targeted for Laboratory Analysis: Soil samples targeted for laboratory analysis are immediately protected at both ends with Teflon tape, sealed with non-reactive caps, taped, labeled, and immediately stored in an insulated container cooled with blue ice. A portion of the soil is placed in a baggie and the soil gas is measured using the PID. Groundwater samples are collected after temporary casing is placed in the hole and a minimum of one borehole volume has been purged. Relatively representative groundwater samples are collected with individual disposable acrylic bailers / peristaltic pump / ball and check valve and dispensed directly into containers specifically prepared for the analyses. Once collected, groundwater samples are immediately placed in ice chests cooled with blue ice. Soil and groundwater samples are then transported to a State-certified laboratory under appropriate chain-of-custody documents

Field Methodology for:
Hollow Stem Auger Drilling and Monitoring Well Installation

This appendix describes the methods employed in hollow stem auger drilling for soil and groundwater investigations and/or monitoring and/or remediation well installations. Included are specifications for borehole drilling and soil sampling procedures, and the conversion of boreholes into monitoring wells, piezometers, sparge wells, vapor monitoring, and /or vapor extraction wells. Fieldwork tasks comply with standards set in the State Water Resources Control Board's Leaking Underground Fuel Tank Manual (LUFT Manual, 1989).

Borehole Drilling and Soil Sampling Procedures: Exploratory borehole(s) locations are determined based on data from previous investigation(s), local and regional groundwater flow direction, surface topography, underground utilities, overhead utilities and obstructions, property lines, and structures.

The exploratory boreholes are drilled using a truck-mounted drill rig equipped with eight-inch diameter hollow-stem augers. Soil samples are obtained for lithologic logging of native materials and laboratory analysis. The retrieved soil is logged by an experienced geologist using the Unified Soil Classification System (USCS). Soil samples are collected above groundwater and at the soil-groundwater interface. An Organic Vapor Analyzer (OVA) is used during drilling operations for site safety purposes and for on-site interpretation of potential "hot-spots". Vapor readings in parts per million (ppm) are recorded on the boring logs.

The samples are collected by advancing the boring to a point immediately above the sampling depth and driving a modified-California split-spoon sampler into relatively undisturbed soil through the center of the drill augers. The sampler contains three separate six-inch brass sleeves that are driven into undisturbed soils by a standard 140-pound hammer that is repeatedly dropped from a height of 30 inches. The number of blows required to drive the sampler each successive 6-inches is recorded to evaluate the relative consistency of the soil. When driving the split-spoon sampler is complete, the driller advances the auger flight over the split-spoon sampler, thus freeing the sampler to be retrieved. Drilling cuttings are continuously observed and materials retrieved from the sampler are logged by the field geologist. Three brass sleeves are retained from the modified-California split-spoon sampler at 5-foot intervals. The soil sleeves are retained for the following purposes:

- One sleeve is protected at both ends with Teflon tape, sealed with non-reactive caps, taped, labeled, and immediately stored in an insulated container cooled with blue ice. Selected samples (generally at least one per borehole, though soil samples may not be analyzed from borings for remediation wells at well characterized sites) are transported under appropriate chain-of-custody documentation to a State Certified laboratory for analysis specific to the investigation.

- The second sample is extracted from its brass liner and stored in a sealed plastic bag so that it may be screened by the portable OVA for hydrocarbon odors and/or volatile organic compounds.

- The third sample is also extracted from its brass liner and used to describe the subsurface lithology at the specific sampling depth. The retrieved soil is logged by an experienced geologist using the USCS criteria for soil description.

Soil cuttings are either (1) stockpiled on, and covered with, plastic sheeting to eliminate aeration of potentially contaminated soil, or (2) containerized in 55-gallon steel drums. Soil cuttings from drilling operations are disposed of under proper hazardous waste manifest(s) in landfills capable of accepting the appropriate waste type and contaminant concentration.

Conversion of Borehole(s) into Well(s): The boreholes are converted into groundwater monitoring wells, piezometers, sparge wells, vapor monitoring, and /or vapor extraction wells by installing threaded schedule 40 PVC well casing of the appropriate diameter (dependant upon well type). A predetermined portion of the well casing is constructed of machine-slotted sections, which allow for the flow of groundwater and/or soil vapor/air into and out of the well casing. The size of the machined slots (measured in 100thsof inches) is determined by the grain size of the native materials encountered during drilling and by the well's intended use. The well casing is lowered into the borehole through the hollow stem augers and the annular space adjacent to the screened interval is slowly backfilled with sand (sand size is determined by the slot size noted above). A weighted measuring tape with the appropriate graduations (feet and 10ths of feet) is used to prevent bridging of the annular material and to insure that the well is constructed according to the predetermined construction specifications. The annular sand (or filter pack) is extended one to two feet above the top of the screened interval. A two-foot thick bentonite seal is placed above the sand and the remaining annular space is back filled with cement slurry to prevent the inflow of surface water. The wellhead is fitted with a locking watertight plug and is encased in a traffic-rated vault to protect against damage and unauthorized access.

Well Development and Groundwater Sample Collection: Weber, Hayes and Associates' groundwater monitoring field methodology is based on procedures specified in the LUFT Field Manual. The first step in groundwater well sampling is for Weber, Hayes and Associates field personnel to measure the depth-to-groundwater to the nearest hundredth (0.01) of a foot with an electric sounder. If the well appears to be pressurized, or the groundwater level is fluctuating, measurements are made until the groundwater levels stabilize, and a final depth-to-groundwater measurement is taken and recorded. After the depth-to-groundwater is measured, the well is then checked for the presence of free product with a clear, disposable polyethylene bailer. If free product is present, the thickness of the layer is recorded, and the product is bailed to a sheen. All field data (depth-to-groundwater, well purge volume, physical parameters, and sampling method) is recorded on field data sheets. Because removing free product may skew the data, wells that contain free product are not used in groundwater elevation and gradient calculations.

After measuring the depth-to-groundwater, a surge block is used to physically swab the wells entire screened interval a minimum of 50 strokes in order to remove fines for the sand pack and promote gradation between the surrounding formation and the sand pack. Following well swabbing a minimum of 10 well volumes is purged with a low flow submersible electric pump. During purging the physical parameters of temperature, conductivity, pH, dissolved oxygen (D.O.) concentration, and Oxidation-Reduction Potential (ORP) of the purge water are monitored with a QED MP20 Micropurge Flow Through Cell equipped meter to insure that these parameters have stabilized (are within ~ 15 percent of the previous measurement). The QED MP20 meter is capable of continuously monitoring the physical parameters of the purge water via the flow through cell and providing an alarm to indicate when the physical parameters have stabilized to the users specifications. Purging is determined to be complete (stabilized aquifer conditions reached) after the removal of approximately ten well volumes of water or when the physical parameters have stabilized. Dissolved oxygen and ORP measurements are used as an indicator of intrinsic bioremediation within hydrocarbon plumes. All field instruments are calibrated before use.

All purge water is stored on site in DOT-approved, 55-gallon drums for disposal by a state-licensed contractor pending laboratory analysis for fuel hydrocarbons.

After purging, the water level in the well is allowed to recover to 80 percent of its original depth before a sample is collected. After water level recovery, a groundwater sample is collected from each well with a new, disposable bailer, and decanted into the appropriate laboratory-supplied sample container(s). The sample containers at this site were 40-ml. vials. Each vial was filled until a convex meniscus formed above the vial rim, then sealed with a Teflon®-septum cap, and inverted to insure that there were no air bubbles or head space in the vial. All samples are labeled in the field and transported in insulated containers cooled with blue ice to state-certified laboratories under proper chain of custody procedures.

All field and sampling equipment is decontaminated before, between, and after measurements or sampling by washing in a Liqui-Nox and tap water solution, rinsing with tap water, and rinsing with distilled water.

Equipment Decontamination and Decontamination Fluid Containerization Procedures: All drilling equipment is steam cleaned prior to arriving on-site to prevent the transfer of contamination from another site. Accordingly, all drilling equipment is steam cleaned between boreholes (if applicable) and at the end of drilling operations to prevent the transfer of contamination to another site. The drill augers, all soil sampling equipment, and groundwater sampling and/or measurement equipment is thoroughly cleaned between each sampling run with a Liqui-Nox® or Alconox® solution followed by a double rinsing with distilled water to prevent transferring contamination vertically.

All cleaning rinsate, wash water, and other fluids or solids produced during the drilling process are containerized on-site in 55-gallon steel drum(s), and/or are disposed of under proper hazardous waste manifest(s) to an appropriate recycling facility with the capacity to accept the type and concentration of contaminant(s).

Appendix C

Site Health & Safety Plan

SITE HEALTH & SAFETY PLAN
Drilling Program

This Site Health and Safety Plan has been prepared pursuant to the California Occupational Health and Safety Administration Title 8, Section 5192 *Hazardous Waste Operations and Emergency Response* and the U.S. Occupational Health and Safety Administration 29 CRF 1910.120, *Hazardous Waste Operations and Emergency Response*

Job Name /Job Number: Former Exxon Station
Client: Mr. Lynn Worthington, c/o: Golden Empire Properties, Inc.

Site Location: 3055 35th Avenue, Oakland
Type Of Facility/Current Usage Of Property: Former Fueling Facility, currently vacant with no improvements (generally bare earth)

Subcontractors On Site:

Hydraulic Driven Probe Operator
Environmental Control Associates
Contact: Tim Tyler, President (831) 662-8178

Licensed C-57 Well Drilling
Exploration Geoservices, Inc
Contact: Bruce McCall, President : (408) 280-6822

Regulatory Agencies:

Local & Lead Regulatory Agency:

Alameda County Environmental Health (ACEH)
1131 Harbor Bay Parkway
Alameda, California 94502
Case Officer: Barbara Jakub, P.G
Phone Number: (510) 639-1287

Scope of Work:

Hydraulic Driven Probe Drilling & Sampling: A hydraulic driven direct push Geoprobe drill rig will advance proposed borings DP-1 through DP-9 at locations shown on Figure 2 of this report. Fieldwork will be conducted according to our Field Methodology for Hydraulic Driven Probes, which is presented as Appendix B of this report. Soil samples will be continuously cored in approximate 4-foot intervals to depths of approximately: 1) 30 feet bgs in off-site borings DP-1 through DP-3 to vertically profile any potential soil contamination and to collect grab groundwater samples, and 2) 20 feet bgs in the on-site borings (DP-4 through DP-9) to vertically profile residual soil contamination. An experienced geologist will carefully log the continuously cored borings and a Photoioniztion Detector (PID) will be used to monitor potential volatile organic vapors.

Hollow Stem Auger Drilling and Monitoring Well Installation: Monitoring Well Installation will follow our standard *Field Methodology for Hollow Stem Auger Drilling and Monitoring Well Installation*, which is included in Appendix B of this report. One to two monitoring wells will be installed by a licensed C-57 drilling subcontractor and will be constructed of 2-inch PVC casing with approximately 10-feet of 0.010-

inch slot screen placed so the screened section extends across stabilized groundwater (approximately 25 feet deep).

All investigative wastes will be properly containerized, temporarily stored at the Site and disposed of following this field investigation.

Key Field Personnel:

(OSHA training for Hazardous Waste Operations is required on this job)

Jered Chaney – Weber, Hayes and Associates	Environmental Geologist & Site Safety Officer	Office: (831) 722-3580 Cell: (831) 254-1747
Jeff Edmond – ECA	Driven Probe Subcontractor	Cell: (831) 254-1111
John Collins - EGI	Hollow Stem Auger Drilling Subcontactor	Cell: (408) 483-9026

Site Tasks:

- Utility locating and marking
- Hydraulic driven probe drilling to depths up to 30 feet below the ground surface
- Soil and groundwater sampling
- Hollow stem auger drilling and well installation; drilling to depth up to 25-20 feet bgs

Anticipated Physical Hazards:

- **Traffic:** Street traffic; to be mitigated with use of appropriate traffic control and safety devices provided by a professional traffic control subcontractor
- **Heavy Equipment:** Potential physical hazards associated with heavy equipment and noise of the drill rigs will be mitigated with proper class D PPE and exclusion of personnel other than the operator from the vicinity of drill rig
- **Underground Hazards:** Utilities to be cleared by Underground Service Alert (USA) and a private utility locator

Anticipated Chemical Hazards:

Name (CAS # if applicable)	EXPECTED CONCENTRATION ✔Soil ✔ Water ☐ Air	HEALTH EFFECTS
TPH-gas and VOC constituents	Moderate to low-level concentrations anticipated; specifically unknown at this time	**See ATTACHED NIOSH information Sheets**

Medical Surveillance:

Medical surveillance practices for all on-site employees will be maintained in accordance with Title 8 California Code of Regulations, Section 5192(c)(4)(B)

Site Control Measures:

Ingestion Exposure & Control Measures:

- Ingestion of impacted materials is a primary exposure route of concern. This exposure pathway can be controlled with the implementation of proper hygienic practices (i.e., wearing gloves and washing before eating, smoking, or using the restroom).

Traffic Control Measures (pedestrian and vehicle):

- The majority of will be taking place within the fenced subject Site. Appropriate traffic control and safety devices will be provided by a professional traffic control subcontractor for work being conducted in the public right of way.

Decontamination Procedures:

- All equipment in contact with contaminated or potentially contaminated soils will include a triple rinse with liquinox solution/ fresh water / D.I. water. All decon water will be properly containerized and properly disposed of following the field investigation.

Personal Protective Equipment:

(see required Personal Protective Equipment below).

Based on the scope and nature of this field program the following aappropriate level of personal protective equipment is required A: ☐ B: ☐ C: ☐ D ✔

R = required, A = As needed

Hard Hat **A**	Eyewear (type) **A**
Safety Boots **A**	Respirator (type) **A** *(½-face minimum)*

Orange Vest **A**	Filter (type) **A** (organic vapor & particulate)
Hearing Protection **A**	Gloves (type) **A** nitrile
Tyvek Coveralls **A**	

Site Monitoring:

A PID with a lamp of 10.2 ev will be used to periodically monitor the air quality on the work zone. PID reading of 100 parts per million in the breathing zone for more than 1 minute will require donning of Level C equipment - which includes ½-face respirators, goggles, and chemical resistant gloves – **NOT ANTICIPATED.**

Personnel monitoring will be conducted by means of the "buddy system". Appropriate precautions and/or medical/emergency response will be implemented if signs of co-worker distress or fatigue are apparent or injury occurs.

Confined Space Entry Procedures:

Confined space entry is not a component of this field investigation.

Emergency Response:

Appropriate level D PPE will be donned on an as needed basis to mitigate potential physical hazards.

In the event of minor physical injury, appropriate first aid will be administered and worker transport to the emergency room, if necessary. In the event of significant physical injury beyond the level of first aid response, emergency response personnel will be contacted immediately by calling 911 from the nearest land-line.

Hospital Directions: See Attached Map

Hospital/Clinic: Dominican Hospital
1411 East 31st Street,
Oakland, CA 94602 – (510) 437-4800
(See attached directions sheet)

Fire Department Phone Number: *911*
Paramedic Phone Number: *911*
Police Department Phone Number: *911*

Site Hazard Information Provided By: Jered Chaney – Site Safety Officer

_______________________________ Date:
Jered Chaney, Site Safety Officer

Note: All contractors and authorized visitors to the site are responsible for maintaining their safety using standard of care construction site safety procedures. This site safety plan is designed to provide worker right to know information on site contaminants of concern and a generic due diligence overview of safety issues. Neither the professional activities of Weber, Hayes and Associates, nor the presence of Weber, Hayes and Associates employees and subcontractors, shall be construed to imply Weber, Hayes and Associates has any responsibility for methods of work performance, superintendence, sequencing of construction, or safety in on or about the job site.

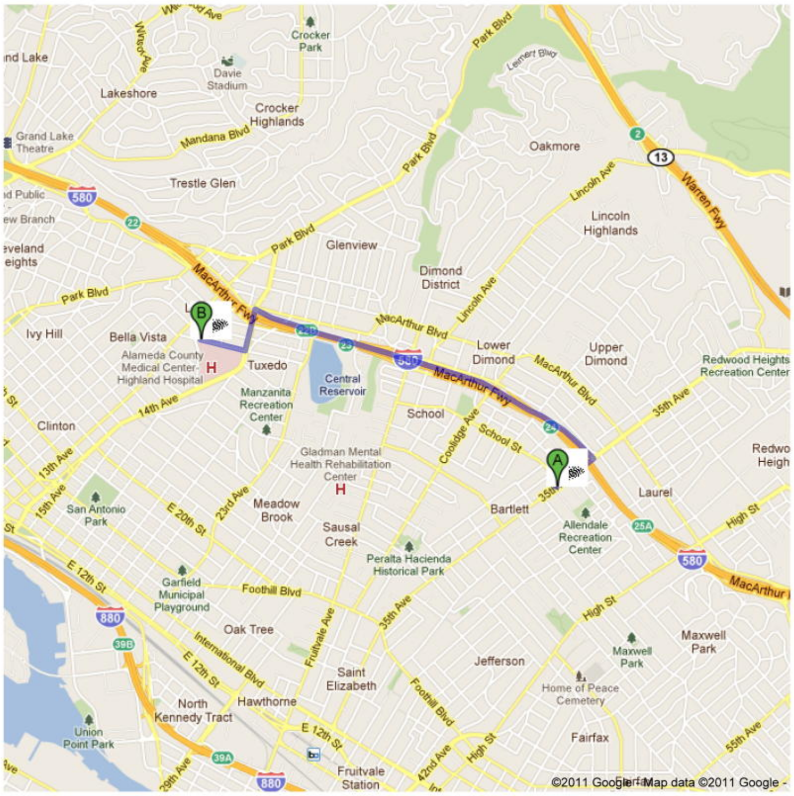
PRINT NAME & INITIAL FOLLOWING TAILGATE MEETING AND SAFETY INSPECTION:

____________________	____________________	____________________
____________________	____________________	____________________
____________________	____________________	____________________
____________________	____________________	____________________

Hospital Map/Directions

Google maps

Directions to 1411 E 31st St, Oakland, CA 94602
2.1 mi – about **5 mins**
Alameda County Medical Center



3055 35th Ave, Oakland, CA 94619

1.	Head **northeast** on **35th Ave** toward **School St**	go 0.2 mi total 0.2 mi
2.	Turn left to merge onto **I-580 W** About 2 mins	go 1.3 mi total 1.5 mi
3.	Take exit **22B** toward **14th Ave/Park Blvd**	go 0.2 mi total 1.8 mi
4.	Turn left onto **Beaumont Ave** About 2 mins	go 0.2 mi total 1.9 mi
5.	Turn right onto **E 31st St** Destination will be on the left	go 0.2 mi total 2.1 mi

1411 E 31st St, Oakland, CA 94602